# LUDDENHAM OPERATIONS PTY LTD
# LUDDENHAM QUARRY

# DA 315-7-2003 (MOD 5) ANNUAL REVIEW

25 SEPTEMBER 2026

Luddenham Operations Pty Ltd

Annual Review for the Luddenham Quarry

DA 315-7-2003 (MOD 5), Schedule 6, Condition 5

# REVISIONS

| Revision | Date | Prepared by | Reviewed by | Revision Comments |
|---|---|---|---|---|
| 00 | 17 September 2026 | Elena Ivanova | Pascal Bobillier | Draft for internal review |
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# 1 INTRODUCTION

Luddenham Operations Pty Ltd operates the shale/clay quarry (the site), which is approved to extract and transport up to 300,000 tonnes (t) per annum of clay and shale products in accordance with State Significant Development Consent DA 315-7-2003 (MOD 5). The site is located at 275 Adams Road, Luddenham, NSW and operates in accordance with the Environmental Protection Licence (EPL) 21562.

In accordance with Schedule 6, Condition 5 of DA 315-7-2003 (MOD 5), this Annual Review assesses the environmental performance of the site between the reporting period of 1 September 2025 to 31 August 2026.

Quarry extraction ceased in late December 2024, and site rehabilitation has been undertaken since January 2025 in accordance with the Site Rehabilitation Strategy outlined in the Site Rehabilitation Plan. Construction of the new recycling facility (SSD-10446), located immediately north of the quarry, commenced in May 2025. Construction of the recycling facility is expected to be completed in December 2026.

As part of the rehabilitation works, the following key activities were carried out during the reporting period:

- Previously stockpiled product and overburden materials were progressively removed from the quarry site to make room for future rehabilitation activities.

# 2 CONDITIONS OF CONSENT

*Table 2-1: Condition of Consent and location within the Annual Review*

| Schedule | Conditions | Description | Report Location |
|---|---|---|---|
| Schedule 3 | 8 | The Applicant must provide annual production data to the [Regional NSW – Mining, Exploration and Geoscience] MEG, in the manner required, on the standard form supplied for that purpose. These data are also to be included in the Annual Review. | Section 3.1 |
| Schedule 4 | 11 | The Applicant must regularly consult with adjoining property owners to ensure property management issues including maintenance of common fences, weed control measures, and bushfire management are coordinated. Details of this consultation are to be reported in the Annual Review. | Section 3.2 |
| Schedule 4 | 21B | The Applicant must report on water extracted from the site each year (direct and indirect) in the Annual Review, including water taken under any water licence. | Section 3.63.6.1 (vi) |
| Schedule 4 | 30(e) | Report on waste minimisation and management in the Annual Review. | Section 3.3 |
| Schedule 4 | 42(b) | Procedures for monitoring of product transport, including keeping of accurate records of all laden truck movements to and from the site (including time of arrival and dispatch) and publishing a summary of these records in the Annual Review. | Section 3.4 |
| Schedule 6 | 5(a) | **By the end of September 2016 and each year following, or other timing as may be agreed by the Planning Secretary, the Applicant must review the environmental performance of the development to the satisfaction of the Planning Secretary. This review must:**<br>• describe the development (including rehabilitation) that was carried out in the previous calendar year, and the development that is proposed to be carried out over the current calendar year | Section 3.5 |
| Schedule 6 | 5(b) | • include a comprehensive review of the monitoring results and complaints records of the development over the previous calendar year, which includes a comparison of these results against:<br>– the relevant statutory requirements, limits or performance<br>– measures/criteria<br>– the monitoring results of previous years | Section 3.6 |

| Schedule | Conditions | Description | Report Location |
|---|---|---|---|
| | | – the relevant predictions in the document/s listed in condition 2 of Schedule 3 | |
| Schedule 6 | 5(c) | • identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance | Section 3.4.5<br>Section 3.11 |
| Schedule 6 | 5(d) | • identify any trends in the monitoring data over the life of the development | Section 3.6 |
| Schedule 6 | 5(e) | • identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies | Section 3.4.6<br>Section 3.6 |
| Schedule 6 | 5(f) | • describe what measures will be implemented over the current calendar year to improve the environmental performance of the development. | Section 3.4.7<br>Section 3.9 |
| Schedule 6 | 6 | Copies of the Annual Review must be made available to Council and any interested person upon request. | Section 3.10 |
| Schedule 6 | 15(a) | From 30 September 2016 and for the duration of the development, the Applicant must:<br>• make copies of the following publicly available on its website:<br>– the document/s listed in condition 2 of Schedule 3<br>– current statutory approvals for the development<br>– approved strategies, plans and programs required under the conditions of this consent<br>– a comprehensive summary of the monitoring results of the<br>– development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs<br>– a complaints register, which is to be updated monthly<br>– the Annual Reviews of the development (for the last 5 years)<br>– any Independent Environmental Audit of the development, and the Applicant's response to the recommendations in any audit<br>– any other matter required by the Planning Secretary | Section 3.11.1 |
| Schedule 6 | 15(b) | – keep this information up to date, to the satisfaction of the Planning Secretary. | Section 3.11.2 |

# 3 ANNUAL REVIEW CONDITIONS REQUIREMENTS

## 3.1 Mining, exploration and geoscience reporting

Quarry extraction activities ceased on 20 December 2024, and no extraction or processing of clay or shale material was undertaken during the reporting period. Annual production reporting requirements for Regional NSW – Mining, Exploration and Geoscience have been lodged accordingly. Activities during the reporting period were limited to site rehabilitation works, environmental monitoring, and the management and removal of previously extracted stockpiled material.

*Table 3-1: Lease details*

| Lease Details | Description |
|---|---|
| Lease name | Mining Lease (ML) 1816 (1992) |
| Return type | Non-coal Mineral Annually (01/07/2023 – 30/06/2024) |
| Mineral/extraction | CLAY SHALE/ STRUCTURAL CLAY |
| Royalty regime | Quantum Royalty |
| Royalty rate | $0.35 per tonne |

*Table 3-2: Royalty*

| Royalty | Tonnes | Australian Dollars ($AUD) |
|---|---|---|
| **Productions** | | |
| Ore produced | | |
| Concentrates produced | | |
| Export sales | | |
| Local sales and other disposals | 0 | 0.00 |
| Purchases | | |
| Net disposals | 0 | 0.00 |
| Closing stock | | |
| Opening stock | | |
| Minerals recovered | 0 | 0.00 |
| **Deductions** | | |
| Gross invoice value of contained mineral | | |
| Invoiced off-site concentrate treatment charges | | |
| Minerals recovered | | 0.00 |
| Direct on-site treatment expenses | | |
| Realisation | | |
| On-site administration | | |
| Depreciation | | |
| Total deductions | | |
| Ex mine value | | 0.00 |
| | Royalty Due | 0.00 |

## 3.2 Stakeholder consultation

Continued consultation with surrounding sensitive receivers will be completed when required in accordance with Schedule 4, Condition 11 and the Environmental Management Strategy (EMS) (EMM 2021). Compliance against project requirements in shown in Table 3-3.

*Table 3-3: Stakeholder consultation*

| Item | Requirement | Luddenham Operations Comments |
|---|---|---|
| 1 | Luddenham Operations will regularly consult with adjoining property owners to ensure property management issues including maintenance of common fences, weed control measures, and bushfire management are coordinated. Details of this consultation will be reported in the Annual Review. | No formal consultation undertaken this year – no issues raised by neighbours. Fences are all in good condition and no issues with weeds, noise and dust have been raised. |
| 2 | General enquiries from the local community will be recorded in a community engagement register, which will also include any copies of formal correspondence, and responded to by the site environmental representative or operations manager within 5 days of the enquiry. | No enquiries submitted from the public this year. |
| 3 | Luddenham Operations will consult with the wider local community on an 'as needs' basis. The need for this wider consultation will be determined based on queries or complaints made to the quarry. | As no queries and/or complaints were received within the reporting period, wider local community consultation was not considered necessary. |

## 3.3 Waste management

Due to the nature of on-site activities undertaken during the reporting period, no waste was generated from the quarrying rehabilitation activities. Only quarry material extracted up to December 2024 was removed from site during the reporting period.

Minor amounts of general waste were produced by employees (i.e. lunch scraps and etc.) which were disposed of in co-mingle waste bins and removed under general council practices.

## 3.4 Traffic and material movement procedures

In accordance with Schedule 4, Condition 42 (b) Luddenham Operations have developed a Road Transport Protocol (EMM 2021) which outlines procedures for monitoring of product transport, including keeping of accurate records of all laden truck movements to and from the site (including time of arrival and dispatch).

The transportation and recording of material, including incidents and reporting, must comply with the procedures outlined within the Luddenham Quarry Road Transport Protocol (EMM 2021). Sections 3.4.1 to 3.4.7 of the Protocol detail elements specific to traffic management.

The Road Transport Protocol (EMM 2021) is available at the project webpage: https://luddenhamquarry.com.au/.

### 3.4.1 Amendments to statutory approvals

No amendments were made to statutory approvals during the reporting period.

### 3.4.2 Total material haulage during the reporting period

During the Annual Review period, a total of 102,863.17 tonnes of material excavated prior to 31 December 2024 was hauled from the site. In accordance with Condition 8A of Schedule 3 (DA 315-7-2003 MOD 5), a maximum of 300,000 tonnes of quarry products may be transported from the site in any calendar year. The quantity of material hauled during the reporting period remained well below the approved annual limit. Accordingly, no exceedance of the annual transport limit occurred during the reporting period.

### 3.4.3 Summary of heavy vehicle movements

Heavy vehicle movements, comprising a total of 6306 loads, generally complied with the Luddenham Quarry Road Transport Protocol (EMM 2021). All quarry trucks access the site from the north and travel north on leaving the site. The most northerly 280 metre (m) long section of Adams Road is the only section of road used by quarry trucks. Figure 3-1 shows a summary of the truckloads exporting material from the site. The site traffic monitoring records are provided in Appendix A of this report.

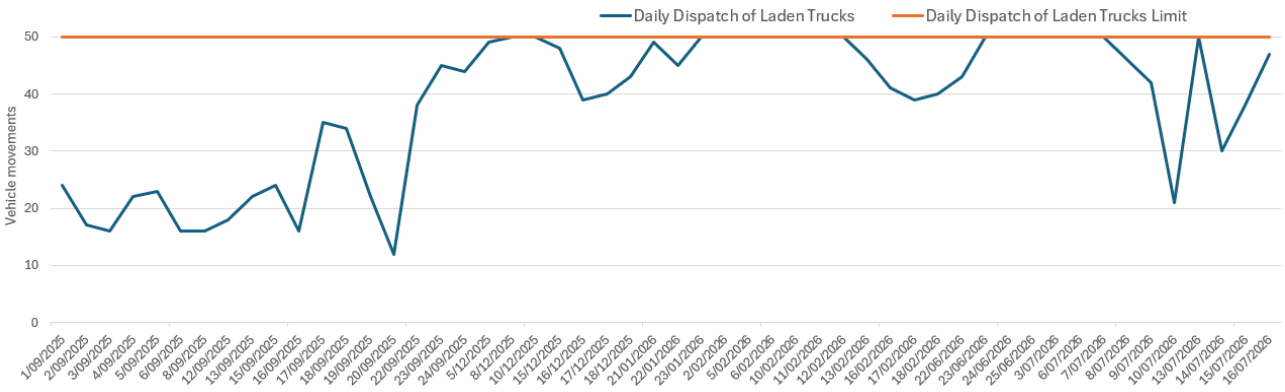



*Figure 3-1: Annual laden truck movement summary*

During the 2025–2026 monitoring period, truck movements did not exceed the maximum daily truck movement limits specified in Condition 8B of Schedule 3 of Development Approval DA 315-7-2003 MOD 5.

### 3.4.4 Summary of complaints or incidents

No complaints or incidents associated with quarrying activities were recorded or reported during the reporting period.

### 3.4.5 Non-compliance and remedial actions

No non-compliance relating to truck loads per day was recorded during the reporting period and hence no actions required to ensure compliance.

### 3.4.6 Discrepancies between predicted and actual impacts of operations and potential cause

No discrepancies between the predicted and actual impacts of operations were identified.

### 3.4.7 Summary of management actions to be implemented

Over the next year, management will implement actions, including an internal review of the approved development consent conditions related to the environmental performance of the site, to ensure that monitoring and rehabilitation activities remain fully compliant. It is noted that a resource recovery facility has been approved on site directly north of the quarry under a separate development consent (SSD-10446), and traffic movements associated with the quarry will continue to be monitored independently from the resource recovery facility construction and operation stages, in accordance with their respective consents.

## 3.5 Development and rehabilitation

Quarry rehabilitation commenced in January 2025, following the cessation of extraction activities on 20 December 2024.

Over the past 12 months, activities on site included:

- stockpiling of extracted shale material, including overburden materials
- dust mitigation measures
- rehabilitation works including weed control, repair and extension of fencing to riparian areas, removal of stockpiled material from the site, geotechnical assessment of quarry wall stability, and commencement of water dam reconstruction works involving silt removal and reshaping of the basin walls.

Over the next 12 months, activities on site will consist of:

- rehabilitation works including:
  - removal of shale stockpiles, including overburden materials
  - implementing dust mitigation measures
  - implement exclusion zone around the quarry cut faces
  - weed management; and
  - completing the water dam reconstruction work.

Appendix B provides a progressive overview of the site during the reporting period.

### 3.5.1 Geotechnical site inspection

On 21 June 2026, JKGeotechnics conducted an inspection of the quarry to assess the stability of the quarry void cut faces. Due to stockpiled overburden materials, the eastern quarry face was not accessible for inspection.

The inspection identified no evidence of significant or deep-seated instability within the observable quarry faces. However, extensive erosion rills were present across all inspected faces, along with minor localised soil slumping near the crest. A previously identified slump feature on the western quarry face, estimated at approximately 10 $m^3$, showed some further deterioration due to erosion, with material deposited on the quarry face and floor.

JKGeotechnics concluded that the observed conditions are not indicative of large-scale instability. The report recommended maintaining formal exclusion zones extending 5m from the crest and toe of the cut faces, supported by appropriate barriers and warning signage. Annual inspections of the quarry faces should continue, with additional inspections undertaken following significant rainfall events or if evidence of instability, such as slumping or tension cracking, is observed.

## 3.6 Environmental monitoring

The Environmental Monitoring section presents a summary of the monitoring results documented to support the Annual Review (AR) for the period of 1 September 2025 to 31 August 2026.

### 3.6.1 Water

This section outlines water quality monitoring undertaken by EMM Consulting (EMM) as part of the Annual Review. The EMM monitoring reports are provided in Appendix C.

#### i. Monitoring program

A water quality monitoring program was developed for the Soil and Water Management Plan (SWMP) (EMM 2021) for the site. The program commenced in March 2022 and during the annual review period involved quarterly groundwater and annual surface water monitoring.

#### a) Monitoring events

Three quarterly water monitoring events and one annual water monitoring event were undertaken for the Annual Review period. A summary of monitoring events, additional investigation measures and outcomes are provided in Table 3-6 below.

b) Laboratory analytes

Water samples were transported to a NATA-accredited laboratory (Australian Laboratory Services (ALS) in Sydney, NSW for analysis. All laboratory analytes that were not additionally measured in situ (i.e. pH, electrical conductivity (EC), dissolved oxygen and oxidation-reduction potential) were received by the laboratory within the maximum holding times.

c) Quality assurance/quality control

Surface and groundwater samples were collected in laboratory-provided sample containers with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain of custody protocols.

The field QA/QC procedures used to establish accurate, reliable, and precise results included:

- calibration of equipment by the supplier before use
- keeping samples chilled
- submitting laboratory samples within holding times
- wearing fresh disposable nitrile gloves during sampling at each sampling location
- collection of a field duplicate sample.

d) Groundwater monitoring network

A groundwater monitoring bore network was installed before quarrying to understand the hydrogeology at the site and to monitor for potential impacts. Three monitoring bores were drilled and installed to a depth of approximately 30 m into the Bringelly Shale with the overlying unconsolidated material cased off. The monitoring bores were sited with one bore up-hydraulic gradient (BSM1) as a background bore (to the quarry footprint) and two bores down-hydraulic gradient of the pit (BSM2 and BSM3). The two down-hydraulic gradient bores are located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek.

During the 2021–2022 annual review, two sites (BSM1 and BSM2) were reported to be damaged and not producing representative results. It is noted that these sites were replaced with new bores, with the first sampling event from these locations being taken in August 2023.

e) Trigger exceedance criteria

The Soil and Water Management Plan (EMM 2021) outlines water quality trigger values for both surface and groundwater quality monitoring. The surface water quality trigger values are presented in Table 3-4 and groundwater quality trigger values are presented in Table 3-5.

*Table 3-4: Surface water assessment criteria and trigger values*

| Parameter | Units | Trigger Value |
|---|---|---|
| **General** [1] | | |
| pH | - | 6.5-8.5 |
| Electrical Conductivity (EC) [3] | µS/cm | 125-2200 |
| Turbidity | NTU | 6-50 |
| Oil and Grease | mg/L | Above detection |
| **Nutrients** [1] | | |
| Ammonia | µg N/L | 20 |
| Oxidised nitrogen | µg N/L | 40 |
| Total nitrogen | µg N/L | 500 |
| Reactive phosphorus | µg P/L | 20 |

| Parameter | Units | Trigger Value |
|---|---|---|
| Total phosphorus | µg P/L | 50 |
| **Dissolved metals** [2] | | |
| Aluminium | µg/L | 55 |
| Arsenic [4] | µg/L | 13 |
| Boron | µg/L | 370 |
| Cadmium | µg/L | 0.2 |
| Chromium [5] | µg/L | 1.0 |
| Copper | µg/L | 1.4 |
| Iron | µg/L | - |
| Manganese | µg/L | 1900 |
| Nickel | mg/L | 11 |
| Lead | mg/L | 3.4 |
| Zinc | mg/L | 8.0 |

1. The trigger values for general parameters and nutrients refer to the DGVs for physical and chemical stressors in south-east Australia (lowland river) that are reported in Tables 3.3.2 and 3.3.3 of ANZECC (2000) as DGV is not yet defined by ANZG (2018).
2. Dissolved metal trigger values are for slightly to moderately disturbed ecosystems (ANZG 2018).
3. Table 3.3.3 of ANZECC (2000) specifies NSW coastal rivers typically have salinity values in the range of 200–300 µS/cm. The DGV for salinity in lowland rivers is 125–2200 µS/cm as a DGV is not yet defined by ANZG (2018).
4. For AS (V).
5. For Cr (VI).

*Table 3-5: Ground water assessment criteria and trigger values*

| Parameter | Units | Trigger Value |
|---|---|---|
| **General** [1] | | |
| pH | - | 6.5-8.5 |
| Electrical Conductivity (EC) [3] | µS/cm | Comparison with upgradient bore [6] |
| Turbidity | NTU | Comparison with upgradient bore [6] |
| Oil and Grease | mg/L | Above detection |
| **Nutrients** [1] | | |
| Ammonia | µg N/L | Comparison with upgradient bore [6] |
| Oxidised nitrogen | µg N/L | Comparison with upgradient bore [6] |
| Total nitrogen | µg N/L | Comparison with upgradient bore [6] |
| Reactive phosphorus | µg P/L | Comparison with upgradient bore [6] |
| Total phosphorus | µg P/L | Comparison with upgradient bore [6] |
| **Dissolved metals** [2] | | |

| Parameter | Units | Trigger Value |
|---|---|---|
| Aluminium | µg/L | 55 |
| Arsenic [4] | µg/L | 13 |
| Boron | µg/L | 370 |
| Cadmium | µg/L | 0.2 |
| Chromium [5] | µg/L | 1.0 |
| Copper | µg/L | 1.4 |
| Iron | µg/L | - |
| Manganese | µg/L | 1900 |
| Nickel | µg/L | 11 |
| Lead | µg/L | 3.4 |
| Zinc | µg/L | 8.0 |

1. The trigger values for general parameters and nutrients refer to the DGVs for physical and chemical stressors in south-east Australia (lowland river) that are reported in Tables 3.3.2 and 3.3.3 of ANZECC (2000) as DGV is not yet defined by ANZG (2018).
2. Dissolved metal trigger values are for slightly to moderately disturbed ecosystems (ANZG 2018).
3. Table 3.3.3 of ANZECC (2000) specifies NSW coastal rivers typically have salinity values in the range of 200–300 µS/cm. The DGV for salinity in lowland rivers is 125–2200 µS/cm as a DGV is not yet defined by ANZG (2018).
4. For AS (V).
5. For Cr (VI).
6. Parameter known to frequently exceed the DVG. Long term trend comparison to upgradient bore (BSM1) is most appropriate means of assessment.

*Table 3-6: Overview of water completed monitoring*

| Monitoring Event Details | Additional Measures Undertaken | Summary of Outcomes |
|---|---|---|
| **Surface water and groundwater monitoring – 15 October 2025 (Quarter 1).** | Additional redox potential monitoring was undertaken to further characterise groundwater conditions. Results indicate a potential reducing trend, with seasonal variability observed across monitoring locations. | Groundwater levels remained within historical ranges, with elevated levels in BSM2 and BSM3 unlikely to be related to quarry activities. Elevated nitrate and nitrogen concentrations continued in BSM2, with profiling indicating the source is likely at or above the standing water interface.<br>The elevated nutrient concentrations were not observed in the upgradient bore and, given the increasing trend following cessation of quarry operations, appear more likely associated with surrounding land uses than site activities. No oil or grease was detected.<br>Zinc concentrations in BSM2 remained below baseline levels and decreased compared to the previous monitoring round, indicating no adverse trends.<br>Quarry Pit pH was consistent with historical results, confirming the previous low result was anomalous. |
| **Surface water and groundwater monitoring – 13 January 2026 (Quarter 2).** | Additional redox potential monitoring was undertaken to further characterise groundwater conditions. | Groundwater levels in down-gradient bores BSM2 and BSM3 exceeded standing water level trigger values but remained within historical ranges and are unlikely to be related to site activities.<br>Groundwater profiling confirmed elevated nitrate and nitrogen concentrations in BSM2 are concentrated near the standing water interface, with nutrient levels remaining significantly above baseline and trigger values. No similar exceedances were detected in the upgradient bore, and the ongoing increasing trend following cessation of quarry operations suggests the source is unrelated to quarry activities and may be associated with surrounding land uses.<br>No oil and grease were detected, and zinc concentrations remained below baseline levels and decreased compared to the previous monitoring round.<br>Quarry Pit pH was consistent with historical monitoring. |
| **Surface water and groundwater monitoring – 15 April 2026 (Annual).** | Surface water monitoring was undertaken at the upstream, midstream and downstream locations along Oaky Creek. Monitoring locations were accessed where practicable due to construction-related access constraints.<br>Additional redox potential monitoring was undertaken to further characterise groundwater conditions.<br>Additional analysis was undertaken of all surface water and groundwater monitoring locations for targeted hydrocarbon suites to determine potential sources of oil and grease identified in the previous monitoring rounds. | Surface water quality remained generally consistent with historical monitoring results. pH levels were within the historical range and indicated slightly alkaline conditions.<br>Elevated electrical conductivity was recorded at the upstream and downstream locations, representing the highest values on record, while the quarry pit and midstream locations remained within historical ranges. Dissolved oxygen concentrations indicated aerobic conditions at all locations and were higher in the quarry pit, midstream and downstream locations than at the upstream location. No site-related impacts on surface water quality were identified.<br>Groundwater profiling at BSM2 confirmed elevated nitrate and nitrogen concentrations are associated with shallow groundwater. Nutrient levels remained significantly above baseline in BSM2 but were not detected in the upgradient bore, indicating the source is unlikely to be related to quarry activities. Copper, manganese and zinc concentrations were within historical ranges, and detected hydrocarbons in BSM3 were attributed to natural biogenic sources rather than site operations. |

| Monitoring Event Details | Additional Measures Undertaken | Summary of Outcomes |
|---|---|---|
| | | Hydrocarbons detected in BSM3 were attributed to natural biogenic sources, with TRH, TPH and oil and grease not detected at concentrations indicative of site-related impacts. |
| **Surface water and groundwater monitoring – 1 July 2026 (Quarter 4).** | Mann-Kendall trend analysis was undertaken as part of this monitoring round.<br>Additional redox potential monitoring was undertaken to further characterise groundwater conditions. | Groundwater levels in BSM2 and BSM3 remained above trigger values but were within historical ranges and are unlikely to be related to quarry activities. Groundwater quality was generally consistent with historical conditions, with pH remaining within the expected range and no oil and grease detected.<br>Elevated nitrate and nitrogen concentrations persisted in BSM2, with nitrate concentrations among the highest recorded and significantly above baseline and trigger values. Nutrient exceedances were not observed in the upgradient bore, suggesting the source is external to quarry operations. Trend analysis identified increasing trends in total and oxidised nitrogen at BSM2, while BSM3 exhibited a decreasing trend in total nitrogen. Reactive phosphorus was marginally above the detection limit and showed decreasing trends in both downgradient bores.<br>Zinc was reported below baseline concentrations for BSM2. The reported concentration for zinc in BSM2 was within historical ranges. No statistically significant trend was identified at BSM2 for concentrations of manganese. |

### ii. Surface water quality exceedances

During the reporting period, the following receiving water downstream/impact site exceedances were noted:

- Ammonia exceeded the trigger value at the upstream, downstream/impact site. However, poorer water quality at the upstream/control site suggests that the quarry is not the source of the exceedance.
- Oxidised nitrogen, total nitrogen and total phosphorus exceeded trigger values at selected surface water monitoring locations. Elevated nutrient concentrations were also observed upstream of the site, suggesting influences from background conditions and/or surrounding land uses rather than site activities.
- Manganese concentrations were detected throughout the receiving environment, including upstream, midstream and downstream locations of Oaky Creek, and were generally higher than concentrations recorded in the Quarry Pit.

Surface water metals concentrations were generally low across the monitoring locations, with most analytes either below detection limits or detected at very low concentrations

- Copper (0.002 mg/L), nickel (0.005 mg/L) and selenium (0.026 mg/L) were detected in the Quarry Pit but were not detected in upstream, midstream or downstream location Oaky Creek.
- Aluminium (0.02 mg/L) and zinc (0.008 mg/L) were detected at low concentrations in the midstream location of Oaky Creek, while iron (0.06 mg/L) were detected at low concentrations in the downstream location of Oaky Creek. Arsenic was detected at low concentrations in the upstream location of Oaky Creek (0.001 mg/L) only.
- All other metals were below laboratory detection limits in Oaky Creek and the Quarry Pit.

The observed concentrations are consistent with natural background variability and do not indicate a site-related impact. Additionally, no discharge occurred from the site water management system during this reporting period.

### iii. Groundwater levels

Key observations of groundwater levels during the reporting period include:

- Groundwater levels in bores BSM1, BSM2, and BSM3 remained within the historical range observed since monitoring began in March 2022. Exceedances of the 2m standing water level (SWL) trigger, as defined in the Water Management Plan (EMM 2021), were recorded at SSM2 and BSM3. All three wells have reported relatively stable STLs since May 2025. This represents an increase and thus part of the TARP triggers relating to distance drawdown effects are not applicable.
- No further action is required, and groundwater levels will continue to be monitored as part of the ongoing monitoring program.

### iv. Groundwater quality exceedances

#### a) Toxicants

Groundwater quality was monitored at three (3) bores (BSM1, BSM2, BSM3) and assessed against baseline data, trigger values, and upgradient control conditions in accordance with the Soil and Water Management Plan (EMM, 2021). Metals concentrations were generally low across the groundwater monitoring network, with most analytes either not detected or present at very low concentrations.

- Zinc was consistently detected at low concentrations in BSM2 (0.022 to 0.039 mg/L) and remained within historical ranges.
- Nickel was intermittently detected in BSM2 at low concentrations (0.009 to 0.010 mg/L).
- Copper, selenium, chromium, cadmium, lead and mercury were generally below detection limits in groundwater bores, while isolated detections of arsenic, boron and iron in BSM1 were comparable with historical results.

Overall, the metals results do not indicate a deteriorating trend in groundwater quality or evidence of widespread metal contamination associated with quarry activities.

Surface water monitoring in Oaky Creek and the Quarry Pit identified occasional metal detections and trigger value exceedances. These results were generally isolated to individual sampling locations, were not reflected in

groundwater monitoring results, and were within historical ranges. The observed concentrations are consistent with natural background variability and do not indicate a site-related impact.

b) Oil and grease

Additional analysis was undertaken in April 2026 to assess source of the oil and grease detections including surface water locations and additional analysis of hydrocarbon suites to assess the composition of the detected oil and grease concentrations.

- Oil and grease were reported at concentrations less than the LOR.
- Detectable concentrations of TRH (C16-C34 of 620 micrograms per litre (µg/L)) and TPH (C10-C14 of 60 µg/L and C15-C28 of 640 µg/L) were observed in BSM3; however, no hydrocarbons were reported above detection limits following silica gel clean-up. This indicates the reported hydrocarbons are likely derived from naturally occurring biogenic sources.

c) Physico-chemical properties

A review of water quality results from the monitoring bore network (BSM1, BSM2 and BSM3) showed water quality for some analytes that are not consistent with baseline data trends, notably:

- Salinity, as indicated by electrical conductivity (EC) remained within historical ranges across the groundwater monitoring network. BSM2 and BSM3 continued to exhibit elevated salinity relative to the upgradient bore (BSM1), consistent with previous monitoring. EC concentrations in BSM1 showed a continued decreasing trend during the reporting period, reducing from 23,336 µS/cm in March 2025 to 2,564 µS/cm in July 2026. This trend may indicate freshwater ingress and/or an imperfect bore casing seal. Surface water EC values within Oaky Creek and the Quarry Pit were variable but generally consistent with historical monitoring results, with elevated EC recorded at the upstream and downstream Oaky Creek locations during April 2026.
- pH was recorded as slightly acidic to circumneutral (6.66 to 6.99) in the three-groundwater monitoring bores sampled.
- Nutrient results indicate distinct groundwater conditions across the monitoring network. Nitrate concentrations in BSM2 remained significantly elevated above baseline levels and continued to show an increasing trend, with the highest concentrations (495 mg/L) recorded since March 2025. In contrast, nitrate concentrations in the upgradient bore (BSM1) and downgradient bore (BSM3) remained low and within historical ranges. Ammonia concentrations were generally stable within historical ranges, with elevated concentrations consistently observed in BSM3. Nitrite concentrations were predominantly low across the monitoring network, although intermittent elevated concentrations were recorded in BSM2. The spatial distribution of nutrients suggests the elevated nitrate concentrations are localised to BSM2 and are not reflected across the broader groundwater monitoring network. The source of the nitrate is unknown, with nearby sources potentially comprising fertiliser on nearby agricultural, country club and/or adjacent Western Sydney International Airport (WSI) land.
- Manganese concentrations were consistently elevated in BSM2 compared to the upgradient bore (BSM1) but remained within the historical range of recorded results. Concentrations fluctuated throughout the monitoring period, with the highest concentration (3.48 mg/L) recorded in March 2025 and 3.37 mg/L reported in July 2026. Manganese concentrations in BSM3 remained low and comparable to background conditions.
- Total phosphorus concentrations exceeded the trigger value (0.05 mg/L) at all monitoring bores on various occasions. The most significant exceedances occurred in BSM1 and BSM2 during 2023-2024, while more recent exceedances were generally minor. Concentrations have reduced substantially since 2024 and remained relatively low and stable during 2025-2026, with no evidence of an increasing trend across the monitoring network.

It is suspected that the monitoring well network may be influenced by:

- monitoring well installation processes (for reconstructed bores BSM1 and BSM2)
- surface water ingress or potentially alluvial inflow, or

- potential off-site sources include the use of fertilisers for the establishment and management of ground cover at WSI.

v. Monitoring program recommendations

Considering the baseline data trends, physical and chemical results in the whole well network (both upgradient and downgradient) and results of additional investigative monitoring, it is unlikely that exceedances are related to operations at the quarry. The following recommendations are made for future monitoring rounds:

- Should repairs to BSM1 not result in a return to baseline salinity levels, analysis of anions and cations, in addition to the existing analytical suite, would provide a better understanding of the reported salinity (measured by electrical conductivity) and nutrient results.
- Collation and review of Redox potential results should continue to assess time-series trends across the site.
- The annual Mann-Kendall trend assessment for analytes exceeding trigger values should be undertaken as part of the July monitoring round.

vi. Water extraction, usage and discharge

Luddenham Operations is required to report on water extracted and discharged from the site during the reporting period in accordance with Schedule 4, Condition 21(b). Water balance modelling undertaken by EMM Consulting Pty Ltd (EMM) to support this Annual Review is provided in Appendix D. A summary of water use during the reporting period is presented in Table 3-7.

*Table 3-7: Summary of water use September 2024 – August 2025*

| Project Location | Volume | Comments | Water licensing |
|---|---|---|---|
| Water management dam | 0 ML/year | Dust suppression water sourced from disturbed area runoff. | N/A |
| | 0.3 ML/year | Loss of stored water through natural evaporation from the quarry pit | N/A |
| | 2.5ML/year | Natural infill of the dam through rainfall | N/A |
| | 0.3 ML/year | Active water management of disturbed area runoff to the dam. | N/A |
| | 5.2 ML/year | Controlled discharge within the site boundaries | N/A |
| Quarry pit | 3.5 ML/year | Dust suppression water sourced from disturbed area runoff. | Exempt[1] |
| | 13.6 ML/year | Loss of stored water through natural evaporation from the quarry pit | N/A |
| | 9.1 ML/year | Active water management of disturbed area runoff to the quarry pit. | N/A |
| | 6.0 ML/year | Natural infill of the quarry pit through rainfall | N/A |
| | 1.8 ML/year | Groundwater inflow to the quarry pit. | WAL45818 |
| Discharge to Oaky Creek | 0 ML/year | No discharge events occurred for the Annual Review period. | N/A |

Table notes:

1. Under the Schedule 1, Item 3 of the Water Management (General) Regulation 2018.

### 3.6.2 Air quality

The Air Quality Management Plan was updated during the previous Annual Review period. The updated version (revision 5) was issued to DPHI on 4 June 2024 with approval issued on 12 July 2024.

i. Deposited Dust

The air quality monitoring network consists of three dust deposition gauges (DDGs) installed, operated and analysed in accordance with AS 3580. 10. 1 2003. Static dust monitoring sites were chosen at locations adjacent to sensitive receivers in proximity to the works in accordance with the approved Air Quality Management Plan (AQMP). Table 3-8 outlines the results of the monitoring completed within the reporting period and further details are provided in Appendix E.

*Table 3-8: Summary of dust monitoring results September 2025 – August 2026*

| Dust deposition gauge | Installation date | Removal date | Insoluble solids (g/m²/month) | Annual average dust criteria (g/m²/month) | Rolling average (g/m²/month) |
|---|---|---|---|---|---|
| DG01 | 18/11/2025 | 06/01/2026[1] | 1.2 | 4 | 1.2 |
| | 06/01/2026 | 03/02/2026 | 1.2 | 4 | |
| | 03/02/2026 | 03/03/2026 | 1.2 | 4 | |
| DG02 | 18/11/2025 | 06/01/2026[1] | **2.6** | 4 | 1.4 |
| | 06/01/2026 | 03/02/2026 | 0.4 | 4 | |
| | 03/02/2026 | 03/03/2026 | 1.2 | 4 | |
| DG03 | 18/11/2025 | 06/01/2026[1] | 1.8 | 4 | 1.7 |
| | 06/01/2026 | 03/02/2026 | 0.5 | 4 | |
| | 03/02/2026 | 03/03/2026 | **2.8** | 4 | |

**Note:**

1. The December 2025 sample exposure period is outside the typical exposure period of 30 +/- 2 days as per *AS3580.10.1/AS3580.10.2* due to the Christmas period.

Figure 3-2 presents the air quality monitoring results summarised in Table 3-8, together with historical monitoring data from previous reporting periods, allowing trends in dust deposition levels to be assessed over time.

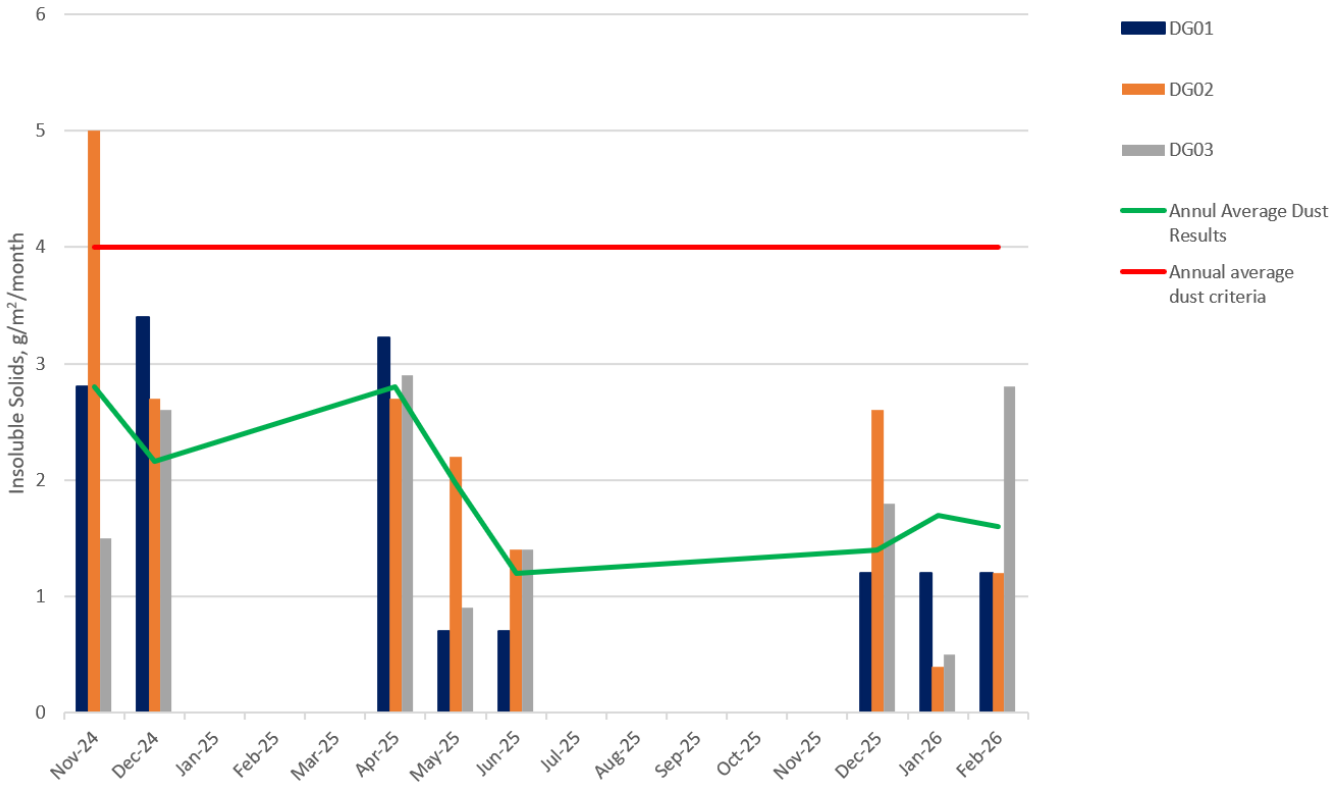



*Figure 3-2: Dust Deposition Gauge Results*

Dust deposition monitoring undertaken during the reporting period recorded all results remained well below the applicable criterion of 4.0 g/m$^2$/month, demonstrating compliance with the site's dust deposition performance requirements at all monitoring locations.

Construction of the recycling facility did not adversely affect dust monitoring results. The implementation of effective dust suppression and management measures by the construction contractor ensured that dust generation was appropriately controlled throughout the construction period.

### ii. Real time monitoring

In accordance with section 5.2.2 of the approved air quality management plan (EMM, June 2024) the continuous real-time monitoring campaign must occur for a 14-day period, once per year during extractive/ haulage operations.

EMM has been commissioned to manage a short-term ambient air quality monitoring campaign at the Quarry site.

A two-week ambient air quality monitoring was completed in January 2026 to assess particulate matter concentrations at the site. Monitoring was undertaken using two continuous particulate monitoring units located at the north-eastern and south-western boundaries of the site, with meteorological data obtained from the Bureau of Meteorology Badgerys Creek AWS and results compared against data from the DCCEEW Bringelly Air Quality Monitoring Station.

No exceedances of the 24-hour $PM_{10}$ criterion of 50 µg/m$^3$ or the 24-hour $PM_{2.5}$ criterion of 25 µg/m$^3$ were recorded at either monitoring location during the monitoring period. $PM_{10}$ concentrations at the quarry were generally lower than those recorded at the DCCEEW Bringelly station, while $PM_{2.5}$ concentrations were comparable to regional background levels. Assessment of upwind and downwind monitoring data indicated that site activities did not result in any exceedance of the applicable assessment criteria. Based on the monitoring results, it was concluded that the site was operating in compliance with the relevant air quality criteria during the monitoring period, and that exceedance of the annual TSP criterion was unlikely.

A full real time air quality monitoring report for January 2026 is provided in Appendix E.

### 3.6.3 Noise

EPL 21562 requires conducting noise monitoring twice a year, at a minimum, two 15-minute measurements at each of the eight attended noise monitoring locations on two consecutive days during daytime operations (7:00 am to 6:00 pm, Monday to Friday). Monitoring on the second day allows for the investigation and correction of any anomalous results recorded on the first day. The noise monitoring purpose was to quantify the acoustic environment and compare site noise levels against specified EPL 21562 limits.

Bi-annual noise surveys of site operations, in accordance with the Noise Management Plan (EMM, 2021), were conducted by the Environmental Manager of Coomber Property Group. Attended monitoring was undertaken during the daytime periods of 16 and 17 February 2026, and 7 and 8 July 2026, at six representative monitoring locations.

Attended environmental noise monitoring was completed in general accordance with Australian Standard AS1055 Acoustics, Description and Measurement of Environmental Noise and relevant NSW requirements. Meteorological data was obtained from the Badgerys Creek automatic weather station (AWS) (station ID 067108) which allowed correlation of atmospheric parameters with measured site noise levels.

During the noise monitoring conducted in February and July 2026, ambient noise levels were primarily influenced by local road traffic, bird activity, light aircraft movements, and construction works associated with the nearby recycling facility and surrounding areas.

The results of both monitoring rounds in February and July 2026 were consistent with previous monitoring rounds and indicated no significant changes or deviations in the observed parameters.

Noise levels at all monitoring locations complied with the EPL limits, confirming that quarry rehabilitation activities were undertaken in accordance with regulatory noise requirements and were not causing adverse impacts to nearby sensitive receivers. The full noise monitoring reports are provided in Appendix F.

## 3.7 Complaints

The nearest sensitive locations to the Quarry are listed in Table 3-9 below. The nearest occupied receiver is R6 (225 Adams Road) that is located approx. 160 m from the quarry. R3 (285 Adams Road), is a derelict and unoccupied building that is located 14 m from the site access road. The Hubertus Country Club is located immediately west of the site. No complaints have been received within the reporting period.

*Table 3-9: Sensitive receivers' locations*

| ID | Address | Classification | Comments |
|---|---|---|---|
| **R1** | 2161–2177 Elizabeth Drive, Luddenham | Residential | Occupied |
| **R2** | 2111–2141 Elizabeth Drive, Luddenham | Residential | **Unoccupied** (building demolished) |
| **R3** | 285 Adams Road, Luddenham | Residential | **Unoccupied** (used as commercial operation) |
| **R4** | 5 Anton Road, Luddenham | Residential | Occupied |
| **R5** | 185 Adams Road, Luddenham | Residential | **Unoccupied** |
| **R6** | 225 Adams Road, Luddenham | Residential | Occupied |
| **R7** | 161 Adams Road, Luddenham | Residential | Occupied |
| **R8** | 2510–2550 Elizabeth Drive, Luddenham | Residential | Occupied |
| **C1** | Hubertus Club – restaurant including outdoor facilities | Commercial | Occupied |
| **AR1** | Hubertus Country Club – outdoor firing range | Active recreation | Occupied |

## 3.8 Incidents

There have been no incidents during the reporting period, as defined by the Conditions of Consent: "An occurrence or set of circumstances that causes or threatens to cause material harm, and which may or may not be or cause non-compliance".

## 3.9 Proposed mitigation measures

Over the next 12 months, activities on site will continue to be managed to meet all relevant statutory requirements, limits, and performance measures/criteria. Mitigations proposed as part of the sites ongoing compliance include the following:

- Ongoing management and rehabilitation of the site in accordance with the mitigation measures listed with relevant management plans.
- Monitoring is to be completed in accordance with relevant management plans.
- An internal review audit be completed to assess site compliance against relevant conditions and management plan requirements.
- Annual inspections of the bedrock cut faces to be undertaken, with additional inspections carried out following significant rainfall events or if signs of instability (e.g., slumping or tension cracks) are observed. Any indications of instability identified between scheduled inspections should trigger immediate reassessment.

## 3.10 Report and document availability

Copies of the Annual Review will be made available to Council and any interested person upon request.

As required by Schedule 6, Condition 15(a), copies of the following documentation are publicly available on Luddenham Operations' website (https://luddenhamquarry.com.au/).

## 3.11 Compliance Review

Monitoring results remain generally consistent with historical data and do not indicate any adverse trends attributable to quarry operations. Variations observed during the reporting period are consistent with previous monitoring results and background environmental conditions. No significant deterioration in environmental performance was identified.

### 3.11.1 Schedule 6, Condition 15 (a)

As conditioned by Schedule 6, Condition 15 (a), this section demonstrates the availability of reports on Luddenham Operations' website:

- The document/s listed in condition 2 of Schedule 3.

*Table 3-10: Schedule 3, Condition 2 requirements*

| Condition | Description | On website |
|---|---|---|
| a | In compliance with these conditions of consent. | - |
| b | In accordance with all written directions of the Planning Secretary | None received |
| c | In general accordance with EIS titled Proposed Clay/Shale Extraction Operation – Lot 3 – 275 Adams Road Luddenham, dated May 2003, and prepared by Douglas Nicolaisen & Associates. | Yes |
| d | In general accordance with correspondence from Douglas Nicolaisen & Associates to the Department dated 16 March 2004 relating to operating hours, location of environmental bunds and reduction in the proposed extraction area. | Yes |
| e | In general accordance with information accompanying modification application DA 315-7-2003-MOD 1 for the relocation of the access bridge across Oaky Creek, lodged 16 November 2005, and prepared by Stuart J Castle. | Yes (MOD5) |
| f | In general accordance with Modification Application DA 315-7-2003 MOD 2 and the accompanying SEE titled Section 96(1A) Modification Application, 275 Adams Road Luddenham produced by Planning Direction Pty Ltd and dated 3 November 2009 and | Yes (MOD5) |

| Condition | Description | On website |
|---|---|---|
| | Acoustic Report – Clay/Shale Quarry at 275 Adams Road Luddenham produced by Golders Associates Ltd and dated 15 December 2009. | |
| g | In general accordance with Modification Application DA 315-7-2003 MOD 3 and the accompanying Environmental Assessment titled Environmental Assessment Report for Epic Mining Pty Ltd: 275 Adams Road, Luddenham, NSW, prepared by Benbow Environmental and dated November 2014 relating to temporary stockpiling, extraction sequencing and other activities. | Yes (MOD3) |
| h | In general accordance with Modification Application DA 315-7-2003 MOD 5 and the accompanying Modification Report titled Luddenham Quarry Modification Report DA 315-7-2003 MOD 5 Prepared for Coombs Property Group & KLF Holdings, prepared by EMM Consulting and dated August 2020; Submissions Report dated December 2020 and RFI Responses dated March 2021; as amended by the revised project description prepared by EMM Consulting and dated 16 April 2021. | Yes (MOD5) |

- Current statutory approvals for the development.

*Table 3-11: Statutory approvals*

| Item | Approval | On website |
|---|---|---|
| 1 | Development Consent DA No. 315-7-2003 | Yes |
| 2 | Environmental Protection Licence – EPL 21562 | Yes |
| 3 | Mining Licence – ML 1816 | Yes |

- Approved strategies, plans and programs required under the conditions of this consent.

*Table 3-12: Strategies, plans and programs*

| Item | Strategies/plans/programs | On website |
|---|---|---|
| 1 | Air Quality Management Plan | Yes |
| 2 | Discharge Characterisation and Water Pollution Impact Assessment | Yes |
| 3 | Environmental Management Strategy | Yes |
| 4 | Final Land Use Plan | Yes |
| 5 | Irrigation Management Plan<br>*No irrigation is currently proposed.* | Yes |
| 6 | Noise Management Plan | Yes |
| 7 | Road Transport Protocol | Yes |
| 8 | Site Rehabilitation Plan (inclusive of Biodiversity Management Plan) | Yes |
| 9 | Soil and Water Management Plan (inclusive Site Water Balance, Erosion and Sediment Control Plan, Surface Water Management Plan and Groundwater Management Plan) | Yes |
| 10 | Traffic Management Plan<br>*Matters addressed in the Road Transport Protocol plan.* | Yes |

- A comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs.

*Table 3-13: Summary of monitoring results*

| Item | Monitoring results | On website |
|---|---|---|
| 1 | Summary of monitoring results<br>*This Annual Review provides a summary of monitoring results and will be uploaded to the website.* | Yes |

- A complaints register, which is to be updated monthly.

*Table 3-14: Complaints register*

| Year | Monitoring results | On website |
|---|---|---|
| 2025 | 1 September 2021 to 31 August 2025 (0 Complaints) | Yes |

- The Annual Reviews of the development (for the last 5 years).

*Table 3-15: Complaints register*

| Year | Annual Review | On website |
|---|---|---|
| 2022 | 2022 Annual Review | Yes |
| 2023 | 2023 Annual Review | Yes |
| 2024 | 2024 Annual Review | Yes |
| 2025 | 2025 Annual Review | Yes |

- Any other matter required by the Planning Secretary.

*Table 3-16: Other matters required by the Planning Secretary*

| Item | Other matters | On website |
|---|---|---|
| 1 | RFI Responses | Yes |
| 2 | Submission Report | Yes |

- Any Independent Environmental Audit of the development, and the Applicant's response to the recommendations in any audit.

*Table 3-17: Independent Environmental Audit*

| Item | Other matters | On website |
|---|---|---|
| 1 | No Independent Environmental Audits were undertaken during the reporting period. The most recent audit was completed on 13 February 2025 by Annabelle Tungol (Artea Green Ventures Pty Ltd). | Yes |

### 3.11.2 Schedule 6, Condition 15 (b)

All information has been checked during the preparation of this report and is maintained in an up-to-date manner.

# 4 SUMMARY OF RESULTS

Table 4-1outlines a summary of the monitoring completed for the Annual Review period and results pertaining the relevant assessments.

*Table 4-1: Summary of monitoring results September 2025 – August 2026*

| Annual review item | Monitoring completed | Exceedance/non-compliance (NC) identified | Comments |
|---|---|---|---|
| Development and rehabilitation | Site inspection | No NCs identified. | Site rehabilitation activities commenced in mid-January 2025. JK Geotechnics undertook an inspection to assess the stability of the quarry cut faces, which did not identify any significant instability. The inspection recommended that the bedrock cut faces continue to be inspected annually, and more frequently following heavy rainfall events or if signs of instability (e.g. slumping or tension cracks) are observed. |
| Traffic management | Review of truck movements | No exceedances identified. | The quarry truck movements were compliant with the traffic management plan and road transport protocol.<br>It is noted that construction of the recycling facility commenced on 1 May 2025. Construction traffic is being monitored in accordance with the Resource Recovery Facility Construction Traffic Management Plan and is reported separately to the Department of Planning in accordance with Development Consent SSD-10446. |
| Surface water | Water sampling | Elevated levels of physical and chemical analytes were recorded within monitoring. | Elevated levels were noted at both upstream and downstream monitoring sites, indicating the quarry is not the source of surface water exceedances. |
| Groundwater | Water sampling | Some exceedances of metals.<br>Anomalous nutrient results in reconstructed wells.<br>Physical parameters indicating potential alluvial or surface water inflow. | Groundwater monitoring schedule and scope compliant with water management plan.<br>Additional monitoring completed throughout the Annual Review period to determine source of anomalies. No connection between anomalous results and onsite activities.<br>Increased levels of contaminates may have been a result from offsite activities and/or previous monitoring well installation processes. |
| Air quality | Dust deposition gauge | NIL | The rolling annual average remained compliant with dust deposition criteria of 4.0 $g/m^2$/month at all monitoring locations during this reporting period. |
| Air quality | Realtime ($PM_{2.5}$ and $PM_{10}$) | NIL | All monitoring completed was compliant against project criteria. |
| Noise | Noise monitoring | NIL | No exceedances identified. All monitoring completed was compliant against project criteria. |
| Complaints | NIL | NIL | No complaints were received during the reporting period. |
| Incidents | Incident Investigation | NIL | No environmental incidents occurred that causes, or threatens to cause, material harm or breaches the limits or performances criteria during the reporting period. |
| Independent Environmental Audit | Audit | NIL | No Independent Environmental Audits were undertaken during the reporting period. |

# **Appendix A** – Material Transportation Register

# Daily Site Load & Tonnage Report

*Report Period: 01/09/25 - 24/09/25*

| Date | Load Count | Daily Tonnage | Load Limit | Status |
|---|---|---|---|---|
| 1/09/2025 | 49 | 1,742.66 | 50 | Pass |
| 2/09/2025 | 50 | 1,879.94 | 50 | Pass |
| 3/09/2025 | 48 | 1,728.10 | 50 | Pass |
| 4/09/2025 | 22 | 837.28 | 50 | Pass |
| 5/09/2025 | 2 | 66.4 | 50 | Pass |
| 6/09/2025 | 21 | 772.94 | 50 | Pass |
| 8/09/2025 | 5 | 191.7 | 50 | Pass |
| 12/09/2025 | 17 | 632.52 | 50 | Pass |
| 13/09/2025 | 1 | 44.9 | 50 | Pass |
| 15/09/2025 | 27 | 1,093.26 | 50 | Pass |
| 16/09/2025 | 27 | 1,052.42 | 50 | Pass |
| 17/09/2025 | 19 | 825.62 | 50 | Pass |
| 18/09/2025 | 30 | 1,173.90 | 50 | Pass |
| 19/09/2025 | 11 | 432.86 | 50 | Pass |
| 20/09/2025 | 23 | 844.12 | 50 | Pass |
| 22/09/2025 | 35 | 1,293.16 | 50 | Pass |
| 23/09/2025 | 46 | 1,756.90 | 50 | Pass |
| 24/09/2025 | 6 | 245.84 | 50 | Pass |
| **Grand Total** | **439** | **16,614.52** | **Daily limit** | **Pass** |

# Daily Site Load & Tonnage Report

*Report Period: 5/12/2025 - 18/02/2026*

| Date | Sum of Tonnage | Sum of Movements | Load Limit | Status |
|---|---|---|---|---|
| 5/12/2025 | 972 | 26 | 50 | Pass |
| 8/12/2025 | 871 | 23 | 50 | Pass |
| 10/12/2025 | 1,282 | 29 | 50 | Pass |
| 15/12/2025 | 1,096 | 27 | 50 | Pass |
| 16/12/2025 | 1,081 | 27 | 50 | Pass |
| 17/12/2025 | 1,232 | 29 | 50 | Pass |
| 18/12/2025 | 627 | 15 | 50 | Pass |
| 21/01/2026 | 1,156 | 30 | 50 | Pass |
| 22/01/2026 | 1,148 | 29 | 50 | Pass |
| 23/01/2026 | 986 | 24 | 50 | Pass |
| 2/02/2026 | 685 | 17 | 50 | Pass |
| 5/02/2026 | 610 | 16 | 50 | Pass |
| 6/02/2026 | 826 | 22 | 50 | Pass |
| 10/02/2026 | 910 | 23 | 50 | Pass |
| 11/02/2026 | 669 | 16 | 50 | Pass |
| 12/02/2026 | 622 | 16 | 50 | Pass |
| 13/02/2026 | 722 | 18 | 50 | Pass |
| 16/02/2026 | 920 | 22 | 50 | Pass |
| 17/02/2026 | 920 | 24 | 50 | Pass |
| 18/02/2026 | 669 | 16 | 50 | Pass |
| **Grand Total** | **18003.53** | **449** | **Daily limit** | **0 days failed** |

# Daily Site Load & Tonnage Limit Check

| Row Labels | Load Count | Daily Tonnage | 50 Load Limit | Status |
|---|---|---|---|---|
| 22/06/26 | 35 | 1,330.080 | **50** | OK - did not exceed |
| 23/06/26 | 34 | 1,312.500 | **50** | OK - did not exceed |
| 24/06/26 | 22 | 877.150 | **50** | OK - did not exceed |
| 25/06/26 | 12 | 472.630 | **50** | OK - did not exceed |
| (blank) | | | | |
| **Grand Total** | **103** | **3,992.360** | **Daily limit** | **All days OK** |

Each listed day is checked against the site limit of 50 loads. Load counts and daily tonnage

# Daily Site Load & Tonnage Report

*Report Period: 03/07/26 - 23/07/26*

| Date | Load Count | Daily Tonnage | Load Limit | Status |
|---|---|---|---|---|
| 03/07/26 | 38 | 1,462.3 | 50 | Pass |
| 06/07/26 | 45 | 1,714.3 | 50 | Pass |
| 07/07/26 | 44 | 1,678.2 | 50 | Pass |
| 08/07/26 | 49 | 1,874.8 | 50 | Pass |
| 09/07/26 | 50 | 1,905.2 | 50 | Pass |
| 10/07/26 | 50 | 1,927.0 | 50 | Pass |
| 13/07/26 | 48 | 1,822.9 | 50 | Pass |
| 14/07/26 | 39 | 1,484.2 | 50 | Pass |
| 15/07/26 | 40 | 1,569.0 | 50 | Pass |
| 16/07/26 | 43 | 1,615.2 | 50 | Pass |
| 20/07/26 | 49 | 1,855.0 | 50 | Pass |
| 21/07/26 | 45 | 1,686.5 | 50 | Pass |
| 22/07/26 | 50 | 1,907.7 | 50 | Pass |
| 23/07/26 | 50 | 1,866.7 | 50 | Pass |
| **Grand Total** | **640** | **24,368.830** | **Daily limit** | **0 days failed** |

# Daily Site Load & Tonnage Report

*Report Period: 24/07/26 - 31/08/26*

| Date | Load Count | Daily Tonnage | Load Limit | Status |
|---|---|---|---|---|
| 24/07/26 | 50 | 1,870.300 | 50 | Pass |
| 27/07/26 | 50 | 1,926.080 | 50 | Pass |
| 28/07/26 | 50 | 1,926.130 | 50 | Pass |
| 30/07/26 | 50 | 1,927.930 | 50 | Pass |
| 31/07/26 | 50 | 1,940.140 | 50 | Pass |
| 03/08/26 | 46 | 1,749.540 | 50 | Pass |
| 04/08/26 | 41 | 1,583.080 | 50 | Pass |
| 05/08/26 | 39 | 1,511.080 | 50 | Pass |
| 07/08/26 | 40 | 1,514.640 | 50 | Pass |
| 08/08/26 | 43 | 1,675.620 | 50 | Pass |
| 12/08/26 | 50 | 1,923.880 | 50 | Pass |
| 13/08/26 | 50 | 1,976.720 | 50 | Pass |
| 14/08/26 | 50 | 1,924.600 | 50 | Pass |
| 19/08/26 | 50 | 1,920.050 | 50 | Pass |
| 20/08/26 | 50 | 1,851.520 | 50 | Pass |
| 21/08/26 | 50 | 1,943.030 | 50 | Pass |
| 22/08/26 | 46 | 1,826.380 | 50 | Pass |
| 24/08/26 | 42 | 1,666.140 | 50 | Pass |
| 25/08/26 | 21 | 824.300 | 50 | Pass |
| 27/08/26 | 50 | 1,942.310 | 50 | Pass |
| 28/08/26 | 30 | 1,201.500 | 50 | Pass |
| 29/08/26 | 38 | 1,486.690 | 50 | Pass |
| 31/08/26 | 47 | 1,772.270 | 50 | Pass |
| **Grand Total** | **1,033** | **39,883.930** | **Daily limit** | **0 days failed** |

# **Appendix B** – Development and Rehabilitation

C.1 Quarry overview (14 December 2025) – NearMap



C.2 Quarry overview (28 March 2026) – NearMap



C.3 Quarry overview (15 July 2026) – NearMap



# **Appendix C** – Water Monitoring Reports

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Newcastle NSW 2300
ABN: 28 141 736 558

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# Memorandum

30 October 2025

To: Elena Ivanova
Environmental & Planning Manager
Coombes Property Group

From: Tasman Coupe

**Subject: Luddenham Quarry SWMP monitoring results (Q1 - 2025/2026)**

Dear Elena,

# 1 Background

This memorandum outlines groundwater monitoring undertaken by EMM Consulting Pty Ltd (EMM) on behalf of Coombes Property Group (CPG) at Luddenham Quarry, 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, referred to herein as the site), as required by the groundwater and surface water monitoring program that was developed as part of the Soil and Water Management Plan (SWMP) (EMM 2021).

The program commenced in March 2022 and involves quarterly groundwater and annual surface water monitoring of water quality parameters, groundwater levels and contaminants of potential concern (CoPC) at seven locations. The sampling locations comprise three groundwater locations (BSM1, BSM2 and BSM3) and four surface water locations (downstream, upstream, quarry pit and water management dam), Refer to Appendix A for monitoring locations. Previous monitoring events have occurred on the following dates: 11 March 2022, 31 August 2022, 24 August 2023, 14 December 2023, 27 March 2024, 23 May 2024, 7 August 2024, 4 December 2024. 4 March 2025, 7 May 2025 and 17 July 2025.

# 2 Program overview

The surface water and groundwater monitoring documented in this report was undertaken by a suitably qualified EMM Environmental Scientist on 15 October 2025 for the September to November 2025 monitoring period (Q1 of the 2025–2026 annual review period).

## 2.1 Rainfall context

The Bureau of Meteorology operates a rain gauge at Badgerys Creek [approximately 3 kilometres (km)] from the site – Station number: 067108. A total of 0.2mm of rain was recorded at the station in the five days preceding the monitoring event. No rain was recorded on the day sampling was undertaken.

## 2.2 Water quality analytes

The analytical suite for the monitoring program is presented in Table 2.1. Physical and chemical stressors (except for total suspended solids) were monitored in the field with a calibrated hand-held water quality meter. All other parameters are analysed at a laboratory accredited by the National Association of Testing Authorities (NATA).

**Table 2.1 Water quality analytes**

| Category | Parameters | Analysis method |
|---|---|---|
| Physical and chemical stressors | Dissolved oxygen (DO), electrical conductivity (EC), pH, total dissolved solids (TDS), turbidity. | In the field with a calibrated hand-held water quality meter. |
| | Total suspended solids (TSS). | Analysis undertaken at NATA accredited laboratory. |
| Nutrients | Ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen, reactive phosphorus, total phosphorus. | |
| Dissolved metals | Aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc. | |
| Other | Total hardness, oil and grease. | |

Laboratory certificates are presented in Appendix E. Calibration certificates are provided in Appendix G.

## 2.3 Laboratory analysis

Water samples were transported to a NATA-accredited laboratory, Australian Laboratory Services (ALS) in Smithfield, NSW for analysis. Samples were received by the laboratory within the recommended holding times.

## 2.4 Quality assurance/quality control

Samples were collected in laboratory-provided sample containers with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain of custody protocols.

The field quality assurance/quality control (QA/QC) procedures used to establish accurate, reliable, and precise results included:

- calibration of equipment by the supplier and testing by EMM staff prior before use
- keeping samples chilled
- submitting laboratory samples within holding times
- wearing disposable nitrile gloves during sampling at each sampling location
- using dedicated sampling equipment
- collection of a field duplicate sample.

QA/QC was assessed by calculating relative percentage difference (RPD) of the field duplicate ($S_{duplicate}$) sample to the parent sample ($S_{parent}$) as per the following equation.

$$Relative\ \%\ difference = \frac{|S_{parent} - S_{Dupilcate}|}{\frac{S_{parent} + S_{Dupilcate}}{2}} \times 100$$

Results were considered to confirm acceptable degree of data quality where RPDs were below 30%.

Most results for the monitoring round were within RPD limits (refer Appendix C), indicating adequate QA/QC. Only nitrite reported RPD above the data quality limit. Both primary and duplicate results were within the historical range reported for nitrite concentrations and both were three orders of magnitude smaller than the respective nitrate concentration. Hence, this conformance outlier is not considered likely to impact the conclusions or overall data quality of the investigation.

# 3 Monitoring results

Analytical results are discussed in the following sections. Groundwater and surface water analytical results are reported in the appendices (Appendix B - Groundwater levels, Appendix C - Water quality monitoring results, Appendix D - Water quality timeseries charts).

## 3.1 Groundwater levels

Groundwater levels were monitored using an interface probe at each of the three groundwater monitoring bores during sampling. Based on the requirements outlined in the soil and water management plan (EMM, 2021)[1], a water level deviation of two metres from the long-term median groundwater level in the quarry monitoring bores is considered a trigger for further action as per the groundwater trigger action response plan (Table B.2, EMM 2021). Two metres (m) has been used as the trigger as the deviation value aligns with the minimal impact considerations of the aquifer interference activities stated in the NSW Aquifer Interference Policy (DPI 2012).

Following recommendations in the March 2025 groundwater monitoring memorandum (EMM 2025), a resurvey of the groundwater bores was undertaken by Total Surveying Solutions on 14 April 2025. Groundwater levels since the May 2025 monitoring period are calculated based on the resurveyed monitoring bore data. Groundwater and survey data are presented in Appendix B. For context, the average baseline and subsequent upper and lower trigger values are presented in Table 3.1.

**Table 3.1 Water level trigger values**

| Bore ID | Average Baseline (mAHD) | Upper SWL Trigger (mAHD) | Lower SWL Trigger (mAHD) | October 2025 SWL (mAHD) |
|---|---|---|---|---|
| BSM1 | 58.13 | 60.13 | 56.13 | 58.09 |
| BSM2 | 50.68 | 52.68 | 48.68 | **53.04** |
| BSM3 | 46.29 | 48.29 | 44.29 | **50.05** |

Notes: **Bold font** used to highlight water level deviation of two metres from the long-term median groundwater level in the quarry monitoring bores. This is a trigger for further action as per the groundwater trigger action response plan (Table B.2, EMM 2021).

All three groundwater monitoring bores were within the historical range since the program commenced in March 2022.

[1] EMM, 2021. *Luddenham Quarry Soil and Water Management Plan. Doc Ref: J190749 RP49.* 22 September 2021

BSM1 was within 2 m of the baseline average whilst both BSM2 and BSM3 were observed above the 2 m trigger as prescribed by the WMP (EMM 2021). Based on the survey data, it appears the bores have consistently exceeded the 2 m trigger across the 13 monitoring events at BSM1 (4 occasions), BSM2 (11 occasions) and BSM3 (13 occasions). This represents an increase and thus part of the TARP triggers relating to distance drawdown effects are not applicable.

Upon consultation with CPG, it is understood there has been no quantitative historical monitoring of the water level within the quarry pit has been undertaken. Despite this, anecdotal evidence indicates the base of the quarry pit to be approximately 30 m bgl with water observed covering a portion of the pit base. The depth to water of the monitoring bores monitored was between 9.757 metres below ground level (m bgl) at BSM2 and 15.353 m bgl at BSM1. The standing water level in monitoring bores is believed to be more than 10m above the water level of the quarry pit which would indicate the pit is not the source of the sustained increased water level.

## 3.2 Groundwater quality

Field observations for completed groundwater monitoring are presented in Table 3.2. Data collected in the field is presented in Appendix F.

**Table 3.2 Field observations (groundwater monitoring)**

| Time of sample | Groundwater monitoring bore | Site description | Field comments/context |
|---|---|---|---|
| **Groundwater sampling locations** | | | |
| 15/10/2025 11:30 am | BSM1 | Hydraulically upgradient of the quarry pit, BSM2 and BSM3. Bore monitored to measure background contamination levels. Located near the western site boundary in the southern portion of the site, to the west of the site access/haul road. | Clear, colourless, slight sulphurous odour, no sheen observed. |
| 15/10/2025 10:47 am | BSM2 | Hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Bore water was clear and colourless, with no odour or sheen observed during sampling.<br>A field duplicate was taken as a quality assurance (QA) sample at this bore. |
| 15/10/2025 10:14 am | BSM3 | Hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Clear and colourless, slight sulphurous odour, no sheen observed. |

Groundwater quality results are presented in Appendix C. Key observations of groundwater quality for the monitoring period include the following:

- pH was slightly acidic to circumneutral (6.68–6.86) in the three groundwater monitoring bores sampled.
- Salinity, as indicated by EC, was lower in upgradient BSM1 (3,676 microsiemens per centimetre (µS/cm)) compared to downgradient bores BSM2 (21,019 µS/cm) and BSM3 (25,131 µS/cm), all reporting within historical ranges. BSM1 results are low, compared to baseline trends (22,560 µS/cm at BSM1) potentially indicating freshwater ingress.

- All three monitoring bores reported moderate to strongly reducing conditions (i.e electron- rich). All three locations were reported with stronger reducing conditions than the previous monitoring round. No baseline median is available within previous reports for oxidation-reduction (Redox) potential. This should be monitored during subsequent monitoring rounds to assess the chemistry against collated historical data in a time series trend.

- Nutrients remain present in all bores and elevated above baseline for nitrate in BSM2 (462 milligrams per litre (mg/L)). This represents the second highest reported nitrate concentration with the previous three rounds reporting the highest three concentrations (395mg/L and 218 mg/L) since May 2025. The source of the nitrate is unknown, with nearby sources comprising the potential use of fertiliser on nearby agricultural land, country club and revegetation of the adjacent airport.

- Elevated concentrations zinc were detected in BSM2 (discussed in Section 3.4).

- Oil and grease were reported at concentrations less than the laboratory limit of reporting (LOR).

## 3.3 Surface water quality

Field observations for completed surface water monitoring are presented in Table 3.3.

**Table 3.3 Field observations (surface water monitoring)**

| Time of sample | Monitoring point | Site description | Field comments | Site photos |
|---|---|---|---|---|
| **Surface water sampling locations** | | | | |
| 15/10/2025 9:44 AM and 12:08 PM | QUARRY PIT | Sample of the pit quarry water in the northern portion of the pit. | Pit water was green, clear with no odour or sheen. Quarry pit water level was higher than the previous monitoring rounds this year. |   |

As the monitoring of the quarry pit was limited to field parameters during this round, results of monitoring are presented in Table 3.4.

**Table 3.4 Quarry pit monitoring results**

| Field Parameter | Unit | 1st visit- AM | 2nd visit- PM |
|---|---|---|---|
| Temp (Field) | °C | 24.8 | 27.6 |
| pH (Field) | - | 8.09 | 8.52 |
| EC (field) | µS/cm | 4914 | 5100 |
| DO (Field) | mg/L | 6.36 | -0.05 |
| Redox Potential (Field) | mV | 31.5 | -37.4 |

Key observations of the surface water quality are summarised below:

- pH was recorded as slightly basic (8.09 and 8.52, respectively). These results confirm the measurement taken during the previous monitoring round (July 2025) was anomalous and is not representative of the water quality within the Quarry Pit. The results of this round (October 2025) are in line with historical monitoring.

## 3.4 Review of exceedances

Water quality results were reviewed for trigger exceedances, via comparison of default guideline values or comparison of other chemical properties to the upgradient bore (BSM1).

An assessment of exceedances including actions taken and recommendations for the groundwater monitoring is presented in Table 3.5.

**Table 3.5 Review of exceedances (groundwater)**

| Exceedance description | Assessment and actions taken |
|---|---|
| **Nutrients** | |
| Oxidised nitrogen significantly exceeded the upgradient bore concentrations (<0.01 mg/L) at BSM2, with the second highest concentration on record at 462 mg/L. This exceedance is attributable to the nitrate concentration at BSM2. | Following sustained elevated and increasing nitrogen results in BSM2, profiling was undertaken during the July monitoring round to determine if the source of the nitrogen could be informed by sample depth within the screened water column. The reported concentration in the shallow sample from BSM2 for nitrate, and subsequently total and oxidised nitrogen, was the highest on record. This indicated the source of the nitrogen is likely at or above the standing water interface. The total nitrogen concentration within the shallow sample was approximately seven times higher than that of the sample taken from the middle of the screened water column in the same well.<br>Following completion of the July sampling the hydrasleeve was reinstated at the middle of the screened water column.<br>The nitrate concentration during this round (462 mg/L) was greater than the July monitoring round result at the middle of the screened water column (116mg/L) but was less than the shallow July nitrate concentration (692mg/L). The nitrate concentration during this round was the second highest on record.<br>The elevated nutrients concentrations were not observed in the background upgradient sample location.<br>Baseline data results were reviewed, where the following was noted:<br>• As a result of the nitrate concentration at BSM2, total and oxidised nitrogen was noted to be significantly above the trigger value (upgradient bore comparison). The median baseline concentration at BSM2 of 21 mg/L, is significantly greater than the median baseline for the upgradient bore of 0.137 mg/L. Regardless the reported concentration of 462 mg/L is significantly greater than the median baseline for nitrate with the upgradient bore reporting nitrate below detectable limits.<br>• No historical records of ammonia or total nitrogen were available.<br>• Reactive phosphorus marginally exceeded the LOR with upgradient bore reporting a concentration below detectable limits.<br>Timeseries charts of nutrients exceedances were prepared (refer Appendix D). |
| Ammonia exceeded the upgradient bore concentration (0.68 mg/L) at BSM3 (5.56 mg/L). BSM3 also exceeded the ANZECC 95% protection level for freshwater (0.9 mg/L). | |
| Total nitrogen significantly exceeded the upgradient bore concentrations (1.4 mg/L) at BSM2, with a concentration of 472 mg/L. This exceedance is attributable to the nitrate concentration at BSM2. BSM3 also exceeded the upgradient bore with a concentration of 5.8 mg/L, attributed to the ammonia concentration. | |
| Reactive phosphorus exceeded the upgradient bore concentrations (<0.01 mg/L) at BSM2 and BSM3, with concentrations of 0.01 mg/L and 0.02 mg/L, respectively. | |
| **Metals** | |
| Zinc exceeded the trigger values (0.008 mg/L) at BSM2 with reported concentrations of 0.022 mg/L and 0.023 mg/L (QA). | Zinc was reported below baseline concentrations for BSM2. The reported concentration for zinc in BSM2 reduced from the previous round. |

# 4 Summary and recommendations

The following provides a summary of additional investigations:

- Down gradient bores BSM2 and BSM3 were reported above the standing water level trigger value as part of the October 2025 monitoring event. All water levels were within the historical ranges. Sustained elevated water levels are not likely to be attributable to the site as the monitored water level is substantially greater than the reported base of the quarry pit.

- pH was recorded as slightly basic (8.09 and 8.52, respectively) within the Quarry Pit. These results confirm the measurement taken during the previous monitoring round (July 2025) was anomalous and is not representative of the water quality within the Quarry Pit. The results of this round (October 2025) are in line with historical monitoring.

- Oil and grease were not present at detectable concentrations during the October 2025 sampling round.

- No confirmed source has been identified for the sustained elevated and increasing nutrient concentrations observed within monitoring well BSM2. Nitrate concentration profiling has indicated the source of the nitrogen is likely at or above the standing water interface. The site is surrounded by agricultural land, a country club and the Western Sydney Airport (WSA) which has been undertaking significant re-establishment of ground cover vegetation upstream of the site since 2021. The elevated standing water table, increased chloride (as identified previously by the laboratory as the source of matrix interference) in BSM2 support the possibility that widespread use of fertilisers around the site may have contributed to the reported increase in nutrients observed at monitoring bores at the site. Detailed surface water and groundwater monitoring associated with the WSA construction was not available for review to verify this potential source. Based on the sustained increasing trend following the cessation of quarry operations, the change appears unrelated to quarry activities.

The following recommendations are made for future monitoring:

- The next quarterly monitoring round should be undertaken as a groundwater only monitoring round in mid- January 2026 to meet the objectives of the SWMP and comply with the conditions of consent.

- Collate the Redox potential results to date for the site and assess data by reviewing any time series trends.

Please contact the undersigned with any questions or clarifications.

Yours sincerely,

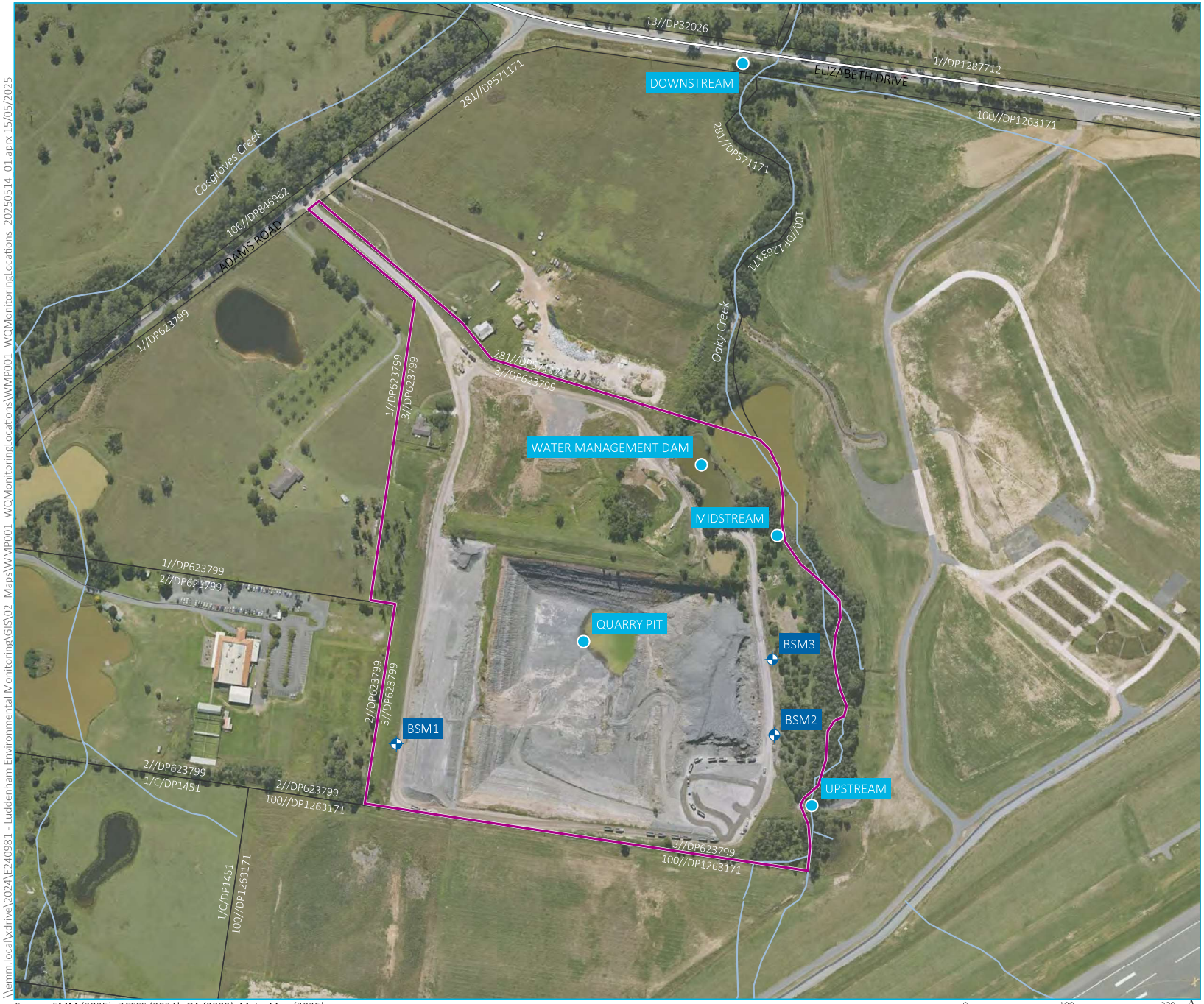


**Tasman Coupe**
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# Appendix A

## Water quality monitoring locations

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KEY

- Study area
- Groundwater monitoring bore
- Water quality monitoring location

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary

*Source: EMM (2025); DCSSS (2024); GA (2009); MetroMap (2025)*

Water quality monitoring locations

Luddenham Quarry
Water Management Plan
Figure 1

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# Appendix B
## Groundwater levels

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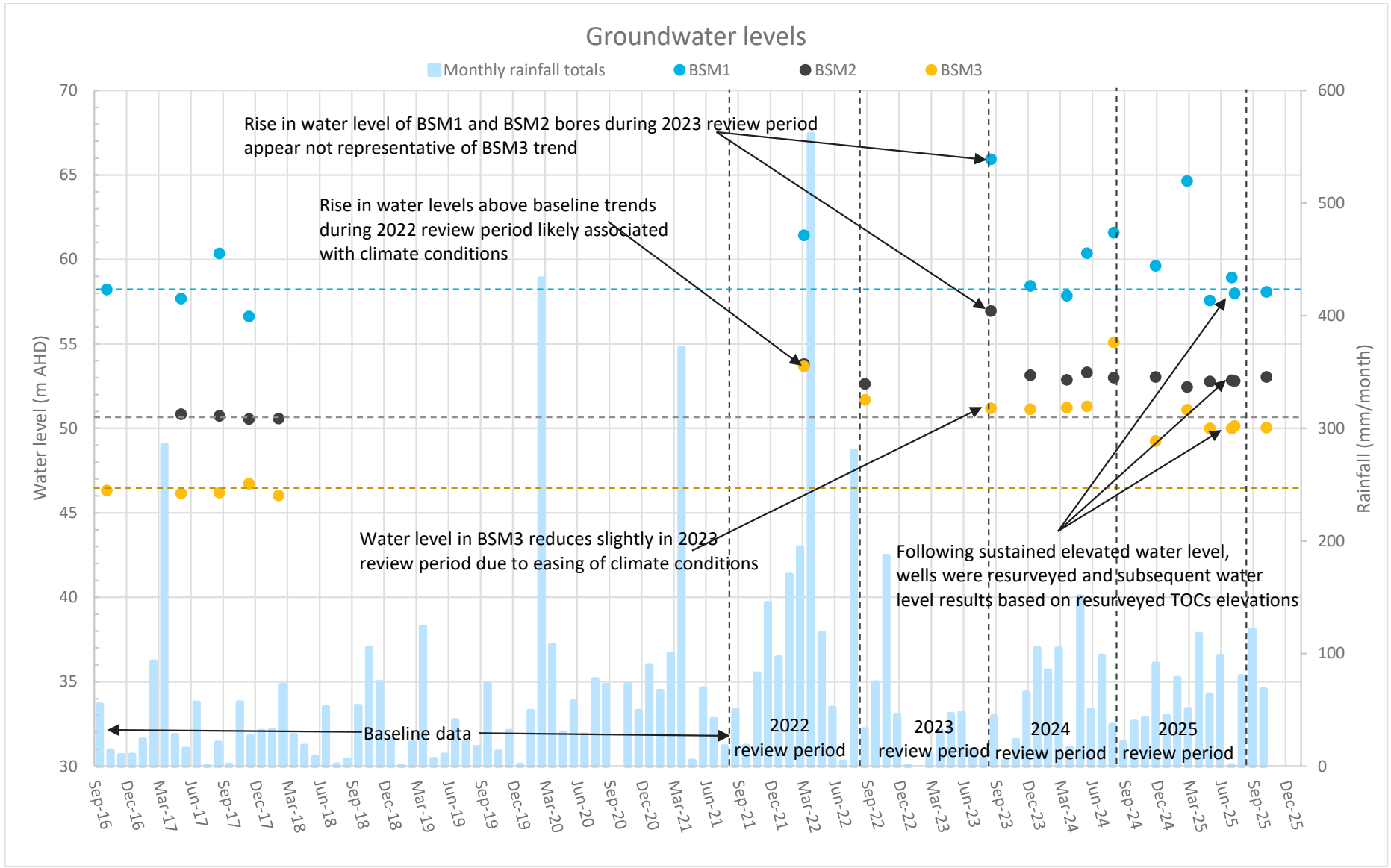



**Figure B.1** **Ground water levels**

# Appendix C

## Water quality monitoring results

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Location Code | BSM1 | BSM2 | BSM2 | BSM3 |
| | | | | Field ID | BSM1 | BSM2 | QA | BSM3 |
| | | | | Lab Report Number | ES2532122 | ES2532122 | ES2532122 | ES2532122 |
| | | | | Date | 15 Oct 2025 | 15 Oct 2025 | 15 Oct 2025 | 15 Oct 2025 |
| | Unit | EQL | ANZG (2018) freshwater 95% toxicant DGVs | Trigger Values | | | | |
| **Field** | | | | | | | | |
| **Temp (Field)** | °C | 0.1 | | - | 24.4 | 31.8 | - | 29.1 |
| **pH (Field)** | - | 0.01 | | 6.5-8.5 | 6.86 | 6.68 | - | 6.82 |
| **EC (field)** | µS/cm | 1 | | BSM1 | 3,676 | 21,019 | - | 25,131 |
| **DO (Field)** | mg/L | 0.1 | | | 0.96 | 0.77 | - | 0.12 |
| **Redox Potential (Field)** | mV | 0.1 | | | -201.8 | -129.6 | - | -337.7 |
| **TSS** | mg/L | 5 | | BSM1 | 147 | <5 | <5 | 25 |
| **Inorganics** | | | | | | | | |
| **Hardness as $CaCO_3$ (filtered)** | mg/L | 1 | | | 836 | 2,270 | 2,280 | 3,580 |
| **Ammonia as N** | mg/L | 0.01 | 0.9 | BSM1 | 0.68 | 0.22 | 0.22 | 5.56 |
| **Nitrite (as N)** | mg/L | 0.01 | | | <0.01 | 0.32 | 0.17 | <0.01 |
| **Nitrate (as N)** | mg/L | 0.01 | | | <0.01 | 462 | 457 | <0.01 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | | BSM1 | <0.01 | 462 | 457 | <0.01 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | | | 1.4 | 9.6 | 9.7 | 5.8 |
| **Nitrogen (Total)** | mg/L | 0.1 | | BSM1 | 1.4 | 472 | 467 | 5.8 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | | BSM1 | <0.01 | 0.01 | 0.01 | 0.02 |
| **Total Phosphate (as P)** | MG/L | 0.01 | | BSM1 | 0.06 | 0.04 | 0.04 | 0.04 |
| **Metals** | | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | 0.055 | 0.055 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Arsenic (filtered)** | mg/L | 0.001 | 0.013 | 0.013 | 0.002 | <0.001 | <0.001 | <0.001 |
| **Boron (filtered)** | mg/L | 0.05 | 0.94 | 0.37 | 0.06 | <0.05 | <0.05 | <0.05 |
| **Cadmium (filtered)** | mg/L | 0.0001 | 0.0002 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper (filtered)** | mg/L | 0.001 | 0.0014 | 0.0014 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Iron (filtered)** | mg/L | 0.05 | | | 1.99 | 0.08 | 0.09 | <0.05 |
| **Lead (filtered)** | mg/L | 0.001 | 0.0034 | 0.0034 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese (filtered)** | mg/L | 0.001 | 1.9 | 1.9 | 0.973 | 1.74 | 1.72 | 0.220 |
| **Mercury (filtered)** | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Nickel (filtered)** | mg/L | 0.001 | 0.011 | 0.011 | <0.001 | 0.010 | 0.010 | <0.001 |
| **Selenium (filtered)** | mg/L | 0.01 | 0.005 | | <0.01 | <0.01 | <0.01 | <0.01 |
| **Zinc (filtered)** | mg/L | 0.005 | 0.008 | 0.008 | <0.005 | 0.022 | 0.023 | <0.005 |
| **TRH** | | | | | | | | |
| **Oil and Grease** | mg/L | 5 | | LOR | <5 | <5 | <5 | <5 |

**Environmental Standards**
DoE, 2018, ANZG (2018) freshwater slightly-moderately disturbed system toxicant DGVs
DoE, 2000, ANZECC 2000 FW 95%

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Location Code | BSM2 | BSM2 | |
| | | | | Field ID | BSM2 | QA | |
| | | | | Lab Report Number | ES2532122 | ES2532122 | |
| | | | | Date | 15 Oct 2025 | 15 Oct 2025 | |
| | | | | Matrix Type | Water | Water | RPD |
| | Unit | EQL | ANZG (2018) freshwater 95% toxicant DGVs | Trigger Values | | | |
| **Field** | | | | | | | |
| **TSS** | mg/L | 5 | | BSM1 | <5 | <5 | 0 |
| **Inorganics** | | | | | | | |
| **Hardness as $CaCO_3$ (filtered)** | mg/L | 1 | | | 2,270 | 2,280 | 0 |
| **Ammonia as N** | mg/L | 0.01 | 0.9 | BSM1 | 0.22 | 0.22 | 0 |
| **Nitrite (as N)** | mg/L | 0.01 | | | 0.32 | 0.17 | 61 |
| **Nitrate (as N)** | mg/L | 0.01 | | | 462 | 457 | 1 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | | BSM1 | 462 | 457 | 1 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | | | 9.6 | 9.7 | 1 |
| **Nitrogen (Total)** | mg/L | 0.1 | | BSM1 | 472 | 467 | 1 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | | BSM1 | 0.01 | 0.01 | 0 |
| **Total Phosphate (as P)** | MG/L | 0.01 | | BSM1 | 0.04 | 0.04 | 0 |
| **Metals** | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | 0.055 | 0.055 | <0.01 | <0.01 | 0 |
| **Arsenic (filtered)** | mg/L | 0.001 | 0.013 | 0.013 | <0.001 | <0.001 | 0 |
| **Boron (filtered)** | mg/L | 0.05 | 0.94 | 0.37 | <0.05 | <0.05 | 0 |
| **Cadmium (filtered)** | mg/L | 0.0001 | 0.0002 | 0.0002 | <0.0001 | <0.0001 | 0 |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | 0 |
| **Copper (filtered)** | mg/L | 0.001 | 0.0014 | 0.0014 | <0.001 | <0.001 | 0 |
| **Iron (filtered)** | mg/L | 0.05 | | | 0.08 | 0.09 | 12 |
| **Lead (filtered)** | mg/L | 0.001 | 0.0034 | 0.0034 | <0.001 | <0.001 | 0 |
| **Manganese (filtered)** | mg/L | 0.001 | 1.9 | 1.9 | 1.74 | 1.72 | 1 |
| **Mercury (filtered)** | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | 0 |
| **Nickel (filtered)** | mg/L | 0.001 | 0.011 | 0.011 | 0.010 | 0.010 | 0 |
| **Selenium (filtered)** | mg/L | 0.01 | 0.005 | | <0.01 | <0.01 | 0 |
| **Zinc (filtered)** | mg/L | 0.005 | 0.008 | 0.008 | 0.022 | 0.023 | 4 |
| **TRH** | | | | | | | |
| **Oil and Grease** | mg/L | 5 | | LOR | <5 | <5 | 0 |

**Environmental Standards**
DoE, 2018, ANZG (2018) freshwater slightly-moderately disturbed system toxicant DGVs

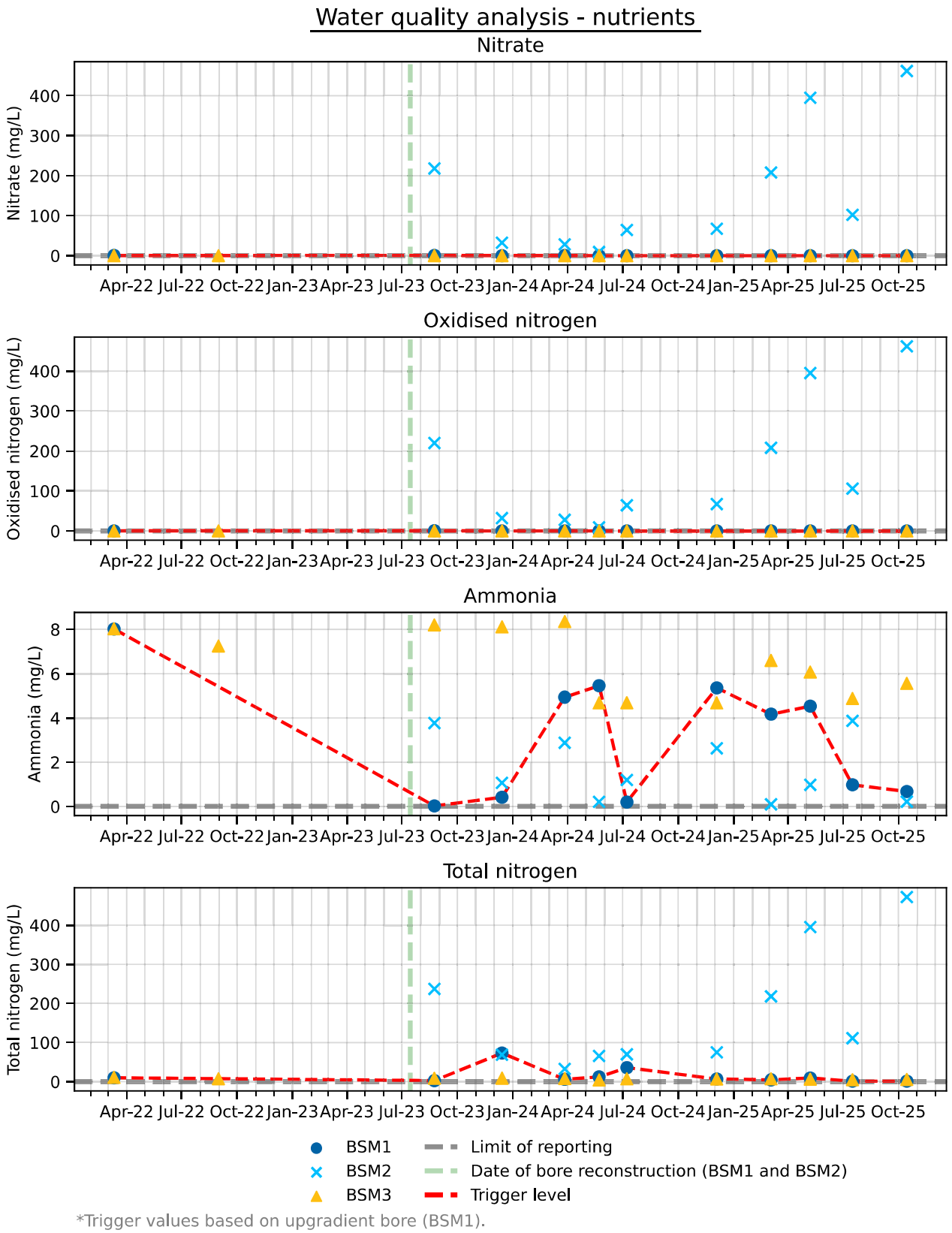
*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 ( > 30 x EQL) )
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

# Appendix D

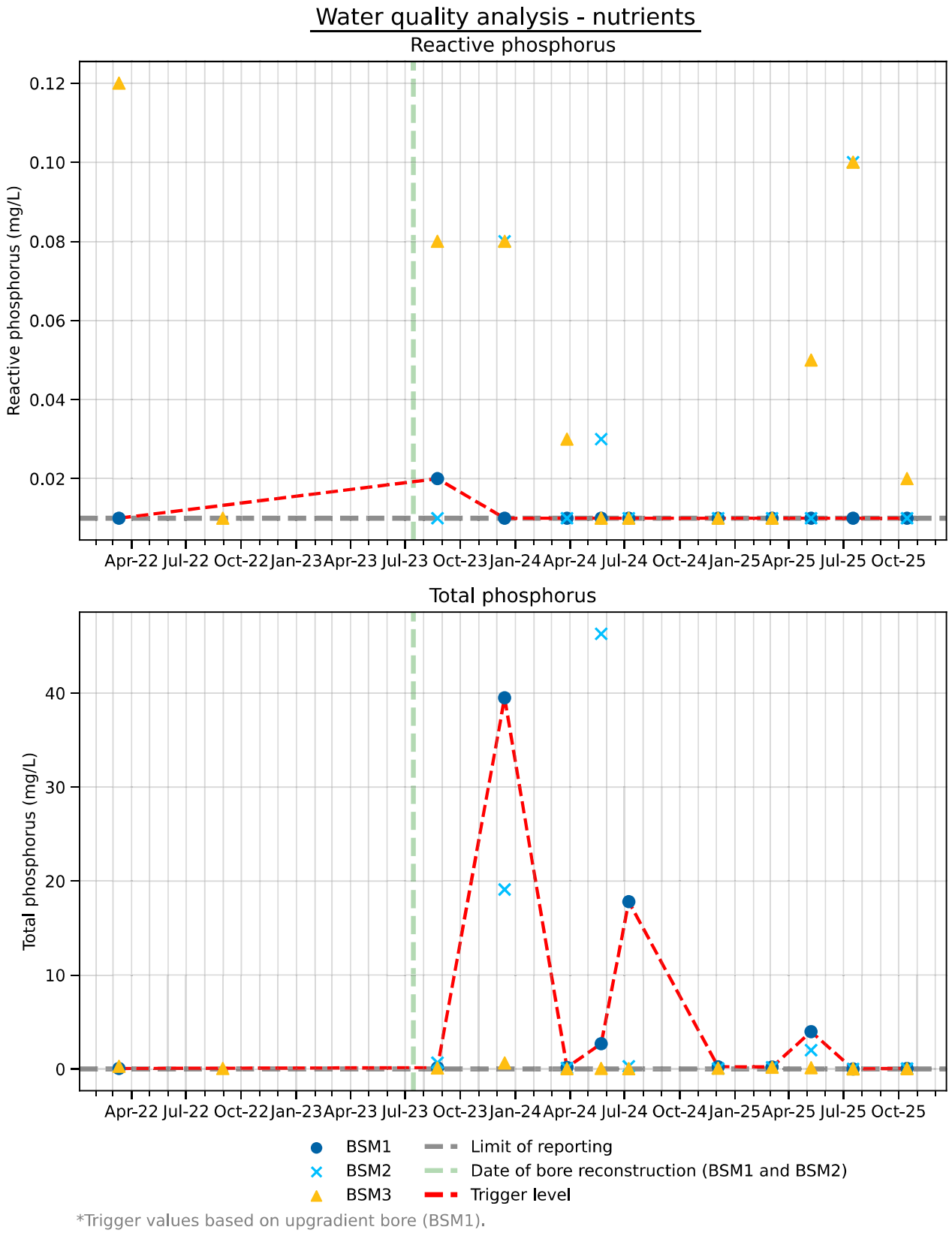
Water quality timeseries charts

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## D.1 Timeseries water quality charts – nutrients

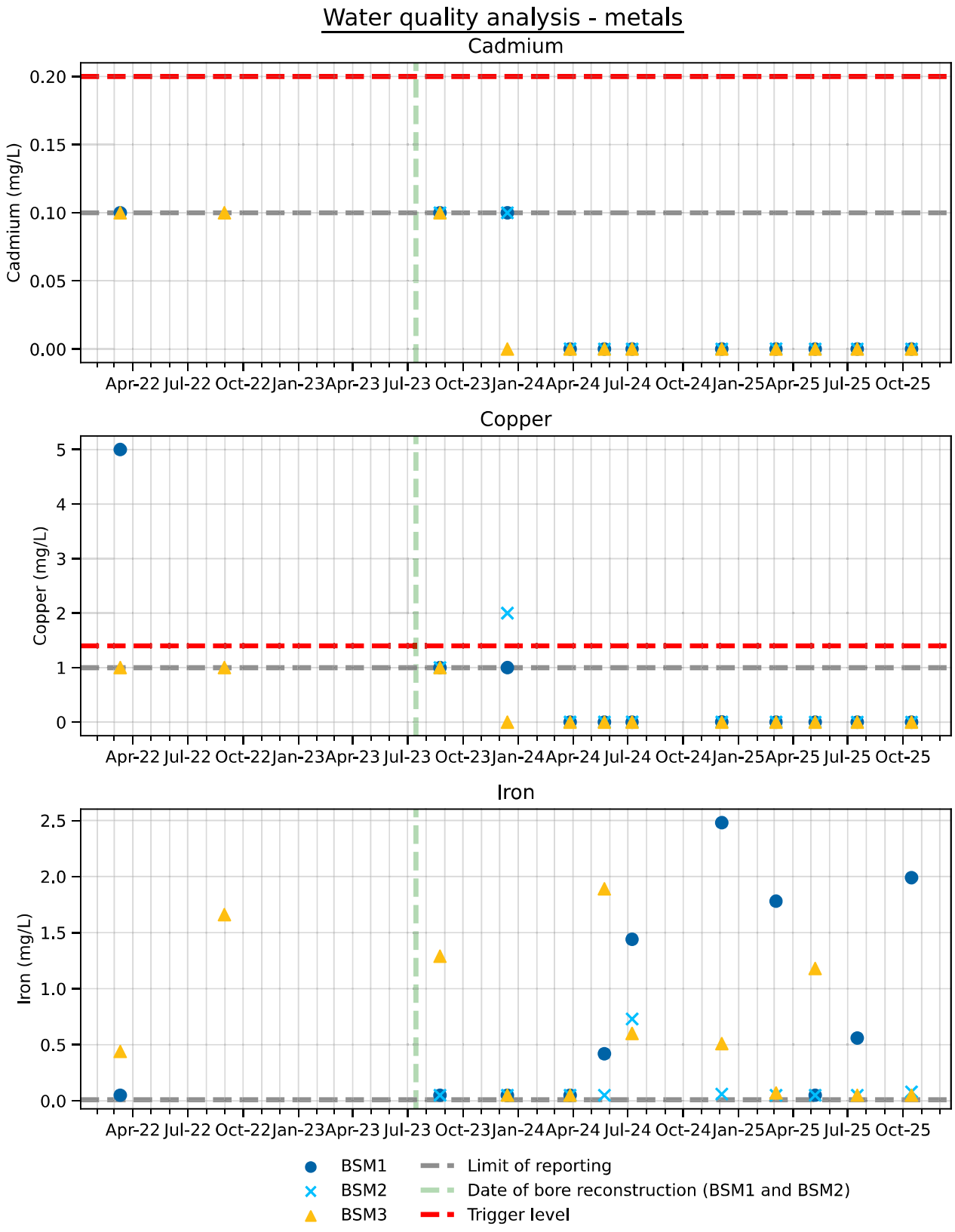



*Trigger values based on upgradient bore (BSM1).



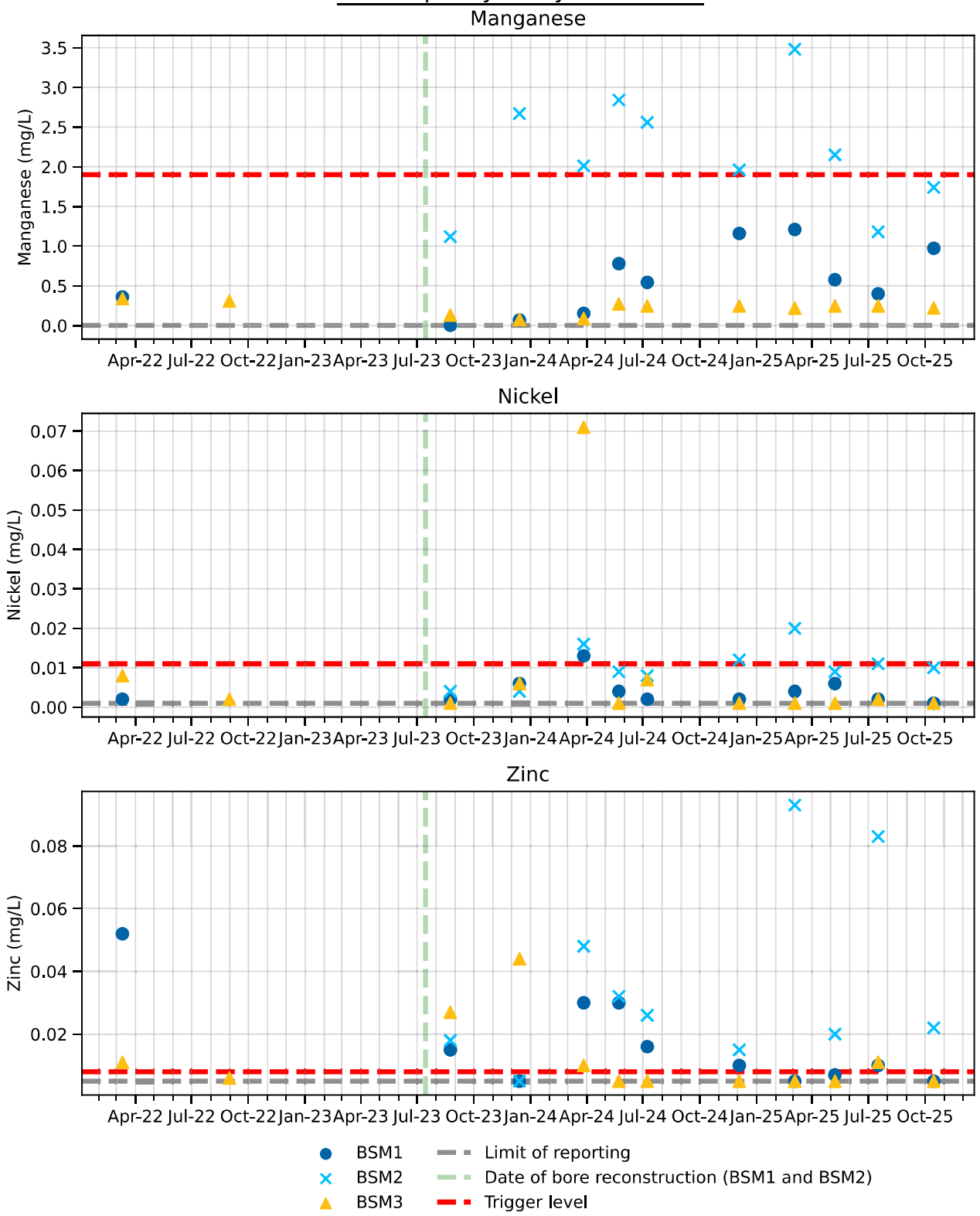

*Trigger values based on upgradient bore (BSM1).

## D.2 Timeseries water quality charts – metals




*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

# Water quality analysis - metals




*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

# Appendix E
## Laboratory certificates

EMM
creating opportunities

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2532122** | Page | : 1 of 4 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Oct-2025 14:00 |
| Order number | : ---- | Date Analysis Commenced | : 17-Oct-2025 |
| C-O-C number | : ---- | Issue Date | : 22-Oct-2025 14:42 |
| Sampler | : JUDE LEWIS | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK067G/EK071G: It is recognised that total phosphorus is less than reactive phosphorus. However, the difference is within experimental variation of the methods.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QA | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2532122-001 | ES2532122-002 | ES2532122-003 | ES2532122-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | | |
| Suspended Solids (SS) | ---- | 5 | mg/L | | **147** | <5 | **25** | <5 | **----** |
| **ED093F: SAR and Hardness Calculations** | | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | | **836** | **2270** | **3580** | **2280** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | **0.002** | <0.001 | <0.001 | <0.001 | **----** |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | **----** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | **0.010** | <0.001 | **0.010** | **----** |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Selenium | 7782-49-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.022** | <0.005 | **0.023** | **----** |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.973** | **1.74** | **0.220** | **1.72** | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | | **0.06** | <0.05 | <0.05 | <0.05 | **----** |
| Iron | 7439-89-6 | 0.05 | mg/L | | **1.99** | **0.08** | <0.05 | **0.09** | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | **----** |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | **0.68** | **0.22** | **5.56** | **0.22** | **----** |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | <0.01 | **0.32** | <0.01 | **0.17** | **----** |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | <0.01 | **462** | <0.01 | **457** | **----** |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | <0.01 | **462** | <0.01 | **457** | **----** |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QA | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | 15-Oct-2025 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2532122-001 | ES2532122-002 | ES2532122-003 | ES2532122-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **1.4** | **9.6** | **5.8** | **9.7** | **----** |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **1.4** | **472** | **5.8** | **467** | **----** |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.06** | **0.04** | **0.04** | **0.04** | **----** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | <0.01 | **0.01** | **0.02** | **0.01** | **----** |
| **EP020: Oil and Grease (O&G)** | | | | | | | | | |
| Oil & Grease | ---- | 5 | mg/L | | <5 | <5 | <5 | <5 | **----** |

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2532122** | Page | : 1 of 7 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Oct-2025 |
| Order number | : ---- | Date Analysis Commenced | : 17-Oct-2025 |
| C-O-C number | : ---- | Issue Date | : 22-Oct-2025 |
| Sampler | : JUDE LEWIS | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 6936093)** | | | | | | | | | |
| EN2517522-007 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 11 | 9 | 22.8 | No Limit |
| ES2532120-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 9 | 8 | 11.4 | No Limit |
| ES2532141-003 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | <5 | 0.0 | No Limit |
| ES2532186-023 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 24 | 25 | 4.0 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 6936250)** | | | | | | | | | |
| ES2531978-001 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 (0.0010)* | mg/L | <0.0010 | <0.0010 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 (0.010) * | mg/L | 0.921 | 0.868 | 5.9 | 0% - 20% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 (0.010) * | mg/L | 0.032 | 0.029 | 8.1 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 (0.050) * | mg/L | 0.179 | 0.184 | 3.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 (0.10)* | mg/L | <0.10 | <0.10 | 0.0 | No Limit |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 6936250) - continued** | | | | | | | | | |
| ES2531978-001 | Anonymous | EG020A-F: Selenium | 7782-49-2 | 0.01 (0.10)* | mg/L | <0.10 | <0.10 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 (0.10)* | mg/L | 2.27 | 2.24 | 1.1 | 0% - 20% |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 (0.10)* | mg/L | 1.00 | 0.95 | 4.6 | No Limit |
| ES2531978-011 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | 0.002 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | 0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.014 | 0.013 | 0.0 | 0% - 50% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | 0.003 | 0.003 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | 0.012 | 0.012 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | 0.02 | 0.02 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 6936253)** | | | | | | | | | |
| ES2532122-002 | BSM2 | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 1.74 | 1.73 | 1.0 | 0% - 20% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | 0.010 | 0.010 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | 0.022 | 0.022 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | 0.08 | <0.05 | 42.1 | No Limit |
| ES2532280-001 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | 0.004 | 0.004 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.056 | 0.058 | 3.4 | 0% - 20% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 6936253) - continued** | | | | | | | | | |
| ES2532280-001 | Anonymous | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | 0.61 | 0.61 | 0.0 | 0% - 50% |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| **EG035F: Dissolved Mercury by FIMS (QC Lot: 6936252)** | | | | | | | | | |
| ES2532122-002 | BSM2 | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| **EK055G: Ammonia as N by Discrete Analyser (QC Lot: 6937285)** | | | | | | | | | |
| EN2517483-001 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.72 | 0.74 | 3.6 | 0% - 20% |
| ES2532049-004 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK057G: Nitrite as N by Discrete Analyser (QC Lot: 6936630)** | | | | | | | | | |
| EN2517394-001 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| ES2531904-003 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 6937286)** | | | | | | | | | |
| EN2517522-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| ES2532049-004 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 6937287)** | | | | | | | | | |
| ES2532127-005 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 0.04 | 0.04 | 0.0 | No Limit |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6937281)** | | | | | | | | | |
| EN2517522-001 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 0.7 | 0.7 | 0.0 | No Limit |
| ES2531865-005 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 0.7 | 0.4 | 62.0 | No Limit |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 6937283)** | | | | | | | | | |
| ES2532122-003 | BSM3 | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 5.8 | 5.5 | 5.7 | 0% - 20% |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 6937282)** | | | | | | | | | |
| ES2532122-003 | BSM3 | EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | 0.04 | 0.04 | 0.0 | No Limit |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 6936636)** | | | | | | | | | |
| ES2532122-001 | BSM1 | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |

## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Acceptable Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 6936093)** | | | | | | | | |
| EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | 150 mg/L | 106 | 83.0 | 129 |
| | | | | <5 | 1000 mg/L | 96.9 | 82.0 | 110 |
| | | | | <5 | 816 mg/L | 98.5 | 83.0 | 118 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 6936250)** | | | | | | | | |
| EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 101 | 80.0 | 116 |
| EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 104 | 85.0 | 114 |
| EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.1 mg/L | 100 | 84.0 | 110 |
| EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 102 | 85.0 | 111 |
| EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 102 | 81.0 | 111 |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 102 | 83.0 | 111 |
| EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 101 | 82.0 | 110 |
| EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 102 | 82.0 | 112 |
| EG020A-F: Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | 0.1 mg/L | 102 | 85.0 | 115 |
| EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.1 mg/L | 104 | 81.0 | 117 |
| EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 100 | 85.0 | 115 |
| EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 106 | 82.0 | 112 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 6936253)** | | | | | | | | |
| EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 98.2 | 80.0 | 116 |
| EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 109 | 85.0 | 114 |
| EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.1 mg/L | 102 | 84.0 | 110 |
| EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 99.0 | 85.0 | 111 |
| EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 105 | 81.0 | 111 |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 102 | 83.0 | 111 |
| EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 99.4 | 82.0 | 110 |
| EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 105 | 82.0 | 112 |
| EG020A-F: Selenium | 7782-49-2 | 0.01 | mg/L | <0.01 | 0.1 mg/L | 109 | 85.0 | 115 |
| EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.1 mg/L | 108 | 81.0 | 117 |
| EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 96.5 | 85.0 | 115 |
| EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 98.4 | 82.0 | 112 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 6936252)** | | | | | | | | |

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EG035F: Dissolved Mercury by FIMS (QCLot: 6936252) - continued** | | | | | | | | |
| EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | 0.01 mg/L | 89.7 | 83.0 | 105 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 6937285)** | | | | | | | | |
| EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 97.6 | 90.0 | 114 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 6936630)** | | | | | | | | |
| EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 101 | 82.0 | 114 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6937286)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 103 | 91.0 | 113 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6937287)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 99.5 | 91.0 | 113 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6937281)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | 5 mg/L | 103 | 69.0 | 123 |
| | | | | <0.1 | 2.5 mg/L | 103 | 70.0 | 123 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6937283)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | 5 mg/L | 102 | 69.0 | 123 |
| | | | | <0.1 | 2.5 mg/L | 104 | 70.0 | 123 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6937282)** | | | | | | | | |
| EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | <0.01 | 2.21 mg/L | 98.4 | 71.3 | 126 |
| | | | | <0.01 | 0.5 mg/L | 82.7 | 71.3 | 126 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6936636)** | | | | | | | | |
| EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 102 | 85.0 | 117 |
| **EP020: Oil and Grease (O&G) (QCLot: 6940215)** | | | | | | | | |
| EP020: Oil & Grease | ---- | 5 | mg/L | <5 | 5000 mg/L | 99.8 | 81.0 | 121 |
| | | | | <5 | 4000 mg/L | 93.1 | 70.0 | 110 |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | SpikeRecovery(%): MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 6936250)** | | | | | | | |
| ES2531978-002 | Anonymous | EG020A-F: Arsenic | 7440-38-2 | 1 mg/L | 125 | 70.0 | 130 |
| | | EG020A-F: Cadmium | 7440-43-9 | 0.25 mg/L | 98.4 | 70.0 | 130 |
| | | EG020A-F: Chromium | 7440-47-3 | 1 mg/L | 91.6 | 70.0 | 130 |

Sub-Matrix: **WATER**

| | | | | Matrix Spike (MS) Report | | | |
|---|---|---|---|---|---|---|---|
| | | | | Spike | SpikeRecovery(%) | Acceptable Limits (%) | |
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *Concentration* | *MS* | *Low* | *High* |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 6936250) - continued** | | | | | | | |
| ES2531978-002 | Anonymous | EG020A-F: Copper | 7440-50-8 | 1 mg/L | 112 | 70.0 | 130 |
| | | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 93.4 | 70.0 | 130 |
| | | EG020A-F: Manganese | 7439-96-5 | 1 mg/L | 93.6 | 70.0 | 130 |
| | | EG020A-F: Nickel | 7440-02-0 | 1 mg/L | 110 | 70.0 | 130 |
| | | EG020A-F: Zinc | 7440-66-6 | 1 mg/L | 111 | 70.0 | 130 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 6936253)** | | | | | | | |
| ES2532122-003 | BSM3 | EG020A-F: Arsenic | 7440-38-2 | 1 mg/L | 122 | 70.0 | 130 |
| | | EG020A-F: Cadmium | 7440-43-9 | 0.25 mg/L | 97.6 | 70.0 | 130 |
| | | EG020A-F: Chromium | 7440-47-3 | 1 mg/L | 92.4 | 70.0 | 130 |
| | | EG020A-F: Copper | 7440-50-8 | 10 mg/L | 93.2 | 70.0 | 130 |
| | | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 90.7 | 70.0 | 130 |
| | | EG020A-F: Manganese | 7439-96-5 | 1 mg/L | 91.4 | 70.0 | 130 |
| | | EG020A-F: Nickel | 7440-02-0 | 1 mg/L | 108 | 70.0 | 130 |
| | | EG020A-F: Zinc | 7440-66-6 | 1 mg/L | 109 | 70.0 | 130 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 6936252)** | | | | | | | |
| ES2532122-001 | BSM1 | EG035F: Mercury | 7439-97-6 | 0.01 mg/L | 75.4 | 70.0 | 130 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 6937285)** | | | | | | | |
| EN2517483-001 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.5 mg/L | 112 | 70.0 | 130 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 6936630)** | | | | | | | |
| EN2517394-001 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.5 mg/L | 105 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6937286)** | | | | | | | |
| EN2517522-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.5 mg/L | 107 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 6937287)** | | | | | | | |
| ES2532127-005 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.5 mg/L | 108 | 70.0 | 130 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6937281)** | | | | | | | |
| EN2517529-020 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 50 mg/L | 82.9 | 70.0 | 130 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 6937283)** | | | | | | | |
| ES2532122-004 | QA | EK061G: Total Kjeldahl Nitrogen as N | ---- | 100 mg/L | 76.6 | 70.0 | 130 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 6937282)** | | | | | | | |
| ES2532122-004 | QA | EK067G: Total Phosphorus as P | ---- | 1 mg/L | 83.8 | 70.0 | 130 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 6936636)** | | | | | | | |
| ES2532122-001 | BSM1 | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.5 mg/L | 102 | 70.0 | 130 |

# QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2532122** | Page | : 1 of 7 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Oct-2025 |
| Site | : ---- | Issue Date | : 22-Oct-2025 |
| Sampler | : JUDE LEWIS | No. of samples received | : 4 |
| Order number | : ---- | No. of samples analysed | : 4 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

### *Outliers : Analysis Holding Time Compliance*

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

### *Outliers : Frequency of Quality Control Samples*

- **NO Quality Control Sample Frequency Outliers exist.**

## Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

| Method / Container / Client Sample ID(s) | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|
| | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | |
| **Clear Plastic Bottle - Natural** | | | | | | |
| BSM1, BSM2, BSM3, QA | ---- | ---- | ---- | 18-Oct-2025 | 17-Oct-2025 | **1** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | |
| **Clear Plastic Bottle - Natural** | | | | | | |
| BSM1, BSM2, BSM3, QA | ---- | ---- | ---- | 18-Oct-2025 | 17-Oct-2025 | **1** |

# Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | |
| **Clear Plastic Bottle - Natural (EA025H)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | **----** | **17-Oct-2025** | 22-Oct-2025 | ✓ |
| **ED093F: SAR and Hardness Calculations** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | **----** | **17-Oct-2025** | 12-Nov-2025 | ✓ |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | **----** | **17-Oct-2025** | 13-Apr-2026 | ✓ |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | **----** | **20-Oct-2025** | 12-Nov-2025 | ✓ |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK055G)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | ---- | **18-Oct-2025** | 12-Nov-2025 | ✓ |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK057G)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | ---- | **18-Oct-2025** | 17-Oct-2025 | × |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | ---- | **17-Oct-2025** | 12-Nov-2025 | ✓ |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM1 | **15-Oct-2025** | **----** | ---- | ---- | **18-Oct-2025** | 12-Nov-2025 | ✓ |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM2, QA | **15-Oct-2025** | **17-Oct-2025** | 12-Nov-2025 | ✓ | **17-Oct-2025** | 12-Nov-2025 | ✓ |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM1, BSM3 | **15-Oct-2025** | **17-Oct-2025** | 12-Nov-2025 | ✓ | **18-Oct-2025** | 12-Nov-2025 | ✓ |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK067G)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **17-Oct-2025** | 12-Nov-2025 | ✓ | **18-Oct-2025** | 12-Nov-2025 | ✓ |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK071G)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | ---- | **18-Oct-2025** | 17-Oct-2025 | × |
| **EP020: Oil and Grease (O&G)** | | | | | | | |
| **Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)** | | | | | | | |
| BSM1, BSM2, BSM3, QA | **15-Oct-2025** | **----** | ---- | ---- | **20-Oct-2025** | 12-Nov-2025 | ✓ |

# Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 4 | 38 | **10.53** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 3 | 27 | **11.11** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 2 | 11 | **18.18** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 4 | 40 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 3 | 28 | **10.71** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 10 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 38 | **5.26** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 27 | **7.41** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 4 | 50 | **8.00** | **8.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 5 | 40 | **12.50** | **12.50** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 6 | 28 | **21.43** | **15.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 10 | **20.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 38 | **5.26** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 27 | **7.41** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 3 | 50 | **6.00** | **6.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 2 | 40 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 2 | 28 | **7.14** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 10 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 38 | **5.26** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 27 | **7.41** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| Matrix Spikes (MS) - Continued | | | | | | | |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 2 | 28 | **7.14** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 10 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Suspended Solids (High Level) | EA025H | WATER | In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3) |
| Major Cations - Dissolved | ED093F | WATER | In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3) |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| Dissolved Mercury by FIMS | EG035F | WATER | In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3). |
| Ammonia as N by Discrete analyser | EK055G | WATER | In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrite as N by Discrete Analyser | EK057G | WATER | In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrate as N by Discrete Analyser | EK058G | WATER | In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3) |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | WATER | In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | WATER | In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Total Nitrogen as N (TKN + Nox) By Discrete Analyser | EK062G | WATER | In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3) |

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Total Phosphorus as P By Discrete Analyser | EK067G | WATER | In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | WATER | In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Oil and Grease | EP020 | WATER | In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3) |

| Preparation Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| TKN/TP Digestion | EK061/EK067 | WATER | In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3) |

# CHAIN OF CUSTODY

ALS Laboratory: please tick →


ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com


| | | | |
|---|---|---|---|
| CLIENT: EMM Consulting Pty Ltd | TURNAROUND REQUIREMENTS : ☑ Standard TAT (List due date): | FOR LABORATORY USE ONLY (Circle) Client Drop-off | |
| OFFICE: Sydney | (Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date): | Custody Seal Intact? | Yes No (N/A) |
| PROJECT: E240981 PROJECT NO E240981 | ALS QUOTE NO.: EN/111/25 | Free ice / frozen ice bricks present upon receipt? | (Yes) No N/A |
| ORDER NUMBER: PURCHASE ORDER NO.: | COUNTRY OF ORIGIN: Australia | Random Sample Temperature on Receipt | 6.1°C, 7.3°C 7.9°C |
| PROJECT MANAGER: Tasman Coupe CONTACT PH: 0439 694 514 | COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7 | Other comment: 1 HARD ESKY | |
| SAMPLER: Jude Lewis (JL) SAMPLER MOBILE: 0466 312 176 | RELINQUISHED BY: Jude Lewis | RECEIVED BY: Bulent (ALS CROWS NEST) | RELINQUISHED BY: |
| COC Emailed to ALS? Yes EDD FORMAT (or default): | DATE/TIME: 15/10/25 14:00 | DATE/TIME: 15/10/25 14.00 pm | DATE/TIME: |
| Email Reports to: tcoupe@emmconsulting.com.au, esdat+emmwater@esdatlabsync.net | | | RECEIVED BY: |
| Email Invoice to: tcoupe@emmconsulting.com.au, payments@emmconsulting.com.au | | | DATE/TIME: 15/10/25 1905. |

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: All metals dissolved. Add Chromatograms to analysis report.

| ALS USE ONLY | SAMPLE DETAILS MATRIX: Solid(S) Water(W) | | | CONTAINER INFORMATION | | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (refer to codes below) | TOTAL BOTTLES | Total Suspended Solids (EA025H) | Nutrients (NT-8A) | Dissolved metals (W-30) Plus Boron and Manganese | Oil and grease (EP020) | Total hardness | | | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. TRH/BTEXN analysed both pre- and post- silica gel clean up (W-4 AND W-4SG). |
| | BSM1 | 15/10/25 | w | | 7 | x | x | x | x | x | | | | All metals dissolved. |
| | BSM2 | 15/10/25 | w | | 7 | x | x | x | x | x | | | | All metals dissolved. |
| | BSM3 | 15/10/25 | w | | 7 | x | x | x | x | x | | | | All metals dissolved. |
| | QA | 15/10/25 | w | | 7 | x | x | x | x | x | | | | All metals dissolved. |
| | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | |
| | | | | TOTAL | 28 | | | | | | | | | |

Environmental Division Sydney
Work Order Reference
ES2532122

Telephone : + 61-2-8784 8555

*Water Container Codes:* P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

# Appendix F
Field data

EMM
creating opportunities

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM1 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | JL | ☑ Gauging |
| **Client** | CPG | **Date** | 15/10/2025 11:30 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 15.353 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 30.02 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well casing moves from left to right | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI ProQuatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 11:48 | | | 6.86 | 3676 | -201.8 | 0.96 | 24.4 |
| | | | | | | | |
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| | |
|---|---|
| **Comments** | Clear, slight sulfuric odour, no sheen |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM1 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 7 |

| | |
|---|---|
|  | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: 55.99° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM2 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | JL | ☑ Gauging |
| **Client** | CPG | **Date** | 15/10/2025 10:47 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 9.757 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 29.63 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well cap secure | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI ProQuatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 11:10 | | | 6.68 | 21019 | -129.6 | 0.77 | 31.8 |
| | | | | | | | |
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| | | | | | | | |
| **Comments** | Clear, no odour or sheen | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM2 |
| **QC Sample ID (if applicable)** | QA |
| **Number of bottles collected** | 14 |

| | |
|---|---|
|  | |
| **Photo 1** | **Photo 2** |
| Location: 150.71864274166666 / -33.872757166666666 | Location: / |
| Direction: 139.64° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM3 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | JL | ☑ Gauging |
| **Client** | CPG | **Date** | 15/10/2025 10:14 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 12.549 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 31.54 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well cap secure, logger in well | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI ProQuatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 10:33 | | | 6.82 | 25131 | -337.7 | 0.12 | 29.1 |
| | | | | | | | |
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| | | | | | | | |

| | |
|---|---|
| **Comments** | Clear, sulfuric odour, no sheen |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM3 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 7 |

| | |
|---|---|
|  |  |
| **Photo 1** | **Photo 2** |
| Location: 150.71952105 / -33.87522512777778 | Location: / |
| Direction: 234.6° clockwise from north | Direction: 275.61° clockwise from north |

| | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Quarry pit - morning |
| **Project** | Luddenham Quarry | **Field staff** | JL |
| **Client** | CPG | **Date** | 15/10/2025 09:41 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | -33.8755455 | **Longitude** | 150.719635 |
| **Weather** | Clear, sunny | | |

☑ **Dry weather event** ☐ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Still |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Not sampled |
| **Water quality meter model** | YSI ProQuatro |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | 31.5 |
| **pH** | 8.09 | **Dissolved oxygen (mg/L)** | 6.36 |
| **Electrical conductivity (uS/cm)** | 4914 | **Temperature (degC)** | 24.8 |
| **Comments** | Clear, no odour or sheen | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | no |
| **Field filtered for metals?** | |
| **Sample ID** | |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | |

| Upstream | |
|---|---|
|  |  |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: 175.09° clockwise from north | Direction: 219.38° clockwise from north |

| Downstream | |
|---|---|
|  | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: 262.72° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Quarry pit - afternoon |
| **Project** | Luddenham Quarry | **Field staff** | JL |
| **Client** | CPG | **Date** | 15/10/2025 12:08 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | | **Longitude** | |
| **Weather** | Clear, sunny | | |
| ☑ **Dry weather event** | | ☐ **Wet weather event (rain in previous 24 hrs)** | |
| **Site description** | Still | | |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Not sampled |
| **Water quality meter model** | YSI ProQuatro |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | -37.4 |
| **pH** | 8.52 | **Dissolved oxygen (mg/L)** | -0.05 |
| **Electrical conductivity (uS/cm)** | 5100 | **Temperature (degC)** | 27.6 |
| **Comments** | Clear, no odour or sheen | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | no |
| **Field filtered for metals?** | |
| **Sample ID** | |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Appendix G
## Calibration certificates

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# Certificate of Service and Calibration

## Water Quality Meter

## YSI Professional Plus

| | |
|---|---|
| **Company Name** | WAM Scientific |
| **Office Address** | 26 Bungarra Crescent, Chipping Norton NSW 2170 |
| **Phone Number** | +61 405 241 484 |
| **Contact Name** | William Pak |
| **Instrument** | YSI Pro Quatro Water Quality Meter w/ 1m Quatro Cable |
| **Serial Number** | 21H103046 |
| **Client Name** | Jude Lewis, Tasman Coupe (EMM) |
| **Project Number** | E240981-W16 |
| **Comments** | - |

**Instrument Check**

| Item | Test | Test Passed | Comments |
|---|---|---|---|
| 2 x Alkaline C-size Batteries | Klein Tools MM300 Multimeter | ✓ | Both batteries reading above 2.9V |
| Battery Saver Function | Operation | ✓ | Automatically turns off after 60 minutes if idle |
| Unit Display | Operation | ✓ | Screen visible, no damage |
| Keypad | Operation | ✓ | Responsive, no damage |
| Connection Port and Cable | Condition/Check | ✓ | Clean, no damage |
| Monitor Housing | Condition/Check | ✓ | No damage |
| Firmware | Version | ✓ | 4.0.0 |
| pH Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| pH millivolts for pH 7.00 | Calibration | ✓ | pH 7.00 calibration range between 0 mV ± 50 mV |
| pH millivolts for pH 4.00 | Calibration | ✓ | pH 4 mV range +165 to +180 from 7 buffer mV value |
| pH slope | Calibration | ✓ | Range between 55 to 60 mV/pH (ideal value 59 mV) |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| ORP Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| ORP Reading | Calibration | ✓ | Within ± 80 mV of reference Zobell Reading |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| Conductivity/Temp Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| Conductivity Cell | Calibration | ✓ | Conductivity cell constant 5.0 ± 1.0 in GLP file |
| Clean Sensor Readings | Calibration | ✓ | Clean sensor reads less than 3 uS/cm in dry air |
| Dissolved Oxygen Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| DO Cap | Condition/Calibration | ✓ | 1.25 mil PE membrane (yellow membrane) |
| DO Sensor in Use | Condition | ✓ | Polarographic DO sensor |
| DO Sensor Value | Calibration | ✓ | (min 4.31 uA - max 8.00 uA) Avg 6.15 uA |

**Instrument Readings**

| Parameter | Standard Used | Reference No. | Calibration Value | Observed | Actual | Units |
|---|---|---|---|---|---|---|
| Temperature | Centre 370 Thermometer | Room Temp. | 16.7 | 15.9 | 16.7 | °C |
| pH | pH 4.00 | 417183 | 4.01 | 3.90 | 4.01 | pH |
| pH | pH 7.00 | 419528 | 7.00 | 6.95 | 7.00 | pH |
| ORP | Zobell A & B | 420448/418958 | 247.3 | 249.2 | 247.3 | mV |
| Conductivity | 2760 µs/cm at 25°C | 399819 | 2760 | 2979 | 2760 | µs/cm |
| Zero Dissolved $O_2$ | $NaSO_3$ in Distilled $H_2O$ | 426184 | 0.0 | -0.3 | 0.0 | % |
| 100% Dissolved $O_2$ | 100% Air Saturated $H_2O$ | Fresh Air | 100.0 | 95.1 | 100.0 | % |

**Declaration**

**WAM Scientific** certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

| | |
|---|---|
| **Calibrated By** | William Pak |
| **Calibration Date** | 13/10/2025 |
| **Calibration Due** | 13/04/2026 |

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# Memorandum

13 February 2026

To: Elena Ivanova
Environmental & Planning Manager
Coombes Property Group

From: Tasman Coupe

**Subject: Luddenham Quarry soil and water management plan monitoring results (Q2 - 2025/2026)**

Dear Elena,

## 1 Background

This memorandum details groundwater monitoring activities undertaken by EMM Consulting Pty Ltd (EMM) on behalf of Coombes Property Group (CPG) at Luddenham Quarry, 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, referred to herein as the site). The groundwater and surface water quality monitoring works were undertaken as part of the groundwater and surface water monitoring program outlined in the Soil and Water Management Plan (SWMP, EMM 2021).

The monitoring program commenced in March 2022 and involves quarterly groundwater and annual surface water monitoring of water quality parameters, groundwater levels and contaminants of potential concern (CoPC) at seven pre-existing locations. The sampling locations comprise three groundwater locations (BSM1, BSM2 and BSM3) and four surface water locations (downstream, upstream, quarry pit and water management dam). Monitoring locations are detailed in Appendix A.

Prior to this monitoring round, previous monitoring events have occurred on the following dates: 11 March 2022, 31 August 2022, 24 August 2023, 14 December 2023, 27 March 2024, 23 May 2024, 7 August 2024, 4 December 2024. 4 March 2025, 7 May 2025, 17 July 2025 and 15 October 2025.

## 2 Program overview

The groundwater and surface water monitoring documented in this report was undertaken by a suitably qualified EMM Environmental Engineer on 13 January 2026 for the December 2025 to February 2026 monitoring period (Q2 of the 2025–2026 annual review period).

## 2.1 Rainfall context

The Bureau of Meteorology operates a rain gauge at Badgerys Creek [approximately 3 kilometres (km)] from the site – Station number: 067108. A total of 5.2 mm of rain was recorded at the station in the five days preceding the monitoring event. A total of 2.6 mm of rain was recorded on the day sampling was undertaken.

## 2.2 Water quality analytes

The analytical suite for the monitoring program is presented in Table 2.1. Physical and chemical stressors [except for total suspended solids (TSS)] were monitored in the field with a calibrated hand-held water quality meter. All other parameters were analysed at a National Association of Testing Authorities (NATA) accredited laboratory.

**Table 2.1 Water quality analytes**

| Category | Parameters | Analysis method |
|---|---|---|
| Physical and chemical stressors | Dissolved oxygen (DO), electrical conductivity (EC), pH, total dissolved solids (TDS), turbidity. | In the field with a calibrated hand-held water quality meter. |
| | Total suspended solids (TSS). | Analysis undertaken at NATA accredited laboratory. |
| Nutrients | Ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen, reactive phosphorus, total phosphorus. | |
| Dissolved metals | Aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc. | |
| Other | Total hardness, oil and grease. | |

Laboratory certificates are presented in Appendix E. Calibration certificates are provided in Appendix G.

## 2.3 Laboratory analysis

Water samples were transported to a NATA-accredited laboratory, Australian Laboratory Services (ALS) in Smithfield, NSW for analysis. Samples were received by the laboratory within the recommended holding times.

## 2.4 Quality assurance/quality control

Samples were collected in laboratory-provided sample containers with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain of custody protocols.

The field quality assurance/quality control (QA/QC) procedures used to establish precise, accurate, replicable reliable, and comparable results included:

- calibration of equipment by the supplier and testing by EMM staff prior before use
- keeping samples chilled
- submitting laboratory samples within holding times
- wearing disposable nitrile gloves during sampling at each sampling location
- using dedicated sampling equipment
- collection of a field duplicate sample.

QA/QC was assessed by calculating relative percentage difference (RPD) of the field duplicate ($S_{duplicate}$) sample to the parent sample ($S_{parent}$) as per the following equation.

$$Relative\ \%\ difference = \frac{|S_{parent} - S_{Dupilcate}|}{\frac{S_{parent} + S_{Dupilcate}}{2}} \times 100$$

Results were considered to confirm acceptable degree of data quality where RPDs were below 30%.

Most results for the monitoring round were within RPD limits (refer Appendix C), indicating adequate QA/QC. The RPD exceedances for TSS, ammonia and total phosphate were a result of low concentrations (<10x laboratory limit of reporting (LOR)) elevating the percentage difference reported. Only TKN reported an elevated RPD above the data quality limit. The duplicate result reported detectable concentrations whilst the primary sample was reported below LOR. This mirrors the result and is likely attributed to TSS concentrations. The duplicate reported concentration was within the historical range reported for TKN concentrations and was three orders of magnitude smaller than the respective nitrate concentration. Hence, this conformance outlier is not considered likely to impact the conclusions or overall data quality of the investigation.

# 3 Monitoring results

Analytical results are discussed in the following sections. Groundwater and surface water analytical results are reported in the appendices (Appendix B – Groundwater levels, Appendix C – Water quality monitoring results, Appendix D – Water quality timeseries charts).

## 3.1 Groundwater levels

Groundwater levels were monitored using an interface probe at each of the three groundwater monitoring bores during sampling. Based on the requirements outlined in the SWMP (EMM, 2021)[1], a water level deviation of two metres (m) from the long-term median groundwater level in the quarry monitoring bores is considered a trigger for further action in accordance with the groundwater trigger action response plan (Table B.2, EMM 2021). Two m was adopted as the trigger as the deviation value aligns with the minimal impact considerations of the aquifer interference activities stated in the NSW Aquifer Interference Policy (DPI 2012).

Following recommendations in the March 2025 groundwater monitoring memorandum (EMM 2025), a resurvey of the groundwater bores was undertaken by Total Surveying Solutions on 14 April 2025. Groundwater levels since the May 2025 monitoring period have been calculated based on the resurveyed monitoring bore data. Groundwater and survey data are presented in Appendix B. For context, the average baseline and subsequent upper and lower trigger values are presented in Table 3.1.

[1] EMM, 2021. *Luddenham Quarry Soil and Water Management Plan. Doc Ref: J190749 RP49.* 22 September 2021

**Table 3.1 Water level trigger values**

| Bore ID | Average Baseline (mAHD) | Upper SWL Trigger (mAHD) | Lower SWL Trigger (mAHD) | January 2026 SWL (mAHD) |
|---|---|---|---|---|
| BSM1 | 58.13 | 60.13 | 56.13 | 57.75 |
| BSM2 | 50.68 | 52.68 | 48.68 | **53.06** |
| BSM3 | 46.29 | 48.29 | 44.29 | **50.05** |

Notes: **Bold font** used to highlight water level deviation of two metres from the long-term median groundwater level in the quarry monitoring bores. This is a trigger for further action as per the groundwater trigger action response plan (Table B.2, EMM 2021).

All three groundwater monitoring bores were within the historical range since the program commenced in March 2022.

BSM1 was within 2 m of the baseline average whilst both BSM2 and BSM3 were observed above the 2 m trigger as prescribed by the WMP (EMM 2021). Based on the survey data, it appears the bores have consistently exceeded the 2 m trigger across the 14 monitoring events at BSM1 (4 occasions), BSM2 (12 occasions) and BSM3 (14 occasions). This represents an increase and thus part of the TARP triggers relating to distance drawdown effects are not applicable.

Upon consultation with CPG, it is understood that no quantitative historical monitoring of the water level within the quarry pit has been undertaken. Despite this, anecdotal evidence indicates the base of the quarry pit to be approximately 30 metres below ground level (m bgl) with water observed covering a portion of the pit base. The depth to water within the measured monitoring bores ranged between 9.745 m bgl at BSM2 and 15.69 m bgl at BSM1. The standing water level in monitoring bores is believed to be more than 10m above the water level of the quarry pit which would indicate the pit is not the source of the sustained increase in water level measured at BSM2 and BSM3 during the January 2026 monitoring round.

## 3.2 Groundwater quality

Field observations for completed groundwater monitoring are presented in Table 3.2. Data collected in the field is presented in Appendix F.

**Table 3.2 Field observations (groundwater monitoring)**

| Time of sample | Groundwater monitoring bore | Description | Field comments/context |
|---|---|---|---|
| **Groundwater sampling locations** | | | |
| 13/01/2026 1:37 pm | BSM1 | Located hydraulically upgradient of the quarry pit, BSM2 and BSM3. Bore monitored to measure background contamination concentrations. Located near the western site boundary in the southern portion of the site, to the west of the site access/haul road. | Clear and colourless with black particulate, slight sulphurous odour, no sheen observed. |
| 13/01/2026 12:21 pm | BSM2 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Bore water was clear and colourless, with no odour or sheen observed during sampling.<br>A field duplicate was taken as a quality assurance (QA) sample at this bore. |

| Time of sample | Groundwater monitoring bore | Description | Field comments/context |
|---|---|---|---|
| 13/01/2026 11:22 am | BSM3 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Clear and colourless with black particulate, sulphurous odour, no sheen observed. |

Groundwater quality results are presented in Appendix C. Key observations of groundwater quality for the January 2026 monitoring period include the following:

- pH was recorded as slightly acidic to circumneutral (6.55–6.88) in the three groundwater monitoring bores sampled.
- Salinity, as indicated by EC, was lower in upgradient BSM1 [3,730 microsiemens per centimetre (µS/cm)] compared to downgradient bores BSM2 (20,238 µS/cm) and BSM3 (22,373 µS/cm), all reporting within historical ranges. BSM1 results are low, compared to baseline trends (22,560 µS/cm at BSM1) potentially indicating freshwater ingress.
- Monitoring bores BSM1 and BSM3 reported moderate to strongly reducing conditions. Monitoring bore BSM2 reported neutral to weak oxidising conditions. All three locations were reported with less reducing conditions than the previous monitoring round. No baseline median is available within previous reports for oxidation-reduction (Redox) potential. Collated historical data has been presented in a time series trend in Appendix D. There is a potential the monitoring locations are exhibiting a reducing trend with seasonal variability. This should be monitored during subsequent monitoring rounds.
- Nutrients remain present in all bores and elevated above baseline for nitrate in BSM2 (474 milligrams per litre (mg/L)). This represents the second highest reported nitrate concentration reported over the monitoring period. The three most recent rounds of monitoring (July and October 2025, and this round, January 2026) also reported the most elevated nitrate concentrations (462 mg/L and 684 mg/L) detected over the monitoring period. The source of the nitrate is unknown, with nearby sources potentially comprising fertiliser on nearby agricultural, country club and/or adjacent Western Sydney Airport (WSA) land.
- Elevated concentrations of manganese and zinc were detected in BSM2 (discussed in Section 3.4).
- Oil and grease were reported at concentrations less than the LOR.

## 3.3 Surface water quality

CPG requested review of surface water parameters in the quarry pit, whilst onsite. Field observations for completed surface water monitoring are presented in Table 3.3.

### Table 3.3 Field observations (surface water monitoring)

| Time of sample | Monitoring point | Site description | Field comments | Site photos |
|---|---|---|---|---|
| **Surface water sampling locations** | | | | |
| 13/01/2026 1:18 PM | Quarry Pit | Sample of quarry pit water in the northern portion of the pit. | Pit water was green, clear with no odour or sheen. Quarry pit water level was higher than the monitoring rounds last year. |  |

As the monitoring of the quarry pit was limited to field parameters during this round, results of monitoring are presented in Table 3.4.

### Table 3.4 Quarry pit monitoring results

| Field Parameter | Unit | January 2026 visit |
|---|---|---|
| Temp (Field) | °C | 29.1 |
| pH (Field) | - | 8.66 |
| EC (field) | µS/cm | 6066 |
| DO (Field) | mg/L | 0.0 |
| Redox Potential (Field) | mV | -19.1 |

Key observations of the surface water quality are summarised below:

- pH was recorded as slightly alkaline (8.66). This result supports the conclusion the measurement taken during a previous monitoring round (July 2025) was anomalous and is not representative of the water quality within the Quarry Pit. The results of this round (January 2026) is consistent with historical monitoring.
- EC was recorded within historical ranges, exhibiting brackish conditions.
- The quarry pond was recorded without dissolved oxygen (DO) during the January 2026 monitoring round, indicating anoxic conditions. DO has historically been highly variable within the Quarry pit.
- Redox potential indicated the quarry pit is exhibiting mildly reducing conditions. Given the recorded DO reading indicates oxygen levels within the quarry pit are depleted, this substantiates the recorded reducing (anerobic) environment.

## 3.4 Review of exceedances

Water quality results were reviewed for trigger exceedances, via comparison of default guideline values or comparison of other chemical properties to the upgradient bore (BSM1).

An assessment of exceedances including actions taken and recommendations for the groundwater monitoring is presented in Table 3.5.

### Table 3.5 Review of exceedances (groundwater)

| Exceedance description | Assessment and actions taken |
|---|---|
| **Nutrients** | |
| Oxidised nitrogen exceeded the upgradient bore (BSM1) concentrations (<0.01 mg/L) at BSM2, with the second highest concentration over the monitoring period at 475 mg/L. | Following sustained elevated and increasing nitrogen results in BSM2, profiling was undertaken during the July 2025 monitoring round to evaluate whether nitrogen concentrations varied at different depths within the screened water column. The reported concentration in the shallow sample (~1 m below standing water level) from BSM2 for nitrate, and subsequently total and oxidised nitrogen, was the detected. Total nitrogen concentration within the shallow sample (~1 m below standing water level) was approximately seven times higher than that of the sample taken from the middle of the screened water column in the same well. Subsequent sampling has targeted middle of the screened water column.<br>The nitrate concentration during this round (474 mg/L) was greater than the July monitoring round result at the middle of the screened water column (116mg/L) but was less than the shallow July nitrate concentration (692mg/L). The nitrate concentration during this round was the second highest on record.<br>Elevated nutrient concentrations were not detected in the background upgradient sample location.<br>Baseline data results were reviewed, where the following was noted:<br>• Total and oxidised nitrogen was noted to be significantly above the trigger value (upgradient bore comparison). The median baseline concentration at BSM2 of 21 mg/L, exceeds the median baseline for the upgradient bore of 0.137 mg/L.<br>• The reported concentration of 474 mg/L is greater than the median baseline concentration for nitrate (21 mg/L) with the upgradient bore (BSM1) reporting nitrate below detectable limits.<br>• No historical records of ammonia or total nitrogen were available.<br>• Reactive phosphorus marginally exceeded the LOR with upgradient bore reporting a concentration below detection limits.<br>Timeseries charts of nutrients exceedances were prepared to present trends in nutrient concentrations over the monitoring period (refer Appendix D). |
| Ammonia exceeded the upgradient bore (BSM1) concentration (0.79 mg/L) at BSM3 (6.58 mg/L). BSM3 also exceeded the ANZECC 95% protection level for freshwater (0.9 mg/L). | |
| Total nitrogen significantly exceeded the upgradient bore (BSM1) concentrations (2.3 mg/L) at BSM2, with a concentration of 475 mg/L. This exceedance is attributable to the nitrate concentration at BSM2. BSM3 also exceeded the upgradient bore with a concentration of 6.4 mg/L, attributed to the ammonia concentration. | |
| Reactive phosphorus exceeded the upgradient bore concentrations (<0.01 mg/L) at BSM2 and BSM3, with concentrations of 0.02 mg/L, at both locations. | |
| **Metals** | |
| Zinc exceeded the trigger values (1.9 mg/L) at BSM2 with reported concentrations of 2.09 mg/L and 2.15 mg/L (QC1). | Zinc was reported below baseline concentrations for BSM2. The reported concentration of zinc in BSM2 was lower than the previous round. |
| Zinc exceeded the trigger values (0.008 mg/L) at BSM2 with reported concentrations of 0.024 mg/L and 0.025 mg/L (QA). | Zinc was reported below baseline concentrations for BSM2. The reported concentration for zinc in BSM2 was lower than from the previous round. |

# 4 Summary and recommendations

The following provides a summary of additional investigations:

- Down gradient bores BSM2 and BSM3 were measured above the upper standing water level trigger value during the January 2026 monitoring event. All water levels were within the historical ranges. Sustained elevated water levels are not likely to be attributable to the site as the monitored water level is substantially greater than the reported base of the quarry pit and observed quarry pit water level.
- pH was recorded as slightly alkaline (8.66) within the Quarry Pit. The results of this round (January 2026) are consistent with historical monitoring, excluding the July 2025 monitoring round (where pH 2.05 was recorded).
- Oil and grease were not present at detectable concentrations during the January 2026 sampling round.
- No confirmed source has been identified for the elevated nutrient concentrations within monitoring bore BSM2. The site is surrounded by agricultural land, a country club and WSA which has been undertaking re-establishment of ground cover vegetation upstream of the site since 2021. The elevated standing water table, increased chloride (as identified previously by the laboratory as the source of matrix interference) in BSM2 support the possibility that widespread use of fertilisers around the site may have contributed to the reported increase in nutrients observed at monitoring bores at the site. Detailed surface water and groundwater monitoring associated with the WSA construction was not available for review to verify this potential source. Based on the sustained increasing trend following the cessation of quarry operations, the change appears unrelated to quarry activities.

The following recommendations are made for future monitoring:

- The next quarterly monitoring round should be undertaken as a groundwater and surface monitoring round in mid- April 2026 to meet the objectives of the SWMP and comply with the conditions of consent.
- Collated Redox potential results for the site should be continued, reviewing any time series trends.
- The annual recommended Mann-Kendall assessment, for analytes at sample locations exceeding the trigger values, should be undertaken as part of the April monitoring round.

Please contact the undersigned with any questions or clarifications.

Yours sincerely,

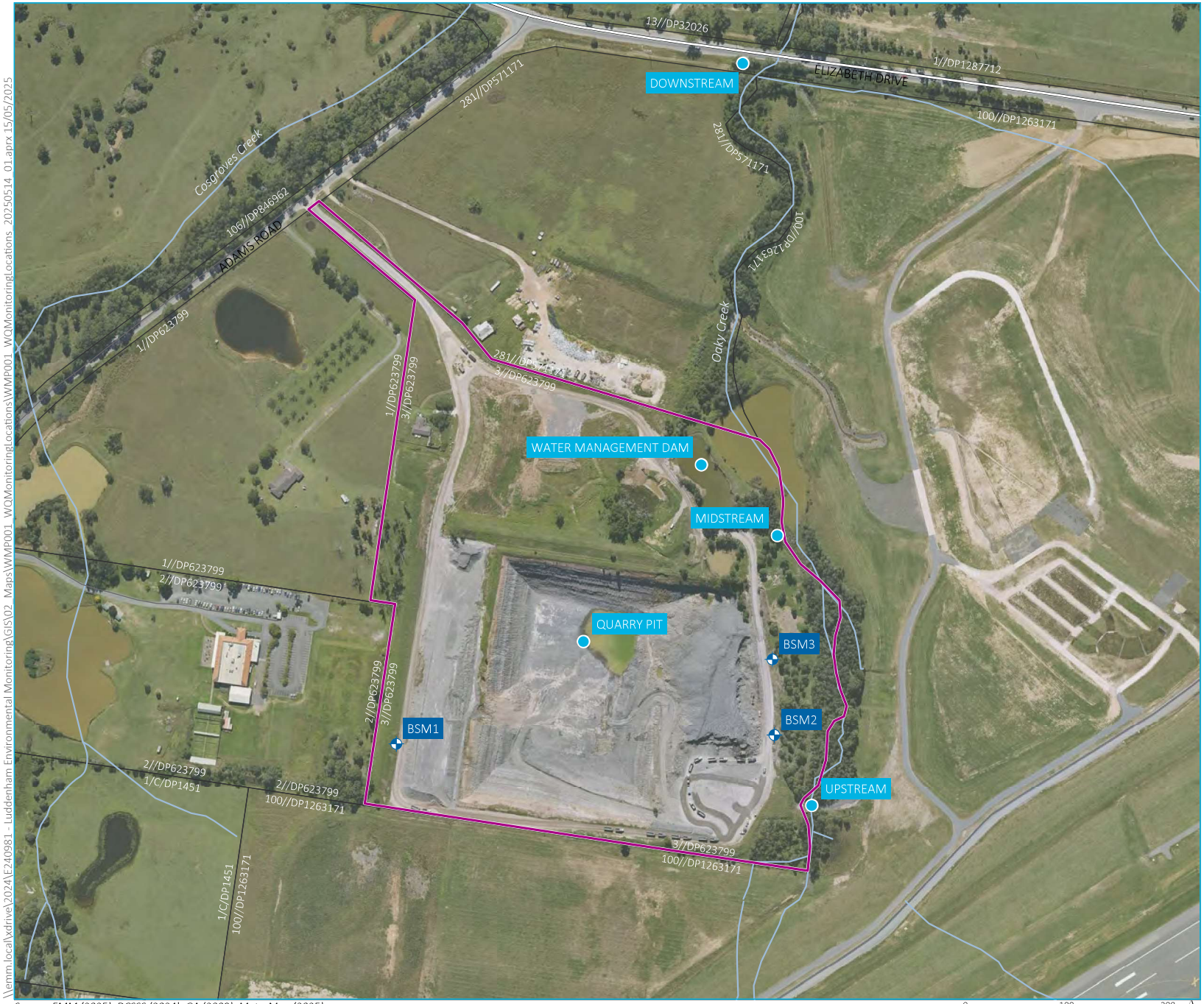


**Tasman Coupe**
Senior Environmental Engineer
tcoupe@emmconsulting.com.au

# Appendix A

## Water quality monitoring locations

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KEY

- Study area
- Groundwater monitoring bore
- Water quality monitoring location

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary

*Source: EMM (2025); DCSSS (2024); GA (2009); MetroMap (2025)*

Water quality monitoring locations

Luddenham Quarry
Water Management Plan
Figure 1

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\\emm.local\xdrive\2024\E240981 - Luddenham Environmental Monitoring\GIS\02_Maps\WMP001_WQMonitoringLocations\WMP001_WQMonitoringLocations_20250514_01.aprx 15/05/2025

# Appendix B
## Groundwater levels

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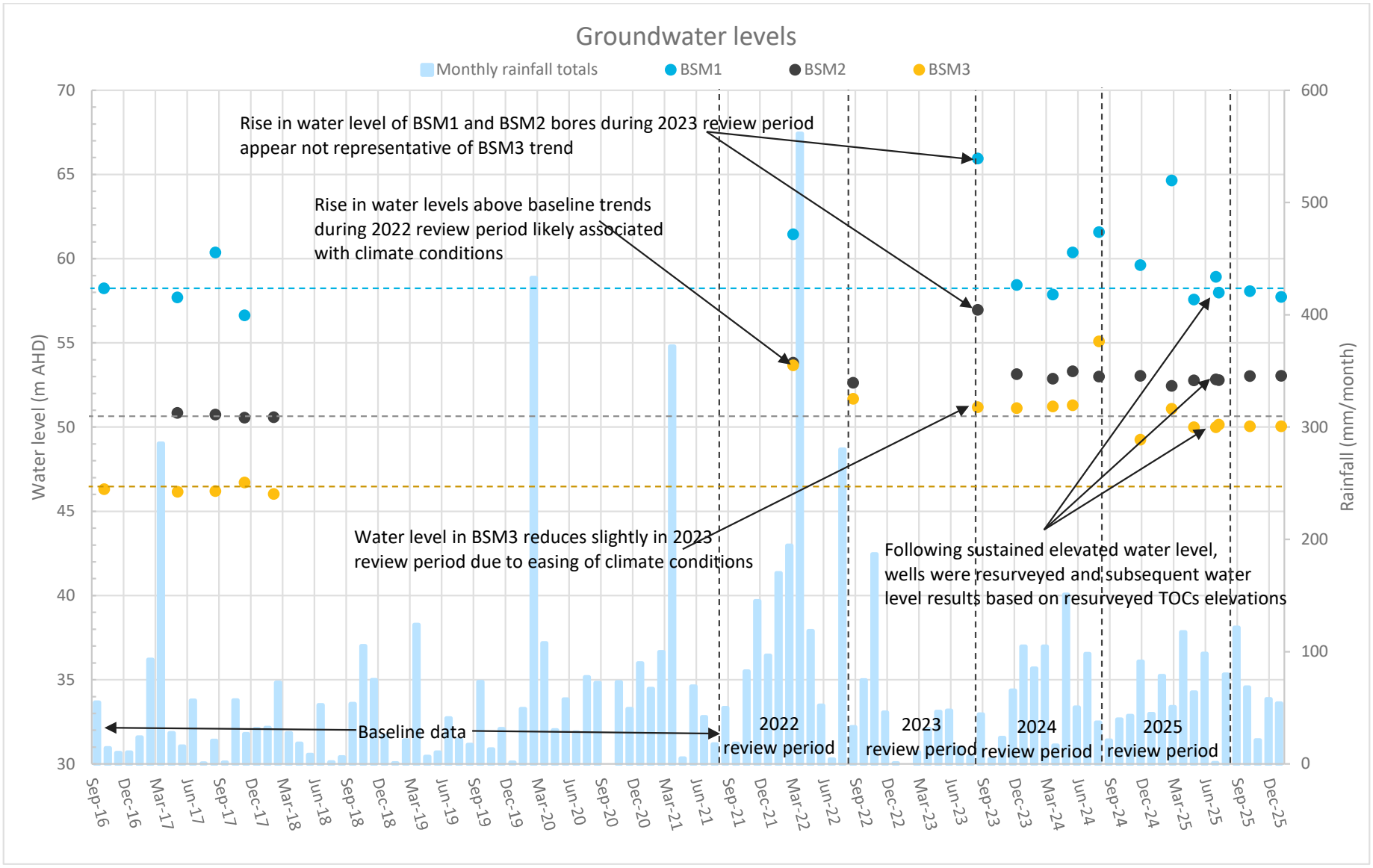



**Figure B.1** **Ground water levels**

# Appendix C

## Water quality monitoring results

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Location Code | BSM1 | BSM2 | BSM2 | BSM3 |
| | | | | Field ID | BSM1 | BSM2 | QC1 | BSM3 |
| | | | | Lab Report Number | ES2601174 | ES2601174 | ES2601174 | ES2601174 |
| | | | | Date | 13 Jan 2026 | 13 Jan 2026 | 13 Jan 2026 | 13 Jan 2026 |
| | Unit | EQL | ANZG (2018) freshwater 95% toxicant DGVs | Trigger values | | | | |
| **Field** | | | | | | | | |
| **Temp (Field)** | °C | 0.1 | | | 23.6 | 23.1 | - | 21.1 |
| **pH (Field)** | - | 0.01 | | 6.5-8.5 | 6.81 | 6.55 | - | 6.88 |
| **EC (field)** | µS/cm | 1 | | BSM1 | 3,730 | 20,238 | - | 22,373 |
| **DO (Field)** | mg/L | 0.1 | | | 0 | 1.76 | - | 0.92 |
| **TDS (Field)** | mg/L | 0.01 | | | 2,384 | 13,230 | - | 14,628 |
| **Redox Potential (Field)** | mV | 0.1 | | | -115.8 | 8.5 | - | -273.9 |
| **TSS** | mg/L | 5 | | BSM1 | 32 | <5 | 14 | 30 |
| **Inorganics** | | | | | | | | |
| **Hardness as $CaCO_3$ (filtered)** | mg/L | 1 | | | 632 | 2,090 | 2,160 | 3,560 |
| **Ammonia as N** | mg/L | 0.01 | 0.9 | BSM1 | 0.79 | 0.03 | 0.01 | 6.58 |
| **Nitrite (as N)** | mg/L | 0.01 | | | <0.01 | 0.80 | 0.78 | <0.01 |
| **Nitrate (as N)** | mg/L | 0.01 | | | <0.01 | 474 | 394 | <0.01 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | | BSM1 | <0.01 | 475 | 395 | <0.01 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | | | 2.3 | <0.1 | 5.8 | 6.4 |
| **Nitrogen (Total)** | mg/L | 0.1 | | BSM1 | 2.3 | 475 | 401 | 6.4 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | | BSM1 | <0.01 | 0.02 | 0.02 | <0.01 |
| **Total Phosphate (as P)** | MG/L | 0.01 | | BSM1 | 0.18 | 0.05 | 0.03 | 0.07 |
| **Metals** | | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | 0.055 | 0.055 | <0.01 | <0.01 | <0.01 | <0.01 |
| **Arsenic (filtered)** | mg/L | 0.001 | 0.013 | 0.013 | 0.001 | <0.001 | <0.001 | <0.001 |
| **Boron (filtered)** | mg/L | 0.05 | 0.94 | 0.37 | 0.07 | <0.05 | <0.05 | <0.05 |
| **Cadmium (filtered)** | mg/L | 0.0001 | 0.0002 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper (filtered)** | mg/L | 0.001 | 0.0014 | 0.0014 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Iron (filtered)** | mg/L | 0.05 | | | 1.48 | <0.05 | <0.05 | <0.05 |
| **Lead (filtered)** | mg/L | 0.001 | 0.0034 | 0.0034 | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese (filtered)** | mg/L | 0.001 | 1.9 | 1.9 | 0.661 | 2.09 | 2.15 | 0.190 |
| **Mercury (filtered)** | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Nickel (filtered)** | mg/L | 0.001 | 0.011 | 0.011 | 0.002 | 0.009 | 0.010 | <0.001 |
| **Selenium (filtered)** | mg/L | 0.004 | 0.005 | | <0.004 | <0.004 | <0.004 | <0.004 |
| **Zinc (filtered)** | mg/L | 0.005 | 0.008 | 0.008 | <0.005 | 0.024 | 0.025 | <0.005 |
| **TRH** | | | | | | | | |
| **Oil and Grease** | mg/L | 5 | | LOR | <5 | <5 | <5 | <5 |

**Environmental Standards**
DoE, 2018, ANZG (2018) freshwater slightly-moderately disturbed system toxicant DGVs
DoE, 2000, ANZECC 2000 FW 95%

| | | | | | |
|---|---|---|---|---|---|
| | | Location Code | BSM2 | BSM2 | |
| | | Field ID | BSM2 | QC1 | |
| | | Lab Report Number | ES2601174 | ES2601174 | |
| | | Date | 13 Jan 2026 | 13 Jan 2026 | |
| | | Matrix Type | Water | Water | RPD |
| | Unit | EQL | | | |
| **Field** | | | | | |
| **TSS** | mg/L | 5 | <5 | 14 | 95 |
| **Inorganics** | | | | | |
| **Hardness as $CaCO_3$ (filtered)** | mg/L | 1 | 2,090 | 2,160 | 3 |
| **Ammonia as N** | mg/L | 0.01 | 0.03 | 0.01 | 100 |
| **Nitrite (as N)** | mg/L | 0.01 | 0.80 | 0.78 | 3 |
| **Nitrate (as N)** | mg/L | 0.01 | 474 | 394 | 18 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | 475 | 395 | 18 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | <0.1 | 5.8 | 193 |
| **Nitrogen (Total)** | mg/L | 0.1 | 475 | 401 | 17 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | 0.02 | 0.02 | 0 |
| **Total Phosphate (as P)** | mg/L | 0.01 | 0.05 | 0.03 | 50 |
| **Metals** | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | <0.01 | <0.01 | 0 |
| **Arsenic (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 |
| **Boron (filtered)** | mg/L | 0.05 | <0.05 | <0.05 | 0 |
| **Cadmium (filtered)** | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 |
| **Copper (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 |
| **Iron (filtered)** | mg/L | 0.05 | <0.05 | <0.05 | 0 |
| **Lead (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 |
| **Manganese (filtered)** | mg/L | 0.001 | 2.09 | 2.15 | 3 |
| **Mercury (filtered)** | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 |
| **Nickel (filtered)** | mg/L | 0.001 | 0.009 | 0.010 | 11 |
| **Selenium (filtered)** | mg/L | 0.004 | <0.004 | <0.004 | 0 |
| **Zinc (filtered)** | mg/L | 0.005 | 0.024 | 0.025 | 4 |
| **TRH** | | | | | |
| **Oil and Grease** | mg/L | 5 | <5 | <5 | 0 |

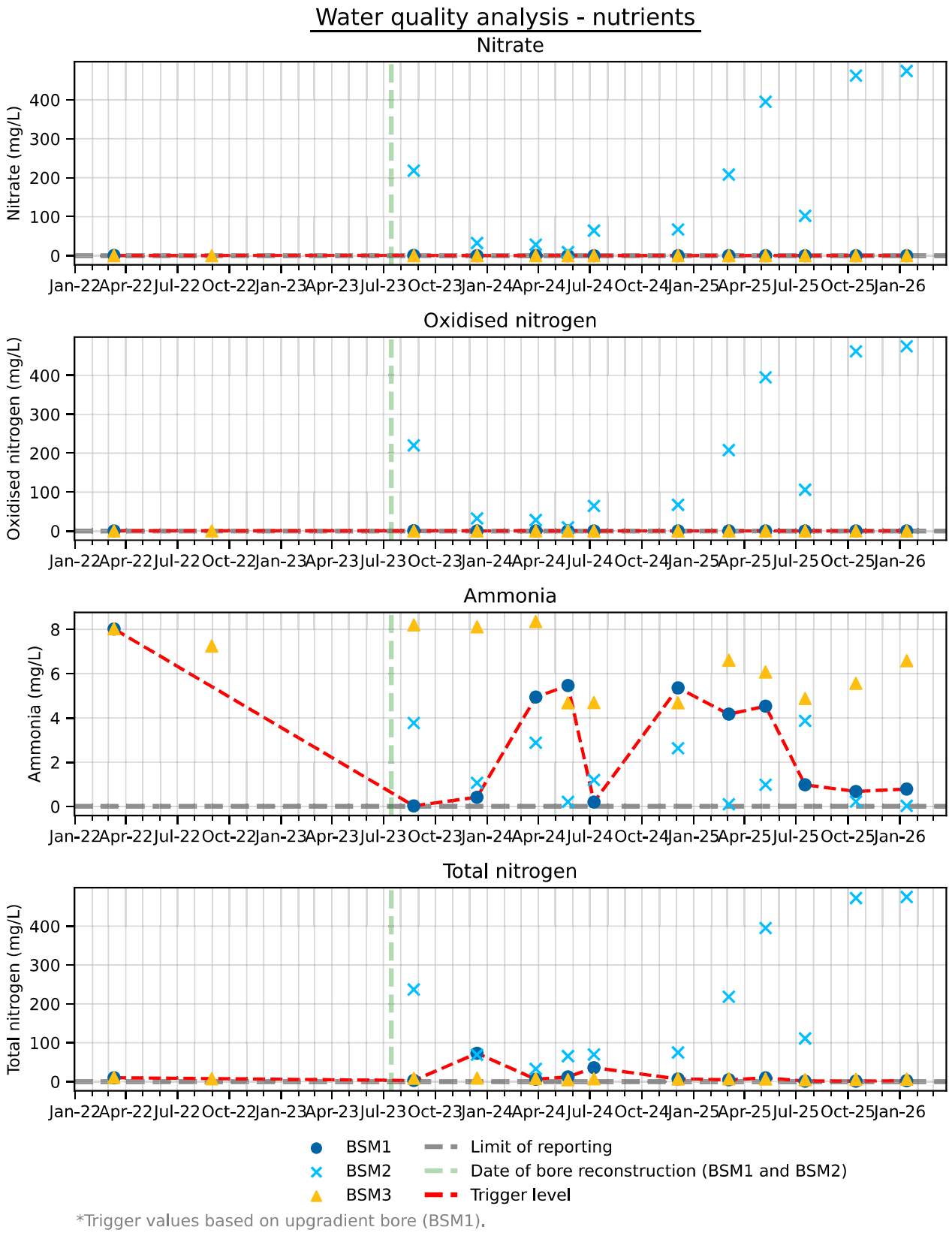
***RPDs have only been considered where a concentration is greater than 1 times the EQL.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 ( > 30 x EQL) )**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

# Appendix D

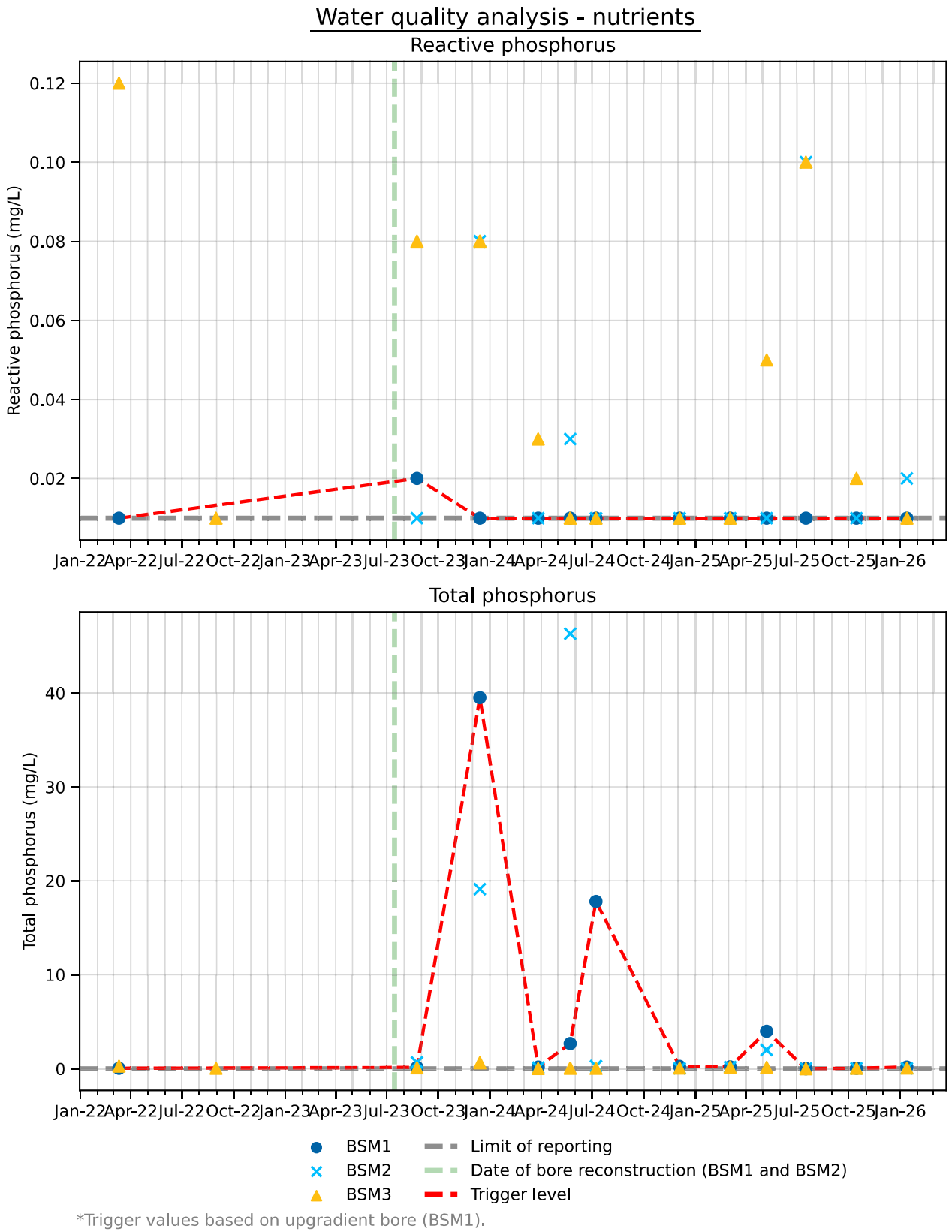
Water quality timeseries charts

EMM
creating opportunities

## D.1 Timeseries water quality charts – nutrients

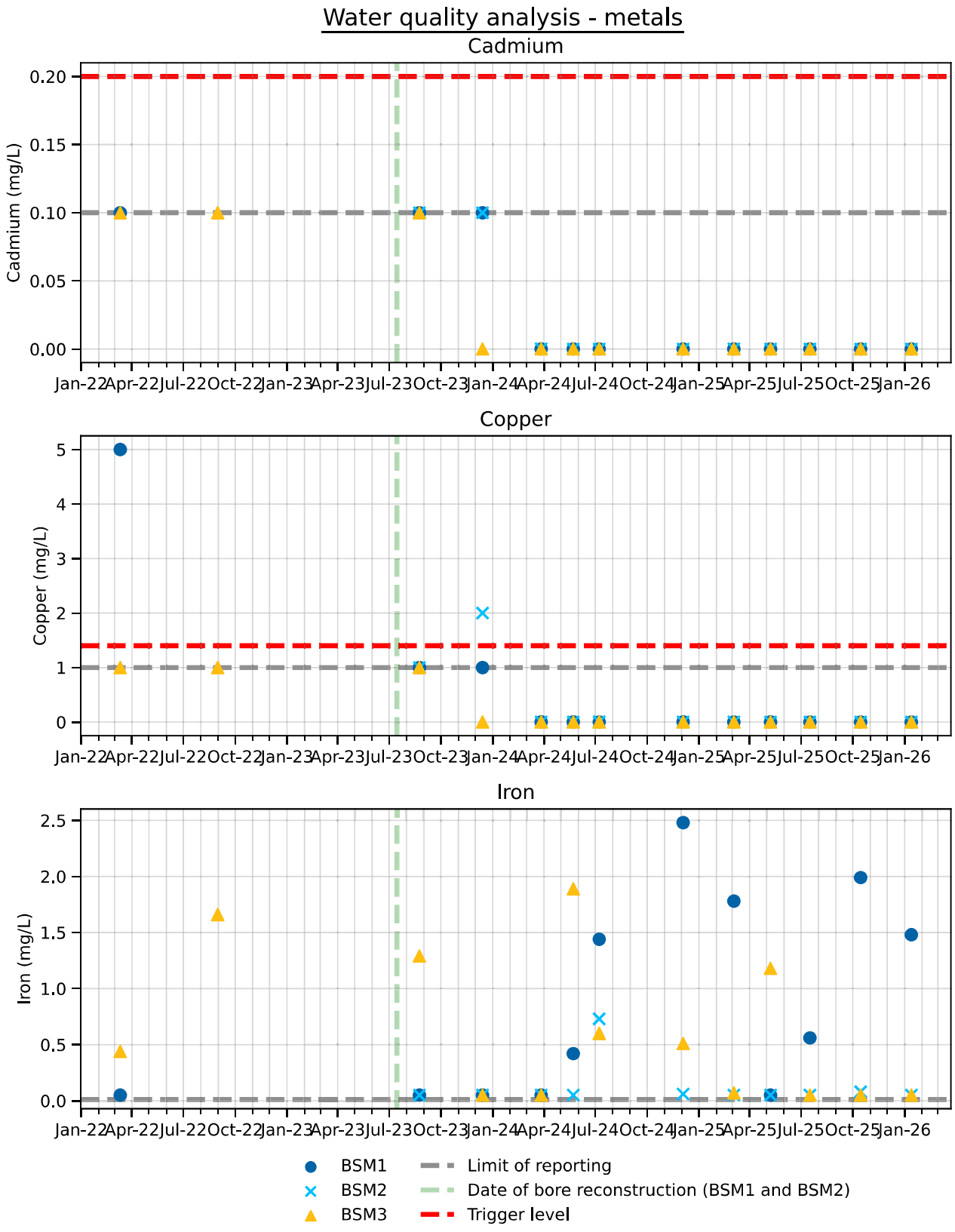



*Trigger values based on upgradient bore (BSM1).



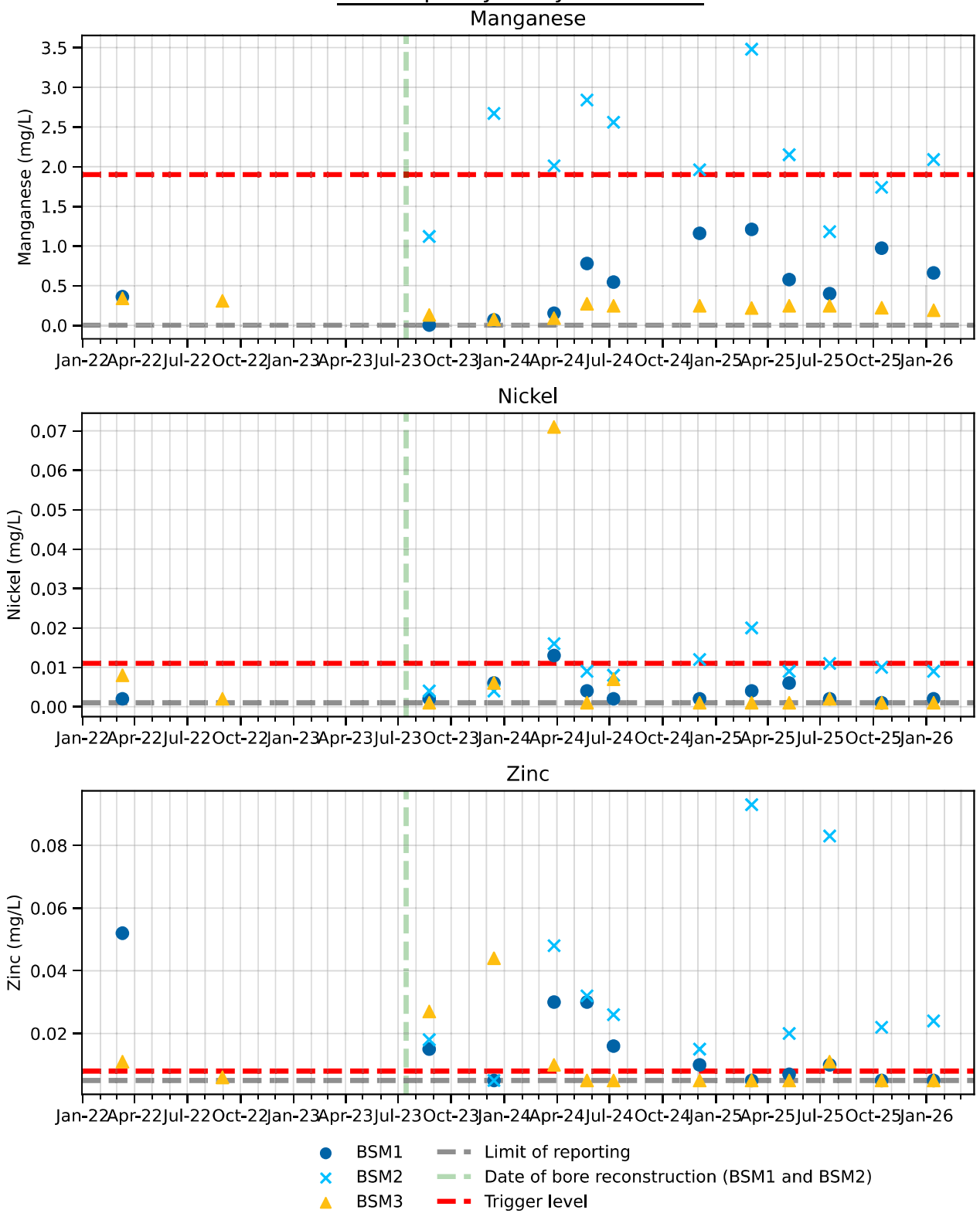

*Trigger values based on upgradient bore (BSM1).

## D.2 Timeseries water quality charts – metals



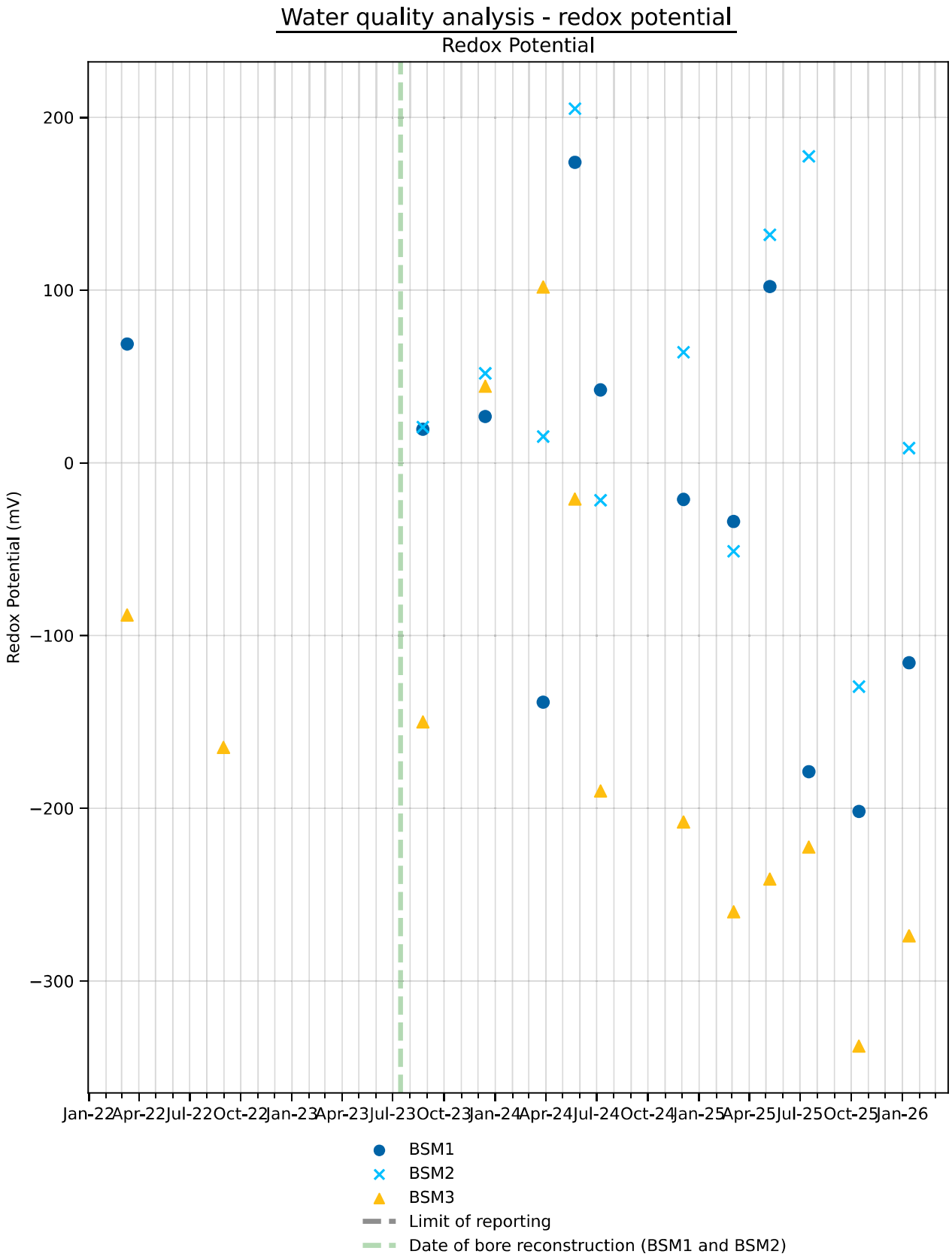

*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

# Water quality analysis - metals




*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

## D.3 Timeseries water quality charts – Redox Potential



# Appendix E
## Laboratory certificates

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# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2601174** | Page | : 1 of 4 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 13-Jan-2026 16:15 |
| Order number | : ---- | Date Analysis Commenced | : 15-Jan-2026 |
| C-O-C number | : ---- | Issue Date | : 22-Jan-2026 16:36 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |
| Wisam Marassa | Inorganics Coordinator | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EK055G/EK061G: It has been noted that ammonia is greater than TKN, however this difference is within the limits of experimental variation.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QC1 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2601174-001 | ES2601174-002 | ES2601174-003 | ES2601174-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | | |
| Suspended Solids (SS) | ---- | 5 | mg/L | | **32** | <5 | **30** | **14** | **----** |
| **ED093F: SAR and Hardness Calculations** | | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | | **632** | **2090** | **3560** | **2160** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | **0.001** | <0.001 | <0.001 | <0.001 | **----** |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | **----** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Nickel | 7440-02-0 | 0.001 | mg/L | | **0.002** | **0.009** | <0.001 | **0.010** | **----** |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | **----** |
| Selenium | 7782-49-2 | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | **----** |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.024** | <0.005 | **0.025** | **----** |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.661** | **2.09** | **0.190** | **2.15** | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | | **0.07** | <0.05 | <0.05 | <0.05 | **----** |
| Iron | 7439-89-6 | 0.05 | mg/L | | **1.48** | <0.05 | <0.05 | <0.05 | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | **----** |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | **0.79** | **0.03** | **6.58** | **0.01** | **----** |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | <0.01 | **0.80** | <0.01 | **0.78** | **----** |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | <0.01 | **474** | <0.01 | **394** | **----** |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | <0.01 | **475** | <0.01 | **395** | **----** |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QC1 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | 13-Jan-2026 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2601174-001 | ES2601174-002 | ES2601174-003 | ES2601174-004 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **2.3** | <0.1 | **6.4** | **5.8** | **----** |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **2.3** | **475** | **6.4** | **401** | **----** |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.18** | **0.05** | **0.07** | **0.03** | **----** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | <0.01 | **0.02** | <0.01 | **0.02** | **----** |
| **EP020: Oil and Grease (O&G)** | | | | | | | | | |
| Oil & Grease | ---- | 5 | mg/L | | <5 | <5 | <5 | <5 | **----** |

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2601174** | Page | : 1 of 5 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 13-Jan-2026 |
| Order number | : ---- | Date Analysis Commenced | : 15-Jan-2026 |
| C-O-C number | : ---- | Issue Date | : 22-Jan-2026 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 4 | | |
| No. of samples analysed | : 4 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |
| Wisam Marassa | Inorganics Coordinator | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 7141808)** | | | | | | | | | |
| EN2600669-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | <5 | 0.0 | No Limit |
| ES2600992-003 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | <5 | 0.0 | No Limit |
| ES2601020-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 21 | 22 | 6.9 | No Limit |
| ES2601174-004 | QC1 | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 14 | 16 | 18.2 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7141461)** | | | | | | | | | |
| ES2601207-001 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 (0.0010)* | mg/L | <0.0010 | <0.0010 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 (0.010) * | mg/L | 0.142 | 0.142 | 0.0 | 0% - 50% |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 (0.010) * | mg/L | 0.320 | 0.332 | 3.8 | 0% - 20% |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 (0.010) * | mg/L | <0.010 | <0.010 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 (0.010) * | mg/L | 0.054 | 0.057 | 4.0 | No Limit |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 (0.010) * | mg/L | 0.120 | 0.119 | 1.3 | 0% - 50% |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 (0.040) * | mg/L | <0.040 | <0.040 | 0.0 | No Limit |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7141461) - continued** | | | | | | | | | |
| ES2601207-001 | Anonymous | EG020A-F: Zinc | 7440-66-6 | 0.005 (0.050) * | mg/L | 0.052 | <0.050 | 4.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 (0.10)* | mg/L | 0.32 | 0.32 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 (0.10)* | mg/L | 3.14 | 3.33 | 5.9 | 0% - 20% |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 (0.10)* | mg/L | 5.07 | 5.20 | 2.5 | 0% - 20% |
| EN2600706-001 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | 0.004 | 0.004 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.001 | 0.001 | 0.0 | No Limit |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | 0.002 | 0.002 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | <0.004 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | 0.27 | 0.27 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| **EG035F: Dissolved Mercury by FIMS (QC Lot: 7141463)** | | | | | | | | | |
| EN2600916-003 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| ES2601198-002 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| **EK055G: Ammonia as N by Discrete Analyser (QC Lot: 7138718)** | | | | | | | | | |
| ES2601127-015 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 3.01 | 3.15 | 4.7 | 0% - 20% |
| ES2601171-013 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.04 | 0.03 | 32.1 | No Limit |
| **EK057G: Nitrite as N by Discrete Analyser (QC Lot: 7134889)** | | | | | | | | | |
| EN2600637-004 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| ES2601091-018 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 7138719)** | | | | | | | | | |
| ES2601127-015 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 0.03 | 0.03 | 0.0 | No Limit |
| ES2601171-013 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 0.95 | 0.89 | 6.5 | 0% - 20% |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 7138713)** | | | | | | | | | |
| ES2601127-015 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 4.5 | 4.5 | 0.0 | 0% - 20% |
| ES2601171-014 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | <0.1 | 0.0 | No Limit |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 7138712)** | | | | | | | | | |
| ES2601127-015 | Anonymous | EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | 0.07 | 0.08 | 16.8 | No Limit |
| ES2601171-014 | Anonymous | EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | 0.01 | 0.03 | 65.7 | No Limit |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 7134890)** | | | | | | | | | |
| ES2601174-001 | BSM1 | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |

## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Acceptable Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 7141808)** | | | | | | | | |
| EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | 150 mg/L | 96.0 | 83.0 | 129 |
| | | | | <5 | 1000 mg/L | 93.6 | 82.0 | 110 |
| | | | | <5 | 825 mg/L | 93.8 | 83.0 | 118 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7141461)** | | | | | | | | |
| EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 98.7 | 80.0 | 116 |
| EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 97.6 | 85.0 | 114 |
| EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.1 mg/L | 98.7 | 84.0 | 110 |
| EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 96.4 | 85.0 | 111 |
| EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 94.8 | 81.0 | 111 |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 95.0 | 83.0 | 111 |
| EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 93.9 | 82.0 | 110 |
| EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 94.0 | 82.0 | 112 |
| EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | 0.1 mg/L | 94.4 | 85.0 | 115 |
| EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.1 mg/L | 97.0 | 81.0 | 117 |
| EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 102 | 85.0 | 115 |
| EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 97.3 | 82.0 | 112 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7141463)** | | | | | | | | |
| EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | 0.01 mg/L | 95.1 | 83.0 | 105 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7138718)** | | | | | | | | |
| EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 104 | 90.0 | 114 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7134889)** | | | | | | | | |
| EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 98.2 | 82.0 | 114 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7138719)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 99.3 | 91.0 | 113 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7138713)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | 5 mg/L | 97.6 | 69.0 | 123 |
| | | | | <0.1 | 2.5 mg/L | 98.3 | 70.0 | 123 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7138712)** | | | | | | | | |
| EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | <0.01 | 2.21 mg/L | 99.4 | 71.3 | 126 |
| | | | | <0.01 | 0.5 mg/L | 96.6 | 71.3 | 126 |

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7134890)** | | | | | | | | |
| EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 103 | 85.0 | 117 |
| **EP020: Oil and Grease (O&G) (QCLot: 7143367)** | | | | | | | | |
| EP020: Oil & Grease | ---- | 5 | mg/L | <5 | 5000 mg/L | 91.7 | 81.0 | 121 |

## *Matrix Spike (MS) Report*

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | SpikeRecovery(%): MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7141461)** | | | | | | | |
| EN2600787-001 | Anonymous | EG020A-F: Arsenic | 7440-38-2 | 1 mg/L | 102 | 70.0 | 130 |
| | | EG020A-F: Cadmium | 7440-43-9 | 0.25 mg/L | 99.5 | 70.0 | 130 |
| | | EG020A-F: Chromium | 7440-47-3 | 1 mg/L | 99.4 | 70.0 | 130 |
| | | EG020A-F: Copper | 7440-50-8 | 1 mg/L | 97.9 | 70.0 | 130 |
| | | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 76.4 | 70.0 | 130 |
| | | EG020A-F: Manganese | 7439-96-5 | 1 mg/L | 96.3 | 70.0 | 130 |
| | | EG020A-F: Nickel | 7440-02-0 | 1 mg/L | 98.1 | 70.0 | 130 |
| | | EG020A-F: Zinc | 7440-66-6 | 1 mg/L | 98.1 | 70.0 | 130 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7141463)** | | | | | | | |
| EN2600916-002 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.01 mg/L | 87.0 | 70.0 | 130 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7138718)** | | | | | | | |
| ES2601127-015 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.5 mg/L | # Not Determined | 70.0 | 130 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7134889)** | | | | | | | |
| EN2600637-004 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.5 mg/L | 105 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7138719)** | | | | | | | |
| ES2601127-015 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.5 mg/L | 98.5 | 70.0 | 130 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7138713)** | | | | | | | |
| ES2601171-001 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 5 mg/L | 90.6 | 70.0 | 130 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7138712)** | | | | | | | |
| ES2601171-001 | Anonymous | EK067G: Total Phosphorus as P | ---- | 1 mg/L | 93.0 | 70.0 | 130 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7134890)** | | | | | | | |
| ES2601174-001 | BSM1 | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.5 mg/L | 106 | 70.0 | 130 |

# QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2601174** | Page | : 1 of 7 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 13-Jan-2026 |
| Site | : ---- | Issue Date | : 22-Jan-2026 |
| Sampler | : TASMAN COUPE | No. of samples received | : 4 |
| Order number | : ---- | No. of samples analysed | : 4 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

### *Outliers : Analysis Holding Time Compliance*

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

### *Outliers : Frequency of Quality Control Samples*

- **NO Quality Control Sample Frequency Outliers exist.**

## Outliers : Quality Control Samples

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **WATER**

| Compound Group Name | Laboratory Sample ID | Client Sample ID | Analyte | CAS Number | Data | Limits | Comment |
|---|---|---|---|---|---|---|---|
| **Matrix Spike (MS) Recoveries** | | | | | | | |
| EK055G: Ammonia as N by Discrete Analyser | ES2601127--015 | Anonymous | **Ammonia as N** | 7664-41-7 | Not Determined | ---- | **MS recovery not determined, background level greater than or equal to 4x spike level.** |

## Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

| Method / Container / Client Sample ID(s) | | Extraction / Preparation: Date extracted | Due for extraction | Days overdue | Analysis: Date analysed | Due for analysis | Days overdue |
|---|---|---|---|---|---|---|---|
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural** | | | | | | | |
| BSM1, | BSM2, | ---- | ---- | ---- | 19-Jan-2026 | 15-Jan-2026 | **4** |
| BSM3, | QC1 | | | | | | |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural** | | | | | | | |
| BSM1, | BSM2, | ---- | ---- | ---- | 19-Jan-2026 | 15-Jan-2026 | **4** |
| BSM3, | QC1 | | | | | | |

# Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | | Sample Date | Extraction / Preparation: Date extracted | Due for extraction | Evaluation | Analysis: Date analysed | Due for analysis | Evaluation |
|---|---|---|---|---|---|---|---|---|
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | |
| **Clear Plastic Bottle - Natural (EA025H)** | | | | | | | | |
| BSM1, | BSM2, | **13-Jan-2026** | **----** | ---- | **----** | **20-Jan-2026** | 20-Jan-2026 | ✓ |
| BSM3, | QC1 | | | | | | | |
| **ED093F: SAR and Hardness Calculations** | | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)** | | | | | | | | |
| BSM1, | BSM2, | **13-Jan-2026** | **----** | ---- | **----** | **20-Jan-2026** | 10-Feb-2026 | ✓ |
| BSM3, | QC1 | | | | | | | |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **20-Jan-2026** | 12-Jul-2026 | ✓ |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **21-Jan-2026** | 10-Feb-2026 | ✓ |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK055G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **21-Jan-2026** | 10-Feb-2026 | ✓ |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK057G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **19-Jan-2026** | 15-Jan-2026 | × |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM2 | **13-Jan-2026** | **----** | ---- | ---- | **19-Jan-2026** | 10-Feb-2026 | ✓ |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM1, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **21-Jan-2026** | 10-Feb-2026 | ✓ |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **19-Jan-2026** | 10-Feb-2026 | ✓ | **19-Jan-2026** | 10-Feb-2026 | ✓ |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK067G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **19-Jan-2026** | 10-Feb-2026 | ✓ | **19-Jan-2026** | 10-Feb-2026 | ✓ |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK071G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **19-Jan-2026** | 15-Jan-2026 | × |
| **EP020: Oil and Grease (O&G)** | | | | | | | |
| **Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)** | | | | | | | |
| BSM1, BSM2, BSM3, QC1 | **13-Jan-2026** | **----** | ---- | ---- | **20-Jan-2026** | 10-Feb-2026 | ✓ |

# Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 2 | 15 | **13.33** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 4 | 40 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 5 | 40 | **12.50** | **12.50** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 3 | 20 | **15.00** | **15.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 2 | 40 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| Matrix Spikes (MS) - Continued | | | | | | | |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 4 | **25.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Suspended Solids (High Level) | EA025H | WATER | In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3) |
| Major Cations - Dissolved | ED093F | WATER | In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3) |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| Dissolved Mercury by FIMS | EG035F | WATER | In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3). |
| Ammonia as N by Discrete analyser | EK055G | WATER | In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrite as N by Discrete Analyser | EK057G | WATER | In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrate as N by Discrete Analyser | EK058G | WATER | In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3) |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | WATER | In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | WATER | In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Total Nitrogen as N (TKN + Nox) By Discrete Analyser | EK062G | WATER | In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3) |

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Total Phosphorus as P By Discrete Analyser | EK067G | WATER | In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | WATER | In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Oil and Grease | EP020 | WATER | In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3) |

| Preparation Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| TKN/TP Digestion | EK061/EK067 | WATER | In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3) |

# CHAIN OF CUSTODY

*ALS Laboratory: please tick →*


☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5630 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com


| | | | |
|---|---|---|---|
| **CLIENT: EMM Consulting Pty Ltd** | **TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics) | ☐ Standard TAT (List due date): | **FOR LABORATORY USE ONLY (Circle)** |
| **OFFICE: Sydney** | | ☐ Non Standard or urgent TAT (List due date): | Custody Seal Intact? Yes No N/A |
| **PROJECT: E240981** **PROJECT NO E240981** | **ALS QUOTE NO.: EN/111/25** | **COC SEQUENCE NUMBER (Circle)** | Free ice / frozen ice bricks present upon receipt? Yes No N/A |
| **ORDER NUMBER:** **PURCHASE ORDER NO.:** | **COUNTRY OF ORIGIN: Australia** | COC: 1 2 3 4 5 6 7 | Random Sample Temperature on Receipt: °C |
| **PROJECT MANAGER: Tasman Coupe** | **CONTACT PH: 0421 081 113** | OF: 1 2 3 4 5 6 7 | Other comment: |

| | | | | | |
|---|---|---|---|---|---|
| **SAMPLER: Tasman Coupe** | **SAMPLER MOBILE: 0421 081 113** | **RELINQUISHED BY:** | **RECEIVED BY:** | **RELINQUISHED BY:** | **RECEIVED BY:** |
| **COC Emailed to ALS? Yes** | **EDD FORMAT (or default):** | | | | |
| **Email Reports to: tcoupe@emmconsulting.com.au, esdat+emmwater@esdatlabsync.net** | | DATE/TIME: | DATE/TIME: | DATE/TIME: | DATE/TIME: |
| **Email Invoice to**: tcoupe@emmconsulting.com.au, payments@emmconsulting.com.au | | | | | |

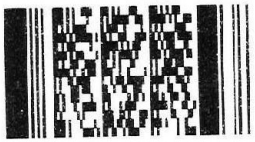
**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: All metals dissolved. Add Chromatograms to analysis report.**

| ALS USE ONLY | SAMPLE DETAILS MATRIX: Solid(S) Water(W) | | | CONTAINER INFORMATION | | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required). | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE *(refer to codes below)* | TOTAL BOTTLES | Total Suspended Solids (EA025H) | Nutrients (NT-8A) | Dissolved metals (W-30) Plus Boron and Manganese | Oil and grease (EP020) | Total hardness | | | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. TRH/BTEXN analysed both pre- and post- silica gel clean up (W-4 AND W-4SG). |
| | BSM1 | | w | | 8 | x | x | x | x | x | | | | All metals dissolved. |
| | BSM2 | | w | | 5 | x | x | x | x | x | | | | All metals dissolved. |
| | BSM3 | | w | | 8 | x | x | x | x | x | | | | All metals dissolved. |
| | QC1 | | w | | 5 | x | x | x | x | x | | | | All metals dissolved. |
| | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | |
| | | | | TOTAL | 26 | | | | | | | | | |

***Water Container Codes:*** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl prese Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserve

ildehyde Preserved Glass;

Environmental Division
Sydney
Work Order Reference
ES2601174



Telephone : + 61-2-8784 8555

# Appendix F
Field data

EMM
creating opportunities

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM1 | ☐ Well development |
| **Project** | Luddenham Quarry Environmental Monitoring | **Field staff** | Tasman Coupe | ☑ Gauging<br>☑ Sampling |
| **Client** | CPG | **Date** | 13/01/2026 13:37 | |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 15.69 |
| **Depth to DNAPL (mBTOC)** | | **Well depth (mBTOC)** | 30.13 |
| **Well diameter (mm)** | | | |
| **Comments** | Monument intact Well cap secure. | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro Quatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 13:50 | 1 | | 6.81 | 3730 | -115.8 | 0 | 23.6 |
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| | |
|---|---|
| **Comments** | Clear, colourless, slight sulfurous odour, no sheen, black particulate. TDS 2384 mg/L |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM1 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM2 | ☐ Well development |
| **Project** | Luddenham Quarry Environmental Monitoring | **Field staff** | Tasman Coupe | ☑ Gauging<br>☑ Sampling |
| **Client** | CPG | **Date** | 13/01/2026 12:21 | |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 9.745 |
| **Depth to DNAPL (mBTOC)** | | **Well depth (mBTOC)** | 29.69 |
| **Well diameter (mm)** | | | |
| **Comments** | Monument intact, Well cap secure. | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro Quatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 12:35 | 1 | | 6.55 | 20238 | 8.5 | 1.76 | 23.1 |
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| | |
|---|---|
| **Comments** | Clear, colourless, no odour, no sheen. TDS 13230 mg/L |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM2 |
| **QC Sample ID (if applicable)** | QC1 |
| **Number of bottles collected** | 5 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM3 | ☐ Well development |
| **Project** | Luddenham Quarry Environmental Monitoring | **Field staff** | Tasman Coupe | ☑ Gauging<br>☑ Sampling |
| **Client** | CPG | **Date** | 13/01/2026 11:22 | |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 12.555 |
| **Depth to DNAPL (mBTOC)** | | **Well depth (mBTOC)** | 31.48 |
| **Well diameter (mm)** | | | |
| **Comments** | Monument intact Well cap secure, logger in well. | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro Quatro |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 11:48 | 1 | 12.555 | 6.88 | 22373 | -273.9 | 0.92 | 21.1 |
| | | | | | | | |
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| | |
|---|---|
| **Comments** | Clear, colourless, sulfurous odour, no sheen, black particulate. TDS 14628 mg/L |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM3 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Quarry Pit |
| **Project** | Luddenham Quarry Environmental Monitoring | **Field staff** | Tasman Coupe |
| **Client** | CPG | **Date** | 13/01/2026 13:18 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | -33.8605 | **Longitude** | 151.1988 |
| **Weather** | Sunny | | |

☐ **Dry weather event** ☑ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Stagnant, green, almost entire pit floor covered in water |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Grab |
| **Water quality meter model** | YSI Pro Quatro |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | -19.1 |
| **pH** | 8.66 | **Dissolved oxygen (mg/L)** | 0 |
| **Electrical conductivity (uS/cm)** | 6606 | **Temperature (degC)** | 29.1 |
| **Comments** | Clear, colourless, no odour, no sheen | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | no |
| **Field filtered for metals?** | |
| **Sample ID** | |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Appendix G
## Calibration certificates

EMM
creating opportunities

| | |
|---|---|
| WQM make/model | YSI Pro Quatro |
| Unit number | 21H103046 |
| Checked by | TC |
| Components inspected? | yes |
| Date and Time | 13/01/2026 10:49 |
| Battery status (%) | 100 |
| **Calibration completed for pH Standard 1?** | yes_cal |
| Calibration standard | 4 |
| Pre-calibration reading | 4.48 |
| Post-calibration reading | 3.98 |
| Passed calibration? | **yes** |
| **Calibration completed for pH Standard 2?** | yes_cal |
| Calibration standard | 7 |
| Pre-calibration reading | 6.9 |
| Post-calibration reading | 6.94 |
| Passed calibration? | **yes** |
| **Calibration completed for Specific Conductance?** | yes_cal |
| Calibration standard | 2760 |
| Pre-calibration reading | 3211 |
| Post-calibration reading | 2770 |
| Passed calibration? | **yes** |
| **Calibration completed for Dissolved Oxygen?** | yes_cal |
| Calibration standard | 100 |
| Pre-calibration reading | 97.3 |
| Post-calibration reading | 97.5 |
| Passed calibration? | **yes** |
| **Calibration completed for Oxidation-reduction potential?** | yes_cal |
| Calibration standard | 230 |
| Pre-calibration reading | 227 |
| Post-calibration reading | 227 |
| Passed calibration? | **yes** |
| Comments | DO (zero)= 0.11 mg.L |

# E240981_RP1_WMP_monitoring_v1_final

Final Audit Report 2026-02-16

| | |
|---|---|
| Created: | 2026-02-15 |
| By: | Scarlet Ward (scward@emmconsulting.com.au) |
| Status: | Signed |
| Transaction ID: | CBJCHBCAABAAUT8oCznCKHBPuTwExMGUE302eceaaQUH |

## "E240981_RP1_WMP_monitoring_v1_final" History

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# Memorandum

12 May 2026

To: Elena Ivanova
Environmental & Planning Manager
Coombes Property Group

From: Tasman Coupe

**Subject: Luddenham Quarry soil and water management plan monitoring results (Q3 2025/2026)**

Dear Elena,

# 1 Background

This memorandum details groundwater monitoring activities undertaken by EMM Consulting Pty Ltd (EMM) on behalf of Coombes Property Group (CPG) at Luddenham Quarry, 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, referred to herein as the site). The groundwater and surface water quality monitoring works were undertaken as part of the groundwater and surface water monitoring program outlined in the Soil and Water Management Plan (SWMP, EMM 2021).

The monitoring program commenced in March 2022 and involves quarterly groundwater and annual surface water monitoring of water quality parameters, groundwater levels and contaminants of potential concern (CoPC) at seven pre-existing locations across the site. The sampling locations comprise three groundwater locations (BSM1, BSM2 and BSM3) and four surface water locations (downstream, upstream, quarry pit and water management dam). Monitoring locations are detailed in Appendix A.

Prior to this annual monitoring period, which covers 1 September 2025 to 31 August 2026, monitoring events have occurred on 11 occasions between 11 March 2022 and 17 July 2025. Previous monitoring events completed as part of this annual monitoring period include 15 October 2025 and 13 January 2026.

# 2 Program overview

The groundwater and surface water monitoring documented in this report was undertaken by a suitably qualified EMM Environmental Engineer on 15 April 2026 for the March to May 2026 monitoring period (Q3 of the 2025–2026 annual review period). During the sampling round, the water management dam remained inaccessible due to construction of the advanced resource recovery facility. As such, the midstream surface water sampling location, which is adjacent to water management dam within Oakey Creek, was sampled as a replacement.

## 2.1 Rainfall context

The Bureau of Meteorology operates a rain gauge at Badgerys Creek [approximately 3 kilometres (km)] from the site – Station number: 067108. No rain was recorded at the station in the five days preceding the monitoring event or on the day sampling was undertaken.

## 2.2 Water quality analytes

The analytical suite for the monitoring program is presented in Table 2.1. Physical and chemical stressors [except for total suspended solids (TSS)] were monitored in the field with a calibrated hand-held water quality meter. All other parameters were analysed at a National Association of Testing Authorities (NATA) accredited laboratory.

**Table 2.1 Water quality analytes**

| Category | Parameters | Analysis method |
|---|---|---|
| Physical and chemical stressors | Dissolved oxygen (DO), electrical conductivity (EC), pH, total dissolved solids (TDS), turbidity. | In the field with a calibrated hand-held water quality meter. |
| | Total suspended solids (TSS). | Analysis undertaken at NATA accredited laboratory. |
| Nutrients | Ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen, reactive phosphorus, total phosphorus. | |
| Dissolved metals | Aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc. | |
| Other | Total hardness, oil and grease. | |

Laboratory certificates are presented in Appendix E. Calibration certificates are provided in Appendix G.

## 2.3 Laboratory analysis

Water samples were transported to a NATA-accredited laboratory, Australian Laboratory Services (ALS) in Smithfield, NSW for analysis. Samples were received by the laboratory within the recommended holding times.

## 2.4 Quality assurance/quality control

Samples were collected in laboratory-provided sample containers with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain of custody protocols.

The field quality assurance/quality control (QA/QC) procedures used to establish precise, accurate, replicable reliable, and comparable results included:

- calibration of equipment by the supplier and testing by EMM staff prior before use
- keeping samples chilled
- submitting laboratory samples within holding times
- wearing disposable nitrile gloves during sampling at each sampling location
- using dedicated sampling equipment
- collection of a field duplicate sample.

QA/QC was assessed by calculating relative percentage difference (RPD) of the field duplicate ($S_{duplicate}$) sample to the parent sample ($S_{parent}$) as per the following equation.

$$Relative\ \%\ difference = \frac{|S_{parent} - S_{Dupilcate}|}{\frac{S_{parent} + S_{Dupilcate}}{2}} \times 100$$

Results were considered to confirm acceptable degree of data quality where RPDs were below 30%.

Most results for the monitoring round were within RPD limits (refer Appendix C), indicating adequate QA/QC. The RPD exceedances for copper and total phosphate were a result of low concentrations (<10x laboratory limit of reporting (LOR)) elevating the percentage difference reported. Hence, these conformance outliers are not considered likely to impact the conclusions or overall data quality of the investigation.

# 3 Monitoring results

Analytical results are discussed in the following sections. Groundwater and surface water analytical results are reported in the appendices (Appendix B – Groundwater levels, Appendix C – Water quality monitoring results, Appendix D – Water quality timeseries charts).

## 3.1 Groundwater levels

Groundwater levels were monitored using an interface probe at each of the three groundwater monitoring bores (BSM1, BSM2 and BSM3) during sampling. Based on the requirements outlined in the SWMP (EMM, 2021)[1], a water level deviation of 2 metres (m) from the long-term median groundwater level in the quarry monitoring bores is considered a trigger for further action in accordance with the groundwater trigger action response plan (Table B.2, EMM 2021). Two metres was adopted as the trigger as the deviation value aligns with minimal impact considerations outlined in the aquifer interference activities stated in the NSW Aquifer Interference Policy (DPI 2012).

Following recommendations in the March 2025 groundwater monitoring memorandum (EMM 2025), a resurvey of the groundwater bores was undertaken by Total Surveying Solutions on 14 April 2025. Groundwater levels since the May 2025 monitoring period have been calculated based on the resurveyed monitoring bore data. Groundwater and survey data are presented in Appendix B. For context, the average baseline and subsequent upper and lower trigger values are presented in Table 3.1.

**Table 3.1 Water level trigger values**

| Bore ID | Average baseline (mAHD) | Upper SWL trigger (mAHD) | Lower SWL trigger (mAHD) | April 2026 SWL (mAHD) |
|---|---|---|---|---|
| BSM1 | 58.13 | 60.13 | 56.13 | 57.68 |
| BSM2 | 50.68 | 52.68 | 48.68 | **53.09** |
| BSM3 | 46.29 | 48.29 | 44.29 | **50.18** |

Notes: **Bold font** used to highlight water level deviation of 2 m from the long-term median groundwater level in the quarry monitoring bores. This is a trigger for further action as per the groundwater trigger action response plan (Table B.2, EMM 2021).

[1] EMM, 2021. *Luddenham Quarry Soil and Water Management Plan. Doc Ref: J190749 RP49.* 22 September 2021

All three groundwater monitoring bores were within the historical range since the program commenced in March 2022.

BSM1 was within 2 m of the baseline average whilst both BSM2 and BSM3 were observed above the 2 m trigger as prescribed by the WMP (EMM 2021). Based on the survey data, it appears the bores have consistently exceeded the 2 m trigger across the 15 monitoring events at BSM1 (5 occasions), BSM2 (13 occasions) and BSM3 (15 occasions). Despite the identified increase in SWL from the baseline average, all three wells have reported relatively stable STLs since May 2025. This represents an increase and thus part of the TARP triggers relating to distance drawdown effects are not applicable.

Upon consultation with CPG, it is understood that no quantitative historical monitoring of the water level within the quarry pit has been undertaken. Notwithstanding, anecdotal evidence indicates the base of the quarry pit to be approximately 30 metres below ground level (m bgl) with surface water observed covering a portion of the pit base. The depth to water within the measured monitoring bores ranged between 9.71 m bgl at BSM2 and 15.758 m bgl at BSM1. The standing water level in monitoring bores is believed to be more than 10m above the water level of the quarry pit which would indicate the pit is not the source of the increase in water level measured at BSM2 and BSM3 during the April 2026 monitoring round.

## 3.2 Groundwater quality

Field observations for completed groundwater monitoring are presented in Table 3.2. Field sheets presenting data collected whilst sampling is presented in Appendix F.

**Table 3.2 Field observations (groundwater monitoring)**

| Time of sample | Groundwater monitoring bore | Description | Field comments/context |
|---|---|---|---|
| **Groundwater sampling locations** | | | |
| 15/04/2026 9:27 am | BSM1 | Located hydraulically upgradient of the quarry pit, BSM2 and BSM3. Bore monitored to measure background contamination concentrations. Located near the western site boundary in the southern portion of the site, to the west of the site access/haul road. | Clear and colourless with no odour or no sheen observed. |
| 15/04/2026 10:21 am | BSM2 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Bore water was clear and colourless, with no odour or sheen observed during sampling.<br>A field duplicate was taken as a quality assurance (QC1) sample at this bore. |
| 15/04/2026 11:03 am | BSM3 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to measure potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Clear and colourless, strong sulphurous odour, no sheen observed. |

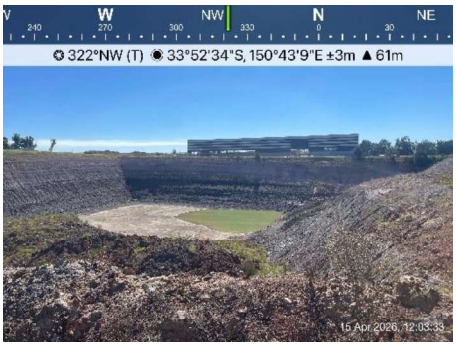
Groundwater quality results are presented in Appendix C. Key observations of groundwater quality for the April 2026 monitoring period include the following:

- pH was recorded as slightly acidic to circumneutral (6.65–6.9) in the three groundwater monitoring bores sampled.
- Salinity, as indicated by EC, was lower in upgradient BSM1 [2,786 microsiemens per centimetre (µS/cm)] compared to downgradient bores BSM2 (17,817 µS/cm) and BSM3 (22,752 µS/cm), which are within historical ranges. BSM1 results are low, compared to baseline trends (22,560 µS/cm at BSM1) and have reported a decreasing trend since March 2025, potentially indicating freshwater ingress.
- Monitoring bores BSM1 and BSM2 reported mild reducing conditions. Monitoring bore BSM3 reported strongly reducing conditions. All three locations were reported within historical ranges. No baseline median is available within previous reports for oxidation-reduction (Redox) potential. Collated historical data has been presented in a time series trend in Appendix D. This should be monitored during subsequent monitoring rounds.
- Nutrients remain present in all three bores and elevated above baseline for nitrate in BSM2 (448 milligrams per litre (mg/L) and in corresponding duplicate sample (QC1). Elevated nitrate concentrations have been reported since March 2025. The four most recent rounds of monitoring (July and October 2025, January 2026, and this round, April 2026) also reported the most elevated nitrate concentrations (684 mg/L, 462 mg/L, 474 mg/L) detected over the monitoring period. The source of the nitrate is unknown, with nearby sources potentially comprising fertiliser on nearby agricultural, country club and/or adjacent Western Sydney Airport (WSA) land.
- Elevated concentrations of copper, manganese and zinc were detected in BSM2 (discussed in Section 3.4).
- Oil and grease were reported at concentrations less than the LOR. Detectable concentrations of TRH ($C_{16}$-$C_{34}$ of 620 micrograms per litre (µg/L)) and TPH ($C_{10}$-$C_{14}$ of 60 µg/L and $C_{15}$-$C_{28}$ of 640 µg/L) were observed in BSM3 with no hydrocarbons reported above detection limits following silica gel clean-up.

## 3.3 Surface water quality

Field observations for completed surface water monitoring are presented in Table 3.3. Field sheets presenting data collected whilst sampling is presented in Appendix F.

## Table 3.3 Field observations (surface water monitoring)

| Time of sample | Monitoring point | Site description | Field comments | Site photos |
|---|---|---|---|---|
| **Surface water sampling locations** | | | | |
| 15/04/2026 12:35 PM | Quarry Pit | Sample of quarry pit water in the northern portion of the pit. | Pit water was green, clear with no odour or sheen. Quarry pit water level was lower than all monitoring rounds since May 2025. |   |
| 15/04/2026 1:13 PM | UPSTREAM | Upstream sample point of Oaky Creek. | Creek stagnant with water greater than 0.5 m deep. Water in creek was dark green, clear, algal / bacterial sheen. No odour noted. |   |
| 15/04/2025 No sample | WATER MANAGEMENT DAM (WMD) | Water management dam in the northern portion of the site collecting water from the catchment north of the Quarry. | No access or sampling authorised due to construction. Dam impacted by construction works associated with the Advanced Resource Recovery Facility (ARRF). | |
| 15/04/2026 1:27 PM | MIDSTREAM | Replacement sampling location in water body in line with Oaky Creek adjacent to the WMD. | Waterbody was stagnant. Water was green, turbid with no odour or sheen noted. |   |
| 15/04/2026 2:00 PM | DOWNSTREAM | Downstream sample point of Oaky Creek. | Creek stagnant. Water in creek was green-brown and turbid with no odour or sheen noted. |   |

Recorded surface water quality parameters are summarised below:

- pH was recorded as slightly alkaline (7.48 to 8.7). The results of this round (April 2026) are consistent with historical monitoring.
- EC was the highest on record for upstream and downstream sampling locations (3,747 µS/cm and 3,648 µS/cm, respectively) on Oaky Creek. The quarry pit and midstream (as a substitute for the inaccessible water management dam) were reported within historical ranges, exhibiting brackish conditions.
- The quarry pit, midstream and downstream locations all reported higher dissolved oxygen (DO) concentrations (6.27 mg/L, 5.03 5.03 mg/L and 5.59 mg/L, respectively) than the upstream location during the April 2026 monitoring round, all of which indicated aerobic conditions. DO has historically been highly variable across the site.
- Redox potential indicated all four surface water locations are exhibiting mildly reducing conditions.

## 3.4 Review of exceedances

Water quality results were reviewed for trigger exceedances, via comparison of default guideline values or comparison of other chemical properties to the upgradient bore (BSM1).

An assessment of exceedances including actions taken and recommendations for the groundwater monitoring is presented in Table 3.4.

### Table 3.4 Review of exceedances (groundwater)

| Exceedance description | Assessment and actions taken |
|---|---|
| **Nutrients** | |
| Oxidised nitrogen exceeded the upgradient bore (BSM1) concentrations (<0.01 mg/L) at BSM2 at 449 mg/L. | Following sustained elevated and increasing nitrogen results in BSM2, profiling was undertaken during the July 2025 monitoring round to evaluate whether nitrogen concentrations varied at different depths within the screened water column. The reported concentration in the shallow sample (~1 m below standing water level) from BSM2 for nitrate, and subsequently total and oxidised nitrogen, was the detected. Total nitrogen concentration within the shallow sample (~1 m below standing water level) was approximately seven times higher than that of the sample taken from the middle of the screened water column in the same well. Subsequent sampling has targeted middle of the screened water column.<br>The nitrate concentration during this round (448 mg/L) was greater than the July monitoring round result at the middle of the screened water column (116 mg/L) but was less than the shallow July nitrate concentration (692 mg/L). The nitrate concentration during this round was the fourth highest on record.<br>Elevated nutrient concentrations were not detected in the background upgradient sample location.<br>Baseline data results were reviewed, where the following was noted:<br>• Total and oxidised nitrogen was noted to be significantly above the trigger value (upgradient bore comparison). The median baseline concentration at BSM2 of 21 mg/L, exceeds the median baseline for the upgradient bore of 0.137 mg/L.<br>• The reported concentration of 448 mg/L is greater than the median baseline concentration for nitrate (21 mg/L) with the upgradient bore (BSM1) reporting nitrate below detectable limits.<br>• No baseline historical records of ammonia or total nitrogen were available.<br>• Reactive phosphorus marginally exceeded the LOR with upgradient bore reporting a concentration below detection limits.<br>Timeseries charts of nutrients exceedances were prepared to present trends in nutrient concentrations over the monitoring period (refer Appendix D). |
| Ammonia exceeded the upgradient bore (BSM1) concentration (0.69 mg/L) at BSM3 (6.22 mg/L). BSM3 also exceeded the ANZECC 95% protection level for freshwater (0.9 mg/L). | |
| Total nitrogen significantly exceeded the upgradient bore (BSM1) concentrations (1.4 mg/L) at BSM2, with a concentration of 465 mg/L. This exceedance is attributable to the nitrate concentration at BSM2. BSM3 also exceeded the upgradient bore with a concentration of 6.8 mg/L, attributed to the ammonia concentration. | |
| Total phosphorus exceeded the upgradient bore concentrations (0.06 mg/L) at BSM3, with a concentration of 0.12 mg/L. | |
| **Metals** | |
| Copper exceeded the trigger values (0.0014 mg/L) at BSM2 in duplicate sample QC1 with reported concentrations of 0.002 mg/L. | Copper was reported below baseline concentrations for BSM2. The reported concentration of copper in BSM2 was within historical ranges. |
| Manganese exceeded the trigger values (1.9 mg/L) at BSM2 with reported concentrations of 2.17 mg/L and 2.32 mg/L (QC1). | No baseline historical records are available for manganese concentrations for BSM2. The reported concentration of manganese in was within historical ranges. |
| Zinc exceeded the trigger values (0.008 mg/L) at BSM2 with reported concentrations of 0.023 mg/L and 0.026 mg/L (QC1). | Zinc was reported below baseline concentrations for BSM2. The reported concentration for zinc in BSM2 was within historical ranges. |
| **Hydrocarbons** | |
| TRH was reported above detectable limits at BSM3 in $C_{16}$–$C_{34}$ fraction (620 µg/L). | Groundwater sampling reported concentrations of hydrocarbons above detection limits. This was limited to downgradient bore BSM3. This was not reflected in the results for TRH and TPH analysis following silica gel cleanup, where all samples reported concentrations below detection limits. This indicates the reported hydrocarbons are from a naturally occurring biogenic source (lipids, plant oils, etc.) and unrelated to site operations. Detectable concentrations of Oil and grease were not reported as part of the April 2026 groundwater sampling round. |
| TPH was reported above detectable limits at BSM3 in $C_{10}$-$C_{16}$ fractions (60 µg/L) and $C_{15}$-$C_{28}$ fractions (640 µg/L). | |

An assessment of exceedances including actions taken and recommendations for the surface water monitoring program is presented Table 3.5.

**Table 3.5 Review of exceedances (surface water)**

| Exceedance description | Assessment, actions taken and recommendations |
|---|---|
| **Nutrients** | |
| Ammonia exceeded the trigger value (0.02 mg/L) at the Oaky Creek upstream and downstream site with a concentration of 0.05 mg/L at both locations. | Nutrients at the upstream site, within the quarry pit and receiving environment were elevated above surface water trigger values. Nutrients were of lower concentration than noted in groundwater bores. This suggests high nutrients may be naturally occurring or present from activities upgradient of the site. |
| Oxidised nitrogen exceeded trigger value (0.02 mg/L) in the Quarry Pit with a concentration of 3.42 mg/L. | |
| Total nitrogen exceeded the trigger value (0.5 mg/L) at all locations. | |
| Total phosphorus exceeded trigger value (0.05 mg/L) at the upstream Oaky creek location and in the Quarry Pit with concentrations of 0.06 mg/L and 0.07 mg/L, respectively. | |
| **Metals** | |
| Copper exceeded the trigger value (0.0014 mg/L) in the Quarry Pit with a concentration of 0.002 mg/L. | Copper, nickel and selenium concentrations observed in the Quarry Pit were not observed in the upstream, receiving environment or monitoring bores. All concentrations were within historical ranges. |
| Selenium exceeded the ANZECC 95% protection level for freshwater (0.005 mg/L) in the quarry pit with a concentration of 0.026 mg/L. | |

# 4 Summary and recommendations

The following provides a summary of additional investigations:

- Down gradient bores BSM2 and BSM3 were measured above the upper standing water level trigger value during the April 2026 monitoring event. All water levels were within the historical ranges. Sustained elevated water levels are not likely to be attributable to quarrying activities the site as the monitored water level is substantially greater than the reported base of the quarry pit and observed quarry pit water level.

- pH was recorded as slightly alkaline (7.48 to 8.7) within the surface water locations and slightly acidic to circumneutral (6.65 to 6.9) within groundwater locations. The results of this round (April 2026) are consistent with historical monitoring.

- Water levels in the Quarry Pit were the lowest since May 2025. In contrast, the water level at the upstream Oaky Creek location was higher than reported throughout 2025 and 2026.

- Detectable concentrations of TRH/TPH were reported, however concentrations of oil and grease and TRH/TPH following silica gel clean up were not reported at detectable concentrations during this April sampling round. This indicates the reported hydrocarbons are likely from a naturally occurring biogenic source (lipids, plant oils, etc.) and unrelated to site operations.

- No confirmed source for the elevated nutrient concentrations within monitoring bore BSM2 has been identified. The site is surrounded by agricultural land, a country club and WSA which undertook re-establishment of ground cover vegetation upstream of the site since 2021. The elevated standing water table, increased chloride (as identified previously by the laboratory as the source of matrix interference) in BSM2 support the possibility that widespread use of fertilisers around the site may have contributed to the reported increase in nutrients observed at monitoring bores at the site. Detailed surface water and groundwater monitoring associated with the WSA construction was not available for review to verify this potential source. Based on the sustained increasing trend following the cessation of quarry operations, the change appears unrelated to quarry activities.

The following recommendations are made for future monitoring:

- The next quarterly groundwater monitoring round should be undertaken in mid-July 2026 to meet the objectives of the SWMP and comply with the conditions of consent.

- Analysis of anions and cations (in addition to the existing analytical suite) would further inform the understanding of reported salinity (as measured in by electrical conductivity) and nutrients results. This is recommended as part of the July 2026 monitoring round.

- Collated Redox potential results for the site should be continued, reviewing time series trends.

- The annual recommended Mann-Kendall assessment, for analytes at sample locations exceeding the trigger values, should be undertaken as part of the July monitoring round.

Please contact the undersigned with any questions or clarifications.

Yours sincerely,

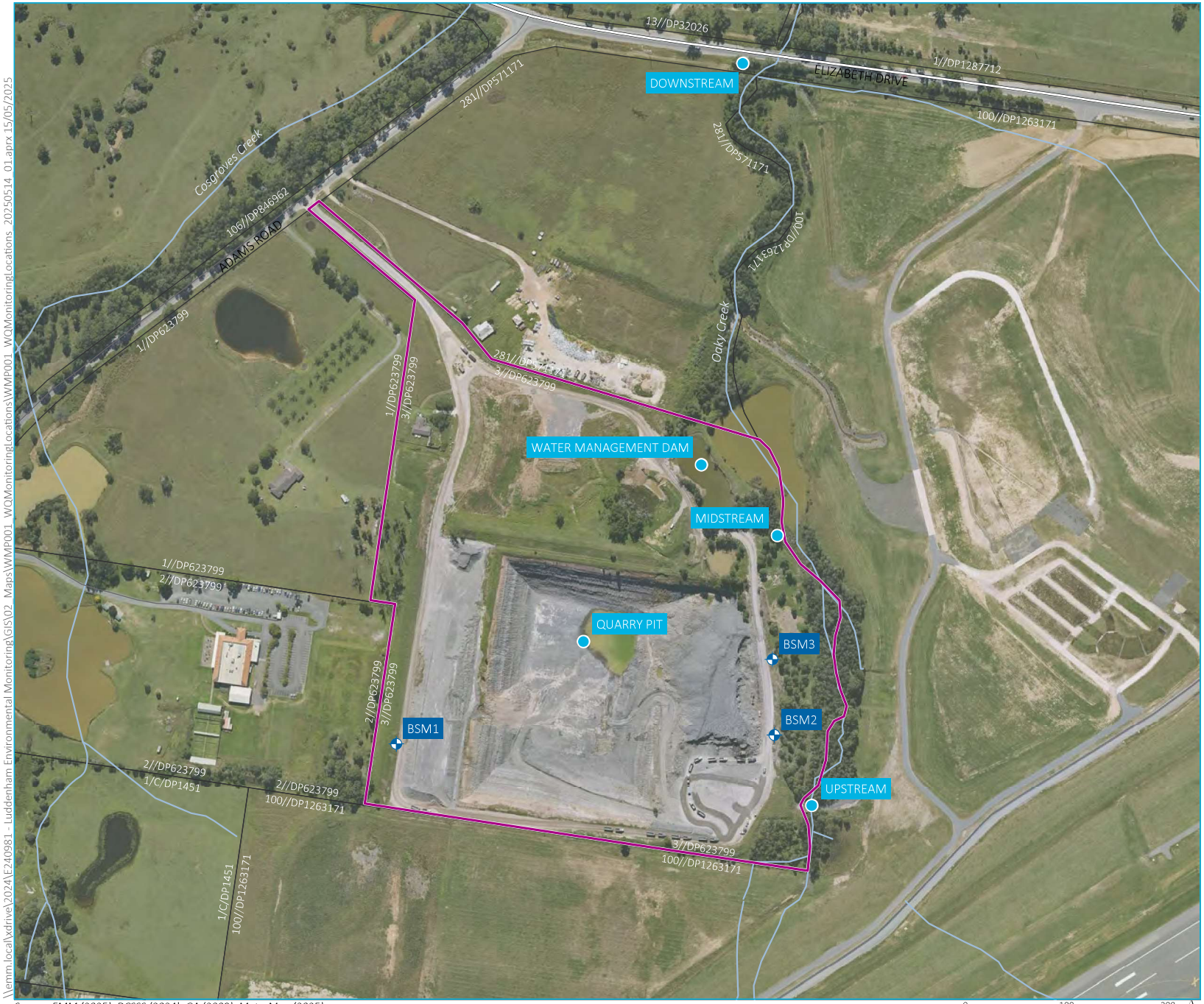


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# Appendix A

## Water quality monitoring locations

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KEY

- Study area
- Groundwater monitoring bore
- Water quality monitoring location

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary

Source: EMM (2025); DCSSS (2024); GA (2009); MetroMap (2025)

0 100 200 m

GDA2020 MGA Zone 56

N

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# Water quality monitoring locations

Luddenham Quarry
Water Management Plan
Figure 1

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# Appendix B
## Groundwater levels

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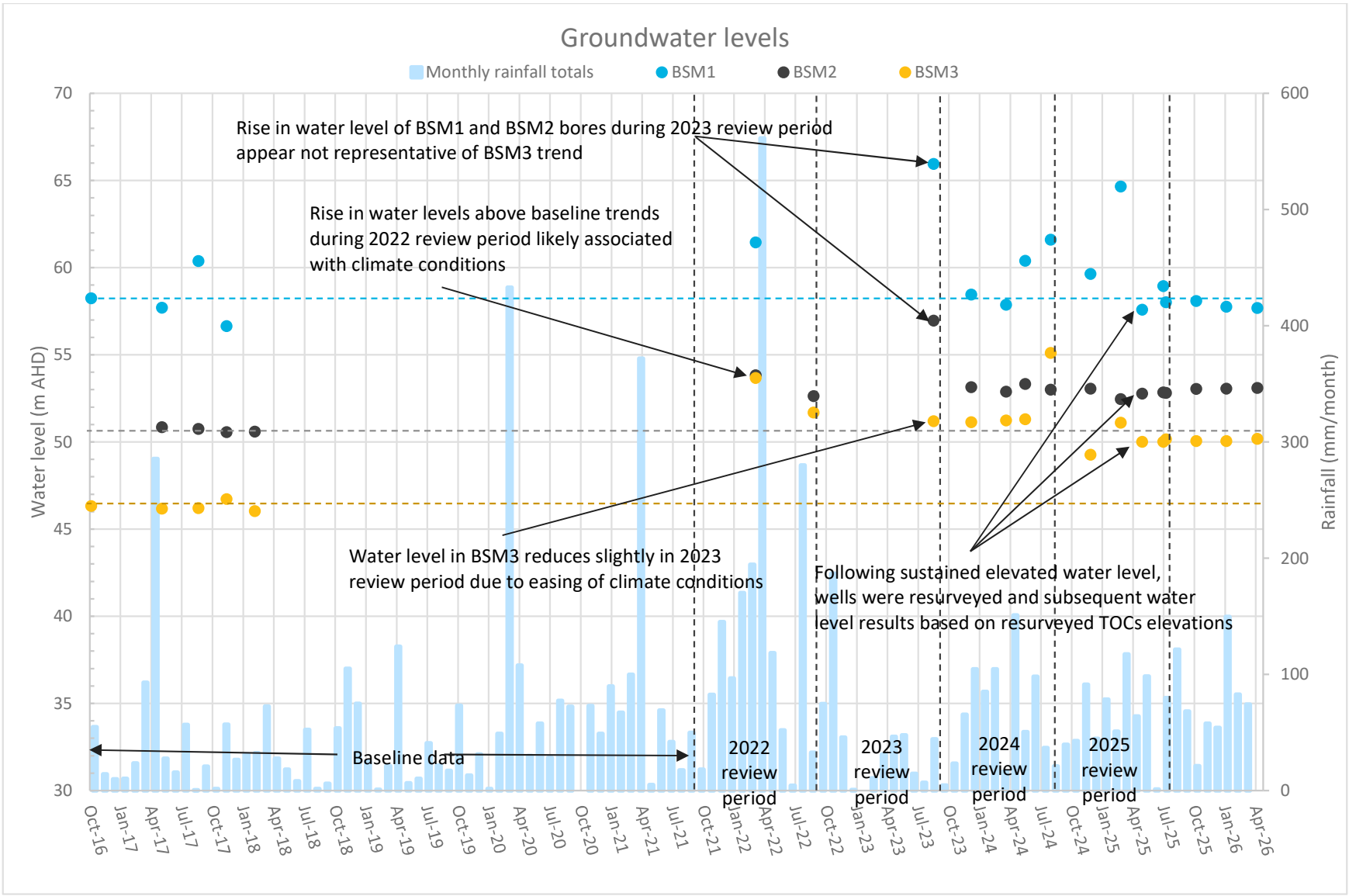



**Figure B.1** **Ground water levels**

# Appendix C
## Water quality monitoring results

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**Appendix C**
**Table C1**
**Analytical Results Table- Groundwater**

**Luddenham Quarry**
**April 2026 Monitoring**
**E240981**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | **Location Code** | **BSM1** | **BSM2** | **BSM2** | **BSM3** |
| | | | | **Date** | **15 Apr 2026** | **15 Apr 2026** | **15 Apr 2026** | **15 Apr 2026** |
| | | | | **Field ID** | **BSM1** | **BSM2** | **QC1** | **BSM3** |
| | | | | **Lab Report Number** | **ES2611873** | **ES2611873** | **ES2611873** | **ES2611873** |
| | Unit | EQL | ANZG (2018) Freshwater 95% toxicant DGVs | **Trigger Value (groundwater)** | | | | |
| **Field** | | | | | | | | |
| **Temp (Field)** | °C | 0.1 | | - | 19.2 | 20.1 | - | 20.4 |
| **pH (Field)** | - | 0.01 | | **6.5-8.5** | 6.9 | 6.65 | - | 6.98 |
| **EC (field)** | µS/cm | 1 | | **BSM1** | 2,786 | **17,817** | - | **22,752** |
| **DO (Field)** | mg/L | 0.1 | | | 0.47 | 1.17 | - | 0.53 |
| **Redox Potential (Field)** | mV | 0.1 | | | 67.1 | 84.8 | - | -295.6 |
| **Corrected Redox (Eh)** | mV | 0.1 | | | 267.1 | 284.8 | - | -95.6 |
| **TDS** | mg/L | 1 | | | 2,146 | 17,268 | - | 14,791 |
| **TSS** | mg/L | 5 | | **BSM1** | 34 | 26 | 24 | 23 |
| **Inorganics** | | | | | | | | |
| **Hardness as $CaCO_3$ (filtered)** | mg/L | 1 | | | 491 | 2,150 | 2,300 | 3,410 |
| **Ammonia as N** | mg/L | 0.01 | 0.9 | **BSM1** | 0.69 | 0.01 | 0.01 | **6.22** |
| **Nitrite (as N)** | mg/L | 0.01 | | | <0.01 | 0.82 | 0.83 | <0.01 |
| **Nitrate (as N)** | mg/L | 0.01 | | | <0.01 | **380** | **448** | 0.01 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | | **BSM1** | <0.01 | **381** | **449** | **0.01** |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | | | 1.4 | 14.6 | 15.9 | 6.8 |
| **Nitrogen (Total)** | mg/L | 0.1 | | **BSM1** | 1.4 | **396** | **465** | **6.8** |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | | **BSM1** | <0.01 | <0.01 | <0.01 | <0.01 |
| **Total Phosphate (as P)** | mg/L | 0.01 | | **BSM1** | 0.06 | 0.03 | 0.01 | **0.12** |
| **Metals** | | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | 0.055 | **0.055** | <0.01 | <0.01 | <0.01 | <0.01 |
| **Arsenic (filtered)** | mg/L | 0.001 | 0.013 | **0.013** | 0.001 | <0.001 | <0.001 | <0.001 |
| **Boron (filtered)** | mg/L | 0.05 | 0.94 | **0.37** | 0.08 | <0.05 | <0.05 | <0.05 |
| **Cadmium (filtered)** | mg/L | 0.0001 | 0.0002 | **0.0002** | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | 0.001 | **0.001** | <0.001 | <0.001 | <0.001 | <0.001 |
| **Copper (filtered)** | mg/L | 0.001 | 0.0014 | **0.0014** | <0.001 | <0.001 | **0.002** | <0.001 |
| **Iron (filtered)** | mg/L | 0.05 | | | 0.47 | <0.05 | <0.05 | <0.05 |
| **Lead (filtered)** | mg/L | 0.001 | 0.0034 | **0.0034** | <0.001 | <0.001 | <0.001 | <0.001 |
| **Manganese (filtered)** | mg/L | 0.001 | 1.9 | **1.9** | 0.332 | **2.17** | **2.32** | 0.175 |
| **Mercury (filtered)** | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **Nickel (filtered)** | mg/L | 0.001 | 0.011 | **0.011** | 0.001 | 0.009 | 0.01 | <0.001 |
| **Selenium (filtered)** | mg/L | 0.004 | 0.005 | | <0.004 | <0.004 | <0.004 | <0.004 |
| **Zinc (filtered)** | mg/L | 0.005 | 0.008 | **0.008** | <0.005 | **0.023** | **0.026** | <0.005 |
| **BTEX** | | | | | | | | |
| **Benzene** | µg/L | 1 | 950 | **LOR** | <1 | <1 | - | <1 |
| **Toluene** | µg/L | 2 | | **LOR** | <2 | <2 | - | <2 |
| **Ethylbenzene** | µg/L | 2 | 80 | **LOR** | <2 | <2 | - | <2 |
| **Xylene (m & p)** | µg/L | 2 | | **LOR** | <2 | <2 | - | <2 |
| **Xylene (o)** | µg/L | 2 | 350 | **LOR** | <2 | <2 | - | <2 |
| **Xylene Total** | µg/L | 2 | | **LOR** | <2 | <2 | - | <2 |
| **Total BTEX** | µg/L | 1 | | **LOR** | <1 | <1 | - | <1 |
| **Naphthalene (VOC)** | mg/L | 0.005 | 0.016 | **LOR** | <0.005 | <0.005 | - | <0.005 |
| **TRH** | | | | | | | | |
| **C6-C10** | µg/L | 20 | | **LOR** | <20 | <20 | - | <20 |
| **C6 - C10 less BTEX (F1)** | µg/L | 20 | | **LOR** | <20 | <20 | - | <20 |
| **>C10-C16** | µg/L | 100 | | **LOR** | <100 | <100 | - | <100 |
| **>C10 - C16 less Naphthalene (F2)** | µg/L | 100 | | **LOR** | <100 | <100 | - | <100 |
| **>C16-C34** | µg/L | 100 | | **LOR** | <100 | <100 | - | **620** |
| **>C34-C40** | µg/L | 100 | | **LOR** | <100 | <100 | - | <100 |
| **>C10-C40 (Sum of total)** | µg/L | 100 | | **LOR** | <100 | <100 | - | **620** |
| **Oil and Grease** | mg/L | 5 | | **LOR** | <5 | <5 | - | <5 |
| **TRH - (Silica Gel Cleanup)** | | | | | | | | |
| **TRH >C10 - C16 Fraction minus Naphthalene (F2) (SG)** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TRH >C10-C16 (after silica gel clean-up)** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TRH >C16-C34 (after silica gel clean-up)** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TRH >C34-C40 (after silica gel clean-up)** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TRH >C10 - C40 Fraction (sum) (SG)** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TPH** | | | | | | | | |
| **C6-C9** | µg/L | 20 | | **LOR** | <20 | <20 | - | <20 |
| **C10-C14** | µg/L | 50 | | **LOR** | <50 | <50 | - | **60** |
| **C15-C28** | µg/L | 100 | | **LOR** | <100 | <100 | - | **640** |
| **C29-C36** | µg/L | 50 | | **LOR** | <50 | <50 | - | <50 |
| **C10-C36 (Sum of total)** | µg/L | 50 | | **LOR** | <50 | <50 | - | **700** |
| **TPH - (Silica Gel Cleanup)** | | | | | | | | |
| **TPH C10-C14 Fraction after Silica Cleanup** | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | - | <0.05 |
| **TPH C15-C28 Fraction after Silica Cleanup** | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | - | <0.1 |
| **TPH C29-C36 Fraction after Silica Cleanup** | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | - | <0.05 |
| **TPH C10-C36 (Total) (after silica gel clean-up)** | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | - | <0.05 |

**Environmental Standards**
DoE, 2018, ANZG (2018) freshwater slightly-moderately disturbed system toxicant DGVs

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Location Code | DOWNSTREAM | MIDSTREAM | QUARRY PIT | QUARRY PIT | UPSTREAM |
| | | | | Date | 15 Apr 2026 | 15 Apr 2026 | 15 Apr 2026 | 15 Apr 2026 | 15 Apr 2026 |
| | | | | Field ID | DOWNSTREAM | MIDSTREAM | QC2 | QUARRY PIT | UPSTREAM |
| | | | | Lab Report Number | ES2611873 | ES2611873 | ES2611873 | ES2611873 | ES2611873 |
| | Unit | EQL | ANZG (2018) toxicant DGVs[1] | Trigger Values (Fresh water) | | | | | |
| **Field** | | | | | | | | | |
| Temp (Field) | °C | 0.1 | | - | 16.6 | 23 | - | 25 | 14.6 |
| pH (Field) | - | 0.01 | | 6.5-8.5 | 7.59 | 8.31 | - | **8.7** | 7.48 |
| EC (field) | µS/cm | 1 | | 125-2200 | **3,684** | **4,072** | - | **7,536** | **3,747** |
| DO (Field) | mg/L | 0.1 | | | 5.59 | 5.03 | - | 6.27 | 1.48 |
| Redox Potential (Field) | mV | 0.1 | | | 25.2 | -25.9 | - | -75 | -48.1 |
| Corrected Redox (Eh) | mV | 0.1 | | | 225.2 | 174.1 | - | 125 | 151.9 |
| TDS | mg/L | 1 | | | 4,901 | 2,434 | - | 2649 | 2,228 |
| TSS | mg/L | 5 | | | 16 | 28 | - | 76 | 7 |
| **Inorganics** | | | | | | | | | |
| Hardness as $CaCO_3$ (filtered) | mg/L | 1 | | | 492 | 461 | - | 936 | 428 |
| Ammonia as N | mg/L | 0.01 | 0.9 | **0.02** | **0.05** | 0.01 | - | 0.02 | **0.05** |
| Nitrite (as N) | mg/L | 0.01 | | | <0.01 | <0.01 | - | 0.07 | <0.01 |
| Nitrate (as N) | mg/L | 0.01 | | | 0.04 | <0.01 | - | 3.35 | 0.01 |
| Nitrite + Nitrate as N | mg/L | 0.01 | | **0.04** | 0.04 | <0.01 | - | **3.42** | 0.01 |
| Total Kjeldahl Nitrogen | mg/L | 0.1 | | | 0.7 | 0.8 | - | 1.2 | 1.0 |
| Nitrogen (Total) | mg/L | 0.1 | | **0.05** | **0.7** | **0.8** | - | **4.6** | **1.0** |
| Reactive Phosphorus (as P) (filtered) | mg/L | 0.01 | | **0.02** | <0.01 | <0.01 | - | <0.01 | <0.01 |
| Total Phosphate (as P) | mg/L | 0.01 | | **0.05** | 0.03 | 0.04 | - | **0.07** | **0.06** |
| **Metals** | | | | | | | | | |
| Aluminium (filtered) | mg/L | 0.01 | 0.055 | **0.055** | <0.01 | 0.02 | - | <0.01 | <0.01 |
| Arsenic (filtered) | mg/L | 0.001 | 0.013 | **0.013** | <0.001 | <0.001 | - | <0.001 | 0.001 |
| Boron (filtered) | mg/L | 0.05 | 0.94 | **0.37** | <0.05 | <0.05 | - | <0.05 | <0.05 |
| Cadmium (filtered) | mg/L | 0.0001 | 0.0002 | **0.0002** | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 |
| Chromium (III+VI) (filtered) | mg/L | 0.001 | 0.001 | **0.01** | <0.001 | <0.001 | - | <0.001 | <0.001 |
| Copper (filtered) | mg/L | 0.001 | 0.0014 | **0.0014** | <0.001 | <0.001 | - | **0.002** | <0.001 |
| Iron (filtered) | mg/L | 0.05 | | | 0.06 | <0.05 | - | <0.05 | 0.11 |
| Lead (filtered) | mg/L | 0.001 | 0.0034 | **0.0034** | <0.001 | <0.001 | - | <0.001 | <0.001 |
| Manganese (filtered) | mg/L | 0.001 | 1.9 | **1.9** | 0.195 | 0.017 | - | 0.002 | 0.083 |
| Mercury (filtered) | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | - | <0.0001 | <0.0001 |
| Nickel (filtered) | mg/L | 0.001 | 0.011 | **0.011** | <0.001 | <0.001 | - | 0.005 | <0.001 |
| Selenium (filtered) | mg/L | 0.004 | 0.005 | | <0.004 | <0.004 | - | 0.026 | <0.004 |
| Zinc (filtered) | mg/L | 0.005 | 0.008 | **0.008** | <0.005 | 0.008 | - | <0.005 | <0.005 |
| **BTEX** | | | | | | | | | |
| Benzene | µg/L | 1 | 950 | **LOR** | <1 | <1 | <1 | <1 | <1 |
| Toluene | µg/L | 2 | | **LOR** | <2 | <2 | <2 | <2 | <2 |
| Ethylbenzene | µg/L | 2 | 80 | **LOR** | <2 | <2 | <2 | <2 | <2 |
| Xylene (m & p) | µg/L | 2 | | **LOR** | <2 | <2 | <2 | <2 | <2 |
| Xylene (o) | µg/L | 2 | 350 | **LOR** | <2 | <2 | <2 | <2 | <2 |
| Xylene Total | µg/L | 2 | | **LOR** | <2 | <2 | <2 | <2 | <2 |
| Total BTEX | µg/L | 1 | | **LOR** | <1 | <1 | <1 | <1 | <1 |
| Naphthalene (VOC) | mg/L | 0.005 | 0.016 | **LOR** | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| **TRH** | | | | | | | | | |
| C6-C10 | µg/L | 20 | | **LOR** | <20 | <20 | <20 | <20 | <20 |
| C6 - C10 less BTEX (F1) | µg/L | 20 | | **LOR** | <20 | <20 | <20 | <20 | <20 |
| >C10-C16 | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| >C10 - C16 less Naphthalene (F2) | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| >C16-C34 | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| >C34-C40 | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| >C10-C40 (Sum of total) | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| Oil and Grease | mg/L | 5 | | **LOR** | <5 | <5 | <5 | <5 | <5 |
| **TRH - (Silica Gel Cleanup)** | | | | | | | | | |
| TRH >C10 - C16 Fraction minus Naphthalene (F2) (SG) | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| TRH >C10-C16 (after silica gel clean-up) | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| TRH >C16-C34 (after silica gel clean-up) | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| TRH >C34-C40 (after silica gel clean-up) | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| TRH >C10 - C40 Fraction (sum) (SG) | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **TPH** | | | | | | | | | |
| C6-C9 | µg/L | 20 | | **LOR** | <20 | <20 | <20 | <20 | <20 |
| C10-C14 | µg/L | 50 | | **LOR** | <50 | <50 | <50 | <50 | <50 |
| C15-C28 | µg/L | 100 | | **LOR** | <100 | <100 | <100 | <100 | <100 |
| C29-C36 | µg/L | 50 | | **LOR** | <50 | <50 | <50 | <50 | <50 |
| C10-C36 (Sum of total) | µg/L | 50 | | **LOR** | <50 | <50 | <50 | <50 | <50 |
| **TPH - (Silica Gel Cleanup)** | | | | | | | | | |
| TPH C10-C14 Fraction after Silica Cleanup | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| TPH C15-C28 Fraction after Silica Cleanup | mg/L | 0.1 | | **LOR** | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| TPH C29-C36 Fraction after Silica Cleanup | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| TPH C10-C36 (Total) (after silica gel clean-up) | mg/L | 0.05 | | **LOR** | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

**Environmental Standards**

[1]DoE, 2018, ANZG (2018) freshwater slightly-moderately disturbed system toxicant DGVs

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location Code | | | BSM2 | BSM2 | | QUARRY PIT | QUARRY PIT | |
| Date | | | 15 Apr 2026 | 15 Apr 2026 | | 15 Apr 2026 | 15 Apr 2026 | |
| Field ID | | | BSM2 | QC1 | RPD | QUARRY PIT | QC2 | RPD |
| | Unit | EQL | | | | | | |
| **Field** | | | | | | | | |
| TSS | mg/L | 5 | 26 | 24 | 8 | 76 | - | - |
| **Inorganics** | | | | | | | | |
| Hardness as $CaCO_3$ (filtered) | mg/L | 1 | 2,150 | 2,300 | 7 | 936 | - | - |
| Ammonia as N | mg/L | 0.01 | 0.01 | 0.01 | 0 | 0.02 | - | - |
| Nitrite (as N) | mg/L | 0.01 | 0.82 | 0.83 | 1 | 0.07 | - | - |
| Nitrate (as N) | mg/L | 0.01 | 380 | 448 | 16 | 3.35 | - | - |
| Nitrite + Nitrate as N | mg/L | 0.01 | 381 | 449 | 16 | 3.42 | - | - |
| Total Kjeldahl Nitrogen | mg/L | 0.1 | 14.6 | 15.9 | 9 | 1.2 | - | - |
| Nitrogen (Total) | mg/L | 0.1 | 396 | 465 | 16 | 4.6 | - | - |
| Reactive Phosphorus (as P) (filtered) | mg/L | 0.01 | <0.01 | <0.01 | 0 | <0.01 | - | - |
| Total Phosphate (as P) | mg/L | 0.01 | 0.03 | 0.01 | 100 | 0.07 | - | - |
| **Metals** | | | | | | | | |
| Aluminium (filtered) | mg/L | 0.01 | <0.01 | <0.01 | 0 | <0.01 | - | - |
| Arsenic (filtered) | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| Boron (filtered) | mg/L | 0.05 | <0.05 | <0.05 | 0 | <0.05 | - | - |
| Cadmium (filtered) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 | <0.0001 | - | - |
| Chromium (III+VI) (filtered) | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| Copper (filtered) | mg/L | 0.001 | <0.001 | 0.002 | 67 | 0.002 | - | - |
| Iron (filtered) | mg/L | 0.05 | <0.05 | <0.05 | 0 | <0.05 | - | - |
| Lead (filtered) | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| Manganese (filtered) | mg/L | 0.001 | 2.17 | 2.32 | 7 | 0.002 | - | - |
| Mercury (filtered) | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 | <0.0001 | - | - |
| Nickel (filtered) | mg/L | 0.001 | 0.009 | 0.010 | 11 | 0.005 | - | - |
| Selenium (filtered) | mg/L | 0.004 | <0.004 | <0.004 | 0 | 0.026 | - | - |
| Zinc (filtered) | mg/L | 0.005 | 0.023 | 0.026 | 12 | <0.005 | - | - |
| **BTEX** | | | | | | | | |
| Benzene | µg/L | 1 | <1 | - | - | <1 | <1 | 0 |
| Toluene | µg/L | 2 | <2 | - | - | <2 | <2 | 0 |
| Ethylbenzene | µg/L | 2 | <2 | - | - | <2 | <2 | 0 |
| Xylene (m & p) | µg/L | 2 | <2 | - | - | <2 | <2 | 0 |
| Xylene (o) | µg/L | 2 | <2 | - | - | <2 | <2 | 0 |
| Xylene Total | µg/L | 2 | <2 | - | - | <2 | <2 | 0 |
| Total BTEX | µg/L | 1 | <1 | - | - | <1 | <1 | 0 |
| Naphthalene (VOC) | mg/L | 0.005 | <0.005 | - | - | <0.005 | <0.005 | 0 |
| **TRH** | | | | | | | | |
| C6-C10 | µg/L | 20 | <20 | - | - | <20 | <20 | 0 |
| C6 - C10 less BTEX (F1) | µg/L | 20 | <20 | - | - | <20 | <20 | 0 |
| >C10-C16 | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| >C10 - C16 less Naphthalene (F2) | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| >C16-C34 | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| >C34-C40 | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| >C10-C40 (Sum of total) | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| Oil and Grease | mg/L | 5 | <5 | - | - | <5 | <5 | 0 |
| **TRH - (Silica Gel Cleanup)** | | | | | | | | |
| TRH >C10 - C16 Fraction minus Naphthalene (F2) (SG) | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| TRH >C10-C16 (after silica gel clean-up) | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| TRH >C16-C34 (after silica gel clean-up) | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| TRH >C34-C40 (after silica gel clean-up) | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| TRH >C10 - C40 Fraction (sum) (SG) | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| **TPH** | | | | | | | | |
| C6-C9 | µg/L | 20 | <20 | - | - | <20 | <20 | 0 |
| C10-C14 | µg/L | 50 | <50 | - | - | <50 | <50 | 0 |
| C15-C28 | µg/L | 100 | <100 | - | - | <100 | <100 | 0 |
| C29-C36 | µg/L | 50 | <50 | - | - | <50 | <50 | 0 |
| C10-C36 (Sum of total) | µg/L | 50 | <50 | - | - | <50 | <50 | 0 |
| **TPH - (Silica Gel Cleanup)** | | | | | | | | |
| TPH C10-C14 Fraction after Silica Cleanup | mg/L | 0.05 | <0.05 | - | - | <0.05 | <0.05 | 0 |
| TPH C15-C28 Fraction after Silica Cleanup | mg/L | 0.1 | <0.1 | - | - | <0.1 | <0.1 | 0 |
| TPH C29-C36 Fraction after Silica Cleanup | mg/L | 0.05 | <0.05 | - | - | <0.05 | <0.05 | 0 |
| TPH C10-C36 (Total) (after silica gel clean-up) | mg/L | 0.05 | <0.05 | - | - | <0.05 | <0.05 | 0 |

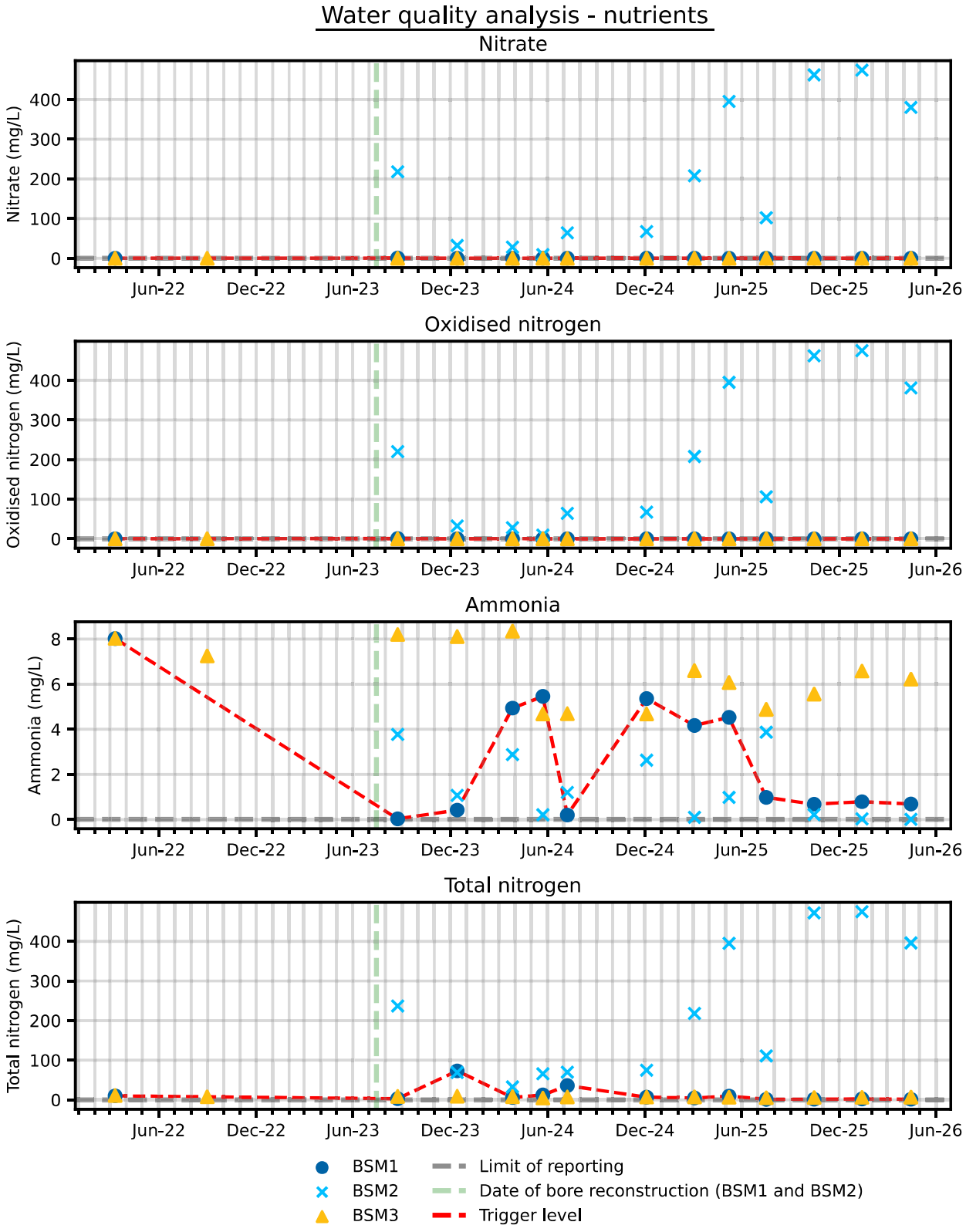
***RPDs have only been considered where a concentration is greater than 1 times the EQL.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 50 (1 - 10 x EQL); 50 (10 - 30 x**
*****Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory**

# Appendix D

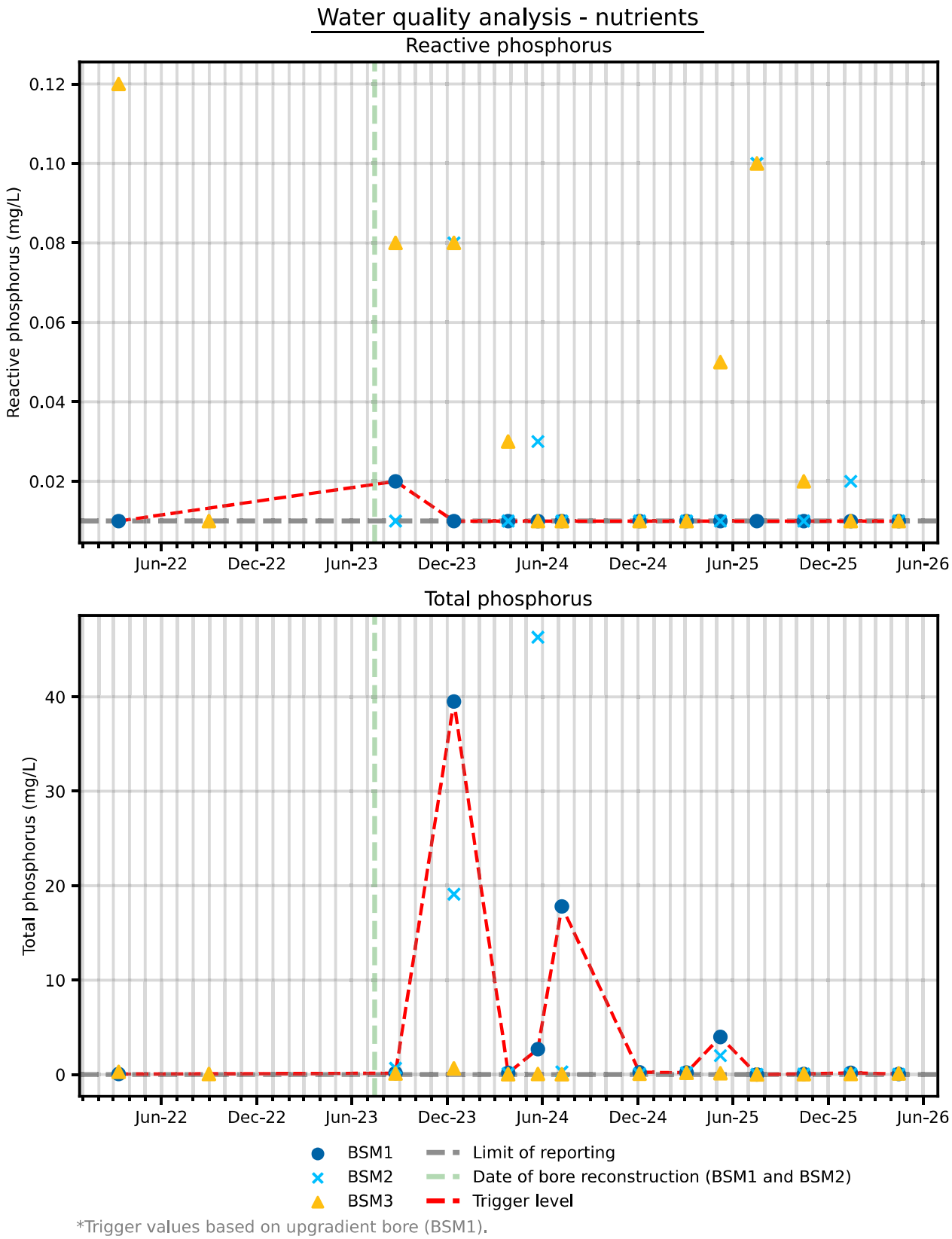
Water quality timeseries charts

EMM
creating opportunities

## D.1 Timeseries water quality charts – nutrients

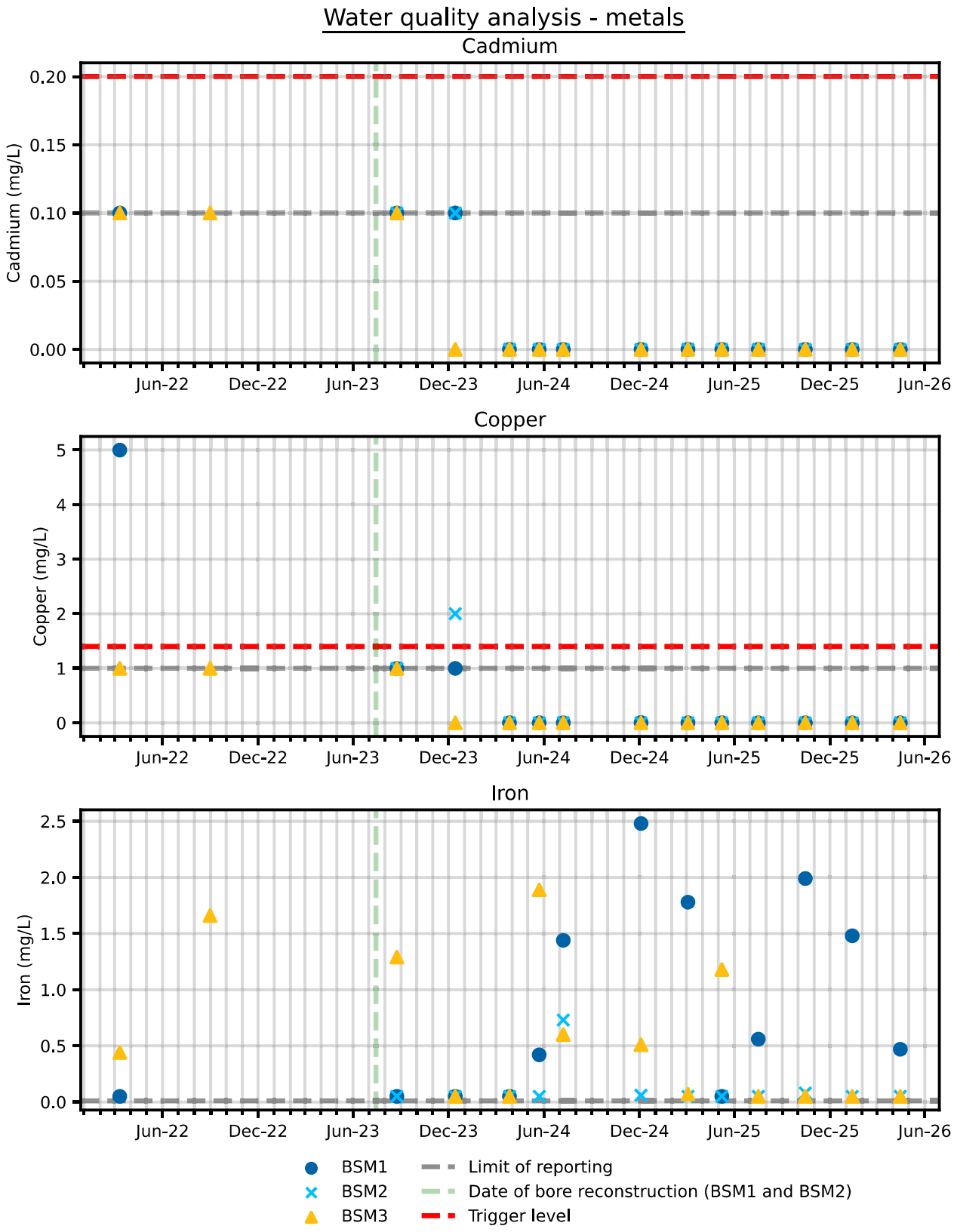



*Trigger values based on upgradient bore (BSM1).

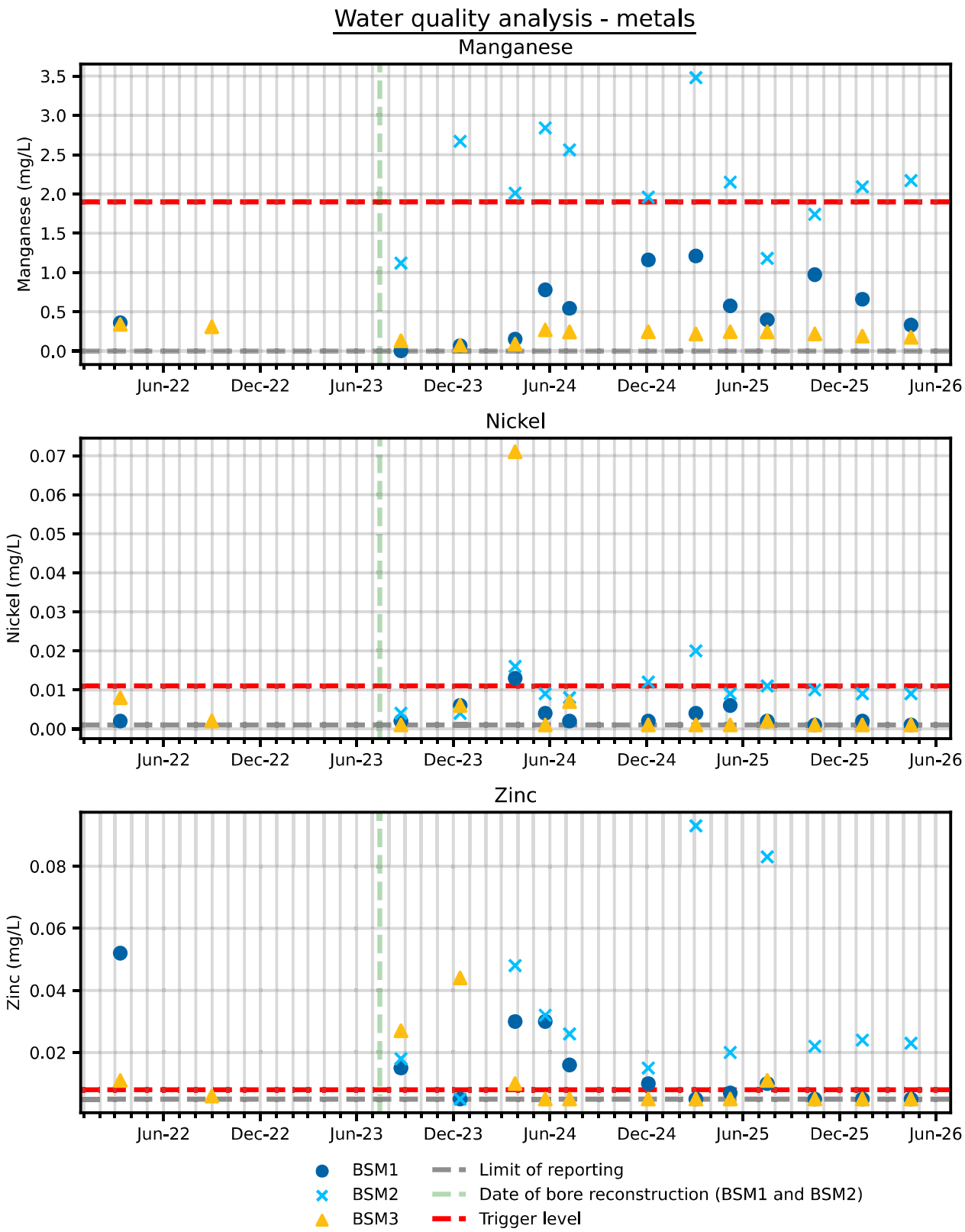



*Trigger values based on upgradient bore (BSM1).

## D.2 Timeseries water quality charts – metals

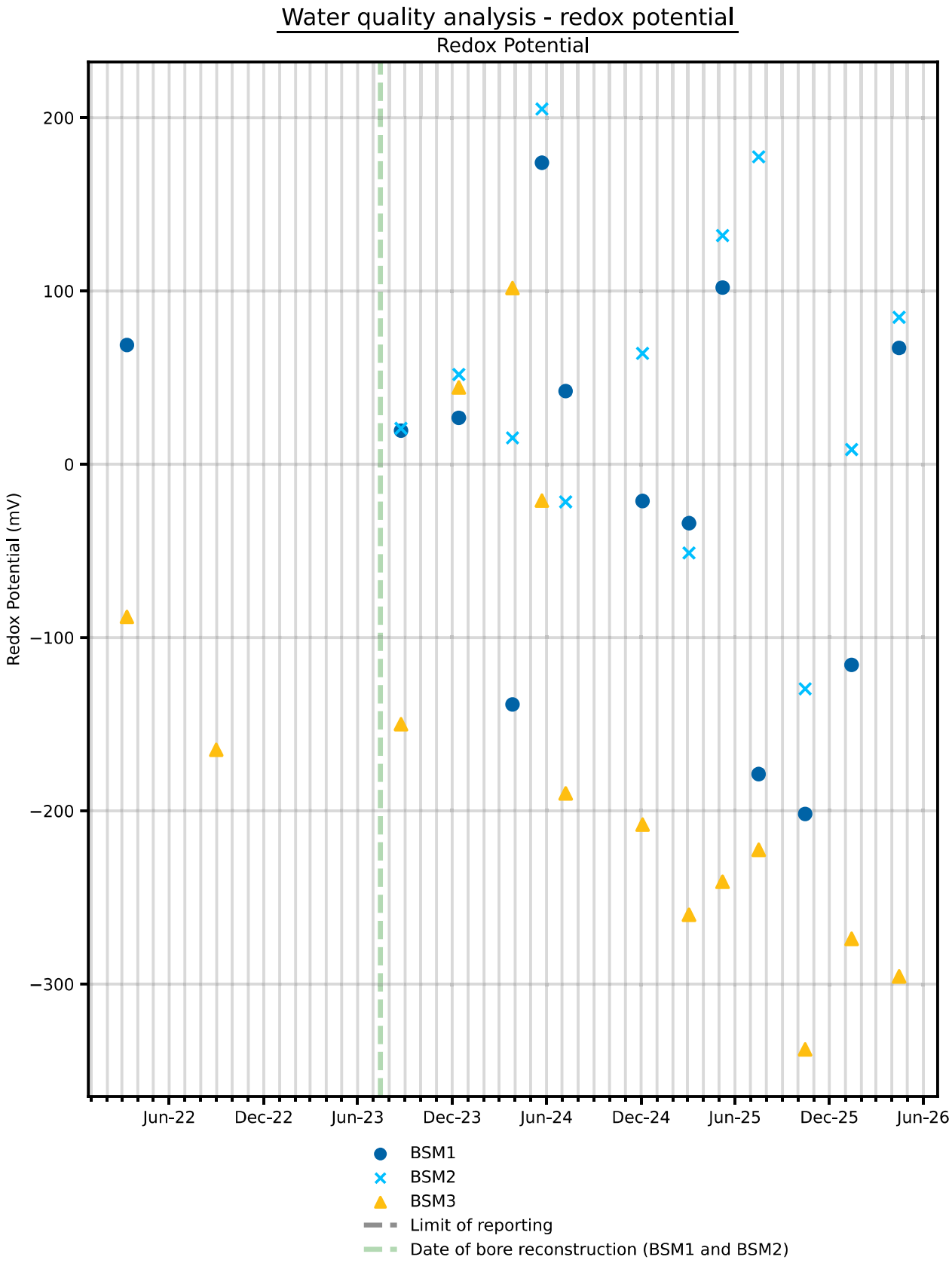



*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).




*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

## D.3 Timeseries water quality charts – Redox Potential



# Appendix E
## Laboratory certificates

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# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2611873** | Page | : 1 of 9 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Apr-2026 15:30 |
| Order number | : ---- | Date Analysis Commenced | : 16-Apr-2026 |
| C-O-C number | : ---- | Issue Date | : 23-Apr-2026 16:44 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 9 | | |
| No. of samples analysed | : 9 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QUARRY PIT | UPSTREAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 |
| Compound | CAS Number | LOR | Unit | | ES2611873-001 | ES2611873-002 | ES2611873-003 | ES2611873-004 | ES2611873-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | | |
| Suspended Solids (SS) | ---- | 5 | mg/L | | **34** | **26** | **23** | **76** | **7** |
| **ED093F: SAR and Hardness Calculations** | | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | | **491** | **2150** | **3410** | **936** | **428** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | **0.001** | <0.001 | <0.001 | <0.001 | **0.001** |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **0.002** | <0.001 |
| Nickel | 7440-02-0 | 0.001 | mg/L | | **0.001** | **0.009** | <0.001 | **0.005** | <0.001 |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Selenium | 7782-49-2 | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | **0.026** | <0.004 |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.023** | <0.005 | <0.005 | <0.005 |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.332** | **2.17** | **0.175** | **0.002** | **0.083** |
| Boron | 7440-42-8 | 0.05 | mg/L | | **0.08** | <0.05 | <0.05 | <0.05 | <0.05 |
| Iron | 7439-89-6 | 0.05 | mg/L | | **0.47** | <0.05 | <0.05 | <0.05 | **0.11** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | **0.69** | **0.01** | **6.22** | **0.02** | **0.05** |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | <0.01 | **0.82** | <0.01 | **0.07** | <0.01 |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | <0.01 | **380** | **0.01** | **3.35** | **0.01** |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | <0.01 | **381** | **0.01** | **3.42** | **0.01** |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QUARRY PIT | UPSTREAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 |
| Compound | CAS Number | LOR | Unit | | ES2611873-001 | ES2611873-002 | ES2611873-003 | ES2611873-004 | ES2611873-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **1.4** | **14.6** | **6.8** | **1.2** | **1.0** |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **1.4** | **396** | **6.8** | **4.6** | **1.0** |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.06** | **0.03** | **0.12** | **0.07** | **0.06** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| **EP020: Oil and Grease (O&G)** | | | | | | | | | |
| Oil & Grease | ---- | 5 | mg/L | | <5 | <5 | <5 | <5 | <5 |
| **EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup** | | | | | | | | | |
| C10 - C14 Fraction | ---- | 50 | µg/L | | <50 | <50 | <50 | <50 | <50 |
| C15 - C28 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| C29 - C36 Fraction | ---- | 50 | µg/L | | <50 | <50 | <50 | <50 | <50 |
| ^ C10 - C36 Fraction (sum) | ---- | 50 | µg/L | | <50 | <50 | <50 | <50 | <50 |
| **EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup** | | | | | | | | | |
| >C10 - C16 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| >C16 - C34 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| >C34 - C40 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| ^ >C10 - C40 Fraction (sum) | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| >C10 - C16 Fraction minus Naphthalene (F2) | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | ---- | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| C10 - C14 Fraction | ---- | 50 | µg/L | | <50 | <50 | **60** | <50 | <50 |
| C15 - C28 Fraction | ---- | 100 | µg/L | | <100 | <100 | **640** | <100 | <100 |
| C29 - C36 Fraction | ---- | 50 | µg/L | | <50 | <50 | <50 | <50 | <50 |
| ^ C10 - C36 Fraction (sum) | ---- | 50 | µg/L | | <50 | <50 | **700** | <50 | <50 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QUARRY PIT | UPSTREAM |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 |
| Compound | CAS Number | LOR | Unit | | ES2611873-001 | ES2611873-002 | ES2611873-003 | ES2611873-004 | ES2611873-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | <20 | <20 | <20 | <20 | <20 |
| >C10 - C16 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| >C16 - C34 Fraction | ---- | 100 | µg/L | | <100 | <100 | **620** | <100 | <100 |
| >C34 - C40 Fraction | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| ^ >C10 - C40 Fraction (sum) | ---- | 100 | µg/L | | <100 | <100 | **620** | <100 | <100 |
| ^ >C10 - C16 Fraction minus Naphthalene (F2) | ---- | 100 | µg/L | | <100 | <100 | <100 | <100 | <100 |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | <1 | <1 | <1 | <1 | <1 |
| Toluene | 108-88-3 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| Ethylbenzene | 100-41-4 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ^ Total Xylenes | ---- | 2 | µg/L | | <2 | <2 | <2 | <2 | <2 |
| ^ Sum of BTEX | ---- | 1 | µg/L | | <1 | <1 | <1 | <1 | <1 |
| Naphthalene | 91-20-3 | 5 | µg/L | | <5 | <5 | <5 | <5 | <5 |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1.2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | **134** | **134** | **121** | **132** | **131** |
| Toluene-D8 | 2037-26-5 | 2 | % | | **122** | **116** | **114** | **107** | **111** |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | **115** | **114** | **125** | **129** | **133** |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | MIDSTREAM | DOWNSTREAM | QC1 | QC2 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2611873-006 | ES2611873-007 | ES2611873-008 | ES2611873-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | | |
| Suspended Solids (SS) | ---- | 5 | mg/L | | **28** | **16** | **24** | **----** | **----** |
| **ED093F: SAR and Hardness Calculations** | | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | | **461** | **492** | **2300** | **----** | **----** |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | **0.02** | <0.01 | <0.01 | **----** | **----** |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | **0.002** | **----** | **----** |
| Nickel | 7440-02-0 | 0.001 | mg/L | | <0.001 | <0.001 | **0.010** | **----** | **----** |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | **----** | **----** |
| Selenium | 7782-49-2 | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | **----** | **----** |
| Zinc | 7440-66-6 | 0.005 | mg/L | | **0.008** | <0.005 | **0.026** | **----** | **----** |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.017** | **0.195** | **2.32** | **----** | **----** |
| Boron | 7440-42-8 | 0.05 | mg/L | | <0.05 | <0.05 | <0.05 | **----** | **----** |
| Iron | 7439-89-6 | 0.05 | mg/L | | <0.05 | **0.06** | <0.05 | **----** | **----** |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | **----** | **----** |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | **0.01** | **0.05** | **0.01** | **----** | **----** |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | <0.01 | <0.01 | **0.83** | **----** | **----** |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | <0.01 | **0.04** | **448** | **----** | **----** |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | <0.01 | **0.04** | **449** | **----** | **----** |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | MIDSTREAM | DOWNSTREAM | QC1 | QC2 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2611873-006 | ES2611873-007 | ES2611873-008 | ES2611873-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **0.8** | **0.7** | **15.9** | **----** | **----** |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **0.8** | **0.7** | **465** | **----** | **----** |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.04** | **0.03** | **0.01** | **----** | **----** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | **----** | **----** |
| **EP020: Oil and Grease (O&G)** | | | | | | | | | |
| Oil & Grease | ---- | 5 | mg/L | | <5 | <5 | **----** | <5 | **----** |
| **EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup** | | | | | | | | | |
| C10 - C14 Fraction | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| C15 - C28 Fraction | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| C29 - C36 Fraction | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| ^ C10 - C36 Fraction (sum) | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| **EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup** | | | | | | | | | |
| >C10 - C16 Fraction | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| >C16 - C34 Fraction | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| >C34 - C40 Fraction | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| ^ >C10 - C40 Fraction (sum) | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| >C10 - C16 Fraction minus Naphthalene (F2) | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | | | |
| C6 - C9 Fraction | ---- | 20 | µg/L | | <20 | <20 | **----** | <20 | **----** |
| C10 - C14 Fraction | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| C15 - C28 Fraction | ---- | 100 | µg/L | | <100 | <100 | **----** | <100 | **----** |
| C29 - C36 Fraction | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| ^ C10 - C36 Fraction (sum) | ---- | 50 | µg/L | | <50 | <50 | **----** | <50 | **----** |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | MIDSTREAM | DOWNSTREAM | QC1 | QC2 | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | 15-Apr-2026 00:00 | ---- |
| Compound | CAS Number | LOR | Unit | | ES2611873-006 | ES2611873-007 | ES2611873-008 | ES2611873-009 | -------- |
| | | | | | Result | Result | Result | Result | ---- |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued** | | | | | | | | | |
| C6 - C10 Fraction | C6_C10 | 20 | µg/L | | <20 | <20 | ---- | <20 | ---- |
| ^ C6 - C10 Fraction minus BTEX (F1) | C6_C10-BTEX | 20 | µg/L | | <20 | <20 | ---- | <20 | ---- |
| >C10 - C16 Fraction | ---- | 100 | µg/L | | <100 | <100 | ---- | <100 | ---- |
| >C16 - C34 Fraction | ---- | 100 | µg/L | | <100 | <100 | ---- | <100 | ---- |
| >C34 - C40 Fraction | ---- | 100 | µg/L | | <100 | <100 | ---- | <100 | ---- |
| ^ >C10 - C40 Fraction (sum) | ---- | 100 | µg/L | | <100 | <100 | ---- | <100 | ---- |
| ^ >C10 - C16 Fraction minus Naphthalene (F2) | ---- | 100 | µg/L | | <100 | <100 | ---- | <100 | ---- |
| **EP080: BTEXN** | | | | | | | | | |
| Benzene | 71-43-2 | 1 | µg/L | | <1 | <1 | ---- | <1 | ---- |
| Toluene | 108-88-3 | 2 | µg/L | | <2 | <2 | ---- | <2 | ---- |
| Ethylbenzene | 100-41-4 | 2 | µg/L | | <2 | <2 | ---- | <2 | ---- |
| meta- & para-Xylene | 108-38-3 106-42-3 | 2 | µg/L | | <2 | <2 | ---- | <2 | ---- |
| ortho-Xylene | 95-47-6 | 2 | µg/L | | <2 | <2 | ---- | <2 | ---- |
| ^ Total Xylenes | ---- | 2 | µg/L | | <2 | <2 | ---- | <2 | ---- |
| ^ Sum of BTEX | ---- | 1 | µg/L | | <1 | <1 | ---- | <1 | ---- |
| Naphthalene | 91-20-3 | 5 | µg/L | | <5 | <5 | ---- | <5 | ---- |
| **EP080S: TPH(V)/BTEX Surrogates** | | | | | | | | | |
| 1.2-Dichloroethane-D4 | 17060-07-0 | 2 | % | | **135** | **104** | ---- | **126** | ---- |
| Toluene-D8 | 2037-26-5 | 2 | % | | **124** | **104** | ---- | **116** | ---- |
| 4-Bromofluorobenzene | 460-00-4 | 2 | % | | **110** | **90.5** | ---- | **124** | ---- |

## Surrogate Control Limits

| Sub-Matrix: **WATER** | | Recovery Limits (%) | |
|---|---|---|---|
| *Compound* | *CAS Number* | *Low* | *High* |
| **EP080S: TPH(V)/BTEX Surrogates** | | | |
| **1.2-Dichloroethane-D4** | 17060-07-0 | 72 | 143 |
| **Toluene-D8** | 2037-26-5 | 75 | 131 |
| **4-Bromofluorobenzene** | 460-00-4 | 73 | 137 |

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2611873** | Page | : 1 of 8 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Apr-2026 |
| Order number | : ---- | Date Analysis Commenced | : 16-Apr-2026 |
| C-O-C number | : ---- | Issue Date | : 23-Apr-2026 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 9 | | |
| No. of samples analysed | : 9 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |
| Edwandy Fadjar | Organic Coordinator | Sydney Organics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 7344555)** | | | | | | | | | |
| ES2611603-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 712 | 668 | 6.4 | 0% - 20% |
| ES2611844-027 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 45 | 38 | 16.1 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7345664)** | | | | | | | | | |
| ES2611555-005 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.043 | 0.043 | 0.0 | 0% - 20% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | <0.004 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | 0.11 | 0.12 | 0.0 | No Limit |
| ES2611873-001 | BSM1 | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | 0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.332 | 0.329 | 0.8 | 0% - 20% |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7345664) - continued** | | | | | | | | | |
| ES2611873-001 | BSM1 | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | 0.001 | 0.001 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | <0.004 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | 0.08 | 0.08 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | 0.47 | 0.47 | 0.0 | No Limit |
| **EG035F: Dissolved Mercury by FIMS (QC Lot: 7345666)** | | | | | | | | | |
| ES2611873-001 | BSM1 | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| **EK055G: Ammonia as N by Discrete Analyser (QC Lot: 7345857)** | | | | | | | | | |
| ED2600468-001 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 (0.10)* | mg/L | 519 | 495 | 4.8 | 0% - 20% |
| ES2611873-002 | BSM2 | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.01 | 0.01 | 0.0 | No Limit |
| **EK057G: Nitrite as N by Discrete Analyser (QC Lot: 7342403)** | | | | | | | | | |
| EN2605808-001 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | 0.01 | 0.02 | 0.0 | No Limit |
| ES2611873-005 | UPSTREAM | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 7345858)** | | | | | | | | | |
| ED2600468-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 (1.00)* | mg/L | <1.00 | <1.00 | 0.0 | No Limit |
| ES2611873-002 | BSM2 | EK059G: Nitrite + Nitrate as N | ---- | 0.01 (0.10)* | mg/L | 381 | 393 | 3.1 | 0% - 20% |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 7345848)** | | | | | | | | | |
| ED2600468-001 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 (50.0)* | mg/L | 775 | 583 | 28.3 | 0% - 50% |
| ES2611873-003 | BSM3 | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 6.8 | 6.8 | 0.0 | 0% - 20% |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 7345847)** | | | | | | | | | |
| ED2600468-001 | Anonymous | EK067G: Total Phosphorus as P | ---- | 0.01 (0.50)* | mg/L | 8.25 | 6.31 | 26.7 | 0% - 50% |
| ES2611873-003 | BSM3 | EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | 0.12 | 0.10 | 11.1 | 0% - 50% |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 7342402)** | | | | | | | | | |
| ES2611892-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| EN2605800-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | 0.04 | 0.04 | 0.0 | No Limit |
| **EP080/071: Total Petroleum Hydrocarbons (QC Lot: 7341745)** | | | | | | | | | |
| ES2611873-001 | BSM1 | EP080: C6 - C9 Fraction | ---- | 20 | µg/L | <20 | <20 | 0.0 | No Limit |
| ES2611873-006 | MIDSTREAM | EP080: C6 - C9 Fraction | ---- | 20 | µg/L | <20 | <20 | 0.0 | No Limit |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 7341745)** | | | | | | | | | |
| ES2611873-001 | BSM1 | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | <20 | 0.0 | No Limit |
| ES2611873-006 | MIDSTREAM | EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | <20 | 0.0 | No Limit |
| **EP080: BTEXN (QC Lot: 7341745)** | | | | | | | | | |
| ES2611873-001 | BSM1 | EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | <1 | 0.0 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EP080: BTEXN (QC Lot: 7341745) - continued** | | | | | | | | | |
| ES2611873-001 | BSM1 | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.0 | No Limit |
| ES2611873-006 | MIDSTREAM | EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | <1 | 0.0 | No Limit |
| | | EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | <2 | 0.0 | No Limit |
| | | EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | <5 | 0.0 | No Limit |

## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Acceptable Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 7344555)** | | | | | | | | |
| EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | 150 mg/L | 102 | 83.0 | 129 |
| | | | | <5 | 1000 mg/L | 98.6 | 82.0 | 110 |
| | | | | <5 | 817 mg/L | 102 | 83.0 | 118 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7345664)** | | | | | | | | |
| EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 89.9 | 80.0 | 116 |
| EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 91.3 | 85.0 | 114 |
| EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.1 mg/L | 89.4 | 84.0 | 110 |
| EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 89.4 | 85.0 | 111 |
| EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 87.3 | 81.0 | 111 |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 88.7 | 83.0 | 111 |
| EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 87.5 | 82.0 | 110 |
| EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 88.0 | 82.0 | 112 |
| EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | 0.1 mg/L | 92.9 | 85.0 | 115 |
| EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.1 mg/L | 97.3 | 81.0 | 117 |
| EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 94.8 | 85.0 | 115 |
| EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 90.4 | 82.0 | 112 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7345666)** | | | | | | | | |
| EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | 0.01 mg/L | 99.4 | 83.0 | 105 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7345857)** | | | | | | | | |
| EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 93.7 | 90.0 | 114 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7342403)** | | | | | | | | |
| EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 105 | 82.0 | 114 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7345858)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 104 | 91.0 | 113 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7345848)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | 5 mg/L | 95.4 | 69.0 | 123 |
| | | | | <0.1 | 2.5 mg/L | 92.7 | 70.0 | 123 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7345847)** | | | | | | | | |
| EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | <0.01 | 2.21 mg/L | 99.8 | 71.3 | 126 |
| | | | | <0.01 | 0.5 mg/L | 86.0 | 71.3 | 126 |

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7342402)** | | | | | | | | |
| EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 98.0 | 85.0 | 117 |
| **EP020: Oil and Grease (O&G) (QCLot: 7349341)** | | | | | | | | |
| EP020: Oil & Grease | ---- | 5 | mg/L | <5 | 5000 mg/L | 106 | 81.0 | 121 |
| **EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup (QCLot: 7339631)** | | | | | | | | |
| EP071SG: C10 - C14 Fraction | ---- | 50 | µg/L | <50 | 400 µg/L | 76.3 | 55.8 | 112 |
| EP071SG: C15 - C28 Fraction | ---- | 100 | µg/L | <100 | 600 µg/L | 94.0 | 71.6 | 113 |
| EP071SG: C29 - C36 Fraction | ---- | 50 | µg/L | <50 | 400 µg/L | 101 | 56.0 | 121 |
| **EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup (QCLot: 7339631)** | | | | | | | | |
| EP071SG: >C10 - C16 Fraction | ---- | 100 | µg/L | <100 | 500 µg/L | 83.4 | 57.9 | 119 |
| EP071SG: >C16 - C34 Fraction | ---- | 100 | µg/L | <100 | 700 µg/L | 91.5 | 62.5 | 110 |
| EP071SG: >C34 - C40 Fraction | ---- | 100 | µg/L | <100 | 300 µg/L | 98.5 | 61.5 | 121 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 7339630)** | | | | | | | | |
| EP071: C10 - C14 Fraction | ---- | 50 | µg/L | <50 | 400 µg/L | 62.5 | 53.7 | 97.0 |
| EP071: C15 - C28 Fraction | ---- | 100 | µg/L | <100 | 600 µg/L | 101 | 63.3 | 107 |
| EP071: C29 - C36 Fraction | ---- | 50 | µg/L | <50 | 400 µg/L | 74.9 | 58.3 | 120 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 7341745)** | | | | | | | | |
| EP080: C6 - C9 Fraction | ---- | 20 | µg/L | <20 | 260 µg/L | 113 | 75.0 | 127 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 7339630)** | | | | | | | | |
| EP071: >C10 - C16 Fraction | ---- | 100 | µg/L | <100 | 500 µg/L | 73.0 | 53.9 | 95.5 |
| EP071: >C16 - C34 Fraction | ---- | 100 | µg/L | <100 | 700 µg/L | 90.5 | 57.8 | 110 |
| EP071: >C34 - C40 Fraction | ---- | 100 | µg/L | <100 | 300 µg/L | 75.1 | 50.5 | 115 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 7341745)** | | | | | | | | |
| EP080: C6 - C10 Fraction | C6_C10 | 20 | µg/L | <20 | 310 µg/L | 94.7 | 75.0 | 127 |
| **EP080: BTEXN (QCLot: 7341745)** | | | | | | | | |
| EP080: Benzene | 71-43-2 | 1 | µg/L | <1 | 10 µg/L | 93.7 | 68.3 | 119 |
| EP080: Toluene | 108-88-3 | 2 | µg/L | <2 | 10 µg/L | 113 | 73.5 | 120 |
| EP080: Ethylbenzene | 100-41-4 | 2 | µg/L | <2 | 10 µg/L | 108 | 73.8 | 122 |
| EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 2 | µg/L | <2 | 10 µg/L | 112 | 73.0 | 122 |
| EP080: ortho-Xylene | 95-47-6 | 2 | µg/L | <2 | 10 µg/L | 105 | 76.4 | 123 |
| EP080: Naphthalene | 91-20-3 | 5 | µg/L | <5 | 10 µg/L | 106 | 75.5 | 124 |

## *Matrix Spike (MS) Report*

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

| | | | | Matrix Spike (MS) Report | | | |
|---|---|---|---|---|---|---|---|
| | | | | Spike | SpikeRecovery(%) | Acceptable Limits (%) | |
| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Concentration | MS | Low | High |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7345664)** | | | | | | | |
| ES2611555-006 | Anonymous | EG020A-F: Arsenic | 7440-38-2 | 1 mg/L | 111 | 70.0 | 130 |
| | | EG020A-F: Cadmium | 7440-43-9 | 0.25 mg/L | 117 | 70.0 | 130 |
| | | EG020A-F: Chromium | 7440-47-3 | 1 mg/L | 121 | 70.0 | 130 |
| | | EG020A-F: Copper | 7440-50-8 | 1 mg/L | 113 | 70.0 | 130 |
| | | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 116 | 70.0 | 130 |
| | | EG020A-F: Manganese | 7439-96-5 | 1 mg/L | 119 | 70.0 | 130 |
| | | EG020A-F: Nickel | 7440-02-0 | 1 mg/L | 112 | 70.0 | 130 |
| | | EG020A-F: Zinc | 7440-66-6 | 1 mg/L | 117 | 70.0 | 130 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7345666)** | | | | | | | |
| ES2611555-009 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.01 mg/L | 100 | 70.0 | 130 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7345857)** | | | | | | | |
| ED2600468-001 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.5 mg/L | # Not Determined | 70.0 | 130 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7342403)** | | | | | | | |
| EN2605808-001 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.5 mg/L | 110 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7345858)** | | | | | | | |
| ED2600468-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 5 mg/L | 122 | 70.0 | 130 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7345848)** | | | | | | | |
| ED2600468-002 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 2500 mg/L | 91.1 | 70.0 | 130 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7345847)** | | | | | | | |
| ED2600468-002 | Anonymous | EK067G: Total Phosphorus as P | ---- | 50 mg/L | 91.7 | 70.0 | 130 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7342402)** | | | | | | | |
| EN2605800-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.5 mg/L | 106 | 70.0 | 130 |
| **EP080/071: Total Petroleum Hydrocarbons (QCLot: 7341745)** | | | | | | | |
| ES2611873-001 | BSM1 | EP080: C6 - C9 Fraction | ---- | 325 µg/L | 121 | 70.0 | 130 |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 7341745)** | | | | | | | |
| ES2611873-001 | BSM1 | EP080: C6 - C10 Fraction | C6_C10 | 375 µg/L | 112 | 70.0 | 130 |
| **EP080: BTEXN (QCLot: 7341745)** | | | | | | | |
| ES2611873-001 | BSM1 | EP080: Benzene | 71-43-2 | 25 µg/L | 93.5 | 70.0 | 130 |
| | | EP080: Toluene | 108-88-3 | 25 µg/L | 110 | 70.0 | 130 |
| | | EP080: Ethylbenzene | 100-41-4 | 25 µg/L | 108 | 70.0 | 130 |
| | | EP080: meta- & para-Xylene | 108-38-3<br>106-42-3 | 25 µg/L | 111 | 70.0 | 130 |
| | | EP080: ortho-Xylene | 95-47-6 | 25 µg/L | 108 | 70.0 | 130 |

Sub-Matrix: **WATER**

| | | | | Matrix Spike (MS) Report | | | |
|---|---|---|---|---|---|---|---|
| | | | | Spike | SpikeRecovery(%) | Acceptable Limits (%) | |
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *Concentration* | *MS* | *Low* | *High* |
| **EP080: BTEXN (QCLot: 7341745) - continued** | | | | | | | |
| ES2611873-001 | BSM1 | EP080: Naphthalene | 91-20-3 | 25 µg/L | 108 | 70.0 | 130 |

# QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2611873** | Page | : 1 of 9 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 15-Apr-2026 |
| Site | : ---- | Issue Date | : 23-Apr-2026 |
| Sampler | : TASMAN COUPE | No. of samples received | : 9 |
| Order number | : ---- | No. of samples analysed | : 9 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

### *Outliers : Analysis Holding Time Compliance*

- **NO Analysis Holding Time Outliers exist.**

### *Outliers : Frequency of Quality Control Samples*

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

## Outliers : Quality Control Samples

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **WATER**

| Compound Group Name | Laboratory Sample ID | Client Sample ID | Analyte | CAS Number | Data | Limits | Comment |
|---|---|---|---|---|---|---|---|
| **Matrix Spike (MS) Recoveries** | | | | | | | |
| EK055G: Ammonia as N by Discrete Analyser | ED2600468--001 | Anonymous | **Ammonia as N** | 7664-41-7 | Not Determined | ---- | **MS recovery not determined, background level greater than or equal to 4x spike level.** |

## Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

| Quality Control Sample Type | | Count | | Rate (%) | | Quality Control Specification |
|---|---|---|---|---|---|---|
| Analytical Methods | Method | QC | Regular | Actual | Expected | |
| Laboratory Duplicates (DUP) | | | | | | |
| TRH - Semivolatile Fraction | EP071 | 0 | 8 | 0.00 | 10.00 | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 0 | 8 | 0.00 | 10.00 | NEPM 2013 B3 & ALS QC Standard |
| Matrix Spikes (MS) | | | | | | |
| TRH - Semivolatile Fraction | EP071 | 0 | 8 | 0.00 | 5.00 | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 0 | 8 | 0.00 | 5.00 | NEPM 2013 B3 & ALS QC Standard |

# Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| ***Method*** / ***Container*** / Client Sample ID(s) | ***Sample Date*** | *Extraction / Preparation* | | | *Analysis* | | |
|---|---|---|---|---|---|---|---|
| | | ***Date extracted*** | *Due for extraction* | *Evaluation* | ***Date analysed*** | *Due for analysis* | *Evaluation* |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | |
| **Clear Plastic Bottle - Natural (EA025H)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | **----** | **17-Apr-2026** | 22-Apr-2026 | ✓ |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **ED093F: SAR and Hardness Calculations** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **18-Apr-2026** | 13-May-2026 | ✓ |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **18-Apr-2026** | 12-Oct-2026 | ✓ |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **20-Apr-2026** | 13-May-2026 | ✓ |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK055G)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **20-Apr-2026** | 13-May-2026 | ✓ |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK057G)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **17-Apr-2026** | 17-Apr-2026 | ✓ |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **20-Apr-2026** | 13-May-2026 | ✓ |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM2, QC1 | **15-Apr-2026** | **18-Apr-2026** | 13-May-2026 | ✓ | **18-Apr-2026** | 13-May-2026 | ✓ |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM1, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM | **15-Apr-2026** | **18-Apr-2026** | 13-May-2026 | ✓ | **21-Apr-2026** | 13-May-2026 | ✓ |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK067G)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **18-Apr-2026** | 13-May-2026 | ✓ | **21-Apr-2026** | 13-May-2026 | ✓ |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK071G)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC1 | **15-Apr-2026** | **----** | ---- | ---- | **17-Apr-2026** | 17-Apr-2026 | ✓ |
| **EP020: Oil and Grease (O&G)** | | | | | | | |
| **Amber Jar - Sulfuric Acid or Sodium Bisulfate (EP020)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **----** | ---- | ---- | **20-Apr-2026** | 13-May-2026 | ✓ |
| **EP071 SG: Total Petroleum Hydrocarbons - Silica gel cleanup** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071SG)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **17-Apr-2026** | 22-Apr-2026 | ✓ | **21-Apr-2026** | 27-May-2026 | ✓ |
| **EP071 SG: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Silica gel cleanup** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071SG)** | | | | | | | |
| BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **17-Apr-2026** | 22-Apr-2026 | ✓ | **21-Apr-2026** | 27-May-2026 | ✓ |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EP080/071: Total Petroleum Hydrocarbons** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071)**<br>BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **17-Apr-2026** | 22-Apr-2026 | ✓ | **21-Apr-2026** | 27-May-2026 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM1, BSM2, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **16-Apr-2026** | 29-Apr-2026 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM3 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **17-Apr-2026** | 29-Apr-2026 | ✓ |
| **EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions** | | | | | | | |
| **Amber Glass Bottle - Unpreserved (EP071)**<br>BSM1, BSM2, BSM3, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **17-Apr-2026** | 22-Apr-2026 | ✓ | **21-Apr-2026** | 27-May-2026 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM1, BSM2, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **16-Apr-2026** | 29-Apr-2026 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM3 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **17-Apr-2026** | 29-Apr-2026 | ✓ |
| **EP080: BTEXN** | | | | | | | |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM1, BSM2, QUARRY PIT, UPSTREAM, MIDSTREAM, DOWNSTREAM, QC2 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **16-Apr-2026** | 29-Apr-2026 | ✓ |
| **Amber VOC Vial - Sulfuric Acid (EP080)**<br>BSM3 | **15-Apr-2026** | **16-Apr-2026** | 29-Apr-2026 | ✓ | **17-Apr-2026** | 29-Apr-2026 | ✓ |

# Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 0 | 8 | **0.00** | **10.00** | × | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 0 | 8 | **0.00** | **10.00** | × | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 5 | 20 | **25.00** | **12.50** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 3 | 20 | **15.00** | **15.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 20 | **10.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| Method Blanks (MB) - Continued | | | | | | | |
| Suspended Solids (High Level) | EA025H | 2 | 20 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 1 | 8 | **12.50** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Matrix Spikes (MS) | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 9 | **11.11** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| TRH - Semivolatile Fraction | EP071 | 0 | 8 | **0.00** | **5.00** | × | NEPM 2013 B3 & ALS QC Standard |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | 0 | 8 | **0.00** | **5.00** | × | NEPM 2013 B3 & ALS QC Standard |
| TRH Volatiles/BTEX | EP080 | 1 | 20 | **5.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Suspended Solids (High Level) | EA025H | WATER | In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3) |
| Major Cations - Dissolved | ED093F | WATER | In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3) |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| Dissolved Mercury by FIMS | EG035F | WATER | In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3). |
| Ammonia as N by Discrete analyser | EK055G | WATER | In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrite as N by Discrete Analyser | EK057G | WATER | In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrate as N by Discrete Analyser | EK058G | WATER | In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3) |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | WATER | In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | WATER | In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Total Nitrogen as N (TKN + Nox) By Discrete Analyser | EK062G | WATER | In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3) |

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Total Phosphorus as P By Discrete Analyser | EK067G | WATER | In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | WATER | In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Oil and Grease | EP020 | WATER | In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3) |
| TRH - Semivolatile Fraction | EP071 | WATER | In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3) |
| TRH - Total Recoverable Hydrocarbons - Silica Gel Cleanup | EP071SG | WATER | In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM Schedule B(3). |
| TRH Volatiles/BTEX | EP080 | WATER | In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3) |

| Preparation Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| TKN/TP Digestion | EK061/EK067 | WATER | In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3) |
| Separatory Funnel Extraction of Liquids | ORG14 | WATER | In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container. |
| Volatiles Water Preparation | ORG16-W | WATER | A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging. |

# CHAIN OF CUSTODY

*ALS Laboratory: please tick →*


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☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com


| | | | |
|---|---|---|---|
| **CLIENT: EMM Consulting Pty Ltd** | **TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics) | ☐ Standard TAT **(List due date):** | **FOR LABORATORY USE ONLY (Circle)** |
| **OFFICE: Sydney** | | ☐ Non Standard or urgent TAT **(List due date):** | Custody Seal Intact? Yes No N/A |
| **PROJECT: E240981** **PROJECT NO. E240981** | **ALS QUOTE NO.: EN/111/24** | **COC SEQUENCE NUMBER (Circle)** | Free ice / frozen ice bricks present upon receipt? Yes No N/A |
| **ORDER NUMBER:** **PURCHASE ORDER NO.:** | **COUNTRY OF ORIGIN: Australia** | COC: 1 2 3 4 5 6 7 | Random Sample Temperature on Receipt: °C |
| **PROJECT MANAGER: Tasman Coupe** **CONTACT PH: 0421 081 113** | | OF: 1 2 3 4 5 6 7 | Other comment: |
| **SAMPLER: Tasman Coupe** **SAMPLER MOBILE: 0421081113** | **RELINQUISHED BY: Jude Lewis** | **RECEIVED BY:** DR | **RELINQUISHED BY:** |
| **COC Emailed to ALS? Yes** **EDD FORMAT (or default):** | | | |
| **Email Reports to: tcoupe@emmconsulting.com.au, esdat+emmwater@esdatlabsync.net** | DATE/TIME: | DATE/TIME: 15/4/26 1530 | DATE/TIME: |
| **Email Invoice to:** tcoupe@emmconsulting.com.au, payments@emmconsulting.com.au | | | |

**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: All metals dissolved. Add Chromatograms to analysis report.**

| ALS USE ONLY | SAMPLE DETAILS MATRIX: Solid(S) Water(W) | | | CONTAINER INFORMATION | | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required). | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE *(refer to codes below)* | TOTAL BOTTLES | Total Suspended Solids (EA026H) | Nutrients (NT-8A) | Dissolved metals (W-30) Plus Boron and Manganese | Oil and grease (EP020) | TRH Silica Gel (Pre and Post) (W-4 and W-4SG) | Total hardness | | | |
| 1 | BSM1 | 15/04/2026 | w | | 8 | x | x | x | x | x | x | | | All metals dissolved. Add Chromatograms to analysis report. |
| 2 | BSM2 | 15/04/2026 | w | | 8 | x | x | x | x | x | x | | | All metals dissolved. Add Chromatograms to analysis report. |
| 3 | BSM3 | 15/04/2026 | w | | 8 | x | x | x | x | x | x | | | All metals dissolved. Add Chromatograms to analysis report. |
| 4 | QUARRY PIT | 15/04/2026 | W | | 8 | x | x | x | x | x | x | | | Bottles labelled as QP. All metals dissolved. Add Chromatograms to analysis report. |
| 5 | UPSTREAM | 15/04/2026 | W | | 8 | x | x | x | x | x | x | | | Bottles labelled as US. All metals dissolved. Add Chromatograms to analysis report. |
| 6 | MIDSTREAM | 15/04/2026 | W | | 8 | x | x | x | x | x | x | | | Bottles labelled as US. All metals dissolved. Add Chromatograms to analysis report. |
| 7 | DOWNSTREAM | 15/04/2026 | W | | 8 | x | x | x | x | x | x | | | Bottles labelled as DS. All metals dissolved. Add Chromatograms to analysis report. |
| 8 | QC1 | 15/04/2026 | --- | | 4 | x | x | x | | | x | | | All metals dissolved. Add Chromatograms to analysis report. |
| 9 | QC2 | 15/04/2026 | | | 4 | x | | | x | x | | | | All metals dissolved. Add Chromatograms to analysis report. |
| | | | | | | | | | | | | | | |
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| | | | | TAL | 64 | | | | | | | | | |

HT

Environmental Division Sydney
Work Order Reference
ES2611873

Telephone : +61-2-8784 8555

***Water Container Codes:*** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Pre … lium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric … eserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic … Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

# Appendix F
Field data

EMM
creating opportunities

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM16 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | TC | ☑ Gauging |
| **Client** | CPG | **Date** | 15/04/2026 11:48 | ☐ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 6.515 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well dry. Monument intact, well cap secure. | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☐ **Hydrasleeve** | **Hydrasleeve installation only?** | |
| | | **Volume (L)** | |
| | | **New hydrasleeve installed following sampling?** | |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
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| **Comments** | | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | |
| **Field filtered for metals?** | |
| **Sample ID** | |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM1 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | TC | ☑ Gauging |
| **Client** | CPG | **Date** | 15/04/2026 09:27 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 15.758 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 30.01 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Monument intact, well cap secure | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro PLus |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 9:46 | 1 | | 6.9 | 2786 | 67.1 | 0.47 | 19.2 |
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| | | | | | | | |
| **Comments** | Clear colourless, no odour or sheen. TDS=2146 | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM1 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM3 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | TC | ☑ Gauging |
| **Client** | CPG | **Date** | 15/04/2026 11:03 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 12.425 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 31.77 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Monument intact. Well cap secure. Data logger in well | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 11:08 | 1 | | 6.98 | 22752 | -295.6 | 0.53 | 20.4 |
| | | | | | | | |
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| | |
|---|---|
| **Comments** | Clear, colourless, strong sulfurous odour,no sheem. TDS= 14791 |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM2 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM2 | ☐ Well development |
| **Project** | Luddenham Quarry | **Field staff** | TC | ☑ Gauging |
| **Client** | CPG | **Date** | 15/04/2026 10:21 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 9.71 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 29.88 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Monument intact, well cap secure | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 10:32 | 1 | | 6.65 | 17817 | 84.8 | 1.17 | 20.1 |
| | | | | | | | |
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| | | | | | | | |
| **Comments** | Clear colourless, no odour or sheen TDS= 17268 | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM2 |
| **QC Sample ID (if applicable)** | QC1 |
| **Number of bottles collected** | 8 |

| | |
|---|---|
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| | |
|---|---|
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Quarry Pit |
| **Project** | Luddenham Quarry | **Field staff** | Tasman Coupe |
| **Client** | CPG | **Date** | 15/04/2026 12:35 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | | **Longitude** | |
| **Weather** | Sunny | | |

☑ **Dry weather event** ☐ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Green, clear, no odour or sheer. Significantly less water/ lower water level than January 2026 |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Reach pole |
| **Water quality meter model** | YSI |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | -75 |
| **pH** | 8.7 | **Dissolved oxygen (mg/L)** | 6.27 |
| **Electrical conductivity (uS/cm)** | 7536 | **Temperature (degC)** | 25 |
| **Comments** | TDS=4901 | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | QP |
| **QC Sample ID (if applicable)** | QC2 |
| **Number of bottles collected** | 8 |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Upstream |
| **Project** | Luddenham Quarry | **Field staff** | Tasman Coupe |
| **Client** | CPG | **Date** | 15/04/2026 13:13 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | | **Longitude** | |
| **Weather** | Sunny | | |

☑ **Dry weather event** ☐ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Stagnant, however more water than recent rounds. Depth >0.5m |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Reach pole |
| **Water quality meter model** | YSI |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | -48.1 |
| **pH** | 7.48 | **Dissolved oxygen (mg/L)** | 1.48 |
| **Electrical conductivity (uS/cm)** | 3747 | **Temperature (degC)** | 14.6 |
| **Comments** | Dark green, clear, algal/bacterial sheen, no odour. TDS=2434. | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | US |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Midstream |
| **Project** | Luddenham Quarry | **Field staff** | Tasman Coupe |
| **Client** | CPG | **Date** | 15/04/2026 13:27 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | | **Longitude** | |
| **Weather** | Sunny | | |

☑ **Dry weather event** ☐ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Water body adjacent to water management dam, stagnant, deep. |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Reach pole |
| **Water quality meter model** | YSI |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | -25.9 |
| **pH** | 8.31 | **Dissolved oxygen (mg/L)** | 5.03 |
| **Electrical conductivity (uS/cm)** | 4072 | **Temperature (degC)** | 23 |
| **Comments** | Green, turbid, no odour or sheen. TDS=2649 | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | MS |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Surface water sampling field sheet

| | | | |
|---|---|---|---|
| **Job number** | E240981 | **Location ID** | Downstream |
| **Project** | Luddenham Quarry | **Field staff** | Tasman Coupe |
| **Client** | CPG | **Date** | 15/04/2026 14:00 |

## Site

| | | | |
|---|---|---|---|
| **Latitude** | | **Longitude** | |
| **Weather** | Sunny | | |

☑ **Dry weather event** ☐ **Wet weather event (rain in previous 24 hrs)**

| | |
|---|---|
| **Site description** | Stagnant, deep. |

## Sampling equipment

| | |
|---|---|
| **Sampling method** | Reach pole |
| **Water quality meter model** | YSI |

## Field parameters

| | | | |
|---|---|---|---|
| **PID (ppm)** | | **Redox (mV)** | 25.2 |
| **pH** | 7.59 | **Dissolved oxygen (mg/L)** | 5.59 |
| **Electrical conductivity (uS/cm)** | 3684 | **Temperature (degC)** | 16.6 |
| **Comments** | Green bown turbid, no odour or sheen | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | DS |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 8 |

| Upstream | |
|---|---|
| | |
| **Photo 1** | **Photo 2** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

| Downstream | |
|---|---|
| | |
| **Photo 3** | **Photo 4** |
| Location: / | Location: / |
| Direction: ° clockwise from north | Direction: ° clockwise from north |

# Appendix G
Calibration certificates

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WAM SCIENTIFIC

# Certificate of Service and Calibration

## Water Quality Meter

## YSI Professional Plus

| | |
|---|---|
| **Company Name** | WAM Scientific |
| **Office Address** | 26 Bungarra Crescent, Chipping Norton NSW 2170 |
| **Phone Number** | +61 405 241 484 |
| **Contact Name** | William Pak |
| **Instrument** | YSI Pro Quatro Water Quality Meter w/ 1m Quatro Cable |
| **Serial Number** | 24L001545 |
| **Client Name** | Tasman Coupe (EMM Consulting) |
| **Project Number** | E240981 |

**Instrument Check**

| Item | Test | Test Passed | Comments |
|---|---|---|---|
| 2 x Alkaline C-size Batteries | Klein Tools MM300 Multimeter | ✓ | Both batteries reading above 2.9V |
| Battery Saver Function | Operation | ✓ | Automatically turns off after 60 minutes if idle |
| Unit Display | Operation | ✓ | Screen visible, no damage |
| Keypad | Operation | ✓ | Responsive, no damage |
| Connection Port and Cable | Condition/Check | ✓ | Clean, no damage |
| Monitor Housing | Condition/Check | ✓ | No damage |
| Firmware | Version | ✓ | 4.0.0 |
| pH Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| pH millivolts for pH 7.00 | Calibration | ✓ | pH 7.00 calibration range between 0 mV ± 50 mV |
| pH millivolts for pH 4.00 | Calibration | ✓ | pH 4 mV range +165 to +180 from 7 buffer mV value |
| pH slope | Calibration | ✓ | Range between 55 to 60 mV/pH (ideal value 59 mV) |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| ORP Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| ORP Reading | Calibration | ✓ | Within ± 80 mV of reference Zobell Reading |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| Conductivity/Temp Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| Conductivity Cell | Calibration | ✓ | Conductivity cell constant 5.0 ± 1.0 in GLP file |
| Clean Sensor Readings | Calibration | ✓ | Clean sensor reads less than 3 uS/cm in dry air |
| Dissolved Oxygen Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| DO Cap | Condition/Calibration | ✓ | 1.25 mil PE membrane (yellow membrane) |
| DO Sensor in Use | Condition | ✓ | Polarographic DO sensor |
| DO Sensor Value | Calibration | ✓ | (min 4.31 uA - max 8.00 uA) Avg 6.15 uA |

**Instrument Readings**

| Parameter | Standard Used | Reference No. | Calibration Value | Observed | Actual | Units |
|---|---|---|---|---|---|---|
| Temperature | Centre 370 Thermometer | Room Temp. | 20.3 | 20.7 | 20.3 | °C |
| pH | pH 4.00 | 417183 | 4.01 | 3.89 | 4.01 | pH |
| pH | pH 7.00 | 419528 | 7.00 | 6.94 | 7.00 | pH |
| ORP | Zobell A & B | 420448/418958 | 239.3 | 239.7 | 239.3 | mV |
| Conductivity | 2760 µs/cm at 25°C | 399819 | 2760 | 2816 | 2760 | µs/cm |
| Zero Dissolved $O_2$ | $NaSO_3$ in Distilled $H_2O$ | 426184 | 0.0 | -0.2 | 0.0 | % |
| 100% Dissolved $O_2$ | 100% Air Saturated $H_2O$ | Fresh Air | 100.0 | 105.5 | 100.0 | % |

**Declaration**

**WAM Scientific** certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

| | |
|---|---|
| **Calibrated By** | William Pak |
| **Calibration Date** | 09/04/2026 |
| **Calibration Due** | 09/10/2026 |

Level 3 175 Scott Street
Newcastle NSW 2300
ABN: 28 141 736 558

02 4907 4800

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# Memorandum

16 July 2026

To: Elena Ivanova
Environmental & Planning Manager
Coombes Property Group

From: Tasman Coupe

**Subject: Luddenham Quarry soil and water management plan monitoring results (Q4 2025/2026)**

Dear Elena,

## 1 Background

This memorandum details groundwater monitoring activities undertaken by EMM Consulting Pty Ltd (EMM) on behalf of Coombes Property Group (CPG) at Luddenham Quarry, 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, referred to herein as the site). The groundwater quality monitoring works were undertaken as part of the groundwater and surface water monitoring program outlined in the Soil and Water Management Plan (SWMP, EMM 2021).

The monitoring program commenced in March 2022 and involves quarterly groundwater and annual surface water monitoring of water quality parameters, groundwater levels and contaminants of potential concern (CoPC) at seven pre-existing locations across the site. The sampling locations comprise three groundwater locations (BSM1, BSM2 and BSM3) and four surface water locations (downstream, upstream, quarry pit and water management dam). Monitoring locations are detailed in Appendix A.

Prior to this annual monitoring period, which covers 1 September 2025 to 31 August 2026, monitoring events have occurred on 11 occasions between 11 March 2022 and 17 July 2025. Previous monitoring events completed as part of this annual monitoring period include 15 October 2025 and 13 January 2026 and 15 April 2026.

## 2 Program overview

The groundwater monitoring documented in this report was undertaken by a suitably qualified EMM Environmental Engineer on 1 July 2026 for the June to August 2026 monitoring period (Q4 of the 2025–2026 annual review period).

## 2.1 Rainfall context

The Bureau of Meteorology operates a rain gauge at Badgerys Creek [approximately 3 kilometres (km)] from the site – Station number: 067108. A total of 23.6 millimetres (mm) of rainfall was recorded at the station in the five days preceding the monitoring event. On the day of sampling, 2 mm of rainfall was recorded.

## 2.2 Water quality analytes

The analytical suite for the monitoring program is presented in Table 2.1. Physical and chemical stressors [except for total suspended solids (TSS)] were monitored in the field with a calibrated hand-held water quality meter. All other parameters were analysed at a National Association of Testing Authorities (NATA) accredited laboratory.

**Table 2.1 Water quality analytes**

| Category | Parameters | Analysis method |
|---|---|---|
| Physical and chemical stressors | Dissolved oxygen (DO), electrical conductivity (EC), pH, total dissolved solids (TDS), turbidity. | In the field with a calibrated hand-held water quality meter. |
| | Total suspended solids (TSS). | Analysis undertaken at NATA accredited laboratory. |
| Nutrients | Ammonia, nitrate, nitrite, total Kjeldahl nitrogen, total nitrogen, reactive phosphorus, total phosphorus. | |
| Dissolved metals | Aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc. | |
| Other | Total hardness, oil and grease. | |

Laboratory certificates are presented in Appendix E. Calibration certificates are provided in Appendix G.

## 2.3 Laboratory analysis

Water samples were transported to a NATA-accredited laboratory, Australian Laboratory Services (ALS) in Smithfield, NSW for analysis. Samples were received by the laboratory within the recommended holding times.

## 2.4 Quality assurance/quality control

Samples were collected in laboratory-provided sample containers with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain of custody protocols.

The field quality assurance/quality control (QA/QC) procedures used to establish precise, accurate, replicable reliable, and comparable results included:

- calibration of equipment by the supplier and testing by EMM staff prior before use
- keeping samples chilled
- submitting laboratory samples within holding times
- wearing disposable nitrile gloves during sampling at each sampling location
- using dedicated sampling equipment
- collection of a field duplicate sample.

QA/QC was assessed by calculating relative percentage difference (RPD) of the field duplicate ($S_{duplicate}$) sample to the parent sample ($S_{parent}$) as per the following equation.

$$Relative\ \%\ difference = \frac{|S_{parent} - S_{Dupilcate}|}{\frac{S_{parent} + S_{Dupilcate}}{2}} \times 100$$

Results were considered to confirm acceptable degree of data quality where RPDs were below 30%.

Most results for the monitoring round were within RPD limits (refer Appendix C), indicating adequate QA/QC. The RPD exceedances for TSS (BSM2/QC01) and total and oxidised nitrogen (BSM3/QC02) were a result of low concentrations elevating the percentage difference reported. The RPD exceedances for nitrite (BSM2/QC01) and total phosphorus (BSM3/QC02) are the result of sample heterogeneity. These analyte concentrations reported consistency between primary and duplicate with respect to sample trigger value exceedances, despite concentration variability. Hence, these conformance outliers are not considered likely to impact the conclusions or overall data quality of the investigation.

# 3 Monitoring results

Analytical results are discussed in the following sections. Groundwater and surface water analytical results are reported in the appendices (Appendix B – Groundwater levels, Appendix C – Water quality monitoring results, Appendix D – Water quality timeseries charts and Appendix H- Mann-Kendall trend analysis).

## 3.1 Groundwater levels

Groundwater levels were monitored using an interface probe at each of the three groundwater monitoring bores (BSM1, BSM2 and BSM3) during sampling. Based on the requirements outlined in the SWMP (EMM, 2021)[1], a water level deviation of 2 metres (m) from the long-term median groundwater level in the quarry monitoring bores is considered a trigger for further action in accordance with the groundwater trigger action response plan (Table B.2, EMM 2021). Two metres was adopted as the trigger as the deviation value aligns with minimal impact considerations outlined in the aquifer interference activities stated in the NSW Aquifer Interference Policy (DPI 2012).

Following recommendations in the March 2025 groundwater monitoring memorandum (EMM 2025), a resurvey of the groundwater bores was undertaken by Total Surveying Solutions on 14 April 2025. Groundwater levels since the May 2025 monitoring period have been calculated based on the resurveyed monitoring bore data. Groundwater and survey data are presented in Appendix B. For context, the average baseline and subsequent upper and lower trigger values are presented in Table 3.1.

**Table 3.1 Water level trigger values**

| Bore ID | Average baseline (mAHD) | Upper SWL trigger (mAHD) | Lower SWL trigger (mAHD) | July 2026 SWL (mAHD) |
|---|---|---|---|---|
| BSM1 | 58.13 | 60.13 | 56.13 | 58.23 |
| BSM2 | 50.68 | 52.68 | 48.68 | **53.11** |
| BSM3 | 46.29 | 48.29 | 44.29 | **50.14** |

Notes: **Bold font** used to highlight water level deviation of 2 m from the long-term median groundwater level in the quarry monitoring bores. This is a trigger for further action as per the groundwater trigger action response plan (Table B.2, EMM 2021).

[1] EMM, 2021. *Luddenham Quarry Soil and Water Management Plan. Doc Ref: J190749 RP49.* 22 September 2021

All three groundwater monitoring bores were within the historical range since the program commenced in March 2022.

BSM1 was within 2 m of the baseline average whilst both BSM2 and BSM3 were observed above the 2 m trigger as prescribed by the WMP (EMM 2021). This represents an increase and thus part of the TARP triggers relating to distance drawdown effects are not applicable.

Based on the survey data, it appears the bores have consistently exceeded the 2 m trigger across the 16 monitoring events at BSM1 (four occasions), BSM2 (13 occasions) and BSM3 (16 occasions). Despite the identified increase in SWL from the baseline average, all three wells have reported relatively stable SWLs since May 2025.

Upon consultation with CPG, it is understood that no quantitative historical monitoring of the water level within the quarry pit has been undertaken. Notwithstanding, anecdotal evidence indicates the base of the quarry pit to be approximately 30 metres below ground level (m bgl) with surface water observed covering a portion of the pit base. The depth to water within the measured monitoring bores ranged between 9.695 m bgl at BSM2 and 15.215 m bgl at BSM1. The standing water level in monitoring bores is believed to be more than 10 m above the water level of the quarry pit which would indicate the pit is not the source of the increase in water level measured at BSM2 and BSM3 during the July 2026 monitoring round.

## 3.2 Groundwater quality

Field observations for completed groundwater monitoring are presented in Table 3.2. Field sheets presenting data collected whilst sampling is presented in Appendix F.

**Table 3.2 Field observations (groundwater monitoring)**

| Time of sample | Groundwater monitoring bore | Description | Field comments/context |
|---|---|---|---|
| **Groundwater sampling locations** | | | |
| 1/07/2026 9:12 am | BSM1 | Located hydraulically upgradient of the quarry pit, BSM2 and BSM3. Bore monitored to assess background contamination concentrations. Located near the western site boundary in the southern portion of the site, to the west of the site access/haul road. | Colourless, clear, black particulate, distinct organic and sulfurous odour, no sheen observed.<br>The casing within the monument appears to be loose/semi-attached which may indicate an imperfect seal in the casing or between the below ground well and riser. |
| 1/07/2026 10:08 am | BSM2 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to assess potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Colourless, clear, trace brown particulate, no odour, no sheen.<br>A field duplicate was taken as a quality assurance (QC01) sample at this bore. |
| 1/07/2026 10:45 am | BSM3 | Located hydraulically downgradient of the quarry pit and BSM1. Bore monitored to assess potential contamination impact of quarry activities. Located along the eastern downslope perimeter of the quarry, outside the 40 m vegetated riparian zone associated with the western banks of Oaky Creek. | Colourless, clear, trace brown particulate, distinct sulfurous odour, no sheen.<br>A field duplicate was taken as a quality assurance (QC02) sample at this bore. |

Groundwater quality results are presented in Appendix C. Key observations of groundwater quality for the July 2026 monitoring period include the following:

- pH was recorded as slightly acidic to circumneutral (6.66 to 6.99) in the three groundwater monitoring bores sampled.
- Salinity, as indicated by EC, was lower in upgradient BSM1 [2,564 microsiemens per centimetre (µS/cm)] compared to downgradient bores BSM2 (18,051 µS/cm) and BSM3 (23,338 µS/cm), which are within historical ranges. BSM1 results are low, compared to baseline trends (22,560 µS/cm at BSM1) and have reported a decreasing trend since March 2025, potentially indicating freshwater ingress.
- Monitoring bores BSM1 and BSM2 reported mild reducing conditions. Monitoring bore BSM3 reported strongly reducing conditions. All three locations were reported within historical ranges. No baseline median is available within previous reports for oxidation-reduction (Redox) potential. Collated historical data has been presented in a time series trend in Appendix D. This should be monitored during subsequent monitoring rounds.
- Nutrients remain present in all three bores and elevated above baseline for nitrate in BSM2 (495 milligrams per litre (mg/L)) and in corresponding duplicate sample (QC01). Elevated nitrate concentrations have been reported at BSM2 since March 2025. The five most recent rounds of monitoring (July and October 2025, January and April 2026 and this round, July 2026) also reported the most elevated nitrate concentrations (448 to 684 mg/L) detected over the monitoring period. The source of the nitrate is unknown, with nearby sources potentially comprising fertiliser on nearby agricultural, country club and/or adjacent Western Sydney Airport (WSA) land.
- Elevated concentrations of manganese and zinc were detected in BSM2 (discussed in Section 3.3).
- Oil and grease were not reported at concentrations above the LOR.

## 3.3 Review of exceedances and Mann-Kendall trend analysis

Water quality results were reviewed for trigger exceedances, via comparison of default guideline values or comparison of other chemical properties to the upgradient bore (BSM1). Statistical analysis was undertaken for analytes at locations exceeding trigger values.

An assessment of exceedances including actions taken and recommendations for the groundwater monitoring is presented in Table 3.3.

**Table 3.3 Review of exceedances (groundwater)**

| Exceedance description | Assessment and actions taken |
|---|---|
| **Physiochemical parameters** | |
| Electrical conductivity (EC) exceeded the upgradient bore (BSM1) concentrations (2,564 µS/cm) at BSM2 (18,051 µS/cm) and BSM3 (23,338 µS/cm). | The site is located within a region with very high salinity soils and baseline quality monitoring indicating groundwater is saline with total dissolved solids of approximately 18,000 mg/L (SWMP, 2021). EC and TDS results are within historical ranges at BSM2 and BSM3, with BSM1 reporting results the water quality is less saline. As presented in Appendix H, both EC and TDS both exhibit decreasing trends in BSM1, with no trends identified in BSM2 or BSM3 for EC or TDS. As reported in Table 3.2, the casing within the monument appears to be loose/ semi-attached which may indicate an imperfect seal in the casing or between the below ground well and riser. |
| Total dissolved solids (TDS) significantly exceeded the upgradient bore (BSM1) concentrations (1,668 mg/L) at BSM2 (11,730 mg/L), and duplicate sample QC02 (15,175 mg/L). | |

| Exceedance description | Assessment and actions taken |
|---|---|
| **Nutrients** | |
| Oxidised nitrogen exceeded the upgradient bore (BSM1) concentrations (0.07 mg/L) at BSM2 at 496 mg/L. | The nitrate concentration during this round was the second highest on record.<br>Elevated nutrient concentrations were not detected in the background upgradient sample location.<br>Baseline data results were reviewed, where the following was noted:<br>• Total and oxidised nitrogen was noted to be significantly above the trigger value (upgradient bore comparison). The median baseline concentration at BSM2 of 21 mg/L, exceeds the median baseline for the upgradient bore of 0.137 mg/L. Both total and oxidised nitrogen concentrations exhibit increasing trends at BSM2 not exhibited by BSM1.<br>• The reported concentration of 495 mg/L is greater than the median baseline concentration for nitrate (21 mg/L) with the upgradient bore (BSM1) reporting nitrate below detectable limits.<br>• No baseline historical records of ammonia or total nitrogen were available.<br>• BSM3 exhibited a decreasing trend for total nitrogen not exhibited by the upgradient well (BSM1)<br>• Reactive phosphorus marginally exceeded the LOR at upgradient bore and downgradient locations. Both downgradient wells exhibit a decreasing trend for reactive phosphorus.<br>Timeseries charts of nutrients exceedances were prepared to present trends in nutrient concentrations over the monitoring period (refer to Appendix D) with Mann Kendal analysis results presented in Appendix H. |
| Ammonia exceeded the upgradient bore (BSM1) concentration (2.82 mg/L) at BSM3 (6.98 mg/L) and duplicate sample QC02 (6.85 mg/L). BSM3 also exceeded the draft ANZECC 95% protection level for freshwater (0.97 mg/L). | |
| Total nitrogen significantly exceeded the upgradient bore (BSM1) concentrations (5.3 mg/L) at BSM2 (496 mg/L), and duplicate sample QC02 (510 mg/L). This exceedance is attributable to the nitrate concentration at BSM2. BSM3 also exceeded the upgradient bore with a concentration of 8.8 mg/L, and duplicate sample QC02 (10.8 mg/L) attributed predominantly to the ammonia concentration. | |
| Reactive phosphorus exceeded the upgradient bore concentrations (0.02 mg/L) at BSM2 (0.04 mg/L), and duplicate sample QC01 (0.03 mg/L) and BSM3 (0.09 mg/L). | |
| Total phosphorus exceeded the upgradient bore concentrations (0.2 mg/L) at BSM3, with a concentration of 0.26 mg/L, and duplicate sample QC02 (0.44 mg/L). | |
| **Metals** | |
| Manganese exceeded the trigger values (1.9 mg/L) at BSM2 and QC01 with both reporting concentrations of 2.37 mg/L. | No baseline historical records are available for manganese concentrations for BSM2. The reported concentration of manganese in was within historical ranges. No statistically significant trend was identified at BSM2 for concentrations of manganese. |
| Zinc exceeded the trigger values (0.008 mg/L) at BSM2 with reported concentrations of 0.039 mg/L and 0.038 mg/L (QC01). | Zinc was reported below baseline concentrations for BSM2. The reported concentration for zinc in BSM2 was within historical ranges. No statistically significant trend was identified at BSM2 for concentrations of manganese. |

## 3.4 Mann-Kendall analysis of surface water results

Statistical analysis was undertaken for analytes at locations exceeding trigger values. The most recent surface water results in April 2026[2] were used to identify analytes exceeding trigger values. These included:

- pH, EC, copper, selenium, total oxidised nitrogen, total nitrogen and total phosphorus in the Quarry Pit
- EC, ammonia, total nitrogen and total phosphorus at the Oaky Creek upstream site
- EC, Total nitrogen at the online storage Oaky Creek location (midstream)
- EC, Ammonia and total nitrogen in the Oaky Creek downstream site.

[2] EMM, 2026. *Luddenham Quarry soil and water management plan monitoring results (Q3 2025/2026). Doc Ref: E240981 RP10v2. 12* May 2026

As an insufficient number of samples have been collected from the online storage and downstream locations of Oaky Creek to facilitate trend analysis, trend analysis was undertaken of the Oaky Creek upstream site and Quarry Pit locations. Similarly Selenium was added to the monitoring program in 2023 and not enough data points are available for trend analysis of selenium in the Quarry Pit

Of the data sets analysed, only electrical conductivity at the Oaky Creek upstream site and ammonia in the quarry pit show statistically significant trends, both of which were increasing.

# 4 Summary and recommendations

The following provides a summary of the reported investigations:

- Down gradient bores BSM2 and BSM3 were measured above the upper standing water level trigger value during the July 2026 monitoring event. All water levels were within the historical ranges. Sustained elevated water levels are not likely to be attributable to quarrying activities at the site as the monitored water level in groundwater bores is substantially greater than the reported base of the quarry pit and observed quarry pit surface water level.

- pH was recorded as slightly acidic to circumneutral (6.66 to 6.99) within groundwater locations. The results of this round (July 2026) are consistent with historical monitoring.

- Electrical conductivity and total dissolved solid concentrations in BSM1 exhibit a statistically significant decreasing trend. During monitoring the casing within the monument was observed to be loose/semi-attached which may indicate an imperfect seal in the casing or between the below ground well and riser.

- Water levels in the Quarry Pit increased from April 2026 when they were the lowest since May 2025. The water level at the upstream Oaky Creek location was again higher than reported through the current 2025 and 2026 monitoring period.

- No confirmed source for the elevated nutrient concentrations within monitoring bore BSM2 has been identified. The site is surrounded by agricultural land, a country club and WSA which undertook re-establishment of ground cover vegetation upstream of the site since 2021. The elevated standing water table, increased chloride (as identified previously by the laboratory as the source of matrix interference) in BSM2 support the possibility that widespread use of fertilisers around the site may have contributed to the reported increase in nutrients observed at monitoring bores at the site. Detailed surface water and groundwater monitoring associated with the WSA construction was not available for review to verify this potential source. Based on the sustained increasing trend following the cessation of quarry operations, the change appears unrelated to quarry activities.

The following recommendations are made for future monitoring:

- The next quarterly groundwater monitoring round should be undertaken in mid-October 2026 to meet the objectives of the SWMP and comply with the conditions of consent.

- Assessment of the condition of BSM1 to determine the cause of casing movement and (if possible, with available materials) repair of the monitoring bore should be undertaken to ensure the well provides samples representative of aquifer conditions. If repairs to BSM1 do not result in a return to baseline salinity levels, analysis of anions and cations (in addition to the existing analytical suite) should be undertaken further inform the understanding of reported salinity (as measured by electrical conductivity) and nutrients results.

- Collated Redox potential results for the site should be continued, reviewing time series trends.

Please contact the undersigned with any questions or clarifications.

Yours sincerely,

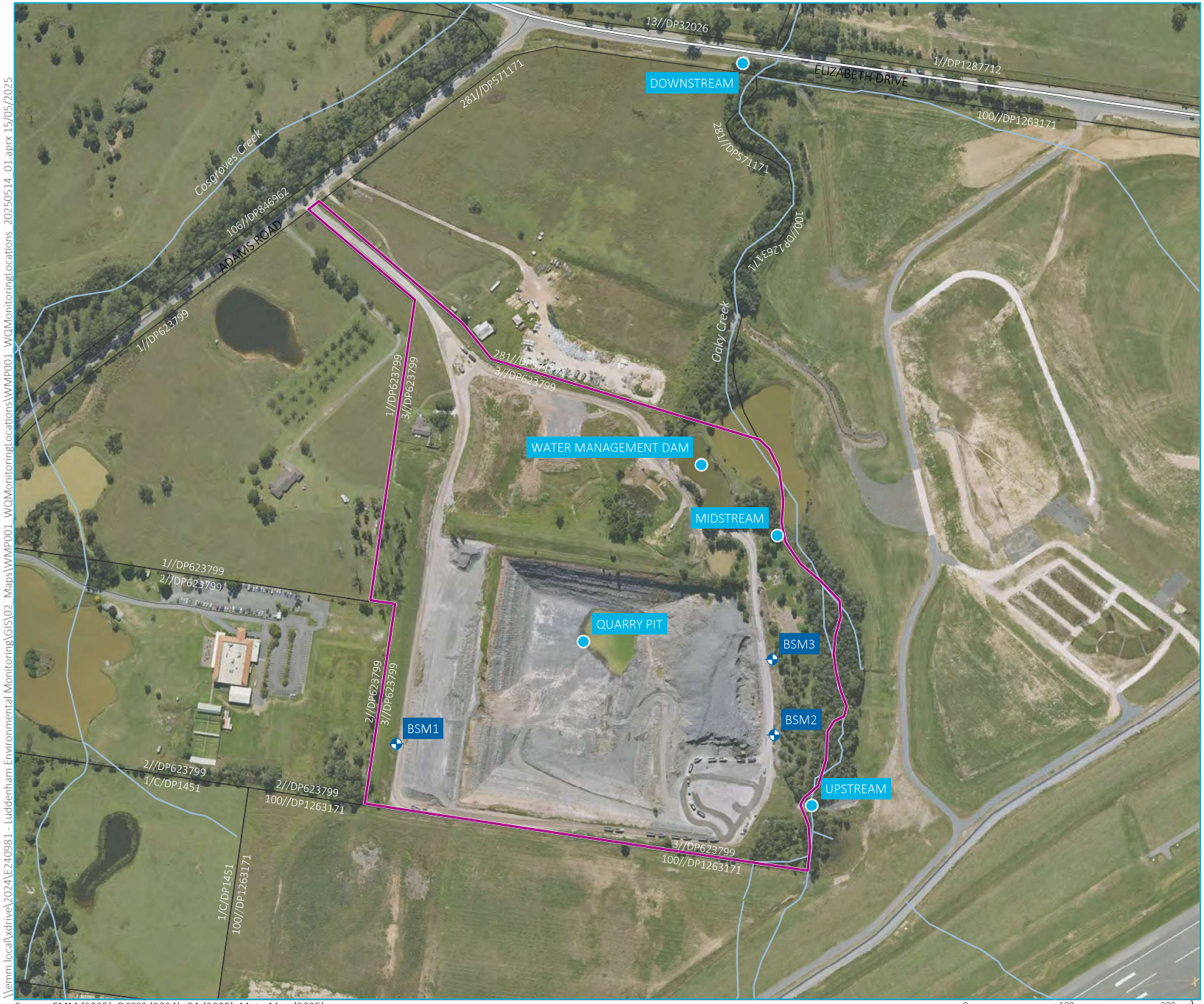


**Tasman Coupe**
Senior Environmental Engineer
tcoupe@emmconsulting.com.au

# Appendix A

## Water quality monitoring locations

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KEY

- Study area
- Groundwater monitoring bore
- Water quality monitoring location

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Cadastral boundary

*Source: EMM (2025); DCSSS (2024); GA (2009); MetroMap (2025)*

## Water quality monitoring locations

Luddenham Quarry
Water Management Plan
Figure 1

EMM
creating opportunities

\\emm.local\xdrive\2024\E240981 - Luddenham Environmental Monitoring\GIS\02_Maps\WMP001_WQMonitoringLocations\WMP001_WQMonitoringLocations_20250514_01.aprx 15/05/2025

# Appendix B
## Groundwater levels

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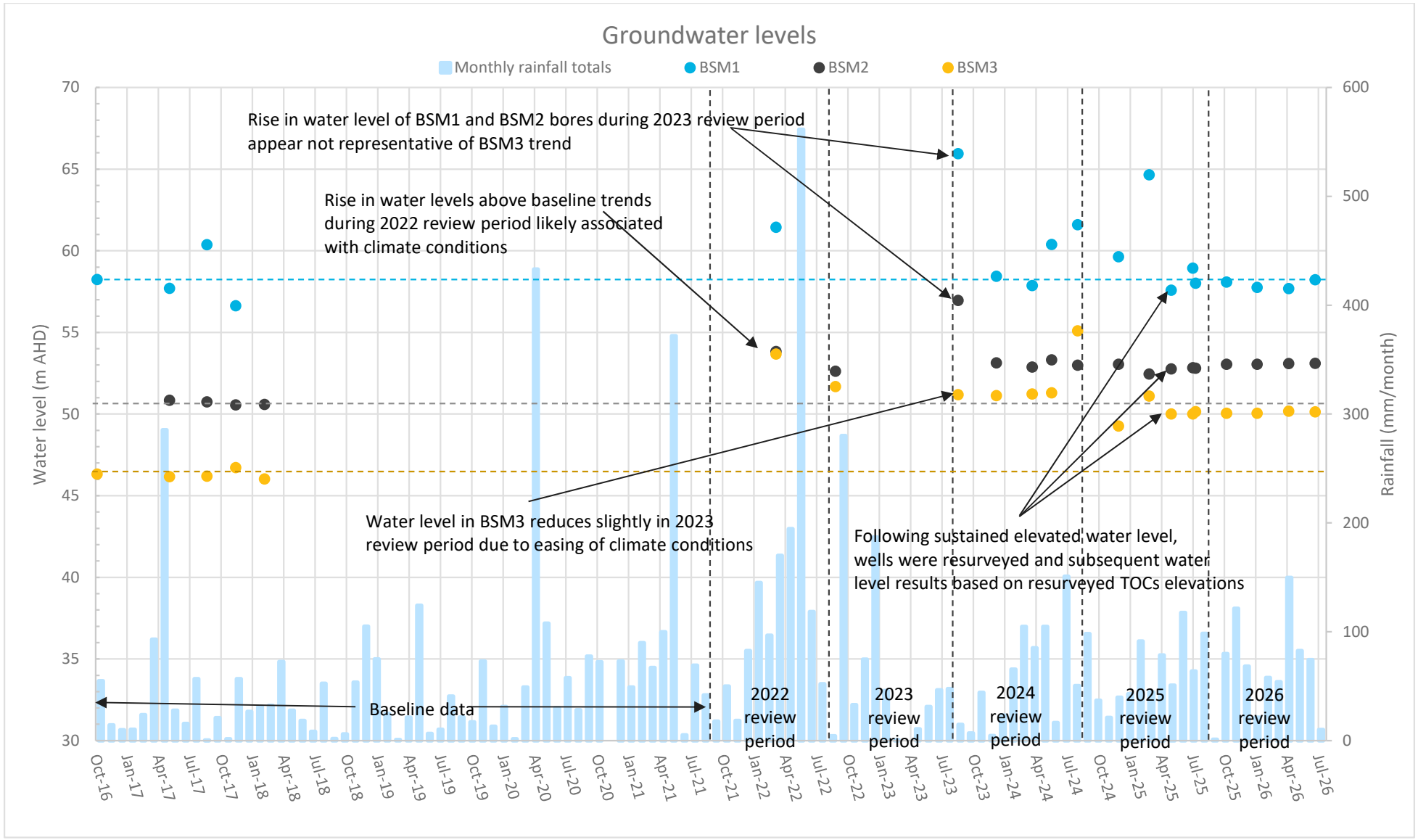



**Figure B.1** **Ground water levels**

# Appendix C

Water quality monitoring results

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Location Code | | | | | BSM1 | BSM2 | BSM2 | BSM3 | BSM3 |
| Date | | | | | 1 Jul 2026 | 1 Jul 2026 | 1 Jul 2026 | 1 Jul 2026 | 1 Jul 2026 |
| Field ID | | | | | BSM1 | BSM2 | QC01 | BSM3 | QC02 |
| Lab Report Number | | | | | ES2621091 | ES2621091 | ES2621091 | ES2621091 | ES2621091 |
| | Unit | EQL | ANZG (2018) Freshwater 95% toxicant DGVs[1] | Trigger Value (ground water)[2] | | | | | |
| **Field** | | | | | | | | | |
| **Temp (Field)** | °C | 0.1 | | - | 17.9 | 19.3 | - | 19.3 | - |
| **pH (Field)** | - | 0.01 | | 6.5-8.5 | 6.9 | 6.66 | - | 6.99 | - |
| **EC (field)** | µS/cm | 1 | | BSM1 | 2,564 | 18051 | - | 23338 | - |
| **DO (Field)** | mg/L | 0.1 | | | 0.82 | 1.35 | - | 0.49 | - |
| **Redox Potential (Field)** | mV | 0.1 | | | 40.9 | 68.2 | - | -271 | - |
| **Corrected Redox (Eh)** | mV | 0.1 | | | 240.9 | 268.2 | - | -71 | - |
| **TDS (Field)** | mg/L | 0.01 | | | 1,668 | 11,730 | - | 15,175 | - |
| **Inorganics** | | | | | | | | | |
| **TSS** | mg/L | 5 | | BSM1 | 20 | 16 | <5 | 36 | - |
| **Hardness as $CaCO_3$** | mg/L | 1 | | | 1,070 | 2,050 | 2,250 | 3,590 | - |
| **Ammonia as N** | mg/L | 0.01 | 0.97[3] | BSM1 | 2.82 | 0.01 | - | 6.98 | 6.85 |
| **Nitrite (as N)** | mg/L | 0.01 | | | 0.05 | 0.72 | 1.06 | <0.01 | <0.01 |
| **Nitrate (as N)** | mg/L | 0.01 | | | 0.02 | 495 | 509 | 0.08 | 0.45 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | | BSM1 | 0.07 | 496 | 510 | 0.08 | 0.45 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | | | 5.2 | <0.1 | - | 8.7 | 10.4 |
| **Nitrogen (Total)** | mg/L | 0.1 | | BSM1 | 5.3 | 496 | - | 8.8 | 10.8 |
| **Total Phosphate (as P)** | mg/L | 0.01 | | BSM1 | 0.2 | 0.01 | - | 0.26 | 0.44 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | | BSM1 | 0.02 | 0.04 | 0.03 | 0.09 | - |
| **Metals** | | | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | 0.055 | 0.055 | <0.01 | <0.01 | <0.01 | <0.01 | - |
| **Arsenic (filtered)** | mg/L | 0.001 | 0.013 | 0.013 | <0.001 | <0.001 | <0.001 | <0.001 | - |
| **Boron (filtered)** | mg/L | 0.05 | 0.94 | 0.37 | 0.11 | <0.05 | <0.05 | <0.05 | - |
| **Cadmium (filtered)** | mg/L | 0.0001 | 0.0002 | 0.0002 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | 0.001 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | - |
| **Copper (filtered)** | mg/L | 0.001 | 0.0014 | 0.0014 | <0.001 | <0.001 | <0.001 | <0.001 | - |
| **Iron (filtered)** | mg/L | 0.05 | | | 0.35 | <0.05 | <0.05 | <0.05 | - |
| **Lead (filtered)** | mg/L | 0.001 | 0.0034 | 0.0034 | <0.001 | <0.001 | <0.001 | <0.001 | - |
| **Manganese (filtered)** | mg/L | 0.001 | 1.9 | 1.9 | 0.417 | 2.37 | 2.37 | 0.185 | - |
| **Mercury (filtered)** | mg/L | 0.0001 | 0.00006 | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | - |
| **Nickel (filtered)** | mg/L | 0.001 | 0.011 | 0.011 | 0.001 | 0.01 | 0.01 | 0.001 | - |
| **Selenium (filtered)** | mg/L | 0.004 | 0.005 | | <0.004 | <0.004 | <0.004 | <0.004 | - |
| **Zinc (filtered)** | mg/L | 0.005 | 0.008 | 0.008 | <0.005 | 0.039 | 0.038 | <0.005 | - |
| **TRH** | | | | | | | | | |
| **Oil and Grease** | mg/L | 5 | | LOR | <5 | <5 | - | <5 | <5 |

**Environmental Standards**

[1]DoE, 2018, ANZG freshwater slightly-moderately disturbed system toxicant DGVs

[2]EMM, 2021. *Luddenham Quarry Soil and Water Management Plan- Table 6.2 Groundwater assessment criteria and trigger values*

[3]DCCEW, 2026, ANZG DRAFT Toxicant default guideline values for aquatic ecosystem protection: Ammonia in freshwater (95% LOSP)

| | | | BSM2 1 Jul 2026 BSM2 ES2621091 Water | BSM2 1 Jul 2026 QC01 ES2621091 Water | RPD | BSM3 1 Jul 2026 BSM3 ES2621091 Water | BSM3 1 Jul 2026 QC02 ES2621091 Water | RPD |
|---|---|---|---|---|---|---|---|---|
| | Unit | EQL | | | | | | |
| **Inorganics** | | | | | | | | |
| **TSS** | mg/L | 5 | 16 | <5 | 105 | 36 | - | - |
| **Hardness as $CaCO_3$** | mg/L | 1 | 2,050 | 2,250 | 9 | 3,590 | - | - |
| **Ammonia as N** | mg/L | 0.01 | 0.01 | - | - | 6.98 | 6.85 | 2 |
| **Nitrite (as N)** | mg/L | 0.01 | 0.72 | 1.06 | 38 | <0.01 | <0.01 | 0 |
| **Nitrate (as N)** | mg/L | 0.01 | 495 | 509 | 3 | 0.08 | 0.45 | 140 |
| **Nitrite + Nitrate as N** | mg/L | 0.01 | 496 | 510 | 3 | 0.08 | 0.45 | 140 |
| **Total Kjeldahl Nitrogen** | mg/L | 0.1 | <0.1 | - | - | 8.7 | 10.4 | 18 |
| **Nitrogen (Total)** | mg/L | 0.1 | 496 | - | - | 8.8 | 10.8 | 20 |
| **Reactive Phosphorus (as P) (filtered)** | mg/L | 0.01 | 0.04 | 0.03 | 29 | 0.09 | - | - |
| **Total Phosphate (as P)** | mg/L | 0.01 | 0.01 | - | - | 0.26 | 0.44 | 51 |
| **Metals** | | | | | | | | |
| **Aluminium (filtered)** | mg/L | 0.01 | <0.01 | <0.01 | 0 | <0.01 | - | - |
| **Arsenic (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| **Boron (filtered)** | mg/L | 0.05 | <0.05 | <0.05 | 0 | <0.05 | - | - |
| **Cadmium (filtered)** | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 | <0.0001 | - | - |
| **Chromium (III+VI) (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| **Copper (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| **Iron (filtered)** | mg/L | 0.05 | <0.05 | <0.05 | 0 | <0.05 | - | - |
| **Lead (filtered)** | mg/L | 0.001 | <0.001 | <0.001 | 0 | <0.001 | - | - |
| **Manganese (filtered)** | mg/L | 0.001 | 2.37 | 2.37 | 0 | 0.185 | - | - |
| **Mercury (filtered)** | mg/L | 0.0001 | <0.0001 | <0.0001 | 0 | <0.0001 | - | - |
| **Nickel (filtered)** | mg/L | 0.001 | 0.010 | 0.010 | 0 | 0.001 | - | - |
| **Selenium (filtered)** | mg/L | 0.004 | <0.004 | <0.004 | 0 | <0.004 | - | - |
| **Zinc (filtered)** | mg/L | 0.005 | 0.039 | 0.038 | 3 | <0.005 | - | - |
| **TRH** | | | | | | | | |
| **Oil and Grease** | mg/L | 5 | <5 | - | - | <5 | <5 | 0 |

Value RPD exceeds 30%

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

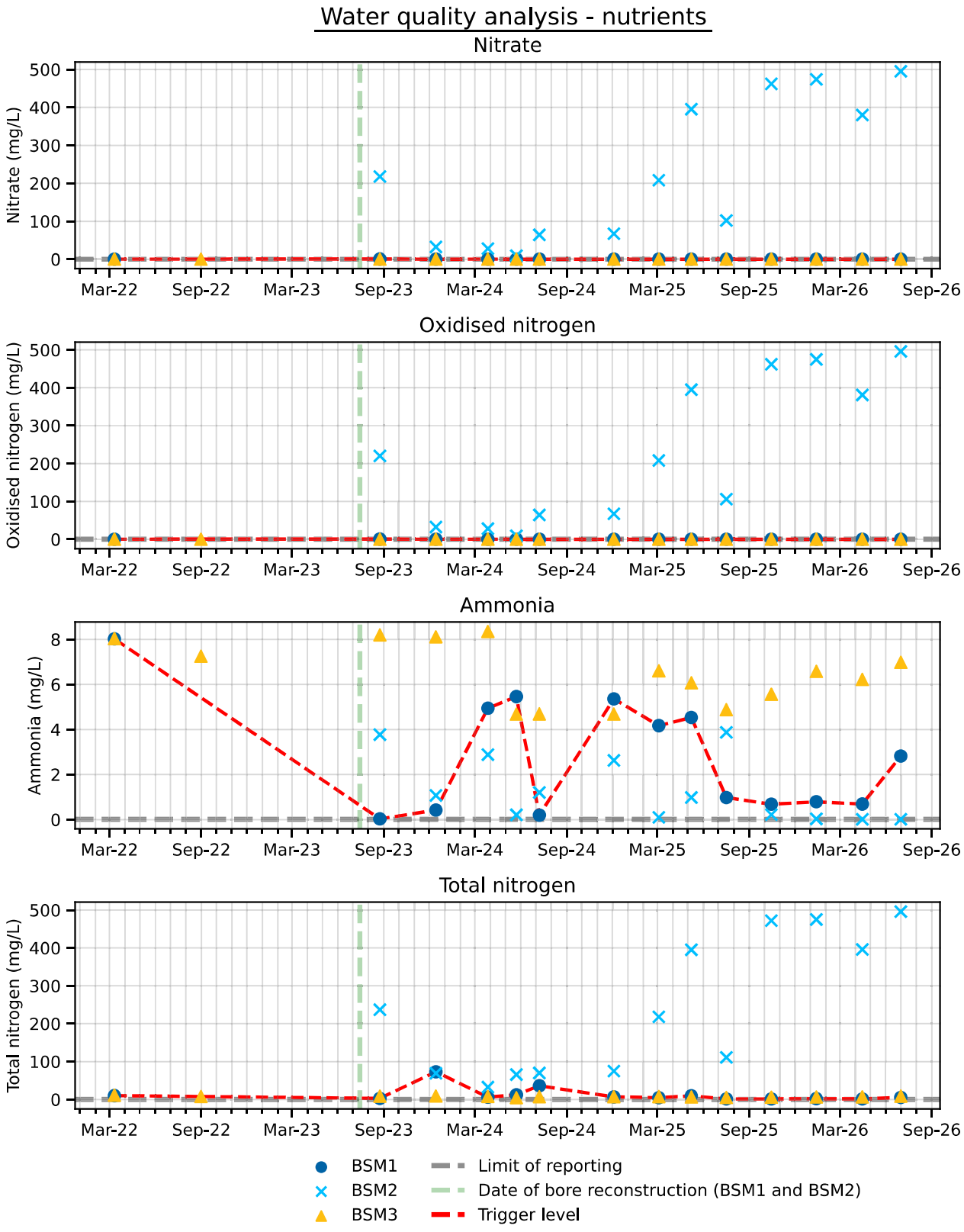
**Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

# Appendix D

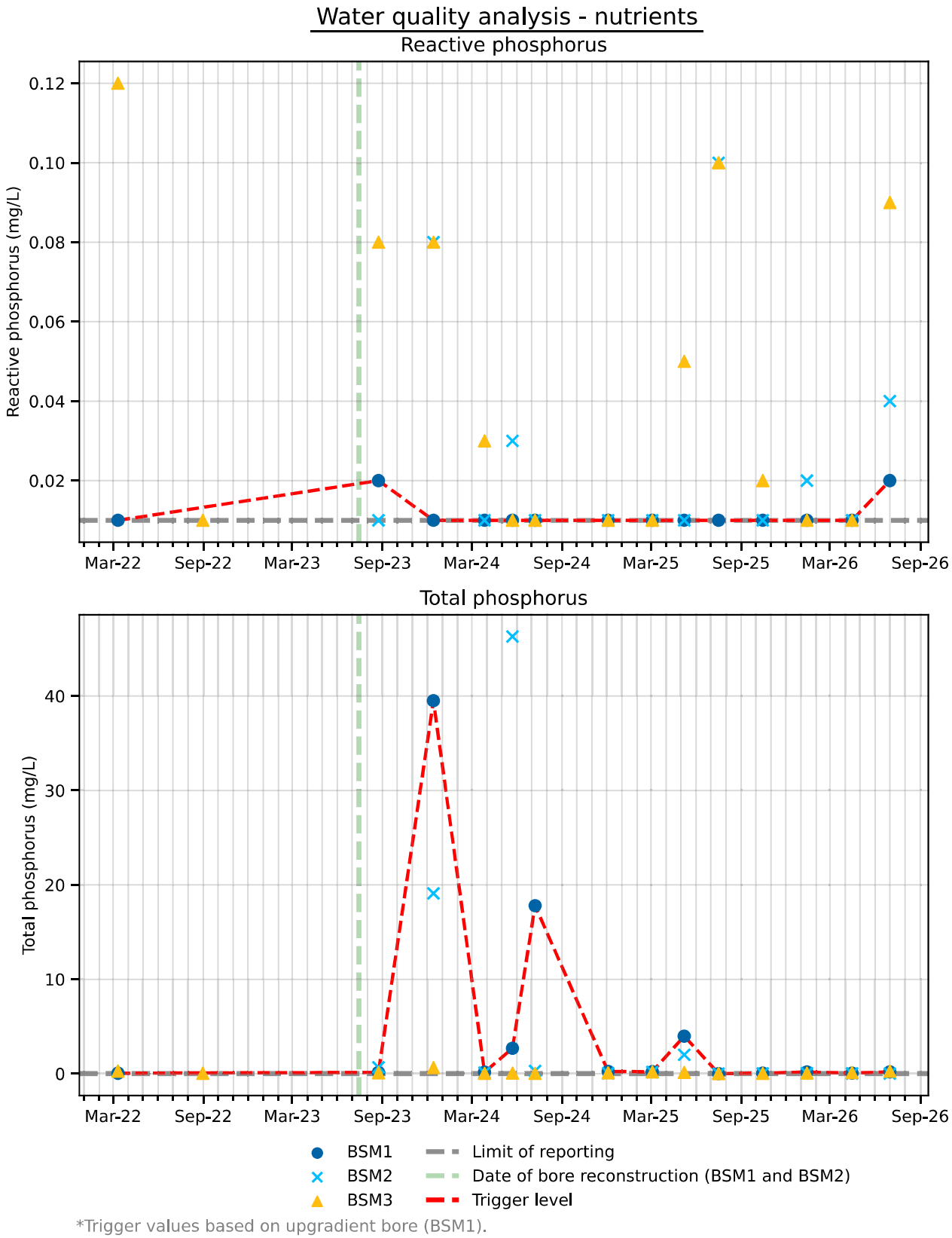
Water quality timeseries charts

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## D.1 Timeseries water quality charts – nutrients

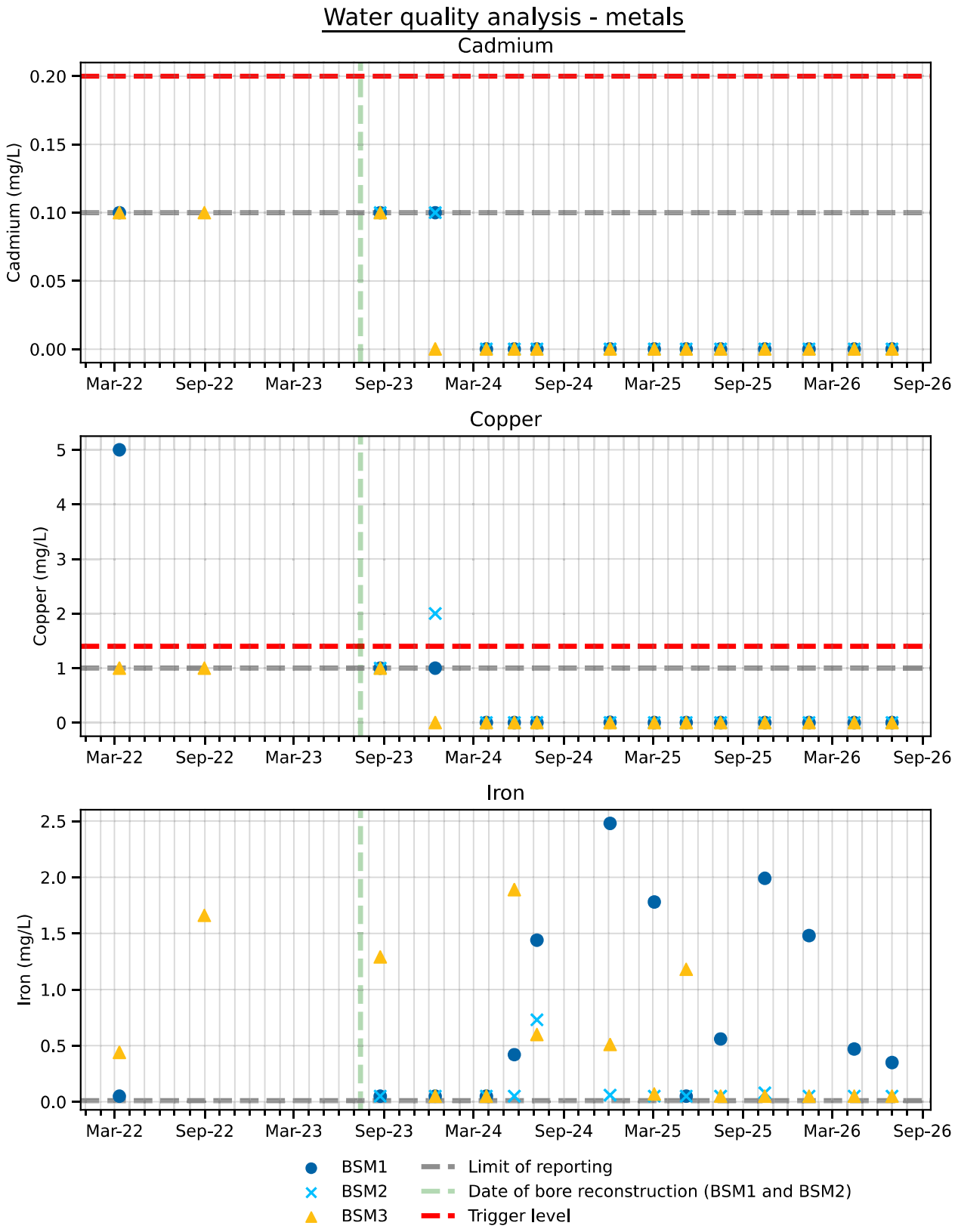



*Trigger values based on upgradient bore (BSM1).

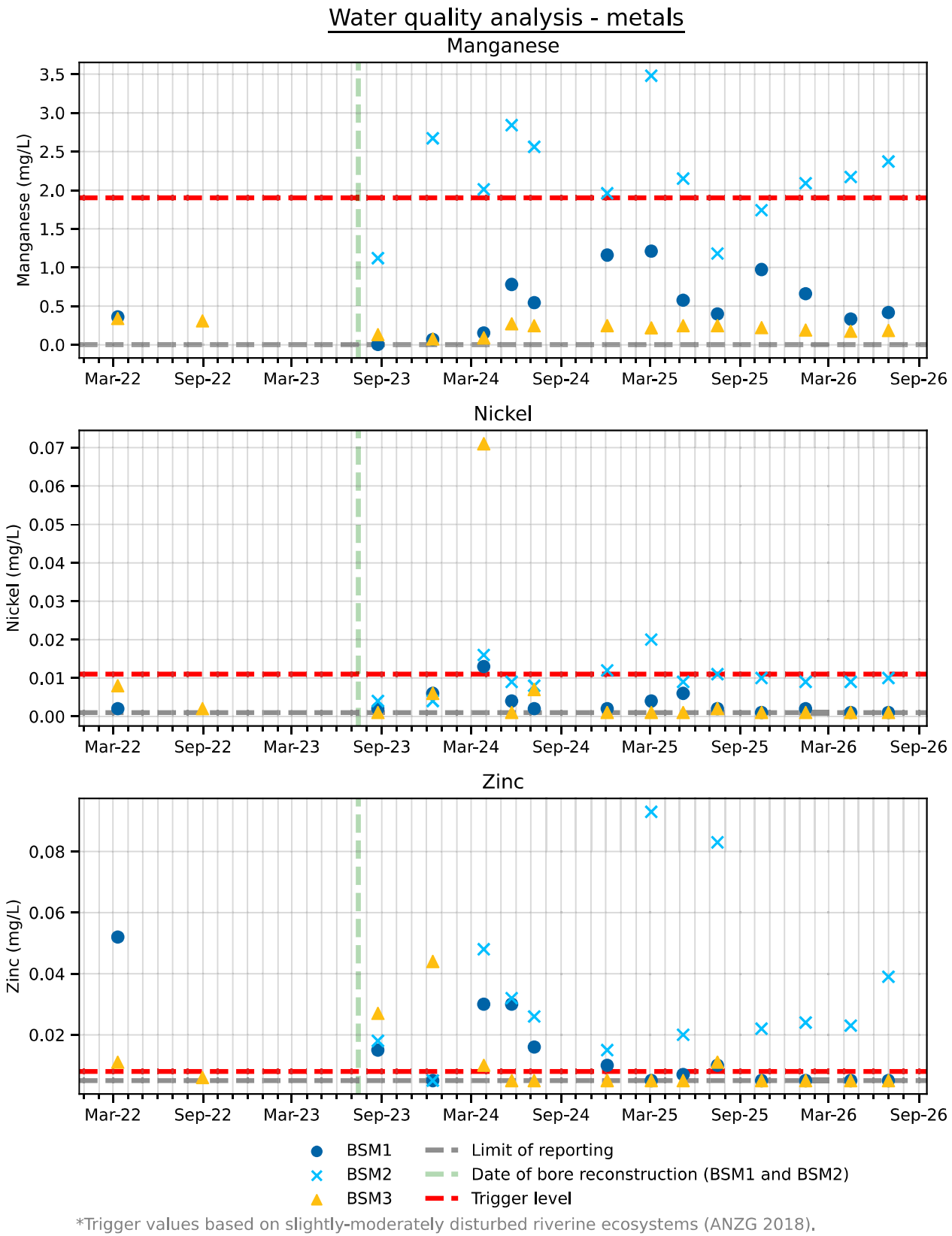



*Trigger values based on upgradient bore (BSM1).

## D.2 Timeseries water quality charts – metals

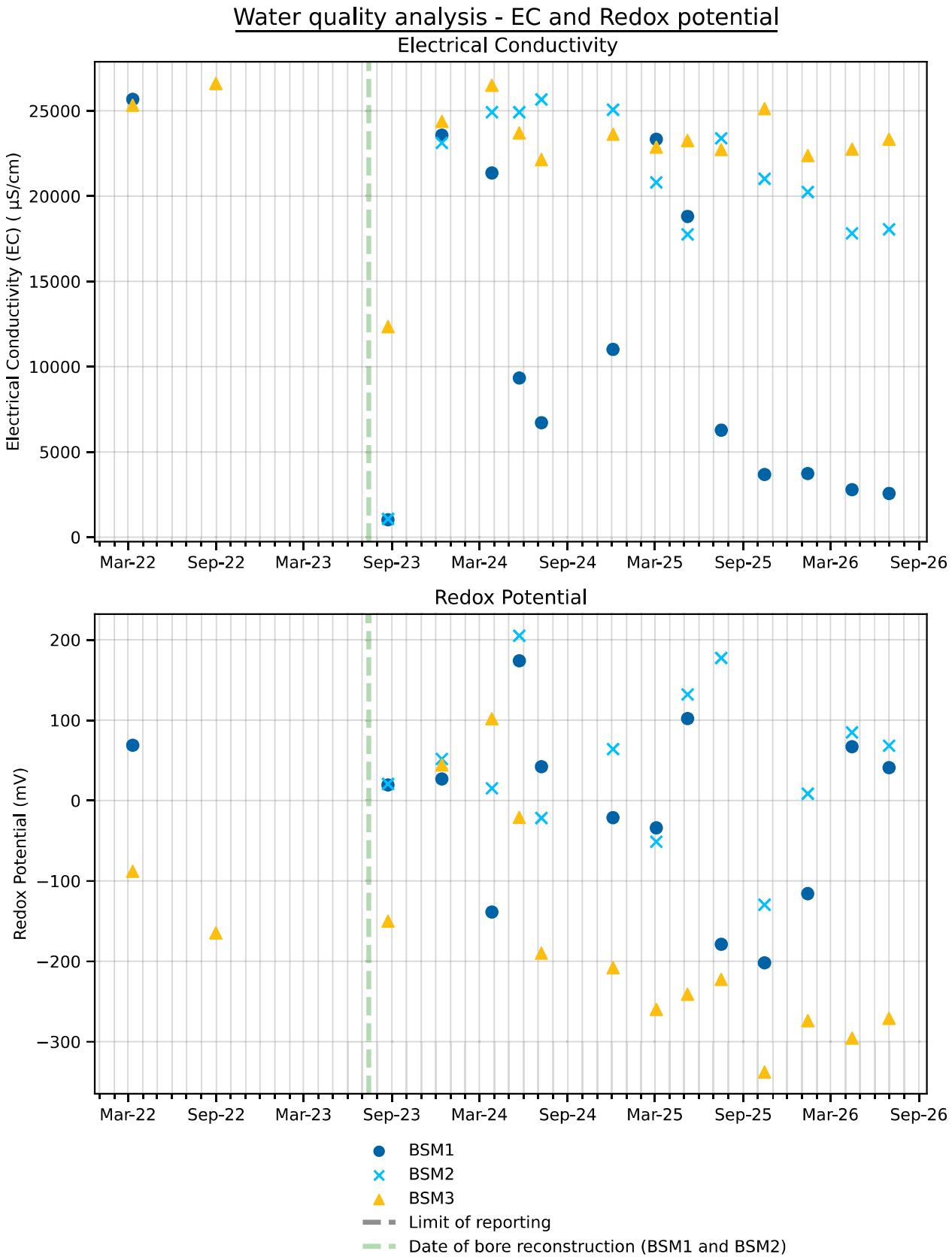



*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).




*Trigger values based on slightly-moderately disturbed riverine ecosystems (ANZG 2018).

## D.3 Timeseries water quality charts – Electrical Conductivity and Redox Potential



# Appendix E
## Laboratory certificates

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# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2621091** | Page | : 1 of 4 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 01-Jul-2026 13:20 |
| Order number | : | Date Analysis Commenced | : 02-Jul-2026 |
| C-O-C number | : ---- | Issue Date | : 07-Jul-2026 17:40 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 5 | | |
| No. of samples analysed | : 5 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- It has been noted that Reactive P is greater than Total P, however this difference is within the limits of experimental variation.
- EK057/EK059G: Nitrite and NOx results confirmed by re analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QC01 | QC02 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 |
| Compound | CAS Number | LOR | Unit | | ES2621091-001 | ES2621091-002 | ES2621091-003 | ES2621091-004 | ES2621091-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | | | |
| Suspended Solids (SS) | ---- | 5 | mg/L | | **20** | **16** | **36** | <5 | ---- |
| **EA065: Total Hardness as CaCO3** | | | | | | | | | |
| Total Hardness as CaCO3 | ---- | 1 | mg/L | | **1070** | **2050** | **3590** | **2250** | ---- |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | | | |
| Aluminium | 7429-90-5 | 0.01 | mg/L | | <0.01 | <0.01 | <0.01 | <0.01 | ---- |
| Arsenic | 7440-38-2 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Cadmium | 7440-43-9 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | ---- |
| Chromium | 7440-47-3 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Copper | 7440-50-8 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Nickel | 7440-02-0 | 0.001 | mg/L | | **0.001** | **0.010** | **0.001** | **0.010** | ---- |
| Lead | 7439-92-1 | 0.001 | mg/L | | <0.001 | <0.001 | <0.001 | <0.001 | ---- |
| Selenium | 7782-49-2 | 0.004 | mg/L | | <0.004 | <0.004 | <0.004 | <0.004 | ---- |
| Zinc | 7440-66-6 | 0.005 | mg/L | | <0.005 | **0.039** | <0.005 | **0.038** | ---- |
| Manganese | 7439-96-5 | 0.001 | mg/L | | **0.417** | **2.37** | **0.185** | **2.37** | ---- |
| Boron | 7440-42-8 | 0.05 | mg/L | | **0.11** | <0.05 | <0.05 | <0.05 | ---- |
| Iron | 7439-89-6 | 0.05 | mg/L | | **0.35** | <0.05 | <0.05 | <0.05 | ---- |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | | | |
| Mercury | 7439-97-6 | 0.0001 | mg/L | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | ---- |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | | | |
| Ammonia as N | 7664-41-7 | 0.01 | mg/L | | **2.82** | **0.01** | **6.98** | ---- | **6.85** |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | | | |
| Nitrite as N | 14797-65-0 | 0.01 | mg/L | | **0.05** | **0.72** | <0.01 | **1.06** | <0.01 |
| **EK058G: Nitrate as N by Discrete Analyser** | | | | | | | | | |
| Nitrate as N | 14797-55-8 | 0.01 | mg/L | | **0.02** | **495** | **0.08** | **509** | **0.45** |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | | | |
| Nitrite + Nitrate as N | ---- | 0.01 | mg/L | | **0.07** | **496** | **0.08** | **510** | **0.45** |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | | | |

## Analytical Results

| Sub-Matrix: WATER (Matrix: WATER) | | | | Sample ID | BSM1 | BSM2 | BSM3 | QC01 | QC02 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 | 01-Jul-2026 00:00 |
| Compound | CAS Number | LOR | Unit | | ES2621091-001 | ES2621091-002 | ES2621091-003 | ES2621091-004 | ES2621091-005 |
| | | | | | Result | Result | Result | Result | Result |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser - Continued** | | | | | | | | | |
| Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | | **5.2** | <0.1 | **8.7** | **----** | **10.4** |
| **EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser** | | | | | | | | | |
| ^ Total Nitrogen as N | ---- | 0.1 | mg/L | | **5.3** | **496** | **8.8** | **----** | **10.8** |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | | | |
| Total Phosphorus as P | ---- | 0.01 | mg/L | | **0.20** | **0.01** | **0.26** | **----** | **0.44** |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | | | |
| Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | | **0.02** | **0.04** | **0.09** | **0.03** | **----** |
| **EP020: Oil and Grease (O&G)** | | | | | | | | | |
| Oil & Grease | ---- | 5 | mg/L | | <5 | <5 | <5 | **----** | <5 |

# QUALITY CONTROL REPORT

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2621091** | Page | : 1 of 6 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 01-Jul-2026 |
| Order number | : | Date Analysis Commenced | : 02-Jul-2026 |
| C-O-C number | : ---- | Issue Date | : 07-Jul-2026 |
| Sampler | : TASMAN COUPE | | |
| Site | : ---- | | |
| Quote number | : EN/111 | | |
| No. of samples received | : 5 | | |
| No. of samples analysed | : 5 | | |

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Ankit Joshi | Senior Chemist - Inorganics | Sydney Inorganics, Smithfield, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC
* = The final LOR has been raised due to dilution or other sample specific cause; adjusted LOR is shown in brackets. The duplicate ranges for Acceptable RPD% are applied to the final LOR where applicable.

## Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 7531185)** | | | | | | | | | |
| ES2620923-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 679 | 748 | 9.7 | 0% - 20% |
| ES2621081-006 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | <5 | 0.0 | No Limit |
| ES2621110-001 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | 206 | 190 | 7.8 | 0% - 20% |
| ES2621210-008 | Anonymous | EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | <5 | 0.0 | No Limit |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7526705)** | | | | | | | | | |
| ES2621078-005 | Anonymous | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | <0.004 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| ES2621091-003 | BSM3 | EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| | | EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |

Sub-Matrix: **WATER**

| | | | | Laboratory Duplicate (DUP) Report | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *LOR* | *Unit* | *Original Result* | *Duplicate Result* | *RPD (%)* | *Acceptable RPD (%)* |
| **EG020F: Dissolved Metals by ICP-MS (QC Lot: 7526705) - continued** | | | | | | | | | |
| ES2621091-003 | BSM3 | EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | <0.001 | 0.0 | No Limit |
| | | EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | 0.185 | 0.181 | 1.9 | 0% - 20% |
| | | EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | 0.001 | 0.001 | 0.0 | No Limit |
| | | EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | <0.004 | 0.0 | No Limit |
| | | EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | <0.005 | 0.0 | No Limit |
| | | EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| | | EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| | | EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | <0.05 | 0.0 | No Limit |
| **EG035F: Dissolved Mercury by FIMS (QC Lot: 7526704)** | | | | | | | | | |
| ES2621078-006 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| ES2621091-001 | BSM1 | EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | <0.0001 | 0.0 | No Limit |
| **EK055G: Ammonia as N by Discrete Analyser (QC Lot: 7525502)** | | | | | | | | | |
| ES2621067-002 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 0.08 | 0.08 | 0.0 | No Limit |
| ES2621226-002 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | 1.23 | 1.23 | 0.0 | 0% - 20% |
| **EK057G: Nitrite as N by Discrete Analyser (QC Lot: 7524136)** | | | | | | | | | |
| EW2603130-001 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| ES2620293-010 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | 0.42 | 0.41 | 0.0 | 0% - 20% |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 7525501)** | | | | | | | | | |
| ES2621067-002 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 0.03 | 0.03 | 0.0 | No Limit |
| ES2621226-002 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 3.32 | 3.30 | 0.6 | 0% - 20% |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 7527524)** | | | | | | | | | |
| ME2600872-003 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | 0.44 | 0.44 | 0.0 | 0% - 20% |
| ED2600790-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 7525505)** | | | | | | | | | |
| ES2620922-001 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 (2.0)* | mg/L | 11.6 | 11.7 | 0.0 | No Limit |
| ES2621153-002 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | 0.3 | 0.3 | 0.0 | No Limit |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 7525506)** | | | | | | | | | |
| ES2620922-001 | Anonymous | EK067G: Total Phosphorus as P | ---- | 0.01 (0.20)* | mg/L | 2.15 | 2.37 | 9.6 | 0% - 50% |
| ES2621153-002 | Anonymous | EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | 0.05 | 0.04 | 0.0 | No Limit |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QC Lot: 7524134)** | | | | | | | | | |
| EN2609849-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | 0.01 | 0.01 | 0.0 | No Limit |
| EW2603130-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | <0.01 | 0.0 | No Limit |

## Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

| | | | | Method Blank (MB) Report | Laboratory Control Spike (LCS) Report | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Spike | Spike Recovery (%) | Acceptable Limits (%) | |
| Method: Compound | CAS Number | LOR | Unit | Result | Concentration | LCS | Low | High |
| **EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 7531185)** | | | | | | | | |
| EA025H: Suspended Solids (SS) | ---- | 5 | mg/L | <5 | 150 mg/L | 104 | 83.0 | 129 |
| | | | | <5 | 1000 mg/L | 97.1 | 82.0 | 110 |
| | | | | <5 | 817 mg/L | 104 | 83.0 | 118 |
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7526705)** | | | | | | | | |
| EG020A-F: Aluminium | 7429-90-5 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 100 | 80.0 | 116 |
| EG020A-F: Arsenic | 7440-38-2 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 96.3 | 85.0 | 114 |
| EG020A-F: Cadmium | 7440-43-9 | 0.0001 | mg/L | <0.0001 | 0.1 mg/L | 96.9 | 84.0 | 110 |
| EG020A-F: Chromium | 7440-47-3 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 97.5 | 85.0 | 111 |
| EG020A-F: Copper | 7440-50-8 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 97.6 | 81.0 | 111 |
| EG020A-F: Lead | 7439-92-1 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 96.8 | 83.0 | 111 |
| EG020A-F: Manganese | 7439-96-5 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 94.4 | 82.0 | 110 |
| EG020A-F: Nickel | 7440-02-0 | 0.001 | mg/L | <0.001 | 0.1 mg/L | 94.7 | 82.0 | 112 |
| EG020A-F: Selenium | 7782-49-2 | 0.004 | mg/L | <0.004 | 0.1 mg/L | 98.3 | 85.0 | 115 |
| EG020A-F: Zinc | 7440-66-6 | 0.005 | mg/L | <0.005 | 0.1 mg/L | 101 | 81.0 | 117 |
| EG020A-F: Boron | 7440-42-8 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 96.7 | 85.0 | 115 |
| EG020A-F: Iron | 7439-89-6 | 0.05 | mg/L | <0.05 | 0.5 mg/L | 98.2 | 82.0 | 112 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7526704)** | | | | | | | | |
| EG035F: Mercury | 7439-97-6 | 0.0001 | mg/L | <0.0001 | 0.01 mg/L | 90.0 | 83.0 | 105 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7525502)** | | | | | | | | |
| EK055G: Ammonia as N | 7664-41-7 | 0.01 | mg/L | <0.01 | 1 mg/L | 100 | 90.0 | 114 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7524136)** | | | | | | | | |
| EK057G: Nitrite as N | 14797-65-0 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 104 | 82.0 | 114 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7525501)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 93.1 | 91.0 | 113 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7527524)** | | | | | | | | |
| EK059G: Nitrite + Nitrate as N | ---- | 0.01 | mg/L | <0.01 | 0.5 mg/L | 92.8 | 91.0 | 113 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7525505)** | | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen as N | ---- | 0.1 | mg/L | <0.1 | 5 mg/L | 104 | 69.0 | 123 |
| | | | | <0.1 | 2.5 mg/L | 106 | 70.0 | 123 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7525506)** | | | | | | | | |

Sub-Matrix: **WATER**

| Method: Compound | CAS Number | LOR | Unit | Method Blank (MB) Report: Result | Laboratory Control Spike (LCS) Report: Spike Concentration | Spike Recovery (%): LCS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|---|
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7525506) - continued** | | | | | | | | |
| EK067G: Total Phosphorus as P | ---- | 0.01 | mg/L | <0.01 | 2.21 mg/L | 92.8 | 71.3 | 126 |
| | | | | <0.01 | 0.5 mg/L | 95.8 | 71.3 | 126 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7524134)** | | | | | | | | |
| EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.01 | mg/L | <0.01 | 0.5 mg/L | 98.3 | 85.0 | 117 |
| **EP020: Oil and Grease (O&G) (QCLot: 7529278)** | | | | | | | | |
| EP020: Oil & Grease | ---- | 5 | mg/L | <5 | 5000 mg/L | 91.4 | 81.0 | 121 |
| | | | | <5 | 4000 mg/L | 98.6 | 70.0 | 110 |

## Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

| Laboratory sample ID | Sample ID | Method: Compound | CAS Number | Matrix Spike (MS) Report: Spike Concentration | SpikeRecovery(%): MS | Acceptable Limits (%): Low | Acceptable Limits (%): High |
|---|---|---|---|---|---|---|---|
| **EG020F: Dissolved Metals by ICP-MS (QCLot: 7526705)** | | | | | | | |
| ES2621078-006 | Anonymous | EG020A-F: Arsenic | 7440-38-2 | 1 mg/L | 96.1 | 70.0 | 130 |
| | | EG020A-F: Cadmium | 7440-43-9 | 0.25 mg/L | 99.8 | 70.0 | 130 |
| | | EG020A-F: Chromium | 7440-47-3 | 1 mg/L | 99.0 | 70.0 | 130 |
| | | EG020A-F: Copper | 7440-50-8 | 1 mg/L | 98.7 | 70.0 | 130 |
| | | EG020A-F: Lead | 7439-92-1 | 1 mg/L | 95.8 | 70.0 | 130 |
| | | EG020A-F: Manganese | 7439-96-5 | 1 mg/L | 103 | 70.0 | 130 |
| | | EG020A-F: Nickel | 7440-02-0 | 1 mg/L | 98.8 | 70.0 | 130 |
| | | EG020A-F: Zinc | 7440-66-6 | 1 mg/L | 101 | 70.0 | 130 |
| **EG035F: Dissolved Mercury by FIMS (QCLot: 7526704)** | | | | | | | |
| ES2621078-005 | Anonymous | EG035F: Mercury | 7439-97-6 | 0.01 mg/L | 93.1 | 70.0 | 130 |
| **EK055G: Ammonia as N by Discrete Analyser (QCLot: 7525502)** | | | | | | | |
| ES2621067-002 | Anonymous | EK055G: Ammonia as N | 7664-41-7 | 1 mg/L | 87.7 | 70.0 | 130 |
| **EK057G: Nitrite as N by Discrete Analyser (QCLot: 7524136)** | | | | | | | |
| ES2620293-010 | Anonymous | EK057G: Nitrite as N | 14797-65-0 | 0.5 mg/L | 98.2 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7525501)** | | | | | | | |
| ES2621067-002 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.5 mg/L | 96.0 | 70.0 | 130 |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 7527524)** | | | | | | | |
| ED2600790-001 | Anonymous | EK059G: Nitrite + Nitrate as N | ---- | 0.25 mg/L | 114 | 70.0 | 130 |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7525505)** | | | | | | | |
| ES2621007-001 | Anonymous | | | | | | |

Sub-Matrix: **WATER**

| | | | | Matrix Spike (MS) Report | | | |
|---|---|---|---|---|---|---|---|
| | | | | Spike | SpikeRecovery(%) | Acceptable Limits (%) | |
| *Laboratory sample ID* | *Sample ID* | *Method: Compound* | *CAS Number* | *Concentration* | *MS* | *Low* | *High* |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 7525505) - continued** | | | | | | | |
| ES2621007-001 | Anonymous | EK061G: Total Kjeldahl Nitrogen as N | ---- | 5 mg/L | # Not Determined | 70.0 | 130 |
| **EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 7525506)** | | | | | | | |
| ES2621007-001 | Anonymous | EK067G: Total Phosphorus as P | ---- | 1 mg/L | # Not Determined | 70.0 | 130 |
| **EK071G: Reactive Phosphorus as P by discrete analyser (QCLot: 7524134)** | | | | | | | |
| EN2609849-001 | Anonymous | EK071G: Reactive Phosphorus as P | 14265-44-2 | 0.5 mg/L | 95.0 | 70.0 | 130 |

# QA/QC Compliance Assessment to assist with Quality Review

| | | | |
|---|---|---|---|
| **Work Order** | : **ES2621091** | Page | : 1 of 7 |
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Telephone | : +61-2-8784 8555 |
| Project | : E240981 | Date Samples Received | : 01-Jul-2026 |
| Site | : ---- | Issue Date | : 07-Jul-2026 |
| Sampler | : TASMAN COUPE | No. of samples received | : 5 |
| Order number | : | No. of samples analysed | : 5 |

**This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.**

Brief method summaries and references are also provided to assist in traceability.

## *Summary of Outliers*

### *Outliers : Quality Control Samples*

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, where applicable to the methodology, NO surrogate recovery outliers occur.**

### *Outliers : Analysis Holding Time Compliance*

- **NO Analysis Holding Time Outliers exist.**

### *Outliers : Frequency of Quality Control Samples*

- **NO Quality Control Sample Frequency Outliers exist.**

## Outliers : Quality Control Samples

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: **WATER**

| Compound Group Name | Laboratory Sample ID | Client Sample ID | Analyte | CAS Number | Data | Limits | Comment |
|---|---|---|---|---|---|---|---|
| **Matrix Spike (MS) Recoveries** | | | | | | | |
| EK061G: Total Kjeldahl Nitrogen By Discrete Analyser | ES2621007--001 | Anonymous | **Total Kjeldahl Nitrogen as N** | ---- | Not Determined | ---- | **MS recovery not determined, background level greater than or equal to 4x spike level.** |
| EK067G: Total Phosphorus as P by Discrete Analyser | ES2621007--001 | Anonymous | **Total Phosphorus as P** | ---- | Not Determined | ---- | **MS recovery not determined, background level greater than or equal to 4x spike level.** |

## Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EA025: Total Suspended Solids dried at 104 ± 2°C** | | | | | | | |
| **Clear Plastic Bottle - Natural (EA025H)** | | | | | | | |
| BSM1, BSM2, BSM3, QC01 | **01-Jul-2026** | **----** | ---- | **----** | **06-Jul-2026** | 08-Jul-2026 | ✓ |
| **EG020F: Dissolved Metals by ICP-MS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)** | | | | | | | |
| BSM1, BSM2, BSM3, QC01 | **01-Jul-2026** | **----** | ---- | **----** | **02-Jul-2026** | 28-Dec-2026 | ✓ |
| **EG035F: Dissolved Mercury by FIMS** | | | | | | | |
| **Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)** | | | | | | | |
| BSM1, BSM2, BSM3, QC01 | **01-Jul-2026** | **----** | ---- | **----** | **06-Jul-2026** | 29-Jul-2026 | ✓ |
| **EK055G: Ammonia as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK055G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC02 | **01-Jul-2026** | **----** | ---- | **----** | **03-Jul-2026** | 29-Jul-2026 | ✓ |
| **EK057G: Nitrite as N by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK057G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC01, QC02 | **01-Jul-2026** | **----** | ---- | **----** | **02-Jul-2026** | 03-Jul-2026 | ✓ |

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

| Method / Container / Client Sample ID(s) | Sample Date | Extraction / Preparation | | | Analysis | | |
|---|---|---|---|---|---|---|---|
| | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| **EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK059G)** | | | | | | | |
| QC01 | **01-Jul-2026** | **----** | ---- | ---- | **03-Jul-2026** | 03-Jul-2026 | ✓ |
| **Clear Plastic Bottle - Sulfuric Acid (EK059G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC02 | **01-Jul-2026** | **----** | ---- | ---- | **03-Jul-2026** | 29-Jul-2026 | ✓ |
| **EK061G: Total Kjeldahl Nitrogen By Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK061G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC02 | **01-Jul-2026** | **02-Jul-2026** | 29-Jul-2026 | ✓ | **02-Jul-2026** | 29-Jul-2026 | ✓ |
| **EK067G: Total Phosphorus as P by Discrete Analyser** | | | | | | | |
| **Clear Plastic Bottle - Sulfuric Acid (EK067G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC02 | **01-Jul-2026** | **02-Jul-2026** | 29-Jul-2026 | ✓ | **02-Jul-2026** | 29-Jul-2026 | ✓ |
| **EK071G: Reactive Phosphorus as P by discrete analyser** | | | | | | | |
| **Clear Plastic Bottle - Natural (EK071G)** | | | | | | | |
| BSM1, BSM2, BSM3, QC01 | **01-Jul-2026** | **----** | ---- | ---- | **02-Jul-2026** | 03-Jul-2026 | ✓ |
| **EP020: Oil and Grease (O&G)** | | | | | | | |
| **Amber Glass Bottle - Sulfuric Acid (EP020)** | | | | | | | |
| BSM1, BSM2, BSM3, QC02 | **01-Jul-2026** | **----** | ---- | ---- | **03-Jul-2026** | 29-Jul-2026 | ✓ |

# Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| **Laboratory Duplicates (DUP)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 2 | 10 | **20.00** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 2 | 18 | **11.11** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 2 | 18 | **11.11** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 4 | 19 | **21.05** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 2 | 15 | **13.33** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 2 | 11 | **18.18** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 4 | 39 | **10.26** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 2 | 19 | **10.53** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 13 | **15.38** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Laboratory Control Samples (LCS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 10 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 19 | **10.53** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 2 | 30 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 5 | 39 | **12.82** | **12.50** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 3 | 19 | **15.79** | **15.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 2 | 13 | **15.38** | **10.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Method Blanks (MB)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 10 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 19 | **10.53** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Oil and Grease | EP020 | 2 | 30 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Suspended Solids (High Level) | EA025H | 2 | 39 | **5.13** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 19 | **5.26** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 13 | **7.69** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| **Matrix Spikes (MS)** | | | | | | | |
| Ammonia as N by Discrete analyser | EK055G | 1 | 10 | **10.00** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Mercury by FIMS | EG035F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | 1 | 18 | **5.56** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | 2 | 19 | **10.53** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

| Quality Control Sample Type | | Count | | Rate (%) | | | Quality Control Specification |
|---|---|---|---|---|---|---|---|
| *Analytical Methods* | *Method* | *QC* | *Regular* | ***Actual*** | ***Expected*** | *Evaluation* | |
| Matrix Spikes (MS) - Continued | | | | | | | |
| Nitrite as N by Discrete Analyser | EK057G | 1 | 15 | **6.67** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | 1 | 11 | **9.09** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | 1 | 19 | **5.26** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |
| Total Phosphorus as P By Discrete Analyser | EK067G | 1 | 13 | **7.69** | **5.00** | ✓ | NEPM 2013 B3 & ALS QC Standard |

## Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Suspended Solids (High Level) | EA025H | WATER | In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3) |
| Hardness as CaCO3 | EA065 | WATER | In house: Referenced to APHA 2340 B. This method is compliant with NEPM Schedule B(3) |
| Dissolved Metals by ICP-MS - Suite A | EG020A-F | WATER | In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector. |
| Dissolved Mercury by FIMS | EG035F | WATER | In house: Referenced to APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3). |
| Ammonia as N by Discrete analyser | EK055G | WATER | In house: Referenced to APHA 4500-NH3 G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrite as N by Discrete Analyser | EK057G | WATER | In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Nitrate as N by Discrete Analyser | EK058G | WATER | In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chemical reduction followed by quantification by Discrete Analyser. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM Schedule B(3) |
| Nitrite and Nitrate as N (NOx) by Discrete Analyser | EK059G | WATER | In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Total Kjeldahl Nitrogen as N By Discrete Analyser | EK061G | WATER | In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3) |
| Total Nitrogen as N (TKN + Nox) By Discrete Analyser | EK062G | WATER | In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3) |
| Total Phosphorus as P By Discrete Analyser | EK067G | WATER | In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3) |

| Analytical Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| Reactive Phosphorus as P-By Discrete Analyser | EK071G | WATER | In house: Referenced to APHA 4500-P F Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by Discrete Analyser. This method is compliant with NEPM Schedule B(3) |
| Oil and Grease | EP020 | WATER | In house: Referenced to APHA 5520 B. Oil & grease is a gravimetric procedure to determine the amount of dissolved or emulsified oil & grease residue in an aqueous sample. The sample is serially extracted three times n-hexane. The resultant extracts are combined, dehydrated and concentrated prior to gravimetric determination. This method is compliant with NEPM Schedule B(3) |

| Preparation Methods | Method | Matrix | Method Descriptions |
|---|---|---|---|
| TKN/TP Digestion | EK061/EK067 | WATER | In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3) |

# SAMPLE RECEIPT NOTIFICATION (SRN)

**Work Order** : **ES2621091**

| | | | |
|---|---|---|---|
| Client | : **EMM CONSULTING PTY LTD** | Laboratory | : Environmental Division Sydney |
| Contact | : TASMAN COUPE | Contact | : Lianna Taing |
| Address | : The Forum Level 10 201 Pacific Highway St Leonards NSW NSW 2065 | Address | : 277-289 Woodpark Road Smithfield NSW Australia 2164 |
| E-mail | : tcoupe@emmconsulting.com.au | E-mail | : lianna.taing@alsglobal.com |
| Telephone | : ---- | Telephone | : +61-2-8784 8555 |
| Facsimile | : ---- | Facsimile | : +61-2-8784 8500 |
| Project | : E240981 | Page | : 1 of 3 |
| Order number | : | Quote number | : EP2023EMGAMM0004 (EN/111) |
| C-O-C number | : ---- | QC Level | : NEPM 2013 B3 & ALS QC Standard |
| Site | : ---- | | |
| Sampler | : TASMAN COUPE | | |

## Dates

| | | | |
|---|---|---|---|
| Date Samples Received | : 01-Jul-2026 13:20 | Issue Date | : 01-Jul-2026 |
| Client Requested Due Date | : 08-Jul-2026 | Scheduled Reporting Date | : **08-Jul-2026** |

## Delivery Details

| | | | |
|---|---|---|---|
| Mode of Delivery | : Carrier | Security Seal | : Intact. |
| No. of coolers/boxes | : 1 | Temperature | : 2,9'C - Ice present |
| Receipt Detail | : | No. of samples received / analysed | : 5 / 5 |

## General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Unless otherwise stated, analytical work for this work order will be conducted at ALS Sydney, NATA accreditation no. 825, site no. 10911.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

## Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

## Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

| Laboratory sample ID | Sampling date / time | Sample ID | WATER - EA025H Suspended Solids - Standard Level | WATER - EA065 Total Hardness as CaCO3 | WATER - EG020F Dissolved Metals by ICP/MS | WATER - EP020 Oil & Grease (O&G) | WATER - NT-04 Nitrite and Nitrate | WATER - NT-08A Total Nitrogen + NO2 + NO3 + NH3 + Total P + | WATER - W-30 11 Metals |
|---|---|---|---|---|---|---|---|---|---|
| ES2621091-001 | 01-Jul-2026 00:00 | BSM1 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| ES2621091-002 | 01-Jul-2026 00:00 | BSM2 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| ES2621091-003 | 01-Jul-2026 00:00 | BSM3 | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ |
| ES2621091-004 | 01-Jul-2026 00:00 | QC01 | ✓ | ✓ | ✓ | | ✓ | | ✓ |
| ES2621091-005 | 01-Jul-2026 00:00 | QC02 | | | | ✓ | | | |

Matrix: **WATER**

| Laboratory sample ID | Sampling date / time | Sample ID | WATER - EK071G Reactive Phosphorus by Discrete analyser | WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P |
|---|---|---|---|---|
| ES2621091-004 | 01-Jul-2026 00:00 | QC01 | ✓ | |
| ES2621091-005 | 01-Jul-2026 00:00 | QC02 | | ✓ |

## Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

## Requested Deliverables

**ALL INVOICES**

| | | |
|---|---|---|
| - A4 - AU Tax Invoice (INV) | Email | finance@emmconsulting.com.au |

**PAYMENTS**

| | | |
|---|---|---|
| - A4 - AU Tax Invoice (INV) | Email | payments@emmconsulting.com.au |

**TASMAN COUPE**

| | | |
|---|---|---|
| - *AU Certificate of Analysis - NATA (COA) | Email | tcoupe@emmconsulting.com.au |
| - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) | Email | tcoupe@emmconsulting.com.au |
| - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) | Email | tcoupe@emmconsulting.com.au |
| - A4 - AU Sample Receipt Notification - Environmental HT (SRN) | Email | tcoupe@emmconsulting.com.au |
| - A4 - AU Tax Invoice (INV) | Email | tcoupe@emmconsulting.com.au |
| - Chain of Custody (CoC) (COC) | Email | tcoupe@emmconsulting.com.au |
| - Chromatogram (CHROM) | Email | tcoupe@emmconsulting.com.au |
| - EDI Format - ENMRG (ENMRG) | Email | tcoupe@emmconsulting.com.au |
| - EDI Format - ESDAT (ESDAT) | Email | tcoupe@emmconsulting.com.au |

# CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 61 8 8359 0890 E: adelaide@alsglobal.com

BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 3421 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

| | | | |
|---|---|---|---|
| **CLIENT:** EMM Consulting Pty Ltd | **TURNAROUND REQUIREMENTS:** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics) | ☐ Standard TAT (List due date): | **FOR LABORATORY USE ONLY (Circle)** |
| **OFFICE:** Sydney | | ☐ Non Standard or urgent TAT (List due date): | Custody Seal Intact? Yes No N/A |
| **PROJECT:** E240981 PROJECT NO E240981 | **ALS QUOTE NO.:** EN/111/25 | **COC SEQUENCE NUMBER (Circle)** | Free ice / frozen ice bricks present upon receipt? Yes No N/A |
| **ORDER NUMBER:** PURCHASE ORDER NO.: | **COUNTRY OF ORIGIN:** Australia | COC: 1 2 3 4 5 6 7 | Random Sample Temperature on Receipt: °C |
| **PROJECT MANAGER:** Tasman Coupe CONTACT PH: 0421 081 113 | | OF: 1 2 3 4 5 6 7 | Other comment: |
| **SAMPLER:** Tasman Coupe SAMPLER MOBILE: 0421 081 113 | **RELINQUISHED BY:** T. Coupe | **RECEIVED BY:** [signature] | **RELINQUISHED BY:** |
| **COC Emailed to ALS?** Yes EDD FORMAT (or default): | DATE/TIME: 1/7/26 12:50pm | DATE/TIME: 1/7/26 1:20pm | DATE/TIME: |
| **Email Reports to:** tcoupe@emmconsulting.com.au, esdat+emmwater@esdatlabsync.net | | | **RECEIVED BY:** |
| **Email Invoice to:** tcoupe@emmconsulting.com.au, payments@emmconsulting.com.au | | | DATE/TIME: |

**COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:** All metals dissolved. Add Chromatograms to analysis report.

| ALS USE ONLY | SAMPLE DETAILS MATRIX: Solid(S) Water(W) | | | CONTAINER INFORMATION | | ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required). | | | | | | | | Additional Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LAB ID | SAMPLE ID | DATE / TIME | MATRIX | TYPE & PRESERVATIVE (refer to codes below) | TOTAL BOTTLES | Total Suspended Solids (EA025H) | Nutrients (NT-8A) | Dissolved metals (W-30) Plus Boron and Manganese | Oil and grease (EP020) | Total hardness | Ammonia, Nitrogen, Total Phos. TKN 2 | Nitrate, Reactive Phos Nitrite 2 | | Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. TRH/BTEXN analysed both pre- and post- silica gel clean up (W-4 AND W-4SG). |
| 1 | BSM1 | 1/07/2026 | w | Ice Esky | 8 | x | x | x | x | x | | | | All metals dissolved. |
| 2 | BSM2 | 1/07/2026 | w | | 8 | x | x | x | x | x | | | | All metals dissolved. |
| 3 | BSM3 | 1/07/2026 | w | | 8 | x | x | x | x | x | | | | All metals dissolved. |
| 4 | QC01 | 1/07/2026 | w | | 3 | x | [illegible] | x | [illegible] | x | | X | | All metals dissolved. |
| 5 | QC02 | 1/7/2026 | w | | 2 | | [illegible] | | X | | X | | | |
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| | | | | | | | | | | | | | | |
| | | | | TOTAL | 0 | | | | | | | | | |

***Water Container Codes:*** P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental Division
Sydney
Work Order Reference
ES2621091

Telephone : +61-2-8784 8555

# Appendix F
Field data

EMM
creating opportunities

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM1 | ☐ Well development |
| **Project** | E240981 | **Field staff** | TC, AM | ☑ Gauging |
| **Client** | CPG | **Date** | 01/07/2026 09:12 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 15.215 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well cap secure standpipe loose | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro plus |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 9:20 | 1 | 15.215 | 6.9 | 2564 | 40.9 | 0.82 | 17.9 |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
| **Comments** | Colourless, clear, black particulate, distinct organic and sulfurous odour, no sheen. TDS=1668 mg.L | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM1 |
| **QC Sample ID (if applicable)** | |
| **Number of bottles collected** | 7 |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM2 | ☐ Well development |
| **Project** | E240981 | **Field staff** | TC, AM | ☑ Gauging |
| **Client** | CPG | **Date** | 01/07/2026 10:08 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 9.695 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 29.712 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well cap secure standpipe loose | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro plus |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 10:20 | 1 | 9.695 | 6.66 | 18051 | 68.2 | 1.35 | 19.3 |
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| **Comments** | Colourless, clear, trace brown particulate, no odour, no sheen. TDS=11730 mg/L | | | | | | |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM2 |
| **QC Sample ID (if applicable)** | QC01 |
| **Number of bottles collected** | 7 |

# Groundwater sampling field sheet

| | | | | |
|---|---|---|---|---|
| **Job number** | E240981 | **Well ID** | BSM3 | ☐ Well development |
| **Project** | E240981 | **Field staff** | TC, AM | ☑ Gauging |
| **Client** | CPG | **Date** | 01/07/2026 10:45 | ☑ Sampling |

## Gauging

| | | | |
|---|---|---|---|
| **PID (ppm)** | Not collected | **LEL (%)** | Not collected |
| **Depth to LNAPL (mBTOC)** | Not observed | **Depth to groundwater (mBTOC)** | 12.46 |
| **Depth to DNAPL (mBTOC)** | Not observed | **Well depth (mBTOC)** | 31.464 |
| **Well diameter (mm)** | 50 | | |
| **Comments** | Well cap secure, dipper in well. | | |

## Sampling equipment

| | | | |
|---|---|---|---|
| **Pumps** | ☐ **Submerged pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | | **Controller info** | |
| | ☐ **Peristaltic pump** | **Pump model** | |
| | | **Length of tubing (m)** | |
| | ☐ **Inertial pump** | **Pump model** | |
| | | **Depth of pump (mBTOC)** | |
| | | **Depth to water after pump placement (mBTOC)** | |
| | **Flow rate (L/min)** | | |
| **Grab sampling** | ☐ **Bailer** | **Disposable?** | |
| | | **Volume (L)** | |
| | ☑ **Hydrasleeve** | **Hydrasleeve installation only?** | no |
| | | **Volume (L)** | 1 |
| | | **New hydrasleeve installed following sampling?** | yes |
| ☐ **Other** | | **Comments** | |

| | |
|---|---|
| **Water quality meter model** | YSI Pro Plus |

## Purging

| Time | Cumulative volume removed (L) | Standing water level (mBTOC) | pH | Electrical conductivity (uS/cm) | Redox (mV) | Dissolved oxygen (mg/L) | Temperature (degC) |
|---|---|---|---|---|---|---|---|
| 10:50 | 1 | | 6.99 | 23338 | -271 | 0.49 | 19.3 |
| | | | | | | | |
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| | | | | | | | |

| | |
|---|---|
| **Comments** | Colourless, clear, trace brown particulate, distinct sulfurous odour, no sheen. TDS= 15175 mg/L |

## Sample collection

| | |
|---|---|
| **Sampled?** | yes |
| **Field filtered for metals?** | yes |
| **Sample ID** | BSM1 |
| **QC Sample ID (if applicable)** | QC02 |
| **Number of bottles collected** | 7 |

# Appendix G
Calibration certificates

EMM
creating opportunities

# Certificate of Service and Calibration

## Water Quality Meter

## YSI Professional Plus

| | |
|---|---|
| **Company Name** | WAM Scientific |
| **Office Address** | 26 Bungarra Crescent, Chipping Norton NSW 2170 |
| **Phone Number** | +61 405 241 484 |
| **Contact Name** | William Pak |
| **Instrument** | YSI Pro Quatro Water Quality Meter w/ 1m Quatro Cable |
| **Serial Number** | 254L001545 |
| **Client Name** | Tasman Coupe (EMM) |
| **Project Number** | E240981W20 |

**Instrument Check**

| Item | Test | Test Passed | Comments |
|---|---|---|---|
| 2 x Alkaline C-size Batteries | Klein Tools MM300 Multimeter | ✓ | Both batteries reading above 2.9V |
| Battery Saver Function | Operation | ✓ | Automatically turns off after 60 minutes if idle |
| Unit Display | Operation | ✓ | Screen visible, no damage |
| Keypad | Operation | ✓ | Responsive, no damage |
| Connection Port and Cable | Condition/Check | ✓ | Clean, no damage |
| Monitor Housing | Condition/Check | ✓ | No damage |
| Firmware | Version | ✓ | 4.0.0 |
| pH Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| pH millivolts for pH 7.00 | Calibration | ✓ | pH 7.00 calibration range between 0 mV ± 50 mV |
| pH millivolts for pH 4.00 | Calibration | ✓ | pH 4 mV range +165 to +180 from 7 buffer mV value |
| pH slope | Calibration | ✓ | Range between 55 to 60 mV/pH (ideal value 59 mV) |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| ORP Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| ORP Reading | Calibration | ✓ | Within ± 80 mV of reference Zobell Reading |
| Response time < 90 seconds | Calibration | ✓ | Responds to correct value within 90 seconds |
| Conductivity/Temp Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| Conductivity Cell | Calibration | ✓ | Conductivity cell constant 5.0 ± 1.0 in GLP file |
| Clean Sensor Readings | Calibration | ✓ | Clean sensor reads less than 3 uS/cm in dry air |
| Dissolved Oxygen Probe | Condition/Calibration | ✓ | Calibrated and conforms to manufacturer's specs |
| DO Cap | Condition/Calibration | ✓ | 1.25 mil PE membrane (yellow membrane) |
| DO Sensor in Use | Condition | ✓ | Polarographic DO sensor |
| DO Sensor Value | Calibration | ✓ | (min 4.31 uA - max 8.00 uA) Avg 6.15 uA |

**Instrument Readings**

| Parameter | Standard Used | Reference No. | Calibration Value | Observed | Actual | Units |
|---|---|---|---|---|---|---|
| Temperature | Centre 370 Thermometer | Room Temp. | 13.3 | 13.1 | 13.3 | °C |
| pH | pH 4.00 | 417183 | 4.01 | 4.01 | 4.01 | pH |
| pH | pH 7.00 | 419528 | 7.00 | 7.05 | 7.00 | pH |
| ORP | Zobell A & B | 420448/418958 | 254.7 | 242.5 | 254.7 | mV |
| Conductivity | 2760 µs/cm at 25°C | 399819 | 2760 | 2669 | 2760 | µs/cm |
| Zero Dissolved $O_2$ | $NaSO_3$ in Distilled $H_2O$ | 426184 | 0.0 | 0.4 | 0.0 | % |
| 100% Dissolved $O_2$ | 100% Air Saturated $H_2O$ | Fresh Air | 100.0 | 110.3 | 100.0 | % |

**Declaration**

**WAM Scientific** certifies that the above instrument was successfully tested according to manufacturer's standards and all necessary checks were conducted to ensure the instrument was fully operational prior to dispatch. The calibration data supplied was obtained in accordance with manufacturer's specifications using solutions of known values.

| | |
|---|---|
| **Calibrated By** | William Pak |
| **Calibration Date** | 26/06/2026 |
| **Calibration Due** | 26/12/2026 |

WAM SCIENTIFIC
+61 418 389 790
rentals@wamscientific.com.au
26 Bungarra Crescent, CHIPPING NORTON NSW 2170
www.wamscientific.com.au

# Appendix H

## Mann-Kendall trend analysis

EMM
creating opportunities

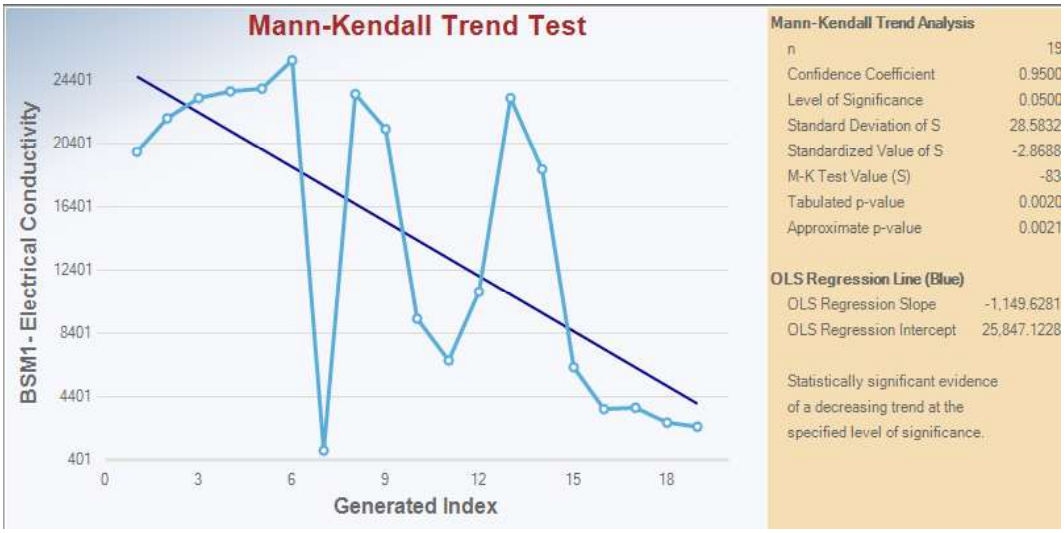
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM1- Electrical Conductivity

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 19 |
| Number Values Reported (n) | 19 |
| Minimum | 1018 |
| Maximum | 25681 |
| Mean | 14351 |
| Geometric Mean | 10185 |
| Median | 18812 |
| Standard Deviation | 9274 |
| Coefficient of Variation | 0.646 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -83 |
| Tabulated p-value | 0.002 |
| Standard Deviation of S | 28.58 |
| Standardized Value of S | -2.869 |
| Approximate p-value | 0.00206 |

**Statistically significant evidence of a decreasing trend at the specified level of significance.**



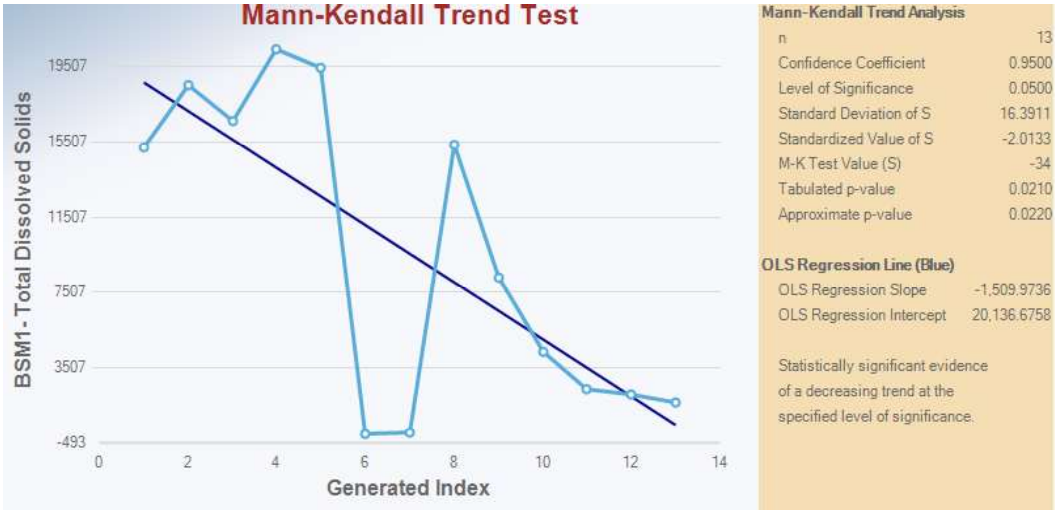
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM1- Total Dissolved Solids

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 13 |
| Number Values Reported (n) | 13 |
| Minimum | 16.69 |
| Maximum | 20400 |
| Mean | 9567 |
| Geometric Mean | 3442 |
| Median | 8300 |
| Standard Deviation | 8100 |
| Coefficient of Variation | 0.847 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -34 |
| Tabulated p-value | 0.021 |
| Standard Deviation of S | 16.39 |
| Standardized Value of S | -2.013 |
| Approximate p-value | 0.022 |

**Statistically significant evidence of a decreasing trend at the specified level of significance.**



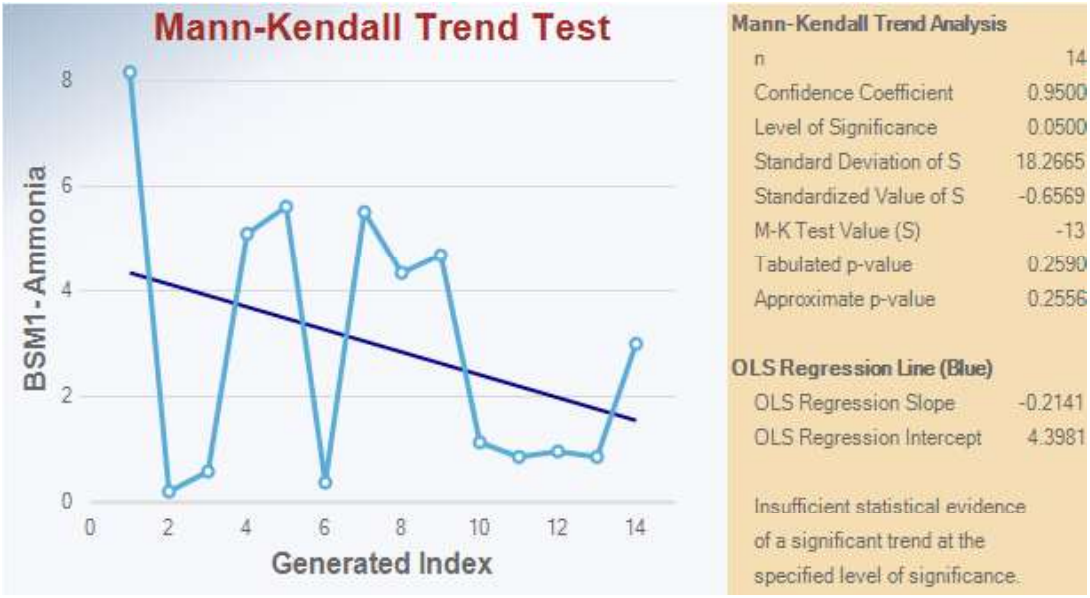
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM1- Ammonia

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 14 |
| Number Values Reported (n) | 14 |
| Minimum | 0.03 |
| Maximum | 8.02 |
| Mean | 2.792 |
| Geometric Mean | 1.334 |
| Median | 1.9 |
| Standard Deviation | 2.583 |
| Coefficient of Variation | 0.925 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -13 |
| Tabulated p-value | 0.259 |
| Standard Deviation of S | 18.27 |
| Standardized Value of S | -0.657 |
| Approximate p-value | 0.256 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



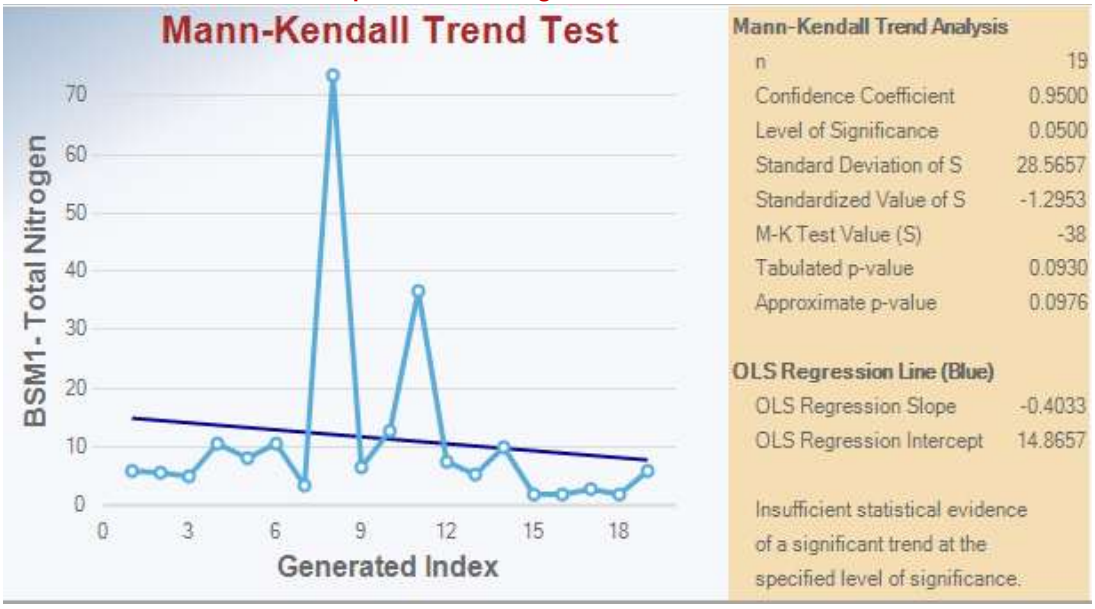
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM1- Total Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 19 |
| Number Values Reported (n) | 19 |
| Minimum | 1.3 |
| Maximum | 73.1 |
| Mean | 10.83 |
| Geometric Mean | 5.944 |
| Median | 5.497 |
| Standard Deviation | 16.9 |
| Coefficient of Variation | 1.56 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -38 |
| Tabulated p-value | 0.093 |
| Standard Deviation of S | 28.57 |
| Standardized Value of S | -1.295 |
| Approximate p-value | 0.0976 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



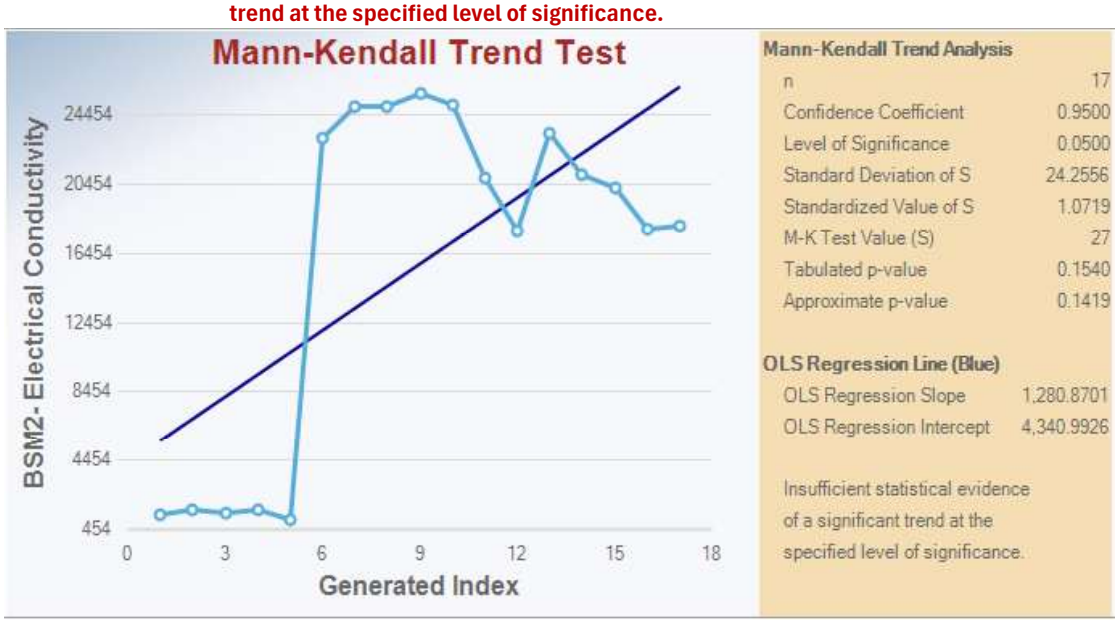
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Electrical Conductivity

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 17 |
| Number Values Reported (n) | 17 |
| Minimum | 1069 |
| Maximum | 25666 |
| Mean | 15869 |
| Geometric Mean | 9656 |
| Median | 20238 |
| Standard Deviation | 9947 |
| Coefficient of Variation | 0.627 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 27 |
| Tabulated p-value | 0.154 |
| Standard Deviation of S | 24.26 |
| Standardized Value of S | 1.072 |
| Approximate p-value | 0.142 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



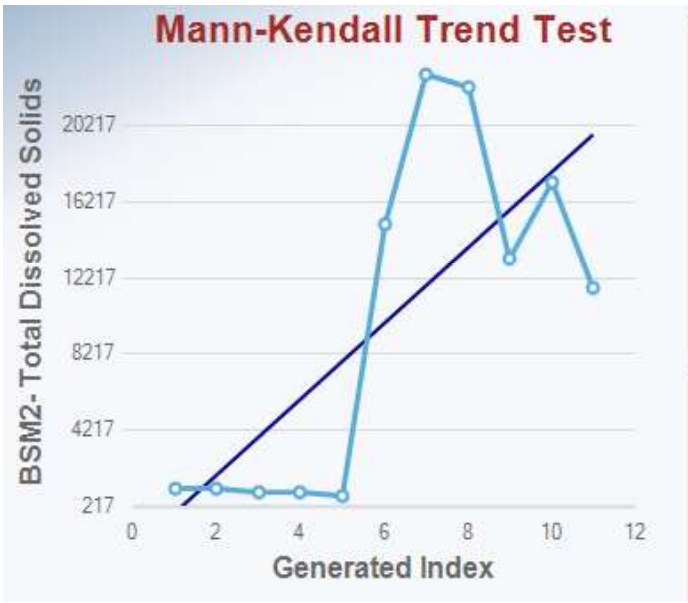
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Total Dissolved Solids

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 771 |
| Maximum | 22940 |
| Mean | 9763 |
| Geometric Mean | 4582 |
| Median | 11730 |
| Standard Deviation | 9022 |
| Coefficient of Variation | 0.924 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 17 |
| Tabulated p-value | 0.109 |
| Standard Deviation of S | 12.85 |
| Standardized Value of S | 1.246 |
| Approximate p-value | 0.106 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**




| Mann-Kendall Trend Analysis | |
|---|---|
| n | 11 |
| Confidence Coefficient | 0.9500 |
| Level of Significance | 0.0500 |
| Standard Deviation of S | 12.8452 |
| Standardized Value of S | 1.2456 |
| M-K Test Value (S) | 17 |
| Tabulated p-value | 0.1090 |
| Approximate p-value | 0.1065 |
| **OLS Regression Line (Blue)** | |
| OLS Regression Slope | 1,991.0545 |
| OLS Regression Intercept | -2,182.9636 |

Insufficient statistical evidence of a significant trend at the specified level of significance.

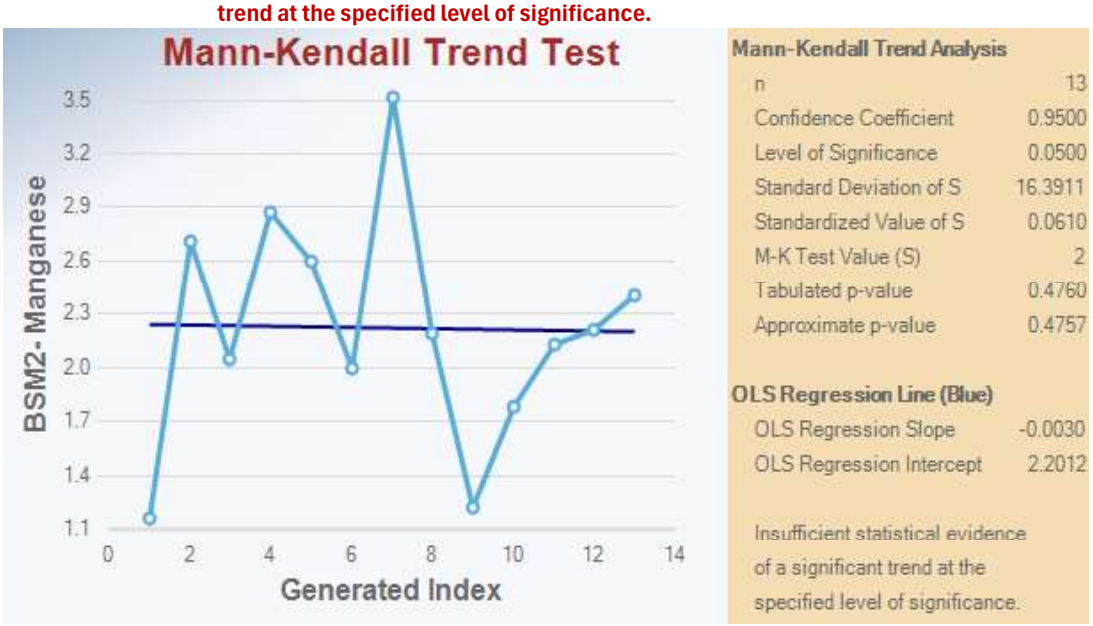
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Manganese

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 13 |
| Number Values Reported (n) | 13 |
| Minimum | 1.12 |
| Maximum | 3.48 |
| Mean | 2.18 |
| Geometric Mean | 2.086 |
| Median | 2.15 |
| Standard Deviation | 0.642 |
| Coefficient of Variation | 0.295 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 2 |
| Tabulated p-value | 0.476 |
| Standard Deviation of S | 16.39 |
| Standardized Value of S | 0.061 |
| Approximate p-value | 0.476 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



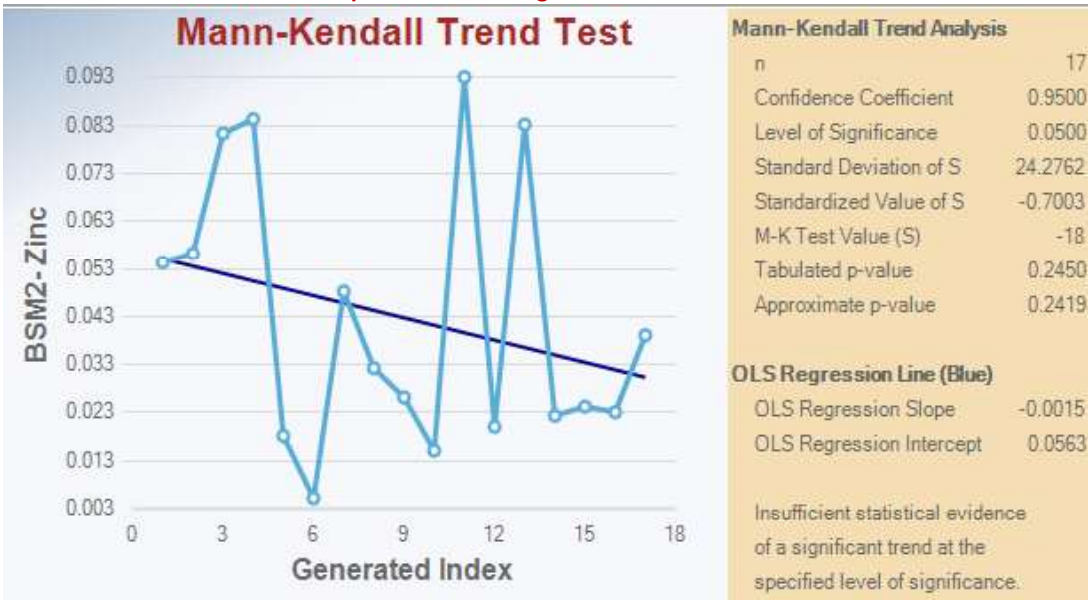
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Zinc

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 17 |
| Number Values Reported (n) | 17 |
| Minimum | 0.005 |
| Maximum | 0.093 |
| Mean | 0.0425 |
| Geometric Mean | 0.0334 |
| Median | 0.032 |
| Standard Deviation | 0.028 |
| Coefficient of Variation | 0.658 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -18 |
| Tabulated p-value | 0.245 |
| Standard Deviation of S | 24.28 |
| Standardized Value of S | -0.7 |
| Approximate p-value | 0.242 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



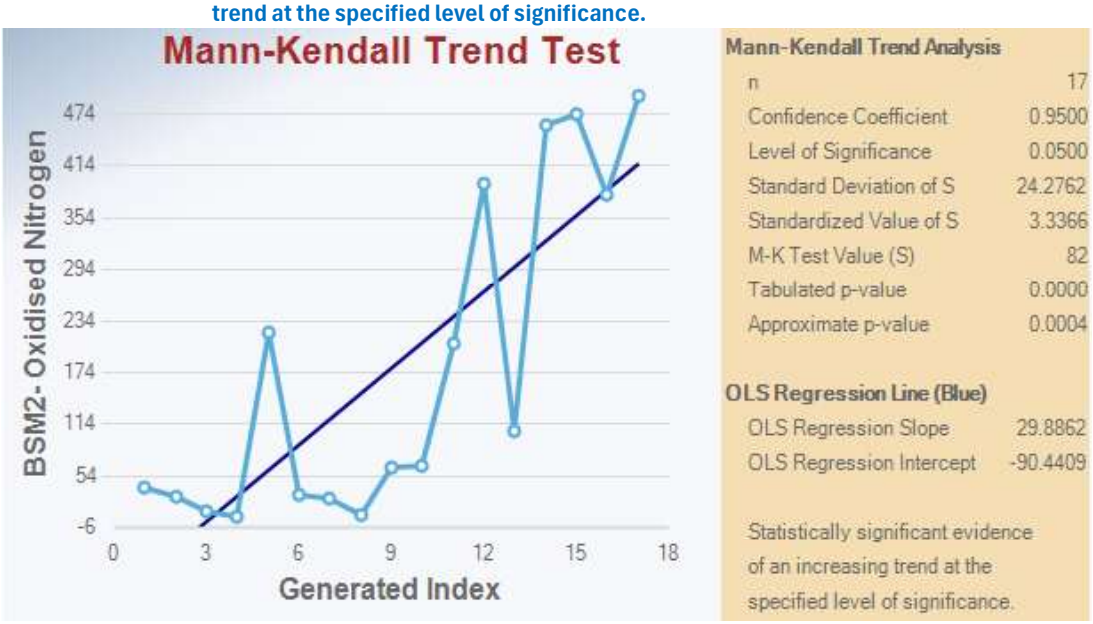
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Oxidised Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 17 |
| Number Values Reported (n) | 17 |
| Minimum | 6.62 |
| Maximum | 496 |
| Mean | 178.5 |
| Geometric Mean | 81.35 |
| Median | 67.3 |
| Standard Deviation | 187.2 |
| Coefficient of Variation | 1.049 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 82 |
| Tabulated p-value | 0 |
| Standard Deviation of S | 24.28 |
| Standardized Value of S | 3.337 |
| Approximate p-value | 4.24E-04 |

**Statistically significant evidence of an increasing trend at the specified level of significance.**



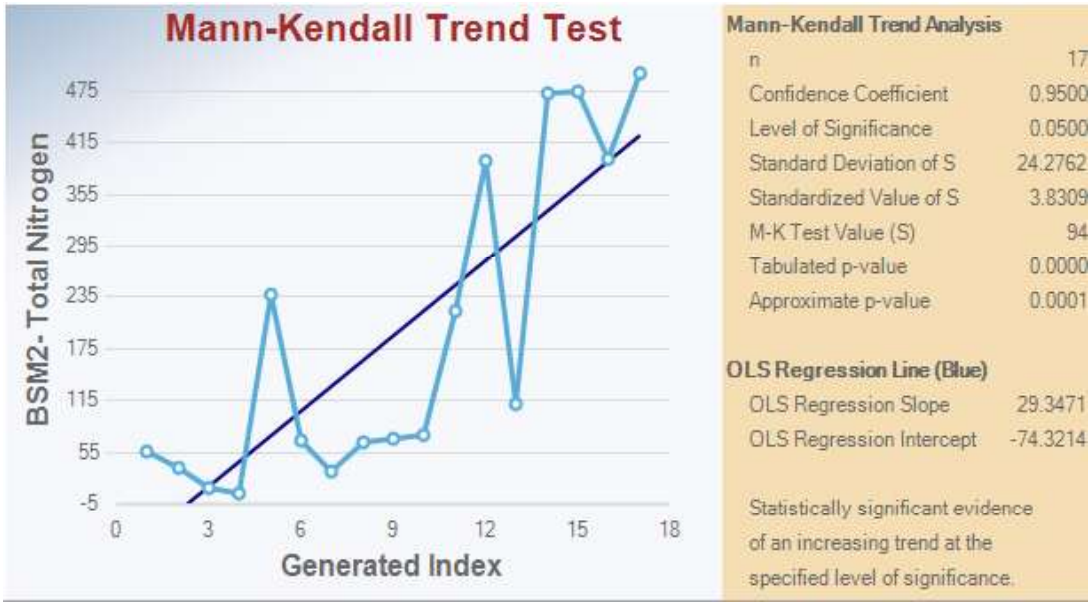
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2- Total Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 17 |
| Number Values Reported (n) | 17 |
| Minimum | 6.82 |
| Maximum | 496 |
| Mean | 189.8 |
| Geometric Mean | 102.6 |
| Median | 74.9 |
| Standard Deviation | 183.1 |
| Coefficient of Variation | 0.965 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 94 |
| Tabulated p-value | 0 |
| Standard Deviation of S | 24.28 |
| Standardized Value of S | 3.831 |
| Approximate p-value | 6.38E-05 |

**Statistically significant evidence of an increasing trend at the specified level of significance.**



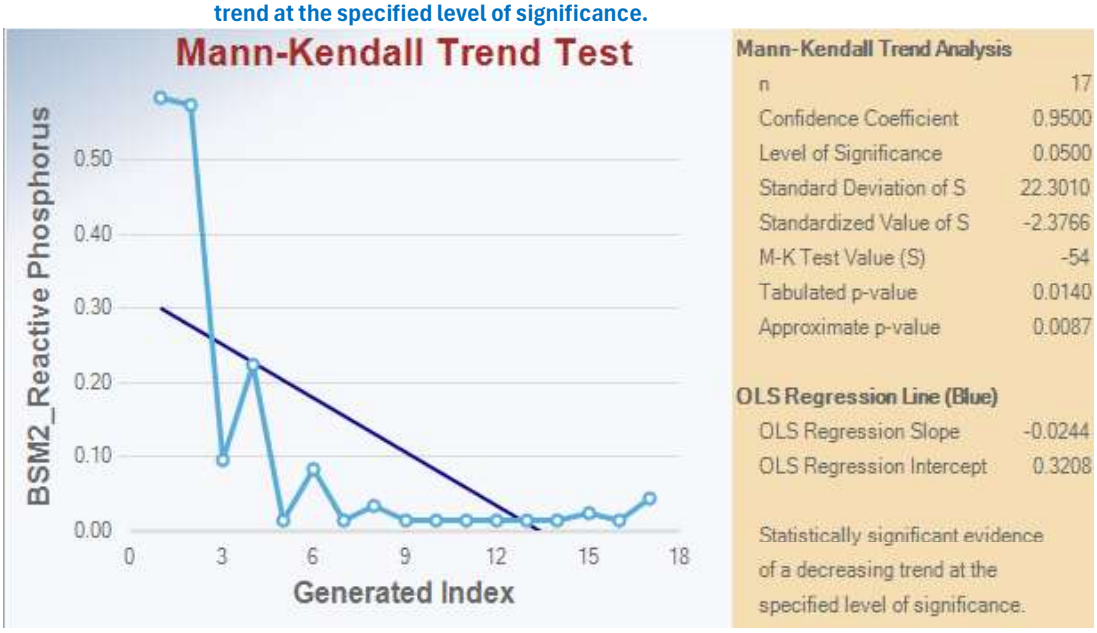
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM2_Reactive Phosphorus

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 17 |
| Number Values Reported (n) | 17 |
| Minimum | 0.01 |
| Maximum | 0.58 |
| Mean | 0.101 |
| Geometric Mean | 0.03 |
| Median | 0.01 |
| Standard Deviation | 0.186 |
| Coefficient of Variation | 1.837 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -54 |
| Tabulated p-value | 0.014 |
| Standard Deviation of S | 22.3 |
| Standardized Value of S | -2.377 |
| Approximate p-value | 0.00874 |

**Statistically significant evidence of a decreasing trend at the specified level of significance.**



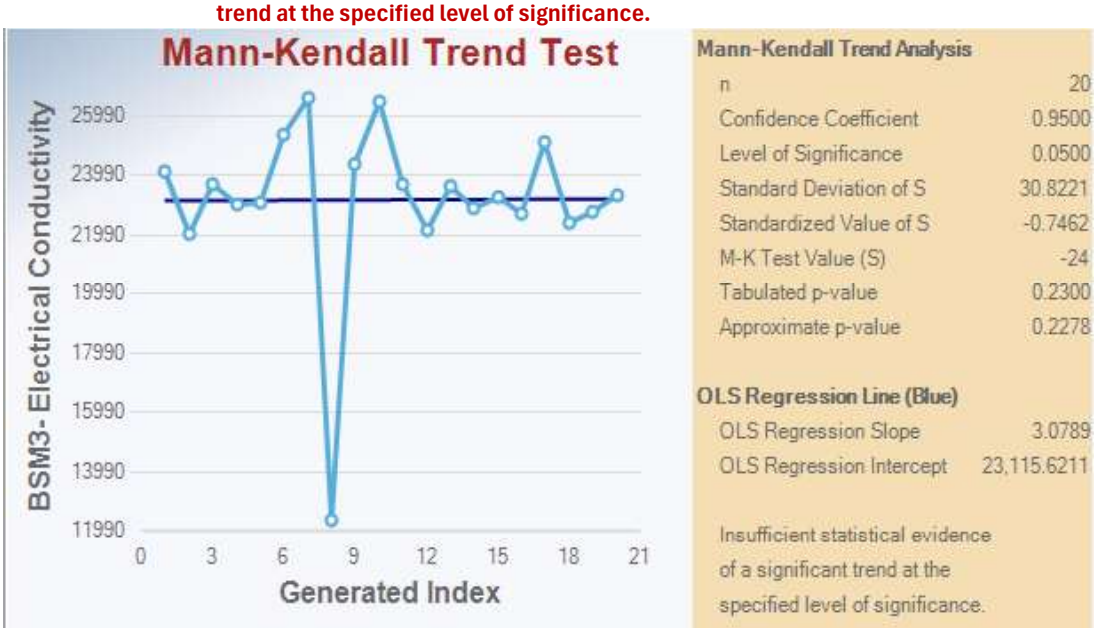
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3- Electrical Conductivity

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 20 |
| Number Values Reported (n) | 20 |
| Minimum | 12346 |
| Maximum | 26600 |
| Mean | 23148 |
| Geometric Mean | 22923 |
| Median | 23297 |
| Standard Deviation | 2858 |
| Coefficient of Variation | 0.123 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -24 |
| Tabulated p-value | 0.23 |
| Standard Deviation of S | 30.82 |
| Standardized Value of S | -0.746 |
| Approximate p-value | 0.228 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



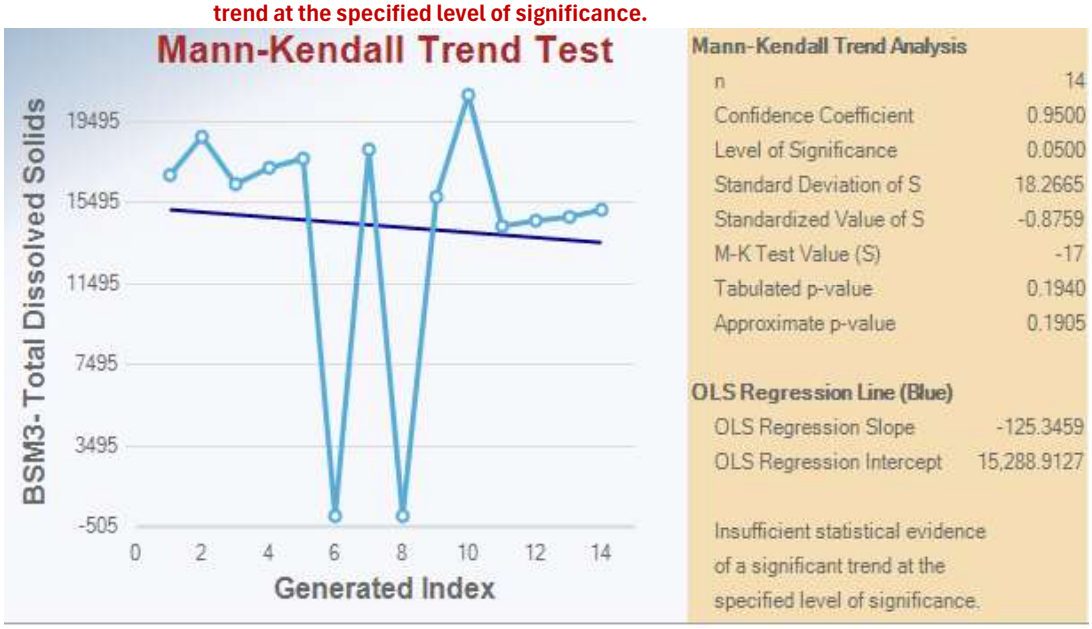
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| From File | 2026_07_Mann Kendall_Input.xls |
| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3- Total Dissolved Solids

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 14 |
| Number Values Reported (n) | 14 |
| Minimum | 16.46 |
| Maximum | 20863 |
| Mean | 14349 |
| Geometric Mean | 6521 |
| Median | 16120 |
| Standard Deviation | 6326 |
| Coefficient of Variation | 0.441 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -17 |
| Tabulated p-value | 0.194 |
| Standard Deviation of S | 18.27 |
| Standardized Value of S | -0.876 |
| Approximate p-value | 0.191 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



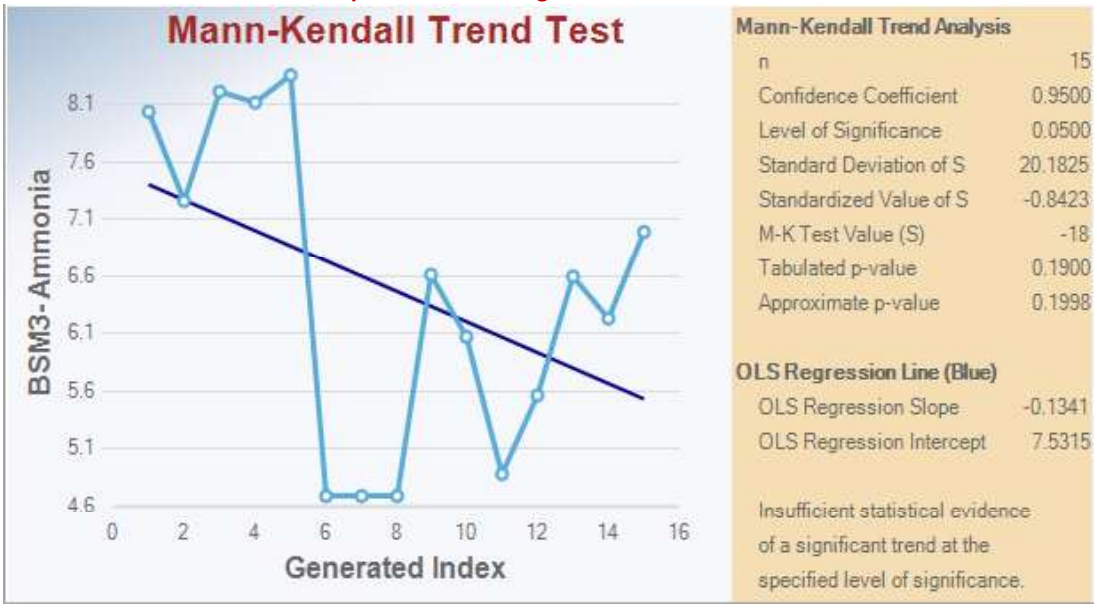
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3- Ammonia

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 15 |
| Number Values Reported (n) | 15 |
| Minimum | 4.68 |
| Maximum | 8.35 |
| Mean | 6.459 |
| Geometric Mean | 6.323 |
| Median | 6.58 |
| Standard Deviation | 1.355 |
| Coefficient of Variation | 0.21 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -18 |
| Tabulated p-value | 0.19 |
| Standard Deviation of S | 20.18 |
| Standardized Value of S | -0.842 |
| Approximate p-value | 0.2 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



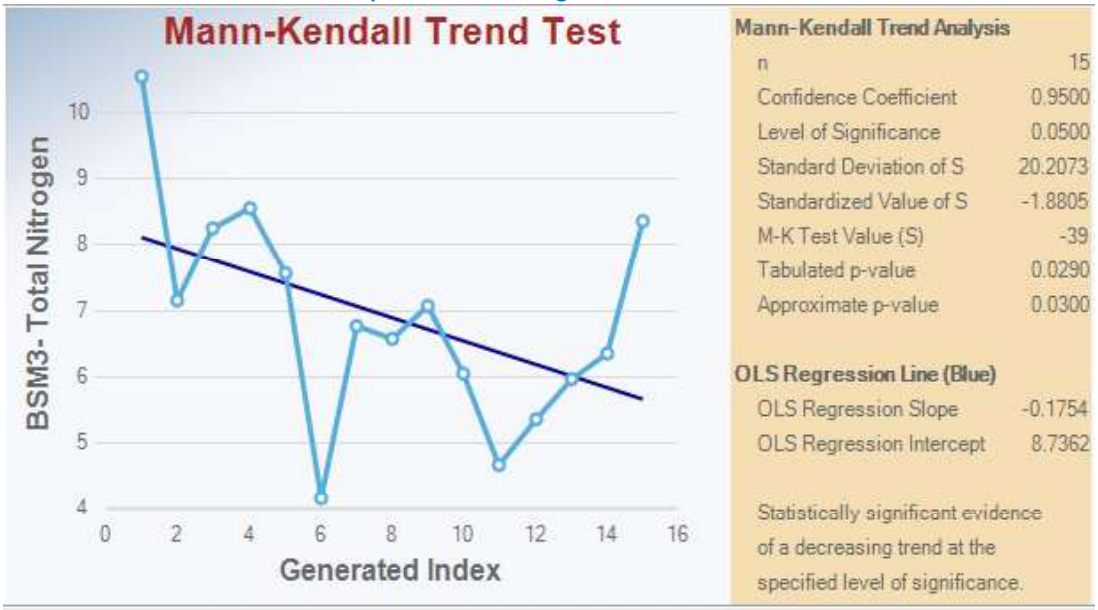
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3- Total Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 15 |
| Number Values Reported (n) | 15 |
| Minimum | 4.6 |
| Maximum | 11 |
| Mean | 7.333 |
| Geometric Mean | 7.163 |
| Median | 7.2 |
| Standard Deviation | 1.638 |
| Coefficient of Variation | 0.223 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -39 |
| Tabulated p-value | 0.029 |
| Standard Deviation of S | 20.21 |
| Standardized Value of S | -1.881 |
| Approximate p-value | 0.03 |

**Statistically significant evidence of a decreasing trend at the specified level of significance.**



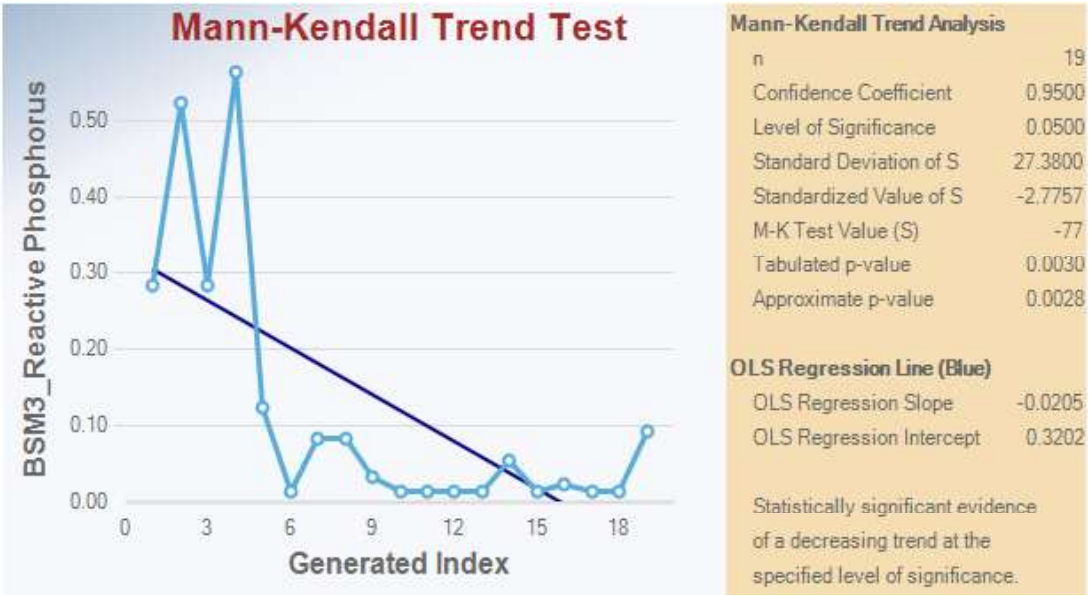
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3_Reactive Phosphorus

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 19 |
| Number Values Reported (n) | 19 |
| Minimum | 0.01 |
| Maximum | 0.56 |
| Mean | 0.115 |
| Geometric Mean | 0.0412 |
| Median | 0.03 |
| Standard Deviation | 0.171 |
| Coefficient of Variation | 1.486 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -77 |
| Tabulated p-value | 0.003 |
| Standard Deviation of S | 27.38 |
| Standardized Value of S | -2.776 |
| Approximate p-value | 0.00275 |

**Statistically significant evidence of a decreasing trend at the specified level of significance.**



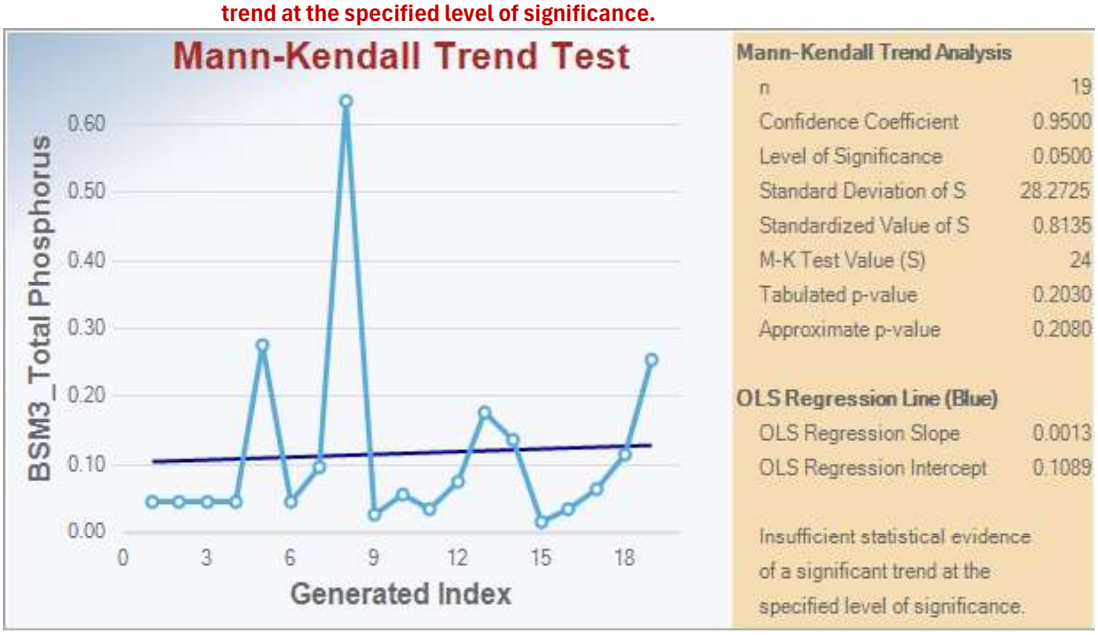
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## BSM3_Total Phosphorus

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 19 |
| Number Values Reported (n) | 19 |
| Minimum | 0.02 |
| Maximum | 0.64 |
| Mean | 0.122 |
| Geometric Mean | 0.0799 |
| Median | 0.06 |
| Standard Deviation | 0.146 |
| Coefficient of Variation | 1.2 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 24 |
| Tabulated p-value | 0.203 |
| Standard Deviation of S | 28.27 |
| Standardized Value of S | 0.814 |
| Approximate p-value | 0.208 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



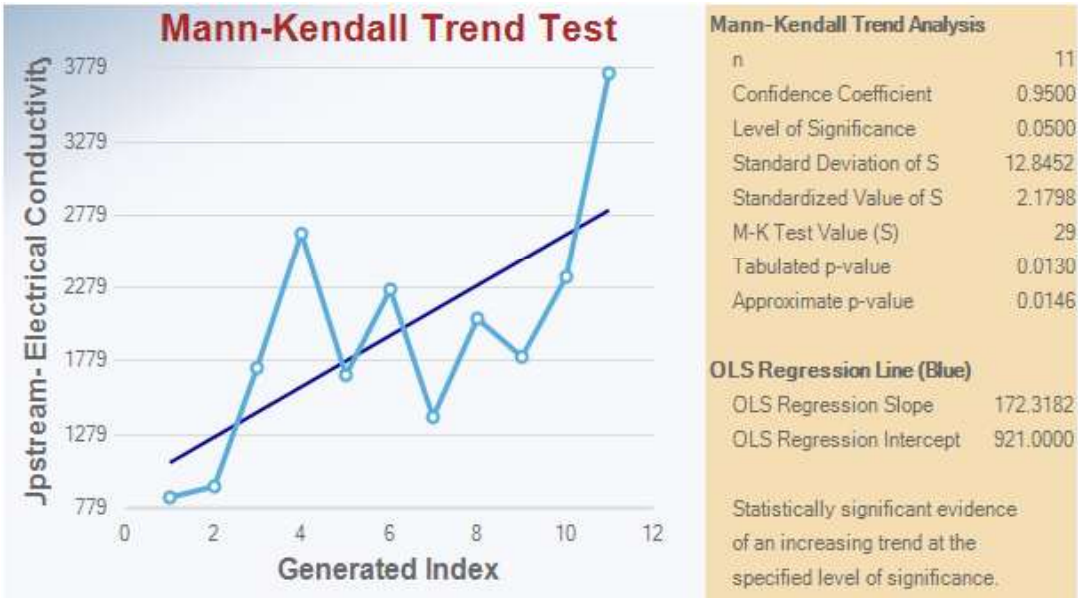
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Upstream- Electrical Conductivity

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 851 |
| Maximum | 3747 |
| Mean | 1955 |
| Geometric Mean | 1800 |
| Median | 1805 |
| Standard Deviation | 817.8 |
| Coefficient of Variation | 0.418 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 29 |
| Tabulated p-value | 0.013 |
| Standard Deviation of S | 12.85 |
| Standardized Value of S | 2.18 |
| Approximate p-value | 0.0146 |

**Statistically significant evidence of an increasing trend at the specified level of significance.**



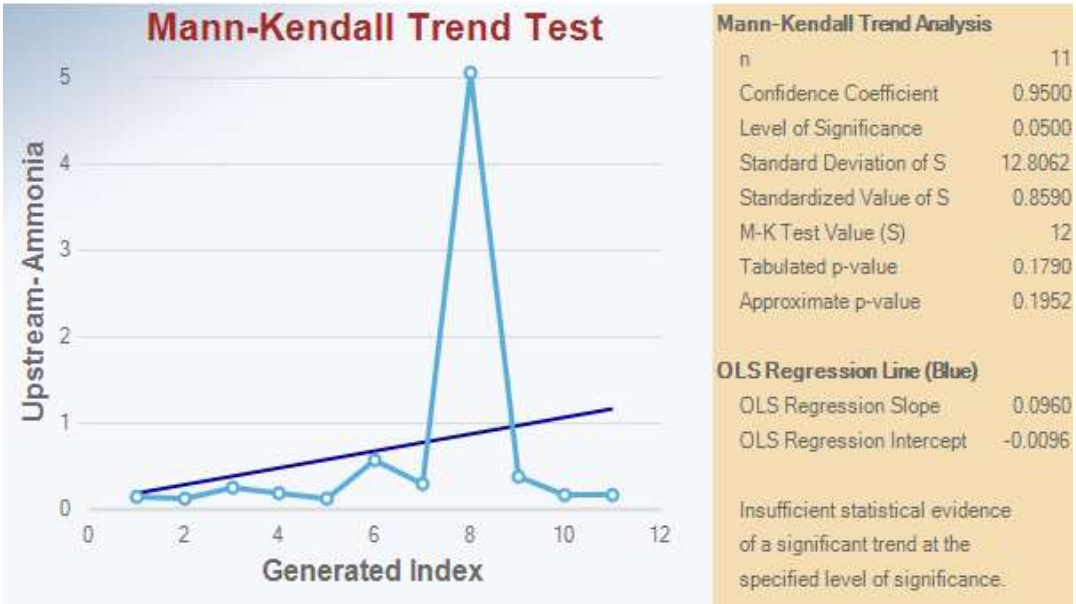
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Upstream- Ammonia

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.01 |
| Maximum | 4.95 |
| Mean | 0.566 |
| Geometric Mean | 0.1 |
| Median | 0.07 |
| Standard Deviation | 1.46 |
| Coefficient of Variation | 2.578 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 12 |
| Tabulated p-value | 0.179 |
| Standard Deviation of S | 12.81 |
| Standardized Value of S | 0.859 |
| Approximate p-value | 0.195 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



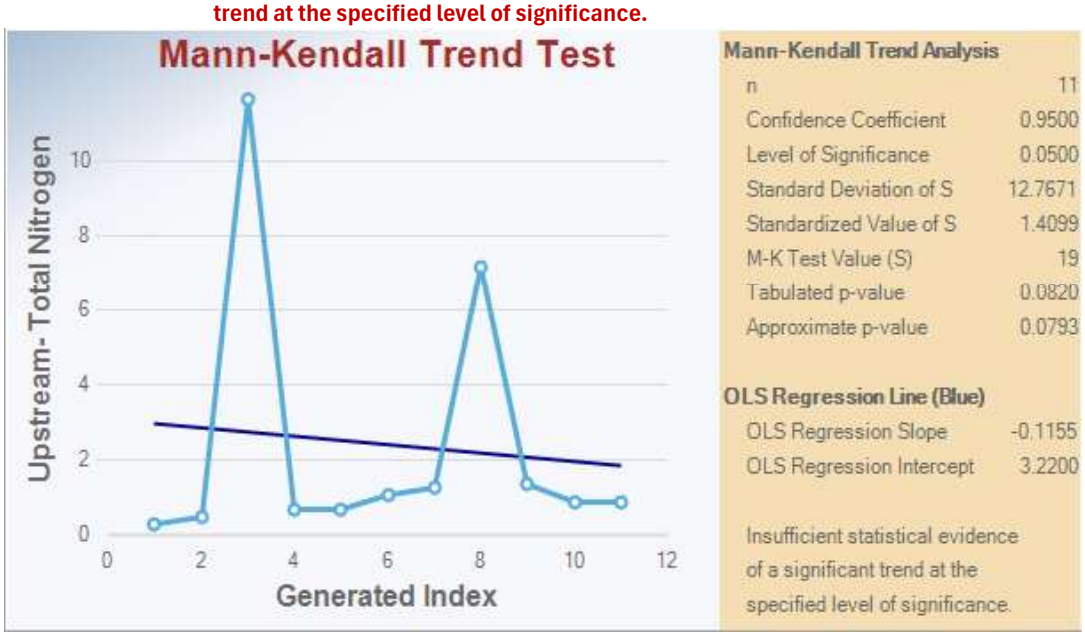
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Upstream- Total Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.4 |
| Maximum | 11.8 |
| Mean | 2.527 |
| Geometric Mean | 1.375 |
| Median | 1 |
| Standard Deviation | 3.629 |
| Coefficient of Variation | 1.436 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 19 |
| Tabulated p-value | 0.082 |
| Standard Deviation of S | 12.77 |
| Standardized Value of S | 1.41 |
| Approximate p-value | 0.0793 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



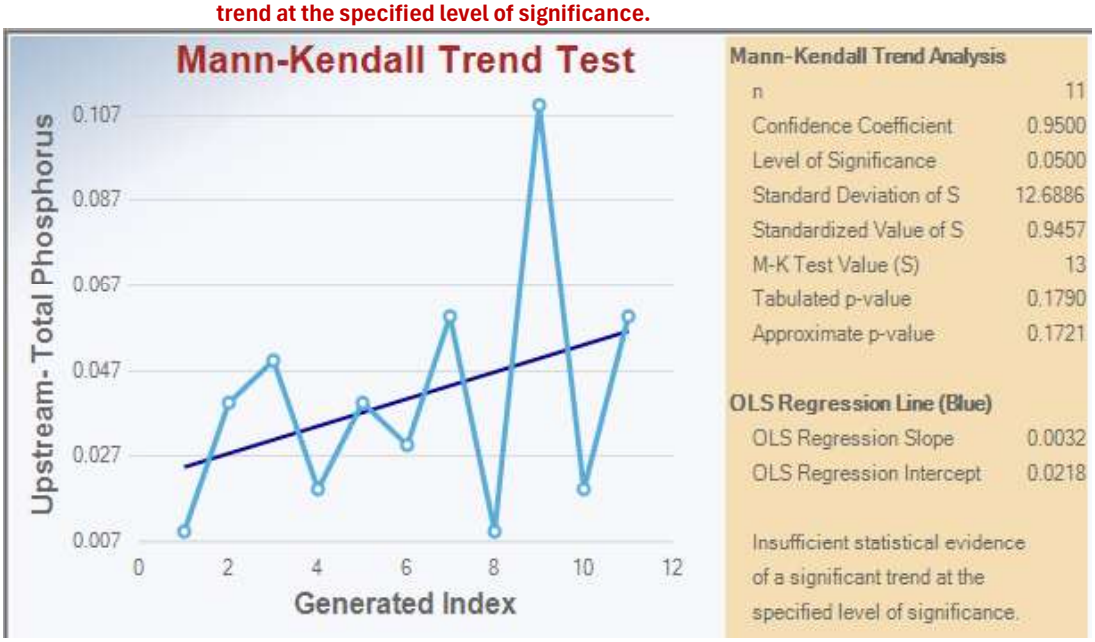
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Upstream- Total Phosphorus

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.01 |
| Maximum | 0.11 |
| Mean | 0.0409 |
| Geometric Mean | 0.0322 |
| Median | 0.04 |
| Standard Deviation | 0.0291 |
| Coefficient of Variation | 0.712 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 13 |
| Tabulated p-value | 0.179 |
| Standard Deviation of S | 12.69 |
| Standardized Value of S | 0.946 |
| Approximate p-value | 0.172 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



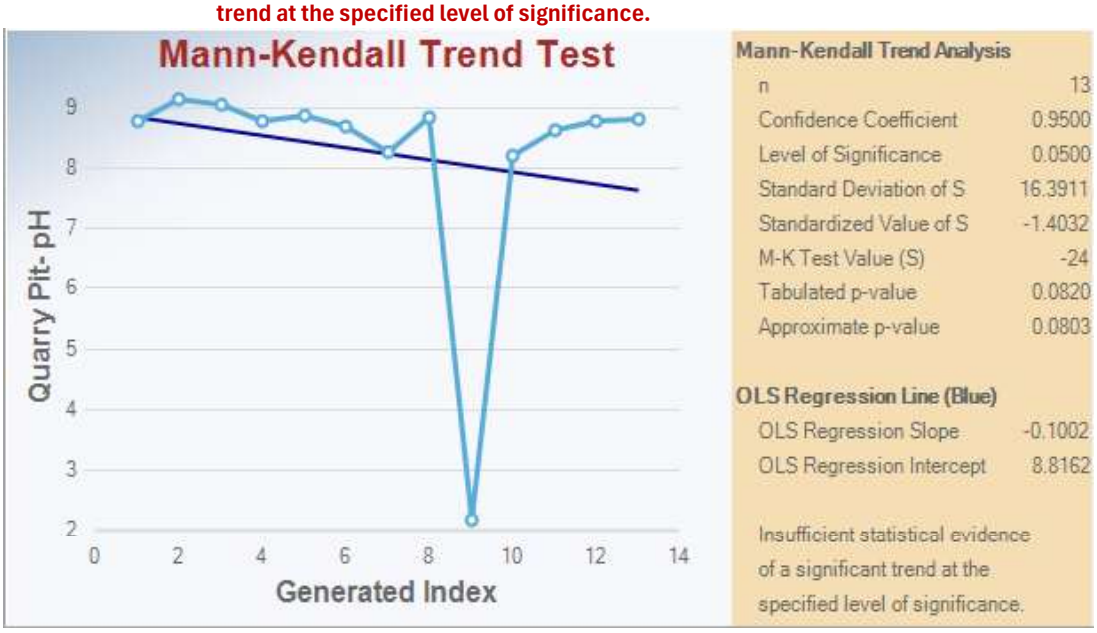
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| From File | 2026_07_Mann Kendall_Input.xls |
| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- pH

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 13 |
| Number Values Reported (n) | 13 |
| Minimum | 2.05 |
| Maximum | 9.03 |
| Mean | 8.115 |
| Geometric Mean | 7.715 |
| Median | 8.66 |
| Standard Deviation | 1.841 |
| Coefficient of Variation | 0.227 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | -24 |
| Tabulated p-value | 0.082 |
| Standard Deviation of S | 16.39 |
| Standardized Value of S | -1.403 |
| Approximate p-value | 0.0803 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



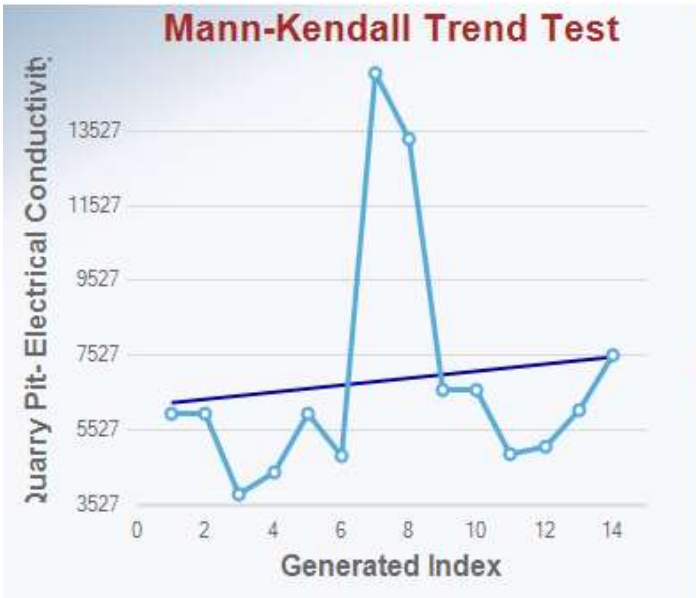
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Electrical Conductivity

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 14 |
| Number Values Reported (n) | 14 |
| Minimum | 3810 |
| Maximum | 15116 |
| Mean | 6872 |
| Geometric Mean | 6349 |
| Median | 5980 |
| Standard Deviation | 3283 |
| Coefficient of Variation | 0.478 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 21 |
| Tabulated p-value | 0.14 |
| Standard Deviation of S | 18.27 |
| Standardized Value of S | 1.095 |
| Approximate p-value | 0.137 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**




| Mann-Kendall Trend Analysis | |
|---|---|
| n | 14 |
| Confidence Coefficient | 0.9500 |
| Level of Significance | 0.0500 |
| Standard Deviation of S | 18.2665 |
| Standardized Value of S | 1.0949 |
| M-K Test Value (S) | 21 |
| Tabulated p-value | 0.1400 |
| Approximate p-value | 0.1368 |
| **OLS Regression Line (Blue)** | |
| OLS Regression Slope | 94.9758 |
| OLS Regression Intercept | 6,159.2527 |

Insufficient statistical evidence of a significant trend at the specified level of significance.

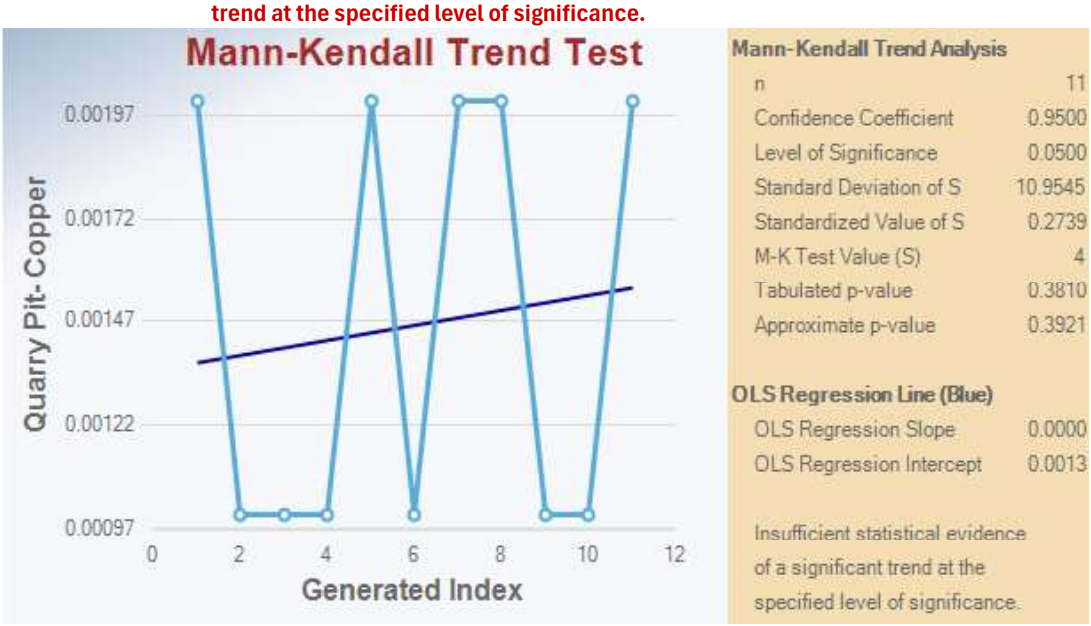
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Copper

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.001 |
| Maximum | 0.002 |
| Mean | 0.00145 |
| Geometric Mean | 0.00137 |
| Median | 0.001 |
| Standard Deviation | 5.22E-04 |
| Coefficient of Variation | 0.359 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 4 |
| Tabulated p-value | 0.381 |
| Standard Deviation of S | 10.95 |
| Standardized Value of S | 0.274 |
| Approximate p-value | 0.392 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



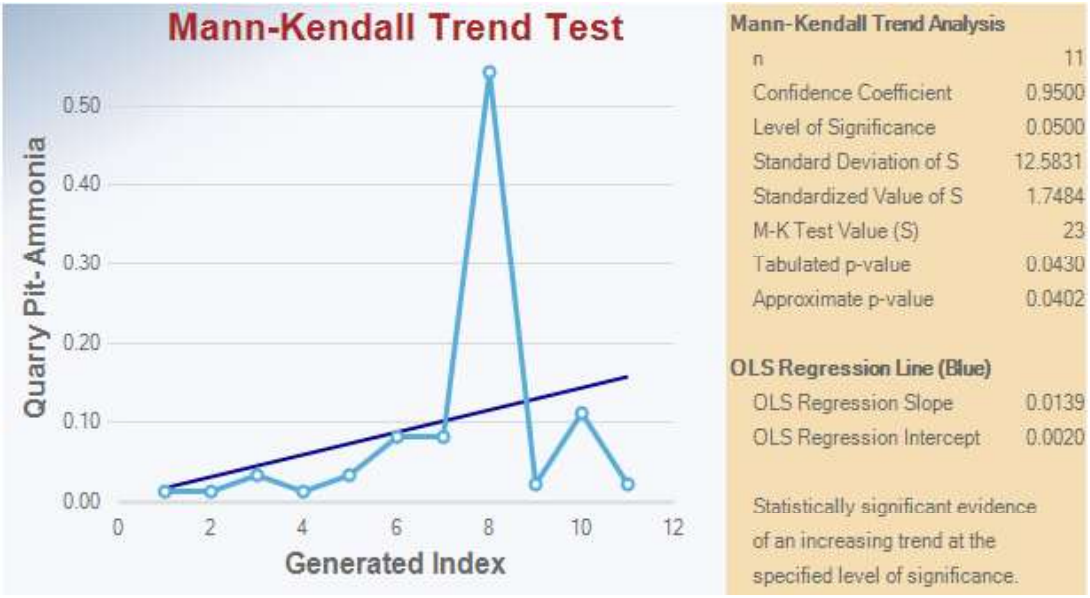
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Ammonia

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.01 |
| Maximum | 0.54 |
| Mean | 0.0855 |
| Geometric Mean | 0.0361 |
| Median | 0.03 |
| Standard Deviation | 0.155 |
| Coefficient of Variation | 1.809 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 23 |
| Tabulated p-value | 0.043 |
| Standard Deviation of S | 12.58 |
| Standardized Value of S | 1.748 |
| Approximate p-value | 0.0402 |

**Statistically significant evidence of an increasing trend at the specified level of significance.**



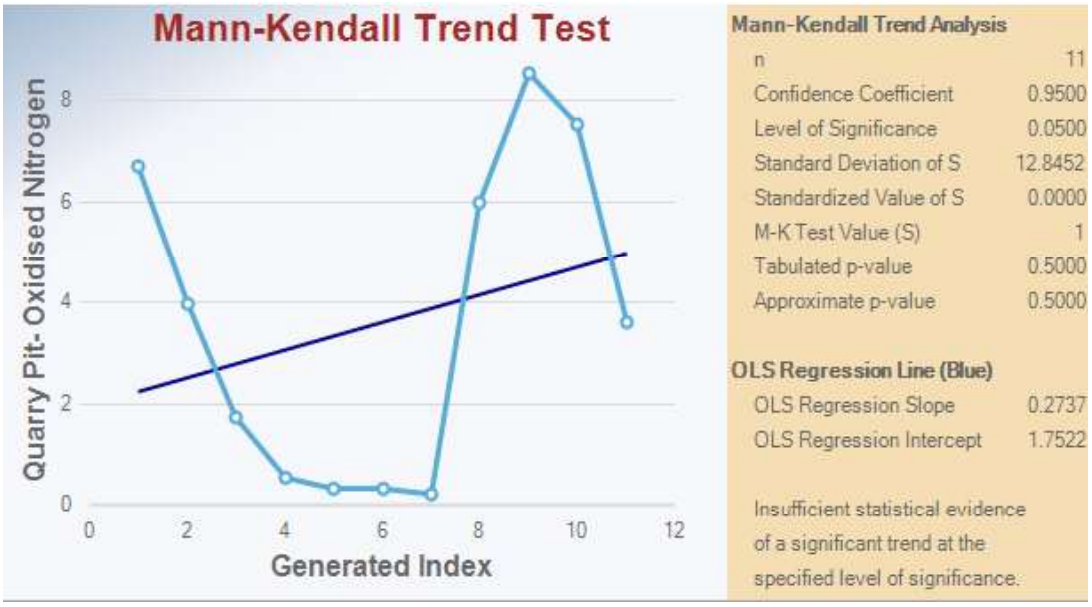
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Oxidised Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.01 |
| Maximum | 8.36 |
| Mean | 3.395 |
| Geometric Mean | 1.092 |
| Median | 3.42 |
| Standard Deviation | 3.183 |
| Coefficient of Variation | 0.938 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 1 |
| Tabulated p-value | 0.5 |
| Standard Deviation of S | 12.85 |
| Standardized Value of S | 0 |
| Approximate p-value | 0.5 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



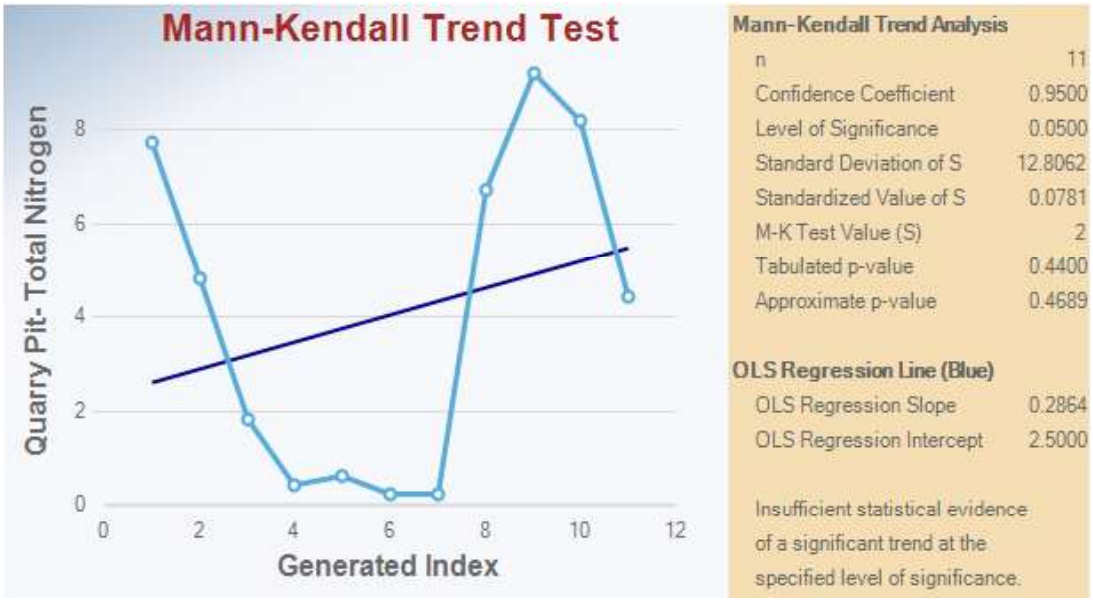
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Total Nitrogen

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.4 |
| Maximum | 9.4 |
| Mean | 4.218 |
| Geometric Mean | 2.4 |
| Median | 4.6 |
| Standard Deviation | 3.531 |
| Coefficient of Variation | 0.837 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 2 |
| Tabulated p-value | 0.44 |
| Standard Deviation of S | 12.81 |
| Standardized Value of S | 0.0781 |
| Approximate p-value | 0.469 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



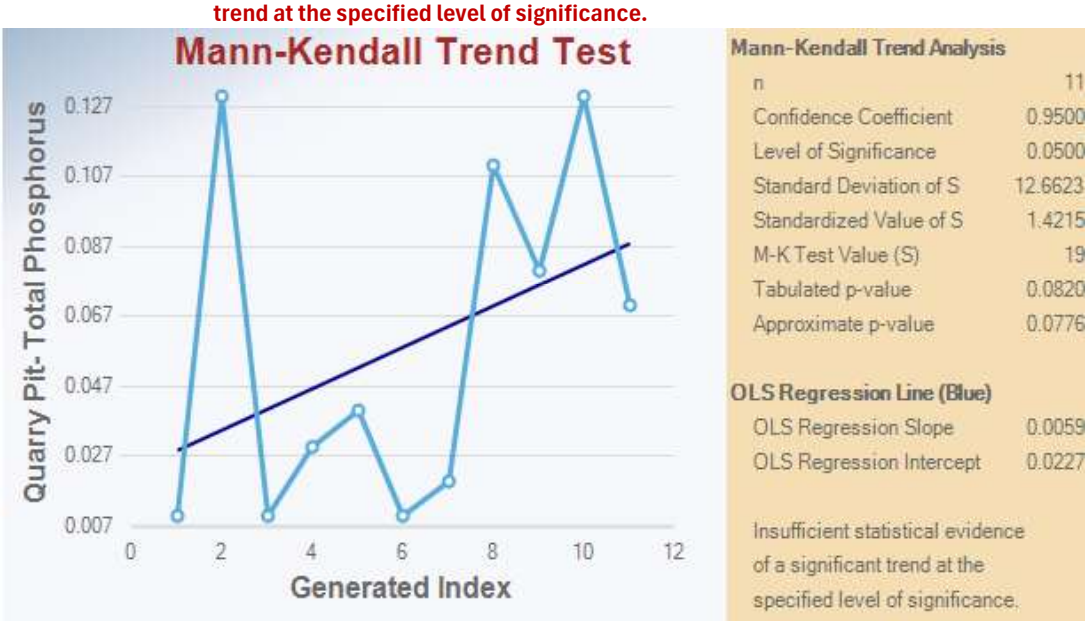
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| Full Precision | OFF |
| Confidence Coefficient | 0.95 |
| Level of Significance | 0.05 |

## Quarry Pit- Total Phosphorus

| General Statistics | |
|---|---|
| Number or Reported Events Not Used | 0 |
| Number of Generated Events | 11 |
| Number Values Reported (n) | 11 |
| Minimum | 0.01 |
| Maximum | 0.13 |
| Mean | 0.0582 |
| Geometric Mean | 0.0382 |
| Median | 0.04 |
| Standard Deviation | 0.0481 |
| Coefficient of Variation | 0.827 |

| Mann-Kendall Test | |
|---|---|
| M-K Test Value (S) | 19 |
| Tabulated p-value | 0.082 |
| Standard Deviation of S | 12.66 |
| Standardized Value of S | 1.422 |
| Approximate p-value | 0.0776 |

**Insufficient evidence to identify a significant trend at the specified level of significance.**



# E240981_RP11_WMP_monitoring_v1

Final Audit Report 2026-07-16

| | |
|---|---|
| Created: | 2026-07-16 |
| By: | Natalie Addison (naddison@emmconsulting.com.au) |
| Status: | Signed |
| Transaction ID: | CBJCHBCAABAAEQdv8WEljnjhtwFBxS8FHJTI-w3yjVSj |

## "E240981_RP11_WMP_monitoring_v1" History

Document created by Natalie Addison (naddison@emmconsulting.com.au)
2026-07-16 - 6:11:15 AM GMT

Document emailed to tcoupe@emmconsulting.com.au for signature
2026-07-16 - 6:12:36 AM GMT

Email viewed by tcoupe@emmconsulting.com.au
2026-07-16 - 8:05:58 AM GMT

Signer tcoupe@emmconsulting.com.au entered name at signing as Tasman Coupe
2026-07-16 - 8:07:31 AM GMT

Document e-signed by Tasman Coupe (tcoupe@emmconsulting.com.au)
Signature Date: 2026-07-16 - 8:07:33 AM GMT - Time Source: server - Signature Appearance Selected: IMAGE

Agreement completed.
2026-07-16 - 8:07:33 AM GMT

Adobe Acrobat Sign

# **Appendix D** – Water Balance Report

Level 3 175 Scott Street
Newcastle NSW 2300
ABN: 28 141 736 558

02 4907 4800

www.emmconsulting.com.au

24 September 2026

Luddenham Operations Pty Ltd
275 Adams Road
Luddenham, NSW, 2745

**Re: Annual water balance review 2025-2026**

Luddenham Quarry is located at 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, 'the site') within the Liverpool City Council municipality. The existing shale/clay quarry is approved by State significant development (SSD) consent DA 315-7-2003, issued by the Minister for Planning under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The site is owned by CFT No 13 Pty Ltd, a member of the Coombes Property Group (CPG).

Luddenham Operations Pty Ltd (Luddenham Operations) is operating the quarry in accordance with Modification 5 (MOD 5) of DA 315-7-2003 which was granted on 24 May 2021.

This letter outlines water balance modelling undertaken by EMM Consulting Pty Ltd (EMM) to support the annual review for Luddenham Quarry, for the period of 1 September 2025 to 31 August 2026.

# 1 Background

Quarrying activities at Luddenham Quarry ceased on 31 December 2024. During the annual review period, activities have included the ongoing removal of existing stockpiled materials and quarry rehabilitation activities.

The construction of the Luddenham Advanced Resource Recovery Facility (ARRC), approved under SSD-10446, commenced on 1 May 2025 to the north of the quarry void and was ongoing throughout the annual review period. The building footprint was completed in June 2026. The water management dam was used as a sediment dam for the initial stages of the ARRC construction in May and June 2025; however, all catchments for the ARRC project during the annual review period were managed in a water management system separate from Luddenham Quarry.

# 2 Methodology and data

The site water balance model that was developed for the Luddenham Quarry MOD5 approval (EMM 2020) was updated to assess the water management system during the annual review period. The following sections outline the model updates.

## 2.1 GoldSim representation

The water balance model was developed in GoldSim version 14. The model was created by representing the water cycle as a series of elements, each containing pre-set rules and data, that were linked together to simulate the interaction of these elements over the annual review period from 1 September 2025 to 31 August 2026.

To undertake the modelling, the following simplifications and assumptions were made:

- No pumped water transfers between the water management dam and the quarry pit were applied to the model, as advised by Luddenham Operations.
- A simulation reporting timeframe was set as the same as the annual review period. A 'warm-up' period of climate data was applied to the rainfall-runoff model ahead of the simulation reporting timeframe to ensure the hydrological model stores were representative of antecedent conditions. The model used the initial water levels in the water management dam and quarry pit based on the results of the 2024–2025 annual water balance. The model initialisation was validated against aerial imagery available for the site in September 2025.
- A dust suppression timeseries was applied to the model based on information provided by Luddenham Operations and their contractors. A total of 3.5 ML was applied from the quarry pit estimated from 1 September 2025 to 31 August 2026.
- Controlled water discharges occurred from the water management dam over the period and totalled an estimated 5.2 ML based on data provided by Luddenham Operations. Monthly release estimates were provided by Luddenham Operations that were assumed as a daily average.
- Construction of the ARRC commenced on 1 May 2025. The water management dam was used as a sediment basin for the initial stages of the construction during May and June 2025. A dedicated sediment basin for the ARRC site was constructed in July 2025, and since that time no water from the construction site has drained to the water management dam. The ARRC construction has been occurring throughout the annual review period; however, no change in catchments for the water management system have been assumed.

## 2.2 Data

### 2.2.1 Climatic data

Daily rainfall and evaporation data from Bureau of Meteorology's Badgerys Creek AWS weather station (station number 67108) was adopted for the water balance model simulation period.

### 2.2.2 Rainfall-runoff model

Surface runoff was estimated using the Australian Water Balance Model (AWBM). The AWBM was developed by Boughton (2004) and is widely used across Australia to estimate runoff. The hydrological model calculates runoff and baseflow components from rainfall after allowing for relevant losses and storage. The AWBM was incorporated into the GoldSim water balance model for the site.

For each surface type present on site, the AWBM was parameterised to achieve long-term average volumetric runoff coefficients (Cv) based on typical values. The assumed catchment breakdown and Cv applied to each surface type are provided in Table 2.1.

**Table 2.1 Catchment runoff parameters**

| Surface type | Management areas | Area (ha) | Cv |
|---|---|---|---|
| Impervious – high runoff potential | Roofs, weighbridge, sealed roads | 0.8 | 0.9 |
| Disturbed – moderate runoff potential | Unsealed roads, stockpiles | 9.8 | 0.6 |
| Pasture – low runoff potential | Grassed catchments, vegetated bunds | 2.7 | 0.4 |

### 2.2.3 Groundwater inflows

The predicted quantity of groundwater to be intercepted by the quarry pit was assumed to be a constant 5 $m^3$/day, based on the original groundwater assessment undertaken for the quarry (Douglas Nicolaisen and Associates 2003).

# 3 Water balance results

The water management system for Luddenham Quarry was modelled from 1 September 2025 to 31 August 2026. The estimated values for each of the inputs and outputs of the water management system for the annual review period are provided in Figure 3.1. A summary of the estimated annual inputs and outputs of the water management system is presented in Table 3.1. Total results have been rounded to 0.1 megalitres per year (ML/year).

As shown in Table 3.1, there was a predicted a net increase of water stored within the quarry pit and decrease in water stored in the water management dam over the annual review period, which is consistent with anecdotal information and site observations made at the beginning and end of the period. There were no uncontrolled discharges modelled from the water management dam into Oaky Creek during the annual review period, which is consistent with site observations.

**Table 3.1 Summary of site water balance**

| Water management element | Volume (ML) |
|---|---|
| **Inputs** | |
| Groundwater inflows | 1.8 |
| Rainfall | 8.5 |
| Catchment runoff | 9.4 |
| **Total inputs** | **19.7** |
| **Outputs** | |
| Dust suppression | 3.5 |
| Evaporation | 13.9 |
| Controlled discharges | 5.2 |
| **Total outputs** | **22.6** |
| **Change in storage** | |
| Quarry pit | -2.8 |
| Water management dam | -0.1 |
| **Total change in storage** | **-2.9** |
| **Balance** | **0** |

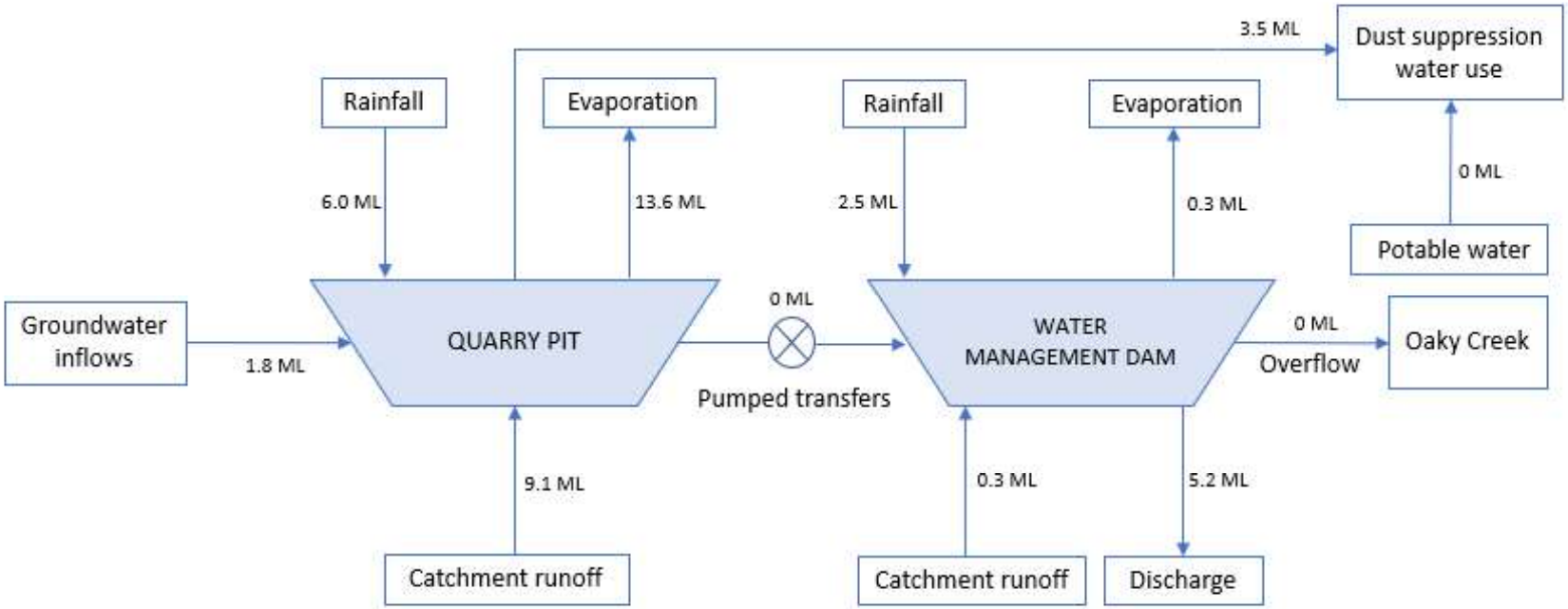
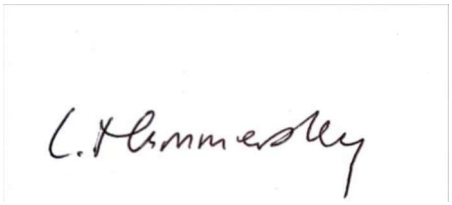



**Figure 3.1** **Water balance schematic with results**

Yours sincerely,



**Lachlan Hammersley**
Senior Associate Water Resources Engineer
lhammersley@emmconsulting.com.au

# References

Boughton, W. 2004, 'The Australian water balance model', *Environmental Modelling & Software*, vol. 19, no. 10, pp. 943–950

Douglas Nicolaisen and Associates 2003, *EIS for Badger Mining Company Pty Ltd, Proposed Clay/Shale Quarry, Lot 3 – 275 Adams Road Luddenham NSW*, prepared for Badger Mining Company Pty Ltd

EMM 2020, Luddenham Quarry – *Modification 5: Surface Water Assessment*, prepared by EMM Consulting Pty Limited for Coombes Property Group and KLF Holdings Pty Ltd.

# **Appendix E** – Air Quality Monitoring Reports

# LUDDENHAM QUARRY

# DUST DEPOSIIOTN MONITORING REPORT FOR DECEMBER 2025 – FEBRUARY 2026

16 MARCH 2026

# Luddenham Quarry
# Dust Deposition Monitoring Report
# December 2025 – February 2026

Luddenham Operations Pty Ltd

## REVISIONS

| Revision | Date | Prepared by | Reviewed by | Revision Comments |
|---|---|---|---|---|
| 1 | 27 March 2026 | Elena Ivanova | Pascal Bobillier | Final |
| | | | | |

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# 1 INTRODUCTION

## 1.1 Overview

Luddenham Operations Pty Ltd operates the shale/clay quarry (the site) under the Environmental Protection Licence (EPL) 21562. The site is located at 275 Adams Road, Luddenham, NSW.

Quarry extraction activities ceased in December 2024, and no mining activities have been undertaken at the quarry site since then. The site is currently being rehabilitated in accordance with the approved Site Rehabilitation Plan, which includes the relocation and removing of overburden and shale stockpiles.

Immediately to the north of the quarry is a construction site occupying approximately 3 hectares of the total site area (Lot 3, DP 623799). Construction activities are being carried out under SSD-10446. Development consent was granted to Coombes Property Group (CPG) to construct and operate a resource recovery facility. Once fully operational, this facility will be permitted to receive and process up to 600,000 tonnes per annum (TPA) of construction and demolition waste, as well as commercial and industrial waste (general solid waste (non-putrescible)).

The air quality monitoring network for the quarry consists of three dust deposition gauges installed, operated and analysed in accordance with AS 3580. 10. 1 2003. Static dust monitoring sites were chosen at locations adjacent to sensitive receivers in close proximity to the works, in accordance with the approved Quarry Air Quality Management Plan (AQMP).

The indicative air quality monitoring locations are shown in Figure 1-1.

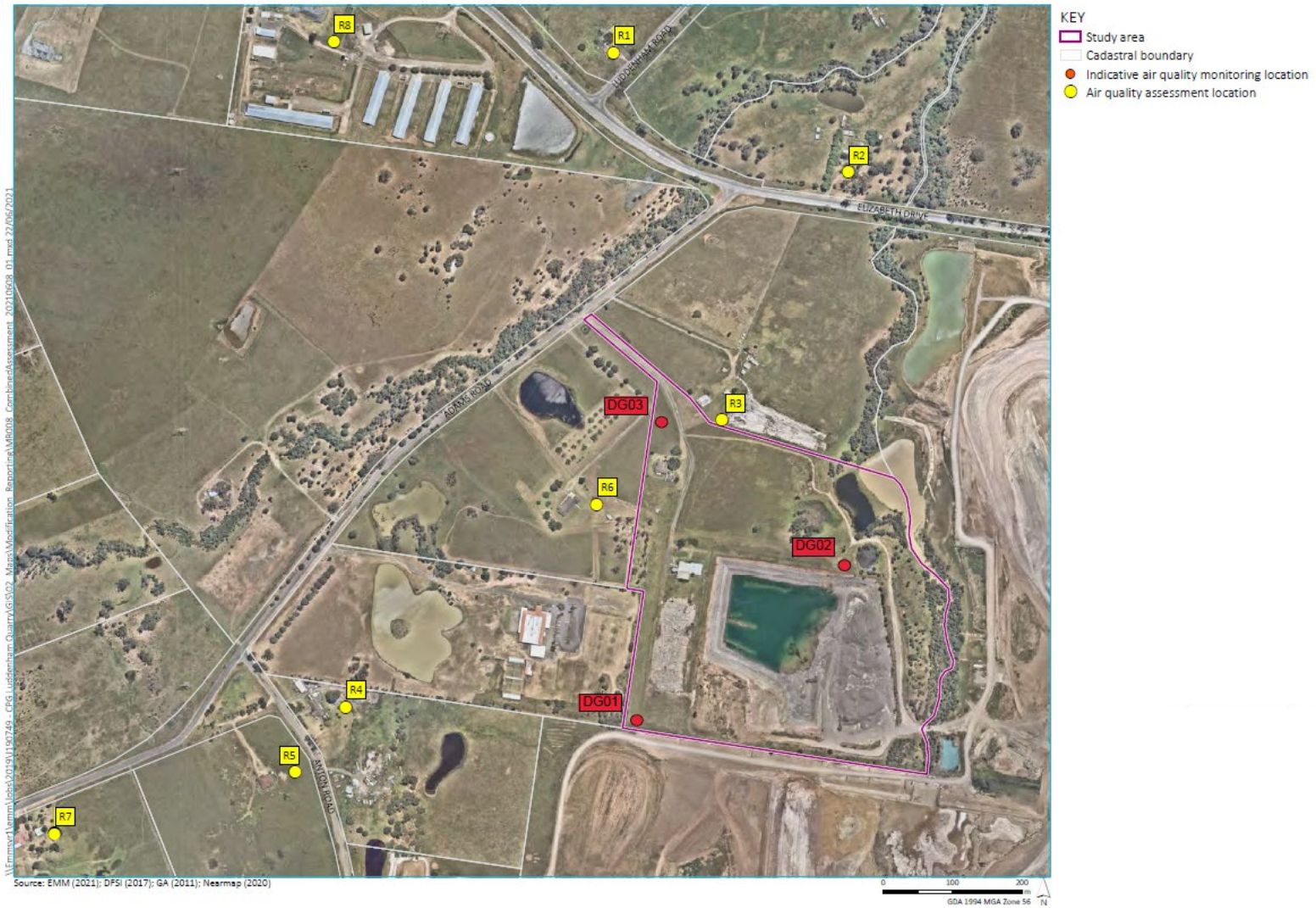



*Figure 1-1: Site dust deposition monitoring location*

# 2 METHODOLOGY

Dust gauges have been installed in accordance with the requirements *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2022) and *AS 3580. 10. 1 2016*.

Dust deposition monitoring will continue to be conducted during periods of active operations (e.g. rehabilitation activities). In accordance with *AS 3580.10.1:2016*, monitoring will be undertaken for a minimum of one (1) month per year during active periods. Samples will be collected and sent to a NATA-accredited laboratory for analysis. Monitoring will not be carried out during inactive periods, unless deemed necessary by CPG. When required, samples will be collected on a monthly basis (every 30 days ± 2 days).

The dust deposition method involves the passive collection of dust via a funnel and bottle arrangement. This method measures the rate of dust deposition by capturing insoluble solids, the portion of deposited matter that does not dissolve in water.

Insoluble solids are the criterion by which dust deposition is measured by the NSW EPA. This metric is considered the most representative of dust components generated by earthworks and construction activities, such as soil and weathered rock.

The applicable dust deposition criteria, as outlined in the Air Quality Management Plan (AQMP), are provided in Table 2-1 below.

*Table 2-1: Deposited dust limits*

| Pollutant | Averaging Period | Impact | Criteria |
|---|---|---|---|
| Deposited Dust Gauge (DDG) | Annual | Total | 4g/m²/month |
| | Annual | Incremental | 2g/m²/month |

# 3 RESULTS

Results from the dust monitoring events conducted in December 20205, January and February 2026 are summarised in Table 3-1 below. The corresponding laboratory analysis reports for this monitoring event are provided in Appendix A of this report.

*Table 3-1: Dust Monitoring results*

| Period | g/m²/month | | | Comments |
|---|---|---|---|---|
| | DG01 | DG02 | DG03 | |
| 18/11/2025-06/01/2026[1] | 1.2 | **2.6** | 1.8 | Only existing stockpiled materials were moved during the monitoring period. No mining activities were undertaken. |
| 06/01/2026-03/02/2026 | 1.2 | 0.4 | 0.5 | |
| 03/02/2026-03/03/2026 | 1.2 | 1.2 | **2.8** | |

**Note:**

1. The December 2025 sample exposure period is outside the typical exposure period of 30 +/- 2 days as per *AS3580.10.1/AS3580.10.2* due to the Christmas period.

*Table 3-2: Annual rolling dust averages monitoring results*

| Criteria | g/m²/month | | | Comments |
|---|---|---|---|---|
| | DG01 | DG02 | DG03 | |
| Annual Rolling Average | 1.2 | 1.4 | 1.7 | The levels of deposited matter were recorded below the total maximum of annual average limits (4g/m²/month) at all monitoring locations |

Figure 3-1 below shows monthly dust deposition results and the rolling annual average for each monitoring location.

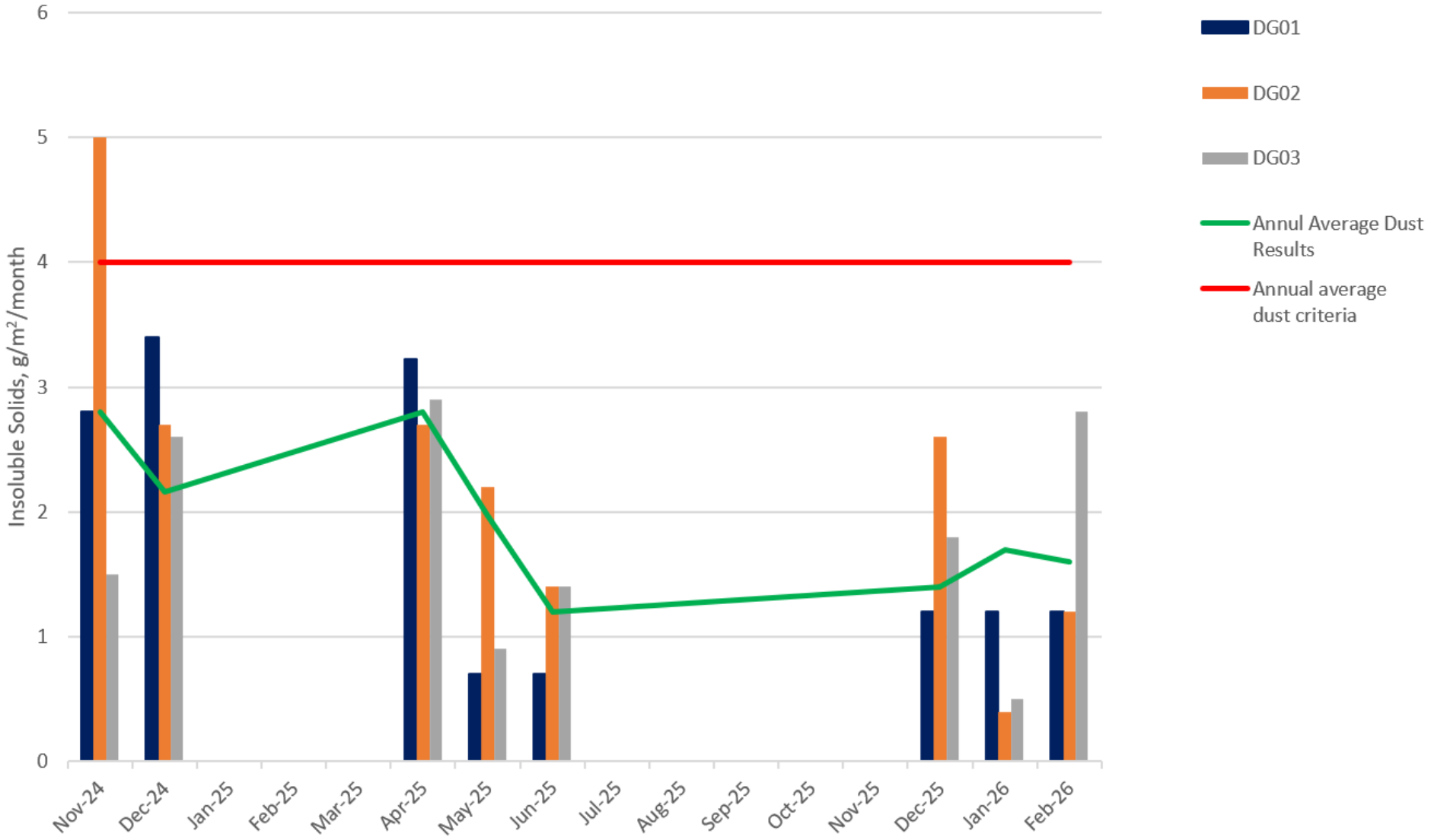



*Figure 3-1: Annual rolling dust averages monitoring results*

# **Appendix A** – Laboratory Analysis Reports

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EN2600205** | Page | : 1 of 3 |
| Client | : **LUDDENHAM OPERATIONS PTY LTD** | Laboratory | : Environmental Division Newcastle |
| Contact | : ELENA IVANOVA | Contact | : |
| Address | : LEVEL 5, 2 GROSVENOR STREET<br>BONDI JUNCTION 2022 | Address | : 5/585 Maitland Road Mayfield West NSW Australia 2304 |
| Telephone | : ---- | Telephone | : +61 2 4014 2500 |
| Project | : ---- | Date Samples Received | : 06-Jan-2026 17:00 |
| Order number | : ---- | Date Analysis Commenced | : 08-Jan-2026 |
| C-O-C number | : ---- | Issue Date | : 19-Jan-2026 15:24 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : EN/333 | | |
| No. of samples received | : 3 | | |
| No. of samples analysed | : 3 | | |

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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

**Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.**

## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Shane Merrell | Laboratory Technician | Newcastle - Inorganics, Mayfield West, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Dust analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in deposition units e.g., g/m².mth where the sampling procedure is not NATA accredited.
- Sample exposure period is outside the typical exposure period of 30 +/- 2 days as per AS3580.10.1/AS3580.10.2
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

## Analytical Results

| Sub-Matrix: DEPOSITIONAL DUST (Matrix: AIR) | | | | Sample ID | DG01 18/11/25 06/01/26 | DG02 18/11/25 06/01/26 | DG03 18/11/25 06/01/26 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 06-Jan-2026 00:00 | 06-Jan-2026 00:00 | 06-Jan-2026 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EN2600205-001 | EN2600205-002 | EN2600205-003 | -------- | -------- |
| | | | | | Result | Result | Result | ---- | ---- |
| **EA120: Ash Content** | | | | | | | | | |
| Ash Content | ---- | 0.1 | g/m².month | | **0.9** | **1.1** | **1.2** | **----** | **----** |
| Ash Content (mg) | ---- | 2 | mg | | **25** | **33** | **34** | **----** | **----** |
| **EA125: Combustible Matter** | | | | | | | | | |
| Combustible Matter | ---- | 0.1 | g/m².month | | **0.3** | **1.5** | **0.6** | **----** | **----** |
| Combustible Matter (mg) | ---- | 2 | mg | | **11** | **43** | **17** | **----** | **----** |
| **EA139: Total Soluble Matter** | | | | | | | | | |
| Total Soluble Matter | ---- | 0.1 | g/m².month | | **0.8** | **3.2** | **0.6** | **----** | **----** |
| Total Soluble Matter (mg) | ---- | 2 | mg | | **22** | **91** | **18** | **----** | **----** |
| **EA141: Total Insoluble Matter** | | | | | | | | | |
| Total Insoluble Matter | ---- | 0.1 | g/m².month | | **1.2** | **2.6** | **1.8** | **----** | **----** |
| Total Insoluble Matter (mg) | ---- | 2 | mg | | **36** | **76** | **51** | **----** | **----** |
| **EA142: Total Solids** | | | | | | | | | |
| Total Solids | ---- | 0.1 | g/m².month | | **2.0** | **5.8** | **2.4** | **----** | **----** |
| Total Solids (mg) | ---- | 2 | mg | | **58** | **167** | **69** | **----** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EN2601749** | Page | : 1 of 3 |
| Client | : **LUDDENHAM OPERATIONS PTY LTD** | Laboratory | : Environmental Division Newcastle |
| Contact | : ELENA IVANOVA | Contact | : |
| Address | : LEVEL 5, 2 GROSVENOR STREET<br>BONDI JUNCTION 2022 | Address | : 5/585 Maitland Road Mayfield West NSW Australia 2304 |
| Telephone | : ---- | Telephone | : +61 2 4014 2500 |
| Project | : ---- | Date Samples Received | : 03-Feb-2026 18:05 |
| Order number | : ---- | Date Analysis Commenced | : 10-Feb-2026 |
| C-O-C number | : ---- | Issue Date | : 11-Mar-2026 12:20 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : EN/333 | | |
| No. of samples received | : 3 | | |
| No. of samples analysed | : 3 | | |

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| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Shane Merrell | Laboratory Technician | Newcastle - Inorganics, Mayfield West, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Dust analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in deposition units e.g., g/m².mth where the sampling procedure is not NATA accredited.
- The dust gauges for all samples were full when received by the laboratory. They may have overflowed in the field. Results for these gauges are thus reported on an 'as received' basis. No algaecide correction has been applied to EA139 Soluble Matter or EA142 Total Solids results (where applicable).
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

## Analytical Results

| Sub-Matrix: DEPOSITIONAL DUST (Matrix: AIR) | | | | Sample ID | DG01 06/01/26 - 03/02/26 | DG02 06/01/26 - 03/02/26 | DG03 06/01/26 - 03/02/26 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 03-Feb-2026 00:00 | 03-Feb-2026 00:00 | 03-Feb-2026 00:00 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EN2601749-001 | EN2601749-002 | EN2601749-003 | -------- | -------- |
| | | | | | Result | Result | Result | ---- | ---- |
| **EA120: Ash Content** | | | | | | | | | |
| Ash Content | ---- | 0.1 | g/m².month | | **0.7** | **0.4** | **0.5** | **----** | **----** |
| Ash Content (mg) | ---- | 2 | mg | | **11** | **7** | **9** | **----** | **----** |
| **EA125: Combustible Matter** | | | | | | | | | |
| Combustible Matter | ---- | 0.1 | g/m².month | | **0.5** | <0.1 | <0.1 | **----** | **----** |
| Combustible Matter (mg) | ---- | 2 | mg | | **8** | <2 | <2 | **----** | **----** |
| **EA139: Total Soluble Matter** | | | | | | | | | |
| Total Soluble Matter | ---- | 0.1 | g/m².month | | **5.3** | **3.0** | **4.9** | **----** | **----** |
| Total Soluble Matter (mg) | ---- | 2 | mg | | **88** | **49** | **80** | **----** | **----** |
| **EA141: Total Insoluble Matter** | | | | | | | | | |
| Total Insoluble Matter | ---- | 0.1 | g/m².month | | **1.2** | **0.4** | **0.5** | **----** | **----** |
| Total Insoluble Matter (mg) | ---- | 2 | mg | | **19** | **7** | **9** | **----** | **----** |
| **EA142: Total Solids** | | | | | | | | | |
| Total Solids | ---- | 0.1 | g/m².month | | **6.5** | **3.4** | **5.4** | **----** | **----** |
| Total Solids (mg) | ---- | 2 | mg | | **107** | **56** | **89** | **----** | **----** |

# CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| **Work Order** | : **EN2603471** | Page | : 1 of 3 |
| Client | : **LUDDENHAM OPERATIONS PTY LTD** | Laboratory | : Environmental Division Newcastle |
| Contact | : ELENA IVANOVA | Contact | : |
| Address | : LEVEL 5, 2 GROSVENOR STREET<br>BONDI JUNCTION 2022 | Address | : 5/585 Maitland Road Mayfield West NSW Australia 2304 |
| Telephone | : ---- | Telephone | : +61 2 4014 2500 |
| Project | : ---- | Date Samples Received | : 03-Mar-2026 17:25 |
| Order number | : ---- | Date Analysis Commenced | : 09-Mar-2026 |
| C-O-C number | : ---- | Issue Date | : 27-Mar-2026 12:55 |
| Sampler | : ---- | | |
| Site | : ---- | | |
| Quote number | : EN/333 | | |
| No. of samples received | : 3 | | |
| No. of samples analysed | : 3 | | |

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## *Signatories*

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

| *Signatories* | *Position* | *Accreditation Category* |
|---|---|---|
| Shane Merrell | Laboratory Technician | Newcastle - Inorganics, Mayfield West, NSW |

## General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Dust analysis as per AS3580.10.1-2016. Samples passed through a 1mm sieve prior to analysis. NATA accreditation does not apply for results reported in deposition units e.g., g/m².mth where the sampling procedure is not NATA accredited.
- For dust analysis, the Limit of Reporting (LOR) referenced in the reports for deposited matter parameters represents the reporting increment rather than reporting limit.

## Analytical Results

| Sub-Matrix: DEPOSITIONAL DUST (Matrix: AIR) | | | | Sample ID | DG01 03/02/26 - 03/03/26 | DG02 03/02/26 - 03/03/26 | DG03 03/02/26 - 03/03/26 | ---- | ---- |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sampling date / time | 03-Mar-2026 09:10 | 03-Mar-2026 09:32 | 03-Mar-2026 08:50 | ---- | ---- |
| Compound | CAS Number | LOR | Unit | | EN2603471-001 | EN2603471-002 | EN2603471-003 | -------- | -------- |
| | | | | | Result | Result | Result | ---- | ---- |
| **EA120: Ash Content** | | | | | | | | | |
| Ash Content | ---- | 0.1 | g/m².month | | **0.8** | **0.5** | **1.8** | **----** | **----** |
| Ash Content (mg) | ---- | 2 | mg | | **14** | **8** | **30** | **----** | **----** |
| **EA125: Combustible Matter** | | | | | | | | | |
| Combustible Matter | ---- | 0.1 | g/m².month | | **0.4** | **0.7** | **1.0** | **----** | **----** |
| Combustible Matter (mg) | ---- | 2 | mg | | **5** | **12** | **17** | **----** | **----** |
| **EA139: Total Soluble Matter** | | | | | | | | | |
| Total Soluble Matter | ---- | 0.1 | g/m².month | | **1.3** | **1.8** | **1.1** | **----** | **----** |
| Total Soluble Matter (mg) | ---- | 2 | mg | | **22** | **29** | **18** | **----** | **----** |
| **EA141: Total Insoluble Matter** | | | | | | | | | |
| Total Insoluble Matter | ---- | 0.1 | g/m².month | | **1.2** | **1.2** | **2.8** | **----** | **----** |
| Total Insoluble Matter (mg) | ---- | 2 | mg | | **19** | **20** | **47** | **----** | **----** |
| **EA142: Total Solids** | | | | | | | | | |
| Total Solids | ---- | 0.1 | g/m².month | | **2.5** | **3.0** | **3.9** | **----** | **----** |
| Total Solids (mg) | ---- | 2 | mg | | **41** | **49** | **65** | **----** | **----** |

# Luddenham Quarry

## Real-time air quality monitoring campaign - January 2026

Prepared for Luddenham Operations Pty Ltd

February 2026

# Luddenham Quarry

## Real-time air quality monitoring campaign - January 2026

Luddenham Operations Pty Ltd

E240981 RP10

February 2026

| Version | Date | Prepared by | Reviewed by | Comments |
|---|---|---|---|---|
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Approved by



**Scott Fishwick**
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26 February 2026

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# 1 Introduction

## 1.1 Overview

Luddenham Quarry is located at 275 Adams Road, Luddenham NSW (Lot 3 in DP 623799, 'the site') within the Liverpool City Council municipality. The existing shale/clay quarry is approved by state significant development (SSD) consent DA 315-7-2003, issued by the NSW Minister for Planning under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The site is owned by CFT No 13 Pty Ltd, a member of the Coombes Property Group (CPG). The site is also subject to approval of an advanced resource recovery centre (ARRC), located immediately north of the quarry pit (development consent SSD-10446) and is currently under construction.

Luddenham Operations Pty Ltd is operating at the quarry in accordance with Modification 5 (MOD 5) of DA 315-7-2003, which was granted by the NSW Department of Planning, Housing and Infrastructure (DPHI then DPIE) on 24 May 2021. As of the 31 December 2024 quarrying operations have been completed at the site, as per Condition 5 (Schedule 3) of the development consent (as modified). Active rehabilitation of the site is now ongoing.

This report provides a summary of the two week real-time particulate matter (PM) monitoring campaign conducted at the site during January 2026 (the assessment period), to satisfy the requirements of the development consent (as modified).

## 1.2 Air quality management plan and monitoring program

Condition 4 (Schedule 4) of the development consent (as modified) requires the preparation of an air quality management plan (AQMP). The AQMP was completed in September 2021 and most recently updated in June 2024.

As identified in Chapter 5 of the AQMP, the requirements for ambient air quality monitoring at the site are outlined in Condition 3 (Schedule 4) as follows:

> carry out regular air quality monitoring to determine whether the development is complying with the relevant conditions in this consent.

The specific AQMP requirements outlined in Condition 4 (Schedule 4) requires a monitoring program that:

> (i) is capable of evaluating the performance of the development against the air quality criteria;
>
> (ii) adequately supports the air quality management system; and
>
> (iii) includes a protocol for identifying any air quality-related exceedance, incident or non-compliance and for notifying the Department and relevant stakeholders of these events.

## 1.3 Continuous particulate matter monitoring

Section 5.2.2 of the AQMP relates to continuous particulate matter (PM) monitoring and is reproduced in this section.

To evaluate compliance with the air quality criteria for TSP, $PM_{10}$ and $PM_{2.5}$ (see Chapter 2), two continuous PM monitoring instructions will be deployed on a campaign basis[1].

[1] If all three size fractions cannot be measured simultaneously by the selected instrument, preference will be given to $PM_{10}$ and $PM_{2.5}$ and TSP will be derived from $PM_{10}$ concentrations based on the assumption that $PM_{10}$ is 40% of TSP.

The instruments will be solar powered and relocatable and will be positioned upwind and downwind of the main dust generation activities occurring during the monitoring campaign. The upwind and downwind monitoring will enable compliance assessment against the short-term air quality criteria, which are evaluated against the increment increase from the development alone, as follows:

- PM contribution from quarry = downwind concentration minus upwind concentration.

Seasonal wind roses for the Bureau of Meteorology (BoM) Badgerys Creek automatic weather station (AWS) are presented in Figure A.1 (of the AQMP), which can be used to determine which locations are upwind and downwind for each monitoring campaign. Compliance assessment will use the meteorological monitoring data collected for the period of each monitoring campaign to determine upwind and downwind conditions on a daily basis.

The continuous monitoring campaign will occur for a 14 day period, once per year during extractive/haulage operations[2].

A compliance assessment against the long-term air quality criteria will be based on monitoring data collected at both locations across each monitoring campaign. The fortnightly average concentrations will be used as a proxy for compliance assessment against the annual average concentrations. Any identified extraordinary events during each monitoring campaign will be excluded from the calculation of the fortnightly average.

[2] As previously mentioned, quarrying operations have since been completed at the site, however, some rehabilitation of the site is currently ongoing. Due to the weather and scheduling, the majority of activities occurring onsite during the assessment period were from the adjoining construction works of the Luddenham Advanced Recycling Centre, immediately north of the quarry pit.

# 2 Applicable criteria

Condition 1 of Schedule 4 lists the relevant air quality criteria for the development (replicated below in Table 2.1 and Table 2.2).

The long-term criteria in Table 2.1 are assessed against the total cumulative impact (the development contribution plus all other sources), whereas the short-term criteria in Table 2.2 apply to the incremental impact (development contribution alone).

**Table 2.1 Long-term air quality criteria for particulate matter**

| Pollutant | Averaging period | Criterion | Basis |
|---|---|---|---|
| Total suspended particulate matter (TSP) | Annual | 90 µg/m$^3$ | Total impact (incremental increase from development plus all other sources) but excluding extraordinary events such as bushfires, prescribed burning, dust storms. |
| Particulate matter <10 µm ($PM_{10}$) | Annual | 25 µg/m$^3$ | |
| Particulate matter <2.5 µm ($PM_{2.5}$) | Annual | 8 µg/m$^3$ | |

**Table 2.2 Short-term air quality criteria for particulate matter**

| Pollutant | Averaging period | Criterion | Basis |
|---|---|---|---|
| Particulate matter <10 µm ($PM_{10}$) | 24 hour | 50 µg/m$^3$ | Incremental impact (increase in concentrations from the development alone). |
| Particulate matter <2.5 µm ($PM_{2.5}$) | 24 hour | 25 µg/m$^3$ | |

As the monitoring campaign is two weeks in duration, the short-term 24 hour average criteria will be the focus of this monitoring report. Discussion regarding compliance with the annual average criteria will be derived from the period averaging concentrations recorded.

# 3 Monitoring network and methodology

## 3.1 Monitoring network

In accordance with Section 5.2.2 of the AQMP, the continuous PM monitoring network installed at the site for the two-week campaign consists of two continuous PM monitoring units.

In the absence of site-specific meteorological measurements, historical wind conditions recorded by the BoM Badgerys Creek AWS (located 2.3 kilometre (km) to the south-east of the site) for the assessment period were reviewed. The data analysis identified a dominance of winds from the north-east and south-east. To record upwind and downwind PM concentrations at the site, the two continuous PM monitoring units were sited at the north-east and south-west corners of the site.

For the assessment period, concurrent meteorological monitoring data from the BoM Badgerys Creek AWS was collated. Further, to provide an understanding of potential regional-scale air quality events, concurrent measurements from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Bringelly air quality monitoring station (AQMS), located 5.9 km to the south-east of the site, have been collated.

The monitoring resources adopted in this campaign are summarised in Table 3.1, and the monitoring locations are shown in Figure 3.1.

**Table 3.1 Summary of monitoring network adopted in monitoring campaign at Luddenham quarry**

| | Location ID | Description | Coordinates (MGA 56) | |
|---|---|---|---|---|
| | | | Easting (m) | Northing (m) |
| Onsite air quality | AQM01 | Site boundary in south-west corner | 288812 | 6249239 |
| | AQM02 | Site boundary in north-east corner | 289181 | 6249454 |
| Reference air quality | DCCEEW AQMS | Bringelly AQMS | 293102 | 6244719 |
| Meteorology | BoM AWS | Badgerys Creek AWS | 289920 | 6246951 |

## 3.2 Monitoring methodology

The BoM Badgerys Creek AWS continuously measures mean wind speed, mean wind direction, the standard deviation of wind direction (referred to as 'sigma-theta'), mean temperature, mean relative humidity, pressure and accumulated rainfall. The measurements are recorded as 1 hour averages from 1 minute data.

The real-time particulate matter monitoring was completed using two AirMetER-DX continuous particulate matter monitoring units installed at the site. The monitoring was conducted at ground level, with the inlet positioned at approximately 1.5 m. During the monitoring period the $PM_{10}$ and $PM_{2.5}$ measurements were taken continuously and recorded as both 1 minute and 1 hour mean values in micrograms per cubic metre ($\mu g/m^3$). Daily average concentrations were also calculated. The PM monitoring installations are shown in Photograph 3.1 and Photograph 3.2.

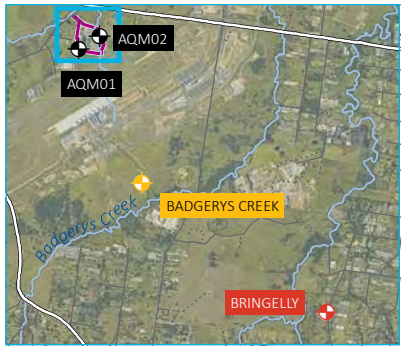


**Photograph 3.1 AQM01 monitoring location**



**Photograph 3.2 AQM02 monitoring location**




KEY

- Study area
- On site air quality monitor
- Major road
- Minor road
- Vehicular track
- Named watercourse
- Cadastral boundary

INSET KEY

- Study area
- Major road
- Named watercourse
- BoM AWS
- DPE AQMS
- On site air quality monitor

\\emm.local\xdrive\2023\E231131 - Luddenham Quarry - Environmental Monitoring\GIS\02_Maps\AQ0010_QuarryMonitoring_20260205_02.mxd 5/02/2026

*Source: EMM (2024); ABS (2021); DFSI (2020, 2021); ESRI (2024); GA (2011)*

0 100 200 m

GDA 1994 MGA Zone 56

N

# Luddenham quarry monitoring network

Luddenham Quarry
Air quality monitoring report
Figure 3.1

EMM
creating opportunities

# 4 Meteorological data

## 4.1 Overview of meteorological data

This section of the report presents a summary and analysis of the meteorological data that were collected by the BoM Badgerys Creek AWS during the assessment period.

An overview of the continuous data from the BoM Badgerys Creek AWS is provided in Figure 4.1. The panel on the left shows the time series of 1 hour values for each parameter, with the grey bars indicating the presence of data and any red bars indicating missing data. Some summary statistics for the reporting period are also given, including the mean, median, 95$^{th}$ percentile, minimum, maximum and number of missing points. The panel on the right shows the frequency distribution of the values for each parameter.

The key descriptive statistics and time series plots for the meteorological parameters collected at the BoM Badgerys Creek AWS during the reporting period are provided in the following sections.

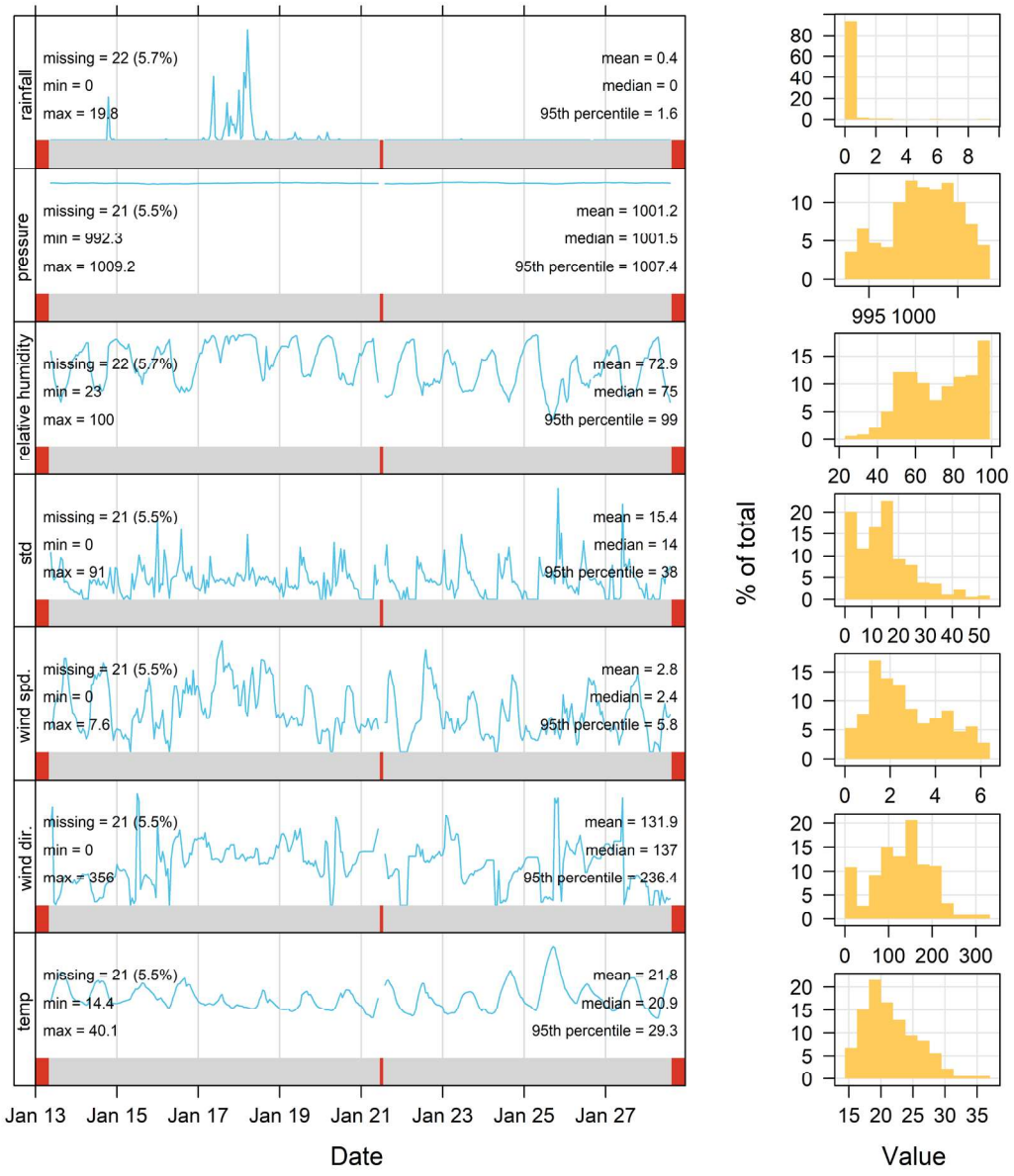



**Figure 4.1 Meteorological data summary – BoM Badgerys Creek AWS**

## 4.2 Meteorological data

Key descriptive statistics for the meteorological data collected at the BoM Badgerys Creek AWS during the assessment period are provided in Table 4.1. The statistics are calculated from the 1 hour values and are shown for the assessment period.

**Table 4.1 Summary of hourly meteorological data – assessment period 2026 – BoM Badgerys Creek AWS**

| Parameter | Minimum | Maximum | Median | Average | Standard deviation |
|---|---|---|---|---|---|
| Temperature (°C) | 14.4 | 40.1 | 20.8 | 21.7 | 4.5 |
| Wind speed (m/s) | 0.0 | 7.6 | 2.3 | 2.7 | 1.7 |
| Rainfall (mm) | 0.0 | 19.9 | 0.0 | 0.4 | 1.8 |
| Relative Humidity (%) | 0.0 | 100.0 | 75.0 | 73.4 | 18.5 |

The wind rose for the assessment period from the BoM Badgerys Creek AWS is presented in Figure 4.2. The wind rose shows that winds during the assessment period were predominately from the east and south-easterly direction.

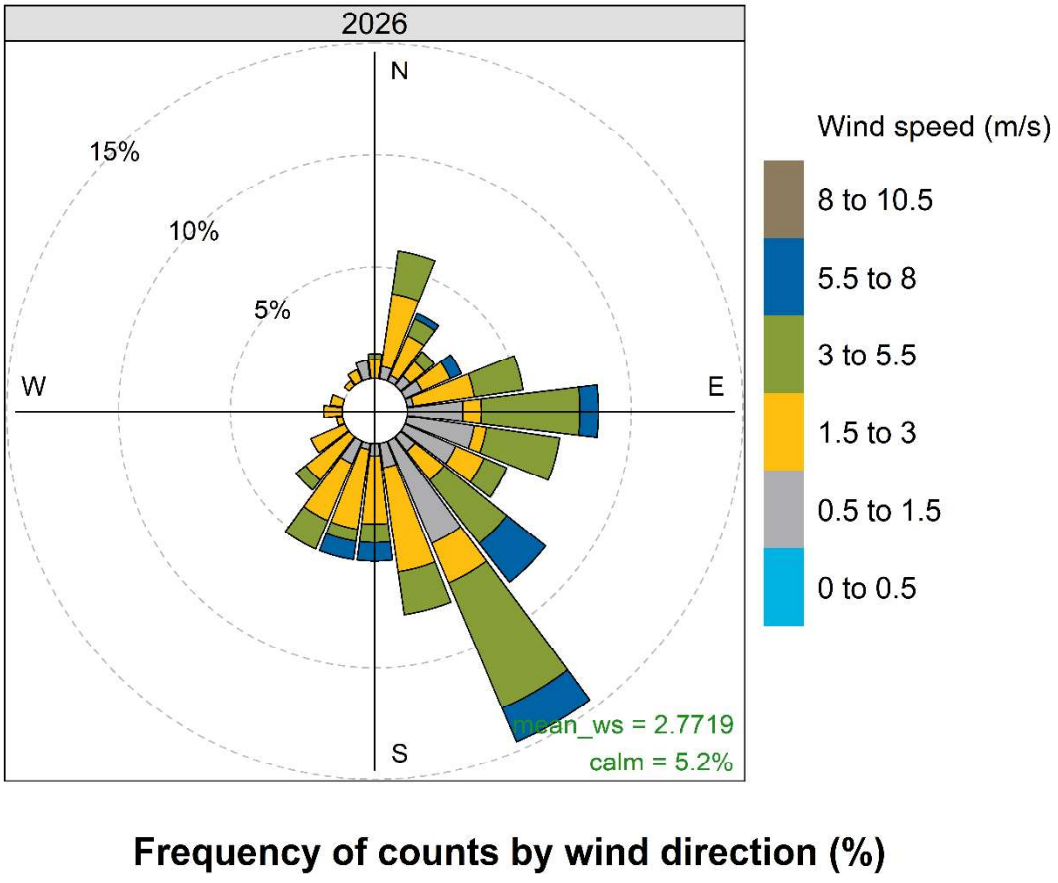



**Figure 4.2 Wind rose for the assessment period – BoM Badgerys Creek AWS**

# 5 Air quality data

## 5.1 Overview of air quality data

This section of the report presents a summary and analysis of the air quality ($PM_{10}$ and $PM_{2.5}$) data that were collected from the onsite monitors during the assessment period. The data from the DCCEEW Bringelly AQMS are included for comparison.

An overview of the continuous (hourly) data from the two $PM_{10}$/$PM_{2.5}$ monitors located at the site in provided in Figure 5.1. Measurements were collected starting from 9:00 am on 13 January 2026 to 9:00 am on 28 January 2026.

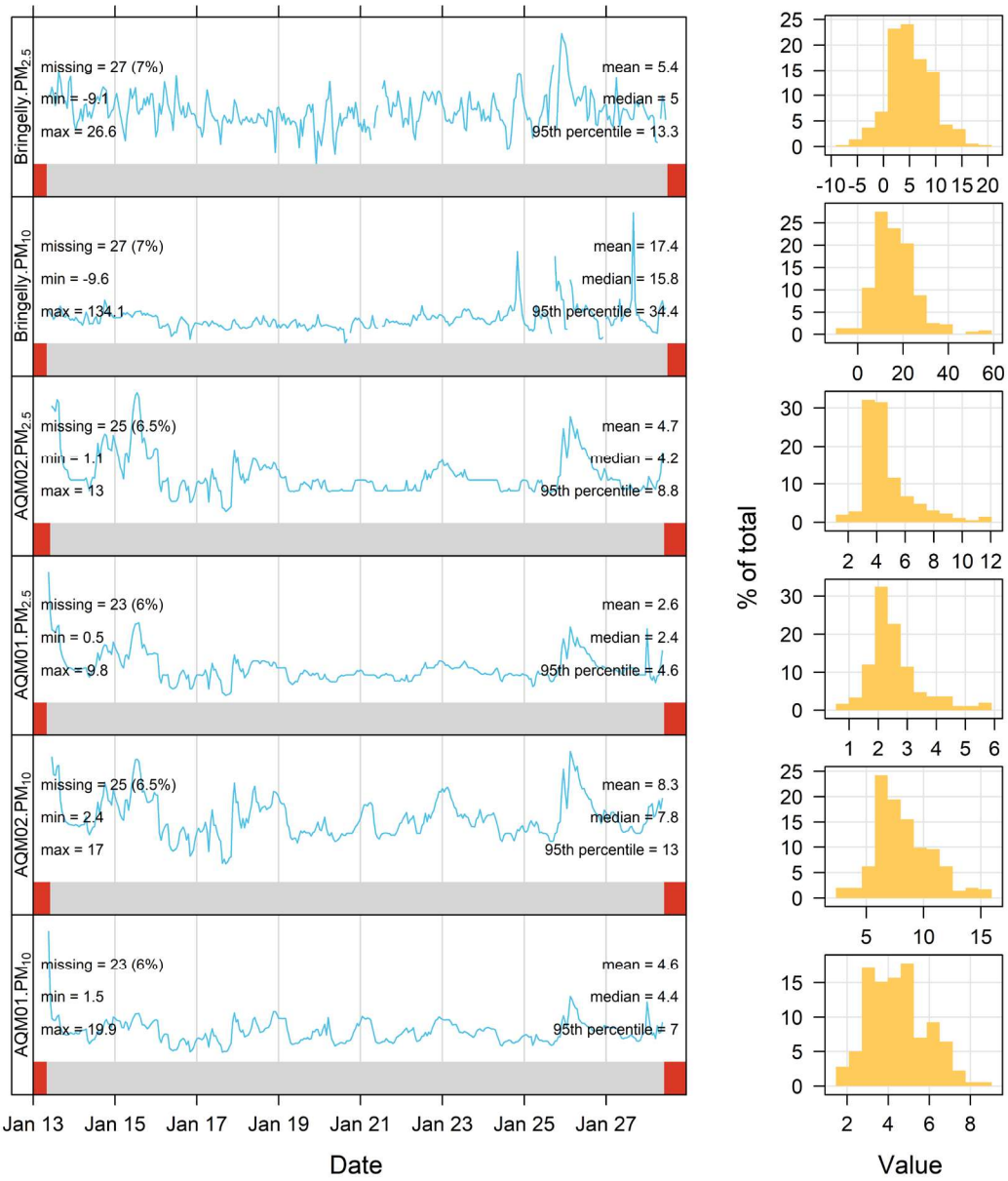



**Figure 5.1 Air quality monitoring data – DCCEEW Bringelly and onsite monitors – assessment period**

## 5.2 $PM_{10}$ concentrations

$PM_{10}$ concentrations are reported here as 24 hour mean values (midnight to midnight). A statistical summary of the 24 hour $PM_{10}$ concentrations recorded (AQM01 – south-west corner) and (AQM02 – north-east corner) at the site during the reporting period is provided in Table 5.1. The corresponding values from the DCCEEW Bringelly AQMS are included for comparison.

The period mean $PM_{10}$ concentrations for AQM01 and AQM02 were notably lower than the DCCEEW Bringelly AQMS. The period mean $PM_{10}$ concentrations for AQM01 were lower than the other two locations.

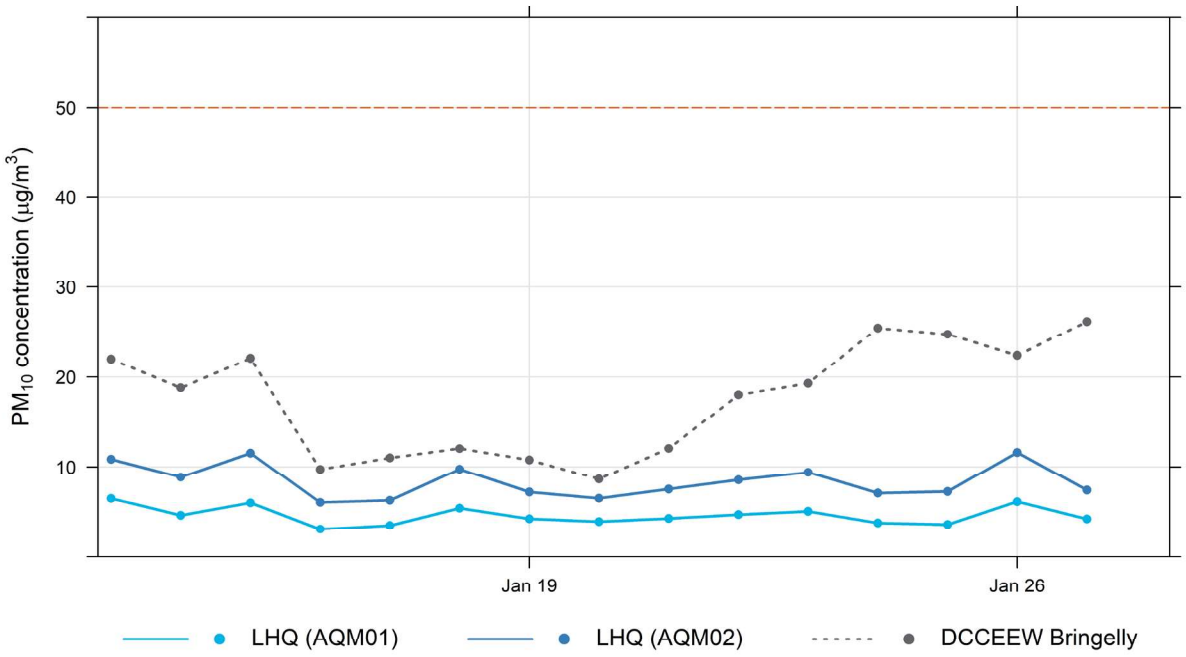
No exceedances of the 24 hour $PM_{10}$ criterion of 50 µg/m³ were recorded at any location during the campaign.

**Table 5.1 Statistics for $PM_{10}$ 24 hour average concentration**

| Monitoring location | Mean (µg/m³) | Median (µg/m³) | Maximum (µg/m³) | Standard deviation | Days above 50 µg/m³ |
|---|---|---|---|---|---|
| AQM01 | 4.5 | 4.2 | 6.1 | 0.9 | 0 |
| AQM02 | 8.2 | 7.5 | 11.6 | 1.8 | 0 |
| DCCEEW Bringelly AQMS | 17.2 | 18.4 | 26.1 | 6.4 | 0 |

The time series of 24 hour $PM_{10}$ concentrations recorded at the site and DCCEEW Bringelly AQMS are plotted in Figure 5.2. The concentrations at all three sites generally followed a similar pattern within the first half of the assessment period, with concentrations at the DCCEEW Bringelly higher than the other two locations.

It is noted that $PM_{10}$ concentrations at AQM01 are lower compared to the other two monitoring locations over the monitoring period. The cause of this difference is unclear, but may be a function of factors such as instrumentation sensitivity or the location of the monitoring equipment.




Note: Red broken line marks 24-hour average $PM_{10}$ criterion of 50 µg/m³

**Figure 5.2 Daily mean $PM_{10}$ concentration**

The measured $PM_{10}$ concentrations from the two onsite monitors at the site and recorded by the DCCEEW Bringelly AQMS are also presented below using bivariate polar plots and polar annulus plots.

The bivariate plots (Figure 5.3 to Figure 5.5) show how $PM_{10}$ concentrations vary by wind speed and wind direction over the reporting period. The plots provide a graphical impression of potential sources influencing $PM_{10}$ concentrations at the monitoring locations.

The following points are noted from the bivariate polar plots (Figure 5.3 to Figure 5.5):

- The bivariate polar plot for AQM01 (Figure 5.3) shows low concentrations in all directions.
- The bivariate polar plot for AQM02 (Figure 5.4) shows low concentrations in all directions.
- The bivariate polar plot for the DCCEEW Bringelly AQMS (Figure 5.5) shows a signal from the east, which is likely to be associated with emissions from regional influences.

The polar annulus plots (Figure 5.6 to Figure 5.8) show the temporal variation in the $PM_{10}$ concentration by wind direction during the whole reporting period. In this case, the temporal variation is by hour of the day (0 to 23).

- The polar annulus plots for AQM01 and AQM02 (Figure 5.6 and Figure 5.7, respectively) show that the highest concentrations occur between 4:00 am and 8:00 am.
- The polar annulus plots for the DCCEEW Bringelly AQMS (Figure 5.8) shows that the highest concentrations occur between 4:00 pm and 8:00 pm.

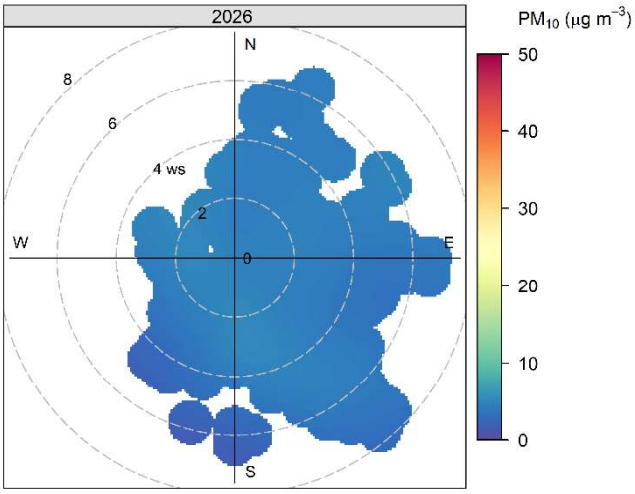



**Figure 5.3 Assessment period bivariate polar plot for $PM_{10}$ at AQM01**

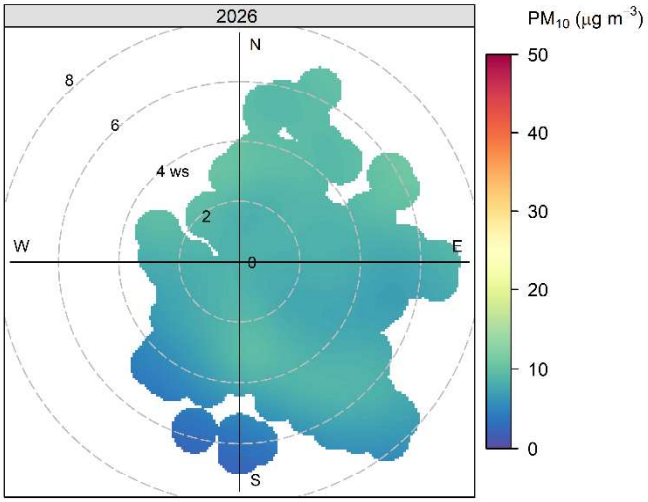



**Figure 5.4 Assessment period bivariate polar plot for $PM_{10}$ at AQM02**

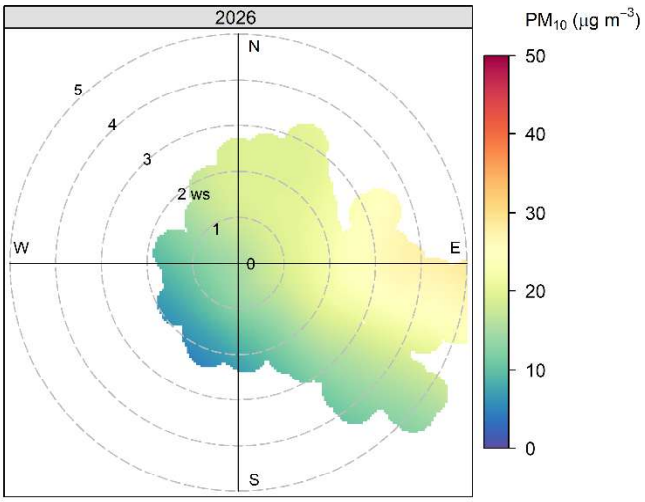



**Figure 5.5 Assessment period bivariate polar plot for $PM_{10}$ at DCCEEW Bringelly**

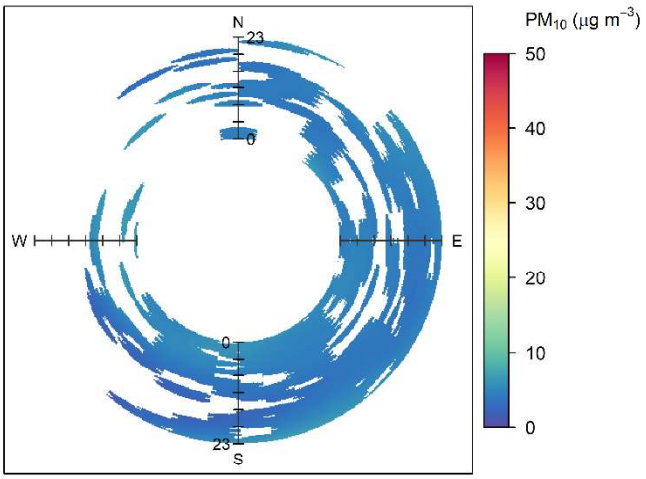



**Figure 5.6 Polar annulus plot for $PM_{10}$ at AQM01**

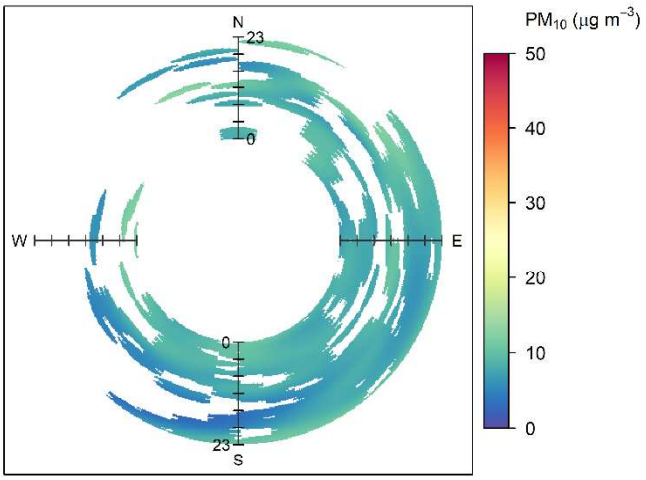



**Figure 5.7 Polar annulus plot for $PM_{10}$ at AQM02**

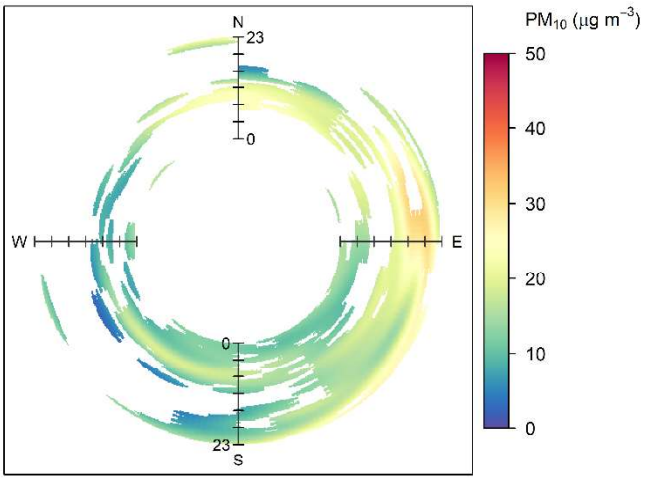



**Figure 5.8 Polar annulus plot for $PM_{10}$ at DCCEEW Bringelly**

## 5.3 $PM_{2.5}$ concentrations

The presentation of the $PM_{2.5}$ data follows the same format as that for $PM_{10}$.

A statistical summary of the 24 hour $PM_{2.5}$ concentrations at the site during the reporting period is provided in Table 5.2. The corresponding values from the DCCEEW Bringelly AQMS are included for comparison.

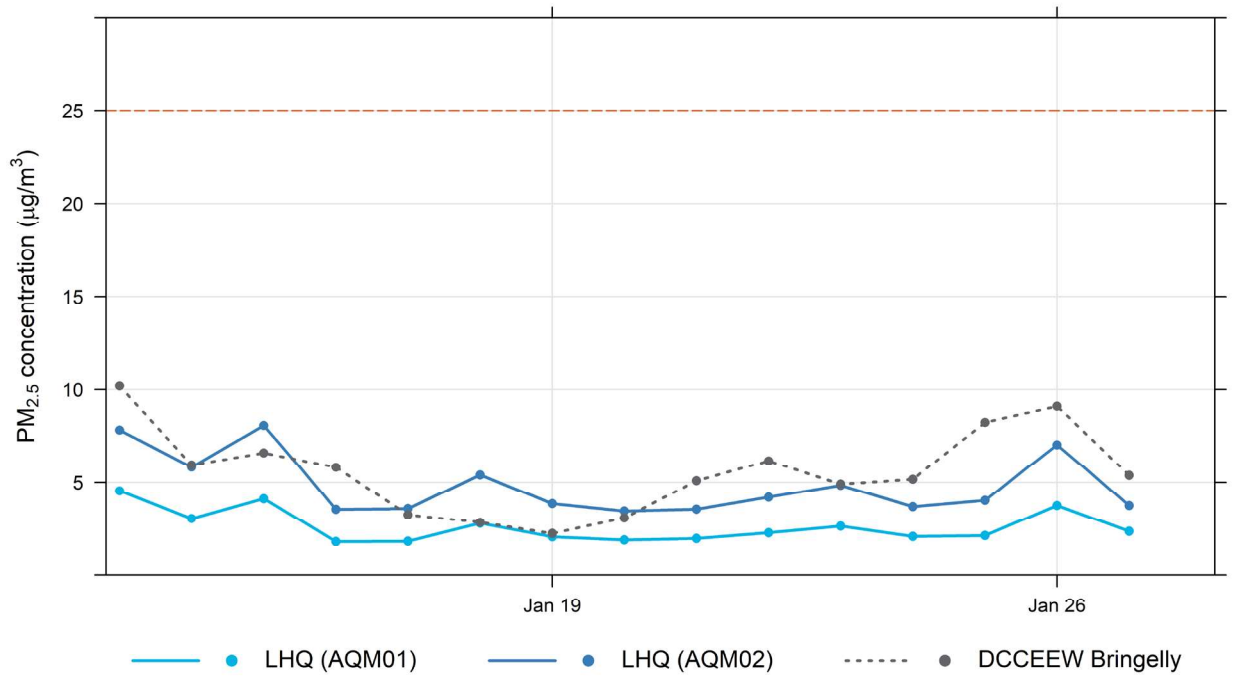
For the monitoring campaign period, the $PM_{2.5}$ concentrations were generally similar between AQM02 and at the DCCEEW Bringelly AQMS. Concentrations were generally lower at AQM01.

No exceedances of the 24 hour average $PM_{2.5}$ criterion (25µg/m$^3$) were recorded at any of the monitoring locations.

**Table 5.2 Statistics for $PM_{2.5}$ 24 hour average concentrations**

| Monitoring location | Mean (µg/m$^3$) | Median (µg/m$^3$) | Maximum (µg/m$^3$) | Standard deviation | Days above 25 µg/m$^3$ |
|---|---|---|---|---|---|
| AQM01 | 2.5 | 2.2 | 4.1 | 0.7 | 0 |
| AQM02 | 4.6 | 3.9 | 8.1 | 1.4 | 0 |
| DCCEEW Bringelly AQMS | 5.3 | 5.3 | 9.1 | 2.0 | 0 |

The time series of 24 hour $PM_{2.5}$ concentrations recorded at the site and Bringelly are presented in Figure 5.9. Concentrations at all three sites generally followed a similar pattern, with concentrations at AQM01 lower than the other two locations.




Note: read broken line marks 24-hour average $PM_{2.5}$ criterion of 25 µg/m$^3$

**Figure 5.9 Daily mean $PM_{2.5}$ concentration**

The bivariate polar plots for $PM_{2.5}$ are shown in Figure 5.10 to Figure 5.12, and the polar annulus plots are shown in Figure 5.13 to Figure 5.15.

The following points are noted from the bivariate polar plots (Figure 5.10 to Figure 5.12):

- The bivariate polar plots for AQM01 and AQM02 (Figure 5.10 and Figure 5.11, respectively) show generally low concentrations in all directions; however, there are slightly higher concentrations recorded at AQM02.
- The bivariate polar plot for the DCCEEW Bringelly AQMS (Figure 5.12) show generally low concentrations in all directions; however, slight signals are noted from the north-east, which is likely to be associated with emissions from road traffic.

The polar annulus plots (Figure 5.13 to Figure 5.15) show the temporal variation in the $PM_{2.5}$ concentration by wind direction during the whole reporting period. In this case the temporal variation is by hour of the day (0 to 23):

- The polar annulus plots for AQM01 and AQM02 (Figure 5.13 and Figure 5.14 , respectively) show that the highest concentrations occur between 8:00 am and 4:00 pm.
- The polar annulus plots for the DCCEEW Bringelly AQMS (Figure 5.15) shows that the highest concentrations occur between 8:00 pm and 12:00 am.

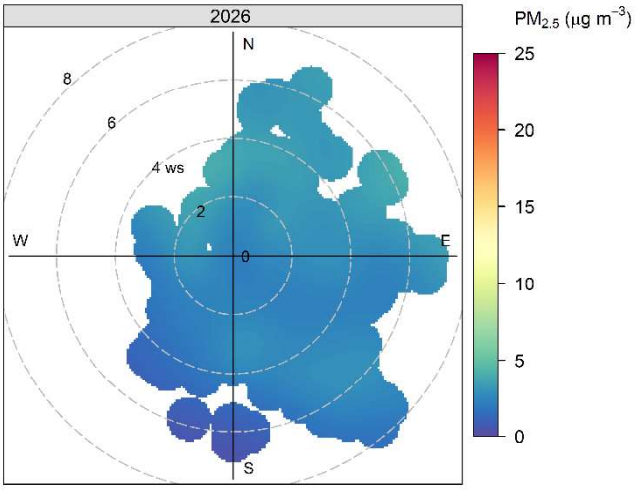



**Figure 5.10 Assessment period bivariate polar plot for $PM_{2.5}$ at AQM01**

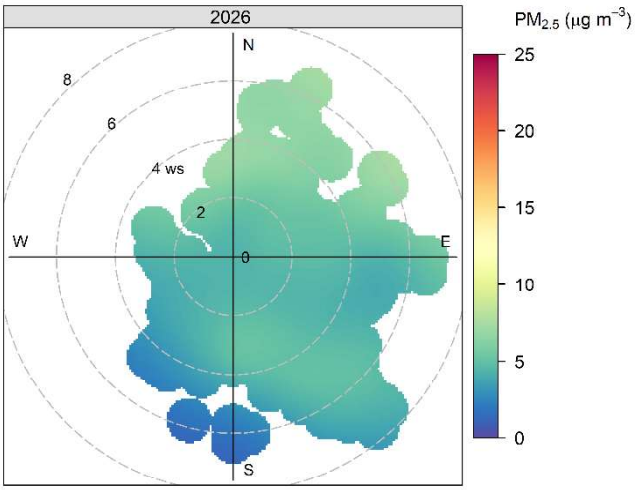



**Figure 5.11 Assessment period bivariate polar plot for $PM_{2.5}$ at AQM02**

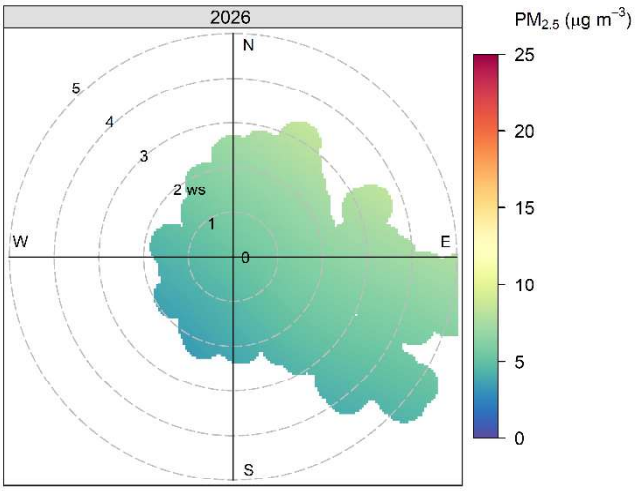



**Figure 5.12 Assessment period bivariate polar plot for $PM_{2.5}$ at DCCEEW Bringelly**

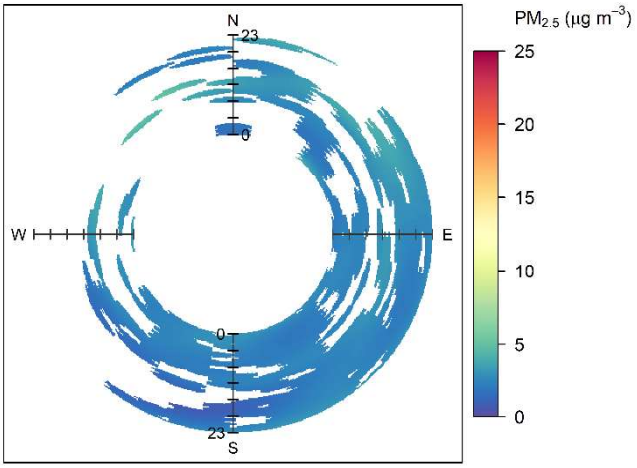



**Figure 5.13 Polar annulus plot for $PM_{2.5}$ at AQM01**

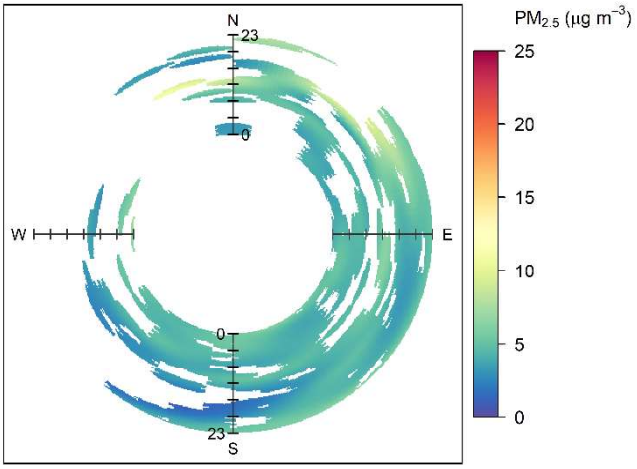



**Figure 5.14 Polar annulus plot for $PM_{2.5}$ at AQM02**

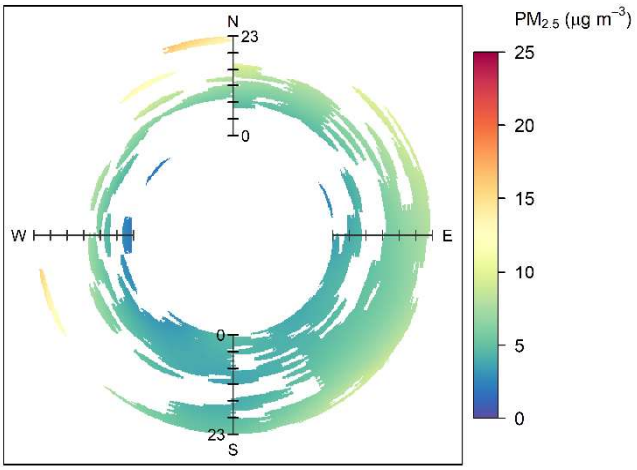



**Figure 5.15 Polar annulus plot for $PM_{2.5}$ at DCCEEW Bringelly**

## 5.4 Upwind and downwind concentrations

As stated in Section 1.2, the upwind and downwind monitoring will enable compliance assessment against the short-term air quality criteria, which are evaluated against the increment increase from the development alone, as follows:

- PM contribution from quarry = downwind concentration minus upwind concentration.

To determine the potential contribution from the site to recorded concentrations, the assessment period for the 2026 monitoring campaign where the wind direction aligned with the two onsite PM monitoring locations were examined. For the purpose of this analysis, downwind conditions were considered to occur when winds were between 10° and 99° for AQM01, and 180° and 320° for AQM02. Upwind conditions were considered between 100° and 360° for AQM01, and 0° and 179° for AQM02.

The mean $PM_{10}$ and $PM_{2.5}$ concentration and wind speeds when the site was upwind or downwind of each monitor are given in Table 5.3. The number of hours for each condition is also provided.

For AQM01 and AQM02, $PM_{10}$ and $PM_{2.5}$ concentrations were generally similar for upwind and downwind conditions.

**Table 5.3 $PM_{10}$ and $PM_{2.5}$ concentrations upwind and downwind of the quarry**

| Parameter | | AQM upwind of quarry | | | AQM downwind of quarry | | |
|---|---|---|---|---|---|---|---|
| | | Mean (µg/m³) | Mean wind speed (m/s) | Hours upwind | Mean (µg/m³) | Mean wind speed (m/s) | Hours downwind |
| $PM_{10}$ | AQM01 | 4.6 | 2.8 | 245 | 4.5 | 2.8 | 112 |
| | AQM02 | 8.4 | 2.8 | 291 | 8.0 | 2.8 | 75 |
| $PM_{2.5}$ | AQM01 | 2.5 | 2.8 | 249 | 2.9 | 2.8 | 112 |
| | AQM02 | 4.8 | 2.8 | 291 | 4.3 | 2.8 | 75 |

The potential contribution of recorded $PM_{10}$ and $PM_{2.5}$ concentrations from onsite emission sources (e.g. quarrying, haulage of material, wind erosion) have been calculated by reviewing the differences in mean measurements at the two locations under upwind and downwind conditions (i.e. AQM01 downwind and AQM02 upwind). The average difference at each site is presented in Table 5.4. For the monitoring period, the average difference (or quarry contribution) was negligible for $PM_{10}$ and $PM_{2.5}$.

**Table 5.4 PM contributions from the quarry**

| Parameters | | Average contribution (µg/m³) |
|---|---|---|
| $PM_{10}$ | AQM01 | Negligible |
| | AQM02 | Negligible |
| $PM_{2.5}$ | AQM01 | 0.4 |
| | AQM02 | Negligible |

## 5.5 TSP concentrations

Measurements of TSP were not collected at the site during the assessment period for 2026. As stated in Section 1.3, TSP concentrations would be derived from $PM_{10}$ concentrations based on the assumption that $PM_{10}$ is 40% of TSP.

For the average $PM_{10}$ concentrations recorded by the two onsite monitors, the derived average TSP concentrations are 11.1 µg/m$^3$ and 20.5 µg/m$^3$ for AQM01 and AQM02 respectively. Both concentrations are well below the applicable assessment criteria of 90 µg/m$^3$ (Table 2.1). It is reminded that the TSP assessment criteria applies to annual average concentrations.

# 6 Conclusion

EMM has been commissioned to manage a short-term ambient air quality monitoring campaign at the site.

A 2 week monitoring program was completed during January 2026 using two continuous PM monitoring units (AirMetER-DX monitoring system) to record concentrations of $PM_{10}$ and $PM_{2.5}$. Meteorological measurements for the monitoring period were sourced from the nearby BoM Badgerys Creek AWS. The onsite PM monitoring data was also compared with monitoring data for the same period from the DCCEEW Bringelly AQMS.

The monitoring equipment was deployed at the north-east and south-west corners of the site, with a specific focus of the monitoring study to record upwind and downwind concentrations.

A summary of the monitoring results are as follows:

- No exceedances of the 24 hour $PM_{10}$ criterion of 50 µg/m$^3$ were recorded at either of the onsite monitoring locations.
- No exceedances of the 24 hour $PM_{2.5}$ criterion of 25 µg/m$^3$ were recorded at either of the onsite monitoring locations.
- $PM_{10}$ and $PM_{2.5}$ concentrations at AQM01 were notably lower than at AQM02 and DCCEEW Bringelly.
- The $PM_{10}$ concentrations at the quarry were generally lower than the concurrent measurements at the DCCEEW Bringelly AQMS for the same period.
- The $PM_{2.5}$ concentrations at the quarry were generally comparable with the concurrent measurements at the DCCEEW Bringelly AQMS for the same period.
- When upwind and downwind concentrations were considered, the contribution from the site did not result in an exceedance of the criteria specified in Chapter 2.
- It is inferred that no exceedances of the annual TSP criterion of 90 µg/m$^3$ would occur based on the recorded $PM_{10}$ concentrations.

# Appendix A

Summary of 24-hour average concentrations recorded on site

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## A.1 Daily average $PM_{10}$ and $PM_{2.5}$ data

**Table A.1 Daily average $PM_{10}$ and $PM_{2.5}$ concentration (µg/m³)**

| Date | $PM_{10}$ concentration (µg/m³) | | $PM_{2.5}$ concentration (µg/m³) | |
|---|---|---|---|---|
| | AQM01 | AQM02 | AQM01 | AQM02 |
| 13/01/2026 | Less than 24-hours of data | | | |
| 14/01/2026 | 4.6 | 8.9 | 3.1 | 5.8 |
| 15/01/2026 | 6.0 | 11.5 | 4.1 | 8.1 |
| 16/01/2026 | 3.1 | 6.0 | 1.8 | 3.5 |
| 17/01/2026 | 3.5 | 6.3 | 1.9 | 3.6 |
| 18/01/2026 | 5.4 | 9.7 | 2.8 | 5.4 |
| 19/01/2026 | 4.2 | 7.2 | 2.1 | 3.9 |
| 20/01/2026 | 3.9 | 6.5 | 1.9 | 3.5 |
| 21/01/2026 | 4.3 | 7.5 | 2.0 | 3.6 |
| 22/01/2026 | 4.7 | 8.5 | 2.3 | 4.2 |
| 23/01/2026 | 5.0 | 9.4 | 2.7 | 4.8 |
| 24/01/2026 | 3.8 | 7.1 | 2.1 | 3.7 |
| 25/01/2026 | 3.6 | 7.3 | 2.2 | 4.0 |
| 26/01/2026 | 6.1 | 11.6 | 3.7 | 7.0 |
| 27/01/2026 | 4.2 | 7.4 | 2.4 | 3.7 |
| 28/01/2026 | Less than 24-hours of data | | | |

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# **Appendix F** – Noise Monitoring Reports

# LUDDENHAM QUARRY

# NOISE COMPLIANCE REPORT – FEBRUARY 2026

27 FEBRUARY 2026

# Luddenham Quarry

# Noise Compliance Report – February 2026

Luddenham Operations Pty Ltd

## REVISIONS

| Revision | Date | Prepared by | Reviewed by | Revision Comments |
|---|---|---|---|---|
| 1 | 27/02/2026 | Elena Ivanova | Pascal Bobillier | Final |
| | | | | |

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# 1 INTRODUCTION

## 1.1 Overview

Luddenham Operations Pty Ltd operates the shale/clay quarry (the site) under the Environmental Protection Licence (EPL) 21562. The site is located at 275 Adams Road, Luddenham, NSW.

Quarry extraction activities ceased in December 2024, and no extractive activities have been undertaken at the quarry site since that time. The site is currently undergoing rehabilitation in accordance with the approved Site Rehabilitation Plan, which includes the removal of products and overburden materials stockpiled on site.

The purpose of noise monitoring was to quantify environmental noise levels surrounding the site and assess compliance with the noise limits specified in Condition L3.3 of EPL 21562.

Attended environmental noise monitoring, as outlined in this report, was conducted in general accordance with Condition L3 of the EPL. The bi-annual noise monitoring was undertaken during the daytime periods of 16th and 17th February 2026 at six representative monitoring locations. Monitoring results are presented in Section 4 of this report.

Immediately to the north of the quarry is a construction site occupying approximately three (3) hectares of the total site area (Lot 3, DP 623799). Construction activities are being carried out under development consent (SSD-10446) that was granted to Coombes Property Group (CPG) to construct and operate a resource recovery facility. Once fully operational, this facility will be permitted to receive and process up to 600,000 tonnes per annum (TPA) of construction and demolition waste, as well as commercial and industrial waste (general solid waste (non-putrescible)). The main activities observed during the monitoring period included installation of building cladding and concrete works.

## 1.2 Attended monitoring locations

Site monitoring locations are detailed in Table 1-1 and shown on Figure 1-1. It should be noted that Figure 1-1 shows actual monitoring positions, not necessarily the location of residences.

*Table 1-1: Attended noise monitoring locations*

| Monitoring Location ID | Sensitive Receiver ID | Location Description | Sensitive Receivers | Comments | Monitoring locations GDA94/MGA56 | |
|---|---|---|---|---|---|---|
| | | | | | Easting | Northing |
| A5 | R1 | Approximately 880m northwest of the site | 2161–2177 Elizabeth Drive, Luddenham | Occupied | 288807 | 6250432 |
| A6 | R2 | Approximately 680m northwest of the site | 2111–2141 Elizabeth Drive, Luddenham | Unoccupied (building demolished) | 289142 | 6250089 |
| A1 | R3 | Approximately 260m north of the site | 285 Adams Road, Luddenham | Unoccupied (used as laydown area) | 288937 | 6249498 |
| A2 | R4 | Approximately 635m southwest of the site | 5 Anton Road, Luddenham utilised for R4, R5 and R7 | Occupied | 288345 | 6249200 |
| | R5 | | 185 Adams Road, Luddenham | Unoccupied | | |
| | R7 | | 161 Adams Road, Luddenham | Occupied | | |
| A3 | R6 | Approximately 260m west of the site | 225 Adams Road, Luddenham | Occupied | 288912 | 6249491 |

| Monitoring Location ID | Sensitive Receiver ID | Location Description | Sensitive Receivers | Comments | Monitoring locations GDA94/MGA56 | |
|---|---|---|---|---|---|---|
| | | | | | Easting | Northing |
| A4 | R8 | Approximately 1020m northwest of the site | 196–214 Adams Road, Luddenham utilised for R8 – 2510–2550 Elizabeth Drive, Luddenham | Occupied | 288632 | 6249769 |

## 1.3 Monitoring Period

Condition L 3.1 of EPL 21562 requires noise monitoring to be undertaken during the day period.

For the purposes of Condition L3.1:

a) Day means the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.




*Figure 1-1: Site and noise monitoring locations*

# 2 NOISE LIMITS

## 2.1 Environmental Protection Licence

The bi-annual monitoring is a requirement as detailed in EPL 21562. The noise assessment criteria for the quarry site are provided in condition L3.1 of EPL 21562. These criteria are specified for the day period at locations which are representative of residences potentially most impacted by site noise. Pages from the site's EPL pertaining to noise are shown in Appendix A. In addition, Appendix B provides information on how changes in noise levels are typically perceived by an average person, together with examples of common noise levels.

## 2.2 Noise limits

Noise impact limits from condition L3.3 of EPL 21562 are provided in Table 2-1.

*Table 2-1: Noise limits*

| Monitoring Location Description | Monitoring Location ID | Sensitive Receiver ID | Monitoring Frequency | Day |
|---|---|---|---|---|
| | | | | $L_{Aeq,15minute}$ |
| 2161–2177 Elizabeth Drive, Luddenham | A5 | R1 | Two times a year | 41 |
| 2111–2141 Elizabeth Drive, Luddenham | A6 | R2 | Two times a year | 43 |
| 285 Adams Road, Luddenham | A1 | R3 | Two times a year | 53 |
| 5 Anton Road, Luddenham | A2 | R4 | Two times a year | 46 |
| 185 Adams Road, Luddenham | A2 | R5 | Two times a year | 45 |
| 161 Adams Road, Luddenham | A2 | R7 | Two times a year | 41 |
| 225 Adams Road, Luddenham | A3 | R6 | Two times a year | 52 |
| 2510–2550 Elizabeth Drive, Luddenham | A4 | R8 | Two times a year | 41 |

## 2.3 Meteorological conditions

Condition L3.3 of the EPL states the noise-enhancing meteorological conditions which the noise limits apply under:

a) The noise limits set out in condition L3.1 apply under the meteorological conditions listed in table below.
b) For those meteorological conditions not referred to in the table below, the noise limits that apply are the noise limits in condition L3.1 table plus 5dB.

The table from Condition L3.3 is reproduced in Table 2-2 below.

*Table 2-2: Applicable meteorological conditions*

| Assessment period | Measurement Parameter |
|---|---|
| Day | Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level |

Condition L3.4 specifies the source of meteorological data to be used and method for determining stability categories:

L3.4 For the purpose of condition L3.3:

a) The meteorological conditions are to be determined from meteorological data obtained from the meteorological weather station identified as BoM monitoring point at Badgerys Creek.
b) Stability category shall be determined using the following method from Fact Sheet D of the Noise Policy for Industry (NSW EPA, 2017):
   i. Use of sigma-theta data (section D1.4).

## 2.4 Other considerations

Monitoring and reporting were undertaken in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

# 3 METHODOLOGY

## 3.1 Overview

Attended environmental noise monitoring was undertaken in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW requirements. Meteorological data was obtained from the Badgerys Creek automatic weather station (AWS) (station ID 067108) which allowed correlation of atmospheric parameters during measured noise levels. Extracted sections of the weather data are reproduced in Table 4-2.

## 3.2 Attended noise monitoring

Attended noise monitoring was conducted during the day period at each location specified in Table 1-1of this report in accordance with condition M7 of EPL 21562.

Measured sound levels from various sources were noted during each measurement and particular attention was paid to the extent of site's contribution (if any) to measured levels. This approach is consistent with the approved NMP for the site and the NPfI.

All monitoring results noted in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (LA90), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as birdsongs, light aircraft noise, continuous road traffic noise or construction activities adjacent to the quarry that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation conditions may not be representative.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5dB lower than relevant limits, then a maximum estimate of site may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

## 3.3 Modifying factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only $L_{Aeq}$.

Low-frequency modifying factor penalties have only been applied to site-only $L_{Aeq}$ levels if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

## 3.4 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3-1. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dB Calibration certificates are provided in Appendix C.

*Table 3-1: Measurement equipment*

| Item | Serial Number | Date of Calibration |
|---|---|---|
| Acoustic Calibrator Svantek, SV 33B | 109960 | 10/07/2025 |
| Sound Level Meter Svantek, SVAN 971 | 39170 | 12/11/2025 |

# 4 RESULTS

## 4.1 Total measured noise levels

Table 4-1 presents the total noise levels measured during each 15-minute attended monitoring period; these levels do not necessarily reflect noise solely generated by activities at the quarry site

During the monitoring period, site operations were audible at one monitoring location, as activities were conducted in close proximity to that location.

Additional sounds included local traffic acceleration, birdsong, insect noise, light aircraft, and construction activities.

*Table 4-1: Total measured noise levels*

| Monitoring Location | Date and Start time | $L_{Amax}$, dB | $L_{A10}$, dB | $L_{Aeq}$, dB | $L_{Amin}$, dB | $L_{A90}$, dB | Notes |
|---|---|---|---|---|---|---|---|
| A5 | 16/02/2026 07:14 | 107.2 | 74.3 | 73.8 | 52.5 | 58.5 | Site noise was not audible; measurements were influenced by local traffic. |
| A5 | 16/02/2026 07:31 | 88.2 | 74.1 | 70.6 | 51.4 | 58.2 | |
| A6 | 16/02/2026 07:51 | 83.2 | 69.5 | 66.6 | 47.8 | 52.5 | Site noise was not audible; measurements were influenced by local traffic and birds. |
| A6 | 16/02/2026 08:21 | 81.0 | 68.2 | 64.8 | 45.6 | 51.1 | |
| A2 | 16/02/2026 08:42 | 77.2 | 58.0 | 55.1 | 39.0 | 41.4 | Site noise was not audible; measurements were influenced by light aircraft, local traffic and birds. |
| A2 | 16/02/2026 08:58 | 83.2 | 55.2 | 57.4 | 37.1 | 40.0 | |
| A4 | 16/02/2026 09:24 | 79.8 | 72.8 | 71.3 | 67.0 | 69.0 | Site noise was not audible; measurements were influenced by local traffic, insects and birds' noise. |
| A4 | 16/02/2026 09:40 | 80.3 | 75.6 | 74.3 | 70.2 | 72.3 | |
| A3 | 16/02/2026 10:14 | 80.3 | 64.3 | 62.5 | 48.5 | 51.7 | Site noise was hardly audible; measurements were influenced by construction activities (rattle guns). |
| A3 | 16/02/2026 10:30 | 81.9 | 63.5 | 63.2 | 48.7 | 52.1 | |
| A1 | 16/02/2026 10:49 | 80.6 | 66.8 | 63.3 | 48.1 | 51.6 | Site noise was not audible; measurements were influenced by construction activities (rattle guns). |
| A1 | 16/02/2026 11:05 | 74.4 | 57.0 | 57.2 | 44.6 | 47.1 | |
| A5 | 17/02/2026 07:15 | 91.0 | 74.5 | 71.5 | 49.3 | 54.6 | Site noise was not audible; measurements were influenced by local traffic. |
| A5 | 17/02/2026 07:31 | 86.7 | 73.9 | 70.5 | 49.5 | 56.5 | |
| A6 | 17/02/2026 07:51 | 82.5 | 69.6 | 66.3 | 43.1 | 51.6 | Site noise was not audible; measurements were influenced by local traffic. |
| A6 | 17/02/2026 08:06 | 79.6 | 69.1 | 65.5 | 42.7 | 53.0 | |
| A2 | 17/02/2026 08:26 | 75.3 | 53.2 | 53.9 | 34.2 | 37.4 | Site noise was not audible; measurements were influenced by local traffic and birds. |
| A2 | 17/02/2026 08:42 | 77.7 | 59.1 | 57.3 | 43.4 | 47.3 | |
| A4 | 17/02/2026 09:01 | 83.2 | 71.4 | 70.1 | 61.8 | 66.5 | Site noise was not audible; measurements were influenced by local traffic, insects and birds' noise. |
| A4 | 17/02/2026 09:17 | 81.5 | 71.8 | 70.2 | 63.6 | 65.5 | |
| A1 | 17/02/2026 09:39 | 88.5 | 63.4 | 64.0 | 50.0 | 52.2 | Site noise was not audible; measurements were influenced by construction activities (rattle guns). |
| A1 | 17/02/2026 10:30 | 80.0 | 66.0 | 64.7 | 49.3 | 52.5 | |
| A3 | 17/02/2026 10:50 | 78.5 | 60.3 | 60.1 | 46.2 | 48.3 | Site noise was hardly audible; measurements were influenced by construction activities (rattle guns). |
| A3 | 17/02/2026 11:06 | 75.1 | 57.1 | 56.5 | 45.5 | 49.9 | |

## 4.2 Atmospheric conditions

As required by condition L3.4 of the EPL, meteorological data was obtained from the Badgerys Creek AWS (station ID 067108) which allowed correlation of atmospheric parameters with measured site noise levels.

Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height. Meteorological conditions recorded by Badgerys Creek AWS on 16/02/2026 and 17/02/2026 are provided in Table 4-2 below.

*Table 4-2: Meteorological conditions (Station ID 067108)*

| Monitoring Location | Time and Date | Temperature, $^0$C | Wind Speed, km/h | Wind Speed, m/s[1] | Wind Direction |
|---|---|---|---|---|---|
| A5 | 16/02/2026 07:14 | 15.7 | 4 | 1.1 | SW |
| A5 | 16/02/2026 07:31 | 16.2 | 7 | 1.9 | WSW |
| A6 | 16/02/2026 07:51 | 16.2 | 7 | 1.9 | WSW |
| A6 | 16/02/2026 08:21 | 16.7 | 7 | 1.9 | SW |
| A2 | 16/02/2026 08:42 | 18.2 | 9 | 2.5 | SW |
| A2 | 16/02/2026 08:58 | 18.2 | 9 | 2.5 | SW |
| A4 | 16/02/2026 09:24 | 19.7 | 9 | 2.5 | SW |
| A4 | 16/02/2026 09:40 | 21.0 | 9 | 2.5 | SW |
| A3 | 16/02/2026 10:14 | 22.4 | 7 | 1.9 | SSE |
| A3 | 16/02/2026 10:30 | 23.1 | 6 | 1.7 | SE |
| A1 | 16/02/2026 10:49 | 23.1 | 6 | 1.7 | SE |
| A1 | 16/02/2026 11:05 | 22.5 | 7 | 1.9 | SE |
| A5 | 17/02/2026 07:15 | 15.7 | 4 | 1.1 | SSE |
| A5 | 17/02/2026 07:31 | 16.5 | 4 | 1.1 | SSE |
| A6 | 17/02/2026 07:51 | 16.5 | 4 | 1.1 | SSE |
| A6 | 17/02/2026 08:06 | 17.5 | 0 | 0 | CALM |
| A2 | 17/02/2026 08:26 | 17.5 | 0 | 0 | CALM |
| A2 | 17/02/2026 08:42 | 19.0 | 0 | 0 | CALM |
| A4 | 17/02/2026 09:01 | 20.8 | 2 | 0.6 | SSE |
| A4 | 17/02/2026 09:17 | 20.8 | 2 | 0.6 | SSE |
| A1 | 17/02/2026 09:39 | 22.3 | 6 | 1.7 | NE |
| A1 | 17/02/2026 10:30 | 24.4 | 15 | 4.2 | N |
| A3 | 17/02/2026 10:50 | 24.4 | 15 | 4.2 | N |
| A3 | 17/02/2026 11:06 | 25.3 | 19 | 5.3 | NNE |

Note: 1. Wind speed of 0.5 m/s and 0 m/s indicated calm conditions at monitoring location.

## 4.3 Compliance Assessment

### 4.3.1 Monitoring results

Table 4-3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Badgerys Creek AWS. Noise enhancing limits are applicable if weather conditions were within specified parameters during each measurement, otherwise the NPfI's 'very noise enhancing' limits apply (i.e. noise enhancing plus 5dB).

In accordance with the EPL, the applicable noise limits during these periods were those specified in Condition L3.1, with an additional 5 dB(A) allowance. The average wind speed and stability category recorded at the Badgerys Creek automatic weather station (AWS) (Station ID 067108) for each 15-minute attended measurement are summarised in Table 4-3 below.

*Table 4-3: Site monitoring results and limits*

| Monitoring Location | Start time and date | Wind Speed, m/s[2] | Stability Category | Noise enhancing limits apply | EPL Limits, dB | Site Noise levels, dB[5] | Exceedances, dB[3] |
|---|---|---|---|---|---|---|---|
| | | | | | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ |
| A5 (R1) | 16/02/2026 07:14 | 1.1 | D | N | 41 | IA | Nil |
| A5 (R1) | 16/02/2026 07:31 | 1.9 | D | N | 41 | IA | Nil |
| A6 (R2) | 16/02/2026 07:51 | 1.9 | D | N | 43 | IA | Nil |
| A6 (R2) | 16/02/2026 08:21 | 1.9 | D | N | 43 | IA | Nil |
| A2 (R4) | 16/02/2026 08:58 | 2.5 | D | N | 46 | IA | Nil |
| A2 (R4) | 16/02/2026 09:24 | 2.5 | D | N | 46 | IA | Nil |
| A2 (R5) | 16/02/2026 08:58 | 2.5 | D | N | 45 | IA | Nil |
| A2 (R5) | 16/02/2026 09:24 | 2.5 | D | N | 45 | IA | Nil |
| A2 (R7)[4] | 16/02/2026 08:58 | 2.5 | D | N | 41 | IA | Nil |
| A2 (R7)[4] | 16/02/2026 09:24 | 2.5 | D | N | 41 | IA | Nil |
| A4 (R8)[4] | 16/02/2026 09:24 | 2.5 | D | N | 41 | IA | Nil |
| A4 (R8)[4] | 16/02/2026 09:40 | 2.5 | D | N | 41 | IA | Nil |
| A3 (R6) | 16/02/2026 10:14 | 1.9 | D | N | 52 | 51.5 | Nil |
| A3 (R6) | 16/02/2026 10:30 | 1.7 | D | N | 52 | 52.1 | Nil |
| A1 (R3) | 16/02/2026 10:49 | 1.7 | D | N | 53 | 51.6 | Nil |
| A1 (R3) | 16/02/2026 11:05 | 1.9 | D | N | 53 | 47.1 | Nil |
| A5 (R1) | 17/02/2026 07:15 | 1.1 | D | N | 41 | IA | Nil |
| A5 (R1) | 17/02/2026 07:31 | 1.1 | D | N | 41 | IA | Nil |
| A6 (R2) | 17/02/2026 07:51 | 1.1 | D | N | 43 | IA | Nil |
| A6 (R2) | 17/02/2026 08:06 | 0 | D | N | 43 | IA | Nil |
| A2 (R4) | 17/02/2026 08:26 | 0 | D | N | 46 | IA | Nil |
| A2 (R4) | 17/02/2026 08:42 | 0 | D | N | 46 | IA | Nil |
| A2 (R5) | 17/02/2026 08:26 | 0 | D | N | 45 | IA | Nil |
| A2 (R5) | 17/02/2026 08:42 | 0 | D | N | 45 | IA | Nil |

| Monitoring Location | Start time and date | Wind Speed, m/s[2] | Stability Category | Noise enhancing limits apply | EPL Limits, dB | Site Noise levels, dB[5] | Exceedances, dB[3] |
|---|---|---|---|---|---|---|---|
| | | | | | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ |
| A2 (R7)[4] | 17/02/2026 08:26 | 0 | D | N | 41 | IA | Nil |
| A2 (R7)[4] | 17/02/2026 08:42 | 0 | D | N | 41 | IA | Nil |
| A4 (R8)[4] | 17/02/2026 09:17 | 0.6 | D | N | 41 | IA | Nil |
| A4 (R8)[4] | 17/02/2026 09:39 | 0.6 | D | N | 41 | IA | Nil |
| A1(R3) | 17/02/2026 09:39 | 1.7 | D | N | 53 | 52.2 | Nil |
| A1 (R3) | 17/02/2026 10:30 | 4.2 | C | Y | 58[1] | 52.5 | Nil |
| A3 (R6) | 17/02/2026 10:50 | 4.2 | C | Y | 57[1] | 48.3 | Nil |
| A3 (R6) | 17/02/2026 11:06 | 5.3 | C | Y | 57[1] | 49.9 | Nil |

Notes:

1. In accordance with Condition L3.2, where meteorological conditions exceed those specified in Condition L3.1, the EPL limits for these periods are those listed in Condition L3.1 plus 5 dB (A).
2. Wind speed 0 m/s or 0.5 m/s indicates calm conditions.
3. A 1 to 2 dB exceedance is considered by the EPA as negligible in accordance with Section 4.2 of the NPfI (EPA 2017).
4. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties (NPfI, EPA 2017) if applicable.
5. AI where site was noted as inaudible from monitoring location.

### 4.3.2 Monitoring results discussion

Attended noise monitoring and observations were conducted on Monday 16th and Tuesday 17th February 2026 at six representative monitoring locations surrounding the site to assess noise levels associated with quarry rehabilitation activities and verify compliance with the limits specified in condition L3.3 of EPL 21562.

Meteorological conditions during the monitoring period were generally calm, with light winds ranging from 0 to 4.2 m/s and were generally suitable for environmental noise monitoring. One measurement exceeded the recommended wind limit for attended noise monitoring (5.0 m/s), with a wind speed of 5.3 m/s recorded at 11:00 am on 17th February 2026 at monitoring location A3. This minor exceedance is considered unlikely to have materially influenced the monitoring results.

During the monitoring period, noise from quarry-related activities was generally inaudible at most monitoring locations. Where audible, quarry noise was very minor and occurred only intermittently at one monitoring location. At most locations, the acoustic environment was dominated by local road traffic, bird activity, light aircraft movements, and construction activities associated with the adjacent development site located immediately north of the quarry.

At the monitoring locations where quarry site noise was not audibly distinguishable from surrounding ambient noise, the site contribution could not be reliably quantified.

Noise levels at all monitoring locations complied with the EPL limits, confirming that current rehabilitation and maintenance activities at the quarry are being undertaken in accordance with regulatory noise requirements and are not causing adverse noise impacts to nearby sensitive receivers. Operational noise emissions from the site are minimal and primarily associated with rehabilitation and maintenance activities.

Overall, the monitoring results indicate that current site activities are not generating noise levels that would adversely affect nearby sensitive receivers, and that the surrounding acoustic environment is primarily influenced by surrounding environmental and community noise sources rather than quarry-related activities.

# **Appendix A** – Extract of EPL 21562

# Environment Protection Licence



**POINT 9**

| Pollutant | Units of Measure | 50 Percentile concentration limit | 90 Percentile concentration limit | 3DGM concentration limit | 100 percentile concentration limit |
|---|---|---|---|---|---|
| Conductivity | microsiemens per centimetre | | | | 4300 |
| Oil and Grease | Visible | | | | Not visible |
| pH | pH | | | | 6.5-8.8 |
| Turbidity | nephelometric turbidity units | | | | 50 |

**POINT 10**

| Pollutant | Units of Measure | 50 Percentile concentration limit | 90 Percentile concentration limit | 3DGM concentration limit | 100 percentile concentration limit |
|---|---|---|---|---|---|
| Conductivity | microsiemens per centimetre | | | | 2100 |
| pH | pH | | | | 6.5-8.5 |

**POINT 12**

| Pollutant | Units of Measure | 50 Percentile concentration limit | 90 Percentile concentration limit | 3DGM concentration limit | 100 percentile concentration limit |
|---|---|---|---|---|---|
| Conductivity | microsiemens per centimetre | | | | 4300 |
| pH | pH | | | | 6.5-8.8 |
| Turbidity | nephelometric turbidity units | | | | 50 |

L2.5 Discharges from Discharge Point 12 must not occur until a rainfall of event of at least 15 millimetres in a day has occurred.

L2.6 Discharges from Discharge Point 12 must immediately cease when conductivity at Monitoring Point 10 reaches 2,100 micro-siemens per centimetre.

## L3 Noise limits

L3.1 Noise generated at the premises that is measured at each noise monitoring point established under this

# Environment Protection Licence



licence must not exceed the noise levels specified in Column 4 of the table below for that point during the corresponding time periods specified in Column 1 when measured using the corresponding measurement parameters listed in Column 2.

**POINT 1**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 41 |

**POINT 2**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 43 |

**POINT 3**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 53 |

**POINT 4**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 46 |

**POINT 5**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 45 |

**POINT 6**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 52 |

# Environment Protection Licence

Licence - 21562

**POINT 7**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 41 |

**POINT 8**

| Time period | Measurement parameter | Measurement frequency | Noise level dB(A) |
|---|---|---|---|
| Day | LAeq (15 minute) | 2 times a year | 41 |

Note: EPA Identification No. 4 and 7 are entitled to negotiated agreement under the *Voluntary Land Acquisition and Mitigation Policy*. Where negotiated agreements are in place noise limits will not apply.

L3.2 For the purposes of Condition L3.1:

a) Day means the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.

L3.3 Noise-enhancing meteorological conditions

a) The noise limits set out in Condition L3.1 apply under the meteorological conditions in the table below.
b) For those meteorological conditions not referred to in the table below, the noise limits that apply are the noise limits in Condition L3.1 plus 5dB.

| Assessment Period | Meteorological Conditions |
|---|---|
| Day | Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level. |
| Evening | Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level. |
| Night | Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level; or<br>Stability category E and F with wind speeds up to and including 2m/s at 10m above ground level. |

L3.4 For the purposes of Condition L3.3:

a) The meteorological conditions are to be determined from the meteorological weather station identified as BoM monitoring point at Badgerys Creek.
b) Stability category shall be determined using the following method from Fact Sheet D of the Noise Policy for Industry (NSW EPA, 2017):

i. Use of sigma-theta data (section D1.4).

L3.5 To assess compliance:

a) with the LAeq(15 minutes) noise limits in Condition L3.1 and L3.3, the noise measurement equipment must be located:

(i) approximately on the property boundary, where any residence is situated 30 metres or less from the property boundary closest to premises; or where applicable,
(ii) in an area within 30 metres of a residence façade, but not closer than 3 metres where any residence on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable,
(iii) in an area within 50 metres of the boundary of a National Park or Nature Reserve,
(iv) at any other location identified in Condition L3.1.

b) with the LAeq(15 minutes) noise limits in Condition L3.1 and L3.3, the noise measurement equipment must be located:

(i) at the reasonably most affected point at a location where there is no residence at the location; or,
(ii) at the reasonably most affected point within an area at a location prescribed by Condition L3.5 (a).

c) with the LAeq(15 minutes) noise limits in Condition L3.1 and L3.3, where it can be demonstrated that direct measurement of noise from a relevant monitoring point is impractical, the EPA may accept alternative means of determining compliance as per Chapter 7 of the NSW Noise Policy for Industry.

L3.6 A non-compliance of Conditions L3.1 and L3.3 will still occur where noise generated from the premises is measured in excess of the noise limit at a point other than the reasonably most affected point at the locations referred to in Condition L3.5 (a) or L3.5 (b).

Note: The reasonably most affected point is a point at a location or within an area at a location experiencing or expected to experience the highest sound pressure level from the premises.

L3.7 For the purpose of determining the noise generated from the premises, the modifying factor corrections in Table C1 in Fact Sheet C of the Noise Policy for Industry (NSW EPA, 2017) may be applied, if appropriate, to the noise measurements by the noise monitoring equipment.

L3.8 Noise measurements must not be undertaken where rain or wind speed at microphone level will affect the acquisition of valid measurements.

L3.9 The following definitions apply to this licence:

a) Noise Policy for Industry - the document entitled “Noise Policy for Industry” published by the NSW Environment Protection Authority in October 2017.

b) Noise – ‘sound pressure levels’ for the purposes of Conditions L3.1 to L3.8.

- LAeq (15 minute) - the value of the A-weighted sound pressure level of a continuous steady sound that, over a 15 minute time interval, has the same mean square sound pressure level as a sound under consideration with a level that varies with time (Australian Standard AS 1055:2018 Acoustics: description and measurement of environmental noise).
- LAFmax – the maximum sound pressure level of an event measured with a sound level meter satisfying Australian Standard AS IEC 61672.1-2013 Electroacoustics - Sound level meters - Part 1: Specifications set to ‘A’ frequency weighting and fast time weighting.

# Appendix B – Noise Perception and Examples Site

## NOISE LEVELS

Table A-1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A-1.

*Table A-1: Perceived change in noise*

| Change in sound pressure level, dB(A) | Perceived change in noise |
|---|---|
| Up to 2 | Not perceptible |
| 3 | Just perceptible |
| 5 | Noticeable difference |
| 10 | Twice (or half) as loud |
| 15 | Large change |
| 20 | Four times (or quarter) as loud |

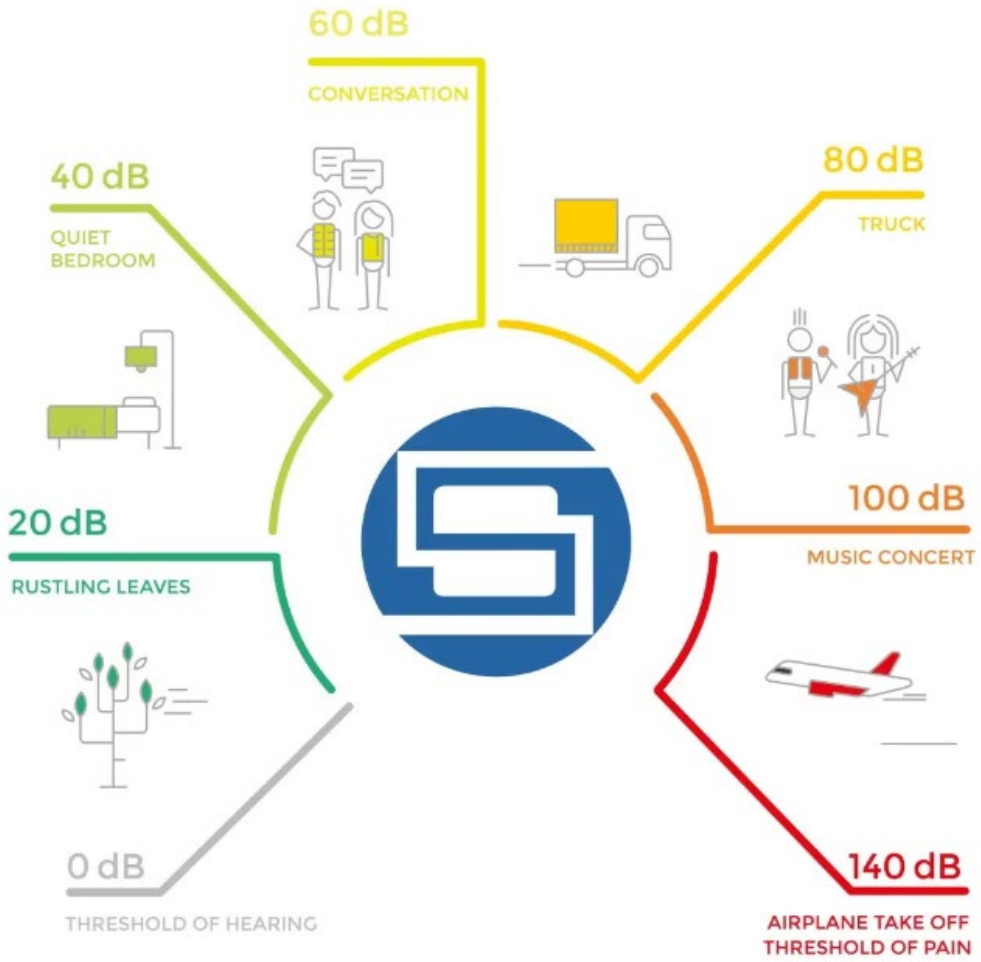



*Figure A-1: Common noise levels*

# Appendix C – Calibration Certificates

# CERTIFICATE OF CALIBRATION

**CERTIFICATE NO: C54610**

**EQUIPMENT TESTED :** Acoustic Calibrator

| | | | |
|---|---|---|---|
| **Make & Model:** | Svantek SV 33B | **Serial No:** | 109960 |
| **Class:** | 1 | | |
| **Owner:** | Acu-Vib Electronics<br>Unit 14/22 Hudson Ave<br>Castle Hill NSW 2154 | | |
| **Tests Performed:** | Measured Output Pressure level, Frequency & Distortion | | |
| **Comments:** | See Details and Class Tolerance overleaf. | | |

**CONDITION OF TEST:**

| | | | | |
|---|---|---|---|---|
| **Ambient Pressure** | 990 | hPa ±1 hPa | **Date of Receipt :** | 10/07/2025 |
| **Temperature** | 22 | °C ±1° C | **Date of Calibration :** | 10/07/2025 |
| **Relative Humidity** | 41 | % ±5% | **Date of Issue :** | 10/07/2025 |

**Acu-Vib Test Procedure:** AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

**CHECKED BY:** L. Gail **AUTHORISED SIGNATURE:** J.M. Kielt .....

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

Acu-Vib Electronics
ACOUSTICS AND VIBRATIONS
Head Office & Calibration Laboratory
Unit 14, 22 Hudson Avenue, Castle Hill NSW 2154
(02) 9680 8133
www.acu-vib.com.au

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

## CERTIFICATE NO: C54610

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

| Clause | Test description |
|---|---|
| B4.6 | Sound Pressure Level<br>(By comparison with a reference calibrator). |
| B4.7 | Frequency<br>(By measurement with a calibrated frequency meter). |
| B4.8 | Total distortion and noise.<br>(By measurement with a calibrated Noise and Distortion meter). |

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

| Parameter | Pre-Adj | Adj Y/N | Output: **(dB re 20 µPa)** | Frequency **(Hz)** | THD&N **(%)** |
|---|---|---|---|---|---|
| Level: | NA | N | 114.01 dB | 1000.02 Hz | 0.35 % |
| Uncertainty | | | ±0.11 dB | ±0.05% | ±0.40 % |
| Uncertainty (at 95% c.l.) k=2 | | | | | |

| Parameter | Class 1 | | Class 2 | |
|---|---|---|---|---|
| Nominal Frequency | 250 Hz | 1 kHz | 250 Hz | 1 kHz |
| Output dB SPL | 0.25 dB | 0.25 dB | 0.40 dB | 0.40 dB |
| Frequency Hz | 0.7 % (1.75 Hz) | 0.7 % (7 Hz) | 1.7 % (4.25 Hz) | 1.7 % (17 Hz) |
| THD&N | 2.5 % | 2.5 % | 3.0 % | 3.0 % |

Tolerance limits from AS/IEC60942 (edition 4)

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

----ooooOoooo----

# CERTIFICATE OF CALIBRATION

**CERTIFICATE NO: SLM56122**

**EQUIPMENT TESTED:** Sound Level Meter

| | | | |
|---|---|---|---|
| **Make & Model:** | Svantek SVAN 971 | **Serial No:** | 39170 |
| **Mic. Model:** | ACO Pacific 7052E | **Serial No:** | 57326 |
| **Pre-Amp. Model:** | Svantek SV 18 | **Serial No:** | 38587 |
| **Band-Pass Filter:** | 1/3 Octave | **Test No:** | F056123 |

**Owner:** Acu-Vib Electronics
Unit 14/22 Hudson Ave
Castle Hill NSW 2154

**Tests Performed:** IEC 61672-3:2013 & IEC 61260-3:2016

**Comments:** All Test passed for Class 1. (See overleaf for details)

**CONDITIONS OF TEST:**

| | | | | |
|---|---|---|---|---|
| **Ambient Pressure** | 1005 | hPa ±1 hPa | **Date of Receipt :** | 12/11/2025 |
| **Temperature** | 22 | °C ±1° C | **Date of Calibration :** | 12/11/2025 |
| **Relative Humidity** | 33 | % ±5% | **Date of Issue :** | 17/11/2025 |

**Acu-Vib Test Procedure:** AVP10 (SLM) & AVP06 (Filters)

**CHECKED BY:** ..... L Gail

**AUTHORISED SIGNATURE:** ..... H. Soe, Lab Manager

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

## CERTIFICATE NO: SLM56122

**The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013**

| **Tests Performed:** | *Clause* | *Result* |
|---|---|---|
| *Absolute Calibration* | 10 | Pass |
| *Acoustical Frequency Weighting* | 12 | Pass |
| *Self-Generated Noise* | 11.1 | Observed |
| *Electrical Noise* | 11.2 | Observed |
| *Long Term Stability* | 15 | Pass |
| *Electrical Frequency Weightings* | 13 | Pass |
| *Frequency and Time Weightings* | 14 | Pass |
| *Reference Level Linearity* | 16 | Pass |
| *Range Level Linearity* | 17 | Pass |
| *Toneburst* | 18 | Pass |
| *Peak C Sound Level* | 19 | Pass |
| *Overload Indicator* | 20 | Pass |
| *High Level Stability* | 21 | Pass |

**Statement of Compliance:** The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.

**This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 61260-3:2016 and were conducted to test the following performance characteristics:**

| **Tests performed** | *Clause* | *Result* |
|---|---|---|
| *Test of relative attenuation at filter midband frequency* | 10 | Pass |
| *Linear operating range including range control if fitted* | 11 | Pass |
| *Test of lower limit of linear operating range* | 12 | Pass |
| *Measurement of relative attenuation (filter shape)* | 13 | Pass |

The filter submitted for testing successfully completed the tests listed above for the environmental conditions under which the tests were performed. If the filter type has successfully completed the pattern-evaluation tests of IEC 61260-2 then it can be stated that the filter set continues to conform to the specifications of IEC 61260-1.

**A full technical report is available on request.**

# LUDDENHAM QUARRY

# NOISE COMPLIANCE REPORT – JULY 2026

13 JULY 2026

# Luddenham Quarry

# Noise Compliance Report – July 2026

Luddenham Operations Pty Ltd

## REVISIONS

| Revision | Date | Prepared by | Reviewed by | Revision Comments |
|---|---|---|---|---|
| 1 | 13/07/2026 | Elena Ivanova | Pascal Bobillier | Final |
| | | | | |

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# 1 INTRODUCTION

## 1.1 Overview

Luddenham Operations Pty Ltd operates the shale/clay quarry (the site) under the Environmental Protection Licence (EPL) 21562. The site is located at 275 Adams Road, Luddenham, NSW.

Quarry extraction activities ceased in December 2024, and no extractive activities have been undertaken at the quarry site since that time. The site is currently undergoing rehabilitation in accordance with the approved Site Rehabilitation Plan, which includes the removal of products and overburden materials stockpiled on site.

The purpose of noise monitoring was to quantify environmental noise levels surrounding the site and assess compliance with the noise limits specified in Condition L3.3 of EPL 21562.

Attended environmental noise monitoring, as outlined in this report, was conducted in general accordance with Condition L3 of the EPL. The bi-annual noise monitoring was undertaken during the daytime periods of 7th and 8th July 2026 at six representative monitoring locations. Monitoring results are presented in Section 4 of this report.

Immediately to the north of the quarry is a construction site occupying approximately three (3) hectares of the total site area (Lot 3, DP 623799). Construction activities are being carried out under development consent (SSD-10446) that was granted to Coombes Property Group (CPG) to construct and operate a resource recovery facility. Once fully operational, this facility will be permitted to receive and process up to 600,000 tonnes per annum (TPA) of construction and demolition waste, as well as commercial and industrial waste (general solid waste (non-putrescible)). The main activities observed during the monitoring period included installation of building cladding and concrete works.

## 1.2 Attended Monitoring Locations

Site monitoring locations are detailed in Table 1-1 and shown on Figure 1-1. It should be noted that Figure 1-1 shows actual monitoring positions, not necessarily the location of residences.

*Table 1-1: Attended noise monitoring locations*

| Monitoring Location ID | Sensitive Receiver ID | Location Description | Sensitive Receivers | Comments | Monitoring locations GDA94/MGA56 | |
|---|---|---|---|---|---|---|
| | | | | | Easting | Northing |
| A5 | R1 | Approximately 880m northwest of the site | 2161–2177 Elizabeth Drive, Luddenham | Occupied | 288807 | 6250432 |
| A6 | R2 | Approximately 680m northwest of the site | 2111–2141 Elizabeth Drive, Luddenham | Unoccupied (building demolished) | 289142 | 6250089 |
| A1 | R3 | Approximately 260m north of the site | 285 Adams Road, Luddenham | Unoccupied (used as laydown area) | 288937 | 6249498 |
| A2 | R4 | Approximately 635m southwest of the site | 5 Anton Road, Luddenham utilised for R4, R5 and R7 | Occupied | 288345 | 6249200 |
| | R5 | | 185 Adams Road, Luddenham | Unoccupied | | |
| | R7 | | 161 Adams Road, Luddenham | Occupied | | |
| A3 | R6 | Approximately 260m west of the site | 225 Adams Road, Luddenham | Occupied | 288912 | 6249491 |

| Monitoring Location ID | Sensitive Receiver ID | Location Description | Sensitive Receivers | Comments | Monitoring locations GDA94/MGA56 | |
|---|---|---|---|---|---|---|
| | | | | | Easting | Northing |
| A4 | R8 | Approximately 1020m northwest of the site | 196–214 Adams Road, Luddenham utilised for R8 – 2510–2550 Elizabeth Drive, Luddenham | Occupied | 288632 | 6249769 |

## 1.3 Monitoring Period

Condition L 3.1 of EPL 21562 requires noise monitoring to be undertaken during the day period.

For the purposes of Condition L3.1:

a) Day means the period from 7am to 6pm Monday to Saturday and the period from 8am to 6pm Sunday and public holidays.




*Figure 1-1: Site and noise monitoring locations*

# 2 NOISE LIMITS

## 2.1 Environmental Protection Licence

The bi-annual monitoring is a requirement as detailed in EPL 21562. The noise assessment criteria for the quarry site are provided in condition L3.1 of EPL 21562. These criteria are specified for the day period at locations which are representative of residences potentially most impacted by site noise. Pages from the site's EPL pertaining to noise are shown in Appendix A. In addition, Appendix B provides information on how changes in noise levels are typically perceived by an average person, together with examples of common noise levels.

## 2.2 Noise limits

Noise impact limits from condition L3.3 of EPL 21562 are provided in Table 2-1.

*Table 2-1: Noise limits*

| Monitoring Location Description | Monitoring Location ID | Sensitive Receiver ID | Monitoring Frequency | Day |
|---|---|---|---|---|
| | | | | $L_{Aeq,15minute}$ |
| 2161–2177 Elizabeth Drive, Luddenham | A5 | R1 | Two times a year | 41 |
| 2111–2141 Elizabeth Drive, Luddenham | A6 | R2 | Two times a year | 43 |
| 285 Adams Road, Luddenham | A1 | R3 | Two times a year | 53 |
| 5 Anton Road, Luddenham | A2 | R4 | Two times a year | 46 |
| 185 Adams Road, Luddenham | A2 | R5 | Two times a year | 45 |
| 161 Adams Road, Luddenham | A2 | R7 | Two times a year | 41 |
| 225 Adams Road, Luddenham | A3 | R6 | Two times a year | 52 |
| 2510–2550 Elizabeth Drive, Luddenham | A4 | R8 | Two times a year | 41 |

## 2.3 Meteorological conditions

Condition L3.3 of the EPL states the noise-enhancing meteorological conditions which the noise limits apply under:

a) The noise limits set out in condition L3.1 apply under the meteorological conditions listed in table below.
b) For those meteorological conditions not referred to in the table below, the noise limits that apply are the noise limits in condition L3.1 table plus 5dB.

The table from Condition L3.3 is reproduced in Table 2-2 below.

*Table 2-2: Applicable meteorological conditions*

| Assessment period | Measurement Parameter |
|---|---|
| Day | Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level |

Condition L3.4 specifies the source of meteorological data to be used and method for determining stability categories:

L3.4 For the purpose of condition L3.3:

a) The meteorological conditions are to be determined from meteorological data obtained from the meteorological weather station identified as BoM monitoring point at Badgerys Creek.
b) Stability category shall be determined using the following method from Fact Sheet D of the Noise Policy for Industry (NSW EPA, 2017):
    i. Use of sigma-theta data (section D1.4).

## 2.4 Other considerations

Monitoring and reporting were undertaken in accordance with the NSW EPA 'Noise Policy for Industry' (NPfI) issued in October 2017 and the 'Approved methods for the measurement and analysis of environmental noise in NSW' (Approved Methods) issued in January 2022.

# 3 METHODOLOGY

## 3.1 Overview

Attended environmental noise monitoring was undertaken in general accordance with Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW requirements. Meteorological data was obtained from the Badgerys Creek automatic weather station (AWS) (station ID 067108) which allowed correlation of atmospheric conditions during measured noise levels. Extracted sections of the weather data are reproduced in Table 4-2.

## 3.2 Attended Noise Monitoring

Attended noise monitoring was conducted during the day period at each location specified in Table 1-1of this report in accordance with condition M7 of EPL 21562.

Measured sound levels from various sources were noted during each measurement and particular attention was paid to the extent of site's contribution (if any) to measured levels. This approach is consistent with the approved NMP for the site and the NPfI.

All monitoring results noted in this report were due to one or more of the following:

- Site noise levels were very low, typically more than 10 dB below the measured background (LA90), and unlikely to be noticed.
- Site noise levels were masked by more dominant sources that are characteristic of the environment (such as birdsongs, light aircraft noise, continuous road traffic noise or construction activities adjacent to the quarry that cannot be eliminated by monitoring at an alternate or intermediate location.
- It was not feasible or reasonable to employ methods, such as to move closer and back calculate. Cases may include rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation conditions may not be representative.

If exact noise levels from site could not be established due to masking by other noise sources in a similar frequency range but were determined to be at least 5dB lower than relevant limits, then a maximum estimate of site may be provided. This is expressed as a 'less than' quantity, such as <20 dB or <30 dB.

## 3.3 Modifying Factors

All measurements were evaluated for potential modifying factors in accordance with the NPfI. Assessment of modifying factors is undertaken at the time of measurement if the site was audible and directly quantifiable. If applicable, modifying factor penalties have been reported and added to measured site-only $L_{Aeq}$.

Low-frequency modifying factor penalties have only been applied to site-only $L_{Aeq}$ levels if the site was the only contributing low-frequency noise source. Specific methodology for assessment of each modifying factor is outlined in Fact Sheet C of the NPfI.

## 3.4 Instrumentation

Equipment used to measure environmental noise levels is detailed in Table 3-1. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dB Calibration certificates are provided in Appendix C.

*Table 3-1: Measurement equipment*

| Item | Serial Number | Date of Calibration |
|---|---|---|
| Acoustic Calibrator Svantek, SV 33B | 93125 | 10/07/2025 |
| Sound Level Meter Svantek, SVAN 971 | 39170 | 12/11/2025 |

# 4 RESULTS

## 4.1 Total measured Noise Levels

Table 4-1 presents the total noise levels measured during each 15-minute attended monitoring period; these levels do not necessarily reflect noise solely generated by activities at the quarry site

During the monitoring period, site operations were audible at one monitoring location, as activities were conducted in close proximity to that location. Additional sounds included local traffic acceleration, surround construction works, birdsong and light aircraft.

*Table 4-1: Total measured noise levels*

| Monitoring Location | Date and Start time | $L_{Amax}$, dB | $L_{A10}$, dB | $L_{Aeq}$, dB | $L_{Amin}$, dB | $L_{A90}$, dB | Notes |
|---|---|---|---|---|---|---|---|
| A5 | 07/07/2026 07:18 | 89.0 | 80.0 | 75.0 | 61.9 | 62.4 | Site noise was not audible; measurements were influenced by local traffic, and construction works next to the monitoring point. |
| A5 | 07/07/2026 07:36 | 71.9 | 72.0 | 68.1 | 65.5 | 65.2 | |
| A6 | 07/07/2026 07:57 | 56.4 | 56.5 | 55.6 | 54.8 | 55.0 | Site noise was not audible; measurements were influenced by local traffic and birds. |
| A6 | 07/07/2026 08:22 | 84.0 | 68.7 | 65.4 | 47.7 | 51.2 | |
| A2 | 07/07/2026 08:45 | 79.2 | 56.8 | 58.1 | 41.3 | 44.6 | Site noise was not audible; measurements were influenced by light aircraft, local traffic and birds. |
| A2 | 07/07/2026 09:02 | 75.0 | 55.2 | 56.7 | 41.3 | 44.0 | |
| A4 | 07/07/2026 09:22 | 81.9 | 64.5 | 63.4 | 44.5 | 46.5 | Site noise was not audible; measurements were influenced by local traffic, insects and birds' noise. |
| A4 | 07/07/2026 09:39 | 82.2 | 61.5 | 61.1 | 42.2 | 45.5 | |
| A1 | 07/07/2026 11:18 | 74.0 | 56.8 | 55.5 | 45.9 | 47.9 | Quarry noise audible but not dominant; measurements influenced by adjacent construction activities. |
| A1 | 07/07/2026 11:34 | 87.5 | 65.7 | 67.1 | 47.0 | 50.1 | |
| A3 | 07/07/2026 11:55 | 61.0 | 49.3 | 47.0 | 40.0 | 42.4 | Quarry noise audible but not dominant; measurements influenced by birds and adjacent construction activities. |
| A3 | 07/07/2026 12:11 | 61.2 | 50.8 | 47.9 | 38.7 | 42.0 | |
| A5 | 08/07/2026 07:18 | 87.9 | 69.5 | 67.0 | 50.6 | 56.1 | Site noise was not audible; measurements were influenced by local traffic, and construction works next to the monitoring point. |
| A5 | 08/07/2026 07:33 | 87.3 | 70.4 | 67.5 | 51.2 | 55.1 | |
| A6 | 08/07/2026 07:52 | 82.7 | 67.6 | 64.5 | 46.8 | 49.5 | Site noise was not audible; measurements were influenced by local traffic. |
| A6 | 08/07/2026 08:08 | 79.0 | 68.2 | 64.3 | 44.6 | 48.7 | |
| A1 | 08/07/2026 08:31 | 86.7 | 68.3 | 67.1 | 49.2 | 51.8 | Quarry noise audible but not dominant; measurements influenced by adjacent construction activities. |
| A1 | 08/07/2026 08:47 | 83.9 | 69.5 | 66.7 | 47.2 | 50.5 | |
| A3 | 08/07/2026 09:07 | 72.3 | 57.0 | 54.6 | 43.0 | 45.3 | Quarry noise audible but not dominant; measurements influenced by birds and adjacent construction activities. |
| A3 | 08/07/2026 09:23 | 66.9 | 51.8 | 50.6 | 43.9 | 45.8 | |
| A2 | 08/07/2026 09:48 | 79.7 | 58.1 | 58.4 | 37.7 | 41.7 | Site noise was not audible; measurements were influenced by light aircraft, local traffic and birds |
| A2 | 08/07/2026 10:04 | 76.9 | 54.3 | 55.3 | 38.2 | 40.9 | |
| A4 | 08/07/2026 10:23 | 84.9 | 64.1 | 63.3 | 41.5 | 45.1 | Site noise was not audible; measurements were influenced by local traffic, insects and birds' noise |
| A4 | 08/07/2026 10:39 | 81.8 | 63.9 | 62.8 | 40.9 | 44.9 | |

## 4.2 Atmospheric Conditions

As required by condition L3.4 of the EPL, meteorological data was obtained from the Badgerys Creek AWS (station ID 067108) which allowed correlation of atmospheric parameters with measured site noise levels. Attended noise monitoring is not done during rain, hail, or wind speeds above 5 m/s at microphone height. Meteorological conditions recorded by Badgerys Creek AWS on 07/07/2026 and 08/07/2026 are provided in Table 4-2 below. Wind speed values were assigned using the closest available Badgerys Creek AWS observation time.

*Table 4-2: Meteorological conditions (Station ID 067108)*

| Monitoring Location | Time and Date | Temperature, $^0$C | Wind Speed, km/h | Wind Speed, m/s[1] | Wind Direction |
|---|---|---|---|---|---|
| A5 | 07/07/2026 07:18 | 10.6 | 15 | 4.2 | WSW |
| A5 | 07/07/2026 07:36 | 10.6 | 15 | 4.2 | WSW |
| A6 | 07/07/2026 07:57 | 11.5 | 17 | 4.7 | WSW |
| A6 | 07/07/2026 08:22 | 11.5 | 17 | 4.7 | SW |
| A2 | 07/07/2026 08:45 | 12.6 | 15 | 4.2 | SW |
| A2 | 07/07/2026 09:02 | 13.7 | 17 | 4.7 | SW |
| A4 | 07/07/2026 09:22 | 13.7 | 17 | 4.7 | SW |
| A4 | 07/07/2026 09:39 | 14.2 | 19 | **5.3** | SSW |
| A1 | 07/07/2026 11:18 | 14.6 | 17 | 4.7 | SW |
| A1 | 07/07/2026 11:34 | 15.9 | 17 | 4.7 | SW |
| A3 | 07/07/2026 11:55 | 15.9 | 17 | 4.7 | WSW |
| A3 | 07/07/2026 12:11 | 15.4 | 20 | **5.6** | WSW |
| A5 | 08/07/2026 07:18 | 7.1 | 9 | 2.5 | WSW |
| A5 | 08/07/2026 07:33 | 7.1 | 9 | 2.5 | WSW |
| A6 | 08/07/2026 07:52 | 7.1 | 9 | 2.5 | WSW |
| A6 | 08/07/2026 08:08 | 9.1 | 9 | 2.5 | WSW |
| A1 | 08/07/2026 08:31 | 11.7 | 9 | 2.5 | SW |
| A1 | 08/07/2026 08:47 | 11.7 | 9 | 2.5 | SW |
| A3 | 08/07/2026 09:07 | 12.4 | 13 | 3.6 | SW |
| A3 | 08/07/2026 09:23 | 12.4 | 13 | 3.6 | SW |
| A2 | 08/07/2026 09:48 | 13.4 | 15 | 4.2 | SW |
| A2 | 08/07/2026 10:04 | 14.6 | 15 | 4.2 | SW |
| A4 | 08/07/2026 10:23 | 14.6 | 15 | 4.2 | SW |
| A4 | 08/07/2026 10:39 | 15.2 | 17 | 4.7 | SW |

Note: 1. Wind speed of 0.5 m/s and 0 m/s indicated calm conditions at monitoring location.

## 4.3 Compliance Assessment

### 4.3.1 Monitoring results

Table 4-3 provides site noise levels in the absence of other sources, where possible, and includes weather data from the Badgerys Creek AWS. Noise enhancing limits are applicable if weather conditions were within specified

parameters during each measurement, otherwise the NPfI's 'very noise enhancing' limits apply (i.e. noise enhancing plus 5dB).

Review of the meteorological data identified two instances where the assigned wind speed marginally exceeded the 5 m/s criterion typically adopted for attended noise monitoring. These occurred at Location A4 on 07/07/2026 at 09:39 (5.3 m/s) and Location A3 on 07/07/2026 at 12:11 (5.6 m/s). The exceedances were minor and based on wind speed data obtained from the nearest available Badgerys Creek AWS observation rather than measurements recorded directly at microphone height. Given the small magnitude of the exceedances and the consistency of the monitoring results, these events are not considered to have materially influenced the assessment conclusions.

In accordance with the EPL, the applicable noise limits during these periods were those specified in Condition L3.1, with an additional 5 dB(A) allowance. The average wind speed and stability category recorded at the Badgerys Creek automatic weather station (AWS) (Station ID 067108) for each 15-minute attended measurement are summarised in Table 4-3 below.

*Table 4-3: Site monitoring results and limits*

| Monitoring Location | Start time and date | Wind Speed, m/s[2] | Stability Category | Noise enhancing limits apply | EPL Limits, dB | Site Noise levels, dB[5] | Exceedances, dB[3] |
|---|---|---|---|---|---|---|---|
| | | | | | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ |
| A5 (R1) | 07/07/2026 07:18 | 4.2 | D | Y | 46 | IA | Nil |
| A5 (R1) | 07/07/2026 07:36 | 4.2 | D | Y | 46 | IA | Nil |
| A6 (R2) | 07/07/2026 07:57 | 4.7 | D | Y | 48 | IA | Nil |
| A6 (R2) | 07/07/2026 08:22 | 4.7 | D | Y | 48 | IA | Nil |
| A2 (R4) | 07/07/2026 08:45 | 4.2 | D | Y | 51 | IA | Nil |
| A2 (R4) | 07/07/2026 09:02 | 4.7 | D | Y | 51 | IA | Nil |
| A2 (R5) | 07/07/2026 08:45 | 4.2 | D | Y | 50 | IA | Nil |
| A2 (R5) | 07/07/2026 09:02 | 4.7 | D | Y | 50 | IA | Nil |
| A2 (R7)[4] | 07/07/2026 08:45 | 4.2 | D | Y | 46 | IA | Nil |
| A2 (R7)[4] | 07/07/2026 09:02 | 4.7 | D | Y | 46 | IA | Nil |
| A4 (R8)[4] | 07/07/2026 09:22 | 4.7 | D | Y | 46 | IA | Nil |
| A4 (R8)[4] | 07/07/2026 09:39 | **5.3** | D | Y | 46 | IA | Nil |
| A1 (R3) | 07/07/2026 11:18 | 4.7 | D | Y | 58 | 55.5 | Nil |
| A1 (R3) | 07/07/2026 11:34 | 4.7 | D | Y | 58 | <58 | Nil |
| A3 (R6) | 07/07/2026 11:55 | 4.7 | D | Y | 57 | 47.0 | Nil |
| A3 (R6) | 07/07/2026 12:11 | **5.6** | D | Y | 57 | 47.9 | Nil |
| A5 (R1) | 08/07/2026 07:18 | 2.5 | D | N | 41 | IA | Nil |
| A5 (R1) | 08/07/2026 07:33 | 2.5 | D | N | 41 | IA | Nil |
| A6 (R2) | 08/07/2026 07:52 | 2.5 | D | N | 43 | IA | Nil |
| A6 (R2) | 08/07/2026 08:08 | 2.5 | D | N | 43 | IA | Nil |
| A1 (R3) | 08/07/2026 08:31 | 2.5 | D | N | 53 | <53 | Nil |
| A1 (R3) | 08/07/2026 08:47 | 2.5 | D | N | 53 | <53 | Nil |
| A3 (R6) | 08/07/2026 09:07 | 3.6 | D | Y | 57 | 54.6 | Nil |
| A3 (R6) | 08/07/2026 09:23 | 3.6 | D | Y | 57 | 50.6 | Nil |

| Monitoring Location | Start time and date | Wind Speed, m/s[2] | Stability Category | Noise enhancing limits apply | EPL Limits, dB | Site Noise levels, dB[5] | Exceedances, dB[3] |
|---|---|---|---|---|---|---|---|
| | | | | | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ | $L_{Aeq,\ 15\ minutes}$ |
| A2 (R4) | 08/07/2026 09:48 | 4.2 | D | Y | 51 | IA | Nil |
| A2 (R4) | 08/07/2026 10:04 | 4.2 | D | Y | 51 | IA | Nil |
| A2 (R5) | 08/07/2026 09:48 | 4.2 | D | Y | 50 | IA | Nil |
| A2 (R5) | 08/07/2026 10:04 | 4.2 | D | Y | 50 | IA | Nil |
| A2 (R7)[4] | 08/07/2026 09:48 | 4.2 | D | Y | 46 | IA | Nil |
| A2 (R7)[4] | 08/07/2026 10:04 | 4.2 | D | Y | 46 | IA | Nil |
| A4 (R8)[4] | 08/07/2026 10:23 | 4.2 | D | Y | 46 | IA | Nil |
| A4 (R8)[4] | 08/07/2026 10:39 | 4.7 | D | Y | 46 | IA | Nil |

Notes:

1. In accordance with Condition L3.2, where meteorological conditions exceed those specified in Condition L3.1, the EPL limits for these periods are those listed in Condition L3.1 plus 5 dB (A).
2. Wind speed 0 m/s or 0.5 m/s indicates calm conditions.
3. A 1 to 2 dB exceedance is considered by the EPA as negligible in accordance with Section 4.2 of the NPfI (EPA 2017).
4. Site-only $L_{Aeq,15minute}$, includes modifying factor penalties (NPfI, EPA 2017) if applicable.
5. AI where site was noted as inaudible from monitoring location.

### 4.3.2 Monitoring results discussion

Attended noise monitoring and observations were conducted on Tuesday 7th and Wednesday 8th July 2026 at six representative monitoring locations surrounding the site to assess noise levels associated with quarry rehabilitation activities and verify compliance with the limits specified in condition L3.3 of EPL 21562.

Meteorological conditions during the monitoring period were generally suitable for environmental noise monitoring, with light winds predominantly ranging from 2.5 to 4.7 m/s. Review of the meteorological data identified two instances where the assigned wind speed marginally exceeded the 5 m/s criterion typically adopted for attended noise monitoring. These occurred at location A4 on 07/07/2026 at 09:39 (5.3 m/s) and Location A3 on 07/07/2026 at 12:11 (5.6 m/s). The exceedances were minor and based on wind speed data obtained from the nearest available Badgerys Creek AWS observation rather than measurements recorded directly at microphone height. Given the small magnitude of the exceedances and the consistency of the monitoring results, these events are not considered to have materially influenced the assessment conclusions

During the monitoring period, noise from quarry rehabilitation activities was generally inaudible at most monitoring locations. Where audible, quarry noise was barely audible and occurred intermittently at two monitoring locations. At most locations, the acoustic environment was dominated by local road traffic, light aircraft movements and construction activities within the surrounding area, including works associated with the adjacent Advanced Recycling and Resource Centre (ARRC) development site located immediately north of the quarry.

At monitoring locations where quarry noise could not be audibly distinguished from the surrounding ambient environment, the specific contribution from quarry activities could not be reliably quantified.

No exceedances attributable to quarry rehabilitation activities were identified during the monitoring period. Where elevated environmental noise levels were recorded, these were associated with external noise sources, including adjacent construction activities and associated traffic movements. Overall, the monitoring results indicate that current quarry rehabilitation and maintenance activities are being undertaken in compliance with the EPL noise requirements and are not generating adverse noise impacts at nearby sensitive receivers.

# **Appendix A** – Extract of EPL 21562

# Appendix B – Noise Perception and Examples Site

## NOISE LEVELS

Table A-1 gives an indication as to how an average person perceives changes in noise level. Examples of common noise levels are provided in Figure A-1.

*Table A-1: Perceived change in noise*

| Change in sound pressure level, dB(A) | Perceived change in noise |
|---|---|
| Up to 2 | Not perceptible |
| 3 | Just perceptible |
| 5 | Noticeable difference |
| 10 | Twice (or half) as loud |
| 15 | Large change |
| 20 | Four times (or quarter) as loud |

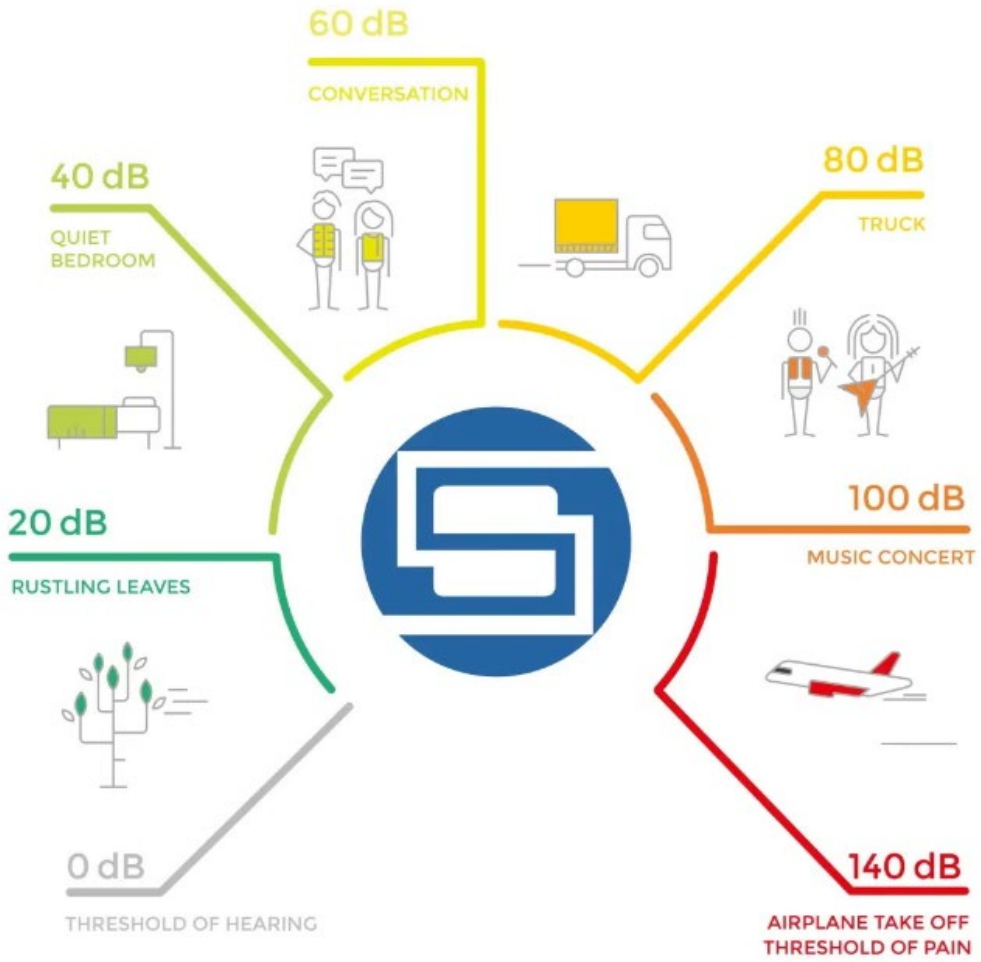



*Figure A-1: Common noise levels*

# Appendix C – Calibration Certificates

# CERTIFICATE OF CALIBRATION

**CERTIFICATE NO: SLM56122**

**EQUIPMENT TESTED:** Sound Level Meter

| | | | |
|---|---|---|---|
| **Make & Model:** | Svantek SVAN 971 | **Serial No:** | 39170 |
| **Mic. Model:** | ACO Pacific 7052E | **Serial No:** | 57326 |
| **Pre-Amp. Model:** | Svantek SV 18 | **Serial No:** | 38587 |
| **Band-Pass Filter:** | 1/3 Octave | **Test No:** | F056123 |

**Owner:** Acu-Vib Electronics
Unit 14/22 Hudson Ave
Castle Hill NSW 2154

**Tests Performed:** IEC 61672-3:2013 & IEC 61260-3:2016

**Comments:** All Test passed for Class 1. (See overleaf for details)

**CONDITIONS OF TEST:**

| | | | | |
|---|---|---|---|---|
| **Ambient Pressure** | 1005 | hPa ±1 hPa | **Date of Receipt :** | 12/11/2025 |
| **Temperature** | 22 | °C ±1° C | **Date of Calibration :** | 12/11/2025 |
| **Relative Humidity** | 33 | % ±5% | **Date of Issue :** | 17/11/2025 |

**Acu-Vib Test Procedure:** AVP10 (SLM) & AVP06 (Filters)

**CHECKED BY:** ..... L Gail

**AUTHORISED SIGNATURE:** ..... H. Soe, Lab Manager

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

## CERTIFICATE NO: SLM56122

**The performance characteristics listed below were tested. The tests are based on the relevant clauses of IEC 61672-3:2013**

| **Tests Performed:** | *Clause* | *Result* |
|---|---|---|
| *Absolute Calibration* | 10 | Pass |
| *Acoustical Frequency Weighting* | 12 | Pass |
| *Self-Generated Noise* | 11.1 | Observed |
| *Electrical Noise* | 11.2 | Observed |
| *Long Term Stability* | 15 | Pass |
| *Electrical Frequency Weightings* | 13 | Pass |
| *Frequency and Time Weightings* | 14 | Pass |
| *Reference Level Linearity* | 16 | Pass |
| *Range Level Linearity* | 17 | Pass |
| *Toneburst* | 18 | Pass |
| *Peak C Sound Level* | 19 | Pass |
| *Overload Indicator* | 20 | Pass |
| *High Level Stability* | 21 | Pass |

**Statement of Compliance:** The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 requirements of IEC61672-1:2013.

**This Sound Level Meter included an Octave Filter Set. Tests were based on IEC 61260-3:2016 and were conducted to test the following performance characteristics:**

| **Tests performed** | *Clause* | *Result* |
|---|---|---|
| *Test of relative attenuation at filter midband frequency* | 10 | Pass |
| *Linear operating range including range control if fitted* | 11 | Pass |
| *Test of lower limit of linear operating range* | 12 | Pass |
| *Measurement of relative attenuation (filter shape)* | 13 | Pass |

The filter submitted for testing successfully completed the tests listed above for the environmental conditions under which the tests were performed. If the filter type has successfully completed the pattern-evaluation tests of IEC 61260-2 then it can be stated that the filter set continues to conform to the specifications of IEC 61260-1.

**A full technical report is available on request.**

# CERTIFICATE OF CALIBRATION

**CERTIFICATE NO: C54610**

**EQUIPMENT TESTED :** Acoustic Calibrator

| | | | |
|---|---|---|---|
| **Make & Model:** | Svantek SV 33B | **Serial No:** | 109960 |
| **Class:** | 1 | | |
| **Owner:** | Acu-Vib Electronics<br>Unit 14/22 Hudson Ave<br>Castle Hill NSW 2154 | | |
| **Tests Performed:** | Measured Output Pressure level, Frequency & Distortion | | |
| **Comments:** | See Details and Class Tolerance overleaf. | | |

**CONDITION OF TEST:**

| | | | | |
|---|---|---|---|---|
| **Ambient Pressure** | 990 | hPa ±1 hPa | **Date of Receipt :** | 10/07/2025 |
| **Temperature** | 22 | °C ±1° C | **Date of Calibration :** | 10/07/2025 |
| **Relative Humidity** | 41 | % ±5% | **Date of Issue :** | 10/07/2025 |

**Acu-Vib Test Procedure:** AVP02 (Calibrators)
Test Method: AS IEC 60942 - 2017

**CHECKED BY:** L. Gail **AUTHORISED SIGNATURE:** J.M. Kielt .....

Accredited for compliance with ISO/IEC 17025 - Calibration

Results of the tests, calibration and/or measurements included in this document are traceable to SI units through reference equipment that has been calibrated by the Australian National Measurement Institute or other NATA accredited laboratories demonstrating traceability.

This report applies only to the item identified in the report and may not be reproduced in part.

The uncertainties quoted are calculated in accordance with the methods of the ISO Guide to the Uncertainty of Measurement and quoted at a coverage factor of 2 with a confidence interval of approximately 95%.

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NATA
WORLD RECOGNISED ACCREDITATION
Accredited Laboratory No. 9262
Acoustic and Vibration Measurements

## CERTIFICATE NO: C54610

The Calibrator described in this report has been tested to the requirements of the standard IEC 60942-[Ed 4]:2017-11.
The tests described in Annex B of the standard (Periodic tests) were carried out under the environmental conditions listed above to the following clauses:

| Clause | Test description |
|---|---|
| B4.6 | Sound Pressure Level<br>(By comparison with a reference calibrator). |
| B4.7 | Frequency<br>(By measurement with a calibrated frequency meter). |
| B4.8 | Total distortion and noise.<br>(By measurement with a calibrated Noise and Distortion meter). |

Notes:

1. The calibrator was calibrated with the main axis vertical and facing down.
2. No corrections have been made for atmospheric pressure, temperature, or humidity.

| Parameter | Pre-Adj | Adj Y/N | Output: **(dB re 20 µPa)** | Frequency **(Hz)** | THD&N **(%)** |
|---|---|---|---|---|---|
| Level: | NA | N | 114.01 dB | 1000.02 Hz | 0.35 % |
| Uncertainty | | | ±0.11 dB | ±0.05% | ±0.40 % |
| Uncertainty (at 95% c.l.) k=2 | | | | | |

| Parameter | Class 1 | | Class 2 | |
|---|---|---|---|---|
| Nominal Frequency | 250 Hz | 1 kHz | 250 Hz | 1 kHz |
| Output dB SPL | 0.25 dB | 0.25 dB | 0.40 dB | 0.40 dB |
| Frequency Hz | 0.7 % (1.75 Hz) | 0.7 % (7 Hz) | 1.7 % (4.25 Hz) | 1.7 % (17 Hz) |
| THD&N | 2.5 % | 2.5 % | 3.0 % | 3.0 % |

Tolerance limits from AS/IEC60942 (edition 4)

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