



Annual Monitoring Review and Management Report 2025–2026

MMG Rosebery

Date: 30/09/2026

Prepared by MMG Rosebery

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Executive Summary

This Annual Monitoring Review and Management Report (AMRMR) has been prepared in accordance with the requirements of Environmental Protection Notices (EPN) 7153/3 and 8815/2, and Permit Conditions Environmental (PCE) 11514 for the annual monitoring period 1 July 2025 to 30 June 2026.

MMG Rosebery is Australia's largest volcanic hosted polymetallic base and precious metals (zinc, lead, copper, gold and silver) mine and its concentrator has been in continuous operation since 1936. MMG Limited (MMG) acquired Rosebery in June 2009. The mine currently produces zinc, lead and copper concentrates and gold doré using mechanised underground mining methods and crushing, grinding and flotation processes. Given the mine's long history, environmental performance at Rosebery is influenced by historical mining practices that preceded MMG's management of the operation.

During the reporting period MMG Rosebery conducted its annual risk profile review, confirming no new risks were added to the site material risk register. Continuous risk analysis and critical control design are integral to MMG's risk management processes, as evidenced by continual comprehensive inspections and audits by the Engineer of Record (EOR) and evaluations by the Independent Tailings Review Board (ITRB). During the reporting period, the EOR reports from the Bobadil and 2/5 Dam tailings' facilities found they do not present a significant risk to the environment and are suitable for the ongoing storage of tailings.

The 2016–2021 Environment Management Plan (EMP) Review report submitted to the Environmental Protection Authority (EPA) on 30 November 2021 discussed the broad environmental implications of mine activities and outlined MMG Rosebery's strategy for 2021–2026. The 2021–2026 Asset Strategy was growth focused, and the 2025 review of the Asset Strategy reaffirmed this growth-focused position, centred on extending the operational life of Rosebery by unlocking the full potential of the resource, optimising tailings solutions, embracing cost-effective technology, fostering a supportive work environment, and adhering to sustainable practices. The Asset Strategy was reviewed again in early 2026, maintaining this growth-focused, life-extension direction. Consistent with the cadence set by the 2016–2021 EMP Review, the next EMP Review report, covering the current planning cycle, is due for submission to the Environment Protection Authority (EPA) in Q4 2026.

Securing additional tailings storage capacity remains a key constraint on Rosebery's current Life of Asset. During the reporting period, MMG Rosebery completed the Bobadil TSF Stage 11A embankment raise, with Stage 11B and Stage 12 forecast for completion in the next reporting period. MMG Rosebery has committed to Stage 13, while Stage 14 remains under investigation. To secure longer-term capacity, MMG lodged Notices of Intent with the EPA for a new Exe Tailings Storage Facility (approximately 22.1 million tonnes, providing around 26 years of storage at current production rates) and a Filtered Tailings Stack at Bobadil Heights (up to 10.45 million tonnes, providing approximately 12 years of additional storage). Draft Environmental Impact Statement (EIS) Guidelines for both proposals were released for public comment during the reporting period. The South Marion Oak TSF, 2/5 Dam TSF subaerial conversion and a proposed Stage 3 embankment raise also remain under assessment by the EPA.

MMG is committed to minimising its environmental footprint, aligning with the International Council on Mining and Metals (ICMM) mining principles and performance expectations, which guide environmental and social requirements. Annual business plans at MMG Rosebery set departmental targets, with environmental goals outlined in the 2026 business plan, corporate strategies and Rosebery's newly developed Sustainability Roadmap. During the reporting period a range of projects were either planned, commenced, or completed resulting in environmental improvement. These range from trialing fog canons for rock breaker dust suppression, to upgrading the dust deposition network and relocating blast monitoring infrastructure to improved monitoring locations.

During the reporting period, MMG Rosebery received three environment related community complaints. Two complaints pertained to noise and one to dust. MMG Rosebery strives to address all complaints to the satisfaction of the complainants and continues to track and manage all community engagement using the stakeholder management software, Borealis.

MMG Rosebery has provided a security deposit to Mineral Resources Tasmania (MRT) as required under the *Mineral Resources Development Act 1995* (MRDA), MRT assessed the value as being adequate. The security deposit value was derived from substantial studies completed as part of the closure prefeasibility programs at Hercules and Rosebery. The studies also informed the Mine Closure Plan submitted to the EPA and MRT in July

2024, in compliance with condition DC3 of EPN 7153/3. During the reporting period, MMG Rosebery submitted the Bobadil TSF Early Mine Closure Plan in compliance with condition DC4.1 of PCE 11514.

The current reporting period saw a 4% increase in ore mined and milled resulting in 910,422 tonnes of tailings deposited between the 2/5 Dam Tailings Storage Facility (TSF) and Bobadil TSF. In the ordinary course of business, waste-rock mined remains underground and included 317,316 tonnes of mine backfill. A total of 247.8 tonnes of non-mineral waste has been stored at 3 Level for disposal underground.

Environmental monitoring continued as per MMG Rosebery's environmental monitoring plans. A review of environmental results for the reporting period is detailed in section 6 and contained within specialist reviews appended to this report. Of note, there were no exceedences for the site discharge point Bobadil Outfall (BO) compliance limits during the reporting period.

1. Purpose

This report was prepared in accordance with the annual reporting requirements outlined in Environmental Protection Notice (EPN) 7153/3 (issued 10 November 2011), EPN 8815/2 (3 Level Waste Rock Dump (WRD) issued 13 February 2015) and Permit Conditions Environmental (PCE) 11514 (issued 7 November 2024). This AMRMR report covers the period 1 July 2025 to 30 June 2026 and is made publicly available through MMG Rosebery's community liaison office in Rosebery and on the MMG website. Requirements of these EPNs and PCE are summarised in Table 1 below.

Table 1. Report coverage of EPN and PCE requirements

EPN / PCE	EPN / PCE Requirement		Section
7153/3 & PCE 11514	G7 1	The AMRMR must be made publicly available...	1
	G7 2.1 G8 2.1	An Executive Summary.	Executive Summary
	G7 2.2 G8 2.2	A review of environmental aspects and impacts register against environmental controls and documentation.	4.1
	G7 2.3 G8 2.3	A review of activity compliance and annual external compliance audit against EPN requirements.	7.1
	G7 2.4 G8 2.4	Environmental planning, including objectives and targets relating to the review period and details of the forward environmental planning and forecasting process, including strategic issues for the activity, for but not limited to the management period.	4.2 and 4.3
	G7 2.5 G8 2.5	A review of environmental commitments and process changes (including annual tonnage) for, but not limited to, the management period.	3.1 and 4.4
	G7 2.6 G8 2.6	A review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring locations, including discharge and ambient monitoring points that illustrate significant trends.	6.3, 6.4, 6.5, 6.6 and Appendix C Appendix D Appendix E Appendix F Appendix G Appendix H
	A4-3	Analysis of yearly climate.	6.1 and Appendix C

EPN / PCE	EPN / PCE Requirement		Section
	A5-3 <i>A8-3</i>	Tabulated high volume air sampler, and dust and metal deposition results for the entire year, showing intermediate values as well as final monitoring results. Tabulated annual averages of the deposition increment above background, supported by deposition isopleths or graphs of monthly results. Summaries of all exceedences, describing the results of any investigations undertaken and the mitigation measures that were adopted in response. Any supporting data analysis or description necessary to aid interpretation of the dataset.	6.5 and Appendix G
	M4-3 <i>E2-2</i>	If the concentrations in effluent from Bobadil Tailings Dam end-of-pipe discharge of parameters listed in EPN do not comply with the levels specified. (Investigation Trigger Level) then an investigation must be conducted and a report summarising the outcomes of all such investigations be submitted in MMG Rosebery's AMRMR.	6.3 and Appendix D
	E5-1.2	Monitor the level of groundwater contamination (mass load of pollutants) due to seepages from the Bobadil, No.2 and No.5 and rehabilitated No.1 tailings storage facilities on the Stitt River and Lake Pieman.	Appendix D
	E3	Annual biological survey and ambient water quality monitoring program of the Stitt River and Lake Pieman to document ongoing environmental conditions, increase the understanding of temporal, spatial and seasonal biological and chemical changes within the lake and progress the development of site-specific toxicity guidelines for sulphate and zinc in Lake Pieman.	6.3, 6.4 and Appendix D Appendix E Appendix F
	N1-1.8	Results of the continuous noise monitoring program and noise related complaints must be reported in the AMRMR.	5.2, 6.6 and Appendix H
	G7 2.7 <i>G8 2.7</i>	Environmental performance, including incident management and community complaints and the corrective and preventative processes implemented.	5.2 and 6.7
	WM1 2.4	Any environmental or stability issue identified and associated with all tailings dams further outlined to the Director in the AMRMR.	6.8
	G7 2.8 <i>G8 2.8</i>	Any approvals or written notifications received in relation to this notice.	5.1
	G7 2.9 <i>G8 2.9</i>	A summary of any rehabilitation works carried out during the period and an estimate of current remediation liabilities.	5.3
	G7 2.10 / WM3-2 <i>G8 2.10 / WM2-2</i>	An inventory of wastes disposed of on The Land during the previous 12 months, including details of the quantities of each waste stream and the location of its disposal.	5.4

EPN / PCE	EPN / PCE Requirement		Section
8815/2	G4-4	Annual review of the surface and ground water monitoring program in accordance with Appendix B of the Detailed Design Report, including an assessment of surface and groundwater impacts from the 3 Level WRD.	6.2 and Appendix D
	M3 1.2	Results of 3 Level WRD surface and groundwater monitoring program.	6.2 and Appendix D



Figure 1. MMG Rosebery Mine.

2. Endorsement

"I hereby certify that to the best of my knowledge, the information within this Annual Monitoring Review and Management Report is true and correct."

Name: Steve Scott

A handwritten signature in dark ink, appearing to read 'S. Scott', with a long horizontal stroke extending to the right.

Position: General Manager MMG Rosebery

Date: 30 September 2026

3. Operational History

3.1 Operational History

EPN 7153/3, G6 1.1.1 Site and operational history, particularly where it relates to the environmental performance of the activity.

EPN 7153/3, G7 2.5 & PCE 11514, G8 2.5 A review of environmental commitments and process changes (including annual tonnage) for, but not limited to, the management period.

MMG Rosebery is Australia's largest volcanic hosted polymetallic base and precious metals (zinc, lead, copper, gold and silver) mine and has been in continuous operation since 1936. As such, environmental performance at Rosebery is influenced by historical mining practices that preceded MMG's management of the operation.

MMG Limited (MMG) acquired Rosebery in June 2009. The consolidated mining lease is 4950 hectares, which includes the Rosebery mine, the decommissioned Hercules mine and more than 178 minor legacy sites and remnant features¹. The Rosebery mining operations are located within Mining Lease (ML) 28M/1993, approximately 300 kilometres north-west of Hobart and 125 kilometres south of Burnie. Maps of MMG Rosebery operational areas are detailed in Appendix A.

Zinc, lead and copper concentrates and gold doré are produced at Rosebery using mechanised underground mining methods and crushing, grinding and flotation processes. Rosebery concentrates are transported by rail to the Port of Burnie where they are shipped in bulk carriers to smelters in Hobart, Port Pirie and overseas. Gold doré bars are sold to a refinery within Australia where they are refined into gold bullion.

MMG Rosebery production data is provided in Table 2. Waste rock and tailing tonnages are provided in section 5.4.1. Note the values reported in Table 2 are based on the financial year reporting period. Production limits in accordance with MMG Rosebery's permit conditions, Permit 1904 as varied by EPN 7153/3, are based on annual tonnes or ore processed from the anniversary date of the EPN (21 September). MMG Rosebery's current permitted processing limit is 1.1M tonnes per year (EPA ref. EN-EM-PE-EX-038147_24 | H949382, 2018). Ore processed from September 2024 to September 2025 did not exceed the 1.1M tonne limit. Year to date values from September 2025 do not indicate that the limit will be exceeded in the September 2025 to September 2026 period.

Table 2. Rosebery production

Unit		2024-25FY	2025-26FY	% Change
Ore Mined*	dry tonnes	983,883	1,024,355	4%
Ore Milled*	dry tonnes	987,326	1,023,115	4%
Gold doré*	oz	19,048	24,339	28%
Copper concentrate*	dry tonnes	7,482	7,039	-6%
Lead concentrate*	dry tonnes	27,818	25,819	-7%
Zinc concentrate*	dry tonnes	91,237	79,883	-12%

*Data sourced from Envizi for period 1 July to 30 June.

¹ The 28M/1993 lease has not been extended by MMG, the increase from 2025 is due to an administrative boundary recalculation performed by Mineral Resources Tasmania, relating to the Lake Johnston Nature Reserve.

Process changes and improvement projects that have influenced Rosebery’s production and environmental performance from 2012–2026 are detailed in Table 3.

Table 3. Operational history and major environmental improvement projects (2012–2026)

Activity	Milestone	Details
Underground Mine	2012	Change in stability methods from mesh and bolts to fibrecrete and resin bolts, to improve ground support. Concrete batch plant used in fibrecrete approved by West Coast Council (PID 6021427).
	2014	Installation of concrete batching plant (PID 6021427) and noise attenuation wall.
	2015	Surface vent (PSF1) fan upgrade to meet increased ventilation flow demand as mine extended (Approval DA14195).
	2015	Installation of a new 120,000L capacity, self-bunded fuel bay and decommissioning of the existing fuel bay site.
	2018	Introduction of grouting for remnant mining.
	2019	Development activity in the 11L, requiring vibration monitoring in the Rosebery township.
	2023	Purchase of one new diesel electric hybrid loader.
	2023	Construction of a new Batch Plant at 4L (DA 2023/19)
	2024	Purchase of two new diesel electric hybrid loaders.
	2024	Upgrade to 33P booster fans underground.
	2024	Southern Upcast Ventilation Fan (PSF3) upgrade.
	2025	Purchase of one new battery electric production drill.
	2025	Z Lens Raisebore Hole construction and Booster Fan Installation.
	2025	24B vent rise installed and P Lens Alimak rise decommissioned.
	2026	Dust suppression upgrade and expansion.
	2026	3L exploration portal developed (Tom McDonald Exploration Portal)
Processing Plant	2014	Commissioning of refurbished MG3 Ball Mill (Approval H287020) to support increased throughput in grinding circuit and reduced grind size. No significant change in noise profile.
	2014	Installation and commissioning of a second Knelson concentrator to improve gold recovery to doré (Approval H316091).
	2015	Installation of a tertiary crushing circuit to increase throughput and enable a finer grind size, which improves recovery of all commodities and is beneficial for tailings transport.
	2021	Filter plant storm water drainage system works completed.
	2023	Primary conveyor replacement (CC3A) completed.
	2026	Installation of an acid addition tank.
	2026	Flotation reagents dosing upgrade.

Activity	Milestone	Details
Tailings Storage	2012	Completed Stage 7 works at Bobadil TSF, which raised the TSF to RL 195m (EPN 8574/1).
	2012	Bobadil polishing pond stability analysis to improve understanding of embankment seepage.
	2013	Completed Stage 8 embankment raise at Bobadil TSF to RL 197m (EPN 8781/1).
	2014	Completion of Bobadil polishing pond redevelopment to improve water treatment (EPN 8814/1).
	2015	Completed Stage 9A upstream embankment raise to the southern portion of the facility to a crest of RL 199m at Bobadil TSF (EPN 9139/1).
	2016	Completed Stage 9B embankment raise at Bobadil TSF to provide storage capacity to allow continued production until 2017. Works include raising the northern portion of the facility to a crest of RL 199m using the upstream construction method and the construction of a new spillway that has been designed for closure (EPN 9139/1).
	2016	Construction of the 2/5 Dam TSF to a crest of RL 170m. The construction is a single continuous embankment formed via upstream and downstream construction over and around the previous 1, 2 and 5 Dam complex, originally constructed between 1950 and 1970 (PCE 9084).
	2018	Tailings deposition commenced in Q1 2018 at the 2/5 Dam (PCE 9084).
	2020	Murchison Highway mitigation works to reduce seepage water entering the Stitt River.
	2021	2/5 Dam TSF subaerial deposition infrastructure works, to allow deposition during construction of a Stage 2 raise (conditional subaerial approval).
	2021	Bobadil TSF 10A upstream and stepped in embankment raise to a crest of RL 201m completed and deposition commences (EPN 10504/1).
	2021	2/5 Dam TSF Stage 2 downstream raise construction to crest of RL 173m commenced (PCE 9084).
	2022	Bobadil TSF 10B upstream and stepped-in embankment raise to a crest of RL 201m completed incorporating a 9-hectare trial closure cover over the stepped in area at RL 199m (EPN 10504/1).
	2022	Completion of works to separate the 2/5 Dam TSF seepage from stormwater drainage adjacent Murchison Highway.
	2024	2/5 Dam TSF screen bund construction completed and revegetated with Poa grass adjacent Murchison Highway in Q1 2024.
	2024	2/5 Dam TSF Stage 2 downstream raise construction to crest of RL 173m completed in Q1 2024 (PCE 9084 as varied by EPN 10620)
	2024	Completion of 2/5 Dam TSF subaerial deposition works (currently operating under temporary approval pending EPA approval).
	2024	Approval received for Bobadil TSF Stage 11 & 12 raises (DA 2024/00032). New Permit Conditions Environmental received (PCE 11514).
	2025	Completion of finger raises at 2/5 Dam TSF.
	2025	Completion of Bobadil Stage 11A embankment raise.

Activity	Milestone	Details
Waste rock management	2015	Commenced construction of Waste Rock Dump at the 3 Level Open Cut Area (3 Level WRD) in accordance with EPN 8815/2. Stage 1 Establishment phase has been completed and construction of Stages 1a and 1b were completed in September 2015.
	2024	Construction of the 3 Level Waste Rock Dump Stage 2 raise 1 including placement of the limestone layer was completed in Q1 2024.
Water Management	2012	Site water balance developed and used on an ongoing basis to refine water management controls.
	2012	Upgrade to site sewerage system.
	2012	Works on 1 Dam Surface drainage, stormwater management for 2 Dam, and hydrological studies on 1/2/5 Dam as part of site water balance model development (Superseded by the construction of the 2/5 Dam TSF).
	2014	Construction of 3 Level clearwater diversion drain to divert up-gradient uncontaminated water to Rosebery Creek.
	2020	Bobadil Polishing Ponds de-sludging works. Work commenced in Q1 2020 with a floating pontoon, pumping sludge within geo-tubes.
	2022	Separation of 2/5 Dam TSF seepage from stormwater drainage adjacent Murchison Highway completed and functional.
	2024	Capture and passive return of eastern seepage back to the seepage collection ponds at 2/5 Dam TSF was completed in Q1 2024.
	2024	Bobadil Polishing Ponds de-sludging works. Work completed during Q1 2024 and resulted in 100% dredging of cells 1 and 2.
	2024	Refurbishment of the Pieman Header Tank.
	2026	Installed new underground 33P Pump Station.
Closure	2012–2013	Decommissioning and removal of redundant infrastructure (old administration building, Heritage Centre, old tank on Filter Plant Road, Assay Laboratory, three sandfill and cement silos).
	2018–2019	Minor legacy workings closure project commenced.
	2019	Rosebery & Hercules Closure Pre-Feasibility Study (PFS) project commenced.
	2023	Closure cover trial installed at the Bobadil TSF.
	2024	Submission of updated Closure Plan and new security deposit.
	2026	Decommissioning and rehabilitation of the Williamsford Settlement Pond.

3.2 Current Environmental Improvement Projects

A summary of the status of environmental improvement projects that were proposed for commencement or continuation during the reporting period is provided in Table 4.

Table 4. Environmental improvement projects – status as of 30 June 2026

Project Details		Status	Status Details
1	Bobadil Underdrainage Redirection Capture seepage prior to entry into the polishing ponds and pump back into the Bobadil TSF.	Complete	Complete Q4 2025
2	Acid Dosing Plant Sulphuric acid dosing plant to correct the flotation slurry feed pH following successful acid dosing trial.	Complete	Complete Q4 2025
3	Baillieu St Air Quality Monitors Installation of two new High Volume Air Sampler (HVAS) units within the Rosebery community associated with Bobadil Stage 11 & 12.	Complete	Complete Q3 2025
4	Raptor Mitigation on Private Power Infrastructure Bird deflectors installed on spans adjoining high-risk power poles.	Complete	Complete Q3 2025
5	Water Rationalisation Study Review of compliance monitoring requirements against current operations to inform updated compliance monitoring submissions to the EPA.	Complete	Complete Q4 2026
6	Review of Climate Strategy Review of the sites Climate Strategy including review of Greenhouse Gas (GHG) emissions reduction targets.	Complete	Complete Q2 2026
7	Development of Nature Strategy Development of a site-specific Nature Strategy incorporating a Locate, Evaluate, Assess and Prepare (LEAP) assessment.	Complete	Complete Q4 2025
8	Upgrade Dust Deposition Network Upgrade infrastructure and relocate to align with EPN 7153/3 and AS/NZ 3580.10.1 2016.	Complete	Complete Q4 2025

Project Details		Status	Status Details
9	2/5 Dam TSF Sprinkler Extension Installation of two additional big-gun sprinklers on the northern wall (total of 16 around the TSF).	Complete	Complete Q1 2026
10	Desludging of the Bobadil Polishing Ponds	Complete	Complete Q1 2026
11	Wedge-tailed Eagle Nest Management Procedure Development of an internal wedge-tailed eagle nest management procedure.	Commenced	Forecast completion Q4 2026
12	2/5 Dam TSF Northern Embankment Instrumentation Installation of geotechnical instrumentation including piezometers, shape-arrays and total stations.	Commenced	Forecast completion Q4 2026
13	Water Characterisation and Modelling Investigation into Rosebery water treatment options.	Commenced	Forecast completion Q4 2026
14	Rock Breaker Dust Mitigation Trialling mitigation measures to capture fugitive dust emissions that result from rock breaking.	Commenced	Forecast completion Q4 2026
15	Crusher Dust Extraction Upgrade Extraction fan upgrade to mitigate dust and reduce exposure to lead dust, silica and diesel particulates.	Commenced	Forecast completion Q4 2027
16	New Vibration Monitoring Location Located within the Rosebery township to monitor underground blasting.	Commenced	Forecast completion Q4 2026
17	New V-notch Weirs for Stormwater Outflow Monitoring Improve monitoring of clean stormwater reporting to the receiving environment.	Commenced	Forecast completion Q3 2026
18	TSF Seepage Characterisation Install continuous flow infrastructure on all 3 v-notch weirs at the 2/5 Dam TSF.	Awaiting Commencement	Forecast completion Q4 2027



Figure 2. One of the upgraded dust deposition gauges installed across the Air Quality Monitoring Network.

4. Planning

4.1 Risk Assessment

EPN 7153/3, G7 2.2 & PCE 11514, G8 2.2 A review of environmental aspects and impacts register against environmental controls and documentation.

The annual risk profile review for the site's material risks was performed in Q1 2026. During the review no new risks were added to the Site Material Risk Register.

Risk analysis of material risks and design of critical controls continues as part of MMG's risk management processes. Alongside the Site Material Risk Register, MMG Rosebery also maintains an Environmental Risk Register and Aspects and Impacts Register as per ISO 14001, though MMG Rosebery is not currently ISO accredited. The Environmental Risk Register was last reviewed in Q3 2021, and the Aspects and Impacts Register in Q2 2025. Further review of the registers is planned during the next reporting period. Additionally, MMG Rosebery is investigating implementing new risk management software, which could allow for consolidation of risk registers.

Tailings dam management in Tasmania is regulated by the Australian National Committee on Large Dams (ANCOLD) guidelines, and Tasmania's Water Management (Safety of Dams) regulations 2015. In addition, MMG also reports under the Global Industry Standard on Tailings Management (GISTM). At MMG Rosebery, the Bobadil and 2/5 Dam TSFs undergo monthly on-site surveillance by ATC Williams under the guidance of the Engineer of Record (EOR). As part of the surveillance program, the EOR conducts annual audits in line with ANCOLD guidelines, as well fulfilling reporting requirements in line with the above regulatory frameworks when required.

During the current reporting period, MMG Rosebery commissioned 5-yearly GISTM Dam Safety Review Reports and Comprehensive Surveillance Inspection and Reports in line with the Safety of Dams regulations and ANCOLD guidelines for the Bobadil and 2/5 Dam TSFs. The 5-yearly GISTM Dam Safety Review Reports cover the period 2021 to 2025, and the Comprehensive Surveillance Inspection and Reports cover the period January to December 2025. All reports will be provided to the EPA upon completion during Q4 2026.

In addition, an autonomous Independent Tailings Review Board (ITRB) was established in 2022 to assess all aspects of the MMG Rosebery TSFs on an annual basis. Since its establishment, the ITRB has convened in July 2022, May 2023, May 2024, March 2025 and March 2026. In addition to convening annually, the Board also meets quarterly. During the reporting year, meetings were held in July and December 2025. The combined inspections by the EOR and evaluations by the ITRB provide Rosebery with clear actions to improve facility performance and mitigate risks.

4.2 Environmental Planning

EPN 7153/3, G7 2.4 & PCE 11514, G8 2.4 Environmental planning, including objectives and targets relating to the review period and details of the forward environmental planning and forecasting process, including strategic issues for the activity, for but not limited to the management period.

A core component of MMG's growth strategy is to identify opportunities to maximise the potential of existing assets. MMG has a coordinated approach to Integrated Business Planning (IBP) which is supported by the MMG Group office in Melbourne. IBP is a four-stage process; Corporate and Asset Strategy (strategically focused 10+ years), Strategic Development Planning (directionally focused 5+ years), Asset Business Planning (delivery focused 5 years) and Annual Business Plan (execution focused 1-3 years).

Asset Business Plans (ABP) are developed in alignment with the broader IBP stages. This enables flexible investment decisions and typically results in two business scenarios (production and productivity cases). The IBP process provides a consistent direction on long-term operational strategy and guides the annual (short-term) and rolling three-year (medium-term) budget plans. The IBP also provides a primary basis for internal, whole-of-life business valuation (net present value).

The 2016–2021 Environment Management Plan (EMP) Review report submitted to the EPA on 30 November 2021 discussed the broad environmental implications of mine activities and outlined MMG Rosebery's strategy for 2021–2026. The 2021–2026 Asset Strategy was growth focused.

The 2025 review of the Asset Strategy reaffirmed a growth-focused position centred on extending the operational life of Rosebery by unlocking the full potential of the resource, optimising tailings solutions, embracing cost-effective technology, fostering a supportive work environment, and adhering to sustainable practices.

Consistent with this direction, exploration and technical studies through 2025 continued to grow Rosebery's resource base. MMG's Mineral Resources and Ore Reserves Statement reported that continued drilling, improvements to the modelling process and reduced cut-off grades at Rosebery led to an increase of 5 million tonnes of ore, a 21% increase compared to the prior year, with contained metal increases across zinc, lead, silver, gold and copper. Rosebery's ore reserve growth was also supported by progress on tailings storage, a key enabler of the Rosebery Ore Reserve increase has been the establishment of plans for further tailings storage facilities, bringing greater certainty to extending the life of the operation.

Securing additional tailings storage capacity remains a key constraint on the current Life of Asset, and extensive studies progressed during 2025 to extend the life of existing facilities while a long-term tailings solution is developed. MMG Rosebery received EPA approval to commence construction of the Bobadil TSF Stage 11 and 12 embankment raises in March 2025. Stage 11A has since been completed, with Stage 11B forecast to be completed during the next reporting period. During 2025, investigations also progressed into potential Bobadil TSF Stage 13 and 14 embankment raises. MMG has committed to Stage 13 and is progressing pre-feasibility design, while Stage 14 remains under investigation to confirm a suitable design. Both raises are considered necessary to support the continued operation of the Bobadil TSF and, if pursued, would be the final embankment raises undertaken at the facility. In November 2025, MMG also lodged a Notice of Intent with the EPA for a new Exe Tailings Storage Facility, proposed to store approximately 22.1 million tonnes of tailings and provide approximately 26 years of storage at current production rates. Draft EIS Guidelines for the proposal were released for public comment in February 2026, with the comment period closing in March 2026. In parallel, the 2/5 Dam TSF subaerial conversion progressed through the EPA assessment process, with the Case for Assessment opened for public comment on 6 December 2025 and closing on 12 January 2026. A related proposal to raise the 2/5 Dam TSF Stage 3 embankment also remains under assessment by the EPA.

During the reporting period, Rosebery began developing a site-specific Nature Plan, consistent with MMG's Group-wide Nature Strategy launched in 2025 to halt and reverse biodiversity loss, build climate resilience and embed nature into how the company works. As part of this, Rosebery began undertaking a LEAP (Locate, Evaluate, Assess, Prepare) assessment to quantify site-specific nature-related risks and opportunities, aligned with the Taskforce on Nature-related Financial Disclosures (TNFD). This reflects the rapidly evolving landscape of climate and nature-related disclosure in Australia and globally; Rosebery is integrating these environmental considerations into its business planning processes to balance growth with sustainability and build operational resilience. MMG Rosebery also continued its decarbonisation efforts during the year, becoming the first mine in Tasmania to introduce a battery-electric production drill in 2025.

The Asset Strategy was reviewed again in early 2026, maintaining Rosebery's growth-focused, life-extension direction. MMG Rosebery's Hercules deposit returned to the mineral resource inventory in 2026 after three years of drilling, adding zinc, lead, copper, silver and gold resources and expanding the site's mining and processing footprint. This investment supports the site's stated ambition of extending Rosebery's mine life beyond 100 years of continuous operation. In May 2026, Rosebery cut the Tom McDonald Exploration Portal, the site's first new exploration portal in three decades, enabling underground diamond drilling into a historic section of the mine first worked between 1890 and 1915. The portal, named for the prospector credited with discovering the Rosebery orebody in 1893, provides underground access to a prospective, previously underexplored resource that cannot be reached from the surface, supporting the site's ongoing resource growth and life-extension work.

Consistent with this direction, MMG lodged a Notice of Intent with the EPA in March 2026 for a Filtered Tailings Stack at Bobadil Heights, adjacent to the existing Bobadil TSF. The proposal would provide approximately 12 years of additional tailings storage capacity at current production rates, with a final capacity of up to 10.45 million tonnes of filtered tailings. The assessment progressed to draft EIS guidelines, which were open for public comment in May 2026. Development of Hercules and expansion of the resource base will require

additional environmental approvals that have not yet been granted, including EPA approval for Hercules and an upgrade to the permitted mill throughput.

Following release of the MMG Climate Strategy in February 2026, MMG Rosebery commenced a program of climate planning work for 2027. This includes a costed Decarbonisation and Transition Plan and a Climate Resilience Assessment, intended to support the site's emissions reduction targets and align with MMG's HKFRS S2 climate-related financial disclosure obligations.

MMG Rosebery completed the LEAP assessment in February 2026, moving the site from initial assessment to a draft Nature Action Plan setting out prioritised actions. As part of this work, a baseline natural capital accounting project, intended to establish measurable baselines to track ecological condition and progress over time, is planned to commence in Q4 2026. On decarbonisation, Rosebery set a site-specific target of a 50% reduction in Scope 1 and 2 emissions by 2035 and carbon neutrality in Scope 1 and 2 by 2040. Rosebery's Integrated Operations Centre, piloted in 2025, continued to progress toward a fully integrated operating model, supporting the safety, productivity and visibility objectives of the site's life-extension strategy.

Consistent with the cadence set by the 2016–2021 EMP Review report submitted to the EPA on 30 November 2021, the next EMP Review report, covering the current planning cycle, is due for submission to the EPA in Q4 2026.

Progress against the specific conditions of PCE 11514, issued to MMG Rosebery on 7 November 2024 upon approval of the Bobadil TSF Stage 11 and 12 embankment raises, is detailed in Appendix B.



Figure 3. Cutting of the Tom McDonald Exploration Portal.

4.3 Objectives and Targets

EPN 7153/3, G7 2.4 & PCE 11514, G8 2.4 Environmental planning, including objectives and targets relating to the review period and details of the forward environmental planning and forecasting process, including strategic issues for the activity for but not limited to, the management period.

In support of MMG's commitment to minimise the environmental footprint and ensure efficient use of natural resources, the MMG Executive Committee made the commitment to align with the International Council on Mining and Metals (ICMM), Mining Principles and corresponding Performance Expectations which provide a comprehensive set of environmental and social requirements, including issues such as mine closure, pollution, waste, water stewardship, energy use, climate change, and nature.

MMG was one of the member companies involved in the development and review process for the Performance Expectations and commenced implementation of the ICMM Performance Expectations in 2020, incorporating robust, site-level validation. At a site level, MMG Rosebery creates an Annual Business Plan that provides a framework for departmental targets. Departmental objectives and targets are created that align with the Annual Business Plan.

MMG's corporate Sustainability Framework, released in 2024, provides the foundation for environmental, social and governance (ESG) performance management across the Group. During the reporting period, MMG completed a Double Materiality Assessment (DMA) to identify and prioritise the environmental, social, governance and economic topics that are most significant to both MMG's impacts on people and the environment, and the potential effect of sustainability matters on MMG's business. The outcomes of the DMA have informed the development of sustainability strategies, targets and KPIs across the Group. As part of the Sustainability Framework, MMG developed a new Nature Strategy and updated its Climate Strategy. In response to these corporate strategies, MMG Rosebery is developing a site-specific Sustainability Roadmap incorporating five key pillars: Nature, Climate, Environmental, Social and Governance (ESG), and Natural Capital Accounting. The roadmap will provide a five-year plan for achieving site-level KPIs and will support alignment with MMG's corporate sustainability priorities. Environmental and social objectives and targets for the reporting period are outlined in Table 5.

Table 5. Environmental targets

Category	Goal	Target	Status as of 30 June 2026
Compliance	Maintain Compliance with environmental licence and regulatory requirements (ECC Targets & Objectives, 2024)	Zero regulatory enforcement actions	Zero regulatory enforcement actions during reporting period.
Compliance	Compliance to Environmental, Sustainability and Safety, Health, Environment and Community (SHEC) auditing and reporting programs (ECC Targets & Objectives, 2024)	All regulatory reporting completed by due dates	All regulatory reporting completed by due dates during reporting period.
Compliance	Compliance against environmental monitoring plan (ECC Targets & Objectives, 2024)	>90% compliance against environmental monitoring plan	>90% compliance against environmental monitoring plan every month during reporting period.
Water	Diminish environmental impacts of the operation on surrounding waterways (ECC Targets & Objectives, 2024)	No uncontrolled discharges from site	Three uncontrolled discharges from site (Appendix D).
Dust	Reduce dust emissions from site (ECC Targets & Objectives, 2024)	No air quality/dust complaints	One air quality complaint received during reporting period (section 5.2, Table 8).

Noise & Vibration	Continuously monitor noise and vibration emissions from site to identify opportunities to reduce community complaints (ECC Targets & Objectives, 2024)	<5 noise complaints and no vibration complaints	Two noise complaints received during reporting period (section 5.2, Table 8)
Disturbance & Rehabilitation	Compliance with Land Clearance & Disturbance Procedures (ECC Targets & Objectives, 2024)	All land clearance activities comply with procedure	All land clearance activities complied with the Land Clearance & Disturbance Procedure.
Weeds & Diseases	Complete and implement Weed Management Procedures on-site (ECC Targets & Objectives, 2024)	Update the Management Plan and proceeding all hierarchical documentation.	Weed and pathogen management framework updated.
Waste	Develop baseline for current non-mineral waste management separation compliance (ECC Targets & Objectives, 2024)	Develop baseline	Preliminary investigation underway via waste stream identification and laboratory classification.
Waste	Further develop waste management hierarchy & better quantify waste streams to identify opportunities (ECC Targets & Objectives, 2024)	Quantify waste streams and complete waste management hierarchy & develop opportunities for 2026	Updated Non-mineral Waste Handling and Disposal Register. Audited contractors waste management processes on-site.
Nature	Develop a Nature Action Plan (Annual Business Plan, 2026)	Development of a finalised Nature Action Plan aligned to the MMG Nature Strategy and WQR	Draft action plan prepared.
Climate	Develop a Climate Action Plan (Annual Business Plan, 2026)	Development of a Decarbonisation Action Plan and Climate Risk and Resilience Action Plan by the end of 2027.	Developing a scope of works.
ESG	Develop a Sustainability Roadmap (ECC Targets & Objectives, 2026)	Set ESG KPI's to inform future targets	Draft Sustainability Roadmap developed.



Figure 4. MMG Rosebery's Epiroc Simba E70SG replaced diesel with battery power.

4.4 Environmental Commitments Review

EPN 7153/3, G7 2.5 & PCE 11514, G8 2.5 A review of environmental commitments and process changes (including annual tonnage) for, but not limited to, the management period.

Key environmental commitments and their current status are outlined in Table 6. Refer to Table 2 for annual tonnages.

Table 6. Environmental commitments – status at 30 June 2026

Commitment	Details	Current Status
Review use of the flume for transporting tailings to Bobadil	Following the flume overtopping event in February 2022 MMG committed to reviewing the use of the flume.	A risk assessment and flume stability investigations were completed in Q4 2022 and Q1 2023. Outcomes resulted in plans for remedial work on the flume, ongoing surveys and monitoring of the embankment. Installation of monitoring technology for the flume has also been investigated, though installation of any technology has been deferred until a suitable solution can be found.
Crusher dust extraction upgrade	Extraction fan upgrade to mitigate dust and reduce exposure to lead dust, silica and diesel particulates.	Option analysis for the upgrade to the exhaust system (feed to the wet scrubber) is currently underway. Concepts are being considered and costed to form part of the business case. If approved, works are forecast to commence during 2027.
Dust deposition network upgrade	Following audit recommendations, MMG Rosebery has committed to upgrade the dust deposition network.	Approval received from EPA to upgrade existing infrastructure and relocate some of the dust deposition gauges in July 2025. New infrastructure has been installed and is now part of the monitoring program.
Blast monitor relocation	Following recommendations by an independent noise consultant, MMG Rosebery committed to relocating the blast monitoring infrastructure.	Approval received from EPA to relocate air blast overpressure (ABO) and vibration monitors in September 2025. Infrastructure is currently being installed to allow for relocation of the vibration monitor.
Decommissioning of the Williamsford Settlement Pond (WSP)	The WSP has been identified as redundant and reporting metalliferous drainage to the environment.	Approval received from EPA to decommission the WSP in February 2026. Decommissioning is scheduled to be completed in Q3 2026.
Removal of Potentially Acid Forming (PAF) material from Baker Creek weir	Following the identification of PAF material stockpiled at the Baker Creek weir during routine clean out of the weir, MMG Rosebery committed to removing the stockpile and disposing of the PAF material at the 2/5 Dam TSF.	Approval received from EPA to remove of 100m ² of PAF material from Baker Creek to the 2/5 Dam TSF. Removal is scheduled to be completed in Q3 2026.

Updated water quality monitoring plan	Due to significant changes on site since the imposition of Condition M1 of PCE 11514 and Condition E2 of 7153/3 in 2011, MMG Rosebery has committed to improving the representativeness of the dam seepage and stormwater monitoring components of the site water quality monitoring plan.	Approval received from EPA in February 2026 to update the water quality monitoring plan, changes were implemented upon approval.
Lead (Pb) contaminated waste disposal	Pb contaminated waste was historically disposed of at the Bobadil Landfill. Due to its closure, MMG Rosebery committed to investigating an alternative disposal method. A proposal was made to the EPA to backfill stopes underground using Pb contaminated waste in October 2025.	Awaiting EPA approval.
V-notch weirs for stormwater monitoring around the Filter Plant	As part of the updated water quality monitoring plan, MMG Rosebery committed to installing two new V-notch weirs for stormwater monitoring within six months of the EPA approving the updated plan.	Scheduled for Q3 2026.
Reinstate stormwater and seepage diversion to BD1	As part of the updated water quality monitoring plan, MMG Rosebery committed reinstating the stormwater and seepage diversion to monitoring location BD1 within six months of the EPA approving the updated plan.	Scheduled for Q3 2026.

Refer to section 7.1 for details of the external compliance audit against commitments in EPN 7153/3 and PCE 11514.

5. Implementation and Operation

5.1 Approvals and Notification

EPN 7153/3, G7 2.8 & PCE 11514, G8 2.8 Any approvals or written notification received in relation to this notice.

An update on the progress of Environmental Approvals within the reporting period is detailed in Table 7. Note that not all of the activities listed within Table 7 are directly related to EPN 7153/3, but for completeness have been included due their location within the bounds of “The Land” as defined by EPN 7153/3 (ML 28M/1993), or their significance to MMG Rosebery’s ongoing operations.

Table 7. Environmental approvals update for the reporting period

Activity	Approval Reference	Approval Date	Details
Dust Deposition Network Upgrade	D25-98633	04/07/2025	Upgrade the existing dust deposition network.
Dust Deposition Gauge temporary relocation	D25-173275	14/10/2025	Temporary relocation of an on-site dust deposition gauge due to construction activity.
Desludge Bobadil Polishing Ponds	D25-188128/007	30/10/2025	Desludging of the Bobadil Polishing Ponds during summer 2025–2026.
Bobadil Groundwater Monitoring Plan	D25-165570-003	8/11/2025	Approval for the new groundwater monitoring plan required under PCE 11514.
Bobadil Beach Blanket Drain Variation	EPN - 12239/1 No Letter Ref	27/11/2025	Reduction in the width of the beach blanket drain to be installed as part of the Stage 11 raise of the Bobadil TSF.
Subaerial Tailings Deposition 2/5 Dam	Letter - D25-289575	22/12/2025	Further temporary approval for subaerial deposition into 2/5 Dam TSF is approved until 30 June 2026 or upon granting of the DA, whichever occurs first.
Work as executed report - Bobadil Stage 11b (final stage)	Letter - D25-289202	19/12/2025	The Department’s Dam Safety Engineer has reviewed the work as executed report submitted and is satisfied that the dam safety conditions on the permit for these works have been satisfied.
Exe TSF - EPA Class of Assessment (2C)	Letter - D25-280073	22/01/2026	Tasmanian EPA determined the class of assessment will be 2C.
Bobadil Stage 12 CPTu Testing	WPA26/3	28/01/2026	Undertake CPTu and Fast Shear Vane Test (FSVT) testing.
Stormwater monitoring	Letter - D26-026014	04/02/2026	Updated stormwater monitoring sites and parameters.
Noise monitoring	Letter - D26-026014	04/02/2026	Equivalent continuous (Leq) and L10 and L90 A-weighted sound pressure levels updated from a 15 to 10-minute period.
Bobadil seepage monitoring	Letter - D26-026014	04/02/2026	Updated seepage monitoring sites and parameters.
Stitt River biological monitoring	Letter - D26-026014	04/02/2026	Electrofishing removed from two sites due to safety concerns.

3L Exploration Portal - EPA Board Assessment Not Required	Letter - D26-32222	17/02/2026	Letter received from EPA outlining assessment under s27(1) of the Environmental Management and Pollution Control Act 1994 (EMPCA) is not required.
Exe Creek - Stage 2 Feasibility Study	WPA26/12	05/03/2026	Works program approval for geophysics survey lines, test pits, water monitoring borehole, water flow stations and an air monitoring station.
Decommissioning of Williamsford Settlement Pond	Permit 116/2009, as varied EPN 8034/1 - Letter D26-49336	12/03/2026	The proposed decommissioning does not require any additional approval or further variation of the conditions contained in Permit 116/2009, as varied by Environment Protection Notice No. 8034/1 (the Permit).
Exe TSF - Environment Protection and Biodiversity Conservation (EPBC) Act Referral	EPBC2026/10425	19/03/2026	Under section 75 of the EPBC Act, the proposed action is a controlled action based on the referral information.
Subaerial Tailings Deposition At 2/5 Dam TSF	PCE 9084 contained in Permit No. DA 0215/00034	18/05/2026	Further temporary approval for subaerial deposition into 2/5 Dam TSF is approved until 31 December 2026 or upon granting of the DA, whichever occurs first; and a minimum 1m Operational Freeboard must be maintained.
Clay Borrow Stage 12 Investigation Program	WPA26/22	26/05/2026	Clay borrow area investigation requiring 9 borrow test pits excavated to ~5 metres depth including the construction of approximately 386 metres of new access tracks.
Bobadil Heights Filtered Tailings Stack	Letter - D26-103290	01/06/2026	EIS guidelines issued for the Bobadil Heights Filtered Tailings Stack. The EPA Board has classed this assessment as a 2C assessment.
Women's Change house	DA 2026 / 00013	06/05/2026	Upgrade of the Women's change house.

5.2 Community Feedback

EPN 7153/3, G7 2.7 & PCE 11514, G8 2.7 Environmental performance, including community complaints and the corrective and preventative processes implemented.

EPN 7153/3, N1 – 1.8 Noise related complaints must be reported in the Annual Monitoring Review and Management Report.

During the reporting period, MMG Rosebery received three environment related community complaints relating to MMG Rosebery mining operations (Table 8). MMG Rosebery categorises complaints in accordance with the Rosebery Complaints and Grievance Procedure (MMG Rosebery, 2023). All complaints made were reportable under EPN 7153/3 and not PCE 11514, as no complaints were received regarding operations at Bobadil TSF.

Of the environment-related complaints, two complaints pertained to noise and one to air quality. Two of the noise complaints were related to nuisance noise audible at sensitive receptors from regular mining activities including hauling and construction operations.

The air quality complaint was in relation to dust. The complaint was investigated and assessed against data captured by MMG Rosebery's air quality network. The network includes depositional dust, high volume air sampling and real-time dust monitoring across the Rosebery township, as well as three on-site weather stations. Analysis of the data did not show any evidence of elevated fugitive mining related dust at any of the monitoring sites located at sensitive receptors across the Rosebery township. Although there was no evidence

of fugitive dust leaving site, MMG Rosebery has a capital works project in place to upgrade the crusher dust extraction fan and has trialed newly installed fog cannons to minimise fugitive dust emissions generated by the crusher.

In addition to the grievances, a resident raised concerns during community consultation, prior to installation, about the proposed location of a dust deposition gauge on their nature strip. In response, MMG Rosebery changed the proposed location to satisfy local residents.

MMG Rosebery values all community feedback and strives for continual environmental improvement through implementing corrective and preventative processes identified during grievance investigations. All grievances and associated investigations are recorded and tracked within MMG's stakeholder management software, Borealis.

Table 8. Grievances received from the community during the reporting period*

ID	Category	Date Received	Details
GR-04561	Environment	11/07/2025	Grievance received via EPA regarding noise. Investigation found the noise was coming from a vibrating roller operating along the 2/5 Dam TSF wall during operational hours. MMG Rosebery updated the Clearance to Work Procedure to include the Environment and Community Departments for works undertaken at the 2/5 Dam TSF, and installed signage directing community members to the Environment and Community Departments for complaints.
GR-04573	Environment	31/07/2025	Grievance received via EPA regarding the excessive use of truck engine brakes when leaving the 2/5 Dam allegedly impacting a community member. Truck drivers were informed and no further remedial action was required.
GR-04767	Environment	5/03/2026	Grievance received by the EPA regarding dust emissions visibly being emitted from the mine site. An investigation was undertaken and found that dust was generated, but there was no evidence of the dust leaving site or resulting in an environmental impact or nuisance. Remedial actions to increase controls were undertaken regardless.

*All community feedback that is frivolous, vexatious, invalid or considered an issue rather than a grievance is not included in this report

5.3 Rehabilitation and Closure

EPN 7153/3 G7 2.9 & PCE 11514, G8 2.9 A summary of any rehabilitation works carried out during the period and an estimate of current remediation liabilities.

5.3.1 Closure Liability

MMG Rosebery has provided a security deposit to MRT as required under the Mineral Resources Development Act 1995 (MRDA), MRT assessed the value as being adequate. The security deposit value was derived from substantial studies completed as part of the closure prefeasibility programs at Hercules and Rosebery. The studies also informed the Rosebery Mine Closure Plan submitted to the EPA and MRT on 31 July 2024, in

compliance with condition DC3 of EPN 7153/3. The next Rosebery Mine Closure Plan is due for submission in July 2029.

On 13 January 2026 during the reporting period, MMG Rosebery submitted the Bobadil TSF Early Mine Closure Plan in compliance with condition DC4.1 of PCE 11514. The next Bobadil TSF Early Mine Closure Plan is due for submission in January 2031.

5.3.2 Progressive Rehabilitation

One major rehabilitation project, the decommissioning of the Williamsford Settling Pond (WSP), was completed during the reporting period. The decommissioning of the WSP forms part of the wider closure works program for the Hercules Mine site, refer to section 5.3.3. Being an underground mine, the disturbance area is otherwise largely limited to operational areas that continue to be used or are planned to be used in the future and are therefore not available for rehabilitation. Current operating areas with potential to be progressively rehabilitated pertain to construction activity at the 2/5 Dam TSF, which is reported under the Permit Conditions - Environmental No. 9084 (Permit 9084) Annual Environmental Report (AER), the Bobadil TSF, and the Assay Creek WRD.

One minor exploration drill site containing two drill pads located along Mt Read Road (referred to as Jupiter) was rehabilitated during the reporting period, undertaken in accordance with the *Mineral Exploration Code of Practice 2012*. The rehabilitated area totaled 0.16 ha. A project initiated in 2018 in conjunction with the EPA and MRT to close out minor legacy workings throughout ML 28M/1993 identified 178 sites/features for remediation. This project requires the support of the Crown Land manager and is ongoing, with 14 sites currently remediated.



Figure 5. Two rehabilitated drill pads located along Mt Read Road as of September 2025.

Other areas undergoing rehabilitation-based projects include the Hercules mine site and Bobadil TSF. The status of the Hercules closure prefeasibility study aimed at the long-term closure and rehabilitation of the Hercules site is discussed below, see section 5.3.3. Monitoring of a nine-hectare closure cover trial that was installed during the 2022–2023 reporting period at the Bobadil TSF has been continued, producing preliminary results. The cover trial was not intended for long-term rehabilitative purposes but is mentioned here due to its significance in informing future TSF closure and rehabilitation (see section 5.3.4).

5.3.3 Hercules

Hercules comprises legacy workings located on the southwest portion of ML 28M/1993. The area is managed and monitored in accordance with the Hercules Monitoring and Maintenance Plan, and MMG continues to undertake a work program to refine the understanding of the site and develop long-term, sustainable closure outcomes. Over the past 12 months, MMG has continued/completed the following tasks within the Hercules closure prefeasibility project:

- Site specific water quality criteria completed and presented to the EPA in Q3 2025. Awaiting EPA response;
- GoldSIM solute balance model completed in May 2026;
- Redesign of the 4L area into a final landform, conceptual completion expected by Q4 2026;
- Work packaged issued for the delivery of a Social Impact and Opportunity Assessment and continued capacity building within the community to understand closure;
- Continued to collect water quality and flow data to inform surface and groundwater models. The models will be used to assess rehabilitation options;
- Continued design and engineering of a 'no regrets' rehabilitation work program that is expected to be executed in 2027;
- Completed the 22nd year of monitoring of revegetation works that were completed in 2004. This long-term data set provides invaluable information for the broader rehabilitation program at site.

Revegetation works were undertaken at Hercules from 2005 to 2008 and subsequently assessed annually using the Hercules Assessment Index for Rehabilitation (HAIR). Upon transition from active treatment to monitoring only (in the absence of ground works which ceased in 2008), annual monitoring was decreased to biannually in 2012.

The last HAIR assessment was undertaken in January 2026 (year 22 of the program) during the reporting year. The results were consistent with previous years. In the absence of any on-ground works since 2008, results have graded to a consistent set of values with pH and nutrient values approaching base line values, and vegetation cover parameters levelling off. The results generally reflect the recent trends with a minor increase in all parameters recorded (LMRS, 2026).

The WSP was built to capture sediment from mine water discharged from the Hercules Mine before it reached the Ring River. It consists of two basins, a sediment forebay and a main settlement pond. The pond historically received mine water from the Hercules Mine 4L, 5L, 6L and 7L adits. Discharge from all adits other than 7L ceased around 2010. The pond also received inflow from local rainfall run-off. The settling pond surfaces contained sediment and material from historic acidic mine water inflows, which needed to be excluded from any revegetated surface, and nearby hardstand/haul road areas were identified as containing acid-generating waste rock unsuitable for incorporation into the rehabilitated surface.

Decommissioning of the WSP commenced on 29 April 2026 and concluded 19 June 2026. Over 25 working days, approximately 0.17 ha was rehabilitated. Impacted sediment was progressively removed and transported to the Bobadil TSF. Following sediment removal, the ponds were treated with crushed limestone and backfilled. Disturbed surfaces were then re-spread with stockpiled topsoil, and the final surface was cultivated along the contour to form a loose, friable growing medium. Native seed from species and provenance suitable for the Williamsford area was applied at approximately 6 kg/ha across all disturbed areas and then fertilised at a rate of 300 kg/ha. Standard site safety and *Phytophthora* hygiene controls were maintained throughout, with no safety, environmental or community incidents recorded. Future works include ongoing monitoring via drone imagery.



Figure 6. WSP before (left) and after (right) civil works have been completed in June 2026.

5.3.4 Bobadil Tailings Storage Facility

During the 2021–22 reporting period, a nine-hectare closure cover trial was installed at the Bobadil TSF as part of the continuation of a comprehensive PFS (PFS Part B, begun in 2020) that will inform and advise the final closure design of the facility. The trial monitors performance of two cover variants that aim to reduce rainfall infiltration and oxygen ingress. Monitoring and data collection continued throughout the reporting period. Preliminary results show that Covadamer Option 2 fulfills both primary and secondary cover option requirements, with seepage shown to be <1% of cumulative rainfall and oxygen concentrations below the geosynthetic clay liner limited to <2% (SGME, 2024). Field results have also allowed the development of a model (showing good correlation with observed results) that can be used to predict long-term cover performance. The trial will continue as vegetation continues to establish, facilitating stronger results.

During the 2023/24 reporting period *Phytophthora cinnamomi* (root rot) was identified within the cover trial and broader Bobadil TSF. In response, MMG Rosebery installed signage, an automated wheel wash and a disinfection station containing Phytoclean at the Bobadil TSF. The presence of root rot within the cover trial shouldn't alter the results or inhibit the performance of the trial. *Phytophthora* was confirmed as present and widespread across the revegetation trial following the 2024 observations. Monitoring of the vegetation during the Year 4 (January 2026) reporting period found that susceptible species have continued to decline in number and coverage, but non-susceptible species are filling the gaps, and the overall coverage percentage score has increased across the site (LMRS, 2026). This concludes that, while disappointing that the pathogen is present, it is unlikely to have a negative effect on the effectiveness of the cover vegetation trial in the medium or long-term (LMRS, 2026).

More broadly, the Year 4 monitoring results indicate the cover trial continues to trend positively. The combined score across all measured parameters rose to 743 out of a possible 900, up from 700 in Year 3, continuing an improving trend since monitoring began in 2023 (LMRS, 2026). Vegetation cover strengthened markedly (up from 47 to 74), exotic and undesirable species remain low, and many native plants have matured to flowering and seeding stage. Soil and peat conditions (nitrogen, organic carbon, pH, moisture) remain within acceptable ranges, with no evidence of problematic browsing (LMRS, 2026). Overall, none of the observed issues, including root rot and a small area of poor vegetation establishment, appear to be undermining the trial's trajectory toward a self-sustaining native cover.

5.4 Waste Disposal

EPN 7153/3 G7 2.10 & PCE 11514, G8 2.1 An inventory of waste disposed on The Land during the previous 12 months, including details of the quantities of each waste and the location of its disposal.

5.4.1 Waste Rock and Tailings

The mineral waste mined to establish development drives used to access the ore body, is primarily used to backfill underground mine stopes and voids. All waste rock that cannot be stored underground is sent to the surface and placed in the 3 Level Waste Rock Dump (3LWRD). During the reporting year, no waste rock was placed in the 3LWRD and 317,316 tonnes of mined waste rock remained underground as backfill.

Since commissioning of the 2/5 Dam TSF in April 2018, tailings have primarily been deposited at the 2/5 Dam TSF. Following completion of the Bobadil Stage 10A & 10B embankment raises, tailings are deposited at Bobadil intermittently depending on operational strategies. Bobadil Stage 11 was completed in December 2025 and construction on Stage 12 is forecast for October 2026. A total of 298,735 tonnes of dry tailings was deposited at 2/5 Dam TSF and 611,687 tonnes at the Bobadil TSF during the reporting period. Waste rock and tailings production is summarised in Table 9.

Table 9. Waste rock and tailings production (tonnes)

	2024-25FY	2025-26FY	% Change
Waste rock mined	346,871	317,316	-9
Waste rock to underground	344,396	317,316	-8
Waste rock to 3 Level WRD	2,475	0	-100
Dry tonnes tailings (Total)	860,788	910,422	6
Dry tonnes tailings (Bobadil TSF)	62,619	611,687	877
Dry tonnes tailings (2/5 Dam TSF)	798,169	298,735	-63

5.4.2 On-site Landfill

The Bobadil Landfill is authorised under EPN 7153/3 Condition WM3 for disposal of lead-contaminated inert materials, including used filter cloths (usually buried underground), poly pipe and other plastics, timber, rubber (excluding tyres) and non-recyclable metal.

Bobadil Landfill reached capacity in May 2025, prompting MMG Rosebery to investigate alternative waste management options. On 23 October 2025, MMG sought EPA feedback on underground disposal of lead-contaminated mining waste, in accordance with EPN 7153/3 condition WM2. The EPA confirmed that hazardous-material-contaminated waste from mining operations, including but not limited to lead contamination, must preferentially be disposed of underground as backfill in stopes. The EPA also advised it had consulted Mineral Resources Tasmania, who support underground disposal provided it does not result in resource sterilisation.

On this basis, waste previously destined for Bobadil Landfill has since May 2025 been stored at the 3LWRD pending underground disposal. This totaled 247.8 tonnes during the reporting period.

In parallel, MMG Rosebery progressed a closure plan for Bobadil Landfill in accordance with PCE 11514 condition WM2.3, submitting it to the EPA on 16 December 2025. The plan remains under review and is forecast to be approved within the next reporting period, with closure works scheduled to coincide with the Bobadil Stage 12 embankment raise.

6. Checking and Corrective Action

6.1 Meteorological Monitoring

EPN 7153/3, A4-3 Analysis of yearly climate.

In accordance with EPN 7153/3, A4-3, MMG commissioned a review of meteorological data for the reporting period. Three weather stations operate across the Rosebery site: one at the main mine site near the administration building and mill, one at Bobadil TSF and one at the 2/5 Dam TSF. Data capture was generally strong, except for wind speed readings at 2/5 Dam TSF, where the equipment sustained physical damage sometime in late 2025 or early 2026. The review found site conditions over the reporting period were marked by low wind speeds, frequent calm periods, a cool temperate climate, high relative humidity and high annual rainfall.

The long-range outlook for the coming summer indicates below-average rainfall and above-average temperatures, driven by an El Niño currently established in the tropical Pacific. However, rainfall in western Tasmania is more heavily influenced by the Southern Annular Mode (SAM) and the position of the subtropical ridge. Because SAM operates on a 1 to 3-week cycle, it can't be forecast at seasonal timeframes, but given the current strength of the El Niño, a conservative approach to summer dust management preparation is underway.

Climate projections for Rosebery under CMIP6 (SSP2-4.5) indicate ongoing warming across western Tasmania this century, with mean annual temperatures projected to rise by approximately 1–2°C from 2035 onward relative to the 1985–2014 baseline. Wind speed and rainfall trends are less certain, with projections showing potential increases or decreases from 2035 onward. In practical terms, this suggests the existing seasonal dust risk pattern at Rosebery will likely continue and could intensify in summer, as warmer, drier conditions reduce surface moisture in exposed materials and raise the risk of fugitive dust emissions.

Full results and details are provided in Appendix C (WSP, 2026).

6.2 Water Monitoring – 3 Level Waste Rock Dump (EPN 8815/2)

EPN 8815/2, G4-4 Annual review of the surface and ground water monitoring program in accordance with Appendix B of the Detailed Design Report, including an assessment of surface and groundwater impacts from the 3 Level WRD.

EPN 8815/2, M3 1.2 Results of 3 Level WRD surface and groundwater monitoring program.

In accordance with EPN 8815/2, G4-4 and M3 1.2, MMG continued its water quality monitoring program at the 3LWRD and commissioned a review of surface and ground water monitoring results for the reporting period.

Surface water run-off from the Waste Rock Dump (WRD) is collected and directed to the Effluent Treatment Plant (ETP) for treatment. During the reporting period, two periods of high rainfall caused water collected off the WRD and stored in the 4L pond to overtop the emergency spillway and report to Rosebery Creek. MMG Rosebery notified the EPA Tasmania of both events and monitored Rosebery Creek in response. Monitoring results showed a high level of dilution within a short distance downstream, with no evidence of environmental nuisance or harm resulting from either event. MMG Rosebery has since implemented action to mitigate the risk of re-occurrence (refer to section 6.7).

Full annual surface water, ground water and lysimeter monitoring results and details are provided in section 14 of Appendix D (Koehnken, 2026).

6.3 Water Monitoring – Rosebery (EPN 7153/3 & PCE 11514)

EPN 7153/3, G7 2.6 & PCE 11514, G8 2.6 A review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring locations, including discharge and ambient monitoring points that illustrate significant trends.

EPN 7153/3, M4-3 & PCE 11514, E2-2 If the concentrations in effluent [from Bobadil Tailings Dam end-of-pipe discharge] of parameters [listed in EPN] do not comply with the levels specified in Column 5 of Table 3 (Percentile Investigation Trigger Level) at the point at which it is discharged to the Pieman River when measured in the units specified in Column 2 of Table 3, then, an investigation into the possible reason for the exceedence must be conducted and a report summarising the outcomes of all such investigations be submitted to the Director in MMG Rosebery's Annual Monitoring Review and Management Report in compliance with G7.

EPN 7153/3, E3 Annual biological survey and ambient water quality monitoring program of the Stitt River and Lake Pieman must be undertaken in accordance with columns 1 to 4 of Table 6 of Attachment 2 and columns 1 to 6 of Table 7 of Attachment 2 to document ongoing environmental conditions, increase the understanding of temporal, spatial and seasonal biological and chemical changes within the lake, and progress the development of site-specific toxicity guidelines for sulphate and zinc in Lake Pieman.

In accordance with EPN 7153/3 conditions G7 2.6, M4-3 and E3, and PCE 11514 conditions G8 2.6 and E2-2, MMG continued its water quality monitoring program and commissioned a review of surface and ground water monitoring results for the reporting period. Results are summarised in Appendix D (Koehnken, 2026). Additionally, all water quality monitoring data pertaining to EPN 7153/3 is submitted to the EPA on a quarterly basis.

During the reporting period, three water quality-related environmental incidents were reported to the EPA. Two of these were the 4L pond overtopping events discussed in section 6.2. The third occurred on 21 October 2025, when high rainfall caused the decant channel downstream of the Bobadil TSF to overflow at the culvert near the railway tracks, discharging water from site that ultimately entered Lake Pieman. This water had already passed through the main TSF, where metal hydroxides are precipitated and captured, and was within the channel connecting to the Polishing Ponds at the time of the overflow. MMG Rosebery reported the event to the EPA and collected water quality samples from the overflow, which returned concentrations below the discharge limits set for the site's authorised discharge point, the Bobadil Outfall, into Lake Pieman. The investigation found no evidence of environmental nuisance or harm resulting from the decant overflow.

The 95th percentile for Total Nitrogen based on the reporting period was 6.5mg/L, greater than the 5.5 mg/L Investigation Trigger Level. An internal investigation for the same issue in the previous reporting period found several likely contributors that included increased underground and shallow blasting (resulting in less dilution of residues), placement of recently blasted rock within the Bobadil TSF as part of the Stage 11 and 12 construction works, and below-average rainfall reducing inflows and dilution. Despite the exceedence, the risk to the receiving environment is considered low due to the 95th percentile value being generic in nature and not linked with known ecosystem processes in the receiving environment. Additionally, Lake Pieman provides strong and ongoing dilution, turbulent flows restrict algal growth, and the naturally dark water further limits light penetration. At the time of this report being submitted to the EPA (30 September 2026), the 95th percentile is still exceeding the Investigation Trigger Level. It is expected to take some time to drop below 5.5 mg/L given the high individual values recorded during the first half of 2026.

A review of the water quality monitoring data for the reporting period found water quality monitoring was conducted in accordance with requisite conditions and that water treatment was effective in reducing metals concentrations in the discharge water. However, there were two instances of missed cyanide samples at the Bobadil outflow on the 13 March and 12 May 2026. Water chemistry results recorded at the authorised discharge point, Bobadil Outfall (BO), complied with EPN discharge limits for all parameters. MMG Rosebery hasn't exceeded the compliance limit of BO discharge parameters (excluding false Total Petroleum Hydrocarbons (TPH) positives) since 2020.

MMG Rosebery's compliance-related water quality monitoring program is extensive, and, over time, operational changes have rendered certain elements of the program outdated. Successive annual water quality reviews have recommended revision of specific monitoring locations and/or parameters to ensure the program remains aligned with current water management practices on site and continues to provide information that is relevant and of value to MMG Rosebery, the regulator and the community.

In 2025, MMG Rosebery commissioned a review of stormwater, Bobadil seepage and Bobadil Outfall monitoring requirements under EPN 7153/3 and PCE 11514. This review informed three submissions to the EPA.

The stormwater and Bobadil seepage submissions were approved by the EPA in February 2026, resulting in updated monitoring locations and parameters that better reflect current stormwater discharge points and sources of seepage. These updated monitoring requirements took effect during the reporting period and are detailed in Appendix D (Koehnken, 2026). Following this approval, MMG Rosebery committed to installing two new V-notch weirs to enhance stormwater monitoring capability, with installation forecast for completion in Q3 2026. MMG Rosebery will continue to review existing EPN/PCE water monitoring conditions against current site water management practices to support the ongoing improvement of monitoring data quality, relevance and reliability.

MMG Rosebery's water quality monitoring program is comprehensive. For a more detailed review of results from the reporting period refer to Appendix D (Koehnken, 2026).

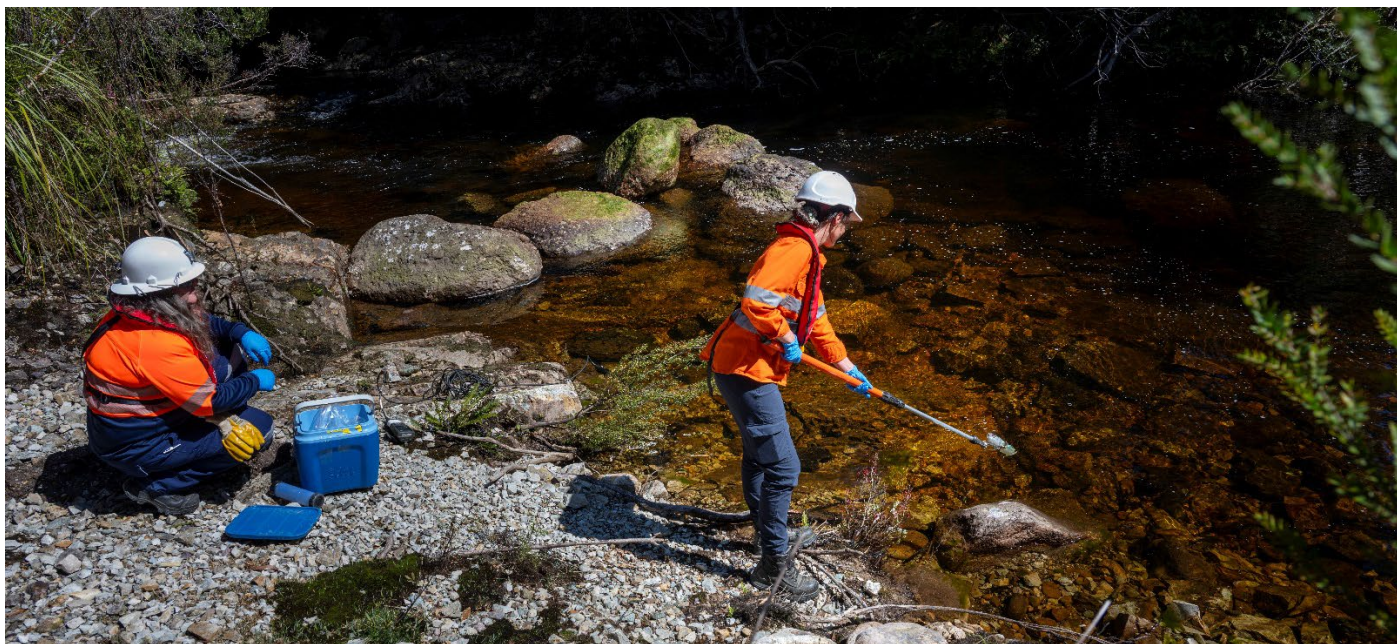


Figure 7. Water quality monitoring of the rivers surrounding MMG Rosebery.

6.4 Biological Monitoring

EPN 7153/3, G7 2.6 & PCE 11514, G8 2.6 A review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring locations, including discharge and ambient monitoring points that illustrate significant trends.

EPN 7153/3, E3 An annual biological survey and ambient water quality monitoring program of the Stitt River and Lake Pieman must be undertaken in accordance with columns 1 to 4 of Table 6 of Attachment 2 and columns 1 to 6 of Table 7 of Attachment 2 to document ongoing environmental conditions, increase the understanding of temporal, spatial and seasonal biological and chemical changes within the lake, and progress the development of site specific toxicity guidelines for sulphate and zinc in Lake Pieman.

In accordance with EPN 7153/3 conditions G7 2.6 and E3, MMG continued its biological monitoring program (encompassing an annual survey of Lake Pieman and bi-annual spring and autumn surveys of the Stitt and Ring rivers) and commissioned a review of the monitoring results upon completion of the surveys. Results are summarised in Appendix E (Entura, 2026) and Appendix F (Entura, 2026).

6.4.1 Lake Pieman

Biological monitoring at Lake Pieman was undertaken in December 2025. The results, considered with the preceding monitoring record, provided no evidence of toxicological impacts on shoreline biological condition attributable to site discharge. Macroinvertebrate abundance and taxa richness showed no decline associated with the outfall, and chlorophyll-a biomass from large woody debris (LWD) did not differ significantly among

site groups. A 2026 water-quality review further found that zinc concentrations in the lake cannot be directly attributed to the Bobadil discharge and that most metals remain below applicable guideline values, indicating an overall low toxicological risk.

The LWD algal sampling method itself is a recognised weakness of the program. Because LWD is exposed as lake levels fluctuate, samples are subject to periodic dewatering, and the Department of Natural Resources and Environment Tasmania (NRE Tas) has since discontinued the underlying scrape method in its own programs after studies found 30–50% of chlorophyll can be lost on retrieval. Variable snag orientation, depth and shading between sites add further inconsistency, making LWD results difficult to compare reliably across sites and years. This is the likely explanation for the historic decline in LWD algal biomass observed from 2016 onwards at sites upstream and downstream of the outfall, previously attributed to reduced nutrient input following cessation of wastewater discharge, though a similar decline in macroinvertebrate abundance and diversity at reference sites suggests broader lake-scale factors, not the outfall, are the more likely driver.

Suspended tiles, introduced in 2024, are a more reliable substrate. They remain submerged regardless of lake level and so avoid the dewatering problem affecting LWD. Tile results in December 2025 showed higher algal biomass with distance downstream of the outfall, but differences were not statistically significant, and there is no plausible mechanism linking the outfall's contaminants (copper, zinc) to increased algal growth, the pattern more likely reflects hydraulic scour, which is greatest near Bastyan Power Station.

Given these methodological limitations and the water-quality evidence, MMG Rosebery commissioned a review into the value of the biomonitoring program, which concluded that continued monitoring is unlikely to materially improve confidence in the outfall's ecological effects. For a more detailed review of results from the reporting period refer to Appendix E (Entura, 2026).

6.4.2 Ring and Stitt Rivers

Biological monitoring of the Ring and Stitt rivers assesses the ecological status of the riverine ecosystem and is used to evaluate changes over time and relate this back to environmental conditions and management actions associated with MMG Rosebery mining operations. Biological monitoring of the Ring and Stitt rivers was undertaken in spring 2025 and autumn 2026. Results are summarised in Table 10 and Table 11, and monitoring locations are shown in Figure 8. For a more detailed review of results, refer to Appendix F (Entura, 2026).

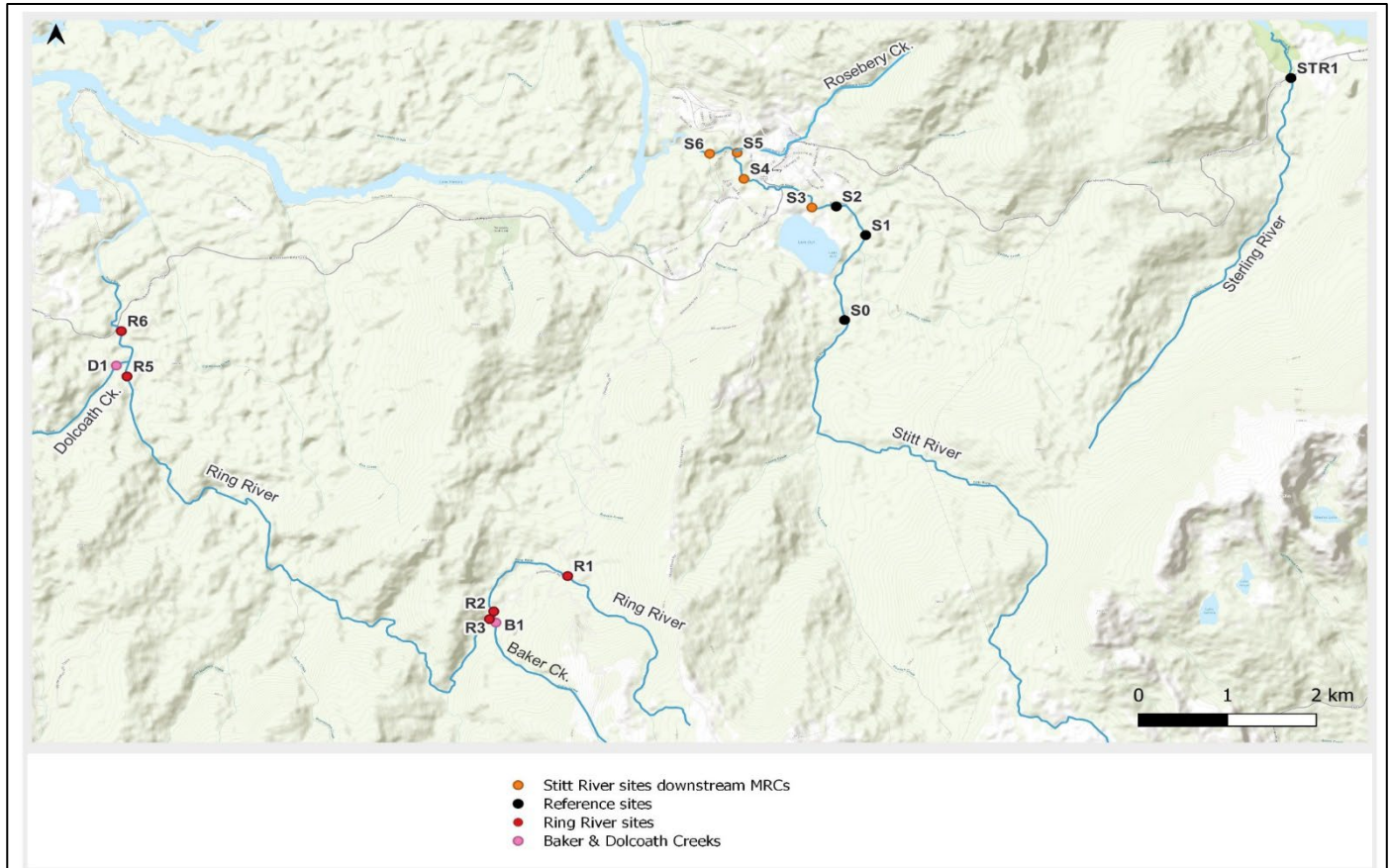


Figure 8. Location of monitoring sites in the Ring River catchment, Stitt River and the Sterling River. MRC refers to mining related contaminants. The new S5.5 monitoring site established for the 2025/26 monitoring season is not shown on the map above, but it is located between S5 and S6.

Table 10. Key findings from biological monitoring of the Ring River

Nature of Change	Findings of Monitoring Program
Status of environmental conditions	The legacy of pollution from the Hercules mine area, particularly via Baker Creek, continues to impact the Ring River catchment. All sites were rated as Poor by the Tasmanian River Condition Index (TRCI) Aquatic Life Index in both spring 2025 and autumn 2026 (Dolcoath Creek was rated Very Poor in autumn 2026), reflecting AusRivAS scores that fell within the impaired bands at every site. Specifically, mostly severely impaired (Band C) or extremely impaired (Band D), with the exception of a single replicate at R1 (autumn 2026) and R2 (spring 2025), which scored significantly impaired (Band B).
Status of understanding of temporal, spatial and seasonal biological changes	Unlike the previous reporting period, a clearer upstream–downstream pattern re-emerged. Site R2, upstream of Baker Creek, had by far the highest abundance of the Ring River sites in spring 2025 (510 animals/m ²) and remained marginally higher in autumn 2026, while R1 further upstream and the downstream sites (R5, R6) all recorded consistently low abundances (30–140 animals/m ²). Site R3, immediately downstream of the Baker Creek confluence, again had the lowest abundance and taxa richness of the Ring River sites, consistent with previous results. Taxa richness and the range of sensitive Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa were highest at R1 and R2, and became substantially more restricted at R3, R5 and R6, a reversal of the unexpected pattern noted in spring 2024, when the highest diversity and abundance of sensitive taxa was recorded at the most downstream site (R6). AusRivAS O/E scores showed no clear or consistent seasonal pattern but confirmed substantially poorer river health at R3 to R6, downstream of the Baker Creek inflow, than at R1 and R2. In summary, the metrics used in the analysis suggest that Baker and Dolcoath creeks remain in a highly degraded condition.

Table 11. Key findings from biological monitoring of the Stitt River

Nature of Change	Findings of Monitoring Program
Status of environmental conditions	The Stitt River remains in significantly better biological condition than the Ring River. AusRivAS results were more variable in this reporting period than previously reported. In spring 2025, only the Sterling River reference site and Stitt River reference sites S1 and S2 were consistently assessed as equivalent to reference condition (Band A), Reference site S0 and impact sites S3–S5.5 were significantly impaired (Band B), and the most downstream site, S6, was severely impaired (Band C). Condition improved substantially in autumn 2026, when S0, S3 and S4 returned reference condition scores, while the Sterling River, S5 and S5.5 remained significantly impaired (Band B), and S6 improved to one Band A and one Band B replicate. Overall, the AusRivAS outputs suggest S3 and S4 remain the most improved of the downstream sites over the long term, although both recorded their first impairment since spring 2023 in this survey, likely linked to elevated pre-survey flows.

Status of understanding of temporal, spatial and seasonal biological changes

During the reporting period a new monitoring site, S5.5, was established immediately downstream of the Rosebery Creek inflow (between S5 and S6) to improve the spatial resolution of the program in the lower river. Biological condition at S5.5 was consistently poorer than at S5, with reduced taxonomic and EPT richness and poor representation of taxa characteristic of the upper river, despite one relatively favourable AusRivAS replicate in autumn 2026. This reinforces the value of using multiple biological metrics rather than a single index. Integrating the biomonitoring results with the detailed water-quality dataset substantially improved interpretation of the spatial pattern this reporting period. Cadmium and lead concentrations increased sharply from S5 to S5.5, coincident with the marked deterioration in macroinvertebrate condition, providing strong evidence that these two metals are important contributors to biological impairment in the lower river. Copper and zinc, both elevated from upstream, are also likely to add to overall toxicological stress from this metal mixture.

The clearest correspondence between water quality and biological condition occurred at S6, which sits downstream of both Rosebery Creek and Primrose Creek and therefore integrates contaminant loads from both tributaries in addition to upstream Stitt River inputs from mine-related contaminants (MRCs), a term used in the report to collectively describe contaminants entering the Stitt River from historical and contemporary mining and township-related sources, including residual seepage from the 2/5 Dam TSF, Rosebery and Primrose creeks, and mine-site and township stormwater.

Rosebery Creek is a major current source of MRCs to the lower river, contributing an estimated average of ~8 kg/day of additional zinc load in 2025–26 (more than double the ~3 kg/day increase attributed to diffuse inputs near the 2/5 Dam TSF), while Primrose Creek, which receives acidic (pH ~4), mine-affected stormwater, adds a further, less-well-characterised contaminant load immediately upstream of S6.

Cadmium, lead and zinc concentrations at S6 were substantially higher than at the upper river sites, and this site showed some of the clearest evidence of biological impairment. This included low taxa and EPT richness, reduced or absent sensitive taxa (certain families of mayfly, stonefly and amphipods), severe AusRivAS impairment in spring and poor TRCI condition. The relatively high total abundance at S6 in autumn did not offset this, as the community there was dominated by taxa tolerant of MRC exposure. Collectively, this indicates the contemporary biological pattern in the Stitt River cannot be explained simply as a downstream response to the 2/5 Dam TSF. S3 and S4 remained in comparatively good condition despite exposure to elevated metals, and the strongest water-quality and biological deterioration instead occurs farther downstream, spatially associated with inputs from Rosebery Creek and, cumulatively, Primrose Creek.

Since 2021, brown trout abundance has also increased at sites downstream of MRC sources. This pattern held in spring 2025 despite high-flow conditions limiting electrofishing, then reversed in autumn 2026 due to a high catch at the Sterling reference site, broadly consistent with the macroinvertebrate evidence of improving river health upstream of the Rosebery

	Creek inflow, but not in the more heavily impacted reach below it.
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6.5 Dust Monitoring

EPN 7153/3, G7 2.6 & PCE 11514, G8 2.6 A review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring location, including discharge and ambient monitoring points that illustrate significant trends. Include a review of the accuracy of the sampling procedure, sampling schedule, sample locations and test methods applied.

EPN 7153/3, A5-3 & PCE 11514, A8-3 Tabulated high-volume air sampler, and dust and metal deposition results for the entire year, showing intermediate values as well as final monitoring results. Tabulated annual averages of the deposition increment above background, supported by deposition isopleths or graphs. Monthly deposition isopleths or graphs of total dust and metal deposition and increment above 'background'. Summaries of all exceedences occurring within the reporting year, describing the results of any investigations undertaken and the mitigation measures that were adopted in response. Any supporting data analysis or description necessary to aid interpretation of the dataset.

In accordance with EPN 7153/3 conditions G7 2.6 and A5-3, and PCE 11514 conditions G8 2.6 and A8-3, MMG continued its dust deposition and ambient air quality monitoring program and commissioned a review of the monitoring results for the reporting period. Results are summarised in Appendix G (WSP, 2026).

High Volume Air Sampling

During the reporting period there was one exceedence of a Trigger Level across the HVAS network. The PM10 Trigger Level was exceeded at Alec St on 3 September 2025. Investigation found the concurrent Total Suspended Particles (TSP) result at the co-located unit was lower than the PM10 result, which is not physically possible under normal operating conditions, and concluded the result was most likely attributable to an unidentified field or operator handling error rather than an actual air quality impact.

There were no exceedences of Compliance Limits at any HVAS location during the reporting period. Data capture for TSP and PM10 was reduced at some locations due to a missed sampling event on 15 September 2025, and a missed TSP sampling event on 8 November 2025. Both events were reported to the EPA within the required timeframe. Internal investigations were completed for the Trigger Level exceedence and all failed sampling events, and corrective and preventative actions were developed and are being implemented to reduce the likelihood of reoccurrence.

The new HVAS monitoring station required under PCE 11514 was installed and became operational on 15 September 2025, ahead of the EPA-approved extension deadline of 10 October 2025. A full twelve months of TSP and PM10 data capture is not yet available, as monitoring did not commence until part-way through the reporting period. Results collected to date are included within Appendix G (WSP, 2026) and no exceedences of the Compliance Limits were recorded.

Dust Deposition

Across the dust deposition network there were no exceedences of the annual average total deposited dust Compliance Limit, or the annual average dust deposition rate above background Compliance Limit, at any location. Investigation found the AD22 gauge was heavily contaminated with bird excrement during December 2025 and January 2026 monitoring rounds. The December 2025 sample could not be analysed by the laboratory and is recorded as a missed sample, while the January 2026 Total Insoluble Matter result of 15.4 g/m²/month (compared with an average of 0.4 g/m²/month at AD22 for the rest of the year) is considered non-representative of ambient dust conditions and has been excluded from the annual average dataset. A temporary bird deterrent was installed at AD22 on 15 January 2026, and the site continues to be monitored closely for further contamination.

Trigger-level background-adjusted exceedences of dust deposition were also recorded at AD21 in October 2025 and at AD21 and AD4 in November 2025. Internal investigations reviewing sampling procedures, laboratory quality assurance/quality control (QA/QC), metal deposition data, meteorological conditions, HVAS

results, real-time monitoring data and community complaints concluded that these trigger exceedences were not indicative of elevated dust emissions from MMG Rosebery mining operations.

Data capture across the dust deposition network was reduced during the reporting period due to a combination of factors. High rainfall in July and August 2025 overflowed collection bottles; a shortened five-day investigative deployment directed by the EPA in September 2025 did not meet the 30 ± 2 day requirement of AS/NZS 3580.10.1:2016 and was therefore invalid, meaning no September 2025 Dust Deposition Gauge (DDG) compliance data are reported; and the AD22 bird contamination event described above.

Following EPA approval received on 4 July 2025, MMG Rosebery implemented an upgrade to the dust deposition network during the reporting period, including larger 5L collection bottles, new stands and relocation of monitoring sites AD2.1, BG3, AD11, AD21, AD22, AD23 and AD25 to improve compliance with the AS/NZS 3580.10.1:2016 and EPN 7153/3, and ensure safe access for environmental technicians. Retrospective approval was also obtained for earlier changes made at AD3, AD4 and AD22. The upgraded network was deployed from 7 October 2025 (20 October 2025 for AD5). DDG AD5 was temporarily relocated approximately 80 meters to a position near the underground transformer between 20 October 2025 and 25 February 2026, with EPA approval, to allow safe completion of coarse ore bin walkway works near its usual location. Monthly sampling continued throughout the relocation.

The dust deposition network upgrade implemented during the reporting period, comprising larger collection bottles, improved infrastructure and relocation of gauges, is expected to provide more meaningful and representative information regarding MMG Rosebery's dust deposition impacts going forward. As dust deposition rates are indicators of amenity issues, the upgraded network outside of the boundary of the MMG Rosebery Mine, along with MMG Rosebery's existing community complaints program, will continue to provide useful insight into the mine's impacts. MMG Rosebery is also investigating options to increase collection frequency during high-rainfall months, to further improve data completeness.

Real-time Monitoring

Continuous real-time dust monitoring results remained below the mitigation level outlined in MMG Rosebery's Dust Mitigation Management Plan for the reporting period, with no mitigation-level exceedences recorded across the network. Thirteen exceedences of the 60-minute inspection level were recorded at the Baillieu Street monitor on a single day, 1 April 2026, between 22:56 and 23:07; no other inspection-level or mitigation-level alerts were recorded elsewhere on the network during the reporting period. During the reporting period, 12-Watt heated inlet sample conditioners fitted to the four existing DustTrak DRX real-time monitors were replaced with 8-Watt units on 21 August 2025, following discontinuation of the original 12-Watt model by the manufacturer. All four DRX units were recalibrated by the EPA Tasmania Air Section and have operated at an adjusted flow rate of 2.0 L/min (previously 3.0 L/min) since the changeover, ensuring a uniform configuration across the real-time monitoring network.

Community

One community grievance was received during the reporting period and recorded within MMG's stakeholder manager software, Borealis. Community feedback was also received on 12 September 2025 regarding the proposed location of a dust deposition gauge associated with the network upgrade; this related to equipment placement rather than air quality impacts. A complaint regarding alleged visible dust emissions was received via EPA Tasmania on 5 March 2026. MMG's investigation, drawing on meteorological data, monitoring results and site observations, did not identify evidence of material off-site dust impacts. Several dust related improvement projects were commenced during the reporting period to reduce the likelihood of mining related fugitive dust causing environmental nuisance or harm to sensitive receptors. These are summarised in section 3.2.

The review of dust deposition and ambient air quality monitoring data for the reporting period found monitoring was conducted in accordance with requisite conditions and that current management measures prescribed in MMG Rosebery's Dust Mitigation Plan continue to be effective in mitigating fugitive dust. Data capture for HVAS TSP and PM10 monitoring exceeded 90% at all stations (97–100%), while data capture across the dust deposition network was lower (67–75%) due to high rainfall overflow, an investigative deployment period and bird contamination. Trigger Level exceedence investigations and corrective actions were completed in a timely manner. There were no Compliance Limit exceedences recorded at any location during the reporting period. The four Trigger Level exceedences recorded, being PM10 at Alec St, and dust deposition above background

at AD21 (October 2025) and AD21/AD4 (November 2025), were attributable to a likely field or handling error and to non-mining-related factors respectively, rather than mining-related emissions.

Full results and details are provided in Appendix G (WSP, 2026).



Figure 9. Real-time air quality monitors installed around the 2/5 Dam TSF.

6.6 Noise and Vibration Monitoring

EPN 7153/3, G7 2.6 & PCE 11514, G8 2.6 A review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring locations ... that illustrate significant trends.

EPN 7153/3, N1 1.8 Results of the continuous noise monitoring program and noise related complaints must be reported ...

In accordance with EPN 7153/3 conditions G7 2.6 and N1 1.8, and PCE 11514 condition G8 2.6, MMG continued its noise and vibration monitoring program and commissioned a review of monitoring results for the reporting period. Results are summarised in Appendix H (Tarkarri, 2026).

A review of the noise and vibration data for the reporting period found that annual average LAeq, LA90 and LA10 10/15-minute noise levels at Cohen St, Mount Black and Murchison St were similar to those measured in the previous year, with reductions of approximately 2–3 dBA observed at Police House and Alec St. Data availability for continuous noise monitoring was ≥95.7% across all locations except Murchison St (89.7%, due to conversion errors and equipment malfunctions). After filtering for adverse weather, meter overloads and data drift, 69.4–77.8% of intervals remained available for analysis. This is a 4% reduction on the previous reporting period, attributed to a greater proportion of data excluded for adverse weather. Following a recommendation from Tarkarri Engineering's previous reviews, the noise monitoring interval was changed following EPA approval from 15 minutes to 10 minutes on 2 February 2026 to align with the 10-minute weather dataset and improve filtering accuracy.

Noise monitoring found annual average levels were generally within 1 dB of the previous reporting period, with the exception of Police House (down approximately 2 dB across most statistics) and Alec St (down approximately 3 dB during evening LAeq and LA10). Evening levels at Mount Black remained elevated

compared with levels prior to last year's review, and the source has not yet been identified. Tarkarri has recommended co-locating a recording meter during evening periods and, if the trend persists, a targeted environmental noise assessment around Mount Black.

MMG Rosebery's current noise monitoring setup still does not allow for compliance with EPN 7153/3 condition N1 1.3, as the monitoring systems cannot measure a 1/3-octave band spectrum (tonality) or record concurrent impulse time response (impulsiveness). MMG Rosebery is investigating upgrading the noise monitoring infrastructure to address this gap.

Ground vibration monitoring at the Hospital location recorded one exceedence of the 5 mm/s (95% of blasts) limit under EPN 7153/3 condition B2 1.3. A vibration measurement of 5.819 mm/s was recorded on 2 May 2026 at 06:47. This exceedence was attributed to a 2.2 ML seismic event following a blast. No blasts exceeded the absolute 10 mm/s limit.

Air blast overpressure (ABO) was monitored at two locations during the reporting period, the existing Hospital location and a new location on the 7 Level (7L) Administration Building roof. EPA approved 7L as the compliance monitoring location on 30 September 2025. Both locations are being assessed in parallel through this transitional reporting period. During the blast window, the lower 115 dB limit (EPN 7153/3 condition B2 1.1) was exceeded on 13 occasions at 7L and 14 occasions at the Hospital and are attributable to sources local to the monitors rather than blasting. The absolute 120 dB limit (condition B2 1.2) was exceeded on three occasions during the blast window at the 7L location, however none of the exceedences coincided with blast times. No breaches were recorded during the blasts monitored at the new 3L Waste Rock Dump Portal between April and July 2026. From next reporting period, only the 7L ABO location will be monitored, in accordance with the EPA's approval of that location as the new compliance monitoring location.

Two noise complaints were received and resolved during the reporting period, tracked through MMG's stakeholder management software, Borealis. For more detail, refer to section 5.2.

The relocation of ABO monitoring infrastructure to the 7L Administration Building roof, recommended in previous reviews on the basis that the Hospital microphone sits too close to the building façade to comply with AS 2187.2-2006, has been successfully implemented. Relocation of the ground vibration monitoring location to 2A Colebrook Street also received EPA approval and MMG is currently finalising installation of the enabling infrastructure, after which a comparable transitional monitoring period will begin.

Full results and details are provided in Appendix H (Tarkarri, 2026).

6.7 Environmental Event Management

EPN 7153/3, G7 2.7 & PCE 11514, G8 2.7 Environmental performance, including incident management ... and the corrective and preventative processes implemented.

EPN 7153/3, G3 If an incident causing or threatening environmental nuisance, serious environmental harm of material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

During the reporting period, MMG Rosebery recorded fifteen environmental incidents including those concerning compliance with EPN limits. All environmental compliance related incidents have been addressed and reported in Section 6 and referenced appendices. All environmental incidents are detailed in Table 12.

There is general alignment between MMG Rosebery's Risk Consequence Criteria ratings and the Environmental Management and Pollution Control Act 1994 (EMPCA) definitions for incidents resulting in Serious (rating ≥ 4) and Material (rating 3) Environmental Harm referenced in EPN 7153/3 condition G3. Three of the fifteen environmental incidents during the reporting year were not confined to site and reported to the receiving environment. However, in accordance with EMPCA, no environmental incidents that occurred during the reporting period resulted in material or serious environmental harm.

All incidents were entered into MMG's Incident Event Management (IEM) system and required an incident investigation. The investigation process records all incident details and reports on immediate actions taken, applies a risk rating as per MMG's Risk Consequence Criteria, and identifies control failures and corrective actions required. The IEM system ensures that in all cases corrective and preventative actions were developed and implemented as per EPN 7153/3 condition G7 2.7, to reduce the likelihood of reoccurrence.

The three unplanned discharges to the receiving environment were all attributed to extreme wet-weather conditions compounded by infrastructure and operational limitations, with no evidence of environmental harm confirmed in any case. On 22 October 2025 (event ID 3720984), exceptionally heavy rainfall caused the Bobadil TSF decant channel to exceed the design capacity of its culvert system, overtopping the railway culvert and discharging off-site toward Lake Pieman. Corrective actions included a capacity assessment of the decant/culvert system, review of pump control logic, and revision of the wet-weather Trigger Action Response Plan (TARP).

Between 11–13 April 2026 (event ID 3819651), sustained rainfall (~91.6 mm), combined with a lightning-induced power outage, temporary pump failure and a blocked decant outlet, caused the 4L Collection Pond to reach capacity and discharge via its designed emergency spillway to Rosebery Creek. The investigation found a 15–20% sediment-related capacity loss and unreliable level instrumentation. Corrective actions included mechanical desilting and pond restoration.

Then between 31 May and 4 June 2026 (event ID 3848509), an ~85% blockage in the gravity-fed pipeline between the 4L Pond and the Effluent Treatment Plant caused by dislodgement of cemented sediment likely disturbed during suction-truck remediation of the April event, caused the pond to again back up and overtop via the spillway to Rosebery Creek. The pipeline was repaired and corrective actions include a preventative maintenance review, installation of pipeline inspection points, and development of a formal TARP for rising pond levels. In all three events, downstream water quality monitoring showed localised, transient elevations at the point of discharge with rapid attenuation and no sustained deviation from background conditions.

Of the fifteen environmental incidents, eight were compliance related. None of the compliance related incidents reported to the EPA were exceedences of environmental limits resulting from MMG Rosebery mining operations. A dot point summary of these compliance related incidents is provided below.

- 3875102: Depositional dust limit exceeded at one site due to bird faeces.
- 3769725: Depositional dust sample unable to be analysed from one site due to bird faeces.
- 3875078: Depositional dust trigger level exceeded at two sites. No evidence of elevated dust emissions associated with MMG Rosebery mining operations.

- 3761901: High volume air sampling unit lost power at one site prior to collecting sample.
- 3746357: Depositional dust trigger level exceeded at one site. No evidence of elevated dust emissions associated with MMG Rosebery mining operations.
- 3875066: Depositional dust monitoring across the network not compliance sampled during September 2025 due to an active and ongoing investigation.
- 3700002: High volume air sampling unit lost power at one site prior to collecting sample.
- 3875067: High volume air sampling trigger level exceeded at one site. The unit measures TSP and recorded a lower TSP result than the co-located PM10 unit. The result is likely erroneous and therefore considered suspect.

There are currently two events still open (refer to Table 12, open incidents are highlighted in red text). Investigations have been completed for these events; however, the status remains open as there are outstanding corrective actions yet to be implemented (including administrative and engineered controls) to prevent re-occurrence prior to closing out. All actions are due to be completed by the end of Q4 2026. Average close out time on incident investigations during the reporting period was 14 days, and the median close out time was 11 days.

Table 12. Environmental incidents during the reporting period

Event Date	Event Description	Risk Consequence Criteria Rating*		Reported to EPA	Event Status
		Actual	Potential		
30.05.2026	3848509: 4 Level Pond overflow	1	1	Yes	Open
17.04.2026	3822719: Vehicle interaction	1	0	No	Closed
14.04.2026	3820769: Diesel spill	1	0	No	Closed
11.04.2026	3819651: 4 Level Pond overflow	2	1	Yes	Open
30.01.2026	3875102: Dust deposition exceedence	1	1	Yes	Closed
29.12.2025	3769725: Missed dust deposition sample	1	1	Yes	Closed
28.11.2025	3875078: Dust deposition trigger level exceedences	1	1	Yes	Closed
08.11.2025	3761901: Missed HVAS sample	0	0	Yes	Closed
31.10.2025	3746357: Dust deposition trigger level exceedence	1	1	Yes	Closed
22.10.2025	3720984: Bobadil decant channel overtopped	3	2	Yes	Closed
10.10.2025	3713927: Tree across flume road	2	1	No	Closed
30.09.2025	3875066: Missed month of dust deposition monitoring	1	1	Yes	Closed
15.09.2025	3700002: Missed HVAS sample	1	1	Yes	Closed
03.09.2025	3875067: HVAS trigger level exceedence	1	1	Yes	Closed
22.07.2025	3664787: Deceased cormorant on TSF	0	0	No	Closed

*Refers to MMG Rosebery's Risk Consequence Criteria

6.8 Tailings Dam Management

EPN 7153/3, WM1 2.4 (all tailings' dams must) have any environmental or stability issue identified and associated with it reported to the Director within 24 hours of becoming aware of the issue and further outlined to the Director in the Annual Monitoring Review and Management Report.

Tailings dam management in Tasmania is regulated by the Australian National Committee on Large Dams (ANCOLD) guidelines, and Tasmania's Water Management (Safety of Dams) regulations 2015. In addition, MMG also reports under the Global Industry Standard on Tailings Management (GISTM). At MMG Rosebery, the Bobadil and 2/5 Dam TSFs undergo monthly on-site surveillance by ATC Williams under the guidance of the Engineer of Record (EOR). As part of the surveillance program, the EOR conducts annual audits in line with ANCOLD guidelines, as well fulfilling reporting requirements in line with the above regulatory frameworks when required.

During the current reporting period, MMG Rosebery commissioned 5-yearly GISTM Dam Safety Review Reports and Comprehensive Surveillance Inspection and Reports in line with the Safety of Dams regulations and ANCOLD guidelines for the Bobadil and 2/5 Dam TSFs. The 5-yearly GISTM Dam Safety Review Reports cover the period 2021 to 2025, and the Comprehensive Surveillance Inspection and Reports cover the period January to December 2025. All reports will be provided to the EPA upon completion during Q4 2026.

In addition, an autonomous Independent Tailings Review Board (ITRB) was established in 2022 to assess all aspects of the MMG Rosebery TSFs on an annual basis. Since its establishment, the ITRB has convened in July 2022, May 2023, May 2024, March 2025 and March 2026. In addition to convening annually, the Board also meets quarterly. During the reporting year, meetings were held in July and December 2025. The combined inspections by the EOR and evaluations by the ITRB provide Rosebery with clear actions to improve facility performance and mitigate risks.

7. Review

7.1 EPN Compliance

EPN 7153/3, G7 2.3 & PCE 11514, G8 2.3 A review of activity compliance and annual external compliance audit against EPN requirements.

MMG Rosebery commissions an annual independent audit against EPN 7153/3 conditions. The last audit was completed in September 2025 during the current reporting period. The audit found that as per previous audits, MMG Rosebery exhibits a high level of statutory compliance against EPN 7153/3. During the audit period (September 2024 to September 2025) there was no evidence of any “significant” environmental impact/harm occurring or being demonstrated as a result of the operation’s current activities.

The audit reviewed compliance against 105 EPN conditions and found MMG Rosebery to be compliant against all of them. No historical noncompliance’s were identified during the audit. The audit also identified 33 observations/improvement opportunities.

MMG Rosebery utilises annual compliance audits not only to assess compliance against statutory requirements but to drive continual environmental improvement that translates to improved environmental outcomes. To facilitate this process all non-compliant audit findings and selected observations are entered into MMG Rosebery’s database as actions and assigned to relevant MMG personnel for implementation. The next audit is scheduled for September 2026, and the accompanying report will be submitted to the Director of the EPA Tasmania within 30 days of receipt.

8. Acronyms

Acronym	Definition
ABO	Air Blast Overpressure
ABP	Asset Business Plan
AER	Annual Environmental Report
AMRMR	Annual Monitoring Review and Management Report
ANCOLD	Australian National Committee on Large Dams
AS/NZS	Australian Standard / New Zealand Standard (joint standard)
BO	Bobadil Outfall
CPTu	Cone Penetration Test with pore pressure measurement
DA	Development Application
DDG	Dust Deposition Gauge
EIS	Environmental Impact Statement
EMPCA	Environmental Management and Pollution Control Act 1994
EOR	Engineer of Record
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPN	Environmental Protection Notice
EPT	Ephemeroptera, Plecoptera and Trichoptera (pollution-sensitive aquatic insect orders used as a biomonitoring index)
ESG	Environmental, Social and Governance
ETP	Effluent Treatment Plant
FSVT	Fast Shear Vane Test
GHG	Greenhouse Gas
GISTM	Global Industry Standard on Tailings Management
HAIR	Hercules Assessment Index for Rehabilitation
HVAS	High Volume Air Sampler

IBP	Integrated Business Planning
ICMM	International Council on Mining and Metals
IEM	Incident Event Management
ISO	International Organization for Standardization
ITRB	Independent Tailings Review Board
KPI	Key Performance Indicator
LAeq	Equivalent continuous A-weighted sound pressure level
LA10	A-weighted sound pressure level exceeded for 10% of the measurement period
LA90	A-weighted sound pressure level exceeded for 90% of the measurement period (background noise level)
ML	Mining Lease
MRC	Mining related contaminants
MRDA	Mineral Resources Development Act 1995
MRT	Mineral Resources Tasmania
NRE	Department of Natural Resources and Environment Tasmania
PAF	Potentially Acid Forming
PFS	Pre-Feasibility Study
PM10	Fraction of total particles suspended in the air, having diameters less than 10µm
QA/QC	Quality assurance / quality control
RL	Reduced Level
SAM	Southern Annular Mode
SHEC	Safety, Health, Environment and Community
TARP	Trigger Action Response Plan
TNFD	Taskforce on Nature-related Financial Disclosures
TPH	Total Petroleum Hydrocarbons
TSF	Tailings Storage Facility

TSP	Total suspended particles – the term given to the fraction of total particles suspended in the air having diameters generally less than 50µm
WRD	Waste rock dump

9. References

Entura (2026). *Biological Condition of the Ring and Stitt Rivers: Spring 2025 and Autumn 2026*. Entura. 4 Elizabeth St, Hobart, TAS 7000.

Entura (2026). *Lake Pieman Biomonitoring. Bobadil discharge: 2025 survey*. Entura. 4 Elizabeth St, Hobart, TAS 7000.

Koehnken (2026). *MMG Rosebery Annual Water Quality Monitoring Review 2025–2026*. Technical Advice on Water. PO Box 3093, West Hobart, TAS 7000.

LMRS (2026). *Bobadil TSF Cover Trials Rehabilitation: Revegetation Success and Root Penetration Monitoring System – Year 4*. LMRS Pty Ltd. 45 Gormanston Rd, Moonah, TAS 7009.

LMRS (2026). *Hercules Assessment Index for Rehabilitation (HAIR) – Year 22*. LMRS Pty Ltd. 45 Gormanston Rd, Moonah, TAS 7009.

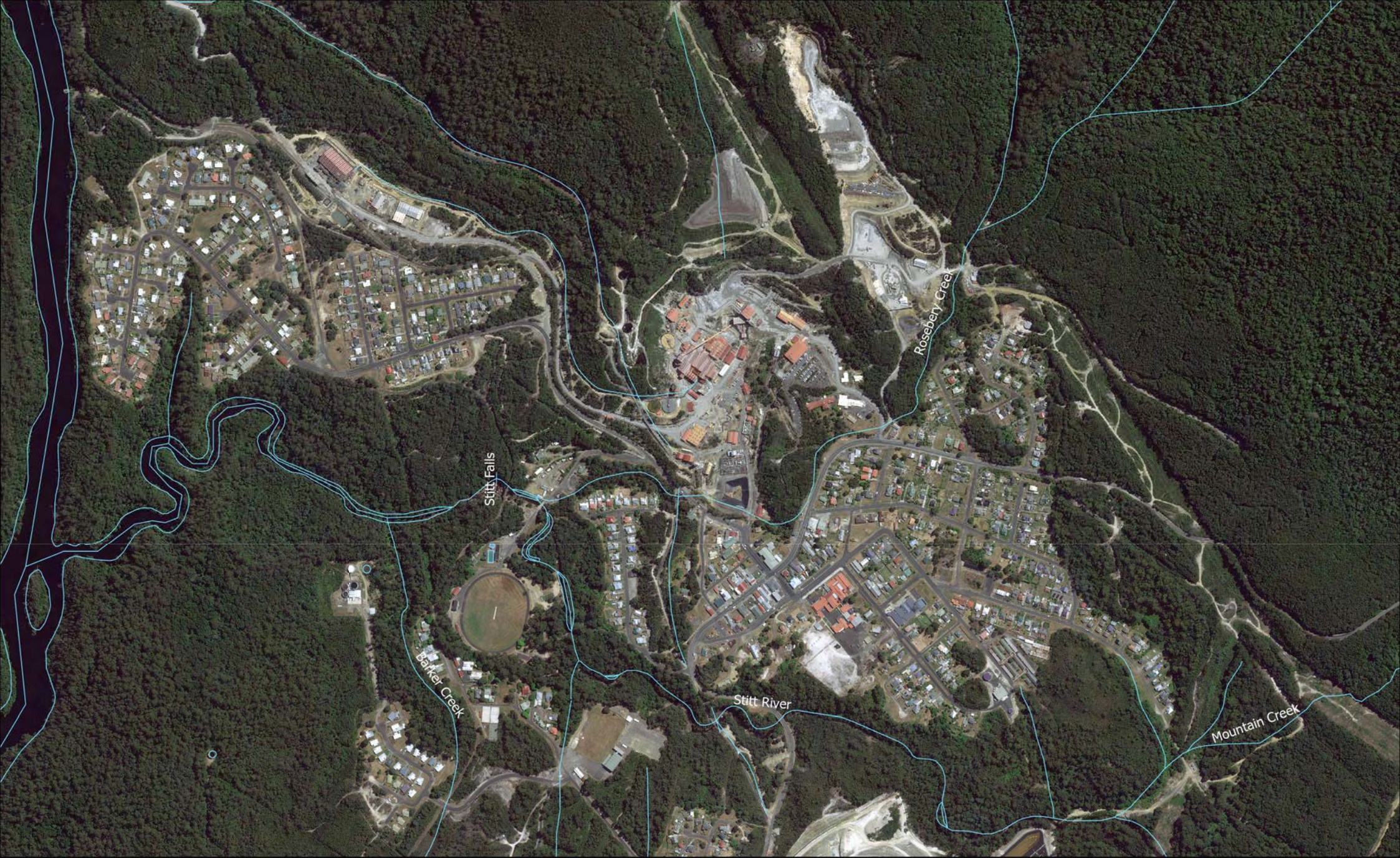
LMRS (2026). *Williamsford Settlement Pond Revegetation Memo*. LMRS Pty Ltd. 45 Gormanston Rd, Moonah, TAS 7009.

SGME (2024). *Cover Trial Annual 22–23 Report – Bobadil Tailings Storage Facility*. SGM Environmental Pty Ltd. PO Box 5622, Stafford Heights, Qld 4053.

Tarkarri (2026). *Rosebery Mine Environmental Noise, Ground Vibration and Air Blast Overpressure Annual Monitoring Data Review*. Tarkarri Engineering. PO Box 506, Kings Meadows, TAS 7249.

WSP (2026). *Annual Air Quality Monitoring Report – FY25/26*. WSP. Level 11, 567 Collins St, Melbourne, VIC 3000.

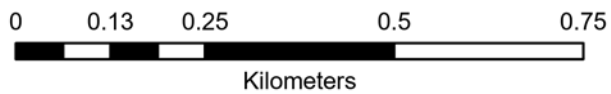
WSP (2026). *Annual Meteorological Report – FY25/26*. WSP. Level 11, 567 Collins St, Melbourne, VIC 3000.



Scale: 1 : 10,000

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1991
Grid: Map Grid of Australia, Zone 55

MMG Rosebery Mine and Rosebery Township
Annual Monitoring Review and Management Report
2023 - 2024





Scale: 1 : 6,000

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1991
Grid: Map Grid of Australia, Zone 55

0 0.07 0.15 0.3 0.45

Kilometers

2/5 Dam Tailings Storage Facility
Annual Monitoring Review and Management Report
2023 - 2024





Scale: 1 : 6,000

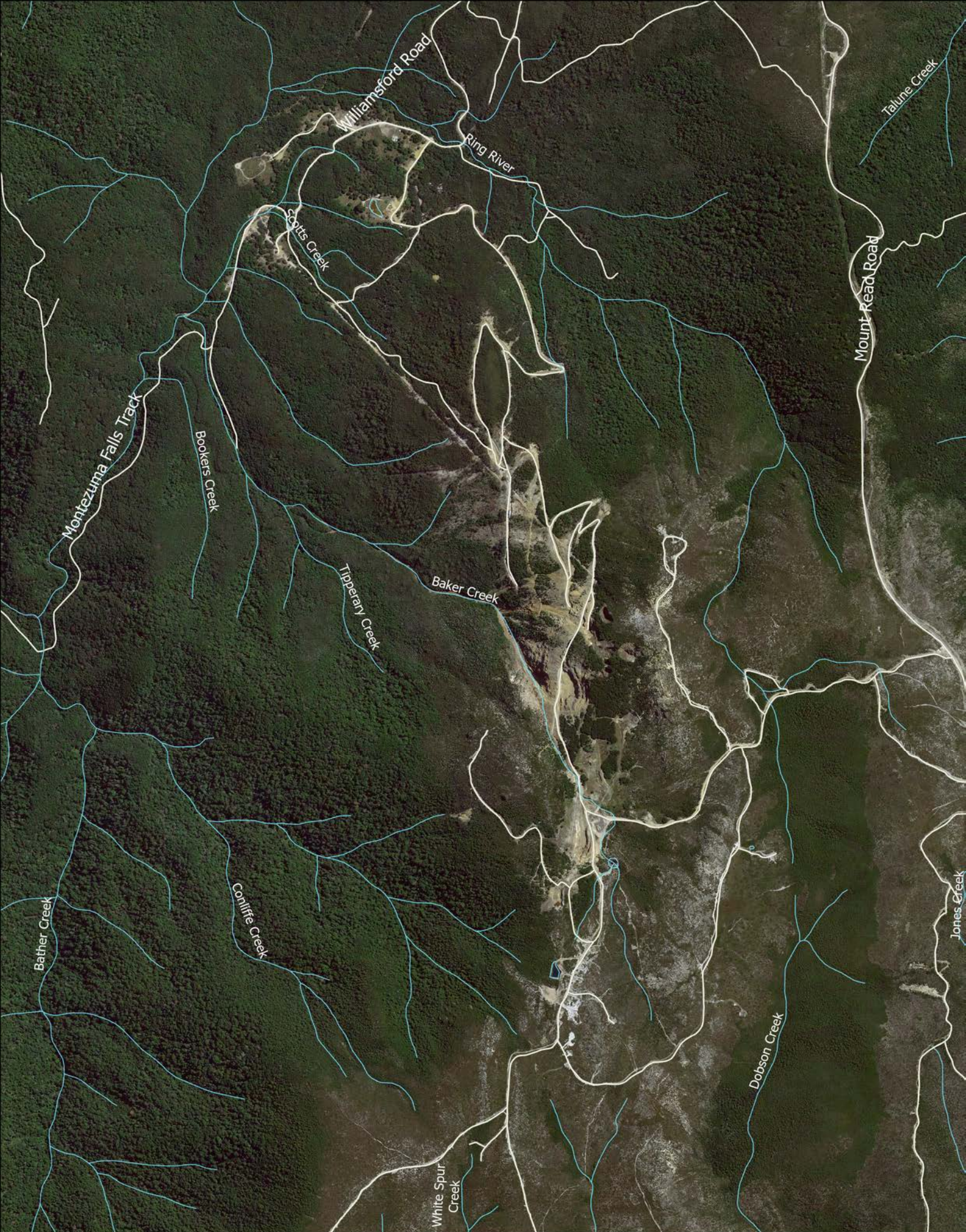
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Horizontal Datum: Geocentric Datum of Australia 1991
Grid: Map Grid of Australia, Zone 55

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Kilometers

Bobadil Tailings Storage Facility
Annual Monitoring Review and Management Report
2023 - 2024





Scale: 1 : 14,500

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1991
Grid: Map Grid of Australia, Zone 55

0 0.17 0.35 0.7 1.05



Kilometers

Hercules and Mount Read
Annual Monitoring Review and Management Report
2023 - 2024



Appendix B Compliance against PCE 11514

PCE 11514 Condition	Title	Status
G7(1)	Notification prior to commencement	Submitted 24/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-33914/011).
A4(1)	Dust Mitigation Plan	Submitted 13/03/25, approved 13/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-45358).
A5(1.1)	Air Monitoring Station – Baillieu Street	Submitted 24/02/25, approved 13/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-45358).
A5(1.4)	Air Monitoring Station – Baillieu Street	Real-time air monitors and DDG installed 17 March 2025, prior to start of construction works.
A5(1.5)	Air Monitoring Station – Baillieu Street	Operational from 15 September 2025 prior to EPA extension expiry date of 10 October 2025 (EPA ref. EN-EM-PE-EX-038147-024 D25-134581).
A8(2)	Reporting of monitoring	Dust reports are compiled internally on a monthly basis and are available upon request from the Director.
B2	Blast Management Plan	Submitted 18/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-44365/001).
CN3(1)	Bobadil Borrow Pit Management Plan	Submitted 18/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-44365/001).
CN1-3	Borrow Pit Operations Manual	Submitted 18/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-44365/001).
DC4(1)	Early Closure Plan	Submitted 13/01/26, approved 28/07/26 (EPA ref. EN-EM-PE-EX-038147-024 D26-292046).
FF1	Protection of threatened species potential habitat	Clearing began after 01/03/25.
FF2(1-2)	Avian Fauna Clearance Plan	Submitted 06/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-33914/011).
FF4(1-2)	Survey and management of Tasmanian wedge-tailed eagle and white bellied sea eagle	Survey complete. No clearing after 05/04/25.

FF5(1) & FF5(3)	Survey and management of Tasmanian devil and spotted quoll	Submitted 12/02/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25- 33914/011). Natural Values Assessment also submitted to support and inform FF5. Submitted 24/05/25, approved 06/03/25 (EN-EM-PE-EX-038147-024 D25-33914/011).
M3(1)	Groundwater Monitoring Plan and Report	Submitted 13/06/25, approved 18/11/25 (EPA ref. EN-EM-PE-EX-038147-024 D25-165570- 003)
M3(5)	Groundwater Monitoring Plan and Report	Groundwater monitoring report has yet to be developed, due 07/11/2026.
OP1(1)	Weed and Disease Management Plan	Submitted 24/01/25, approved 06/03/25 (EPA ref. EN-EM-PE-EX-038147-024 D25- 44365/001).
WM2(3)	Contaminated Landfill Waste Management	Submitted 16/12/25, not yet approved.

MMG Rosebery Mine

Annual Meteorological Report - FY25/26

September 2026



Question today *Imagine tomorrow* Create for the future

Annual Meteorological Report - FY25/26

MMG Rosebery Mine

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Rev	Date	Details
0	11/09/2026	Final revision

	Name	Date	Signature
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Reviewed by:	Carl Van Brink	11/09/2026	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Appendix A

Abbreviations

ACCESS-S	Australian Community Climate and Earth-System Simulator - Seasonal
BoM	Bureau of Meteorology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ECMWF	European Centre for Medium-Range Weather Forecasts
EPA	Environment Protection Authority
EPN	Environment Protection Notice
ERM	Environmental Resources Management Australia
GCM	Global climate model
MMG	MMG Limited
PCE	Permit Conditions - Environmental
SAM	Southern Annular Mode
SSP	Shared Socioeconomic Pathway
WSP	WSP Australia Pty Limited

Executive summary

MMG Rosebery Mine is required to report annually on the analysis of yearly climate data under Environment Protection Notice (EPN) 7153/3. WSP was engaged to complete the Annual Meteorological Review for 1 July 2025 to 30 June 2026 (FY25/26), addressing data availability, data quality, variability between the three on-site monitoring stations, and the relevance of meteorological conditions to operational dust risk.

Data availability was high across all parameters at Bobadil and 7L Carpark, and for all non-wind parameters at 2/5 Dam. The exception was the 2/5 Dam wind record, which showed a marked drop in wind speeds and a corresponding rise in calm conditions from December 2025, consistent with a faulty or partially seized anemometer. The affected data were conservatively invalidated, reducing valid wind data capture at 2/5 Dam to 41.9%. Instrument inspection and verification at this station is recommended.

FY25/26 conditions were characterised by low wind speeds, frequent calm conditions, a cool temperate climate, high relative humidity and high annual rainfall. Mean annual temperatures ranged from 11.1 °C to 11.6 °C, mean relative humidity from 82.5% to 84.9%, and annual rainfall from 2,087 mm to 2,300 mm. Prevailing winds were W to NW at 2/5 Dam and 7L Carpark and SW at Bobadil, with the highest wind speeds consistently occurring during the afternoon.

These conditions were generally considered low risk for fugitive dust generation for most of the reporting period. Summer remains the period of greatest dust potential, and under the forecast warmer and drier summer outlook the unmitigated dust risk is assessed as medium, reducing to low with the existing controls under the Rosebery Dust Mitigation Plan.

1 Introduction

MMG Limited (MMG) Rosebery Mine is one of Australia's longest-operating underground mining operations, located on the west coast of Tasmania near the township of Rosebery. The mine is an underground polymetallic mine producing zinc, copper and lead concentrates, along with valuable by-products including gold and silver. The mining activities include ore extraction using mechanised underground mining methods and onsite processing through crushing and grinding and transportation by rail to the Port of Burnie for shipment.

MMG's Rosebery Mine operates under environmental approval and licensing requirements administered by the Tasmanian Environment Protection Authority (EPA). Air emission controls focus primarily on the management of particulate matter and metal-bearing dust generated from mining and mineral processing activities. MMG is required to conduct environmental monitoring and reporting and demonstrate compliance with regulatory air quality requirements. This annual meteorological review has been prepared to address the requirement for analysis of yearly climate data under:

- Environment Protection Notice (EPN) 7153/3 conditions A4-3, G7 2.6 and 2.7
- Permit Conditions:
 - Environmental (PCE) 9084 G6
 - Environmental (PCE) 11514 G8 2.6, 2.7

The meteorology monitoring network consists of three on-site meteorological monitoring stations located at the Rosebery Mine: Bobadil, 7L Carpark and 2/5 Dam. These stations collect meteorological data to support environmental management, operational planning and annual reporting, including measurement of:

- Wind speed and wind direction (10 m)
- Ambient temperature and relative humidity (~1 m)
- Rainfall (ground level).

2 Monitoring locations

MMG Rosebery Mine operates three on-site meteorological monitoring stations located close to mining operations: Bobadil, 7L Carpark and 2/5 Dam. The stations provide meteorological data representative of local site conditions and support assessment of annual climate variability and operational dust risk.

Figure 2.1 presents the MMG meteorology monitoring locations and the historic BoM Rosebery (HEC Substation; #097073) and currently operating BoM Rosebery (Clemons St; #097093) stations. The currently operating BoM Rosebery (Clemons St) only measures rainfall, whereas the BoM Rosebery (HEC Substation) measured wind, temperature, and rainfall.

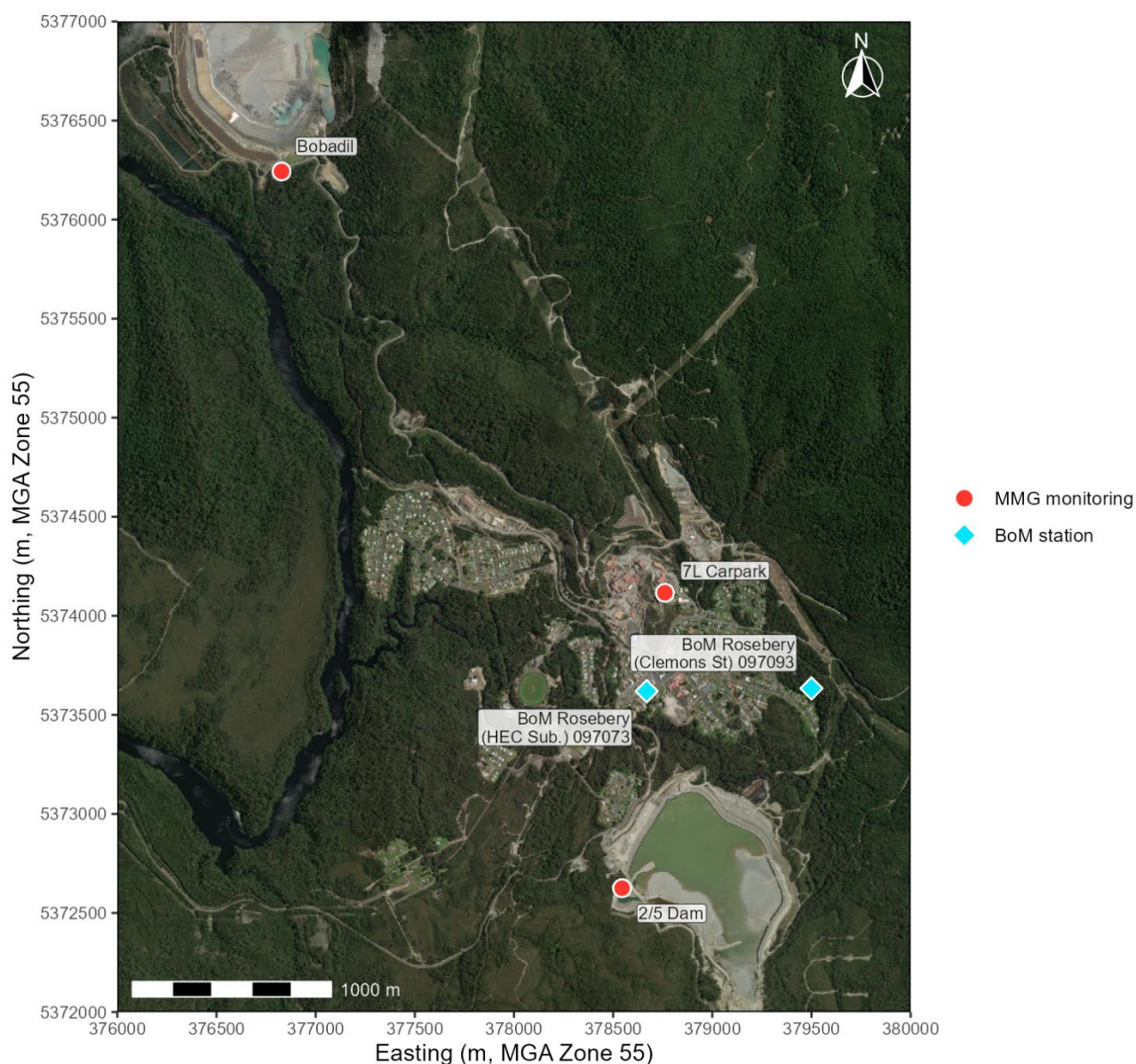


Figure 2.1 Meteorology monitoring station locations.

3 Meteorological analysis

Meteorological data from the Bobadil, 7L Carpark and 2/5 Dam stations were reviewed for the FY25/26 period to assess data availability, data quality and variability between monitoring locations. The analysis considered wind speed and direction, ambient temperature, relative humidity and rainfall. A previous comparison completed for the FY19 annual meteorological report (ERM, 2019) confirmed that the hourly vector averaging technique was appropriate for the site dataset; consistent with that approach, wind speed and direction for this review were assessed using hourly vector-averaged data derived from the MMG monitoring dataset.

3.1 Data availability

All three station meteorology sensors were calibrated in August 2025 (Envirodata, 2025a; Envirodata, 2025b; Envirodata, 2025c). These calibration reports indicate that the meteorological sensors at the 2/5 Dam, Bobadil and Carpark stations were generally operating within relevant field tolerances following service. Key observations included replacement of the 2/5 Dam wind speed sensor, successful post-calibration verification of the Bobadil rain gauge, and qualified solar radiation checks at 2/5 Dam and Carpark due to insufficient light.

Table 3.1 presents a summary of data availability for the FY25/26 reporting period and qualitative descriptors of data quality. Review of the raw wind sensor data for the 2/5 Dam station identified a significant reduction in monthly wind speeds and corresponding increase in the percentage of calm conditions (winds lower than 0.5 m/s), with supporting summary statistics presented in Table 3.2. The pattern is consistent with a faulty or partially seized anemometer, which can occur over time if dust or other material enters the sensor. As a specific point of failure could not be confidently identified from the available data, the affected 2/5 Dam wind speed and wind direction data were conservatively invalidated for the period where monthly calm conditions departed materially from the historical range (greater than the previous years), which occurs from December 2025 where calms are 42.6%, considerably higher than the previous years range (22.0–32.7%).

On this basis, valid wind speed and wind direction data capture at 2/5 Dam was reduced to 41.9% for FY25/26, while the remaining meteorological parameters at 2/5 Dam and the datasets from Bobadil and 7L Carpark were generally of high availability and quality.

Table 3.1 Summary of meteorology data availability and quality (FY25/26)

Parameter		Station		
		2/5 Dam	Bobadil	7L Carpark
Data Capture (%)	Wind speed and direction	41.9%	100%	98.3%
	Temperature	100%	100%	86.7%
	Relative Humidity	100%	100%	98.3%
	Rainfall	100%	100%	98.3%
Data Quality	Wind speed and direction	Low	High	High
	Temperature	High	High	Medium
	Relative Humidity	High	High	High

Parameter		Station		
		2/5 Dam	Bobadil	7L Carpark
	Rainfall	High	High	High

Table notes:

- ^a As per previous reports (EY, 2025; EY, 2024; EY, 2023), a qualitative data quality descriptor has been assigned based on data availability. High data quality is defined as more than 90% valid data available, medium data quality is defined as between 75% and 90% valid data, and low data quality is defined as less than 75% available valid data.

Table 3.2 Monthly average percentage calms (winds less than 0.5 m/s) and wind speeds between 2021 and 2026 for the 2/5 Dam station.

Month	Monthly average percentage calms and wind speed by year: calms % (wind speed m/s)					
	2021	2022	2023	2024	2025	2026
January	^b	35.2% (1.5)	32.4% (1.4)	27.4% (1.5)	34.1% (1.3)	^b
February	^b	36.9% (1.2)	39.4% (1.3)	29.6% (1.6)	31.1% (1.4)	^b
March	^b	34.7% (1.4)	37.9% (1.1)	38.4% (1.3)	44.5% (1.0)	^b
April	^b	51.2% (0.9)	49.2% (1.1)	44.9% (0.8)	42.4% (1.0)	^b
May	^b	42.7% (0.9)	46.6% (0.9)	55.8% (0.7)	44.1% (1.1)	^b
June	^b	38.5% (1.2)	40.1% (1.4)	54.2% (0.8)	50.7% (1.0)	^b
July	48.8% (1.1)	42.5% (1.2)	36.6% (1.2)	50.0% (0.9)	44.5% (1.3)	^b
August	33.7% (1.3)	36.3% (1.3)	41.5% (1.0)	29.3% (1.6)	33.2% (1.5)	^b
September	44.2% (1.3)	36.2% (1.2)	33.1% (1.6)	23.2% (1.6)	22.9% (1.6)	^b
October	37.6% (1.5)	28.6% (2.1)	29.2% (1.6)	20.9% (2.0)	24.0% (1.7)	^b
November	37.2% (1.3)	27.2% (1.6)	29.9% (1.3)	28.7% (1.6)	35.1% (1.4)	^b
December	28.2% (1.6)	32.7% (1.3)	30.2% (1.3)	22.0% (1.6)	^b	^b

Table notes:

- ^a Shaded cells show monthly calms that exceeds the maximum monthly range observed over the preceding years (2021 to 2024)
- ^b Data unavailable.

3.2 Wind speed and direction

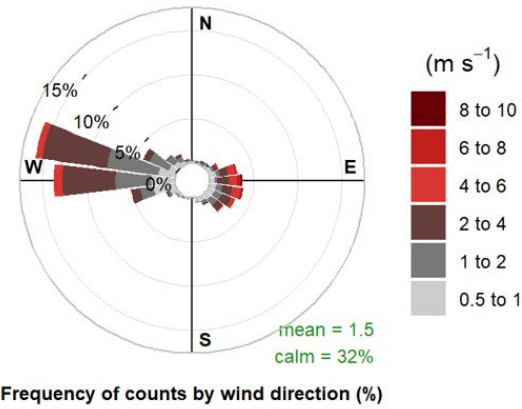
Wind roses were used to summarise the dominant wind patterns at the MMG Rosebery Mine monitoring stations. Wind roses show the frequency of winds by direction and wind speed category, with each bar representing the frequency of winds blowing from that direction. Calm conditions were defined as wind speeds less than 0.5 m/s.

The annual wind roses for FY25/26 are presented in Figure 3.1. These indicate that winds at 7L Carpark were predominantly from the west to north-west, while winds at Bobadil were more frequently from the south-west and north to north-north-east sectors. Valid 2/5 Dam wind data were limited to 41.9% of the year due to invalidation of the affected wind speed and direction record; however, the available valid data indicate a predominance of westerly winds. The differences in dominant wind direction between stations are consistent with local terrain effects around the mine, which modify the broader regional flow and create local sheltering and channelling effects.

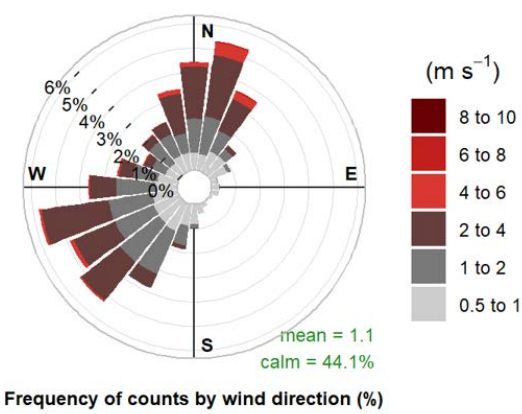
Seasonal and time-of-day wind roses are presented for the 2/5 Dam, 7L Carpark and Bobadil stations in Figure 3.2, Figure 3.3 and Figure 3.4, respectively. These figures show a consistent diurnal pattern across the monitoring network, with higher wind speeds and lower calm percentages during the afternoon period from 12:00 to 18:00, and lower wind speeds with more frequent calm conditions overnight and during the morning. Table 3.3 and Table 3.4 provide the supporting seasonal and time-of-day wind speed and calm statistics. The 2/5 Dam seasonal interpretation is limited to the valid wind data period, with summer and autumn excluded due to the identified anemometer issue.

Figure 3.5 compares the FY25/26 9 am wind roses for the MMG monitoring stations with the historical 9 am wind rose from the former BoM Rosebery HEC Substation. The historical BoM data indicate a high frequency of calm morning conditions, which is broadly consistent with the calm and low wind speed conditions observed at the on-site stations during the morning period. The comparison supports the interpretation that low morning wind speeds are a characteristic feature of the local Rosebery setting rather than being solely attributable to monitoring station effects.

2/5 Dam



Bobadil



7L Carpark

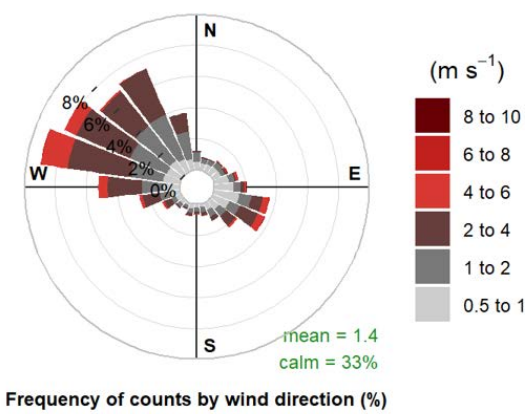


Figure 3.1 Annual wind roses by station for available data in FY25/26.

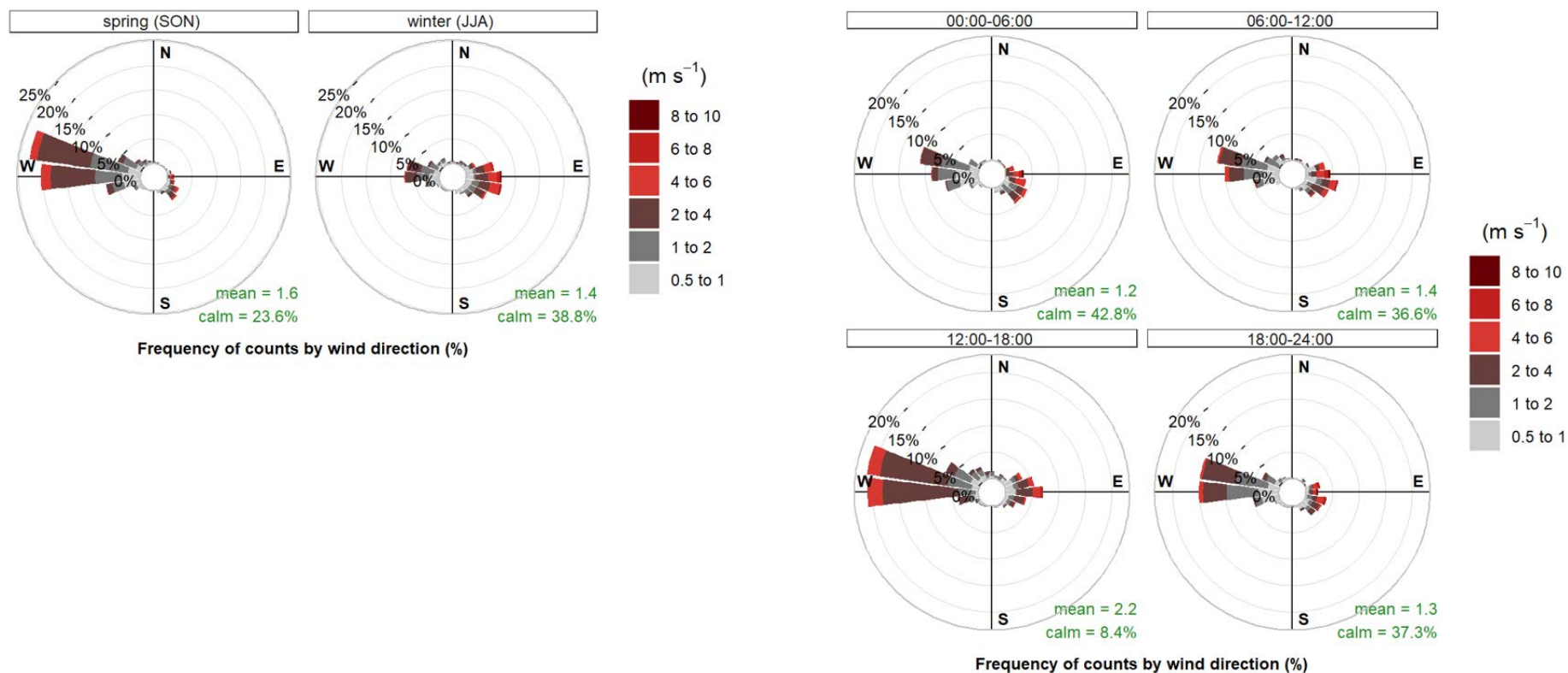


Figure 3.2 Seasonal (left) and time of day (right) wind roses for the 2/5 Dam station.

Figure notes:

^a Seasonal wind roses for Summer and Autumn missing due to invalidated data (likely due to wind anemometer failure) during these periods for FY25/26.

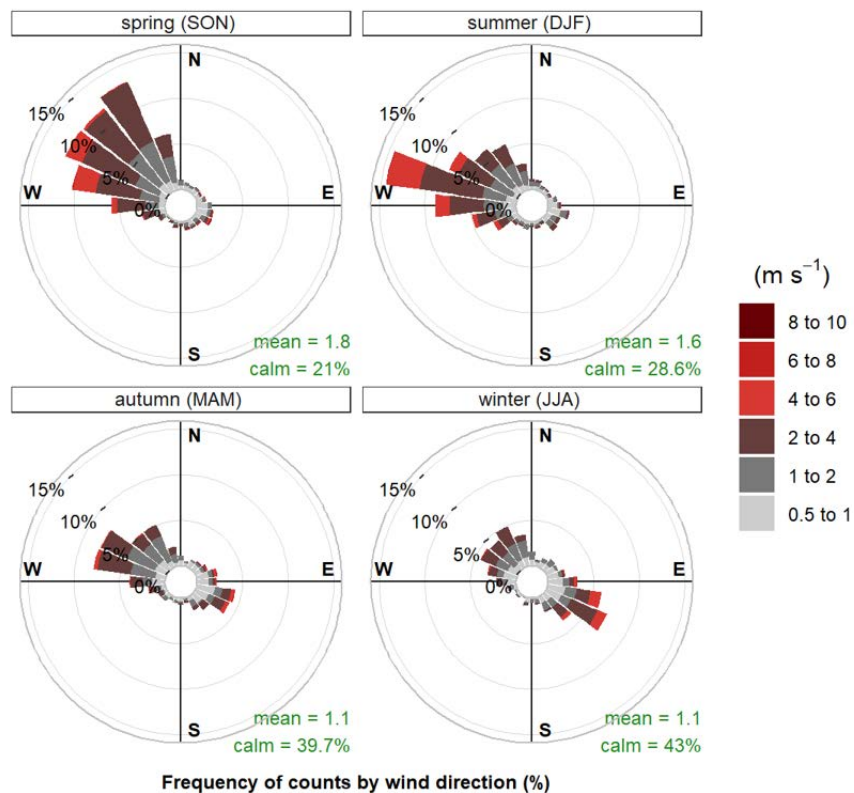
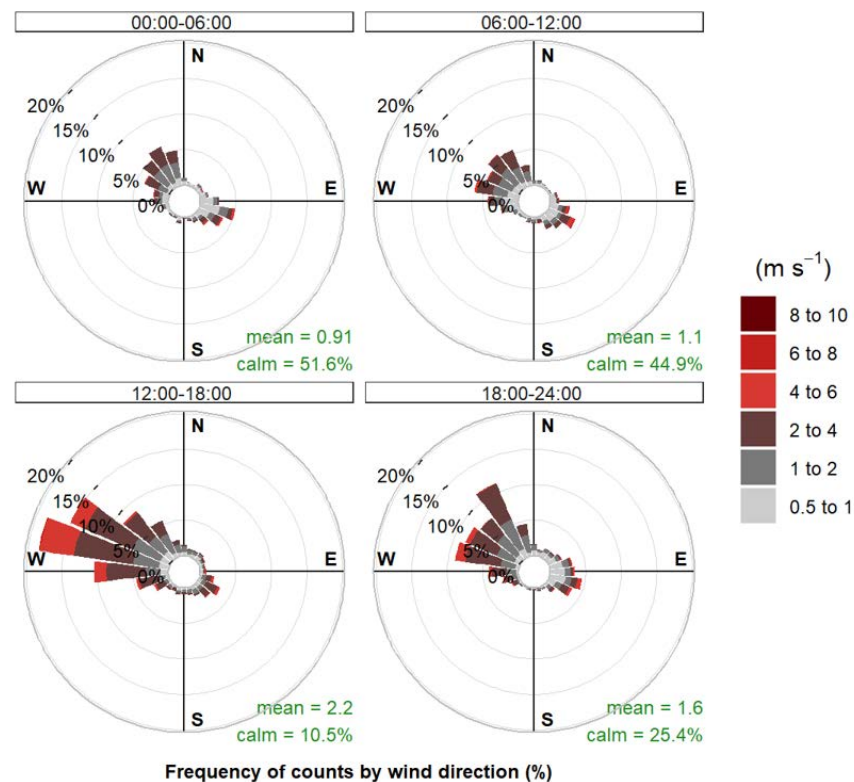


Figure 3.3 Seasonal (left) and time of day (right) wind roses for the 7L Carpark station.

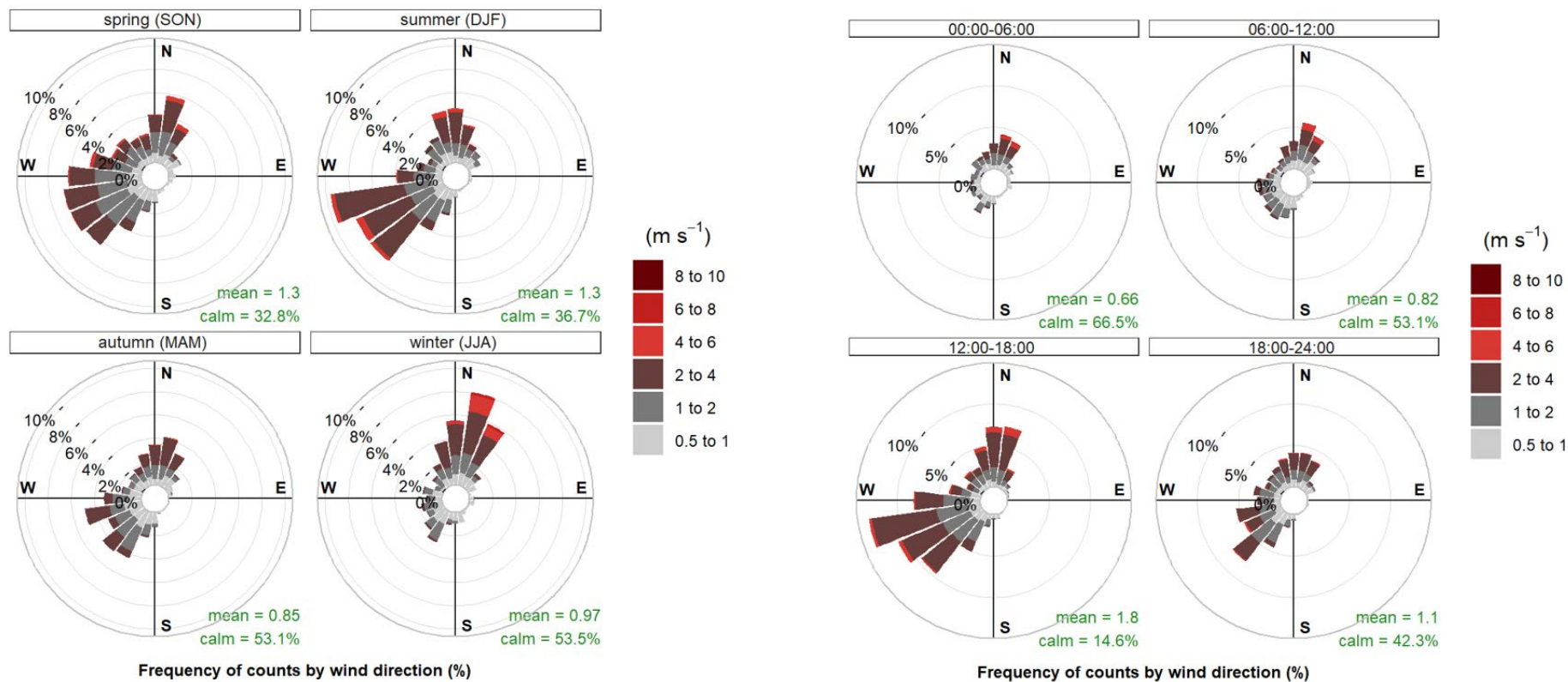


Figure 3.4 Seasonal (left) and time of day (right) wind roses for the Bobadil station.

Table 3.3 Summary of seasonal average wind speed and percentage calms by station.

Station	Mean Wind Speed (m/s)					Percentage Calm Winds (%)					FY25/26 Available Data
	Annual	Summer	Autumn	Winter	Spring	Annual	Summer	Autumn	Winter	Spring	
2/5 Dam	1.5	_ ^a .	_ ^a .	1.4	1.6	32.0	_ ^a .	_ ^a .	38.8	23.6	41.9 %
Bobadil	1.1	1.3	0.9	1.0	1.3	44.1	36.7	53.1	53.5	32.8	100 %
7L Carpark	1.4	1.6	1.1	1.1	1.8	33.0	28.6	39.7	43.0	21.0	98.3 %

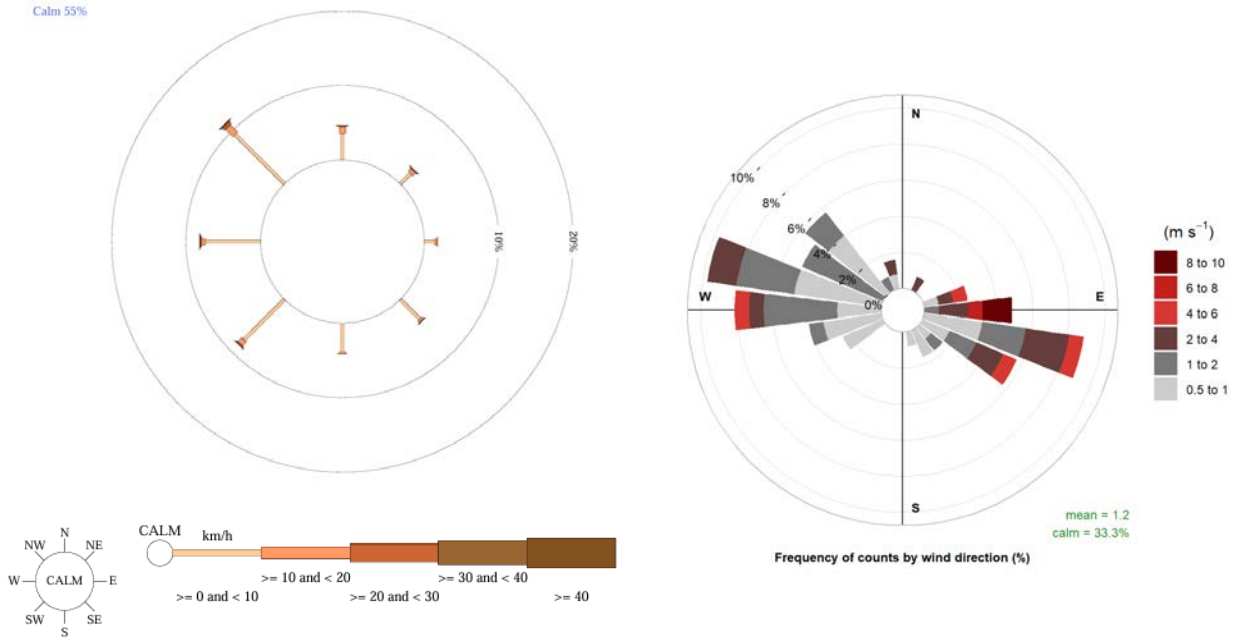
Table notes:

^a Data invalidated between 1 December 2025 to 30 June 2026, likely due to wind anemometer failure.

Table 3.4 Summary of time-of-day average wind speed and percentage calms by station.

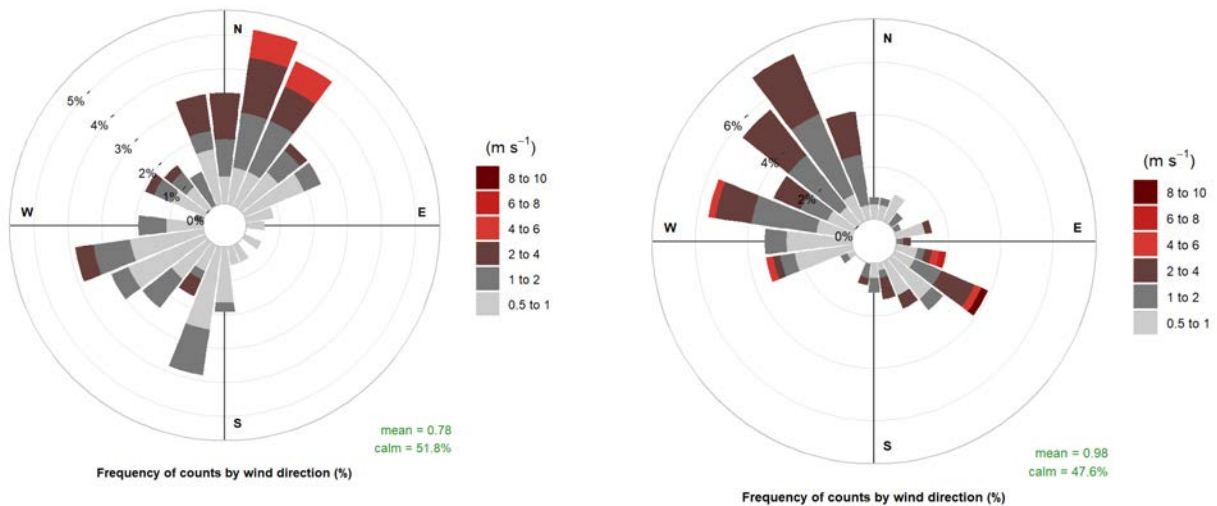
Station	Mean Wind Speed (m/s)					Percentage Calm Winds (%)					FY25/26 Available Data (%)
	Annual	00:00– 06:00	06:00– 12:00	12:00– 18:00	18:00– 00:00	Annual	00:00– 06:00	06:00– 12:00	12:00– 18:00	18:00– 00:00	
2/5 Dam	1.5	1.2	1.4	2.2	1.3	32.0	42.8	36.6	8.4	37.3	41.9 %
Bobadil	1.1	0.7	0.8	1.8	1.1	44.1	66.5	53.1	14.6	42.3	100 %
7L Carpark	1.4	0.9	1.1	2.2	1.6	33.0	51.6	44.9	10.5	25.4	98.3 %

Calm 55%



BoM Rosebery (1979 to 1993)

2/5 Dam



Bobadil

7L Carpark

Figure 3.5 Morning (9 am) FY25/26 wind roses at MMG Rosebery monitoring stations compared to long-term (1979–1993) BoM Rosebery 9 am wind rose (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml). Long-term BoM Rosebery (HEC Substation) mean for wind speed is 3.1 km/h (0.9 m/s) and 55% for calms.

3.3 Temperature

Mean monthly temperatures for FY25/26 are presented in Figure 3.6, with the corresponding mean daily maximum and mean daily minimum monthly temperatures shown in Figure 3.7 and Figure 3.8. The temperature record shows a cool temperate climate, with mean monthly temperatures lowest during winter and highest during summer. Mean annual temperatures were similar across the three monitoring stations, ranging from 11.1 °C at 2/5 Dam to 11.6 °C at 7L Carpark. Figure 3.7 shows that the warmest mean daily maximum temperatures occurred in January 2026, with

monthly mean maximum temperatures of approximately 24 °C to 25 °C across the stations. **Figure 9** shows that mean daily minimum temperatures were lowest during winter, with low minimum temperatures across the FY25/26 period ranging from -1.1 °C at 7L Carpark to -0.1 °C at Bobadil. The three stations show similar seasonal temperature patterns, with only minor inter-station variability.

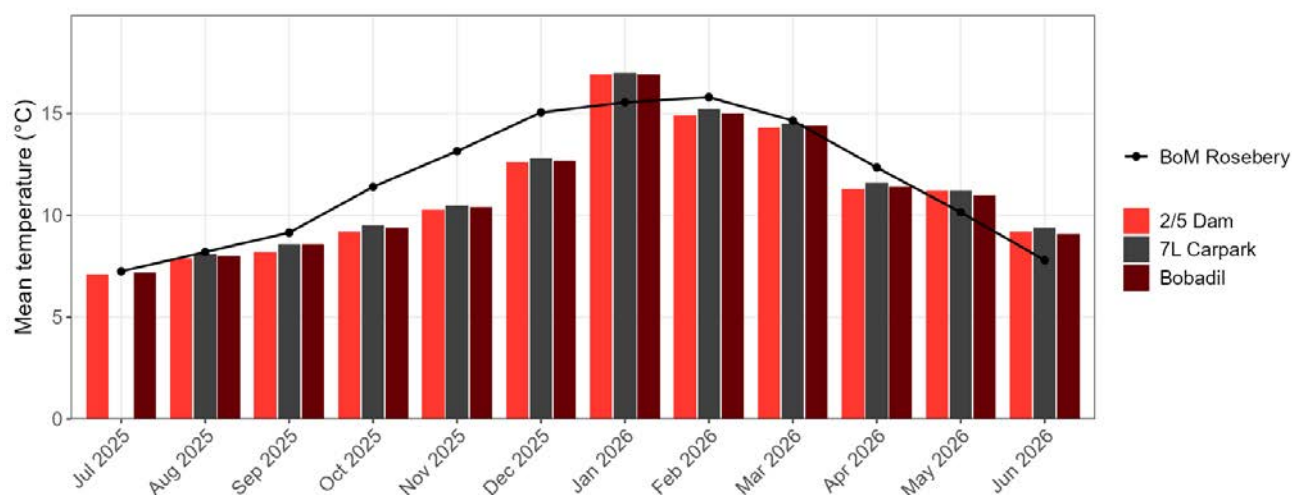


Figure 3.6 Mean daily monthly temperature for FY25/26 for all stations. BoM Rosebery (097073) long-term monthly averages based on the active measurement period 1979 to 1993 and calculated from mean daily minimum and maximum temperatures (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml).

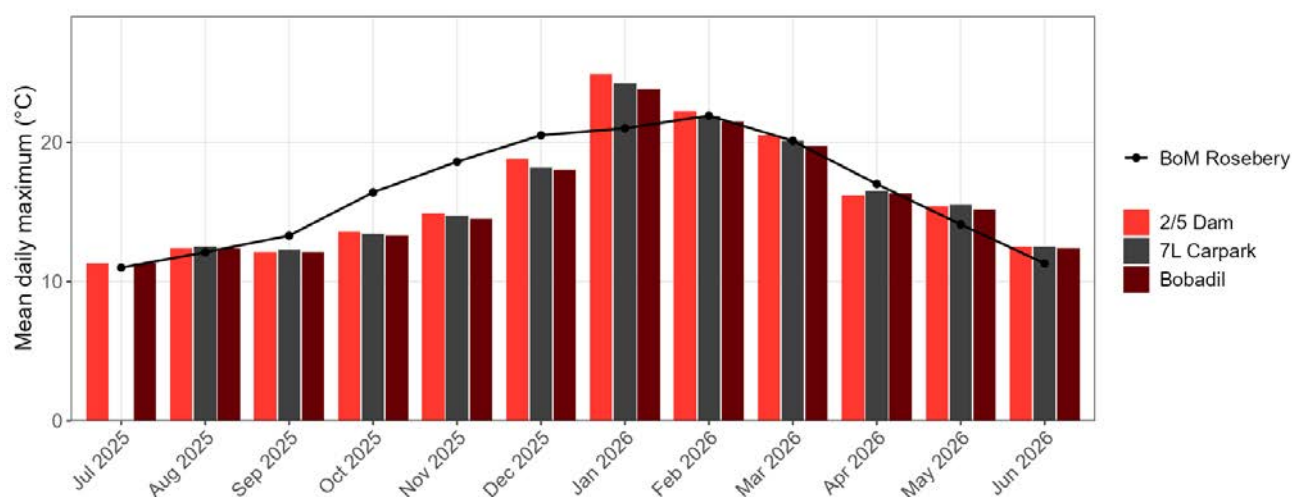


Figure 3.7 Mean daily maximum monthly temperature for FY25/26 for all stations. BoM Rosebery long-term monthly averages based on the active measurement period 1979 to 1993 (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml).

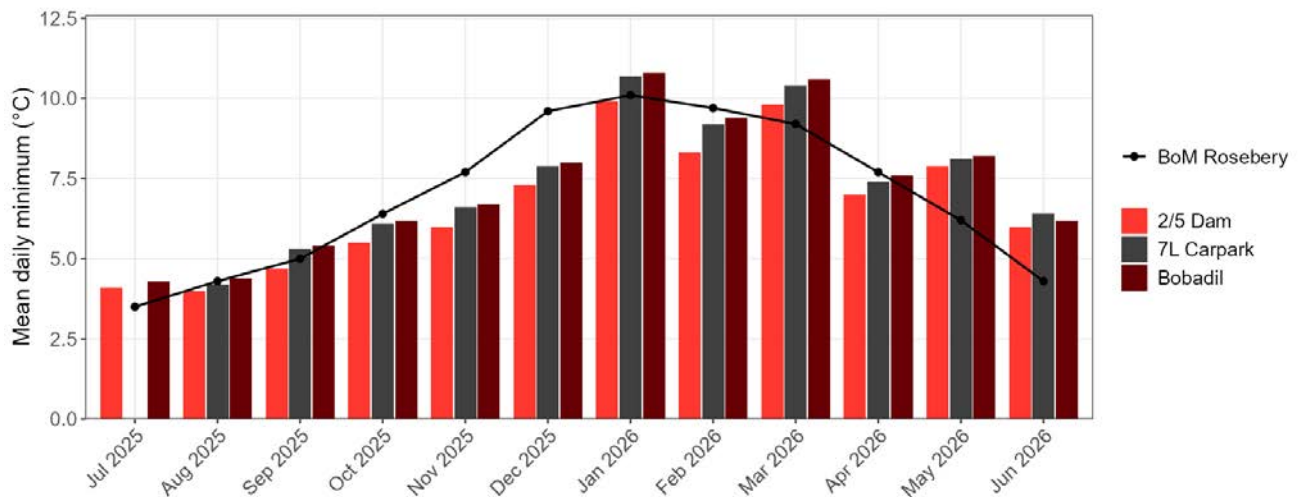


Figure 3.8 Mean daily minimum monthly temperature for FY25/26 for all stations. BoM Rosebery long-term monthly averages based on the active measurement period 1979 to 1993 (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml).

3.4 Relative humidity

Mean monthly relative humidity for FY25/26 is presented in Figure 3.9. Relative humidity was generally high throughout the reporting period, with annual mean relative humidity of 84.8% at 2/5 Dam, 84.9% at Bobadil and 82.5% at 7L Carpark. The highest monthly relative humidity generally occurred during winter, while lower relative humidity was observed during the warmer summer months. The similarity between stations in Figure 3.9 indicates limited spatial variability in relative humidity across the monitoring network. This is consistent with the cool, wet and sheltered setting of the mine and supports the use of the three stations to characterise site-wide humidity conditions relevant to dust generation potential.

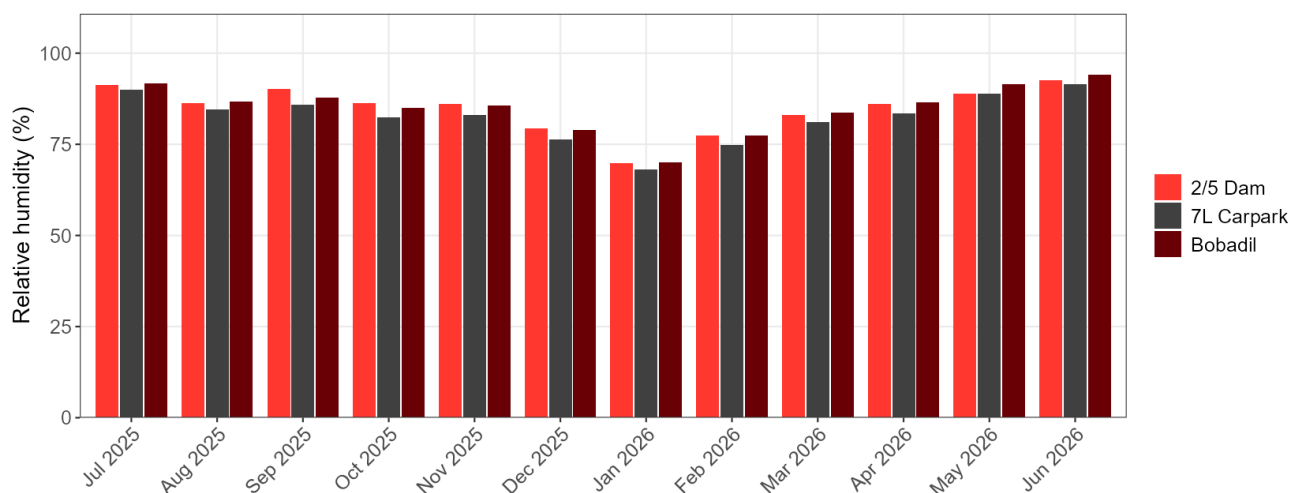


Figure 3.9 Mean monthly relative humidity for FY25/26 for all stations. No long-term monthly averages are available for the historic BoM Rosebery monitoring station.

3.5 Rainfall

Total monthly rainfall for FY25/26 is presented in Figure 3.10, together with the long-term monthly average rainfall for BoM Rosebery. Rainfall was recorded at all three on-site stations throughout the reporting period, with annual totals of 2,244 mm at 2/5 Dam, 2,300 mm at 7L Carpark and 2,087 mm at Bobadil. The highest monthly rainfall occurred in September 2025, while the lowest monthly rainfall occurred in January 2026. As shown in Figure 3.10, FY25/26 monthly rainfall was generally close to the long-term BoM Rosebery monthly averages. The three on-site stations displayed broadly similar monthly rainfall patterns, with Bobadil generally recording slightly lower annual rainfall than 2/5 Dam and 7L Carpark.

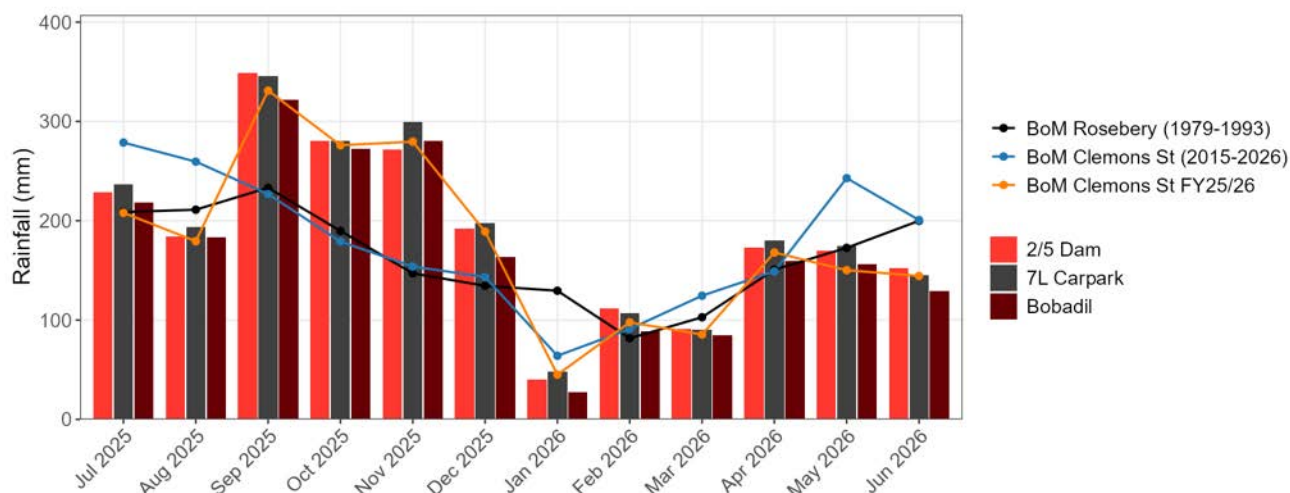


Figure 3.10 Total monthly rainfall for FY25/26 for all stations. BoM Rosebery long term monthly averages based on the active measurement period 1979 to 1993 (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml).

3.6 Summary and inter-station comparisons

A summary of FY25/26 meteorological conditions is provided in Table 3.5. Overall, the monitoring data indicate that the Rosebery Mine experienced low wind speeds, frequent calm conditions, cool temperatures, high relative humidity and substantial annual rainfall during the reporting period. The wind record was affected by the 2/5 Dam anemometer issue; however, the Bobadil and 7L Carpark datasets provide high-availability wind records for interpretation of site wind patterns.

Table 3.5 Summary of meteorology data for meteorology monitoring stations.

Station Name	Annual mean air temperature (°C)	Mean daily max. air temperature (°C)	Mean daily min. air temperature (°C)	Annual mean wind speed (m/s)	Annual mean relative humidity (%)	Annual total rainfall (mm)
2/5 Dam	11.1	16.2	6.7	1.5	84.8	2,244
7L Carpark	11.6	16.6	7.6	1.4	82.5	2,300
Bobadil	11.2	15.8	7.3	1.1	84.9	2,087
Station Average	11.3	16.2 (16.4)^a	7.2 (7.0)^a	1.3	84.1	2,210 (2,214)^b

Table notes:

- ^a. Bracketed values indicated BoM Rosebery long term annual statistics from the active measurement period 1979–1993 (source: https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml).
- ^b. Bracketed values indicated BoM Rosebery (Clemons Street) long term annual statistics from the active measurement period 2015–2026 (source: <https://www.bom.gov.au/climate/data/index.shtml>).
- ^c. Statistics are based on hourly average data, except for rainfall which represents an annual total sum.

A comparison of measured meteorological variables between the three MMG monitoring stations is summarised below, noting that 2/5 Dam wind statistics are based on the valid data period only (41.9% data capture).

- **Wind speed:** Mean annual wind speeds were low at all three stations and within 0.4 m/s of each other, ranging from 1.1 m/s at Bobadil to 1.5 m/s at 2/5 Dam and 1.4 m/s at 7L Carpark (Table 3.3). Bobadil consistently recorded the lowest wind speeds of the three stations across all seasons and all times of day.
- **Calm conditions:** Calms were frequent at all stations, with Bobadil recording the highest annual frequency of calms (44.1%), compared with 33.0% at 7L Carpark and 32.0% at 2/5 Dam.
- **Wind direction:** Prevailing wind directions differed between stations, with westerly winds dominant at 2/5 Dam, WNW to NW winds dominant at 7L Carpark, and SW winds dominant at Bobadil with a secondary northerly to NNE component (Figure 3.1).
- **Temperature:** Inter-station variability in temperature was minimal. Mean annual air temperatures ranged from 11.1 °C at 2/5 Dam to 11.6 °C at 7L Carpark, a difference of 0.5 °C. Daily maximum temperatures ranged from 15.8 °C at Bobadil to 16.6 °C at 7L Carpark, and minimum temperatures ranged from 6.7 °C at 2/5 Dam to 7.6 °C at 7L Carpark (Table 3.5).
- **Relative humidity:** Relative humidity was high and consistent across the network, with annual means of 84.9% at Bobadil, 84.8% at 2/5 Dam and 82.5% at 7L Carpark, a maximum difference of 2.4 percentage points.
- **Rainfall:** Annual rainfall totals were 2,300 mm at 7L Carpark, 2,244 mm at 2/5 Dam and 2,087 mm at Bobadil. Bobadil recorded approximately 9% less rainfall than 7L Carpark.

Overall, measured parameters (with the exception of wind) show close agreement between stations, indicating that these parameters are broadly representative of site-wide conditions. Wind speed and direction showed the greatest inter-station variability, confirming that wind data are location-specific and should be applied to the area represented by each station rather than assumed to be uniform across the site.

4 Forecast and climate outlook

4.1 Long-range weather forecast

The Bureau of Meteorology (BoM) produces long-range forecasts using the Australian Community Climate and Earth-System Simulator - Seasonal (ACCESS-S), which provides probabilistic outlooks of rainfall and temperature for the coming months. These outlooks are presented as the chance of exceeding the median value, rather than as deterministic forecasts (such as with typical weather forecasts), and are used here to provide an indication of the conditions that may influence operational dust risk over the upcoming summer period.

The BoM rainfall outlook for the coming summer period is presented in Figure 4.1, and the corresponding maximum temperature outlook is presented in Figure 4.2. For western Tasmania, the outlook indicates below average rainfall (55% chance of being unusually dry; BoM, 2026) and high probability chances of exceeding median maximum temperatures (87% chance of being unusually warm; BoM, 2026). The outlook is influenced by the current state of the major regional climate drivers, primarily with El Nino currently established across the tropical Pacific, having been declared by the BoM on 16 June 2026, and continuing to strengthen through winter 2026. Long-range forecasts by the European Centre for Medium-Range Weather Forecasts (ECMWF) provide longer-range forecasts out to 13 months and currently forecast a strengthening of the current El Nino event peaking in late 2026 and early 2027 (ECMWF, 2026).

It is noted that the influence of El Nino and the Indian Ocean Dipole on rainfall in western Tasmania is generally weaker than for eastern mainland Australia. Rainfall in this region is dominated by the strength and position of the mid-latitude westerly airstream and the frequency of frontal passages, which are more strongly modulated by the Southern Annular Mode (SAM) and the position of the subtropical ridge. SAM operates on a 1–3 week timescale and is therefore not predictable at seasonal lead times, which adds uncertainty to the applicability of the national scale outlook to the Rosebery site.

It is noted that these outlooks are probabilistic and are not a prediction of conditions on any given day. They are used in this report only to indicate whether the upcoming summer period is more or less likely than usual to present conditions that reduce surface moisture and therefore increase the potential for fugitive dust generation. No bespoke meteorological or climate modelling has been undertaken by WSP for this review.

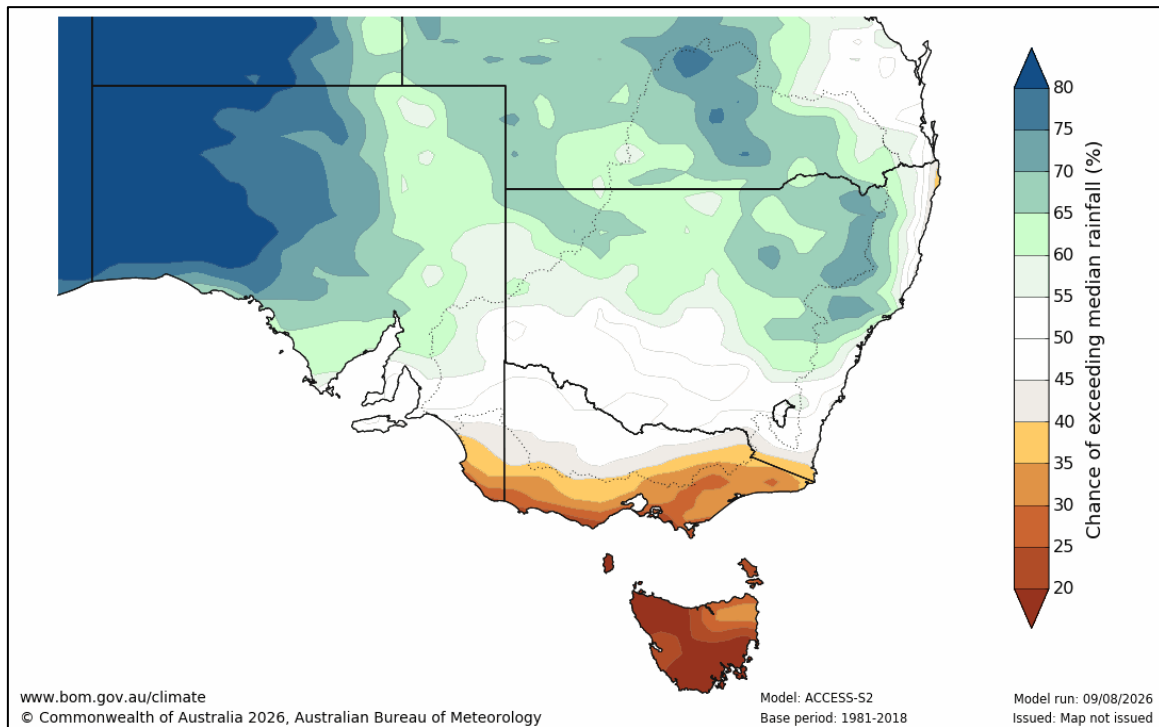


Figure 4.1 Chance of exceeding the median rainfall for October to December 2026 (source: <https://www.bom.gov.au/climate/outlooks/#/overview/summary>). Creative Commons Attribution 4.0 (CC by 4.0) <http://creativecommons.org/licenses/by/4.0/>.

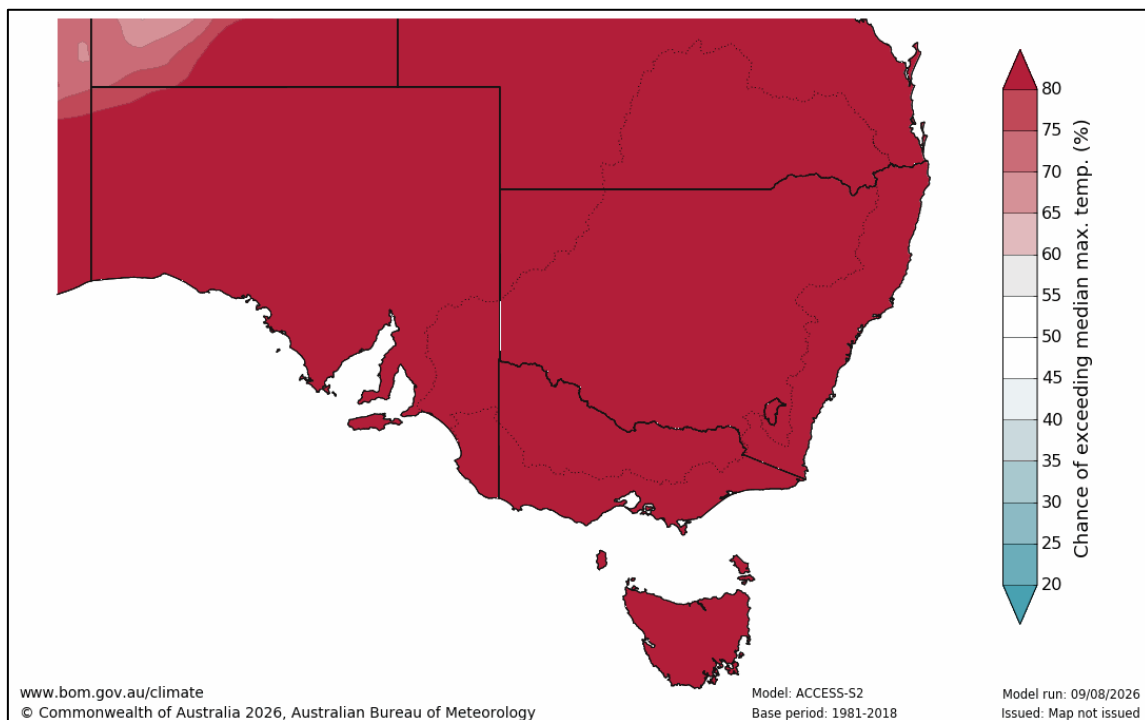


Figure 4.2 Chance of exceeding the median maximum temperature for October to December 2026 (source: <https://www.bom.gov.au/climate/outlooks/#/overview/summary><https://www.bom.gov.au/climate/ahead/outlooks/>). Creative Commons Attribution 4.0 (CC by 4.0) <http://creativecommons.org/licenses/by/4.0/>.

4.2 Climate projections

Climate change projections for the MMG Rosebery site have been considered using the regionally downscaled projections prepared under the national projections available through CSIRO Climate Change in Australia datasets (available at <https://www.climatechangeinaustralia.gov.au/en/obtain-data/download-datasets/>). These sources provide projected changes in temperature, rainfall and rainfall seasonality for the west coast region of Tasmania under a range of emissions scenarios. Figure 4.3, Figure 4.4, and Figure 4.5 present the completed analysis of daily mean temperature, wind speed, and rainfall for the Rosebery site for the period 2035 to 2064. Presented results are based upon the downscaling of latest global climate model outputs (CMIP6) and a single intermediate global warming emissions scenario (SSP2-4.5).

SSP2-4.5 represents a "middle-of-the-road" future pathway in which population growth, economic development and greenhouse gas emissions broadly follow historical trends, resulting in a moderate level of climate change by the end of the century. This scenario is widely adopted for climate adaptation and infrastructure planning because it provides a realistic central estimate of future climate conditions without assuming either rapid global decarbonisation or continued high-emissions growth. For long-life industrial assets such as Rosebery Mine, SSP2-4.5 provides an appropriate basis for evaluating future operational risks and environmental management requirements over the coming decades.

In broad terms, the projections indicate continued warming of temperatures across western Tasmania through the century, with consensus across the global climate models (GCM) that annual mean temperatures would increase by $\sim 1\text{--}2\text{ }^{\circ}\text{C}$ from 2035 onwards compared to the 1985–2014 baseline. Trends for wind speed and rainfall are less certain, with smaller overall variations and climate projections showing both increases and decreases for future climate projections. For the Rosebery Mine, the practical implication of these projections is that the existing seasonal pattern of dust risk is likely to persist and may become more pronounced during summer. Warmer temperatures and drier summer conditions would be expected to reduce surface moisture content of exposed materials.

These projections should be treated as long-term planning context only and do not alter the FY25/26 monitoring findings presented in Section 3.

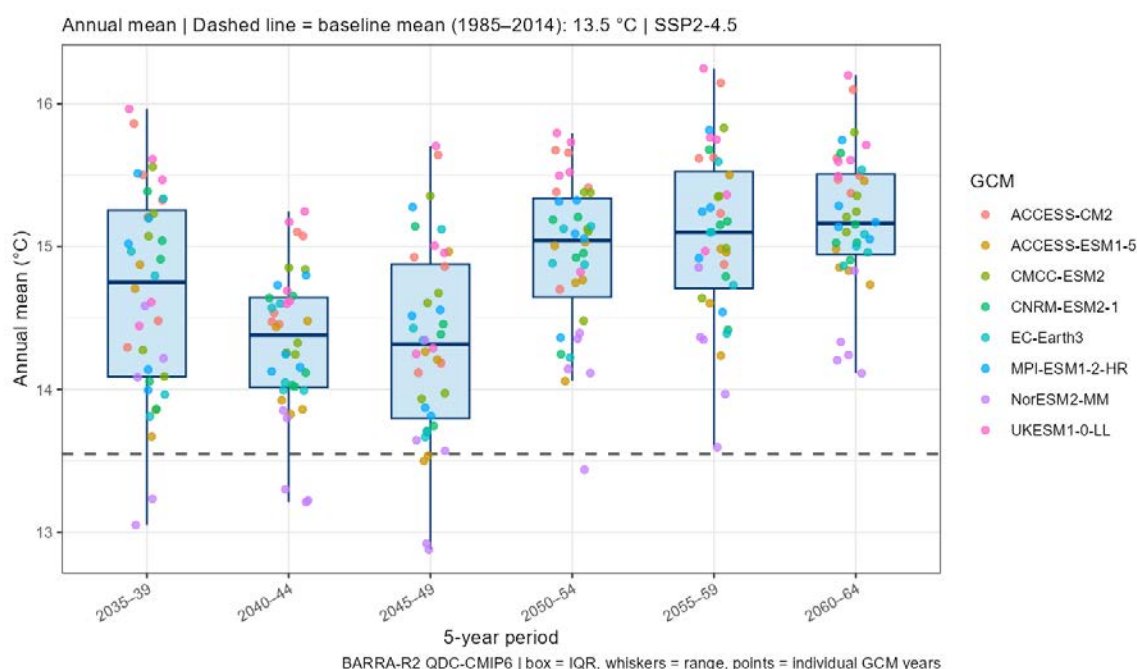


Figure 4.3 5-year average climate projections for annual mean temperature at the Rosebery site (nearest 5km grid square) for the period 2035 to 2064. Data sourced from the Climate Change in Australia national dataset (available at <https://www.climatechangeinaustralia.gov.au/en/obtain-data/download-datasets/>). Creative Commons Attribution 4.0 (CC by 4.0) <http://creativecommons.org/licenses/by/4.0/>.

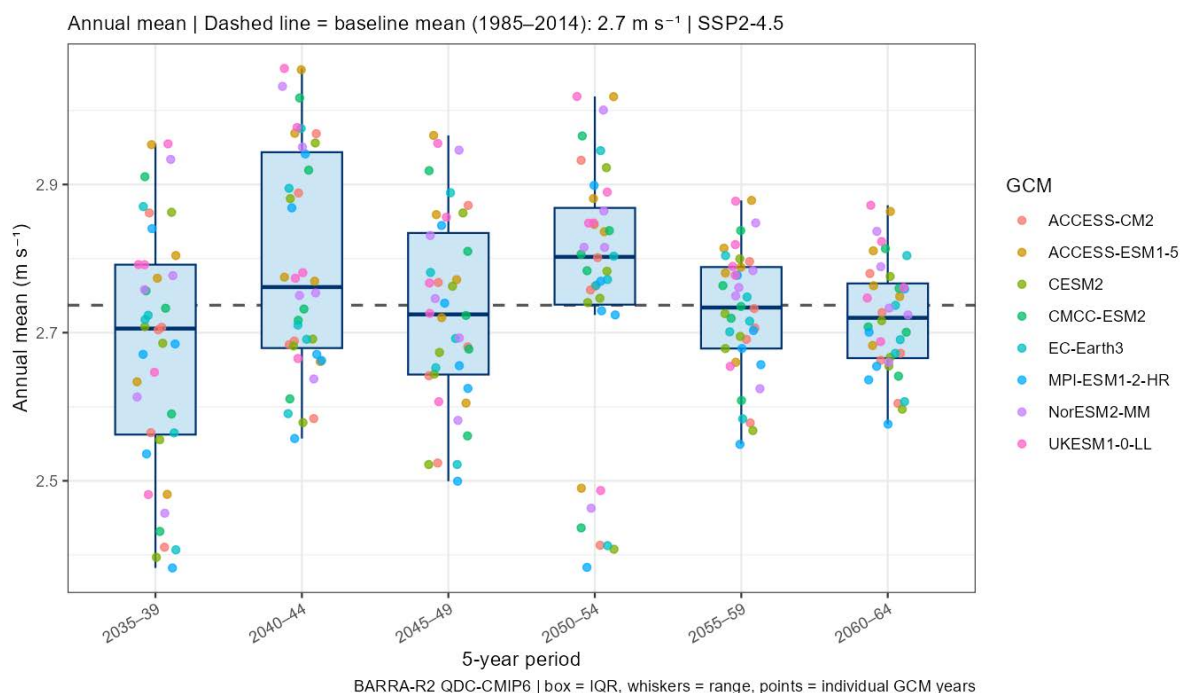


Figure 4.4 5-year average climate projections for annual wind speed at the Rosebery site (nearest 5km grid square) for the period 2035 to 2064. Data sourced from the Climate Change in Australia national dataset (available at <https://www.climatechangeinaustralia.gov.au/en/obtain-data/download-datasets/>). Creative Commons Attribution 4.0 (CC by 4.0) <http://creativecommons.org/licenses/by/4.0/>.

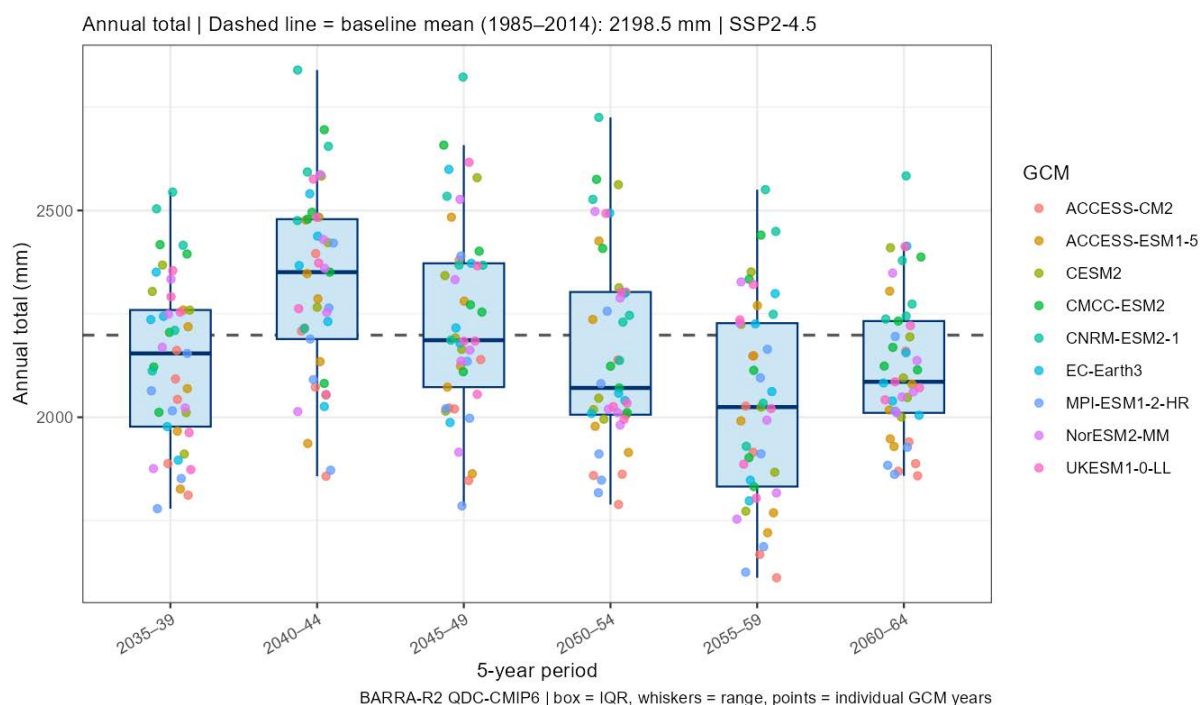


Figure 4.5 5-year average climate projections for annual total rainfall at the Rosebery site (nearest 5km grid square) for the period 2035 to 2064. Data sourced from the Climate Change in Australia national dataset (available at <https://www.climatechangeinaustralia.gov.au/en/obtain-data/download-datasets/>). Creative Commons Attribution 4.0 (CC by 4.0) <http://creativecommons.org/licenses/by/4.0/>.

4.3 Operational risk assessment for summer conditions

An operational dust risk assessment has been undertaken to relate the forecast summer meteorological conditions to operational fugitive dust risk at the Rosebery Mine. The assessment applies the likelihood and consequence categories defined in the MMG Risk Management Procedure, reproduced in Table A.1 to Table A.3, and considers both the unmitigated risk and the residual risk following implementation of the controls described in the Rosebery Dust Mitigation Plan.

The FY25/26 monitoring data indicate that meteorological conditions at the mine are generally lower risk for fugitive dust generation, with low mean wind speeds, a high frequency of calm conditions, high relative humidity and high annual rainfall. The periods of greatest dust potential coincide with the afternoon period from approximately 12:00 to 18:00, when mean wind speeds increase to between 1.8 m/s and 2.2 m/s and the frequency of calm conditions falls to between approximately 8% and 15%. Where these afternoon wind conditions coincide with warmer and drier summer conditions, the potential for wind entrainment of dust from exposed surfaces is elevated.

The outcomes of the operational dust risk assessment are presented in Table 4.1. Under forecast summer conditions of higher-than-average temperatures and lower than average rainfall, unmitigated dust risk is assessed as medium, driven by faster drying and reduced moisture content of exposed material. With implementation of the existing controls, including increased water spray application on dry materials and the inspection and trigger-based response measures set out in the Rosebery Dust Mitigation Plan, the residual risk is assessed as low. This assessment is qualitative and is intended to support operational planning.

Table 4.1 Dust operational risk assessment from summer weather forecast conditions

Forecast Summer Conditions	Likely Impact of Summer Conditions	Unmitigated Dust Risk			Dust Control	Mitigated Dust Risk		
		Likelihood of Emission	Consequence of Emission	Risk Rating		Likelihood of Emission	Consequence of Emission	Risk Rating
Higher than average and maximum temperatures	Faster drying and lower moisture content of material	F	2	Medium	Increasing the use of water sprays on dryer materials. Dust mitigation plan including inspection and mitigation trigger alerts	D	1	Low
Lower than average rainfall	Lower moisture content of material	F	2	Medium	Increasing the use of water sprays on dryer materials. Dust mitigation plan including inspection and mitigation trigger alerts	D	1	Low

5 Limitations

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Bibliography

- BoM (2026a). Climate statistics for Australian locations - Rosebery (HEC Substation), Station 097073. Bureau of Meteorology (BoM), Australian Government. Available at https://www.bom.gov.au/climate/averages/tables/cw_097073.shtml.
- BoM (2026b). Climate Data Online - Rosebery (Clemons Street), Station 097093. Bureau of Meteorology (BoM), Australian Government. Available at <https://www.bom.gov.au/climate/data/>.
- BoM (2026c). Long-range weather and climate outlooks. Bureau of Meteorology (BoM), Australian Government. Available at <https://www.bom.gov.au/climate/outlooks/#/overview/summary>.
- Climate Futures for Tasmania (2023). Climate Modelling Technical Report. University of Tasmania, Hobart.
- CSIRO and Bureau of Meteorology (2026). Climate Change in Australia - projections datasets. CSIRO and Bureau of Meteorology, Australia.
- European Centre for Medium-Range Weather Forecasts (ECMWF). Nino Annual Plumes – Seasonal Forecast – SEAS5. European Centre for Medium-Range Weather Forecasts (ECMWF), Europe.
- Envirodata (2025a). Field Calibration Report - MMG 2/5 Dam. Envirodata Weather Stations Pty Ltd.
- Envirodata (2025b). Field Calibration Report - MMG Bobadil. Envirodata Weather Stations Pty Ltd.
- Envirodata (2025c). Field Calibration Report - MMG 7L Carpark. Envirodata Weather Stations Pty Ltd.
- ERM (2019). Annual Meteorological Review - Rosebery Mine, Project No. 0516238. Environmental Resources Management Australia (ERM), issued 6 August 2019.
- EY (2025). Annual Meteorological Report - FY24/25, MMG Rosebery Mine. Ernst & Young, 6 August 2025.
- EY (2024). Annual Meteorological Report - FY23/24, MMG Rosebery Mine. Ernst & Young, 6 August 2024.
- EY (2023). Annual Meteorological Report - FY22/23, MMG Rosebery Mine. Ernst & Young, 7 August 2023.
- MMG (2019). Risk Management Procedure. MMG Limited.
- MMG (2025). Dust Mitigation Plan - Management Plan – Rosebery Mine. MMG Limited.
- Standards Australia (2020). AS 3580.19:2020 Methods for sampling and analysis of ambient air, Method 19: Ambient air quality data validation and reporting. Standards Australia.

Appendix A



A1 Meteorological Risk Matrix

Table A.1 Likelihood category and relevant description

Likelihood	Likelihood category	Description
Almost Certain	F	Could be incurred more than once in a year
Likely	E	Could be incurred over a 1 to 2 year period
Possible	D	Could be incurred over a 5 year period
Unlikely	C	Could be incurred over a 5 to 20 year period
Rare	B	Could be incurred over a 20 to 50 year period
Very Rare	A	Could be incurred in a period greater than 50 years

(1) Source: MMG Risk Management Procedure, 2019.

Table A.2 Consequence rating

Rating	Consequence - Environment
6	Regional, offsite environmental impact requiring long term recovery with irreversible residual damage; species extinction or permanent impairment of ecosystem function or biodiversity value within site; or irreversible loss or damage to a site or item of significant cultural heritage value.
5	Prolonged or severe offsite environmental impact requiring long term clean up; extensive unconfined on lease impact requiring long term clean up and leaving residual damage; change to ecosystem function or biodiversity value within site; or irreversible damage to a site or item of significant cultural heritage value.
4	Major offsite environmental impact requiring medium term clean up; onsite confined impact requiring significant clean-up effort; temporary impairment of ecosystem function or loss of a listed or protected species; or repairable damage to a site or item of significant cultural heritage value.
3	Reversible offsite environmental impact requiring short term clean up, or onsite confined reversible environmental impact requiring medium term clean up.
2	Low, confined, reversible environmental impact requiring short term clean up of less than one week.
1	Very low, reversible environmental impact confined to a small area within operations, with prompt clean up within a shift.

(1) Source: MMG Risk Management Procedure, 2019.

Table A.3 Risk rating of emission sources

Likelihood rating	1	2	3	4	5	6
F	Medium	Medium	High	Very High	Very High	Very High
E	Low	Medium	High	High	Very High	Very High
D	Low	Medium	Medium	High	High	Very High
C	Low	Low	Medium	Medium	High	High
B	Low	Low	Low	Medium	Medium	High
A	Low	Low	Low	Low	Medium	Medium

(1) Source: MMG Risk Management Procedure, 2019.

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Appendix D MMG Rosebery Annual Water Quality Monitoring Review 2025–2026 (Koehnken, 2026) – Including surface water and groundwater monitoring results and review for 3 Level Waste Rock Dump

MMG Rosebery Annual Water Quality Monitoring Review 2025 to 2026

FINAL

19 August 2026

A Report to MMG Rosebery

Lois Koehnken

◆◆◆*Technical Advice on Water*◆◆◆

DOCUMENT TYPE:	Report	
TITLE:	MMG Rosebery Annual Water Quality Monitoring Review 2025 to 2026	
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PREPARED BY:	Lois Koehnken	Final: 19 August 2026 V1: 29 July 2026 Draft: 22 July 2026
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Limitation of Liability

This report has been prepared using the data provided by MMG Rosebery and its contractors for the specific purpose of summarising water quality results at MMG Rosebery to comply with the annual reporting requirement of EPN 7153/3 and PCE 11514. While care has been taken to ensure the information is accurate at the time of preparation, L Koehnken Pty Ltd makes no guarantee that it is complete or suitable for other uses.

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1 Introduction

The following tables and graphs summarise water quality results from MMG Rosebery for the monitoring period 1 July 2025 to 30 June 2026. Table 1 summarises chemical parameter names and acronyms used in the presentation and description of water quality results.

Table 1. Summary of terms and water quality parameter names.

Name	Description/Definition
2/5	Redeveloped 2 and 5 Tailings Storage Facility (TSF)
Al	Aluminium
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
BO	Bobadil Outfall monitoring point (licenced discharge point for MMG)
BTEX	Volatile organic compounds: benzene, toluene, ethylbenzene, and xylene
Cd	Cadmium
Cu	Copper
CN	Cyanide
D&S	Deep and shallow ground water bores
DO	Dissolved Oxygen – measured in either mg/l or percent saturation (%Sat)
EC	Electrical conductivity, measured in the units $\mu\text{S}/\text{cm}$
ETP	Effluent Treatment Plant
EPA	Environment Protection Authority Tasmania
EPN	Environmental Protection Notice
Fe	Iron
GB	Groundwater bore
LoR	Limit of laboratory reporting
mbgl	Metres below ground level
Mn	Manganese
NATA	National Association of Testing Authorities (Australia)
NOEC	No Observable Effects Concentration
PAF	Potentially acid forming
PCE	Permit Conditions - Environmental
Pb	Lead
pH	Measure of concentration of hydrogen ions in water
T	Temperature
TN	Total nitrogen
TP	Total phosphorus
TPH	Total Petroleum Hydrocarbons
TSF	Tailings Storage Facility
TSS	Total suspended solids
WAD-CN	Weak acid dissociable cyanide - the component of cyanide that is most biologically available and reactive
WRD	Waste Rock Dump
Zn	Zinc

1.1 Regulatory requirement for water quality monitoring and management

The MMG Rosebery site, including the decommissioned Hercules site, has operated under EPN 7153/3 since October 2011. In December 2024, MMG Rosebery was issued a permit from the West Coast Council (DA 2024/0032) to raise the embankment of the Bobadil TSF and operate the TSF. The permit includes Permit Conditions Environmental (PCE 11514) that

outlines the environmental requirements for the operation of the Bobadil tailings facility (TSF) including monitoring requirements for surface water, groundwater and dam seepage. The monitoring requirements supersede the requirements contained in EPN 7153/3 for the Bobadil TSF, but do not affect the monitoring requirements for other areas on the mining lease.

The monitoring requirements of PCE 11514 are similar but not identical to those contained within EPN 7153/3. Differences include eliminating the requirement to monitor thermotolerant coliforms in the Bobadil discharge and increasing monitoring requirements at some sites to include both total and filtered metals, and WAD and Total CN. MMG submitted a groundwater monitoring plan for Bobadil as required by PCE which was approved in November 2025 for implementation in 2026. Changes to groundwater monitoring are summarised in Section 6.

The monitoring requirements for the 2/5 TSF have also changed since issuance of EPN 7153 due to redevelopment of the site and expansion of the seepage collection system. These changes are summarised in the section discussing monitoring at the 2/5 TSF.

During the 2025 to 2026 monitoring year MMG Rosebery reviewed the EPN and PCE monitoring requirements related to Bobadil seepage and site-wide stormwater management and submitted a revised monitoring plan to the EPA which better reflects present water management and ambient discharges from the site. The proposed changes were approved by the EPA in February 2026 with the revised monitoring implemented from March 2026. New flow monitoring infrastructure included in the proposal is required to be operational by September 2026. The monitoring changes are described in detail in the Bobadil seepage and Bobadil Stormwater monitoring sections.

1.2 Note on presentation of results

The MMG 2025 to 2026 monitoring results are presented in a range of graphical formats, including boxplots. Where the recent monitoring results are being compared to the EPN discharge limits at BO boxplots encompassing the 5th to 95th percentile values are used. Where monitoring results are presented to summarise recent monitoring results at sites without discharge limits or show long-term trends, boxplots encompassing the 25th to 75th percentile values are used to provide more detail of the distribution of results.

2 Environmental incidents in the July 2025 to June 2026 monitoring year

There were three environmental incidents at the MMG Rosebery mine site in the monitoring year that required reporting to the EPA.

On 21 October 2025, following high rainfall, the decant channel downstream of the Bobadil TSF overflowed where it enters a culvert near the railway tracks resulting in water being discharged from site and ultimately entering Lake Pieman. This water had passed through the main TSF, where metal hydroxides are precipitated and captured, and was in the channel connecting to the Polishing Ponds. The event was reported to the EPA on 22 October 2025. Water quality samples collected from the overflow on 22 October returned concentrations that were below the discharge limits at Bobadil with concentrations indicative of dilution due to storm water runoff; for example, sulphate concentrations in the overflow were 430 mg/l decreasing to 272 mg/l during the event but ranged from 508 to 521 mg/l at the licenced discharge point when sampled on the 22nd and 28th of October, respectively.

High rainfall was also a factor in an overflow from the 4 Level Collection Pond entering Rosebery Creek on 11 April 2026. MMG reported the incident to the EPA and provided a report including meteorological, flow and water quality results. Flow in Rosebery Creek was elevated throughout the period of discharge. Water quality samples from the 4 Level Collection Pond discharge returned concentrations of some parameters above the EPN 7153 discharge limits, but levels reduced rapidly in Rosebery Creek, with samples collected 180 m downstream returning lower substantially lower levels. MMG Rosebery concluded the pond functioned as designed, however noted that an accumulation of sludge had reduced the total capacity of the pond. Remediation included desludging the pond and calibration of level indicators.

A second overtopping of the 4 Level Collection Pond occurred on 31 May 2026, also following a period of extended rainfall. The MMG investigation found that the desludging of the pond following the April incident had resulted in a blockage of the pipework by consolidated sediment between the 4 Level Collection Pond and the ETP. The event was reported to the EPA and water quality samples were collected from the discharge and the receiving environment on June 1. The water quality results indicated there was a high degree of mixing within Rosebery Creek and MMG concluded there was a low risk to the receiving environment. Following the event corrective actions included pinpointing the location of the blockage, replacing the affected pipeline, and testing the system to verify it met the initial design criteria.

3 Bobadil Tailings Storage Facility Discharge

Treated water from the ETP and variable volumes of tailings are discharged to the Bobadil TSF via a gravity flume system. Within the TSF, tailings are deposited subaerially on beaches with water draining into the Quarry Void and Decant Pond before entering the Decant channel and flowing to the Polishing Ponds (Figure 3-1). The water flows sequentially through the cells in the Polishing Ponds before being discharged to Lake Pieman via the licenced discharge point, Bobadil Outfall (BO). During periods of high flow, discharge can occasionally occur via a second decant structure located in Pond 4 of the Polishing Pond. This water enters the main decant channel upstream of the BO monitoring site so all discharge is captured at the BO monitoring location.

In the 2025 to 2026 monitoring year approximately 610,000 dry tonnes of tailings, equivalent to 67% of the total tails produced at Rosebery, were discharged to the Bobadil TSF, along with all of the treated mine and stormwater and return decant water from the 2/5 TSF. The remaining tailings were discharged to the 2/5 TFS.

A summary of the monitoring results collected during the 2025 to 2026 monitoring period at the licenced discharge point BO is contained in Table 2.

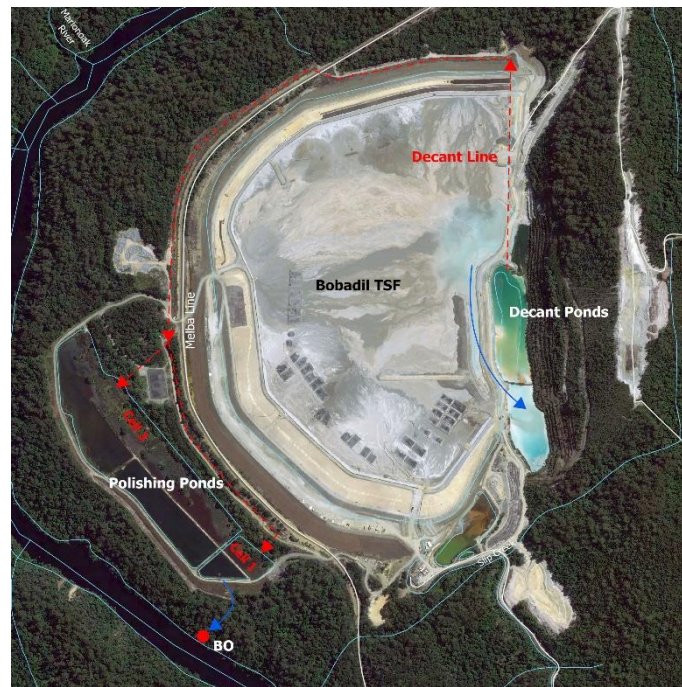


Figure 3-1. Bobadil TSF showing the main dam, Decant Ponds, decant line, Polishing Ponds, and the licenced discharge point from the Polishing Pond (BO).

Table 2. Bobadil tailings discharge monitoring results during the 2025 to 2026 monitoring year.

Requirement	Findings
Monitoring Frequency	<ul style="list-style-type: none"> All samples were completed at the required frequency with the following exceptions: <ul style="list-style-type: none"> Cyanide sample bottles were not received by the laboratory on 13/3/26 and 12/05/26. Following investigation, the bottle checklists were reviewed and confirmed to be correct. The most likely cause is an error associated with bottle preparation or sample handling prior to dispatch. Steps were implemented to ensure future collection of the cyanide sample. Because monitoring was completed on 1 July 2025 and 30 June 2026 a total of 53 samples were collected during the monitoring year
Compliance with EPN discharge limits	<ul style="list-style-type: none"> Rainfall during the 2025 to 2026 monitoring year was highly variable, with the 2025 spring months being very wet, and the remainder of the year having near or below average totals. Overall, the annual rainfall total at Bobadil was 2,080 mm in 2025 to 2026, which is slightly lower than the long-term average of 2,224 mm (1911 – 2018 at Renison Bell, Tasmania, Figure 3-2). The maximum discharge rate at BO was 0.57 m³/s which was driven by a period of extended high rainfall in October 2025. The rest of the year was characterised by moderate to low flow with an average hourly discharge of 0.24 m³/s, and a median hourly flow of 0.25 m³/s (Figure 3-2). The Entura continuous pH readings and the field pH measurements remained well above discharge limits in the TSF and showed good agreement. Similar to previous years, the laboratory pH results were consistently one or more pH units lower suggesting ongoing chemical

	<p>reactions in the samples following collection (Figure 3-3). The decrease in pH does not affect metal concentrations as the metals have already been removed and captured in the TSF.</p> <ul style="list-style-type: none"> • The continuous, field and laboratory pH values were all at or above the PCE limit of pH 6.5 throughout the monitoring year, and the 5th percentile continuous and field results were well above the 5th percentile target of pH 6.7. The 5th percentile laboratory pH was 6.6 due to the decrease during sample storage. • At Bobadil, the low summer discharge did not result in weekly EC or sulphate values increasing above PCE limits or investigative trigger values (Figure 3-4, Figure 3-5). Similar to previous years the Field EC results are consistently lower than the Continuous or Laboratory EC values. The reason for the discrepancy is unknown. • Metal concentrations were below the PCE limits and investigative triggers on all sampling dates (Figure 3-6). Total and filtered mercury, WAD CN and Total CN were below the LoR in all samples. • Eight TPH (sum of C₁₀ – C₃₆) samples returned values above 0.05 mg/l, but results from all eight samples were below 0.05 mg/l when analysed following a silica gel cleanup. The false positives were likely due to the presence of naturally occurring organic acids in the discharge. • All metals and other parameters (TP, TN, TPH, SO₄) were below the discharge limits in all weekly samples during the monitoring year (e.g. Figure 3-6).
Comparison with EPN investigation trigger levels	<ul style="list-style-type: none"> • The 95th percentile values of the samples collected in the 1 July 2025 to 30 June 2026 monitoring year were below the 95th percentile investigative triggers for all parameters except total nitrogen. The 95th percentile value for TN was 6.5 mg/l, higher than the 5.5 mg/l 95th percentile target. The elevated values occurred between 17 February and 24 March, when flows into the TSF were low (Figure 3-7). TN concentrations exceeding the 95th percentile trigger has been a consistent trend at BO. As The exceedance of the 95th percentile poses a low risk to the receiving environment due to: <ul style="list-style-type: none"> o The 95th percentile value being generic in nature and not linked with known ecosystem processes in the receiving environment; o The high level of initial and ongoing dilution provided in Lake Pieman for the BO discharge rapidly decreases concentrations in the mixing zone; o The fast water velocities and turbulent nature of flow in the receiving environment when the power station is operating prevents algal growth; and, o The naturally dark colour of Lake Pieman water restricts light penetration and impedes algal growth.
Significant trends - reporting period	<ul style="list-style-type: none"> • Metal retention in the TSF continues to be highly efficient due to the strict pH control, resulting in low metal concentrations in the discharge from BO over the monitoring year (Figure 3-6).
Significant trends - longer period	<ul style="list-style-type: none"> • Zinc concentrations remain within historic ranges (Figure 3-8, Figure 3-9). The median value for the present monitoring year was 0.025 mg/l, which is within 0.001 mg/l of the previous year's median (0.026 mg/l).

	<ul style="list-style-type: none"> The median sulphate concentration in the 2025 to 2026 monitoring year was (561 mg/l) which is substantially lower as compared to previous years (Figure 3-10). The reason for this is unknown but could be related to most of the months being drier than average resulting in decreased stormwater generation.
Comment	<p>The monitoring requirements in PCE 11514 at BO should be refined to be internally consistent and better reflect the conditions at the site. Suggested changes include:</p> <ul style="list-style-type: none"> The frequency of monitoring should be clarified for parameters listed as both weekly and monthly (e.g. nutrients) or monthly and six-monthly (e.g. TPH) The requirement for the laboratory analysis of pH should be eliminated as the analysis is frequently completed outside of the holding time of the samples, and the field results are more applicable to management of the TSF. Mercury should be removed from the sampling schedule as results have been <LoR for over a decade for both total and filtered mercury. Monitoring frequency should be included in the review based on the large number of parameters that are consistently below discharge targets. Consideration should be given to reducing the frequency of monitoring for parameters that have been below the LoR levels for multiple years. The 95th percentile investigative trigger for total nitrogen should be reviewed with the aim of removing this condition based on the site-specific characteristics of the receiving environment.

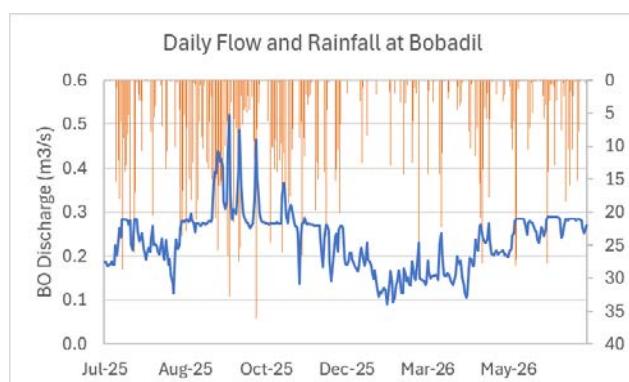
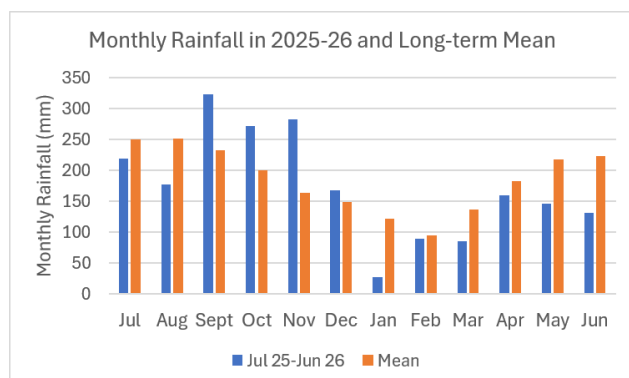


Figure 3-2. (top) Daily rainfall at Bobadil and discharge at BO 1 July 2025 to 30 June 2026, and (bottom) 2025 to 2026 monthly rainfall at Bobadil weather station compared to long-term (1911-2018) monthly averages at Renison Bell (Renison data from BOM).

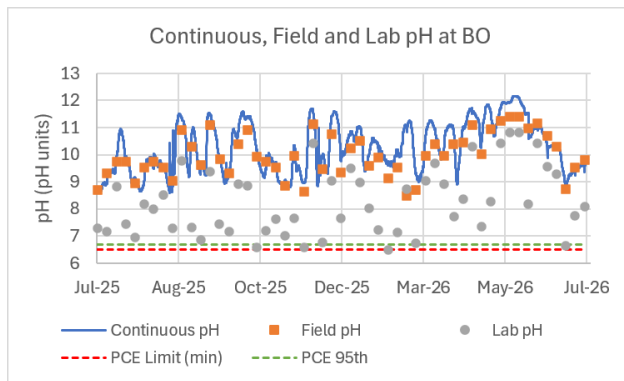


Figure 3-3. Weekly field, laboratory, and continuous hourly pH results from BO, July 2025 to June 2026. Continuous results are from Entura maintained probes.

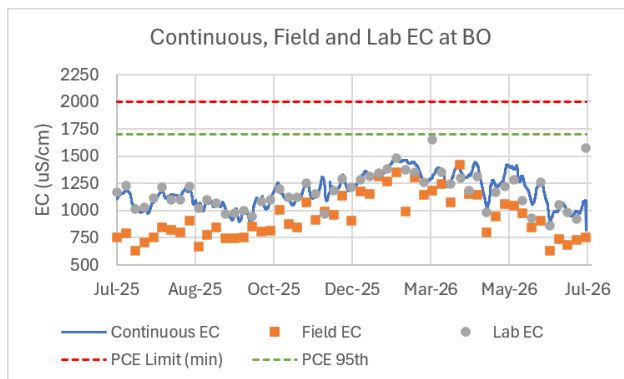


Figure 3-4. Weekly field, laboratory and continuous Entura EC results from BO, July 2025 to June 2026. Laboratory and Continuous results are temperature compensated to 25 °C.

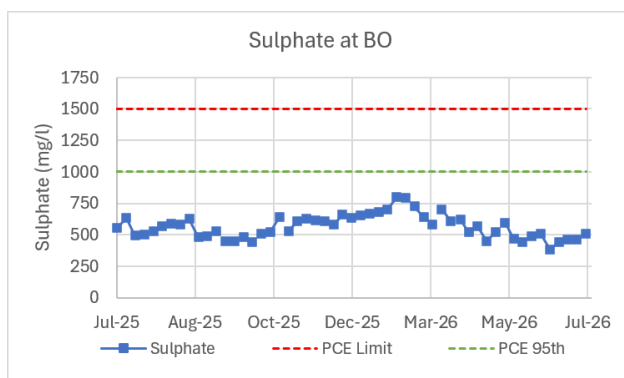


Figure 3-5. Weekly sulphate at BO from July 2025 to June 2026 with EPN discharge limits for sulphate indicated.

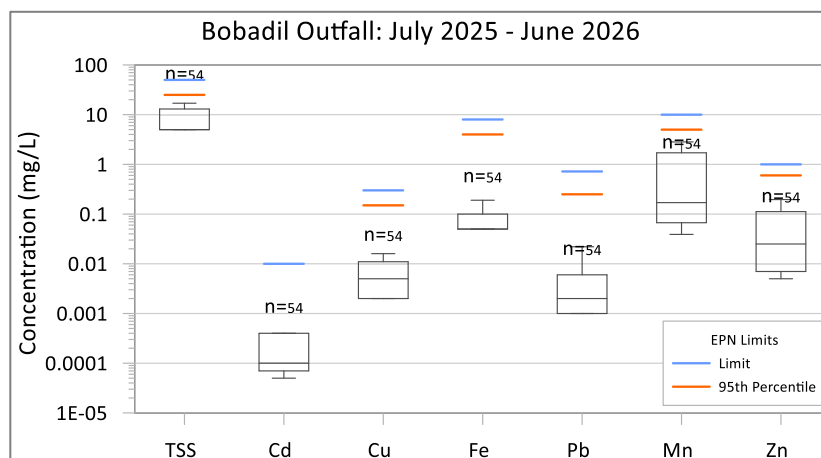


Figure 3-6. Box and whisker plot of TSS and total metal monitoring results at BO for July 2025 to June 2026 compared to EPN limits and 95th percentile trigger. The box encompasses 5th to 95th percentile values, with minimum and maximum values indicated by the whiskers.

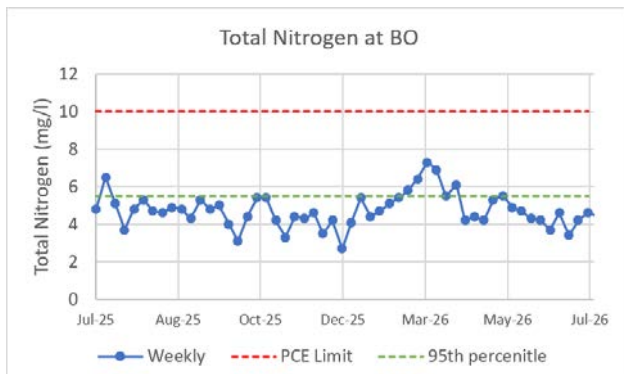


Figure 3-7. Total nitrogen concentrations in July 2025 to June 2026.

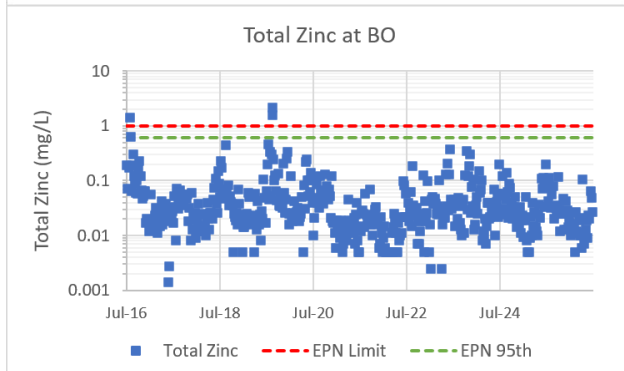


Figure 3-8. Total zinc concentrations from July 2015 to June 2026.

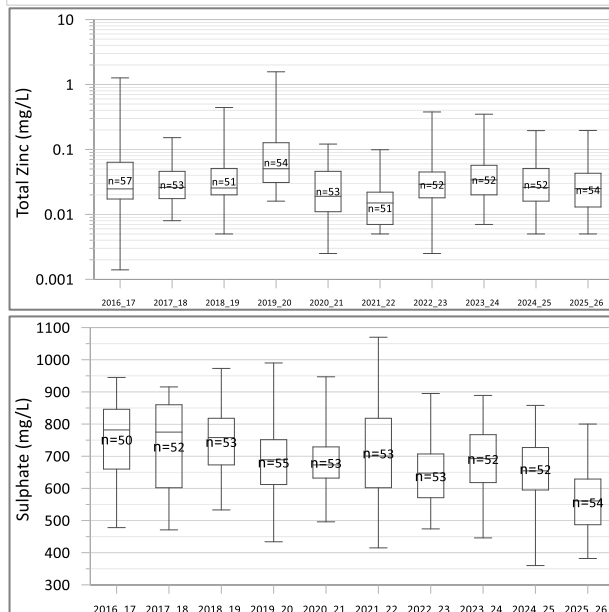


Figure 3-9. Comparison of total zinc concentrations at BO over the past 10 monitoring years (July to June). The box encompasses the 25th to 75th percentile values, and the 'whiskers' extend to the minimum and maximum values.

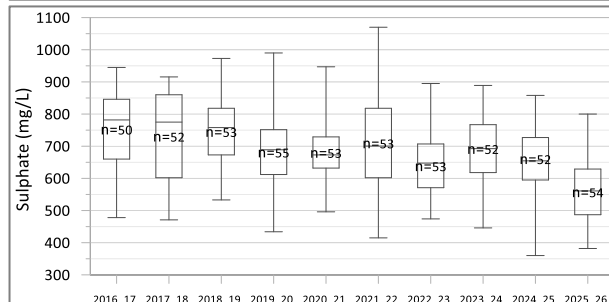


Figure 3-10. Comparison of sulphate concentrations at BO over the past 10 years. The box encompasses the 25th to 75th percentile values, and the 'whiskers' extend to the minimum and maximum values.

4 Internal Bobadil TSF Monitoring (BI and BF)

The monitoring locations for internal sites BI (Bobadil Intermediate) and BF (Bobadil Flume) are shown in Figure 4-1, and the results are summarised in Table 3. BF is located at the head of the flume that transports tailings and treated water to the Bobadil TSF, and BI is at the outlet of the decant pond where water enters the decant channel.

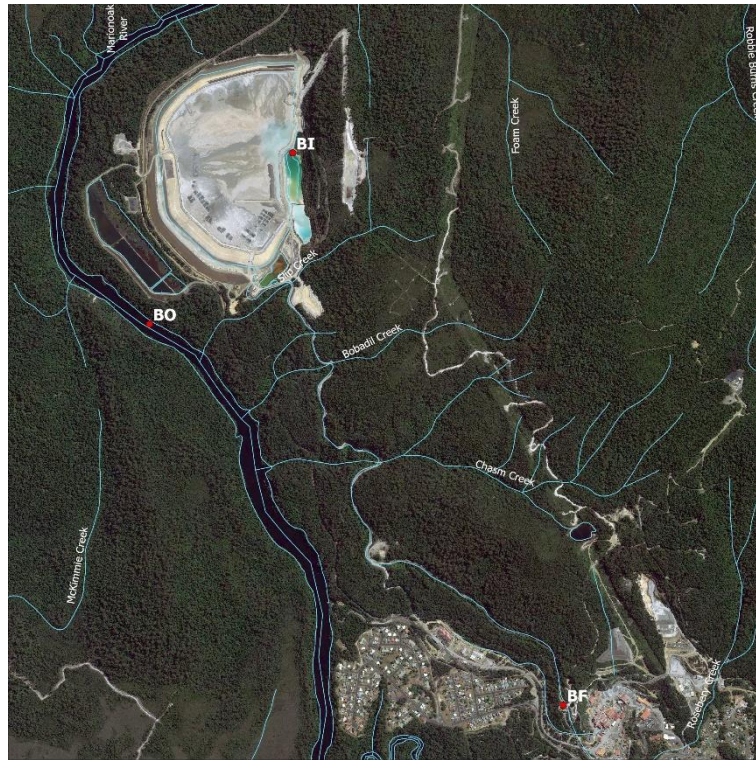


Figure 4-1. Internal monitoring locations BF (head of Flume) and BI (Bobadil intermediate). The discharge point BO is also indicated.

Table 3. Summary of monitoring results from internal monitoring sites at Bobadil TSF for the 2025 to 2026 monitoring year.

Requirement	Findings
Monitoring Frequency	At BI and BF all parameters were monitored on a monthly basis as required, with field and cyanide parameters monitored more frequently.
Significant trends reporting period	<ul style="list-style-type: none"> pH trends are similar to previous years with pH declining between BF, BI and BO, with the largest decline between BI and BO as the water moves through the decant channel and Polishing Pond (Figure 4-2). In contrast, EC values are similar at BI and BO and higher at BF. This is likely due to on going precipitation reactions occurring between BF and BI removing anions and cations from the discharge, such as gypsum precipitation. Sulphate concentrations at the sites ranged from 265 mg/l to 790 mg/l between the sites over the year (Figure 4-4). Median values increased between the sites, from 488 mg/l at BF, to 508 mg/l at BI and 580 mg/l at BO), recognising the difference in sample numbers. The increase is likely attributable to tailings water draining into BI, and from seepage entering the Polishing Pond from the main TSF (Figure 4-4). The seasonal increase in EC and sulphate during the summer months is attributable to lower stormwater and mine water inflows during the dry months. TSS results show that 2 g/l to 198 g/l of tailings and sludge were being transported at BF during each monitoring run. TSS at BI was <45 mg/l on all monitoring dates, demonstrating a high retention of solids in the main TSF (Figure 4-5). TSS in the Bobadil outfall were

	<p>below the EPN limit of 50 mg/l and 95th percentile investigative trigger of 25 mg/l on all occasions due to the additional trapping of solids in the Polishing Pond.</p> <ul style="list-style-type: none"> The total zinc results demonstrate the elevated pH of the wastewater stream promotes the precipitation and settlement of zinc in the main TSF and in the Polishing Pond (Figure 4-6).
Comment	<ul style="list-style-type: none"> The monthly results from BF and BI demonstrate that the Bobadil TSF and Polishing Pond are an efficient system with respect to neutralisation and capture of tailings and metal precipitates.

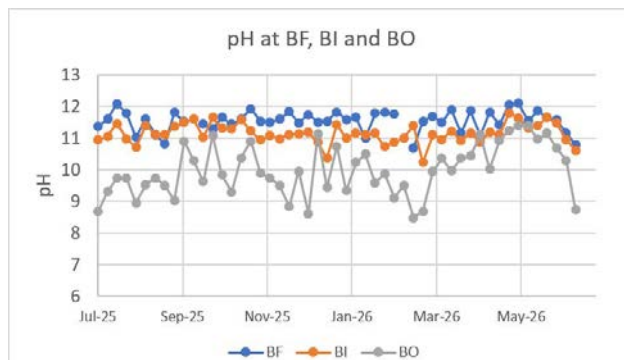


Figure 4-2 Comparison of Field pH at BF, BI and BO for July 2025-June 2026.

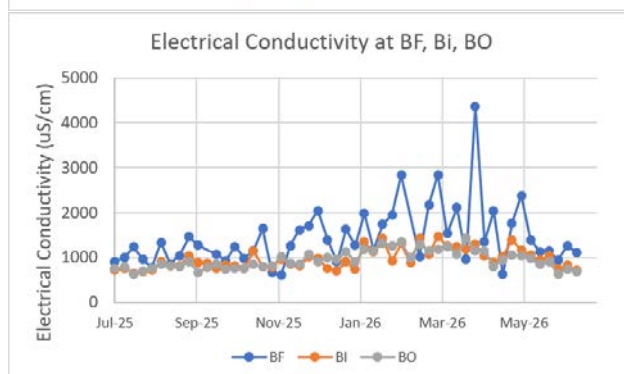


Figure 4-3 Comparison of Field EC results at BF, BI and BO for July 2025 to June 2026.

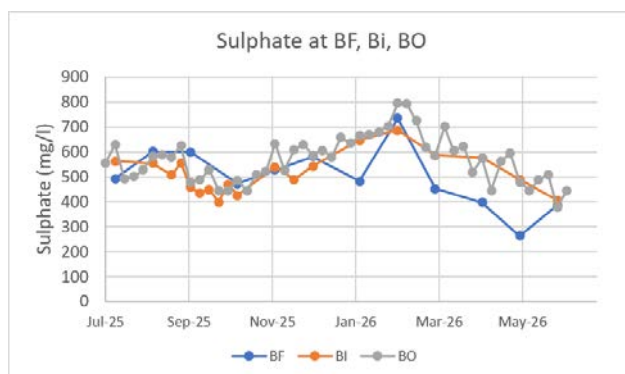
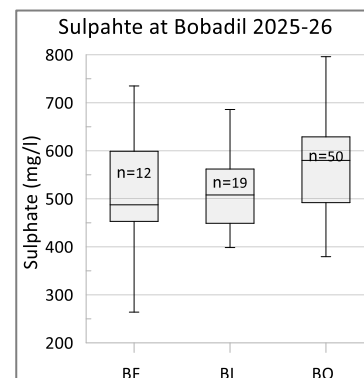


Figure 4-4. (left) Time series of sulphate at BF, BI and BO July 2025-June 2026 (right) box and whisker plots comparing concentrations at BI and BO. Boxes contain the 25th to 75th percentile values, with the minimum and maximum indicated by the 'whiskers'.

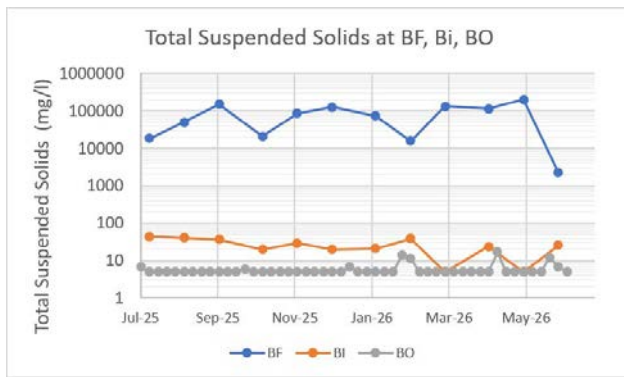


Figure 4-5. TSS at BF, BI and BO July 2025 to June 2026. The LoR is 5 mg/l. Values below this level are shown as 5 mg/l. Note log scale.

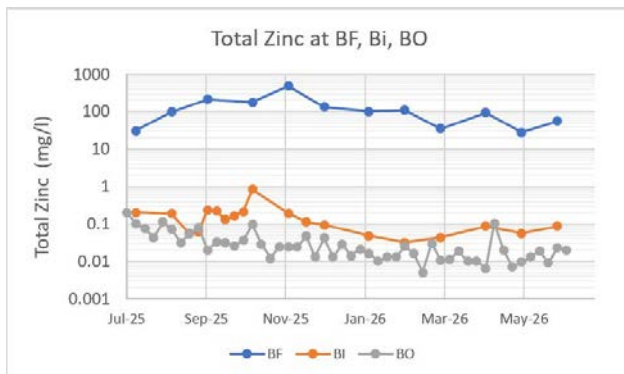


Figure 4-6. Total zinc at BD, BI and BO July 2025 to June 2026. Note log scale.

5 Bobadil TSF Seeps

The EPA approved a request by MMG Rosebery to alter the monitoring requirements for the Bobadil seeps to focus on active seeps that enter the environment. The changes were necessary because since 2011, when the original seepage monitoring requirements were established in the EPN, the expansion of Bobadil and other water management changes have altered seepage flow from the TSF. The historic and newly approved seepage monitoring sites are shown in Figure 5-1 and Table 4 along with the monitoring quarter in which they were required to be monitored based on the revised plan. The parameters included in the monitoring have also been revised, with the new requirements shown in Table 6. The revised parameters include WAD and Free CN and eliminate fluoride and chloride. Monitoring compliance for the first two quarters is evaluated against the original EPN criteria, with the last two quarters evaluated against the revised criteria. Flow monitoring infrastructure is required to be operational at BD1 by September 2026 so flow at this site is not included in the data review.

Table 4. Summary of seepage monitoring locations at Bobadil TSF. Samples that were monitored in each quarter are indicated.

Site	Q1	Q2	Q3	Q4	Comment
BD1	X	X	X	X	Collects stormwater as well as seepage downstream of railroad tracks
BD2	X	X			Removed in February 2026. Site was not collecting seepage
BD3					Discontinued in 2the 024 to 2025 monitoring year due to only being accessible from Lake Pieman and access was unsafe
BD4					Removed many years ago due to expansion of Bobadil TSF
BD5	X	X	X	X	Interpreted to be seepage from the Polishing Pond
BDSP30			X	X	Seepage from lower level of TSF. Combines with stormwater and reports to BD1
BDSP31			X	X	Seepage from lower level of TSF. Combines with stormwater and reports to BD1.

Table 5. Existing and revised monitoring requirements implemented in February 2026.

Period	Frequency	Parameters
EPN 7153 requirements (BD1-5)	Quarterly	Flow, pH, EC, TSS, total and dissolved metals (Al, Cd, Cu, Fe, Pb, Mn, Zn), Ca, Mg, F, Cl, SO ₄
Sept 2026 revised requirements BD1,5 BDSP30, 31)	Quarterly	Flow, pH, EC, TSS, total and dissolved metals (Al, Cd, Cu, Fe, Pb, Mn, Zn), Ca, mg, SO ₄ , WAD CN, Total CN



Figure 5-1. Seepage monitoring locations at Bobadil TSF showing retained, new and removed sites.

Table 6. Summary of monitoring results from Bobadil TSF seeps for the July 2025 to June 2026 monitoring year.

Requirement	Findings
Monitoring Frequency	All monitoring was completed at the required frequency noting the following: <ul style="list-style-type: none"> There was no flow at BDSP30 on the March or June 2026 monitoring dates so no samples have been collected from this site.
Compliance with EPN	Monitoring is the only PCE requirement and all parameters were determined on the collected samples as required.
Significant trends reporting period	<ul style="list-style-type: none"> In general, the water quality results are within the same range as previous years for sites BD1, BD2 and BD5. Some of the variability at BD1 is attributable to a partial diversion of flow away from the monitoring location. This will be addressed by Q1 of monitoring year 2026-2027. This site also receives stormwater runoff in addition to seepage. Flow rates were low on all sampling days, with flow at all sites ≤ 1 l/s. At BDSP31 flows of 0.05 l/s and 0.1 l/s were recorded. Seep BD5 continues to have the highest pH values, ranging between 6.0 and 6.5 during the monitoring year. pH values at BDSP31 were 3.2 and

	<p>2.8 which are the lowest readings recorded in seeps since at least 2015 (Figure 5-2).</p> <ul style="list-style-type: none"> • BD5 continues to have variable total zinc concentrations in the 0.01 to 0.1 mg/l range. The other seeps have higher concentrations with BD1 in the range of 1 to 8 mg/l and BDSP31 returning values of ~40 mg/l on both sampling runs (Figure 5-3). • Total lead results remain in the range of previous results at BD1 and BD5 (Figure 5-4). Concentrations at BDSP31 are intermediate between the BD1 and BD5 seeps at about 0.01 to 0.02 mg/l. • Sulphate concentrations at BD5 continue to be elevated and show low variability, consistent with this seep being sourced from the Polishing Pond (Figure 5-5). The sulphate concentration at BD1 show high variability likely due to the relative proportions of seepage and stormwater at the site. BDSP31 shows elevated concentrations of sulphate. The much lower values at BD1 demonstrates that substantial dilution of the BDSP31 seep occurs between the monitoring sites. • Similar to previous years, the DO levels at BD5 were low, < 5 mg/l, and iron and manganese concentrations were elevated, suggesting a groundwater input to the seep (Fe = 6 – 8 mg/l; Mn= 6-7 mg/l). The DO levels at site BD1 are higher in line with the site being located on an open channel. At BDSP31, metals are elevated but this is attributable to the low pH rather than low oxygen levels. The BDSP31 discharge is well oxygenated due to the discharge flowing through an extended drainage pipe. • Zinc fluxes at the seeps ranged from <0.5 g/day to ~300 g/day (Figure 5-6). Seep BDS31 recorded fluxes of ~100 to 300 g/day whereas the other seeps all discharged <20 g/day.
Comments	<ul style="list-style-type: none"> • The revised seepage monitoring plan is successfully targeting seeps that enter the receiving environment. Seep BDSP31 is very acidic and metal rich and is discharging higher metal loads to the environment as compared to the other seeps. The maximum total zinc load recorded at the seep is equivalent to ~40% of the average daily zinc discharge at BO (based on an average flow of ~231 l/s and an average of 0.035 mg/l zinc at BO). • Concentrations and fluxes at BD1 are likely to change following redirection of the stormwater and seepage entering the abandoned railway channel back to the monitoring site.

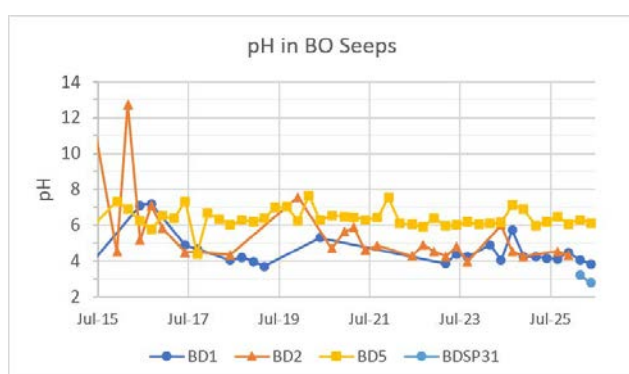


Figure 5-2. pH results from Bobadil seeps, July 2015 to June 2026.

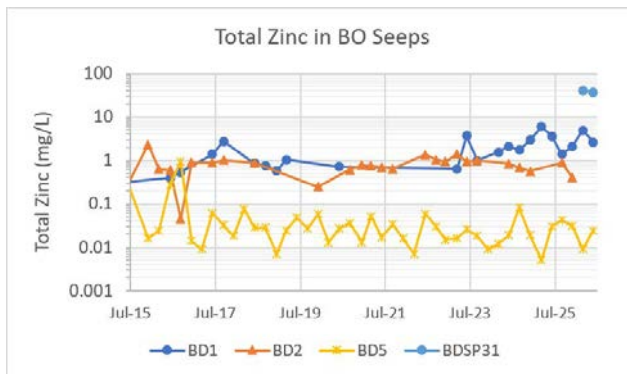


Figure 5-3. Total zinc results from Bobadil seeps, July 2015 to June 2026. Note log scale.

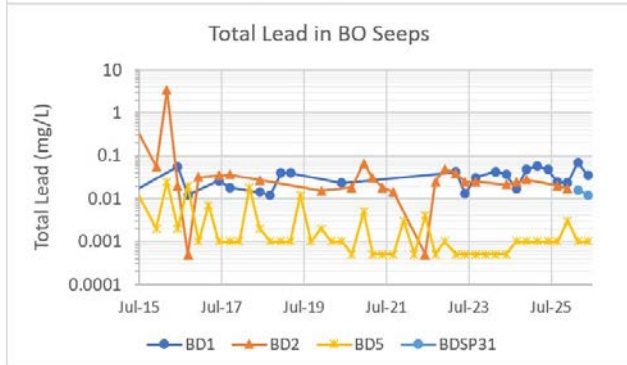


Figure 5-4 Total lead results from Bobadil seeps, July 2015 to June 2026. Note log scale.

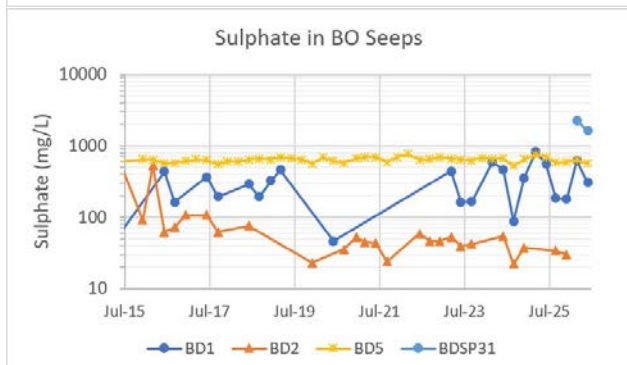


Figure 5-5 Sulphate concentrations in the Bobadil seeps July 2015 to June 2026. Note log scale.

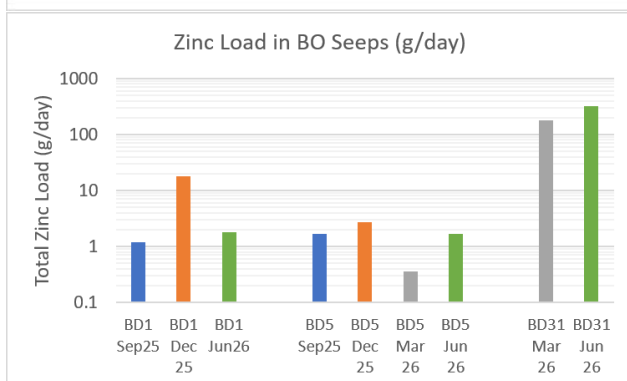


Figure 5-6. Total zinc fluxes on monitoring days at sites BD1, BD5 and BDSP31. Colours indicate sampling date (blue = Sep25, orange=Dec 25, grey=Mar26 and green=Jun 26). Note log scale.

6 Bobadil TSF Groundwater Monitoring

MMG Rosebery submitted a groundwater monitoring plan to the EPA in June 2025 as required by PCE 11514. The plan included additional compliance groundwater monitoring bores, and recommended additional sites be monitored for operational purposes. The plan also expanded the range of parameters determined on each of the groundwater samples (Table 7). The plan was approved in November 2025 with the changes implemented in the April 2026

monitoring round, although an extensive historical data set exists for most parameters at all sites. The locations of the compliance and operational bores are shown in Figure 6-1 with a summary of groundwater monitoring results is contained in Table 8.



Figure 6-1. Location of groundwater monitoring bores near the Bobadil TSF.

Table 7. Parameters determined in the groundwater samples collected at Bobadil TSF.

Chemical group	Parameters
Field parameters	pH, Electrical Conductivity, Total Dissolved Solids

Chemical group	Parameters
General	Acidity, Alkalinity, Total Organic Carbon, Dissolved Organic Carbon
Major ions	Calcium, Chlorine, Magnesium, Potassium, Sodium, Sulphate
Nutrients	Nitrate, Total Nitrogen, Total Phosphorus
Hydrocarbons	TPH, BTEX
Total and dissolved metals	Aluminium, Arsenic, Cadmium, Copper, Total Chromium, Iron, Lead, Manganese, Mercury, Nickel, Zinc

Table 8. Summary of the 2025 to 2026 monitoring results from the groundwater bores located near the Bobadil TSF.

Requirement	Findings
Monitoring Frequency	<ul style="list-style-type: none"> All bores shown in Figure 6-1 were monitored twice during the monitoring year (October 2025 and April 2026). Additional monitoring was completed at a subset of the bores.
Compliance with EPN	<p>All parameters were determined as required under the revised monitoring plan with the following exceptions:</p> <ul style="list-style-type: none"> Field TDS was not determined at any site in 2025, and was not determined at GB 53D, GB 52D, GB 51D or GB 51S in 2026. The lack of results from October 2025 is due to the revised monitoring plan being implemented after this date. Field TDS is based on an algorithm using electrical conductivity so could be retrospectively determined if required. A field measure of TDS is only accurate if the algorithm has been developed for the specific water so field readings are rough estimates and provide limited additional information as compared to EC. Total Organic Carbon (TOC) was not determined at sites GB43, GB43D, GB 53D or GB42 in 2025 with results available for 2026. This is consistent with the groundwater monitoring plan being approved after the first sampling round.
Significant trends - reporting period	<ul style="list-style-type: none"> The revised monitoring plan provides better coverage of groundwater around the Bobadil TSF, with bores located upslope (GB55), and along the northern, western and southern perimeter. Monitoring results are summarised in Figure 6-2 to Figure 6-9, with the results presented in an anticlockwise direction around the TSF starting at the background bore GB55. Dashed lines in the plots separate the bores into groups based on their relative location to the TSF. Bore GB55 is located upslope of the TSF and should be indicative of background groundwater in the area, however the bore is the only one located within the Mount Read Volcanics, so some differences may occur due to the underlying geology. The bore is characterised by pH between 4.5 to 5, generally low alkalinity (<10 mg/l), low sulphate, but elevated acidity due to elevated iron concentrations (up to 25 mg/l total Fe) (Figure 6-2 to Figure 6-9). Dissolved oxygen in GB55 (and the other deep wells) is low, generally <5 mg/l which can account for the elevated iron. DOC in the bore has ranged from 3 to 10 mg/l, which also contributes to the acidity of the water. The results from the additional groundwater bores are broadly consistent with long-term EPN 7153 monitoring results with deeper bores tending to have higher pH, higher concentrations of alkalinity and lower acidity as compared to the shallow aquifer in the same bore

	<p>(Figure 6-2, Figure 6-3, Figure 6-4). Bores 43 and 43D do not show this trend as both bores are located within glacial till, whereas the other deep bores are in bedrock. Bores GB51D and GB51S are also exceptions, with the deeper bore having lower pH and alkalinity and higher acidity as compared to the shallow bore.</p> <ul style="list-style-type: none"> • The shallow bores along the northern and western perimeter generally have higher concentrations of acidity, sulphate, zinc and manganese compared to the deeper bores suggesting a hydraulic link to the TSF (Figure 6-4 to Figure 6-8). • The elevated concentrations of zinc downslope of the Polishing Pond in bores GB42 and GB52S are surprising given the low concentration of zinc in the water within the Polishing Pond. The elevated values may be derived from seepage from the main TSF flowing under the Polishing Pond or potentially from historic materials either underlying the Polishing Pond or materials used to construct the facility. Based on the elevation of the bores and depth of screened intervals these two bores are likely intercepting the same glacial till aquifer. • Bore GB7S, located between the northern extent of the dam and Lake Pieman also records elevated total zinc levels (Figure 6-6, Figure 6-7). This bore is located downslope of the oldest part of the TSF and there may be input from oxidising materials used to construct the dam wall. The deep aquifer in the bore (GB7D) contains comparatively low levels of zinc and sulphate suggesting there is limited connection between the two aquifers. • Sulphate is potentially the best indicator for hydraulic connection to the TSF. Sites GB55, GB7D, GB8D and GB51D all have 75th percentile sulphate concentrations of <10 mg/l suggesting very limited influence from TSF seepage. Sites where sulphate typically ranges from 10 to 200 mg/l (GB6D, GB4, GB53D, GB52D, GB41S&D) can be considered to intercept aquifers with a limited connection to the TSF. The shallow bores with sulphate concentrations higher than 500 mg/l likely have a strong hydraulic connection to the TSF. All of these bores are located within the glacial till that extends beneath the TSF. • TPH was detected in two samples. In October 2025 the C₁₀-C₄₀ sum at GB51D was 0.26 mg/l. The total was comprised of 0.13 mg/l in each of the C₁₅-C₂₈ and C₂₉-C₃₆ factions, with the sample also containing 12 mg/l DOC. DOC poses a high risk of interfering with TPH analyses in these fractions so the reading could be due to a diesel like fuel, or natural organic acids. A TPH reading (sum C₁₀ – C₄₀) of 0.1 mg/l was detected at GB6S in April 2026. GB6S is located between the TSF and Lake Pieman near a road. The results are ambiguous as none of the component fractions are above the LoR in the sample. DOC was elevated in the sample, at 11 mg/l. It is possible that the TPH results are reflecting the natural organic content of the water in both of these samples. TPH has not been recorded previously at either of the sites. • BTEX was below the LoR at all sites on both monitoring occasions. • The results continue to support a conceptual model of the shallow aquifer, situated within Pleistocene glacial till, being hydraulically connected to dam seepage, with elevated zinc, manganese and sulphate derived from the TSF. The deeper groundwater system appears to be largely isolated from TSF impacts.
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Other comments	The revised monitoring strategy provides a more complete understanding of groundwater impacts associated with the Bobadil TSF. The inclusion of a background bore is useful for characterising influent groundwater to the TSF.
Recommendations	The inclusion of the Operational groundwater bores along with the Compliance bores provides a good understanding of groundwater in the area. It is recommended that the Operational bores continue to be included in the monitoring strategy.

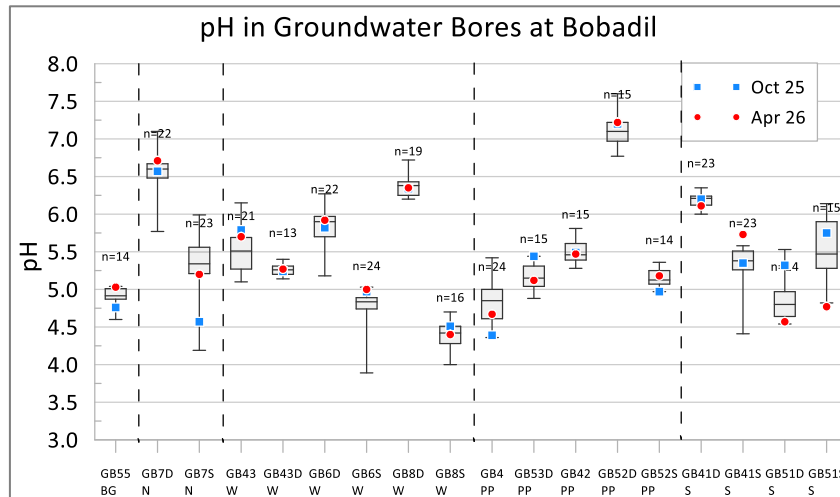


Figure 6-2. pH in groundwater bores at Bobadil. The box encompasses the 25th to 75th percentile results from July 2017 to June 2025 with the October 2025 and April 2026 results shown as data points. The initials under the site name indicate whether the site is background (BG), along the western perimeter of the TSF (W), downslope of the Polishing Pond (PP) or south of the TSF (S). Each group is separated by a dashed vertical line.

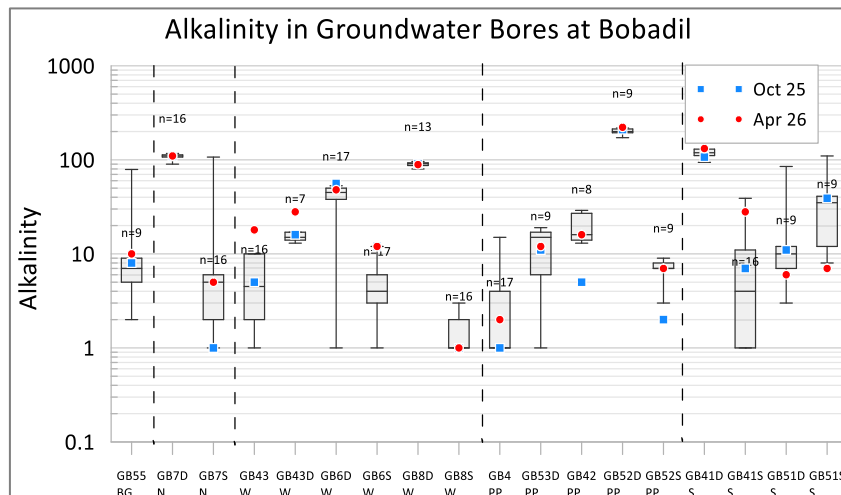


Figure 6-3. Alkalinity in groundwater bores at Bobadil See Figure 6-2 for description.

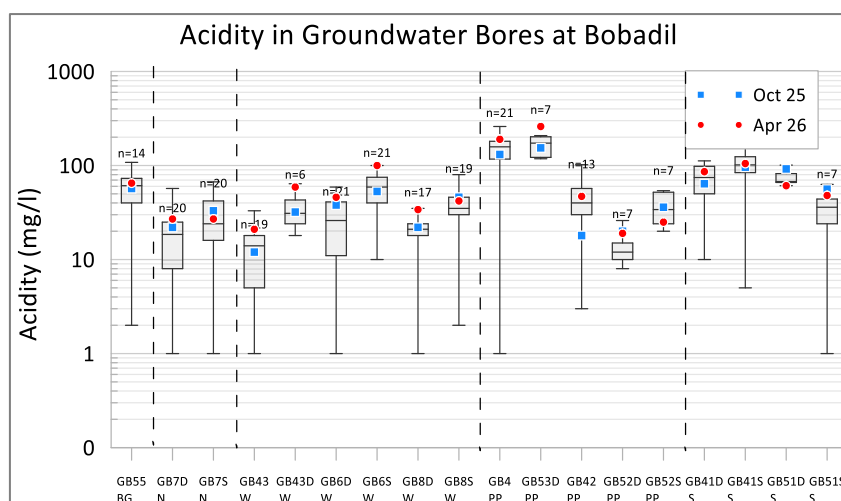


Figure 6-4. Acidity in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

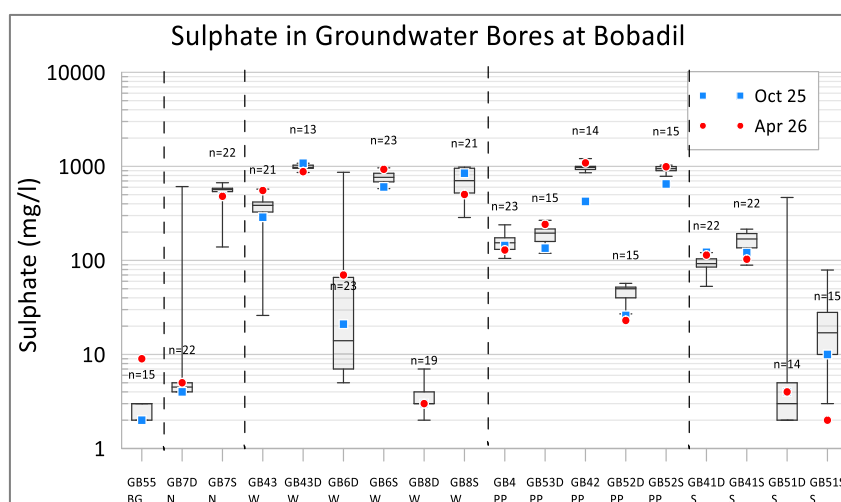


Figure 6-5. Sulphate in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

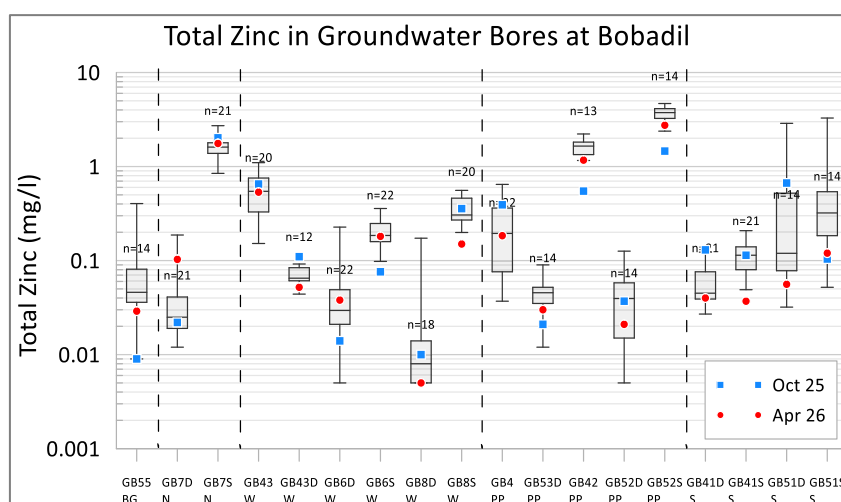


Figure 6-6. Total zinc in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

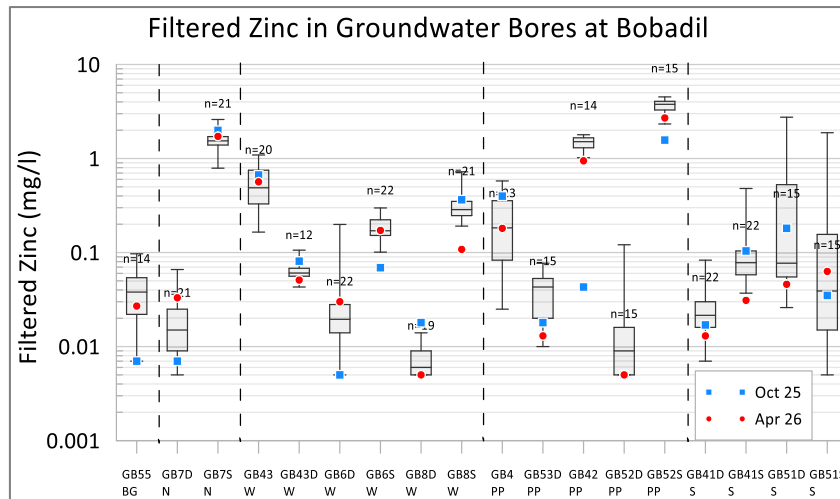


Figure 6-7. Filtered zinc in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

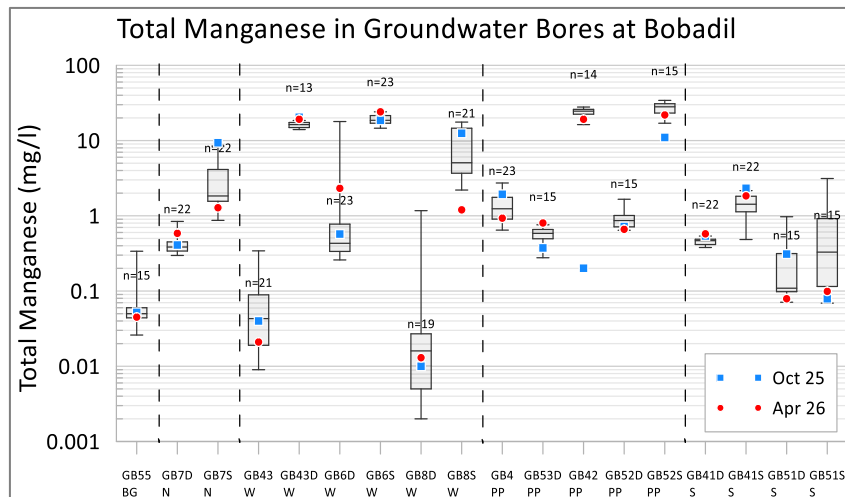


Figure 6-8. Total manganese in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

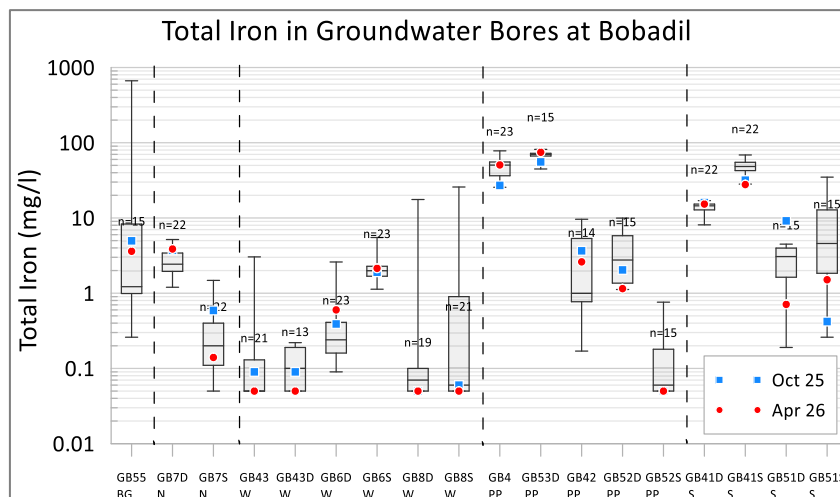


Figure 6-9. Total iron in groundwater bores at Bobadil See Figure 6-2 for description. Note log scale.

7 2/5 Dam TSF Monitoring Results

The redevelopment of the 2/5 Dam TSF under PCE9084 required a revision to the water quality monitoring regime listed in EPN 7153/3. The monitoring strategy has been amended twice, once in February 2018 and most recently in July 2021 based on the Pitt & Sherry (April 2021) monitoring plan. The water quality monitoring sites related to the 2/5 Dam TSF that were sampled in July 2025 to June 2026 are listed in Table 9. MHS2 and MHS3 were initially monitoring seepage emanating from the redeveloped 2/5 TSF, and seepage from the Stitt Park area, respectively. Installation of a French drain and sump system in 2022-2023 has resulted in seepage from the TSF being isolated from local stormwater and pumped back to the TSF. Site MHS2 now collects stormwater that flows along the Murchison Highway, including from a residential area. All stormwater collected at MHS2 continues to be pumped back to the ETP. The seepage at MHS3 continues to be derived from stormwater and seepage from between the 2/5 TSF and Stitt Park area.

During the 2025 to 2026 monitoring year there was no discharge of decant water from the 2/5 Dam TSF to the Stitt River, nor spillage of seepage water from the Seepage Collection Pond (SCP) to the Stitt river. Compliance water quality monitoring is based on the sites listed in Table 9 and Figure 7-2. The 2/5 TSF results are reported in four parts. Section 7.1 describes the surface water and seepage results associated with the TSF, Section 7.2 describes the water quality in the Stitt River receiving environment, Section 7.3 summarises the groundwater monitoring results, and Section 7.4 presents the results of stormwater monitoring along the Murchison Highway.

Table 9. Summary of water quality monitoring at 2/5 dam since redevelopment of the TSF as approved by the EPA in 2021.

Water	Type of Monitoring or Location	Station Names in MMG Database
Surface Water	Grab samples	
	Decant Return	DW01
	Clean Water Diversion upstream of TSF	CWDD01
	Seepage Collection Drain	SCD01, SCD02
	Seepage Collection Pond	SCP01
	Discharge to Stitt River*	SD
	Stitt River upstream of 2/5	WL8
	Stitt River downstream of TSF	SR02
	Stitt River upstream of Stitt Falls	SR03
	Stitt River upstream of L Pieman (downstream of Rosebery Ck)	U/S Pie
	Originally seepage from TSF emanating along Murchison Highway mixed with stormwater. Since July 2022 only stormwater reports to this site	MHS2
	Seepage from downstream TSF emanating along Murchison Highway	MHS3
Groundwater**	Pumped from groundwater bores	GB12, 13, 14S, 14D, 15, 16, 21H, 22H, 23H, 25H, 26H, 27H, 28H, 60 ^{&} , 61 ^{&}

*Only monitored if there is overflow from the TSF. None occurred in the 2025 to 2026 monitoring year.

****Groundwater bores previously designated as GB21 – GB28 are now designated as GB21H-GB28H to avoid confusion with bores located near the 3 Level Open Cut with the same numbering.**
&Additional Bores established in 2024 to provide background information

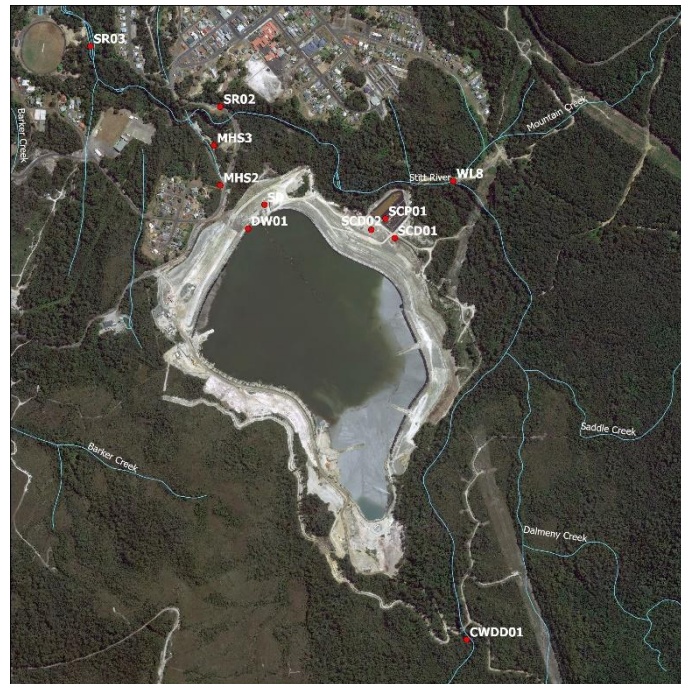


Figure 7-1. Tailings decant and surface water monitoring associated with the 2/5 Dam TSF. Monitoring site U/S Pie is located downstream of SR03, off the aerial photo. Note the MHS2 and MHS3 sites monitor local stormwater with seepage from the collected from the western embankment returned to the TSF.



Figure 7-2. Groundwater bore monitoring locations associated with the 2/5 Dam TSF.

7.1 Trends in the 2 and 5 dam TSF surface waters

The monitoring results for the TSF inflows and decant return are described in Table 10.

Table 10. Summary of monitoring results related to the 2 and 5 Dam in 2025 to 2026.

Requirement	Findings
Compliance with Water Quality Monitoring Strategy	<p>Monitoring at 2/5 Dam was completed as required under the July 2021 Monitoring Plan with samples collected from all sites except for the following:</p> <ul style="list-style-type: none"> SD: Spillway- No water quality results were collected because no water was discharged from the 2/5 Dam TSF into the Stitt River. Parameters in addition to those listed in the monitoring strategy were reported for many of the surface water sites.
Significant trends during reporting period	<p>TSF Decant water:</p> <ul style="list-style-type: none"> pH in the 2 and 5 discharge ranged between 6.5 and 7.0 in the monitoring year. Total zinc concentrations were lower in the summer months when pH values were highest. The high pH and low zinc are likely attributable to a low input of tailings and reduced runoff from the subaerial tailings during the dry summer months. In autumn 2026, pH decreases slightly and total zinc increased substantially suggesting runoff following the dry summer as a potential source (Figure 7-3). Total zinc in the TSF ranged from 0.3 mg/L to 1.5 mg/L, which is a slightly lower range as compared to the previous year (0.25 to 1.75 mg/l). The zinc concentrations have no impact on the environment as all return water is treated in the ETP. Sulphate and EC (Figure 7-4) show similar seasonal trends, with EC varying between ~480 to 930 $\mu\text{S}/\text{cm}$ and sulphate between 174 to 450 mg/l. Maximum sulphate concentrations were lower in the 2025 to 2026 monitoring as compared to the previous year when concentrations reached ~1000 mg/l. Concentrations of sulphate in the 2/5 Dam TSF are lower as compared to the discharge at BO (sulphate range = 400 – 800 mg/l), with the higher values at BO attributable to the addition of mine water, storm water and seepage from the BO TSF. <p>Seepage:</p> <ul style="list-style-type: none"> Seepage from the dam at site SCD01 shows a stronger response to rainfall as compared to SCD02 during the high winter rainfall period, consistent with the seep including surface runoff from the dam wall (Figure 7-5). Seep SCD02 had relatively uniform flows through the year of about 6 l/s, consistent with the seep being fed from groundwater within the TSF. This trend has been unchanged for several years. Monthly seepage rates at the two sites ranged from 3 l/s to 17 l/s. PCE 9084 requires MMG to report any significant increase in seepage flow. MMG monitor this by calculating the percent change in flow relative to the previous monthly measurement. If flow has increased greater than 50% relative to the previous measurement an investigation is completed. At SCD01 this condition was met in September 2025 due to high runoff associated with very high rainfall (Figure 7-5). The recorded flow rate of 17 l/s is well within the historic range. At SCD02 the condition was not met in any month. There is good agreement between the monthly spot flow rates recorded at the seepage collection points and the continuous recording flow from the SCP to the TSF (Figure 7-6).

	<ul style="list-style-type: none"> • The volumetric contribution of seepage pumped back from SCP01 relative to the volume of water pumped back to the ETP from the 2/5 Dam TSF was small except during a period in May 2026 when tailings were only episodically discharged to the 2/5 TSF. During this time the inflow of seepage to the TSF exceeded the volume of water pumped from the TSF to the ETP. Over the entire monitoring period the average seepage return flow was ~8 l/s and the average DW01 return flow was ~42 l/s (Figure 7-7). The return flow to the ETP includes seepage collected along the western and eastern embankments, the SCP inflow, catchment runoff and the conveyance water used to transport the tailings to the TSF. • pH values in the seeps, seepage pond and return water were in the range of ~5.5 to ~7.4 throughout the monitoring year. pH at SCP01 is consistent with the mixing of inflows from SCD01 and SCD02 (Figure 7-8). The pH range in 2025 to 2026 is consistent with the results from previous years. • Total zinc concentrations in SCD01 continue to show seasonality over the 2025 to 2026 year, with the higher values occurring during the wet winter period and low values in the dry summer (Figure 7-9). The highest concentrations at SCD01 are substantially lower than recorded in SCD02, and the high inflow volume from SCD01 results in decreased zinc concentrations in SCP01 during the wet winter. SCD02 continues to show low variability but a decreasing trend. • DW01 zinc trends were similar to SCD01, demonstrating the influence of stormwater inflows at both sites (Figure 7-9). These results are consistent with the conceptual model that the SCD01 seep is derived from recent tailings water in the TSF and runoff from the dam wall, and SCD02 is derived from historic tailings and waste at depth within the TSF. • Sulphate shows similar trends, with SCD02 having the highest concentrations and SCD01 showing seasonal changes. In contrast to total zinc, sulphate concentrations are highest in the summer rather than the winter which may be due to the recycling of water for dust control (Figure 7-10). The DW01 sulphate results show a similar seasonal trend. • Iron concentrations in SCD01, SCD02 and SCP01 are similar to previous years (Figure 7-11). The increasing trend in iron concentrations observed in DW01 between 2021 and July 2024 appears to have stopped, with iron concentrations similar over the past two monitoring years. (Figure 7-12). • Manganese results show similar trends to total zinc, with high variability at SCD01 and higher concentrations at SCD02 and in the DW01 return (Figure 7-13).
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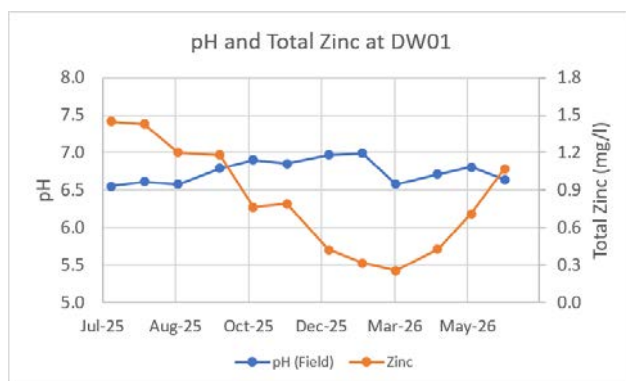


Figure 7-3. pH and total zinc in 2/5 Dam TSF decant return (DW01), July 2025 to June 2026.

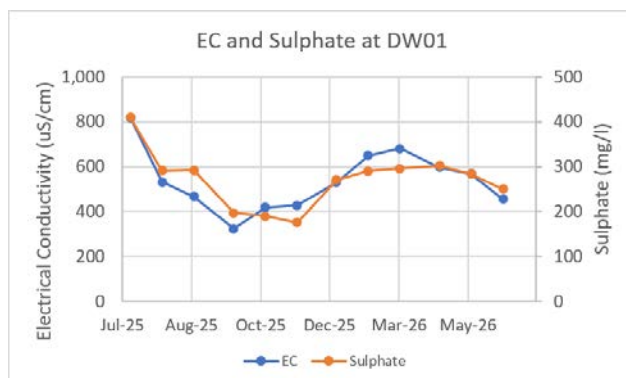


Figure 7-4. Sulphate and EC in the 2/5 Dam TSF decant return, July 2025 to June 2026.

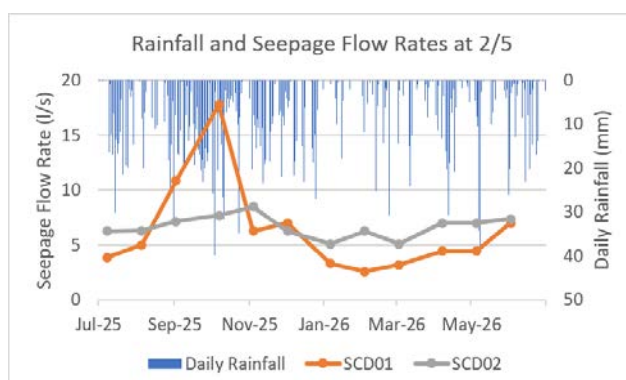


Figure 7-5. Flow rates at SCD01 and SCD02 compared to daily rainfall at the 2/5 Dam TSF 1 July 2025 to 1 July 2026.

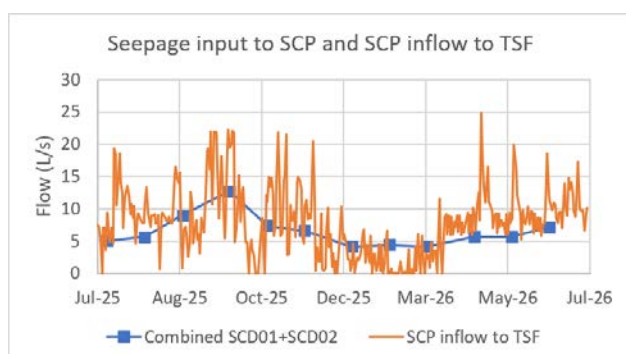


Figure 7-6. Comparison of combined flow rates in SCD01 and SCD02 with average daily return flow from SCP1 to 2/5 dam from July 2025 to July 2026.

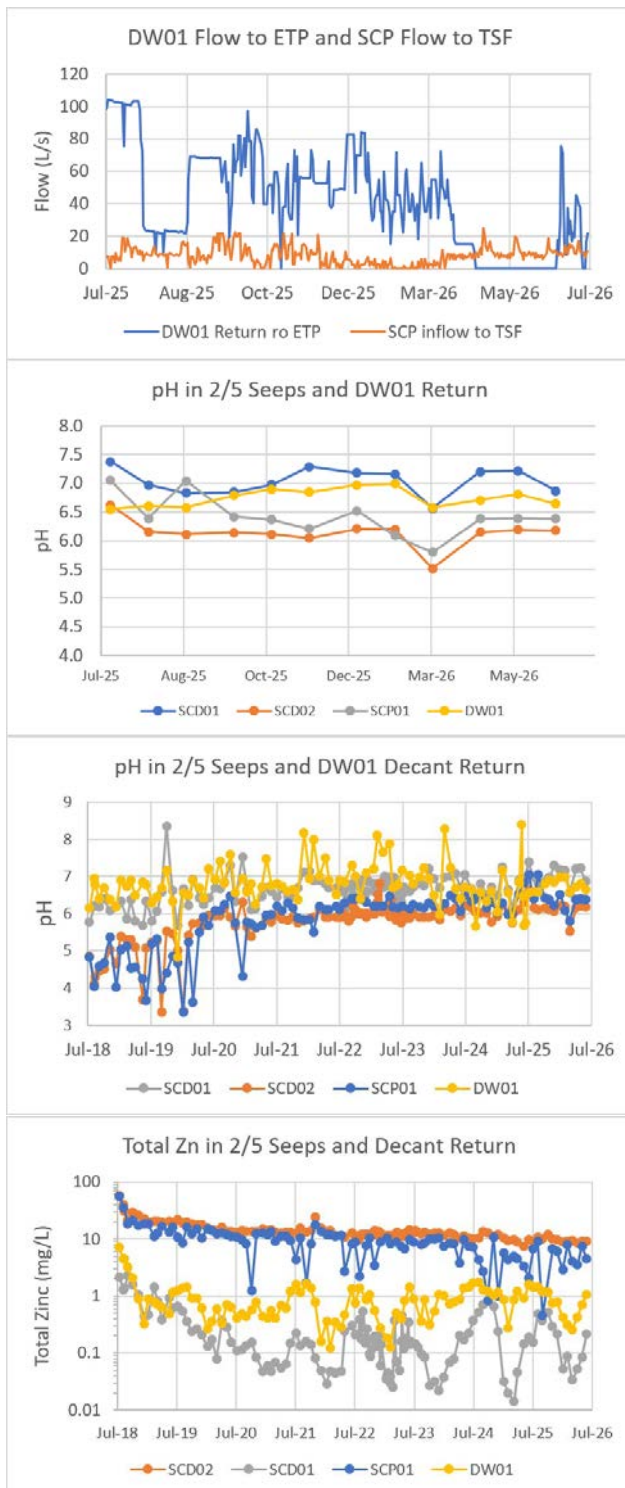


Figure 7-7. Comparison of seepage inflow to 2/5 Dam TSF and Decant return from 2/5 dam to ETP. Decant return includes SCD01, 02, and 03 Seeps.

Figure 7-8. (top) pH in 2/5 seepage drains SCD01 and SCD02 and in the seepage collection pond SCP01 July 2025 to June 2026 (bottom) pH time-series from 2018 to June 2026.

Figure 7-9. Total Zinc in 2/5 seepage drains SCD01 and SCD02, in the seepage collection pond SCP01 and the DW01 decant return to ETP July 2018 to June 2026. Note log scale.

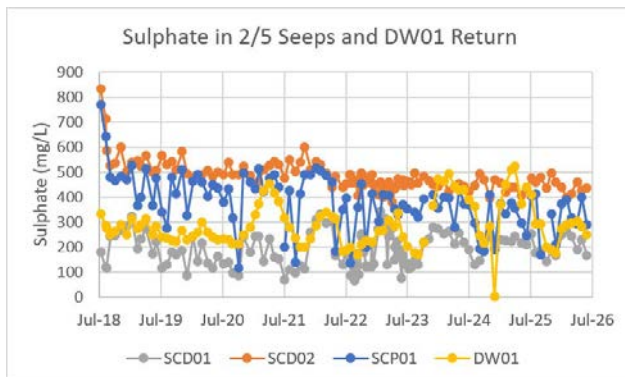


Figure 7-10. Sulphate in 2/5 seepage drains SCD01 and SCD02, in the seepage collection pond SCP01 and the DW01 decant July 2018 to June 2026.

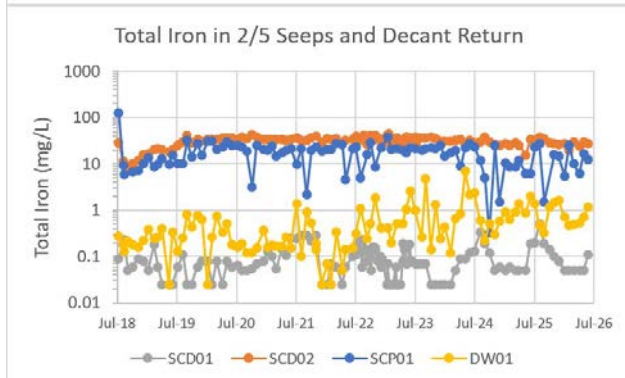


Figure 7-11. Total iron in 2/5 seepage drains SCD01 and SCD02, in the seepage collection pond SCP01 and the DW01 decant July 2018 to June 2025. Note log scale.

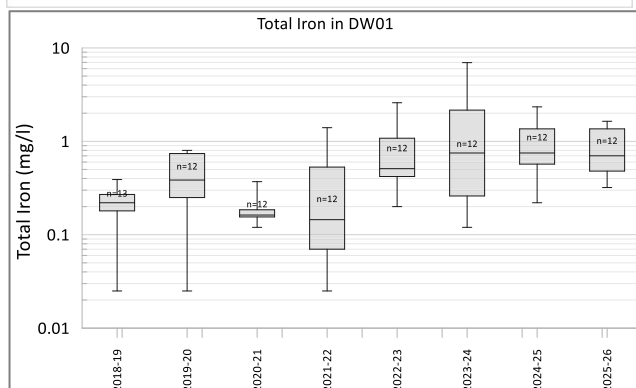


Figure 7-12. Total iron in DW01 return water 2018 – 2026. Note log scale.

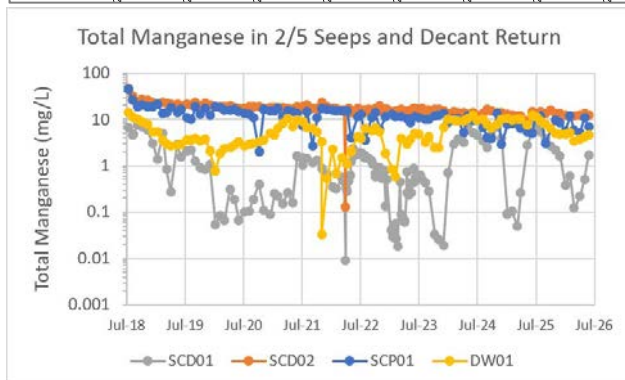


Figure 7-13. Total manganese in 2/5 seepage drains SCD01 and SCD02, in the seepage collection pond SCP01 and the DW01 decant. July 2018 to July 2026. Note log scale.

7.2 Trends in the Stitt River

Additional analysis of the water quality results collected in the Stitt River at WL8 is provided in Section 8. This section relates to the potential impact of the 2/5 TSF on the Stitt River.

Table 11. Summary of monitoring results related to the 2 and 5 Dam in 2025 to 2026.

Requirement	Findings
Significant trends during reporting period	<p>All monitoring in the Stitt River was completed as required with monitoring dates indicated in Figure 7-14.</p> <ul style="list-style-type: none"> Flow in the diversion drain (CWDD01) has the same flow pattern as in the Stitt River, reflecting rainfall and surface runoff. Flows in the drain range from <1 l/s to 120 l/s (Figure 7-14, Figure 7-15). Based on the ratio of flows the CWDD01 catchment contributes ~1/1500 of the flow at WL8. pH levels at the Stitt sites are generally lowest in the Clean Water Diversion (CWDD01) upstream of the Stitt River (Figure 7-16). The highest pH values were recorded at SR02 in most months, with values decreasing downstream. The range of pH values is within the historical range of results. Total zinc at CWDD01 is higher than in the Stitt at WL8 but the high level of dilution provided by the catchment reduces concentrations at the downstream site (Figure 7-17). Zinc concentrations increase between WL8 and the upstream Lake Pieman (U/S Pie) site. Median values increase by 0.033 mg/l between WL8 and SR02, 0.035 mg/l between SR02 and SR03 and 0.049 mg/l between SR03 and U/S Pie. Increases in zinc downstream of WL8 are attributable to seepage and groundwater inputs from the 2/5 TSF, stormwater, diffuse inputs from the fill surrounding and underlying Stitt Park, developments on both sides of the river and inflow from Rosebery Creek, including stormwater from the township (Figure 7-17). Sulphate concentrations increased in a downstream direction in the Stitt but overall remained low in 2025 to 2026 at ≤ 20 mg/l except for one value of 58 mg/l at WL8 (Figure 7-18). Metal concentrations in the WL8 sample were low and Field EC was 42 μS/cm suggesting the elevated sulphate result is an error. Total zinc fluxes have been estimated for the sites in the Stitt River using flow and water quality at CWDD01 to calculate inputs from the diversion drain, flow at WL8 to estimate fluxes at WL8, SR02, and SR03 and the combined flow at WL8 and Rosebery Creek to estimate U/S Pie fluxes. The results for each sampling run are shown in Figure 7-19, and show increases with distance downstream, with a very small percentage of the load attributable to the CWDD01 site. The results show strong seasonality with higher loads transported during the wet winter period. In Figure 7-20, the average increase in zinc flux between each site is shown for the most recent two monitoring years. These average results show that loads were lower in 2025 to 2026 as compared to 2024 to 2025. In both years the largest increase in zinc occurred downstream of the 2/5 TSF between the SR03 and U/S Pie monitoring sites, with ~8 kg/day entering from Rosebery Creek in the most recent year. Near the TSF, between WL8 and SR02 an average increase of ~3 kg/day occurred in 2025 to 2026, which is likely attributable to diffuse emissions from the TSF. The fluxes in the Clean Water

Diversion Drain (CWDD01) and WL8 were low and consistent across both years.

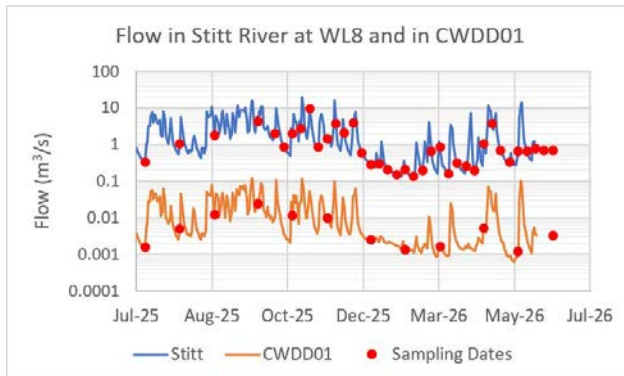


Figure 7-14. Flow in the Clean Water Diversion Drain (CWDD01) compared to flow in the Stitt River at WL8 during the July 2025 to June 2026 monitoring year. Monitoring dates are indicated. Note log scale.

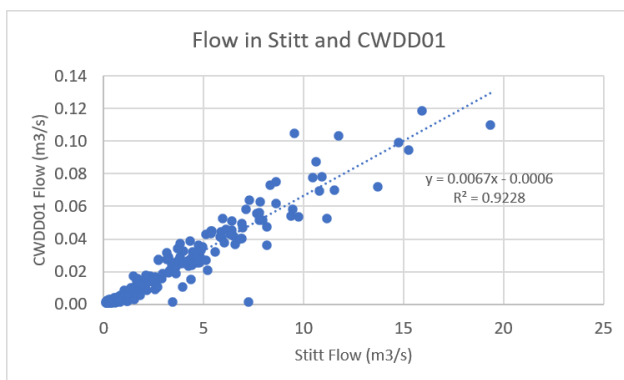


Figure 7-15. Flow and Stitt and CWDD01 in 2025 to 2026 monitoring year showing strong correlation.

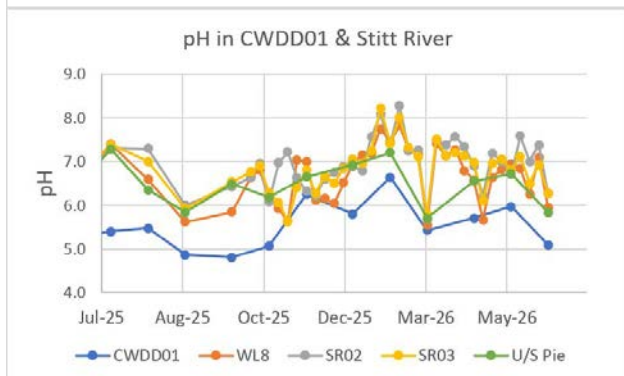
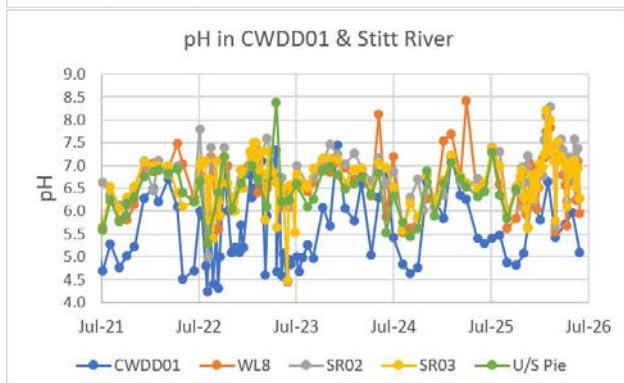


Figure 7-16. (top) pH at Clean Water Diversion Drain and the Stitt River at WL8, SR02, SR03 and U/S Pie from July 2025 to June 2026 (bottom) long-term time series of pH at the Stitt River sites.

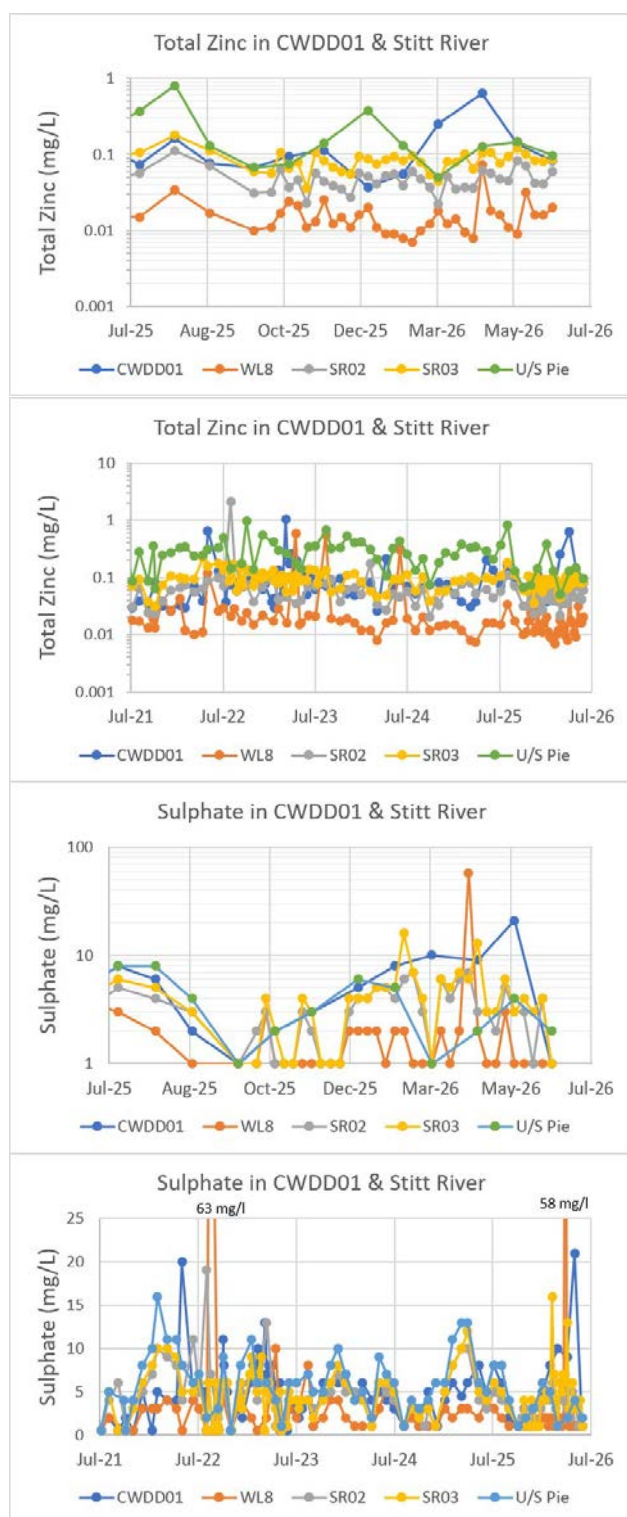


Figure 7-17. (top) Total zinc concentration in the Clean Water Diversion Drain and the Stitt River at WL8, SR02, SR03 and U/S Pie from July 2025 to June 2026 (bottom) Long-term time-series of total zinc in the Stitt River. Note log scale.

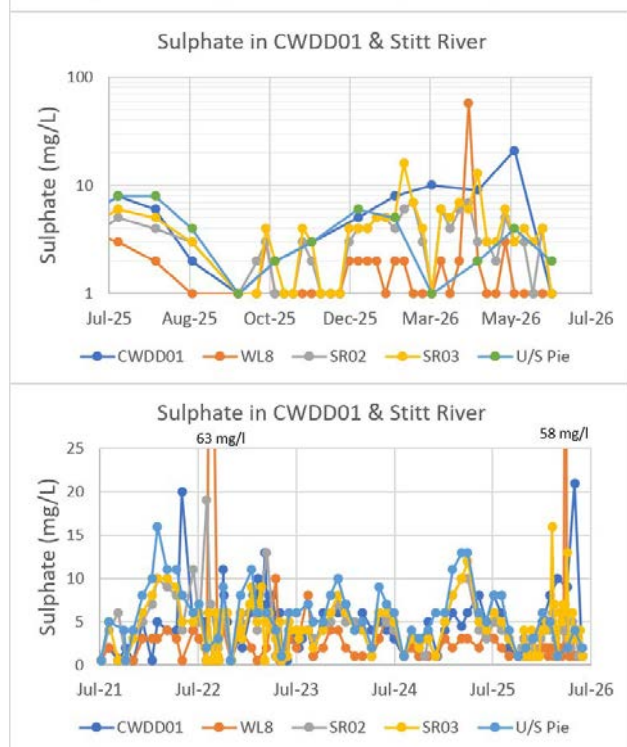


Figure 7-18. (top) Sulphate concentrations in the Clean Water Diversion and the Stitt River at WL8, SR02, SR03 and U/S Pie from July 2025 to June 2026 (bottom) Long-term time series of sulphate at the Stitt River sites.

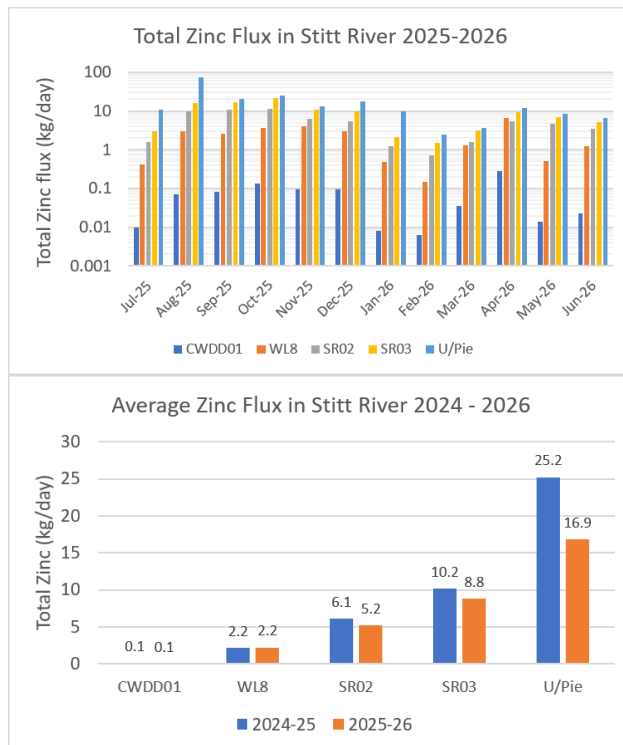


Figure 7-19. Total zinc fluxes at each of the monitoring sites during each monthly monitoring run. Note log scale.

Figure 7-20. Average zinc fluxes at monitoring sites in the Stitt River in 2024 – 2025 and 2025 to 2026.

7.3 Groundwater at 2/5 TSF

The results of groundwater monitoring at the 2/5 TSF are summarised in Table 12

Table 12. Summary of groundwater monitoring results at the 2/5 TSF for the 2025 to 2026 monitoring year.

Requirement	Findings
Compliance with monitoring requirements	<p>All sites were monitored for the required parameters at the required frequency with the following exceptions:</p> <ul style="list-style-type: none"> Groundwater bore GB21H was decommissioned and is no longer being monitored. GB12 was purged dry in November 2025 and April 2026 so was not monitored. Two additional bores, GB60 and GB61, were established at the western end of the screening wall to provide information about background water quality in May 2024. The sites are now included in the monitoring schedule.
Significant trends during reporting period	<p>Trends in Groundwater at 2/5 TSF:</p> <ul style="list-style-type: none"> The water quality results from newly installed bores GB60 and GB61 aim to capture background water quality from the deeper bedrock (GB60) and shallow glacial till (GB61) aquifers. The results (Table 13) show the pH and alkalinity in GB60 have stabilised, with the initial readings considered to be due to contamination from materials used during installation. Results from the background bores show higher levels of iron and manganese in the deep bedrock aquifer as compared to the shallow till. Both bores show low levels of sulphate and variable concentrations of zinc. pH results from the groundwater bores surrounding the 2/5 Dam TSF were within the range of previous results (Figure 7-21). At most sites

	<p>located along the northern and eastern margins of the TSF pH values were in the lower range of previous results. The lowest pH values continue to be recorded at site 12S, although the 2025 to 2026 results are towards the higher end of the historic range. This area was previously affected by a tailings leak from deep within the TSF. It is possible that a groundwater connection existed between this bore and historic tailings in the TSF. The collection and redirection of seepage from this area to the SCP may be reducing seepage entering this bore.</p> <ul style="list-style-type: none"> • The total zinc results for bores 22H and 23H were low compared to historic results (Figure 7-22). This decrease may be due to the seepage collection works at the Murchison Highway reducing the dispersion of seepage from the TSF. The decrease at 23H is about an order of magnitude lower than the long-term median. • Low zinc concentrations were also recorded at sites along the northern and eastern embankment. The decrease at site 12S may be linked to the capture and redirection of seepage from this area into the SCP (Figure 7-22). • Sulphate levels in all bores were within previous ranges, with bores 22H and 23H recorded low values consistent with the low zinc concentrations. (Figure 7-23). • All BTEX values at all sites were below the LoR of 0.001 mg/l. • TPH was recorded at the sites and dates listed in Table 14. The samples were not rerun following a silica gel cleanup so it is unknown if any of the detected TPH is attributable to natural organic acids, as commonly occurs at MMG. The highest value of 190 µg/l was recorded in the shallow aquifer at site GB14S in May 2026. The GB14S and the GB16 total values can be accounted for by the C₁₅ – C₂₈ fraction, which could be indicative of diesel fuel. The other total values are more ambiguous as the sum of the components is lower than the total.
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Table 13. Water quality results from newly established GB60 and GB61. Results from May 2024 to May 2026.

Site	Date	pH	EC µS/cm	Alk mg/l	Tot Cu mg/l	Tot Fe mg/l	Tot Pb mg/l	Tot Mn mg/l	Tot Zn mg/l	SO ₄ mg/l
GB60- Bedrock	May 24	11.2	178	118	0.032	7.5	0.037	0.54	0.072	4
	Nov 24	7.3	149	112	0.037	8.2	0.036	0.95	0.062	3
	May 25	5.7	92	16	0.010	6.1	0.022	0.51	0.073	10
	Nov 25	5.8	76	18	0.005	4.2	0.020	0.48	0.035	5
	May 26	6.0	80	20	0.004	4.0	0.010	0.44	0.042	6
GB61- Glacial till	May 24	5.0	82	13	0.016	0.9	0.018	0.05	0.091	5
	Nov 24	4.9	57	8	0.008	0.68	0.008	0.04	0.038	3
	May 25	4.9	80	2	0.019	0.47	0.014	0.09	0.136	13
	Nov 25	5.2	52	4	0.014	2.0	0.028	0.06	0.063	4
	May 26	5.1	53	4	0.014	1.1	0.022	0.07	0.059	5

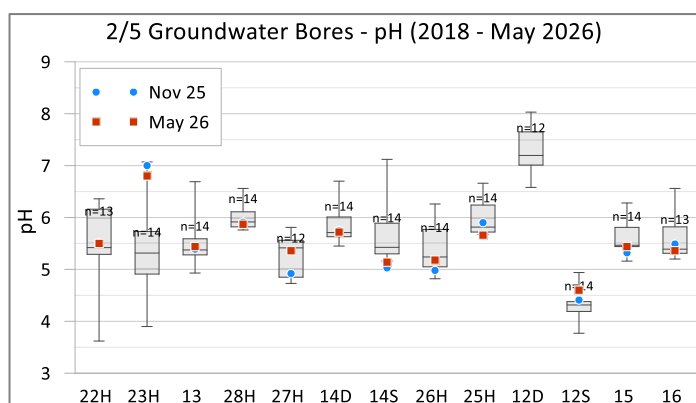


Figure 7-21. pH in the 2/5 Dam TSF ground water bores. Sites are shown in clockwise direction beginning at site GB22H, located on the southern side of the impoundment. Sites GB15 and GB16 are located east of the Stitt River. pH results from October 18 to May 2025, are summarised in the box and whisker plots (box shows the 25th to 75th percentile results, with minimum and maximum shown by the whiskers). Results collected in November 2025 and May 2026 are shown as data points. No samples were collected at 12D in the current monitoring year.

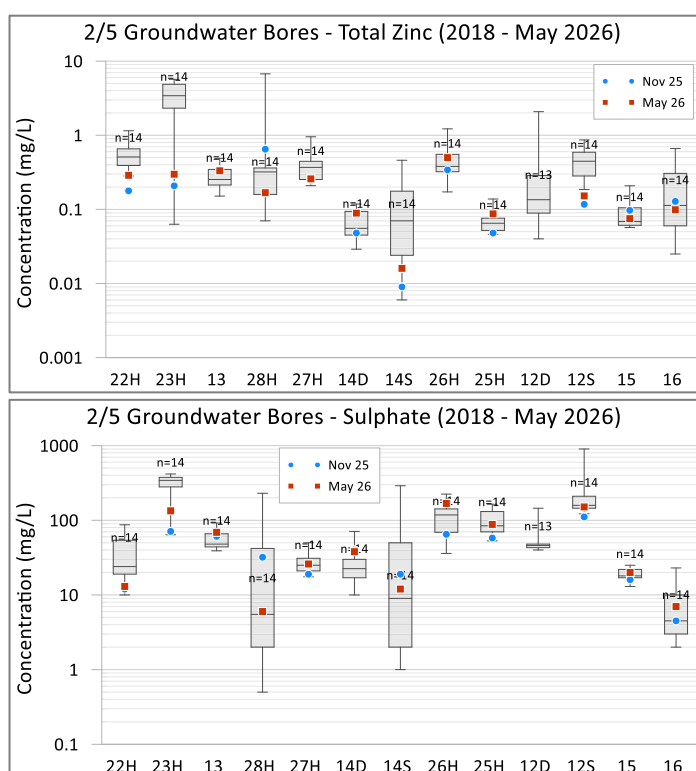


Figure 7-22. Total zinc in 2 and 5 groundwater bores. Description as per Figure 7-21

Figure 7-23. Sulphate in 2 and 5 groundwater bores. Description as per Figure 7-21

Table 14. Summary of TPH results in groundwater bores at 2/5 TSF that were above the LoR. Samples were not subjected to a silica clean up or rerun.

Site & Date	C ₁₀ – C ₄₀ Sum µg/l (LoR = 100)	C ₁₅ – C ₂₈ µg/l	C ₂₉ – C ₃₆ µg/l
GB28H Nov25	120	<100	70
GB28H May 26	110	<100	<50
GB14D May 2026	110	<100	<50
GB14S May 2026	190	180	<50
GB16 Nov 2025	130	130	<50

7.4 Trends at Murchison stormwater site MHS2 and seepage site MHS3

Requirement	Findings
Significant trends during reporting period	<p>Monitoring was completed as required at the Murchison Highway Stormwater and Seeps (MHS2, MHS3).</p> <ul style="list-style-type: none"> The MHS2 monitoring site historically collected seepage from the 2/5 TSF. The separation and removal of TSF seepage from this site in 2021 to 2022 has resulted in decreases in metal concentrations, sulphate and acidity in the MHS2 stream as flow at the site now consists of stormwater rather than seepage (Figure 7-24, Figure 7-25). Sulphate, acidity, iron and manganese at MHS2 are higher during the summer when rainfall is lower. pH is consistently between 6 and 7 throughout the year (Figure 7-25). Seepage at MHS3 is derived from the local fill around Stitt Park. Sulphate shows strong seasonality due to higher rates of infiltration in the wet months producing lower concentrations. The metal concentrations in the 2025 to 2026 monitoring results are similar to the previous year (Figure 7-26, Figure 7-27).
Recommendations	<ul style="list-style-type: none"> Site MHS2 and MHS3 are now stormwater sites. It is recommended this site be monitored on a quarterly basis consistent with the other stormwater monitoring sites. It is also recommended that the direct discharge of the MHS2 seep to the Stitt River be considered in the long term due to the flow largely consisting of municipal stormwater.

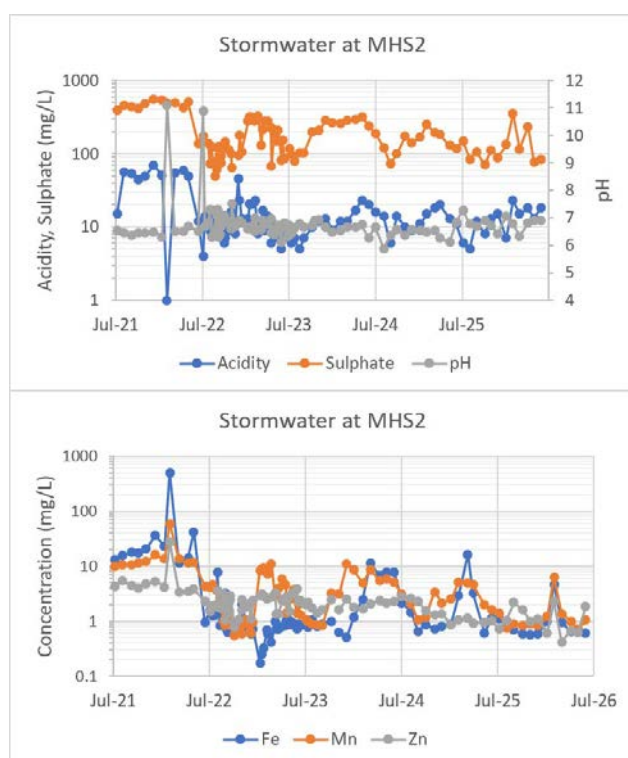


Figure 7-24. Acidity, sulphate, and pH in the MHS2 Seep, July 2021 – June 2026. Note log scale.

Figure 7-25. Total iron, manganese, and zinc in the MHS2 Seep, July 2021 – June 2026. Note log scale.

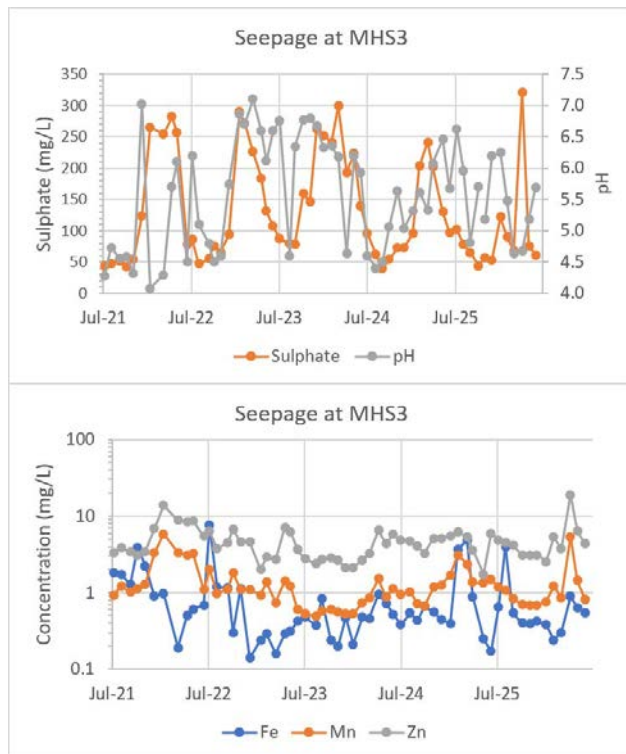


Figure 7-26. Sulphate and pH in the MHS3 Seep, July 2021 – June 2026.

Figure 7-27. Total iron, manganese, and zinc in the MHS3 Seep, July 2021 – June 2026.

8 Stitt River upstream of 2 and 5 Dam

A summary of the monitoring results collected at site WL8 upstream of the 2/5 Dam TSF is contained in Table 15.

Table 15. Summary of monitoring results from the Stitt River upstream of 2 and 5 Dam in 2025 to 2026.

Requirement	Findings
Monitoring Frequency	<p>Monitoring was completed as required in the Stitt River.</p> <ul style="list-style-type: none"> Continuous river flow, pH, EC and temperature are recorded in the Stitt River at site WL8/ML04 site and monitored monthly (Figure 8-1 to Figure 8-4). All other parameters were monitored on at least a monthly basis as required.
Compliance with EPN	<p>All parameters were determined at the required frequency with most parameters determined more frequently (Figure 8-1).</p>
Significant trends reporting period	<ul style="list-style-type: none"> Flow in the Stitt River is characterised by short duration high flow events superimposed on seasonal baseflow changes. There were several high flow events that exceed 10 m³/s during the monitoring year, but only one event exceeded 20 m³/s (Figure 8-1). Continuous pH ranged between 4.8 and 7.1 with the monthly values ranging from 5.5 to 7.5. There is reasonable agreement between the continuous and weekly values except in March 2026 when the field pH readings were two pH units lower than the continuous. The range of pH recorded in the river is within the natural range of west coast rivers (Figure 8-2). Electrical conductivity shows lower EC values during periods of high rainfall, consistent with high surface runoff. The continuous EC values

	<p>are higher than the weekly values for most of the monitoring year. The reason for this is unknown, but both data sets indicate very low conductivity in the river (Figure 8-3).</p> <ul style="list-style-type: none"> • Continuous temperature shows seasonal warming of the river (Figure 8-4) with temperatures ranging from ~5 to 15 °C as would be expected in an undisturbed river catchment. • Metal concentrations were generally low and similar to previous years (Figure 8-5). • Low levels of acidity (1 – 17 mg/l CaCO₃) and alkalinity (1 – 28 mg/l CaCO₃) were present in WL8, consistent with west coast clean waterways. • Nickel results in 2025 to 2026 were all below the 0.001 mg/l LoR. Arsenic results were all below the 0.001 mg/l LoR except for one total arsenic value of 0.003 mg/l in March 2026. The filtered value was <0.001 mg/l. • Sulphate concentrations were ≤4 mg/l throughout the year except for one value of 58 mg/l recorded on 31 March 2026. Metal concentrations in the sample were low and Field EC was 42 µS/cm suggesting the sulphate result is an error.
Long-term trends	The water quality results at WL8 are consistent with the historic results and typical of west coast rivers.

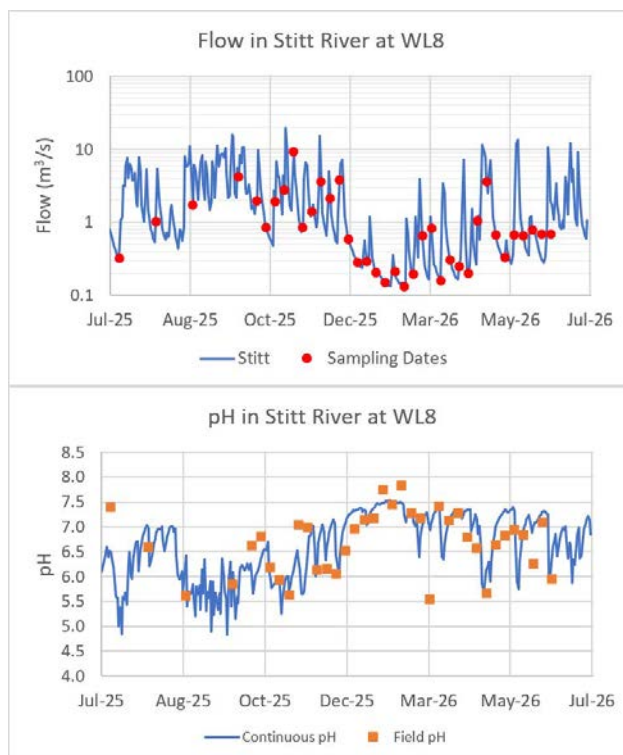


Figure 8-1. Daily average discharge in the Stitt River at WL8 July 2025 to June 2026. Sampling dates are indicated by orange markers.

Figure 8-2. Continuous and field pH results from WL8 July 2025 – June 2026.

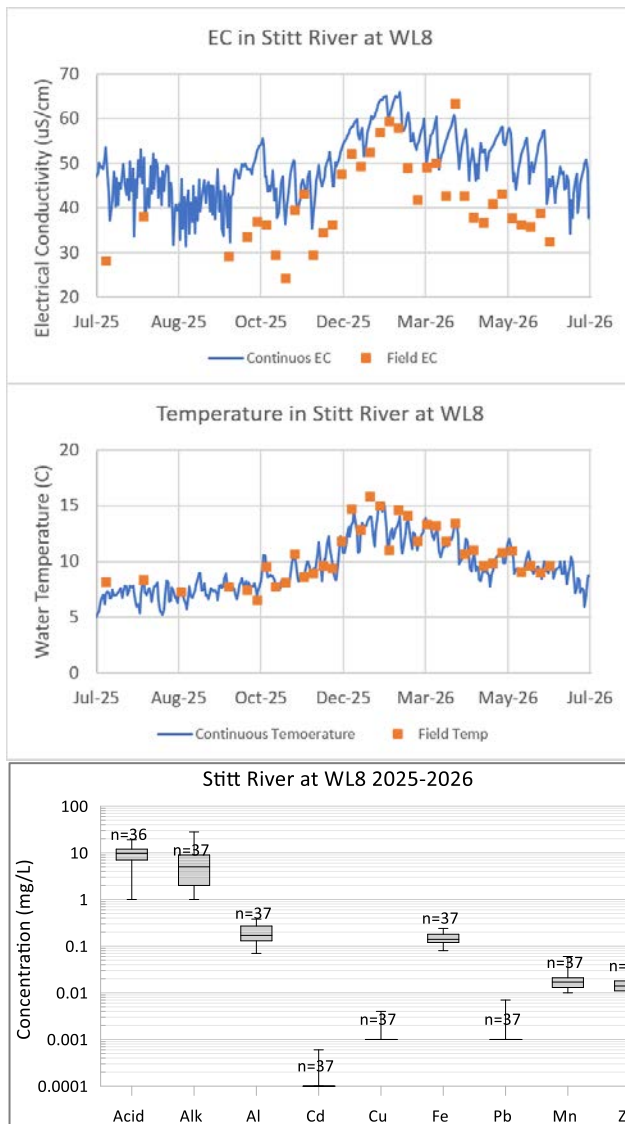


Figure 8-3. Continuous and monthly electrical conductivity and sulphate readings at WL8 2025 – 2026.

Figure 8-4. Continuous and monthly water temperature at WL8 2025 – 2026.

Figure 8-5. Box and whisker graph of sulphate, alkalinity, acidity and total metals in Stitt River upstream of 2 and 5 dam (WL8) for July 2025 to June 2026. Box and whisker plot as described in Figure 3-6, with the box encompassing the 25th to 75th percentile values.

9 Hercules Monitoring

Monitoring sites on the Hercules site are shown in Figure 9-1. Monitoring site Ring at Highway (RAH) is located downstream on the Ring River at the Murchison Highway, north of the extent of the photo. Monitoring site MPW is associated with the South Hercules EPN and is discussed in Section 15. Site WSP is no longer monitored as the settling pond was removed with all flow from 7 Level diverted into Baker Creek. A summary of the monitoring results for Hercules is contained in Table 16.

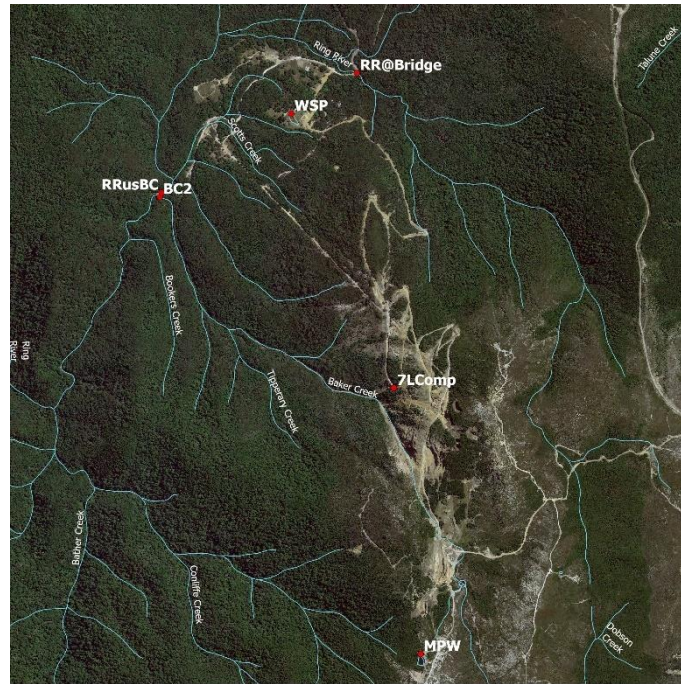


Figure 9-1. Surface water monitoring locations at the Hercules Mine site. Monitoring site Ring at Highway (RAH) is located downstream on the Ring River at the Murchison Highway, north of the extent of the photo.

Table 16. Summary of monitoring results from the Hercules Mine site collected in 2025 to 2026.

Requirement	Findings
Monitoring Frequency	<p>All sites were monitored for the required parameters, at the required frequency with the following exceptions:</p> <ul style="list-style-type: none"> Data is missing for short intervals for the continuous recording parameters at 7Level, BC2 and RRusBC. The short gaps are linked to recalibration of the probes or short outages. The continuous flow, pH, electrical conductivity and temperature results are shown in Figure 9-2 to Figure 9-8. WSP was decommissioned so no monitoring results were collected at this site. All water quality parameters were determined as required.
Compliance with EPN	<p>Monitoring frequency and parameters determined are the only requirements in the EPN. With the exception of the short data gaps in the continuous recording probes all monitoring was completed as required.</p>
Significant trends - reporting period	<ul style="list-style-type: none"> Average flow at 7Level was 4.0 l/s whereas average flows at BC2 and RRusBC were 171 l/s and 362 l/s, respectively. These values are higher as compared to the previous monitoring year and are driven by the frequent high flow events during the year. Median values at BC2 and RRusBC are about half of the average value, with the median flow at 7L 3 L/s (Figure 9-2 to Figure 9-7). Flow, pH and EC show different trends at the sites. At BC2, pH increases during rain events presumably due to the inflow of relatively clean surface runoff as compared to the acid drainage impacted base flow, whereas at 7Level and RRusBC, pH decreases as flow increases. This is consistent with rainfall resulting in the flushing of acid drainage from the underground workings at 7L, and diffuse acid drainage entering the

	<p>'clean' Ring River. In contrast, EC decreases in both BC2 and 7L during rain events but increase in RRusBC. This reflects the low ionic strength of the Ring River baseflow in the absence of acid drainage inputs, and the dominance of acidic water under baseflow conditions at the other two sites.</p> <ul style="list-style-type: none"> • MMG Rosebery investigated the large spike in EC at 7 Level and at BC2. Investigations are continuing but it is possible the increase was associated with works at 5 Level that altered flows and contaminant loads. MMG Rosebery has implemented increased monitoring to better understand the change. • There is variable agreement between the monthly field results for EC and pH and the continuous recording results. Field pH was lower than the continuous readings at BC2 during the second half of the monitoring year, and at 7 level throughout the year (Figure 9-2). At RRusBC there is good agreement between the field and continuous pH (Figure 9-6). • Field and continuous EC results show similar trends with the field values generally slightly lower than the continuous at all sites. • Water temperature results from the three monitoring sites show that temperatures decrease during periods of rainfall, and temperatures remain lower at 7Level during the dry summer months. This is likely due to the predominant groundwater input at 7L maintaining more uniform temperatures throughout the year (Figure 9-8). • The concentration of metals and sulphate at 7 Level showed greater variability in 2025 to 2026 as compared to the previous year (Figure 9-9). This may be due to more water being directed towards the 7 Level monitoring location now that the diversion to the WSP has been decommissioned and/or alterations associated with other flow changes. • The metal concentrations in Baker Creek are higher as compared to the previous year, presumably due to more of the 7 Level water being diverted into the stream and possibly due to additional contaminated water entering the system. Concentrations are lower at BC2 as compared to 7L but flow rates are substantially higher (Figure 9-8). • Concentrations at RRusBC are similar to the previous monitoring year and similar to the water quality results collected upstream of Hercules at the Ring River at Bridge site (Figure 9-9, Figure 9-10, Table 17). This demonstrates that removing the WSP diversion has had a beneficial impact on the Ring River between RR@BR and RRusBC. • The net change in water quality in the catchment is evident by comparing the results from RR@BR (Figure 9-10) with RAH (Figure 9-11). Median total zinc concentrations increase from 0.55 to 4.0 mg/l between the most upstream and downstream sites. • Seasonal patterns continue to be present in the time-series of metal concentrations, with the highest concentrations occurring during the drier summer months (Figure 9-12). Down the length of the Ring River the zinc concentrations increase, but the increase between Ring at Bridge and RRusBC is small now that the WSP has been decommissioned. • Metal and sulphate loads based on the water quality results and flow rate at the time of sampling were substantially higher in 2025 to 2026 as compared to the previous monitoring year (Figure 9-13). The
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	<p>variability between years is likely attributable to the range of flow rates monitored within a given year rather than significant changes at the site. In the 2025 to 2026 monitoring year the average flow rate when sampled was 0.24 m³/s as compared to 0.063 m³/s the previous year.</p> <ul style="list-style-type: none"> The average daily zinc and sulphate fluxes from the site are estimated at 0.69 tonnes/day and 2.31 tonnes/day, respectively, with Baker Creek transporting most of the loads. The percent contribution derived from 7 Level ranges from ~5 to 15%, with 11% of the sulphate and zinc attributable to 7 Level (Figure 9-14). A comparison of the zinc and sulphate fluxes at the RAH site with the sum of the BC2 and RRusBC fluxes is shown in Figure 9-15 and Figure 9-16. There is a reasonable balance for zinc between the sites considering the high variability of flows and number of high flow events included in this year's monitoring schedule. The sulphate balance shows larger discrepancies suggesting additional inputs are contributing as the flux at RAH is frequently higher than the inputs from Hercules. These results are consistent with previous results and suggest that the Hercules site is the predominant source of zinc to the river, but other sources of historic acid drainage inputs are contributing sulphate.
Comments	<ul style="list-style-type: none"> 7Level is contributing a low percentage of the zinc and sulphate load at BC2. If possible, flows from the upper levels (e.g. 6L) should be directed to 7L or monitored independently to capture a greater proportion of the metal loads prior to entering Baker Creek. This would help refine the understanding of the distribution of sources between the underground workings and the waste rock dump within the Baker Creek catchment.

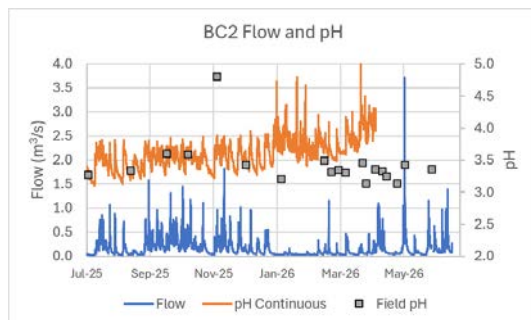


Figure 9-2. Continuous flow, pH, and monthly field pH results in Baker Creek upstream of the Ring River.

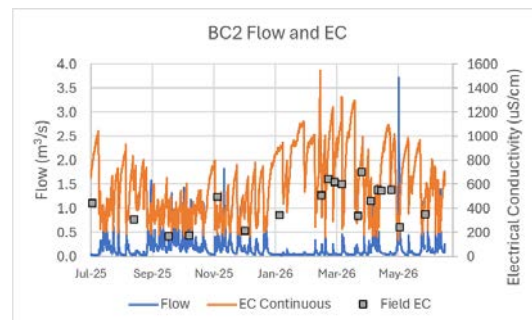


Figure 9-3. Continuous flow, EC, and monthly field EC results in Baker Creek upstream of the Ring River.

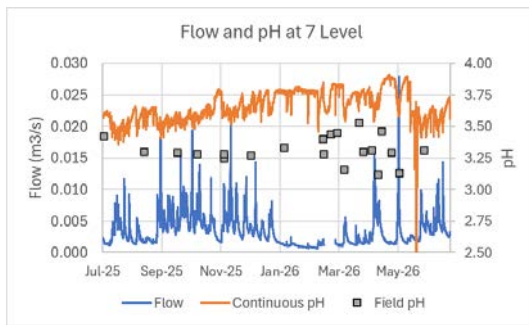


Figure 9-4. Continuous flow, pH, and monthly field pH results at 7Level.

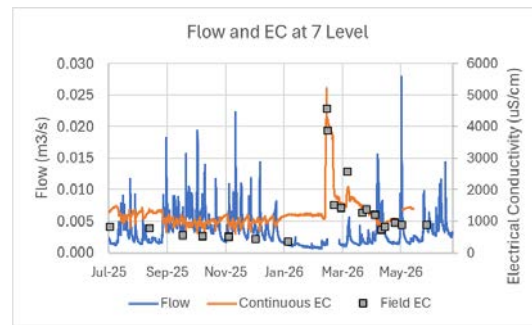


Figure 9-5. Continuous flow, EC and monthly EC results at 7Level

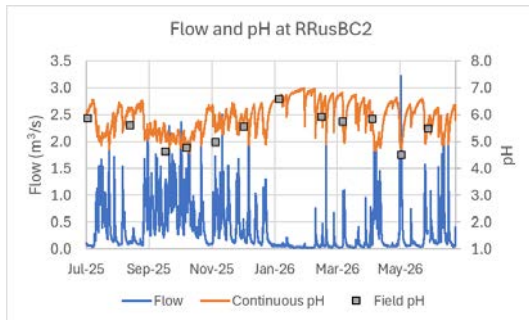


Figure 9-6. Continuous flow, pH, and monthly field pH results in the Ring River upstream of Baker Creek.

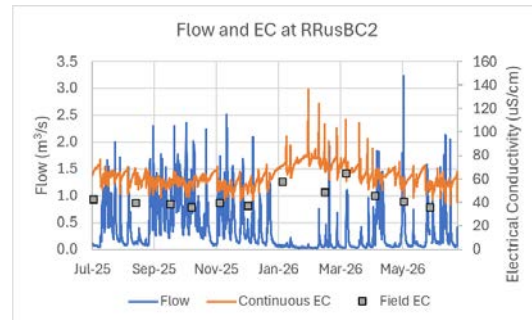


Figure 9-7. Continuous flow, EC, and monthly field EC results in the Ring River upstream of Baker Creek.

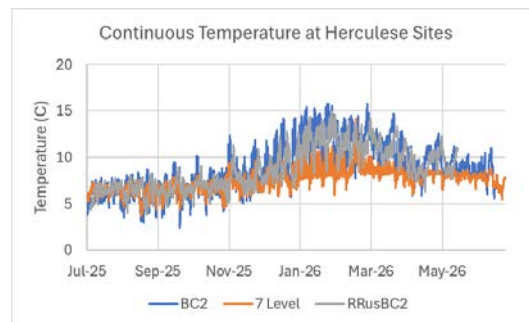
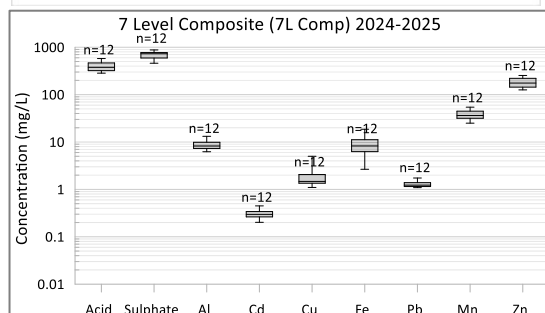
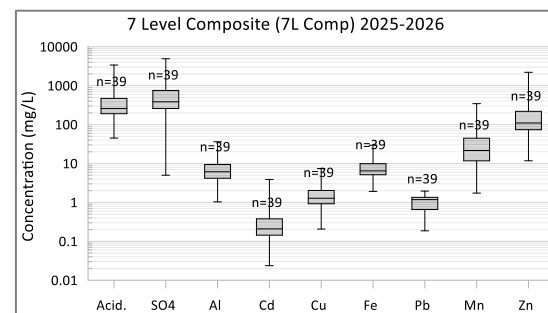
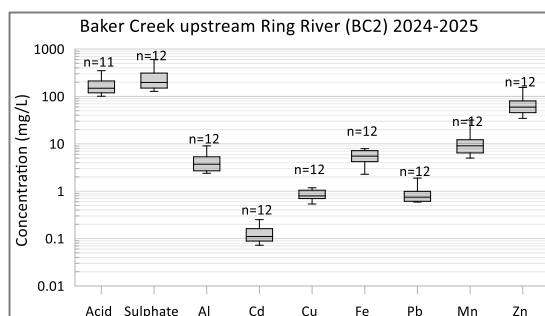
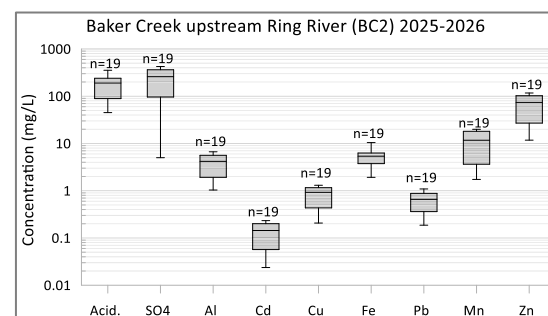


Figure 9-8. Comparison of water temperature at RRusBC, BC2 and 7Level.



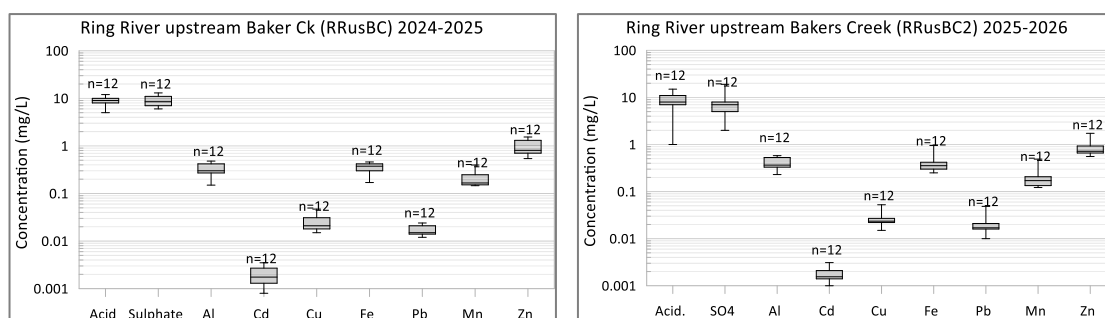


Figure 9-9. Box and whisker plot of total metal and sulphate concentrations at the (top) 7L composite site (middle) BC2 and (bottom) RRusBC in 2024 to 2025 and 2025 to 2026 monitoring years. Box encompasses the 25th to 75th percentile values. Note log scale and scale on Ring River graph is different from other figures (min = 0.001 mg/L, max = 100 mg/L).

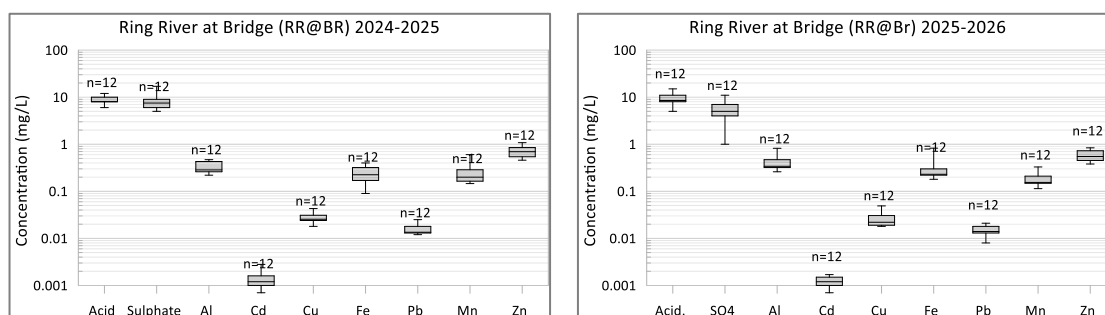


Figure 9-10. Water quality results from Ring at Bridge upstream of the Hercules mine site 2024 to 2025 and 2025 to 2026. Note log scale.

Table 17. Comparison of median concentrations at Ring River at Bridge and Ring River upstream Baker Creek. All values in mg/l.

Site	Acidity	SO ₄	Al	Cd	Cu	Fe	Pb	Mn	Zn
RR@BR	8.5	5	0.34	0.0012	0.022	0.23	0.014	0.15	0.55
RRusBC	15	5	0.39	0.0014	0.022	0.36	0.015	0.13	0.69

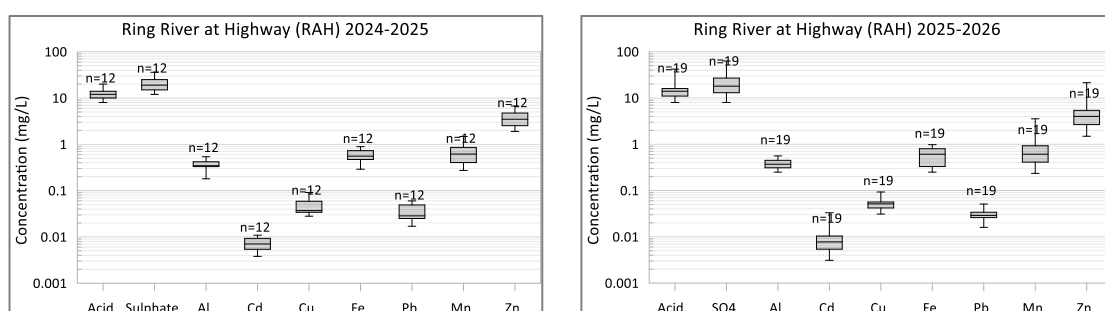


Figure 9-11. Water quality results from Ring at Highway in lower Ring River catchment (left) 2024 to 2025 and (right) 2025 to 2026. Note log scale.

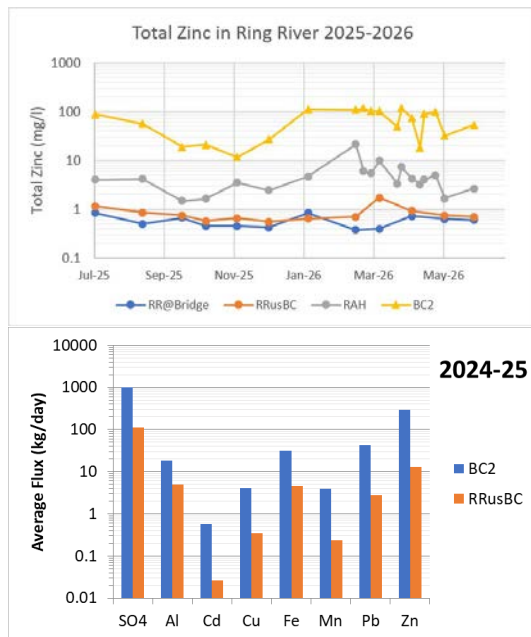


Figure 9-12. Total zinc at Ring at Bridge (upper catchment), upstream of confluence with Baker Creek (RR us BC), in Baker Creek upstream of Ring River and at the Murchison Highway (RAH). Note log scale.

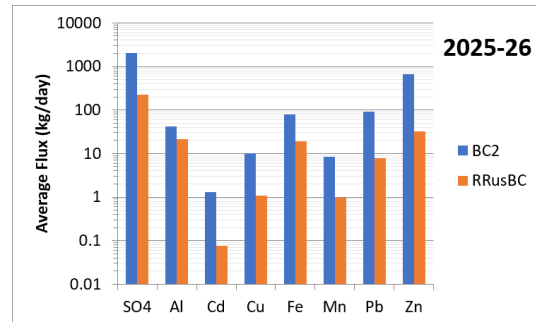


Figure 9-13. Average sulphate and total metal loads in Baker Creek and the Ring River above Baker Creek based on the monthly monitoring results and flow on the monitoring date (left) 2024 to 2025 and (right) 2025 to 2026. Note log scale.

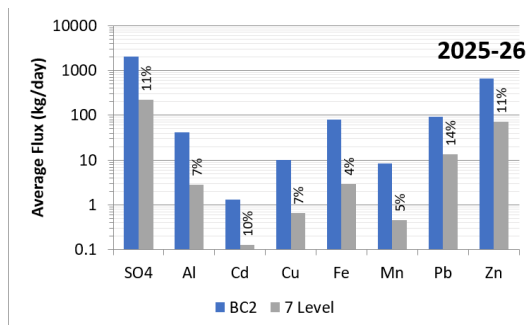


Figure 9-14. Comparison of sulphate and metal loads at BC2 and 7 Level.

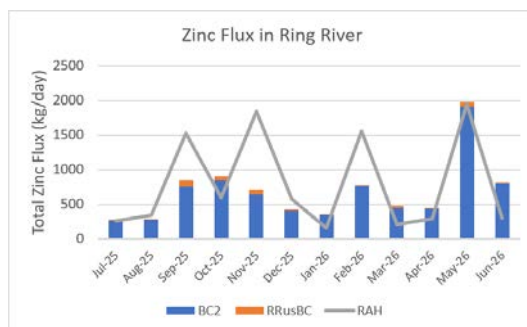


Figure 9-15. Comparison of combined zinc fluxes in Baker Creek and Ring River above Baker Creek, with the zinc flux at Ring River at Murchison Highway July 2025 to June 2026.

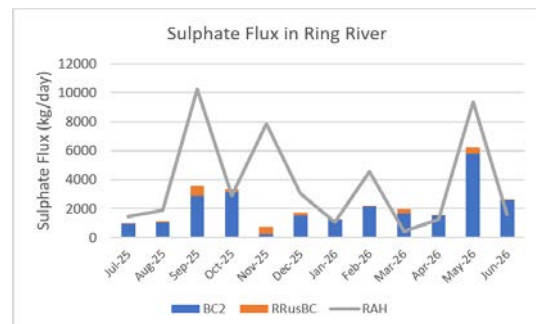


Figure 9-16. Comparison of combined sulphate fluxes in Baker Creek and Ring River above Baker Creek, with the sulphate flux at Ring River at Murchison Highway July 2025 to June 2026.

10 Stormwater monitoring

MMG Rosebery conducted a review of stormwater monitoring in 2025 and the EPA approved proposed changes to the stormwater monitoring strategy. The advantages of the new sites include:

- The revised monitoring locations capture flows that are discharged to the environment (except AC1.1). Due to previous improvements to water management stormwater at many of the original monitoring sites were not discharged, but collected and directed to the ETP for treatment;
- Flow monitoring equipment already exists at most of the new sites, with all sites to be equipped with flow monitoring infrastructure by September 2026. This will allow quantification of the metal and sulphate loads entering the environment. The information can be used for prioritisation of future water management improvements.

The frequency of stormwater monitoring remains quarterly, with the revised site locations summarised in Table 18. The monitoring parameters have been altered, with flow included at each site, and calcium and magnesium removed from the list of required parameters. Stormwater monitoring sites at Rosebery are shown in Figure 10-1, and a summary of the monitoring results collected in 2025 to 2026 is contained in Table 19.

Table 18. Summary of storm water monitoring by quarter reflecting changes in the monitoring schedule approved by the EPA.

Q1	Q2	Q3	Q4	Comment
AC1	AC1	AC1.1	AC1.1	New site upstream of AC1 measures same drainage line and has flow monitoring. This stream flows to AC2/AC2.1.
AC2	AC2	AC2.1	AC2.1	New site measures same stream as AC2 and includes any additional runoff/spill from the Pieman tank area and has flow monitoring equipment installed. The AC2.1 discharge enters Primrose Creek downstream of PC3.
RC1	RC1	RC1000	RC1000	RC1000 is located upstream of RC1 in an undisturbed area and has flow monitoring equipment.
RC2	RC2	RC2	RC2	No Change – site includes flow monitoring equipment.
FPC1	FPC1	FPC-W	FPC-W	FPC1-3 have been replaced with new site FPC West that discharges to the environment. FPC1 and FPC2 streams are collected and treated at the ETP and do not enter the environment. FPC3 is located downstream in a residential area and collects predominantly stormwater runoff from the residential area. Flow monitoring to be initiated at FPC-W in Sept 2026
FPC2	FPC2	FPC-W	FPC-W	
FPC3	FPC3	FPC-W	FPC-W	
PC1	PC1	PC3	PC3	PC1 and PC2 did not monitor water discharged directly to the environment. The sites have been replaced with PC3 which includes stormwater runoff the eastern Filter Plant area. Flow monitoring to be initiated at PC3 in Sept 2026
PC2	PC2	PC3	PC3	
MHS2	MHS2	MHS2	MHS2	Stormwater runoff from near 2/5 TSF. Discussed in Section 7.4

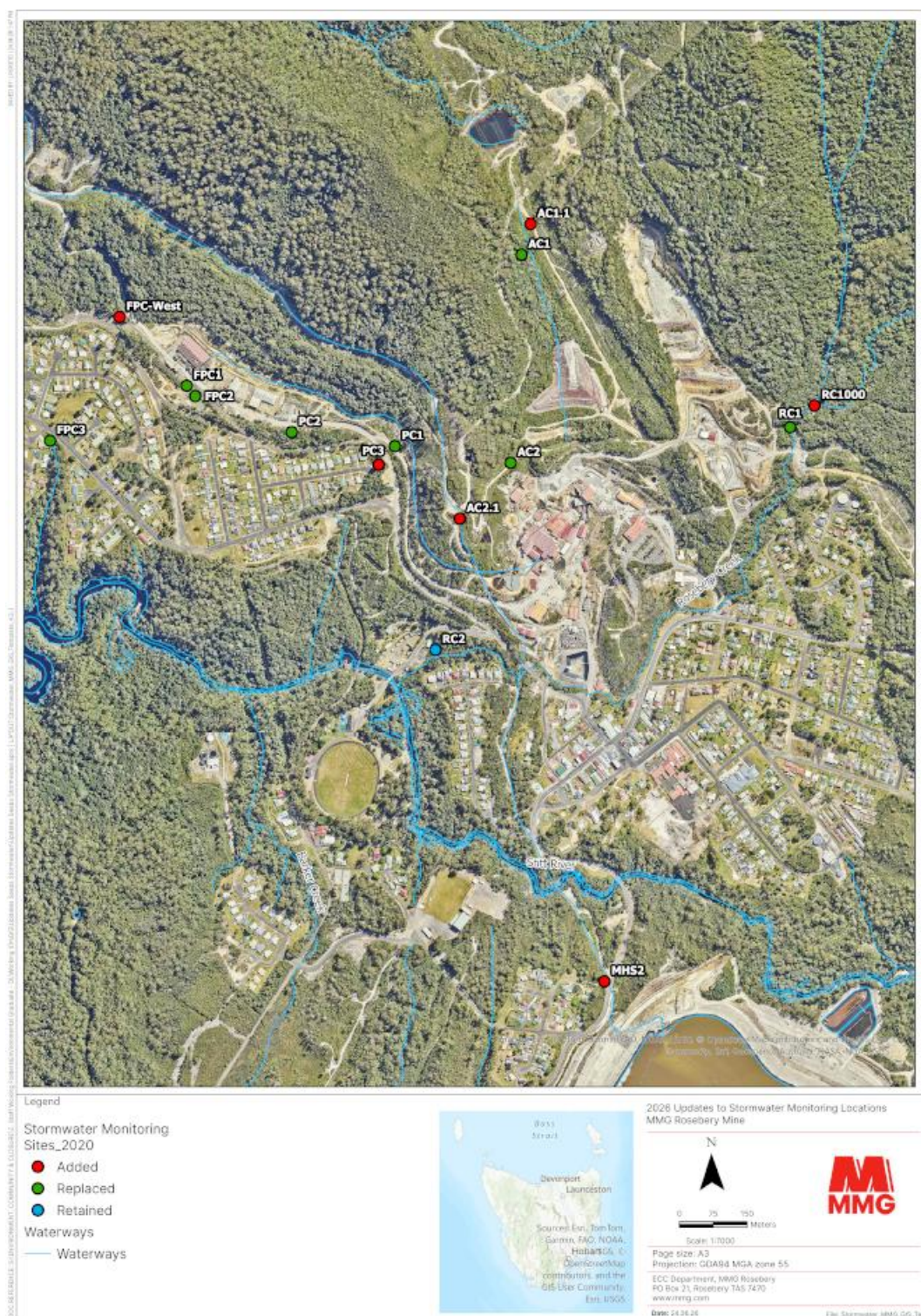


Figure 10-1. Stormwater monitoring sites at MMG Rosebery. Note AC2.1 is discharged via a pipe to Primrose Creek downstream of PC3.

Table 19. Summary of stormwater monitoring results collected on the Rosebery mine lease in 2025 to 2026.

Requirement	Findings
Monitoring Frequency	Quarterly sampling was completed at all stormwater sites as required with the following exception:

	<ul style="list-style-type: none"> There was no flow at FPC-West in March 2026 so no sample was collected
Compliance with EPN	All sites were monitored for the required parameters at the required frequency when water was present.
Significant trends - reporting period	<ul style="list-style-type: none"> Stormwater monitoring in September and December 2025 was completed during wet periods while March and June 2026 corresponded to relatively dry periods. (Figure 10-2). Continuous flow, pH and EC for AC1.1 and AC2.1 are shown in Figure 10-3 and Figure 10-4. At AC1.1, flow fluctuates rapidly but rarely exceeds 10 L/s. pH levels are low and EC is elevated. EC values generally decrease during periods of rainfall suggesting surface runoff is providing dilution. Flow at AC2.1 ranges between <1 and ~30 L/s, with most flows <25 L/s. pH values at the site are typically ~pH 4, and EC generally about 200 – 250 μS/cm (Figure 10-4). The March and June 2026 concentrations collected at AC1.1 are higher than the results collected in September and December 2025 at AC1 (Figure 10-5). This shift is likely due to the dry conditions in the second half of the year combined with site AC1.1 being higher in the catchment and located upstream of a small tributary. The higher concentrations at AC1.1 suggest the main source of metals is within this upper catchment, consistent with the Northern Open Cut Area being a source. AC1.1 stream does not discharge to the environment but rather flows to AC2.1 prior to discharge. The AC2 and AC2.1 water quality results are similar and fall within the range of historic results (Figure 10-5). The metal and sulphate results at AC1/AC1.1 continue to be higher as compared to AC2/AC2.1, due to clean water entering Assay Creek between the monitoring sites. In Primrose Creek, the September and December 2025 water quality results were within the historic range of results at PC1 and PC2 (Figure 10-6). Flow at PC2 is diverted and collected for treatment so does not enter the environment. PC1 does enter the environment, but additional catchment inflow enters downstream of the monitoring site, so the results do not reflect the total stream released from site. Monitoring at the new PC3 site in March and June 2026 returned values similar to the historic results from PC1 indicated that there is limited additional input to the stormwater downstream of PC1, at least under dry conditions (Figure 10-6). In Filter Plant Creek, the results from FPC1, FPC2 and FPC3 in September and December 2025 were within historic ranges. Any flow at FPC1 and FPC2 are collected and treated. At FPC3, located in the lower catchment downstream of a residential area, the concentrations recorded in September and December 2025 were low (Figure 10-7). The one set of results available from new site FPC-West shows concentrations considerably lower than any of the other FPC sites (Figure 10-7). FPC-West reflects the stormwater that is discharged from the western Filter Plant area and enters the environment. The low concentrations in the runoff demonstrate that the Filter Plant stormwater collection system is effective at targeting stormwater with poor water quality.

	<ul style="list-style-type: none"> Flow at RC1000 ranges from <5 L/s to over 600 L/s, with the flow regime characterised by short-duration high flow events (Figure 10-8). pH ranges from ~6 to 6.5, with the lower values coinciding with high rainfall. EC fluctuates between 30 and 60 $\mu\text{S}/\text{cm}$, with the lower values occurring during high flows. AT RC2, flow patterns are similar to RC1000, but maximum flow rates were over 1 m^3/s. (Figure 10-9). In contrast to RC1000, pH values increase during periods of high flow with baseflows at RC2 having low pH values (~pH 4). Similarly, EC increases during base flow conditions, indicative of groundwater being a source of EC to the creek. Comparing the pH and EC records at RC1000 and RC2 shows an overall decrease in pH and substantial increase in EC between the two sites. Water quality in RC1/RC1000 continues to have low metal and sulphate levels consistent with the natural background of the area (Figure 10-10). The results show an increase in all parameters between the sites and is consistent with previous results. The increase is due to diffuse inputs to the creek. Total zinc fluxes at RC2 site ranged from 3 kg/day to 18 kg/day with an average of 13.0 kg/day over the four 2025 to 2026 monitoring dates. (Figure 10-11). Average daily zinc loads in Rosebery Creek upstream of the Stitt based on the 47 quarterly stormwater monitoring results obtained since September 2014 are 18.5 kg/day, with a median value of 12 kg/day. The long-term average total zinc load is consistent with the Stitt River zinc balance that shows an input of ~10 - 15 kg $\text{Zn}_{\text{tot}}/\text{day}$ between site SR03 and site U/S Pie, which is below the confluence of the Stitt River and Rosebery Creek (Figure 7-20).
Comments	<ul style="list-style-type: none"> The revised stormwater monitoring strategy is targeting streams that are discharged from site. The installation of flow infrastructure at PC3 and FPC-West will enable an accurate estimate of stormwater emissions from the site. Early results from FPC-West indicate that stormwater from this area of the site has low metal and sulphate concentrations, reflecting the successful capture of contaminated water from the Filter Plant area.

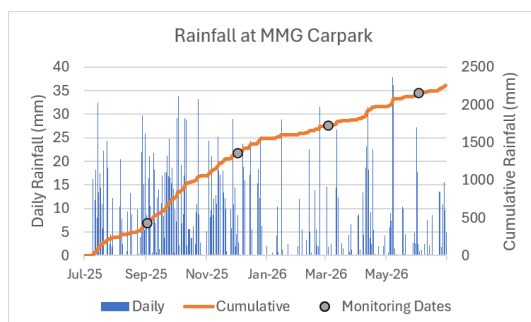


Figure 10-2. Daily and cumulative rainfall at the MMG Carpark during monitoring year and dates of quarterly stormwater sampling.

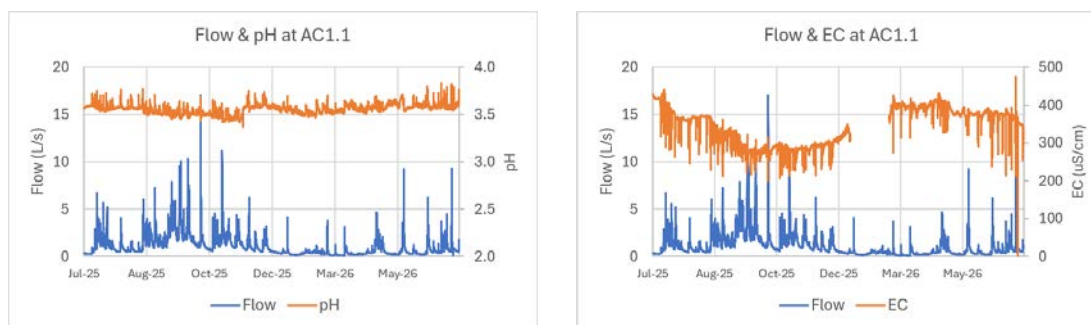


Figure 10-3. (left) Hourly discharge and pH in Assay Creek at site AC1.1 July 2025 to June 2026; (right) flow and continuous EC at AC1.1.

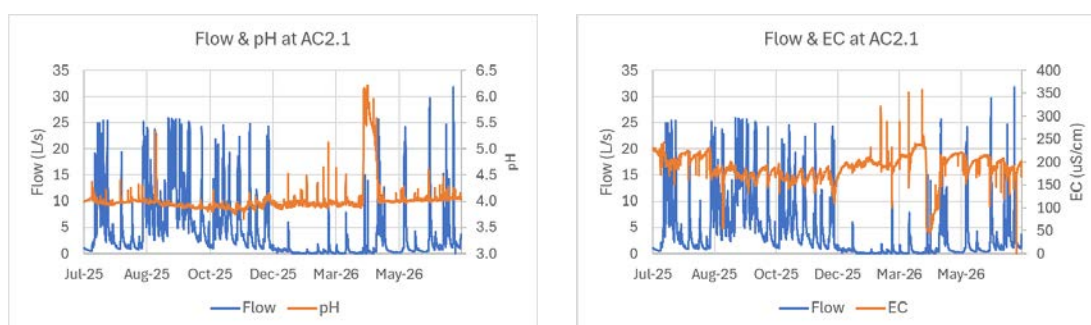


Figure 10-4. (left) Hourly discharge and pH in Assay Creek at site AC2.1 July 2025 to June 2026; (right) flow and continuous EC at AC2.1.

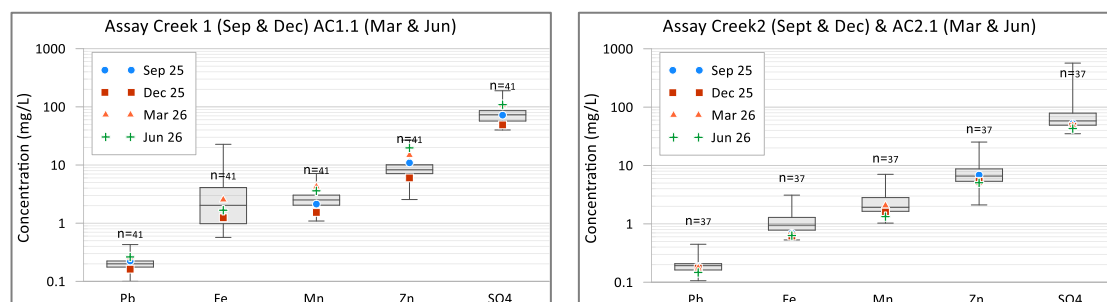
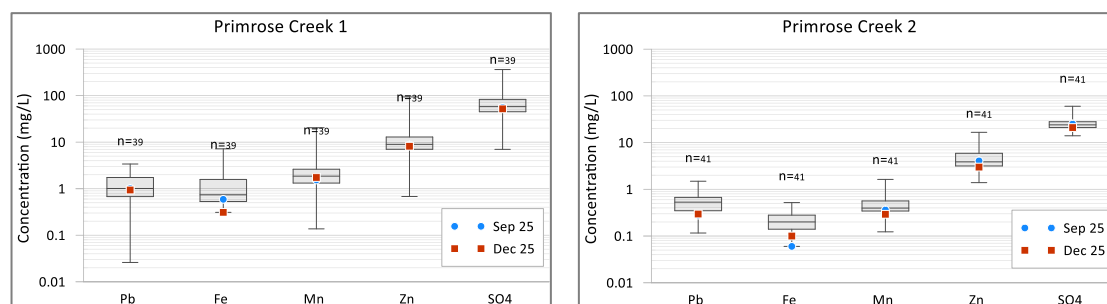


Figure 10-5. Total lead, iron, manganese, zinc and sulphate concentrations in Assay Creek 1 and Assay Creek 2 stormwater sites. The boxes encompass the 25th to 75th percentile monitoring results collected between January 2015 and June 2025, and the monitoring results collected from July 2025 to June 2026 are shown as data points.



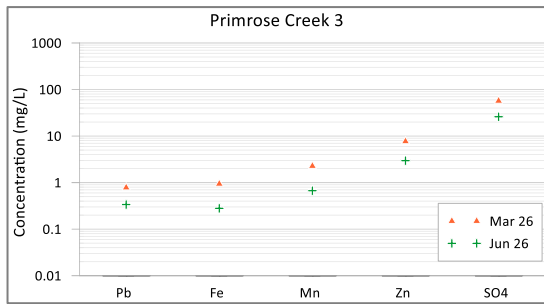


Figure 10-6. Total lead, iron, manganese, zinc, and sulphate concentrations in Primrose Creek stormwater sites (top left) PC1 and (top right) PC2 in Sep and Dec 2025, and in (left) PC3 in March and June 2026. Description as per Figure 10-5.

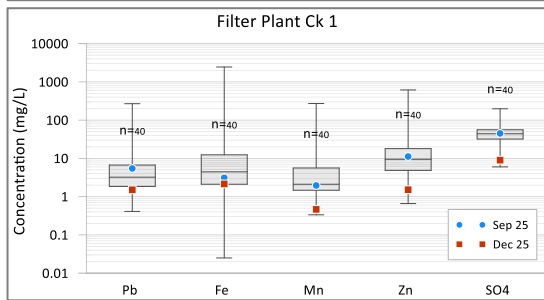
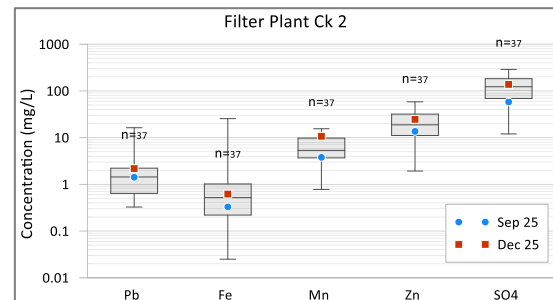
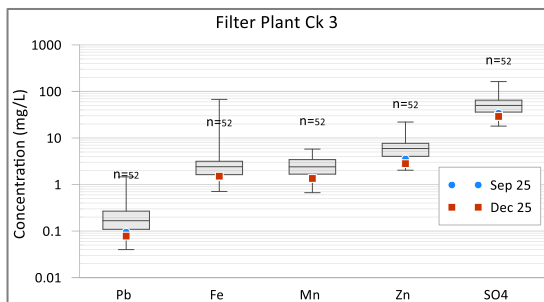
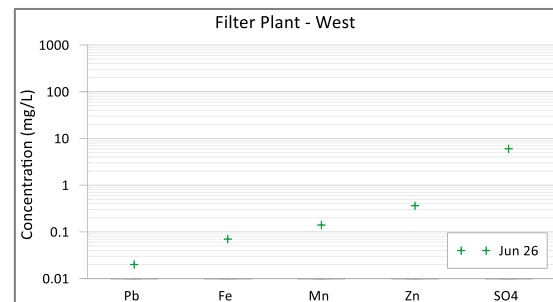


Figure 10-7. Total lead, iron, manganese, zinc, and sulphate concentrations in Filter Plant Creek stormwater sites FPC1, FPC2 and FPC3 and new site FPC-West. Description as per Figure 10-5

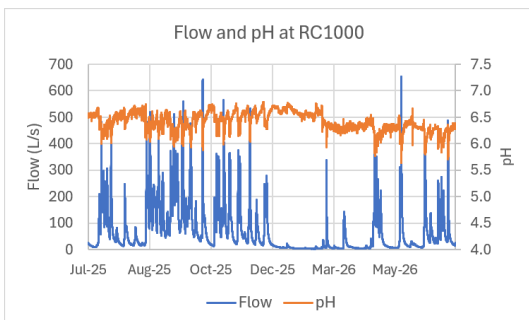
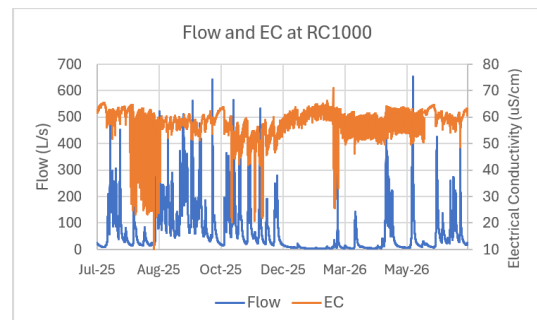


Figure 10-8. (left) Hourly discharge and pH in Assay Creek at site AC2.1 July 2025 to June 2026; (right) flow and continuous EC at AC2.1.

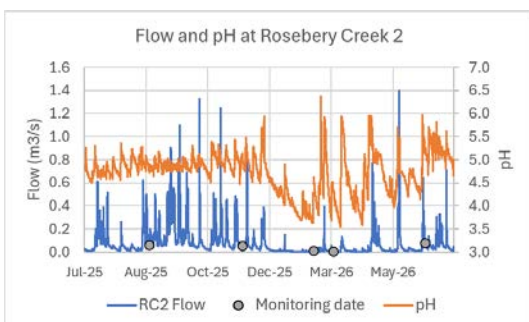
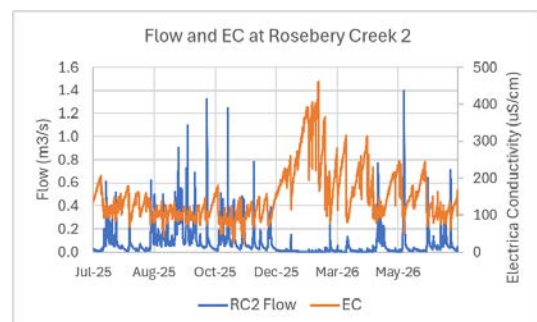


Figure 10-9. (left) Hourly discharge and pH in Rosebery Creek (RC2) July 2025 to June 2026 with monitoring days indicated; (right) flow and continuous EC at RC2.

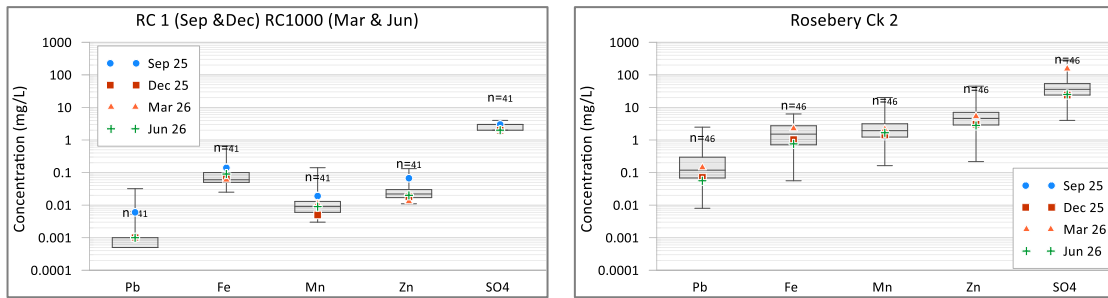


Figure 10-10. Total lead, iron, manganese, zinc, and sulphate concentrations in Rosebery Creek stormwater sites RC1, RC1000 and RC2. Description as per Figure 10-5. Note different minimum scale on RC graphs as compared to other sites.

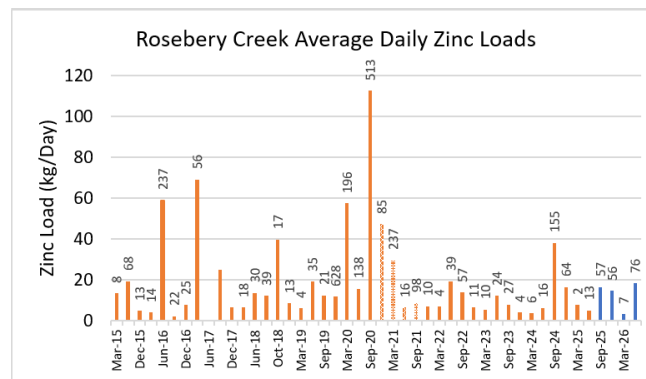


Figure 10-11. Estimated zinc loads at RC2 based on flow measurement at Rosebery Creek gauging site on stormwater monitoring days. Data labels indicate the flow rate in Rosebery Creek in l/s on the sampling day. Stippled fill indicates estimated flow; blue bars show July 2025 to June 2026 results.

11 Underground Mine Water Monitoring

The underground mine water monitoring locations are shown in Figure 11-1, and a summary of the monitoring results is contained in Table 20.

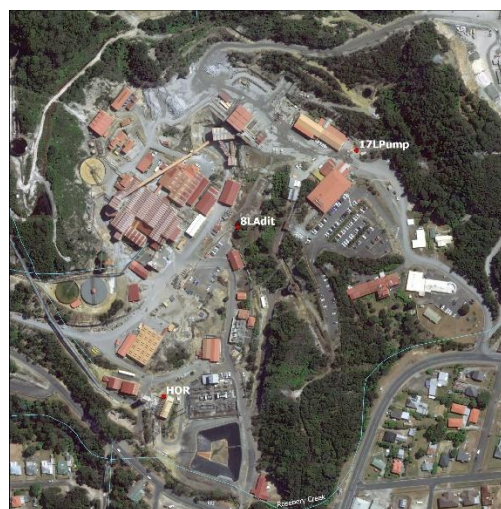


Figure 11-1. Underground mine water monitoring sites.

Table 20. Summary of underground mine water monitoring results for 2025 to 2026.

Requirement	Findings
Monitoring Frequency	Monthly sampling was completed at all sites as required.
Compliance with EPN	All sites were monitored for the required parameters at the required frequency.
Comments	Monitoring results were within historic ranges at sites, with the exception of NED, where results continue to be lower than the long-term results (Jul 2018-Jul 2025, Figure 11-2, Figure 11-3). All water sampled at these sites is directed to the ETP for treatment prior to discharge via the Bobadil TSF.

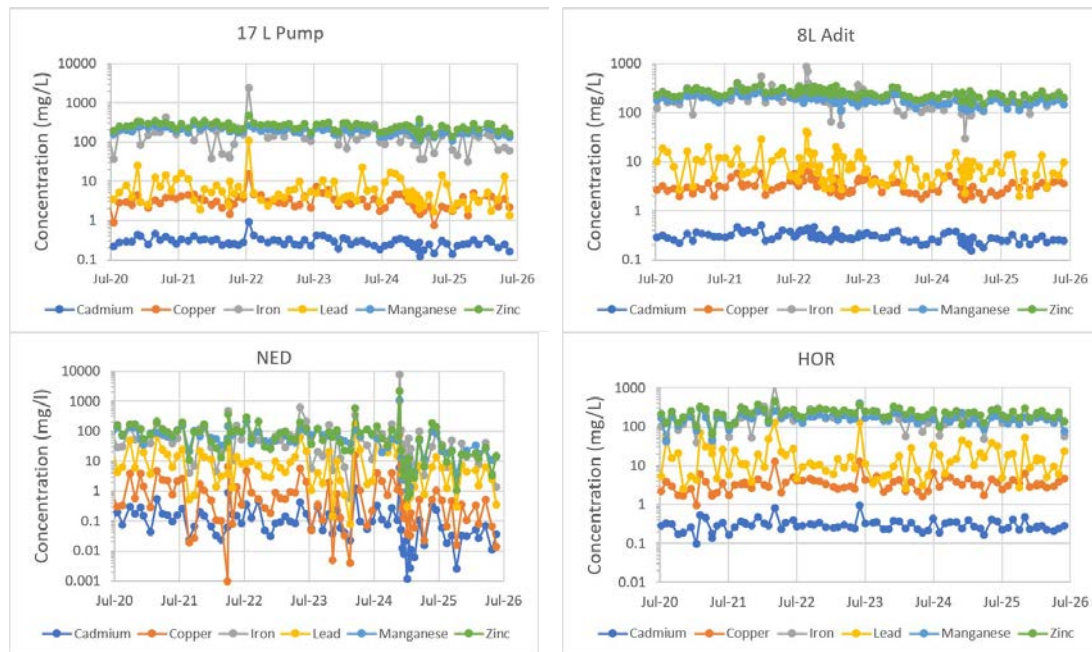
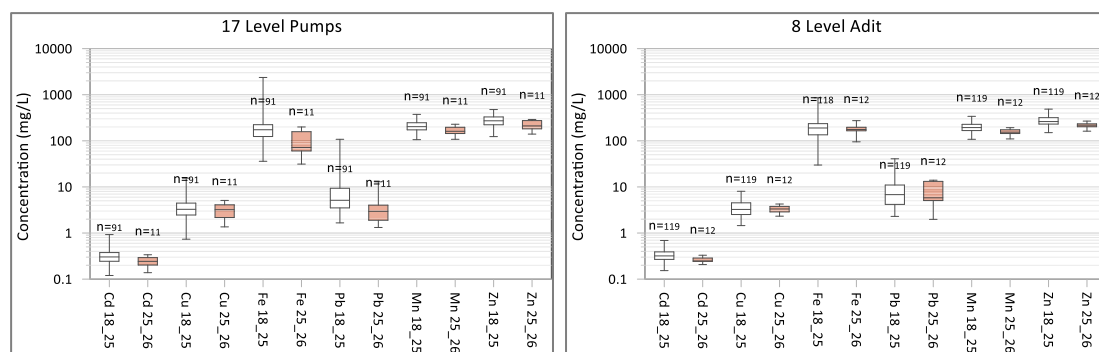


Figure 11-2. Total metal concentrations at underground sites from July 2020 to July 2026. Note different concentration scales.



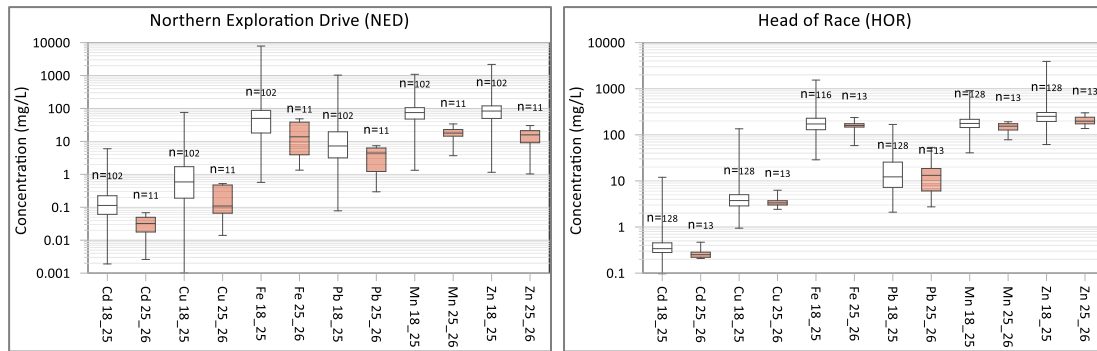


Figure 11-3. Comparison of total metal concentrations the underground sites in 2025 to 2026 with results collected between July 2018 and June 2025. The white boxes show the 2018 to 2025 results with the monthly 2025 to 2026 results shown by the orange box. The box encompasses the 25th to 75th percentile results. Note different concentration scales.

12 Lake Pieman Monitoring

Monitoring locations in Lake Pieman are shown in Figure 12-1. At each site water column profiles of physico-chemical parameters are collected (pH, EC, Temperature, DO, turbidity), and water quality samples are collected from three depths (surface, mid-depth and deep). A summary of the monitoring results collected from Lake Pieman is contained in Table 21.

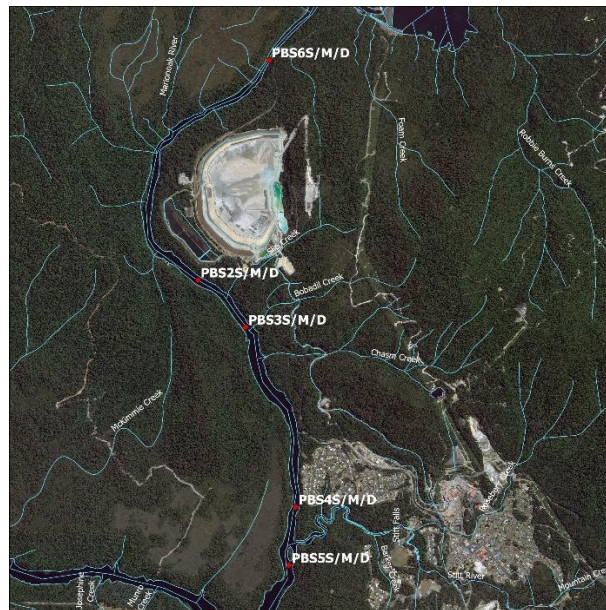


Figure 12-1. Monitoring locations in Lake Pieman. Samples are collected at the surface (S), mid-depth (M) and near the bed (D).

Table 21. Summary of monitoring results from Lake Pieman in 2025 to 2026.

Requirement	Findings
Monitoring Frequency	Quarterly water quality sampling and lake profiling was completed as specified in the EPN. In March 2026 site PBS6 was monitored five days later than the other sites.
Compliance with EPN	There are no requirements in the EPN other than monitoring frequency and parameters determined.

<p>Significant trends reporting period</p>	<p>- Discharge at BO was $<0.3 \text{ m}^3/\text{s}$ during all monitoring periods. The Bastyan Power station operated intermittently during the first three monitoring periods and continuously during June 2026, when discharge from the power station ranged from 100 to $150 \text{ m}^3/\text{s}$. When the power station was discharging the ratio of BO discharge to power station discharge exceeded 400-fold.</p> <ul style="list-style-type: none"> • EC profiles show generally uniform profiles except in March 2026 when higher EC values were recorded at sites PBS2 and PBS3 between the surface and thermocline (Figure 12-3, Figure 12-4). pH values were slightly lower in the surface waters at all sites in March 2026 (Figure 12-4). The difference between PBS6 and the other sites in March is attributable to the site being monitored 5 days later. • The EC and temperature profiles are consistent with the understanding of how discharges from the Bastyan power station control water quality in upper Lake Pieman. • Total zinc results show variable trends, with surface waters tending to increase in zinc concentrations with distance downstream and bottom waters generally decreasing downstream (Figure 12-5). These variable results may reflect complex mixing due to the episodic power station inflows. The highest total zinc concentrations were recorded in the bottom waters at PBS5 in March 2026. Turbidity at this site was higher than at other sites (although still very low, $<5 \text{ NTU}$) and one TSS value was above the LoR. The elevated zinc level could be due to the sampler touching the bed of the lake, or the discharge from the Stitt River. The zinc concentrations at PBS6 are higher than at the sites downstream of Bobadil on several occasions in the surface, mid-depth and bottom waters. Whether the source of the zinc is upstream or downstream of the Bastyan power station is unknown. • Sulphate concentrations (Figure 12-6) show low concentrations with no clear pattern except slightly higher values in March when the power station had been off for over 24 hours. • Sulphate concentrations at PBS6 are lower than at the other sites except on one occasion in December 2025, suggesting the zinc source at PBS6 is unlikely to be a high sulphate mining discharge. The higher sulphate concentrations at PBS2 and PBS3 are consistent with the inflow from Bobadil. • Compared to the long-term results, the 2025 to 2026 total zinc results are within previous ranges for surface and mid-depth results (Figure 12-7). The March 2026 result from bottom water at PBS5 is elevated compared to the previous 5 years of results. In previous years the March 2025 results at PBS5 have frequently been the highest bottom water values. This may be due to the Stitt River entering the lake and occupying a low level in the water column (although the temperature and EC profiles do not show different water at the base of the water column). • The long-term surface sulphate results also show the March 2026 concentrations are within previous monitoring results (Figure 12-8). • Comparing total and filtered zinc results shows little difference between the samples at PBS3, downstream of the BO discharge. At PBS6 the results are variable and confusing, as there are several
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	<p>occasions when the filtered zinc values exceed the total values. The other metals did not show this trend, so it is unlikely the differences are due to a mix-up of samples.</p> <ul style="list-style-type: none"> • At PBS3, the total and filtered zinc values ranged between 0.007 mg/l and 0.019 mg/l over the four monitoring runs with little difference between the total and filtered values demonstrating that most of the zinc is present in the dissolved form. • The median and 95th percentile values for total zinc across all sites were 0.018 mg/l and 0.031 mg/l respectively, which are above the ANZG (2018) 95th percentile trigger value of 0.008 mg/L. However the values are below guidelines that consider pH, DOC and Hardness (Gadd, 2024) which are under development by ANZG. Based on these parameters in Lake Pieman (pH=6, DOC=6 mg/l, Hardness=15-30 mg/l) a zinc guideline of 0.035 mg/l to 0.054 mg/l is applicable. The concentrations in Lake Pieman are below this revised range, indicating a low risk to the environment. • The median and 95th percentile total copper values in 2025 to 2026 were 0.001 mg/l and 0.002 mg/l. These values are conservative as they include the 27 put of 60 copper results from Lake Pieman that were <0.001 mg/l as 0.001 mg/l. These results are below the ANZG (2023) default guideline range of 0.0036 to 0.0071 mg/l (95th percentile protection level) for freshwater containing 4 to 8 mg/l of dissolved organic carbon. DOC levels in Lake Pieman typically exceed 6 mg/l. Based on this revised guideline copper poses a low risk in the receiving environment. • The median (0.001 mg/l) and 95th percentile (0.002 mg/l) values for lead are below the ANZG (2018) 95th percentile trigger value of 0.0034 mg/l with 21 of the results <0.001 mg/l. • All total cadmium results were <0.0001 mg/l except one value of 0.0002 recorded at PBS4 in December 2025. All values are within the ANZG (2018) trigger value of 0.0002 mg/l.
Longer term trends	The results from 2025 to 2026 are consistent with the understanding of mixing within Lake Pieman and highlight the role the Bastyan Power Station plays in controlling the hydrology of the lake.
Comments	The monitoring results continue to demonstrate that there is rapid mixing and dispersion of the BO discharge within upper Lake Pieman. The sulphate concentration in the BO discharge typically ranges between 500 and 800 mg/l, but the concentrations in Lake Pieman rarely exceed 15 mg/l.
Recommendations	As water quality guidelines evolve to include DOC and Hardness (Calcium + Magnesium) it is recommended that these parameters be periodically included in the Lake Pieman monitoring schedule during a dry summer period and a wet winter period to confirm the levels present in the receiving environment.

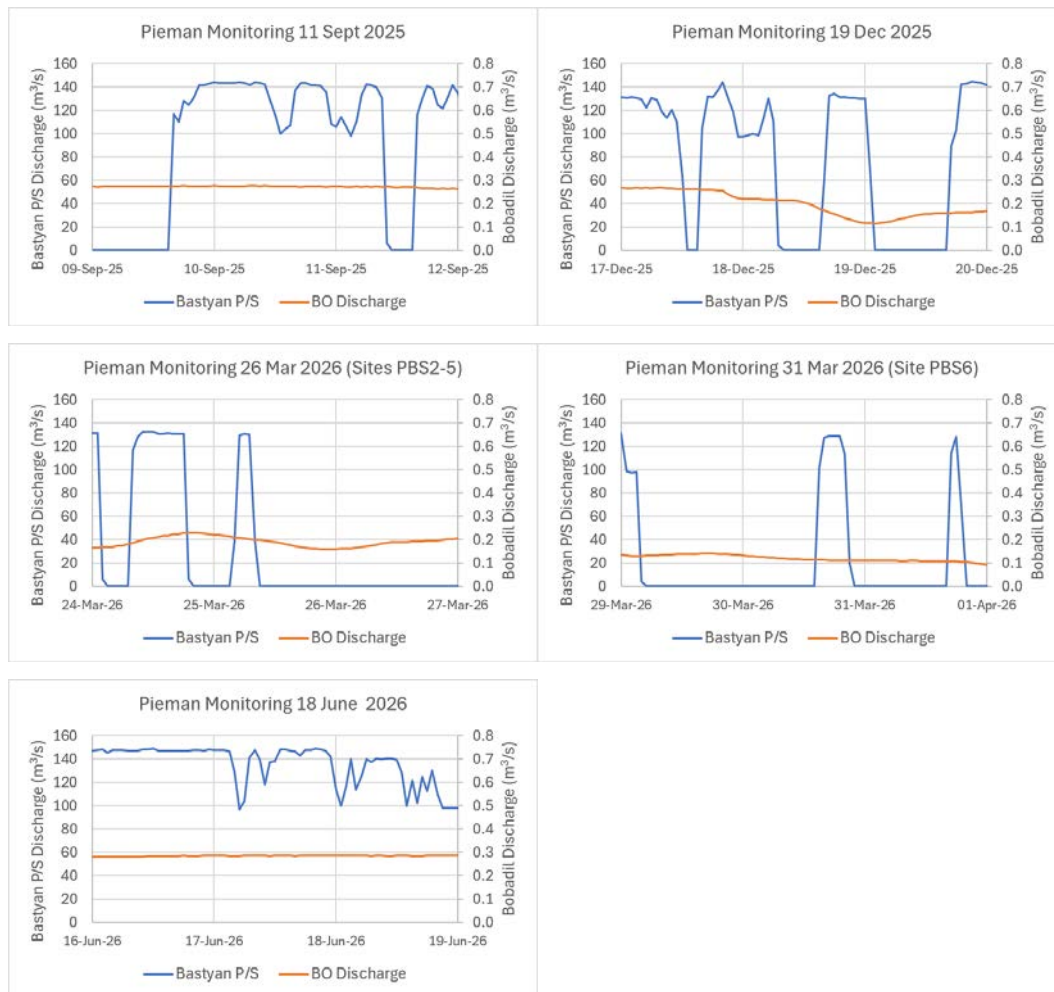


Figure 12-2. Discharge at Bastyan Power Station and Bobadil TSF the two days prior to, and on the day of Lake Pieman monitoring (sampling dates shown on each graph). Two plots are shown for March 2026 as PBS6 was monitored on 31 March and the other sites on 26 March.

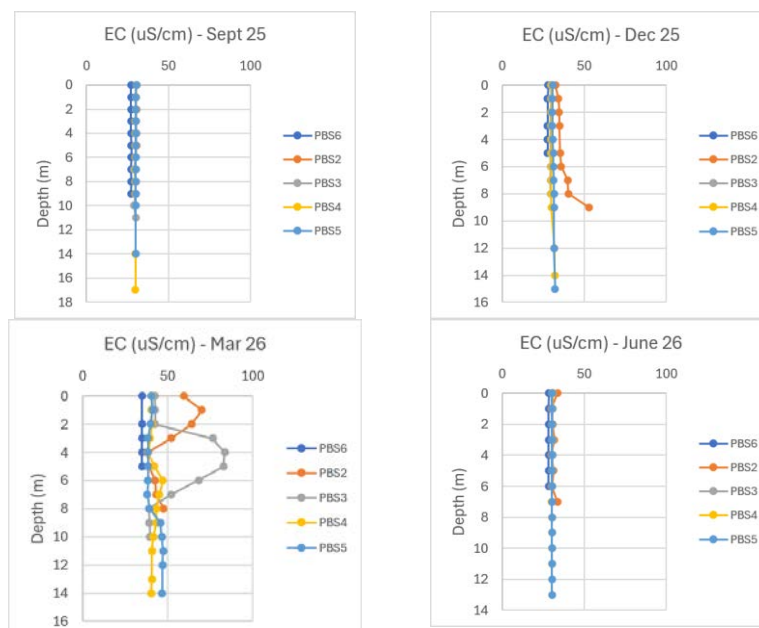


Figure 12-3. Electrical conductivity results for Lake Pieman monitoring sites on each monitoring date in 2025 to 2026. Results are listed in a downstream direction, e.g., PBS6 is at the upstream end of L Pieman. In March 2026 PBS6 was sampled 5 days later than the other sites.

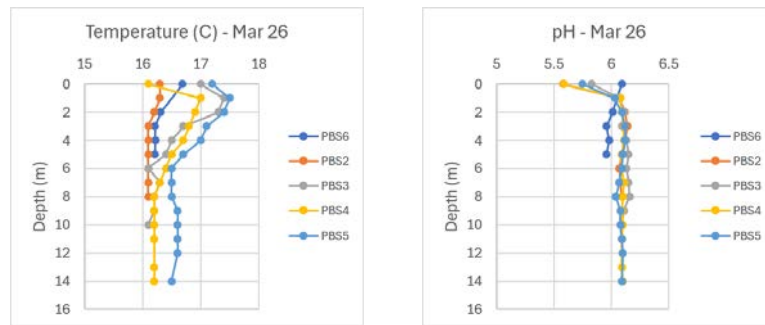


Figure 12-4. Temperature and pH profiles at monitoring sites in March 2026 showing minor thermal stratification and similar pH values except at PBS6 which was monitored 6 days after the other sites.

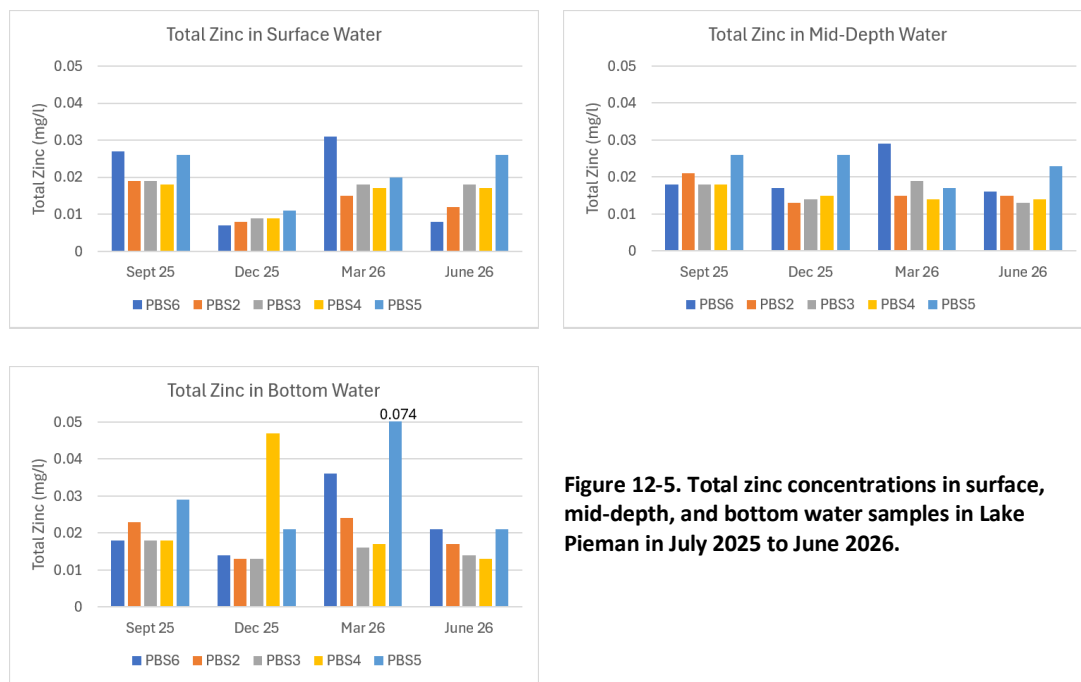


Figure 12-5. Total zinc concentrations in surface, mid-depth, and bottom water samples in Lake Pieman in July 2025 to June 2026.

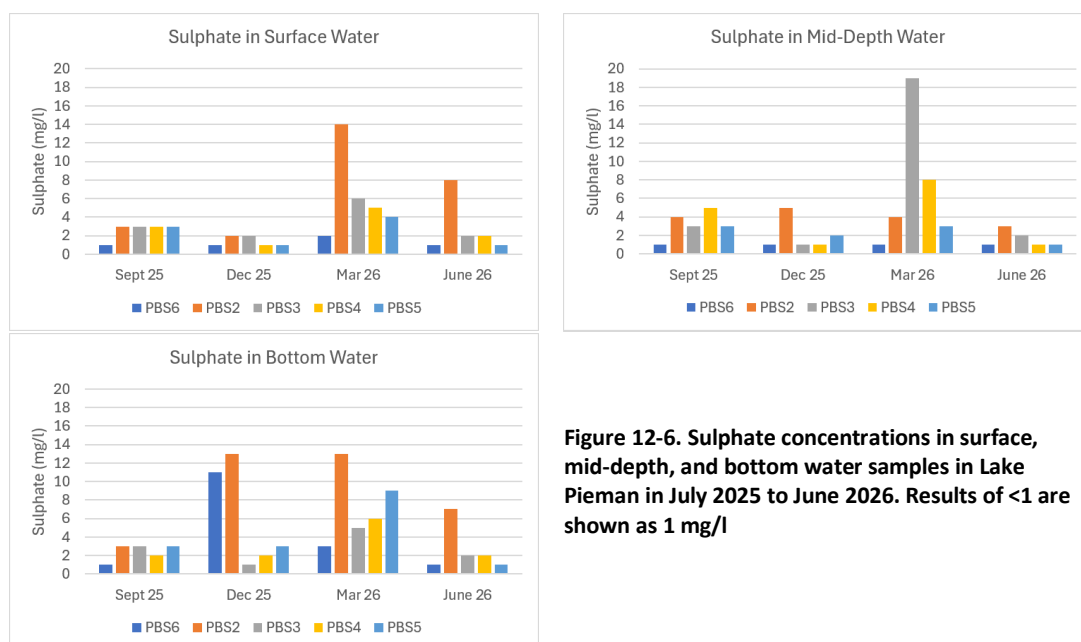


Figure 12-6. Sulphate concentrations in surface, mid-depth, and bottom water samples in Lake Pieman in July 2025 to June 2026. Results of <1 are shown as 1 mg/l

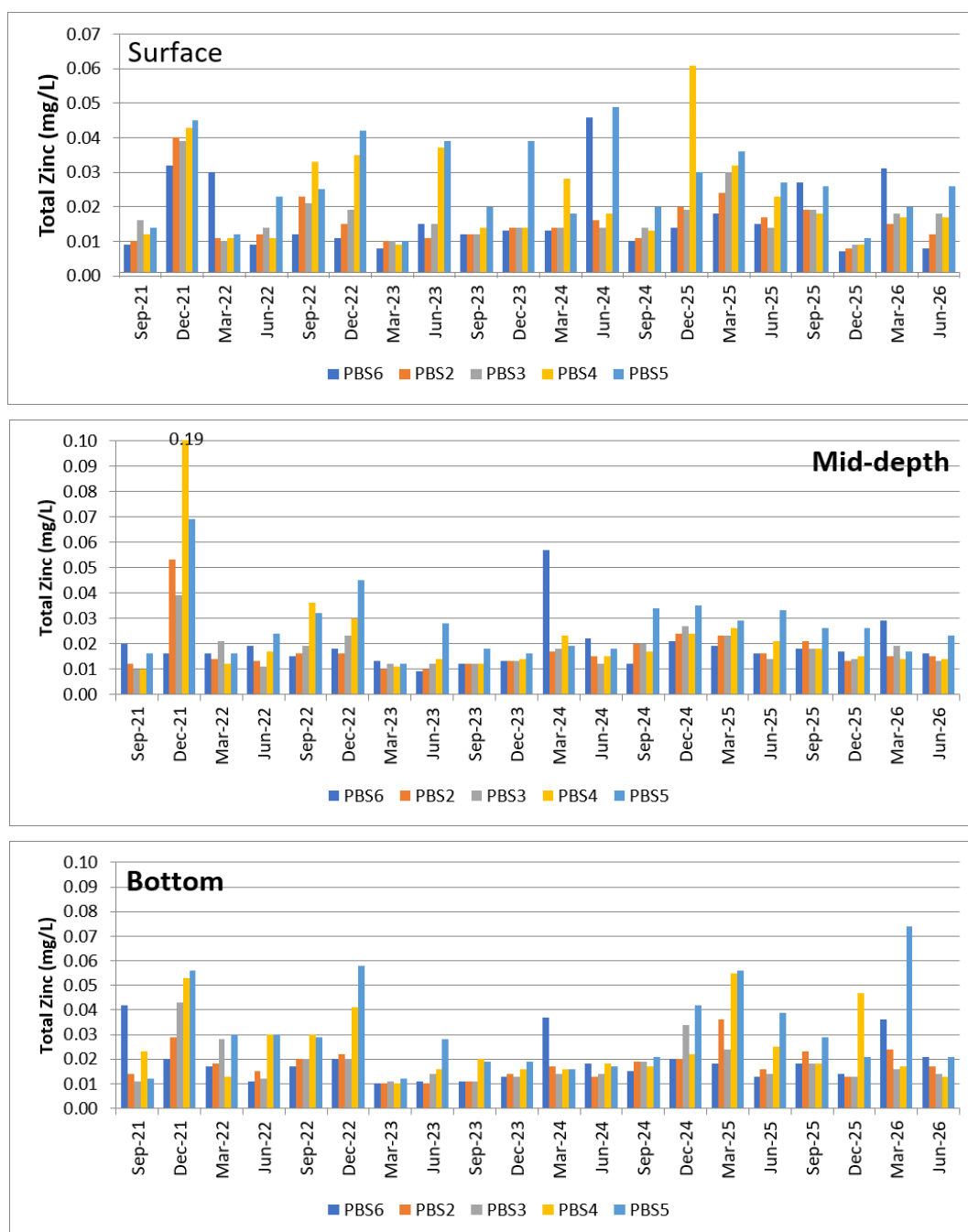


Figure 12-7. Total zinc in surface (top), mid-depth (middle) and bottom water (bottom) samples from September 2021 to June 2026. Labels indicate concentrations that extend beyond the limit of the graph in mid-depth graph.

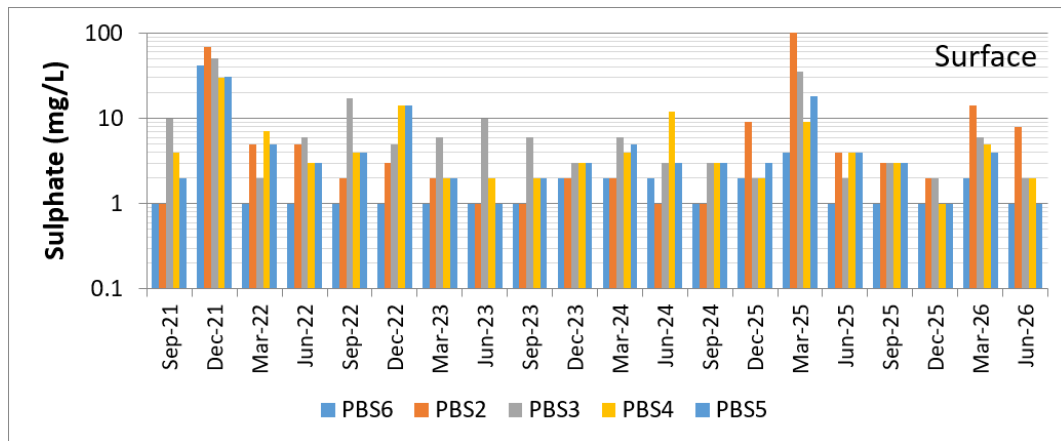


Figure 12-8. Sulphate concentrations in Lake Pieman surface water samples 2021 – 2026.

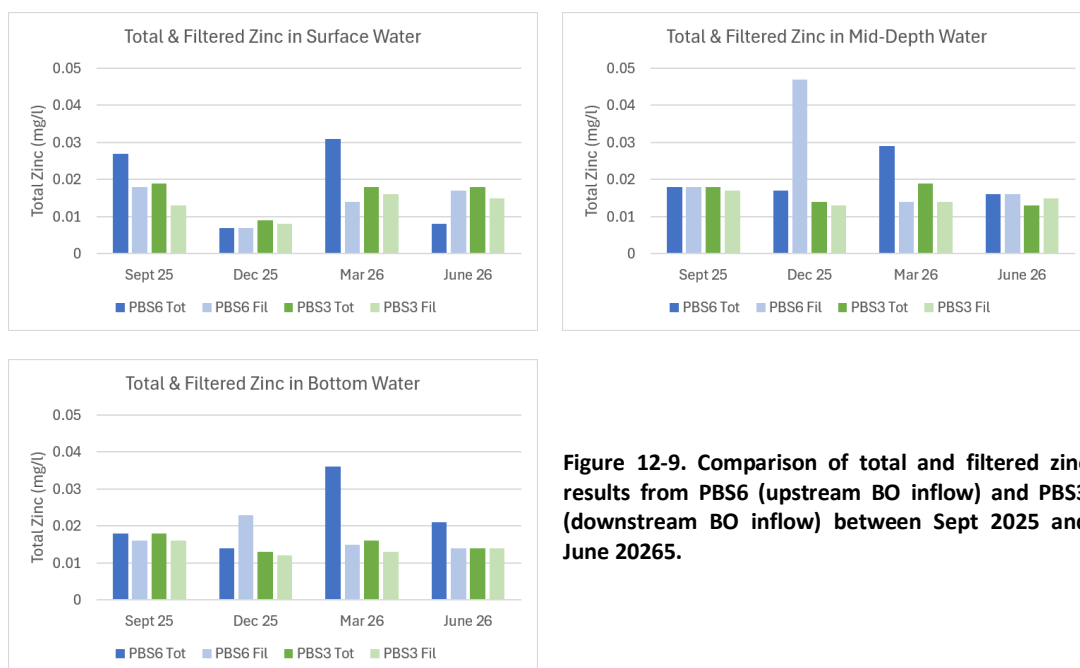


Figure 12-9. Comparison of total and filtered zinc results from PBS6 (upstream BO inflow) and PBS3 (downstream BO inflow) between Sept 2025 and June 2026.

13 Review of Sampling Procedures and QA/QC of water quality monitoring

Item 2.6 under condition G7 of EPN 7153/3 and condition G8 of PCE 11514(r3) lists a requirement that the Annual Review include a review of the accuracy of the sampling procedures, sampling schedule, sampling locations and test methods applied. MMG Rosebery has provided the information upon which the summary in Table 22 is based.

Monitoring information provided by MMG Rosebery includes Surface Water and Ground Water Monitoring Procedures that clearly outline the roles and responsibilities of each team member involved in monitoring, data management and reporting, and provides references to the standard methods that are to be adopted for the collection of samples and reporting of results. The procedures include timelines for completing tasks to ensure that reporting requirements under the EPN can be met, and to ensure that management is aware of potential environmental issues as they arise.

L Koehnken completed several site visits in the 2025 to 2026 monitoring year to MMG Rosebery and visited most monitoring sites included in the EPN and reviewed monitoring strategies and techniques with MMG staff and contractors. During the 2025 to 2026 monitoring year MMG Rosebery completed reviews of seepage monitoring at Bobadil and stormwater monitoring throughout the site. These reviews resulted in recommendations to alter some monitoring locations which was approved by the EPA with implementation commencing in the second half of the 2025 to 2026 monitoring year. All other monitoring locations have remained unchanged since the 2024 to 2025 Annual Review. The staff have confirmed that there have been no changes to the monitoring procedures or contractors in the 2025 to 2026 year.

The onsite QA/QC system, implemented in 2019/2020, ensures consistency between all environmental field technicians. The program consists of a series of field tasks and observations to verify both technician competency and compliance with site procedures. Results are recorded and analysed with feedback provided to improve sampling consistency.

No laboratory visit or audit of analytical methods has been included as part of this review aside from the comparisons provided below. All laboratory analyses included in this review were completed in a NATA certified laboratory (ALS) that is subject to ongoing review and QA/QC checks under the NATA certification process. The laboratory runs duplicates of 1 in every 20 samples that must pass the internal QA/QC limits of the laboratory. Based on this, discrepancies between the Compliance and Field duplicate samples are likely attributable to environmental variability rather than errors in sampling or analysis.

Table 22. Summary of field monitoring practices, applicability of monitoring sites and monitoring frequency, and analytical methods used by MMG Rosebery during the 2025 to 2026 monitoring year.

Requirement	Findings
Accuracy of the Sampling Procedures	<ul style="list-style-type: none"> Water quality samples are collected by trained environmental contractors or the professional environmental staff at MMG Rosebery according to the standard monitoring procedures established by MMG. Samples required for EPN compliance are collected and submitted to a NATA approved lab using appropriate Chain of Control (ALS Melbourne). Field duplicates are collected at a rate of 1 per 20 samples and are also submitted to the primary lab with the duplicate locations selected on a random basis. The Relative Percent Difference (RPD) between the primary and duplicate sample results are tracked, and all discrepancies greater than 50% are noted in the data base. For compliance samples the laboratory is contacted and asked to confirm the result and / or re-run the sample. MMG Rosebery has recently incorporated inter-lab duplicate analyses as part of the QA/QC process with three samples spanning a range of site conditions submitted to two different labs in May to June 2025. The results have shown variable agreement, and a larger comparative data set is required to identify systematic differences. Discrepancies in the reporting of Total Nitrogen and TPH are relevant to the environmental performance at the site. For the two samples with received results, one lab returned values below the 95th percentile investigative value for TN, while the results from the other lab

were above the 5.5 mg/l target on each occasion. Similarly, TPH was detected in a sample by one lab, but not the other. This highlights the need to consider sample and analytical variability when deriving and applying limits and targets. Examples of results are provided below.

Parameter	Lab1	Lab2
Total zinc (mg/l)	6.9	8.6
	1.58	0.73
	0.052	0.019
Sulphate (mg/l)	380	430
	183	220
	494	390
Total Nitrogen	6.9	4.4
	4.4	6.0
TPH (Sum C₁₀-C₃₆)	0.19	<0.10
	<0.05	<0.10

- A comparison of the weekly compliance results with field duplicates analysed by the same laboratory for a total and filtered metal (total and filtered zinc), nutrient (total nitrogen) and a 'general' parameter (total calcium) collected at BO are shown in Figure 13-1 through Figure 13-3.
- The weekly compliance and duplicate samples show good agreement for all parameters with the maximum difference less than 15% and 90th percentile difference less than 10% for all parameters except total zinc. The maximum difference in the total and filtered zinc results was 0.04 mg/l and 0.01 mg/l, respectively, so the elevated percentages are attributable to statistics of small numbers.

	Tot Zn	Fil Zn	Fil Ca	Tot N
Max difference	43%	58%	3%	13%
90 th %tile difference	25%	6%	3%	9%
n=	15	15	15	15

- The MMG Rosebery Mill personnel are responsible for maintenance of one set of pH and EC probes used for continuous monitoring. The probes are calibrated weekly. A second set of continuously monitoring EC and pH probes were established in the 2024 – 2025 monitoring year to provide backup for the Mill. The backup probes are maintained by Entura.
- MMG also contract Entura to manage the water level probe at BO, and water level and water quality probes at numerous sites around the lease (clean water diversion drain (CWDD), Stitt River at WL8, Ring River upstream Baker Creek, Baker

	<p>Creek, 7 Level, Ring River at Murchison Highway, Rosebery Creek).</p> <ul style="list-style-type: none"> Field probes are calibrated weekly as part of the routine monitoring by monitoring personnel according to the established procedures. Backup field instruments are calibrated and maintained on site.
Applicability of sampling schedule and monitoring locations	<ul style="list-style-type: none"> The sampling schedule at the BO outfall is suitable for capturing the water quality variability at the point of discharge. The continuous pH measurements at BO guides management of the ETP and provides an accurate indicator of the discharge water quality. The monitoring plan and supplementary monitoring carried out by MMG for 2/5 dam is adequate to capture environmental releases from the dam to the environment should they occur, and to guide internal management.
Accuracy of analytical test methods	<ul style="list-style-type: none"> All field and analytical methods used in the determination of water quality parameters are consistent with established and appropriate methods. Analytical results are determined by independent NATA registered laboratories, and all water quality results provided by the labs incorporate QA/QC information, including results for field and lab blanks and replicates. The results from all internal and laboratory duplicate analyses are maintained within MMG's water quality database (ESDAT) along with the primary sample results enabling comparison of results. NATA registered laboratories only report results which are within the internal QA/QC limits of the laboratory, so the laboratory analyses are considered accurate within the context of NATA testing.
Recommendations	<p>There are sporadic discrepancies between field EC or pH measurements and continuous readings which is partially due to EC field measurements not being temperature compensated unlike the continuous readings. Intercalibration between the continuous probes and the field and laboratory probes should be routinely conducted to minimise the occurrences and all EC field measurements should be temperature compensated to 25°C.</p>

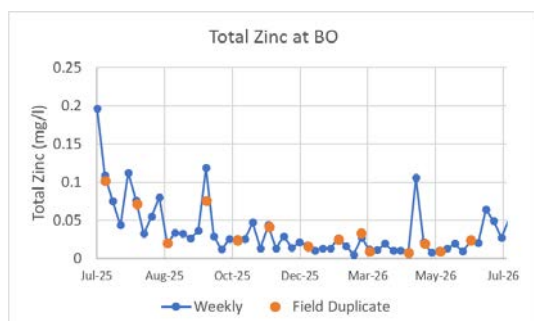


Figure 13-1. Comparison of weekly compliance sampling with field duplicates in (top) total zinc and (bottom) filtered zinc results collected at BO 2025 to 2026.

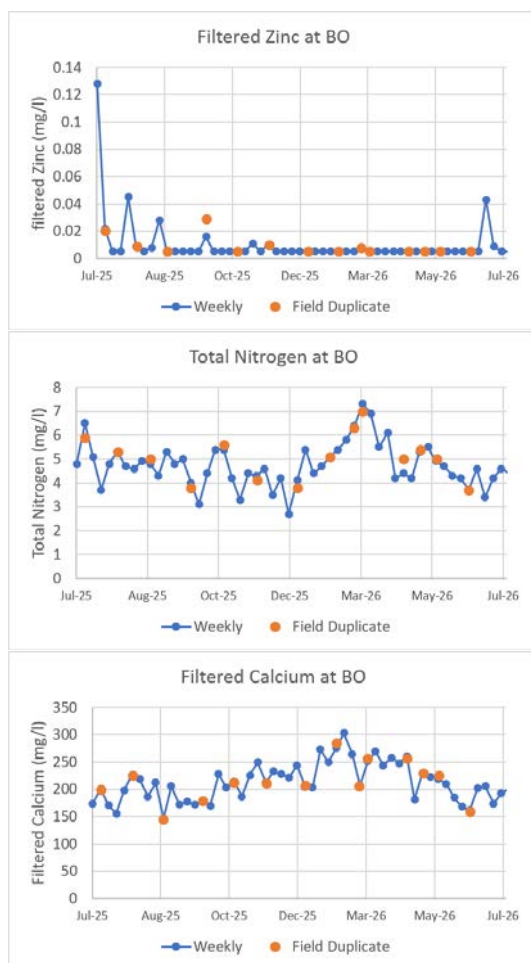


Figure 13-2. Comparison of total nitrogen results at BO in weekly compliance monitoring and Field duplicate samples collected in 2025 to 2026.

Figure 13-3. Comparison of total calcium at BO in weekly compliance monitoring and in field duplicate samples collected in 2025 to 2026.

14 3 Level Waste Rock Dump (EPN 8815/2)

In the 2025 to 2026 monitoring year no additional waste rock was added to the 3 Level WRD.

14.1 Surface water monitoring

Monitoring locations at the 3 Level WRD are shown in Figure 14-1 and a summary of the monitoring results is contained in Table 23.



Figure 14-1. Surface water and groundwater monitoring locations associated with the 3 Level WRD.

Table 23. Summary of surface water monitoring results for 3 Level WRD in 2025 to 2026.

Requirement	Findings
Monitoring Frequency and Parameters	Surface water monitoring is required to be completed on a quarterly basis as the 2015 EPN specifies monthly monitoring for three years, followed by quarterly thereafter. Monitoring was completed as required at all sites for all parameters.
Compliance with EPN – Assessment of surface water impacts from the 3 Level WRD	<p>The EPN requires an assessment of surface water impacts associated with 3 Level WRD.</p> <ul style="list-style-type: none"> Surface water impacts beyond the immediate area of the WRD are limited as surface runoff from the 3 Level WRD is collected at the 4 Level settlement pond and directed to the ETP for treatment and discharge via the Bobadil TSF. There were two unplanned discharges from the 4 Level settlement pond to Rosebery Creek during the 2025 to 2026 monitoring year that are discussed in Section 2. Both incidents coincided with periods of high rainfall and water quality monitoring indicated there was a high level of dilution within a short distance in Rosebery Creek.

	<ul style="list-style-type: none"> pH results from OC3, OC4 and OC5 are within the range of previous results, with OC3, located at the toe of the WRD continuing to have the lowest pH, and surface runoff at OC4 the highest pH (Figure 14-2). Zinc values are also within previous ranges (Figure 14-3), with OC4 and OC5 showing high variability, and opposite trends, with OC4 having highest concentrations in winter and OC5 in summer. Total Zinc at OC3 continues to be higher than at the other sites and ranged from 63 mg/l to 126 mg/l in 2025 to 2026. Total zinc and sulphate increase in Rosebery Creek with distance downstream, reflecting diffuse inputs rather than surface discharge from the 3 Level WRD or open cut as runoff is collected and directed for treatment (Figure 14-4, Figure 14-5). Inputs also include runoff from the township of Rosebery. A time-series of total zinc upstream (RC1) and downstream of the 3L WRD area (RC2) is shown in more detail in (Figure 14-6). The concentrations at RC1 have ranged between 0.01 mg/l and 0.07 mg/l since 2015, with no apparent trend. Concentrations at RC2 ranged from 2.8 mg/l to 5.3 mg/l in the monitoring year. The results from the 2025 to 2026 sampling runs are within the range of historic results (Figure 14-7).
Significant trends - longer period	Surface runoff from the 3L WRD continues to be collected and directed to the ETP for treatment. The downstream increase in zinc and sulphate in Rosebery Creek is attributable to diffuse sources in addition to any groundwater inputs that may be entering from the 3L WRD.

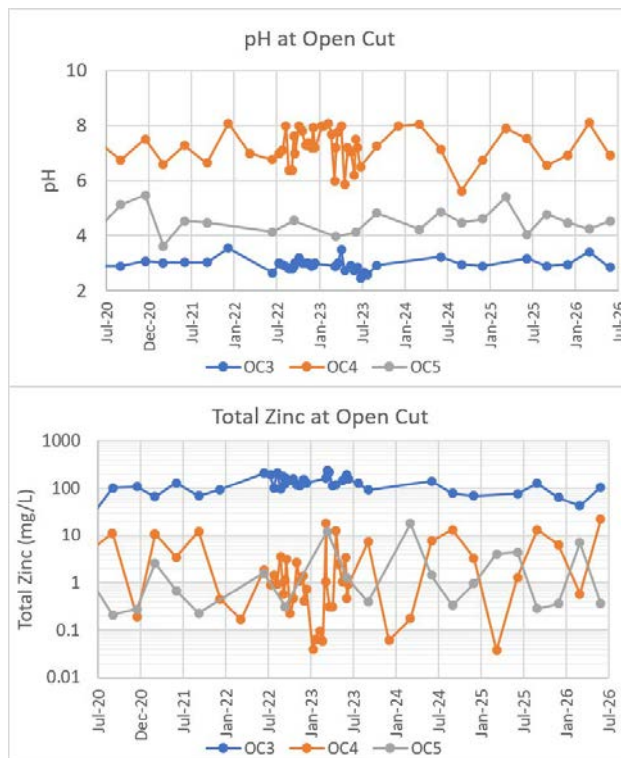


Figure 14-2. Time-series of pH in OC sites June 2020 – June 2026.

Figure 14-3. Time-series of total zinc in OC sites June 2020 to June 2026. Note log scale.

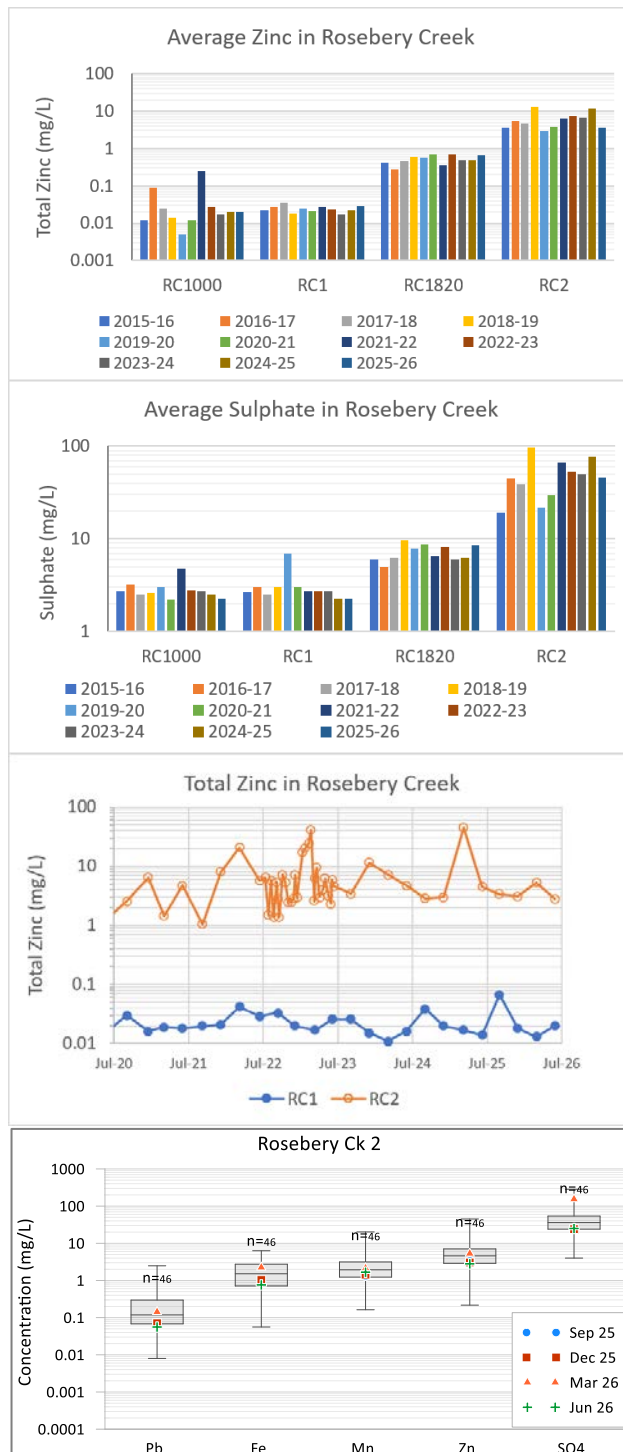


Figure 14-4. Average total zinc concentrations in Rosebery Creek in 2015 – 2026 monitoring years
RC1000=background, RC1=upstream of WRD and open cut, RC1820 downstream of 3L WRD and open cut, RC2=upstream of confluence with Stitt River below all mine and diffuse inputs. Note log scale.

Figure 14-5. Average sulphate concentrations in Rosebery Creek in 2015 – 2026 monitoring years. Note log scale.

Figure 14-6. Comparison of total zinc concentrations at RC1 and RC2 from July 2015 to June 2025. Note log scale.

Figure 14-7. Total metals and sulphate at RC2 in 2025 to 2026 compared to results from Jan 2015 to June 2025. The boxes encompass the 25th to 75th percentile values.

14.2 Groundwater monitoring at 3L WRD

A summary of the monitoring results collected from ground water sampling sites is contained in Table 24.

Table 24. Summary of groundwater monitoring results at 3 Level WRD 2025 to 2026.

Requirement	Findings
Monitoring Frequency and Parameters	Groundwater sampling at the 3 Level WRD was completed on a six-monthly basis as required. Parameters were determined as required when water was able to be collected from the bores.

	<ul style="list-style-type: none"> • GB25D was removed from the monitoring schedule following approval by the EPA for decommissioning in September 2020. • GB26 continues to be dry and are not able to be monitored. This has occurred for many years. • GB44 and GB45 were not sampled in Apr/May 2026 due to a lack of water in the bores. October 2025 was the first time in at least five years that bore GB45 had sufficient water to sample
Compliance with EPN – Assessment of groundwater impacts from the 3 Level WRD	<p>The EPN requires an assessment of groundwater impacts associated with 3 Level WRD. The relative position of the groundwater bores is shown in Figure 14-1.</p> <ul style="list-style-type: none"> • Monitoring results were within the range of previous results except in bore GB46 where pH levels were higher and sulphate lower in April. Sulphate was also lower at GB36 and GB44. (Figure 14-8 to Figure 14-10) • Bores near the top of the valley (GB21-GB25) continue to have higher pH and lower zinc and sulphate concentrations as compared to bores located downslope of the WRD and open cut. • The bores at the base of the WRD (GB27, GB36, GB44, GB46) are characterised by low pH and elevated zinc and sulphate concentrations. • Bore GB23 continues to record elevated zinc (12-18 mg/L) and sulphate (97-140 mg/L) concentrations even though it is located well above the open cut and WRD. This bore is in the Northern Open Cut Area and is presumably impacted by the historic workings. This is consistent with the elevated concentrations of zinc and sulphate recorded at the stormwater runoff monitored at site AC1/AC1.1. • In GB27, which is located within the PAF material in the WRD and has consistently recorded the highest metal concentrations, the copper concentrations in both monitoring runs were substantially lower than previously recorded (Figure 14-11). The decrease in copper is not attributable to a change in pH as pH at the site remained <3.5 during both monitoring runs. The concentrations of other metals have remained similar to historic results at the site. The cause for the decrease is unknown. • Water levels in the groundwater bores show seasonal trends, with water levels higher in (e.g., decrease in depth to water surface) in October/November, and lower in April, following the dry summer months. Water levels recorded in bore GB25S continue to show rapid change. Water level seasonal changes ranged from -4.5 m to +0.4 m at the sites (Figure 14-12, Figure 14-13) with the dry conditions leading to a reduction in water in many bores during both sampling runs.
Significant trends - longer period	<p>The 2025 to 2026 results are largely consistent with historical monitoring. Works in the area associated with development of a new underground access commenced after the observed decrease in copper at GB27 so the change is unlikely related to the redevelopment.</p>

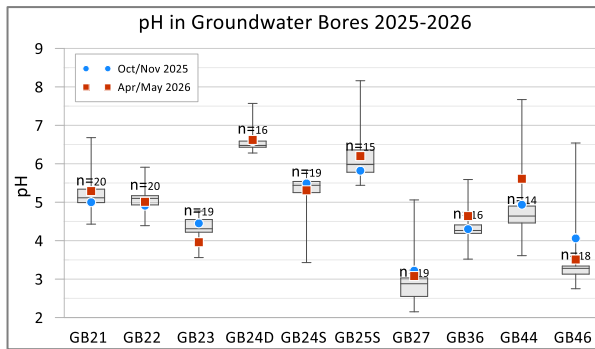


Figure 14-8. pH in groundwater at 3 Level WRD. Box encompasses the 25th to 75th percentile values from 2015 to June 2025, with the 2025 to 2026 results shown as data points. No data points indicate pH was not recorded at the site on the monitoring run.

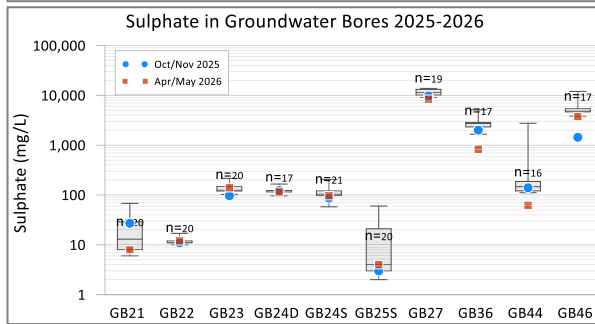


Figure 14-9. Sulphate in groundwater at 3 Level WRD. Box encompasses the 25th to 75th percentile values from 2015 to June 2025, with the 2025 to 2026 results shown as data points.

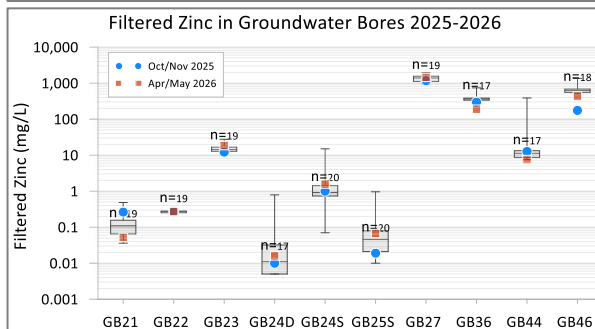


Figure 14-10. Dissolved zinc in groundwater at 3 Level WRD. Box encompasses the 25th to 75th percentile values from 2015 to June 2025, with the 2025 to 2026 results shown as data points.

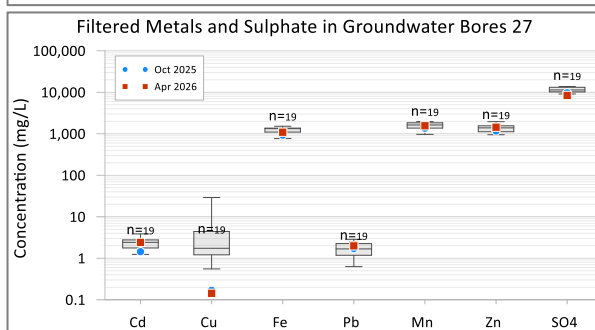


Figure 14-11. Filtered metals in GB27. Box encompasses the 25th to 75th values from 2015 to June 2025. Data points show values recorded in October 2025 and April 2026.

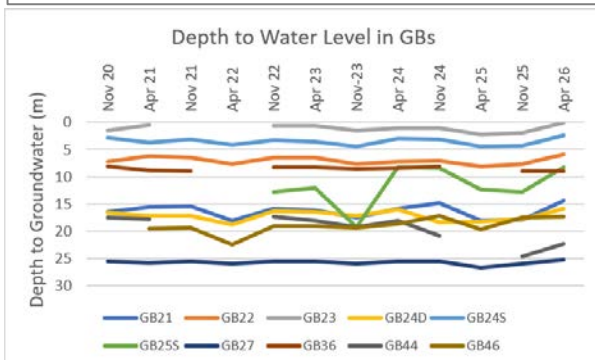


Figure 14-12. Recorded water depth below ground surface at the 3 Level groundwater bores;

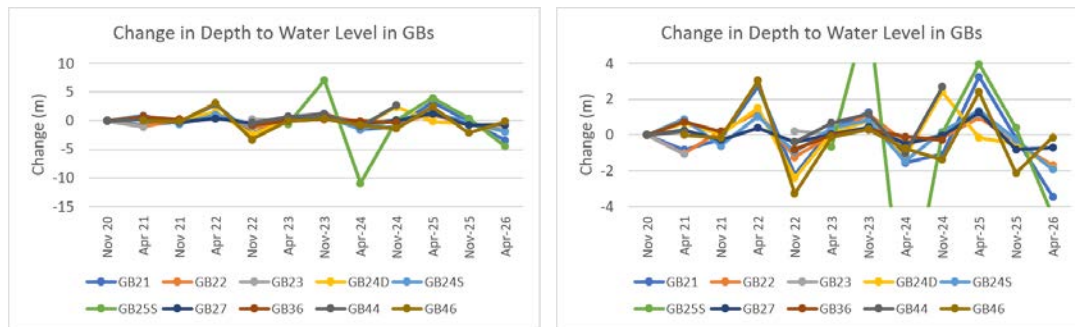


Figure 14-13. Change in the depth to the groundwater surface in the bores between sampling dates. A positive change indicates lower water level (e.g., greater depth to water surface). If no result is shown it indicates water level was not reported for the monitoring period. Both graphs show the same results at a different vertical scale.

14.3 Lysimeter Gas Sampling

A summary of the gas monitoring results collected from the lysimeters in the 3 Level WRD is presented in Table 25.

Table 25. Summary of lysimeter gas monitoring results from 3 Level WRD in 2025 to 2026.

Requirement	Findings
Monitoring Frequency and Parameters	<p>Gas monitoring is required to be implemented at six horizontal gas monitoring pipes over the full construction of the WRD. Only the Stage 2 gas lysimeter has been installed. There are gas lysimeters installed in the Test Pads, but they do not reflect what is occurring within the main dump. Monitoring of the Test Pad ceased in October 2020, and the results until that date are only included here to provide an indication of changes over time within the material.</p> <p>The gas lysimeters were reviewed by an external consultant, SGME, in December of 2024 and found to be functioning properly.</p> <p>Monthly monitoring for O₂, CO₂ and SO₂ was completed at the Stage 2 G1 lysimeter as required.</p>
Compliance with EPN	<p>The EPN sets a Preliminary Performance Objective of <3% <i>in situ</i> O₂ for the gas lysimeters.</p> <ul style="list-style-type: none"> All reported O₂ concentrations at the Stage 2 G1 lysimeter exceeded this value during the July 2025 – June 2026 monitoring period (Figure 14-14) indicating oxygen is not being excluded from the waste rock dump. The concentration in the lysimeter is similar to the atmospheric value of 20.95 %. Sulphide oxidation is not inhibited at these oxygen levels. CO₂ levels in the Stage 2 gas lysimeter varied from 0% to 0.01% over the 12-months (Figure 14-15). No SO₂ was detected in the gas lysimeter.
Significant trends	<p>The results indicate that the WRD is not preventing the ingress of oxygen nor oxidation of sulphide. The results suggest that the placement of the cap on the WRD in 2024 has not as of yet had an impact on oxygen ingress.</p>

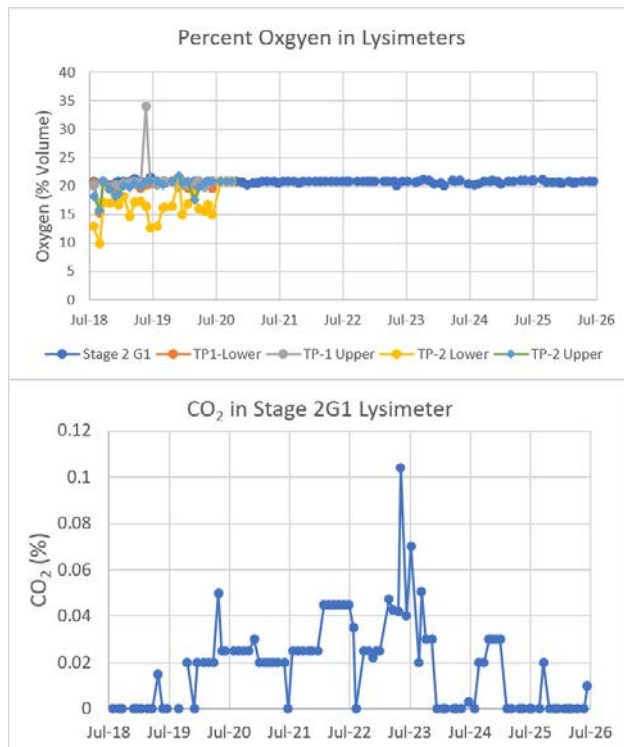


Figure 14-14. Oxygen results from the lysimeters installed in the 3L WRD July 2018 to June 2026.

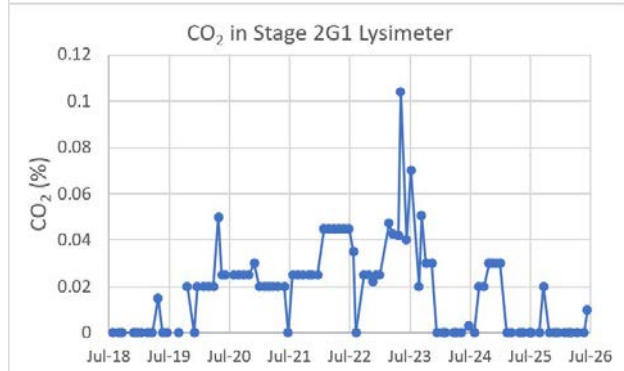


Figure 14-15. Carbon dioxide concentration in Stage 2 gas lysimeter, July 2018 to June 2025.

14.4 Lysimeter Water Sampling

A summary of the water quality monitoring results collected from the lysimeters installed in the 3 Level WRD is presented in Table 26.

Table 26. Summary of water quality results from lysimeters in 3 Level WRD in 2025 to 2026.

Requirement	Findings
Monitoring Frequency and Parameters	<p>Water testing is required to be completed at six lysimeters across the completed footprint of the 3 Level WRD. To date, two lysimeters have been installed. In the 2024 to 2025 monitoring year MMG commissioned a review of the lysimeters by SGME, an independent consultant. The review concluded that Stage 1 L2 was not functioning properly, the water quality results were inaccurate, and the lysimeter should be decommissioned and replaced with a new unit. The review also found the existing monitoring methodology was potentially monitoring old drainage water rather active seepage and changes to the monitoring protocol were recommended and implemented. MMG shared the consultant's report with the EPA in December 2024. Due to the findings of this review only results from Stage 1 L1 are presented.</p> <ul style="list-style-type: none"> No samples were collected in January or March 2027 due to a lack of water in the lysimeters. All parameters were monitored at the required frequency in the collected samples
-Compliance with EPN	<p>The EPN sets Preliminary Performance Objectives for pH, EC, Acidity and Alkalinity as indicated in Table 27.</p> <ul style="list-style-type: none"> At the Stage 1 L1 lysimeter, the pH, acidity and alkalinity results achieve the Performance Objectives.

	<ul style="list-style-type: none">All EC values continue to exceed the Performance Objective at the Stage 1 L1 lysimeter.Sulphate in Stage 1 L1 ranged from 521 mg/L to 1310 mg/L.The pH and alkalinity values in the Stage 1 lysimeter combined with the elevated sulphate concentrations at the site are consistent with the WRD creating neutral mine drainage. The generated sulphate contributes to the elevated EC value. <p>Table 27. Summary of water quality in lysimeters measured between July 2025-June 2026. L= lab result, F = Field reading.</p> <table><tr><th></th><th>Min pH</th><th>Max EC</th><th>Max Acidity</th><th>Min Alkalinity</th><th>Comment</th></tr><tr><td>Prelim. Perf Target</td><td>>4.5 pH unit</td><td><600 µS/cm</td><td><50 mgCaCO₃</td><td>>1 mgCaCO₃</td><td></td></tr><tr><td>Stage 1-L1</td><td>6.7 L 7.1F n=10</td><td>2310 L 1719 F n=10</td><td>33 n=10</td><td>65 n=10</td><td>pH, acidity & alkalinity achieve targets</td></tr></table> <ul style="list-style-type: none">Cadmium, copper, lead, manganese and zinc remained elevated in the 2025 to 2026 monitoring year as compared to years prior to 2024 (2023 to 2024 provided for comparison in Figure 14-16, Figure 14-17). The reason for this increase starting in the 2024 to 2025 monitoring year is unknown but it may be related to the revision of monitoring procedures at the site, a change in flow pathways or disturbance associated with the recent placement of a cover on the surface of the WRD.Iron and aluminium concentrations remained near or below the LoR throughout the year, consistent with the pH of WRD being sufficient to promote the precipitation and retention of these metals.		Min pH	Max EC	Max Acidity	Min Alkalinity	Comment	Prelim. Perf Target	>4.5 pH unit	<600 µS/cm	<50 mgCaCO ₃	>1 mgCaCO ₃		Stage 1-L1	6.7 L 7.1F n=10	2310 L 1719 F n=10	33 n=10	65 n=10	pH, acidity & alkalinity achieve targets
	Min pH	Max EC	Max Acidity	Min Alkalinity	Comment														
Prelim. Perf Target	>4.5 pH unit	<600 µS/cm	<50 mgCaCO ₃	>1 mgCaCO ₃															
Stage 1-L1	6.7 L 7.1F n=10	2310 L 1719 F n=10	33 n=10	65 n=10	pH, acidity & alkalinity achieve targets														
Significant trends	The water quality results continue to be consistent with sulphide oxidation occurring within the waste rock dump and being neutralised by carbonate and silicate minerals to produce neutral rock drainage. The increase in metal concentrations in the past two monitoring years is a substantial change from previous results. Given the time frame of the change, it is likely the increase is due to changes in the sampling methodology. Ongoing sampling will establish whether the increase in metals reflects an isolated pulse of stored water with elevated concentrations, or a sustained and more accurate reflection of the conditions within the WRD.																		
Recommendations	It is recommended that monthly monitoring be maintained, and that SGME be consulted as to whether the increase in metals could be attributable to the change in sampling methodology.																		

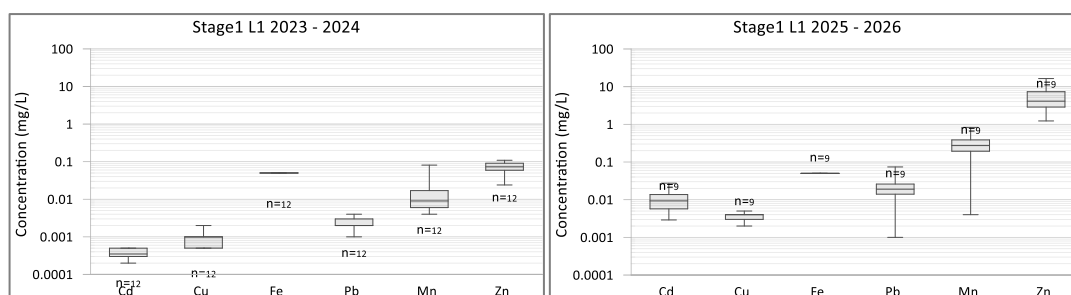


Figure 14-16. Filtered metal concentrations the Stage 1 L1 lysimeter in (left) 2023 to 2024 and (right) 2025 to 2026. The box encompasses the 25th to 75th percentile values.

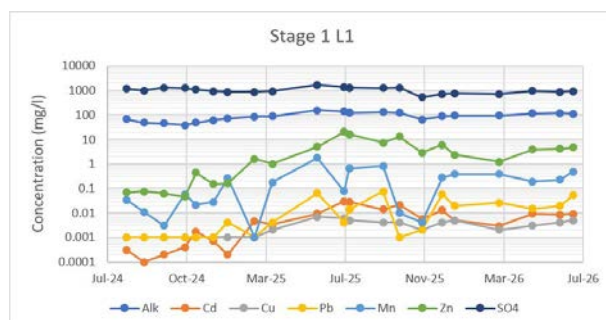


Figure 14-17. Alkalinity, sulphate and filtered metal concentrations in the Stage 1 L1 lysimeter between July 2024 and July 2026. Note log scale.

15 South Hercules Mine Phase 1 (EPN 8034/1)

South Hercules is governed by EPN 8034/1 and is presently under a Care and Maintenance Plan approved by the EPA Tasmania in May 2015. No mining activity was undertaken within the July 2025 to June 2026 reporting period.

15.1 Surface water monitoring

A summary of the monitoring results collected from surface water sampling sites is contained in Table 28.

Table 28. Summary of surface water monitoring results for South Hercules July 2025 to June 2026.

Requirement	Findings
Monitoring Frequency and Parameters	MMG monitored surface water on a monthly basis at sites MPW and BC2 consistent with the Closure Plan (GHD 2015). All parameters were monitored as required.
Compliance with EPN – Assessment of surface water impacts from S. Hercules	<ul style="list-style-type: none"> The only compliance criteria in the Closure Plan are monitoring. pH values were within the historic range at both sites with MPW showing several elevated spikes. pH values at BC2 remain lower than at MPW due to the influx of acidic water from the decommissioned Hercules mine site (Figure 15-1). Zinc and manganese results are within the range of previous results at MPW and continued to show seasonal trends with higher values during winter (Figure 15-2). Zinc, manganese and sulphate values at BC2 in November 2025 were the lowest recorded for all three metals over the past decade. Flow at BC2 was high and increasing at the time of sampling (0.6 m³/s increasing to 0.9 m³/s) suggesting an inflow of cleaner stormwater is responsible for the relatively low concentrations (Figure 15-3). There is a substantial increase in metal concentrations between the MPW and BC2 monitoring sites due to inflows from the decommissioned Hercules site, which enter Baker Creek downstream of the South Hercules site (Figure 15-4).
Significant trends - longer period & comments	The water quality results are consistent with previous results since the site entered care and maintenance. The monitoring requirement should be reviewed as many parameters have shown long-term stability and could be eliminated from the monitoring schedule or reduced in monitoring frequency (e.g., mercury, nutrients, major ions).

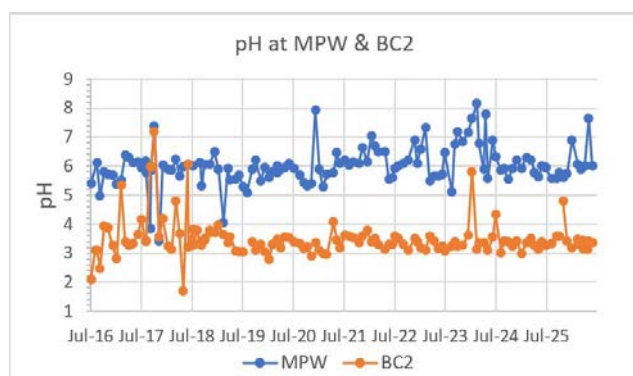


Figure 15-1. pH at the South Hercules surface water monitoring sites MPW and BC2, July 2015 to June 2026.

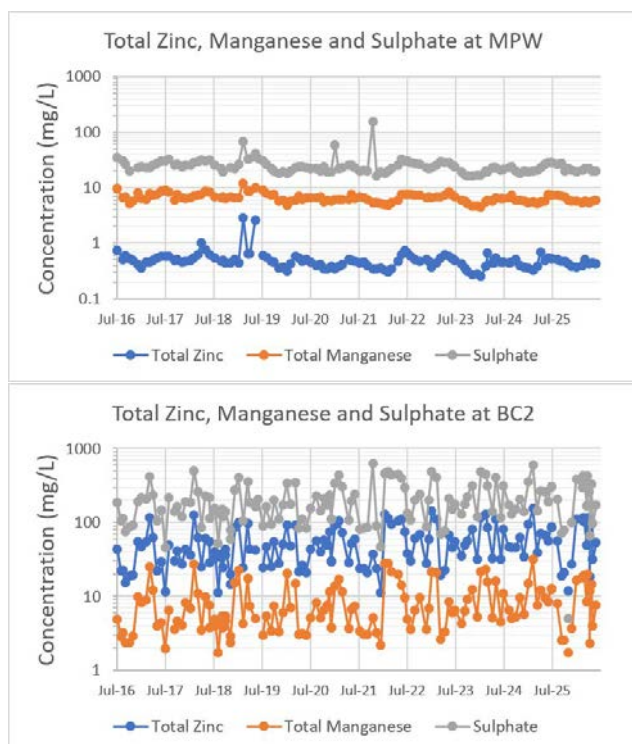


Figure 15-2 total zinc, manganese, and sulphate concentrations in the Mine Pit Water at the South Hercules 2016 to June 2026. Note log scale.

Figure 15-3 Total zinc, manganese, and sulphate concentrations at Bakers Creek above Ring River (BC2), July 2016 to June 2026. Note log scale.

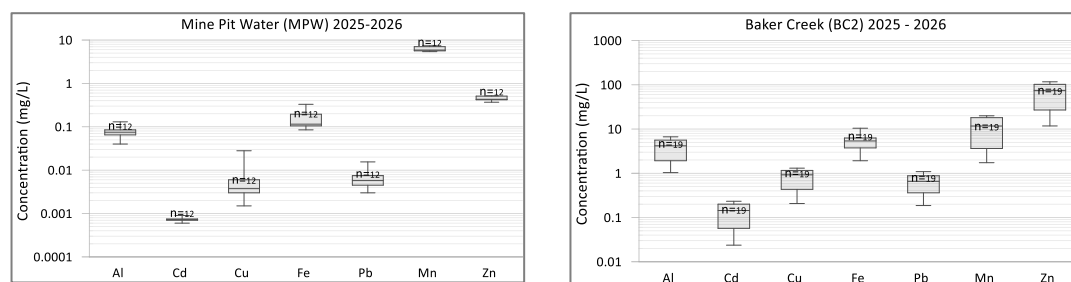


Figure 15-4. Total metal concentrations in the Mine Pit Water at South Hercules (left) and Baker Creek above Ring River (right). The box encompasses the 25th to 75th percentile values. Note different log scales on the two graphs with the Baker Creek scale 100-times higher than MPW.

References

ANZECC & ARMCANZ 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
GHD, 2015. South Hercules Care and Maintenance Plan Report. Report 32/17450.

ANZG 2023, Toxicant default guideline values for aquatic ecosystem protection: Dissolved copper in freshwater. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. CC BY 4.0. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia.

Gadd J.B., Hickey, C.W., Snelder, A.H. (2024) Acute copper and zinc water quality guideline values for Aotearoa. Technical report of the derivation including bioavailability model evaluation. Report prepared for Ministry for the Environment. (260 pp).

Pitt & Sherry, 2021. Water Quality Monitoring Plan 2/5 Dam Tailings Storage Facility Prepared for MMG Roseberry 14 April 2021, Rev C.

SGME, 2025. Audit Report 01 December 2024 to 31 May 2025, Three-Level Waste Rock Dump, Rosebery Mine. Project 17B002, V2-1.

Lake Pieman Biomonitoring

Bobadil discharge: summer 2025 survey

7 September 2026

Prepared by Hydro-Electric Corporation ABN48 072 377 158

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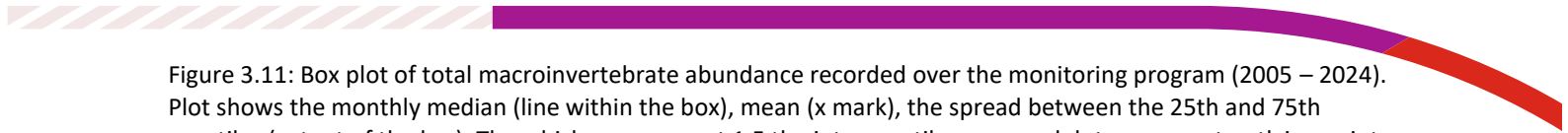


Figure 3.11: Box plot of total macroinvertebrate abundance recorded over the monitoring program (2005 – 2024). Plot shows the monthly median (line within the box), mean (x mark), the spread between the 25th and 75th quartiles (extent of the bar). The whiskers represent 1.5 the interquartile range and dots represent outlying points.

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Executive summary

The December 2025 survey and the broader 20 year monitoring record provide no evidence of toxicological effects from the Bobadil outfall on shoreline macroinvertebrate communities or benthic algal biomass in Lake Pieman. Macroinvertebrate abundance and taxa richness showed no decline associated with the outfall, and chlorophyll-*a* biomass measured from large woody debris (LWD) did not differ significantly among site groups. Suspended tiles recorded higher algal biomass at sites adjacent to and downstream of the outfall, but differences among site groups were not statistically significant and there is no clear mechanism by which the principal contaminants in the outfall (copper and zinc) would be expected to stimulate algal growth. The observed tile pattern may instead reflect differences in hydraulic exposure and scour, which are greater closer to Bastyan Power Station.

The effectiveness of the shoreline biomonitoring program is constrained by the highly variable operating regime of Lake Pieman. Rapid changes in lake level, shoreline erosion, repeated wetting and drying, variable snag habitat and methodological limitations in LWD algal sampling reduce the consistency and sensitivity of the sampling regime. These factors make it difficult to distinguish any outfall related biological response from background variability associated with hydropower operations.

After 20 years of monitoring, the program has not demonstrated an ability to reliably identify biological changes attributable to toxicants from the Bobadil outfall. A review of the available water-quality data in 2026 indicated a low toxicological risk to the Lake Pieman aquatic ecosystem. Most metals remain below applicable guideline values, and zinc concentrations within the lake cannot be directly attributed to the Bobadil discharge. Predicted concentrations following dilution are generally below applicable 95% species protection DGVs.

Considering the biological results, water-quality evidence and inherent limitations of the monitoring design, there appears to be limited benefit in continuing the existing routine shoreline biomonitoring program, as further monitoring is unlikely to materially increase confidence regarding the ecological effects of the outfall.

1. Introduction

MMG have an annual requirement to survey algal biomass and shoreline macroinvertebrates at 15 sites along the shore of Lake Pieman. The sampling is conducted as per condition E3 of EPN 7153/3, to “document on-going environmental conditions in the Lake, increase understanding of temporal, spatial and seasonal biological changes, and progress the development of site-specific toxicity guidelines for sulphate and zinc in Lake Pieman”. The monitoring sites are located up and down the lake from where discharge from the Bobadil Polishing Pond facility enters on the eastern shore (Figure 1.1). The surveys have been undertaken since 2004 except for 2021. Prior to 2011 the surveys were undertaken in autumn and spring each year; however, since 2010, MMG has been required to report on a single annual survey. This report presents the results of the survey conducted in December 2025.

1.1 Background

Lake Pieman is the most downstream artificial storage in the Anthony-Pieman hydropower scheme. The Bobadil discharge enters the eastern shore of Lake Pieman approximately 3.8 km downstream from Bastyan Dam on Lake Rosebery. The upstream end of Lake Pieman experiences large and fluctuating flow rates from the discharge of the Bastyan Power Station which releases up to 150 m³/s of water into the confined valley of the storage (Figure 1.2). Since 2005, the Bastyan Power Station has operated for 57 percent of the time (Figure 1.3). Lake Pieman has an operating range of nearly five metres and water levels fluctuate up and down frequently throughout the year (Figure 1.4).

1.1.1 Bobadil outfall

When operating, the outflow from Bastyan Power Station flows down the narrow confines of the lake (60 - 70 m) in the vicinity of the Bobadil outfall and provides conditions similar to a broad river. Therefore, discharge from the Bobadil outfall would be rapidly dispersed and diluted downstream when the power station is operating and there is likely to be minimal dispersion up the lake.

When the power station is not operating, the water movement in the lake is less uni-directional and local pooling and multidirectional dispersion would occur from the Bobadil outfall, especially in near surface waters. At these times localized biological effects of these discharges may be evident both up and down lake from the outfall.

Bobadil Dam received wastewater from the Rosebery sewage system prior to 2016 (Davies et al. 2005). The contribution of nutrients from town sewage into the Bobadil discharge represented an increase in the nutrient resource which could have to the potential to locally enhance benthic algal production and lead to shifts in macroinvertebrate fauna in the lake. Analysis of data in the pilot study in autumn 2005 led to the conclusion that the shore fauna and algal density in the vicinity of the Bobadil discharge was a balance between eutrophication effects of raised nutrient levels (increased algae), and potential toxicity of the discharge from mine contaminants leading to reduced diversity of macroinvertebrates (Davies et al. 2005). The toxicological impact of the Bobadil discharge on macroinvertebrate diversity and abundance, while observable was considered minor (Davies et al. 2005). With the commissioning of the Rosebery Wastewater Treatment Plant (WWTP) in 2016, sewage wastewater has been diverted away from the Bobadil dam to the Taswater WWTP which discharges into the lower reaches of the Stitt River.



Figure 1.1: Distribution of biomonitoring sites for the Lake Pieman biomonitoring program. The long-term lake water quality sites are also shown

333.1/111.00/1: Bastyan [Power station] - P.S.Disch. (m³/s)

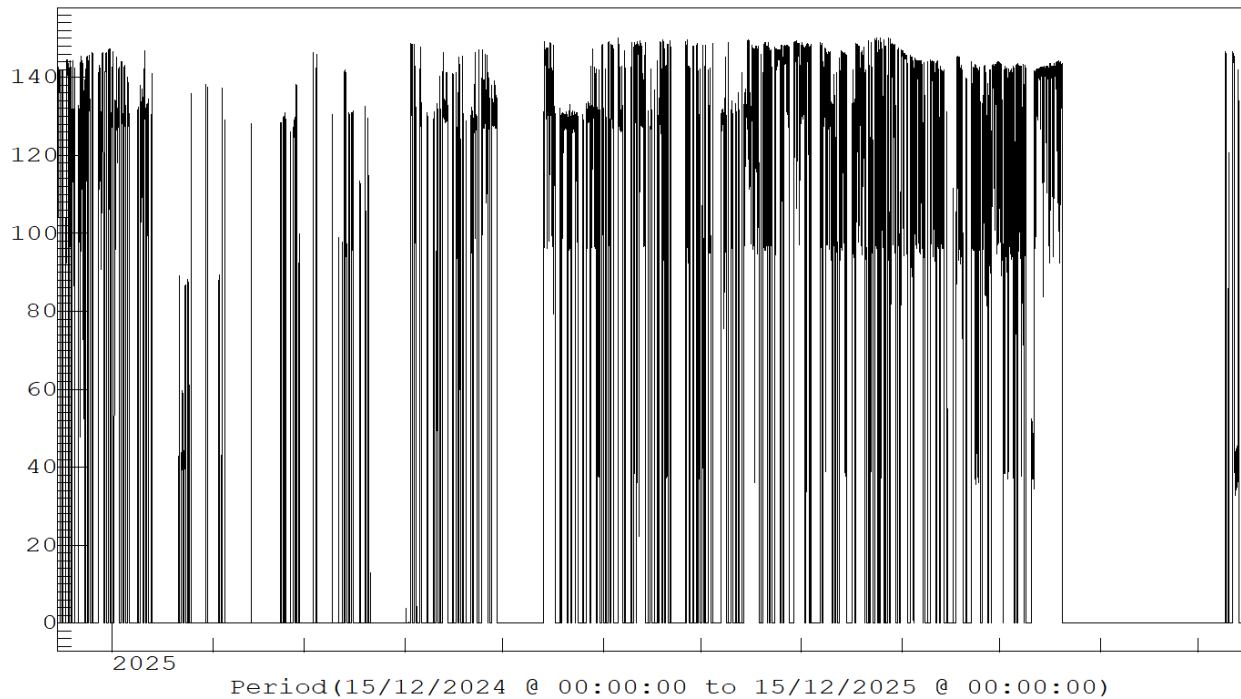


Figure 1.2: Discharge from the Bastyan Power station from the 15th of December 2024 to 15th of December 2025.

333.1/111.00/1: Bastyan [Power station] - P.S.Disch. (m³/s) (01/01/2005 to 19/09/2024)

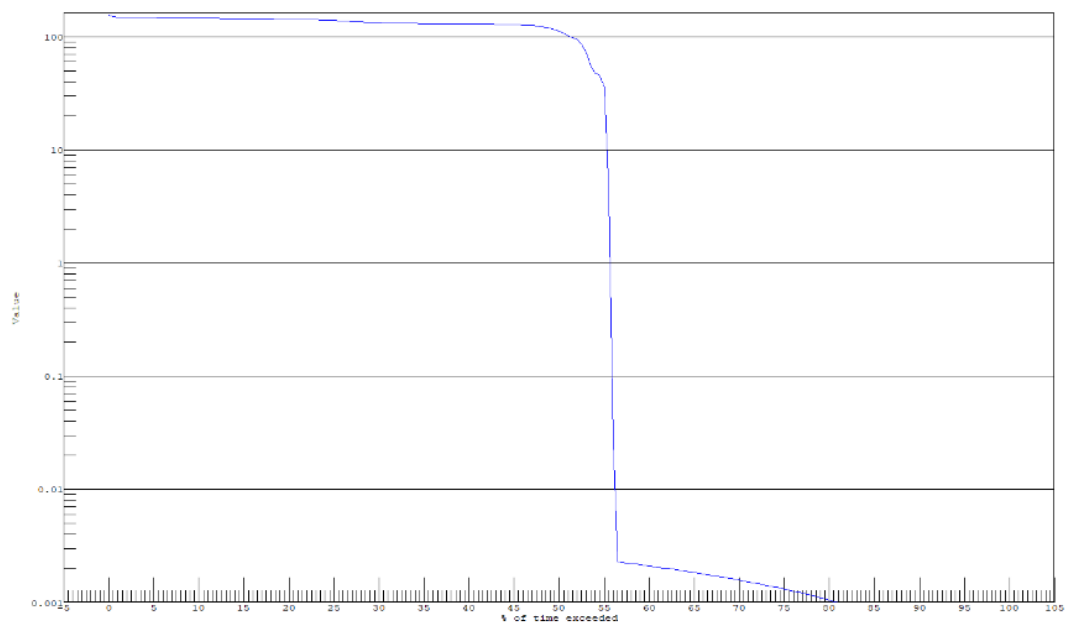


Figure 1.3: Flow duration curve (log) for the Bastyan Power Station from 2005 to 2025

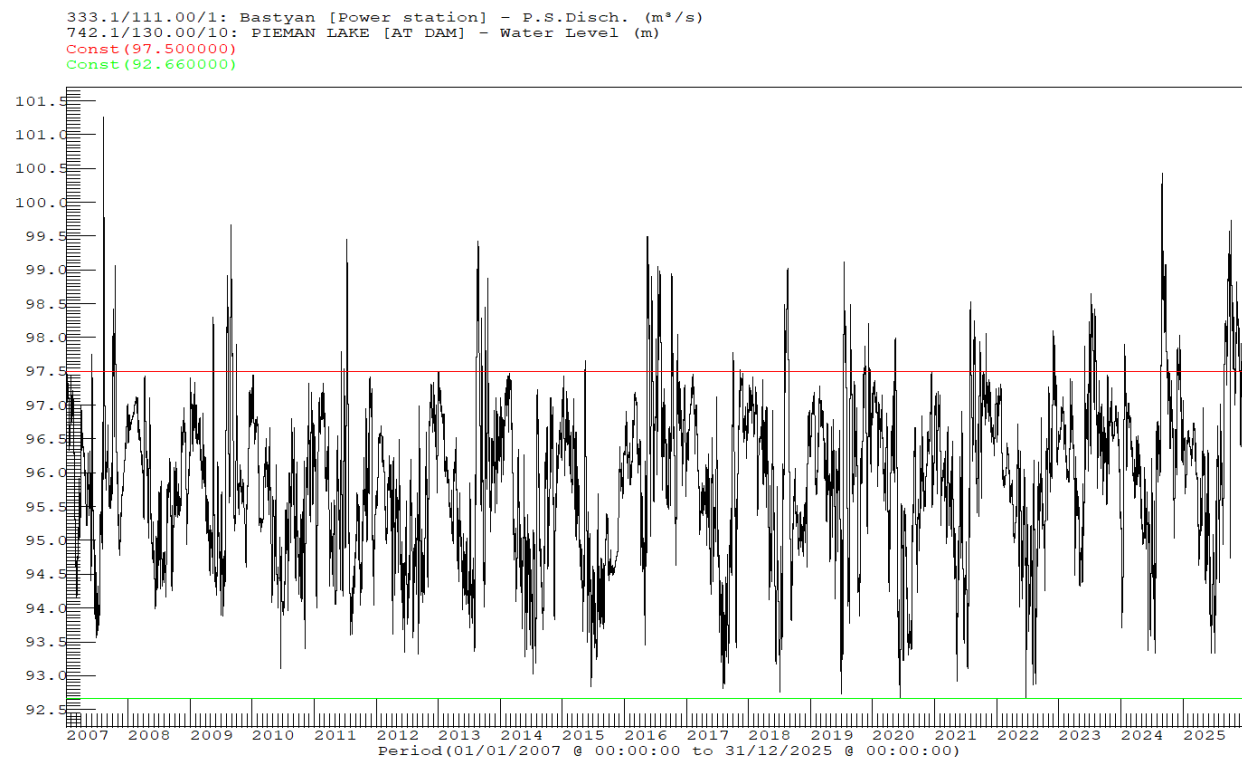


Figure 1.4: Water levels in Lake Pieman from 2006 to 2025. Red line shows full supply level (exceedance is spill) and green line shows the minimum operating level)

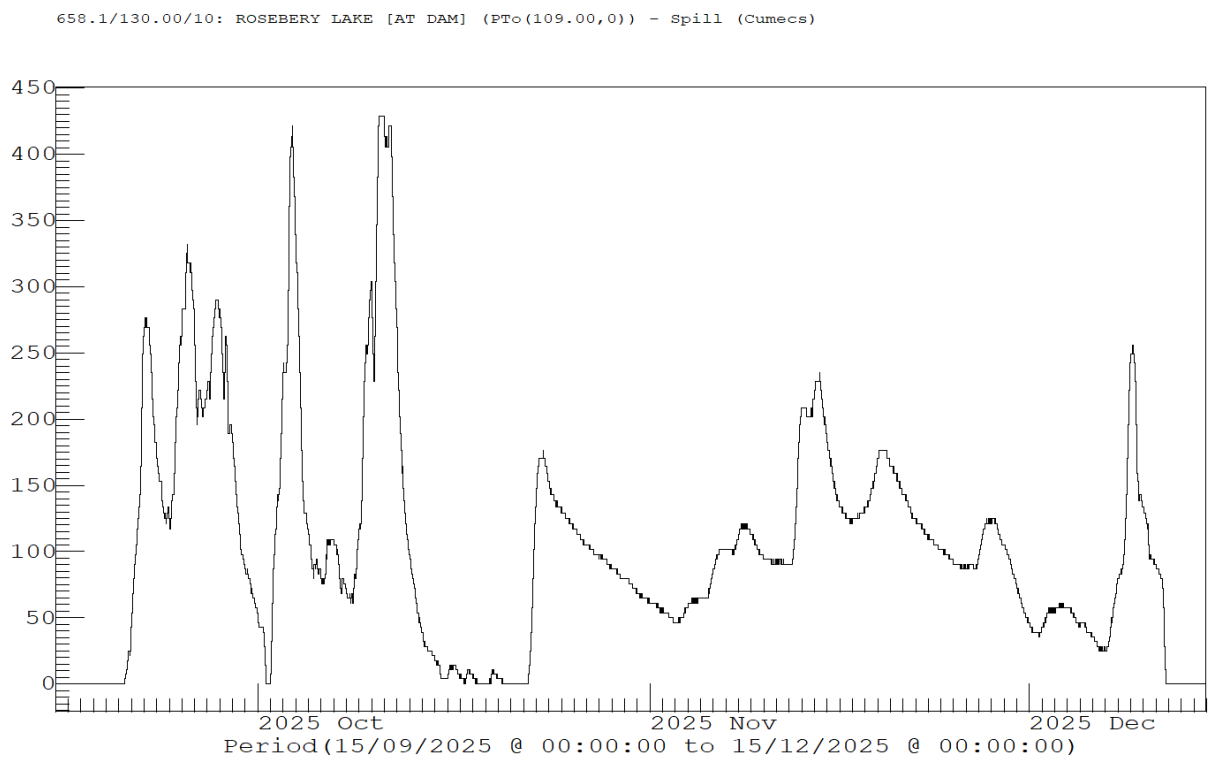


Figure 1.5: Large spill from Bastyan Dam to Lake Pieman in 2025 in the three months prior to the survey.

2. Methods

The survey was conducted on the 15th of December 2025. Fifteen locations on the eastern shore of Lake Pieman¹ were accessed by boat. The sampling methods were consistent with the previous biomonitoring surveys undertaken in Lake Pieman.

Sites 1 to 3 are 2 - 2.7 km upstream from the discharge point and are close to the reference sites MMG use to measure background water quality conditions as part of their other monitoring commitments (Table 2.1; Figure 1.1). Sites 4 – 7 are within 300 metres upstream of the outfall, while sites 8 – 12 are within 460 metres downstream of the outfall and upstream of Bobadil Creek (Table 2.1; Figure 1.1). Sites 13 – 15 are downstream Bobadil Creek and are 0.72 – 1.5 km downstream of the outfall (Table 2.1; Figure 1.1). During development of the monitoring program, it was deemed that site 15 was the most downstream location that could be sampled without the potential for a sustained upstream influence of water quality from the Stitt River (Davies et al. 2011).

Table 2.1: Site groups, site numbers, grid reference and distance from the Bobadil outfall

	Site	Easting	Northing	Distance from outfall (m)
Reference	1	376914	5377951	2670
	2	376744	5377727	2400
	3	376397	5377546	2000
Immediately upstream outfall	4	376229	5376187	290
	5	376313	5376115	180
	6	376396	5376081	90
	7	376457	5376035	20
Immediately downstream outfall	8	376491	5376003	25
	9	376535	5375973	90
	10	376593	5375947	140
	11	376710	5375746	380
	12	376765	5375672	460
Downstream Bobadil Creek	13	376862	5375437	720
	14	377004	5375113	1070
	15	377197	5374778	1460

¹ Since 2006/07, sampling has only been conducted at eastern shore locations, as analyses of previous results indicated that the eastern shore was the only location likely to be affected by the discharge (Davies et al. 2011).

2.1 Benthic algae

At each site, five benthic algae scrapes were collected from submerged tree snags/large woody debris (LWD). Each scrape was collected by using a fixed-area benthic pad scourer (Davies and Gee 1993) on the surface of tree snags approximately 30 – 50 cm from the water surface. Individual sample units were analysed for total chlorophyll-*a* (by a modified acetone extraction-spectrophotometric method - APHA 1993). Statistical differences in mean abundances within the site groups were tested via two-way t-tests and non-parametric Mann–Whitney U tests.

The same scrape method was also used to sample the suspended tile system in December 2025 (Figure 2.1).



Figure 2.1: Example of the system deployed for sampling algae in Lake Pieman in 2024.

2.2 Benthic macroinvertebrates

A single benthic sample was collected per site by using a standard AUSRIVAS kick net (250-micron mesh) to conduct a kick and sweep along a 10 m section of the shoreline. This method is consistent with the collection of edge sampling in riverine habitats during AUSRIVAS sampling. The material collected was placed in zip locked bags and preserved in 70% ethanol.

In the laboratory, each sample was floated in a saturated calcium chloride solution, with hand-sorting of the residue. The floated material was sub-sampled to 20% using a Marchant box-sub-sampler (Marchant 1989). The sub-sample was hand-sorted under a stereo microscope. All macroinvertebrates were counted and identified to family level, except for Nematodes, Oligochaetes, Turbellaria, and Acarina which were not resolved to lower taxonomic levels.

The macroinvertebrate data were analysed as patterns in diversity (number of taxa), abundance and community composition. Statistical differences in mean abundances within the site groups were tested via two-way t-tests.

3. Results

3.1 Preceding lake level conditions, power station and spill conditions

Bastyan Dam on Lake Rosebery was on spill for most of the time from mid-September until December 12, three days prior to the survey. This prolonged period of spill peaked at approximately 430 m³/s with a smaller peak of approximately 255 m³/s on December 9 (Figure 1.5). The lake level declined below the FSL on December 13, falling 30 cm in 24 hours before rising by approximately 15 cm on the day of the survey (Figure 3.1).

Bastyan Power Station was not discharging in the Lake Pieman from mid-October until December 9. The Power Station was discharging approximately 140 m³/s in the 24 hours prior to the survey but was off at the time of the survey (Figure 3.2).

3.2 Shoreline habitat conditions

The following sections describe the habitat conditions (estimate of bank slope, bank materials, snags/LWD, detritus and aquatic macrophytes) recorded at each site. Site photos are provided in Appendix A.

3.2.1 Reference sites (Sites 2 - 3)

Sites 2 and 3 had steep bank profiles of approximately 30 – 50° (Table 3.3; Appendix A.1). The shore material at sites 2 was bedrock, boulder and cobble dominated with overlying sand and silt while site 3 had mainly consolidated clay with embedded boulder and exposed bedrock. Detritus cover was low at sites 2 and 3 (Table 3.3). Large woody debris (LWD) was rare at site 2 but abundant at site 3.

3.2.2 Sites immediately upstream the Bobadil outfall (Sites 4 – 7)

All the shorelines were steep (~40 – 80°) at sites 4 to 7 with bank materials mainly comprised of consolidated clay with a low cover of overlying gravels, sands and silts at all sites and occasional cobble and pebbles at sites 6 and 7 (Table 3.3; Appendix A.2). The cover of fine detritus was low at sites 5 to 7 but was abundant at site 4. LWD was abundant at all sites and the aquatic plant *Isolepis* sp. was present at sites 4 and 5.

3.2.3 Sites immediately downstream the Bobadil outfall (Sites 8 – 12)

The five sites downstream of the Bobadil outfall all had steep banks of consolidated clay with little structural diversity from larger substrate. These sites had a low cover of fine detritus and a low to moderate cover of LWD except for site 12 where LWD was abundant (Table 3.3; Appendix A.3).

3.2.4 Sites downstream Bobadil Creek (Sites 13 – 15)

Of the three sites downstream Bobadil Creek, site 13 was situated on a low sloping bench of consolidated clay with an overlaying cover of loose silt, abundant detritus and the aquatic plant *Isolepis* sp. (Table 3.3; Appendix A.4). Sites 14 and 15 had steep banks with the substrate at site 14 consisting of cobble and pebble embedded in clay with a moderate cover of detritus. The aquatic plant *Isolepis* sp. was also present at site 14.

The substrate at site 15 was mainly comprised of an armoured layer of cobble and pebble (i.e., no fine sediments were visible beneath the coarse rock surface) and a low abundance of detritus (Table 3.3; Section A.1). LWD was abundant at sites 13 and 14 but was scarce at site 15.

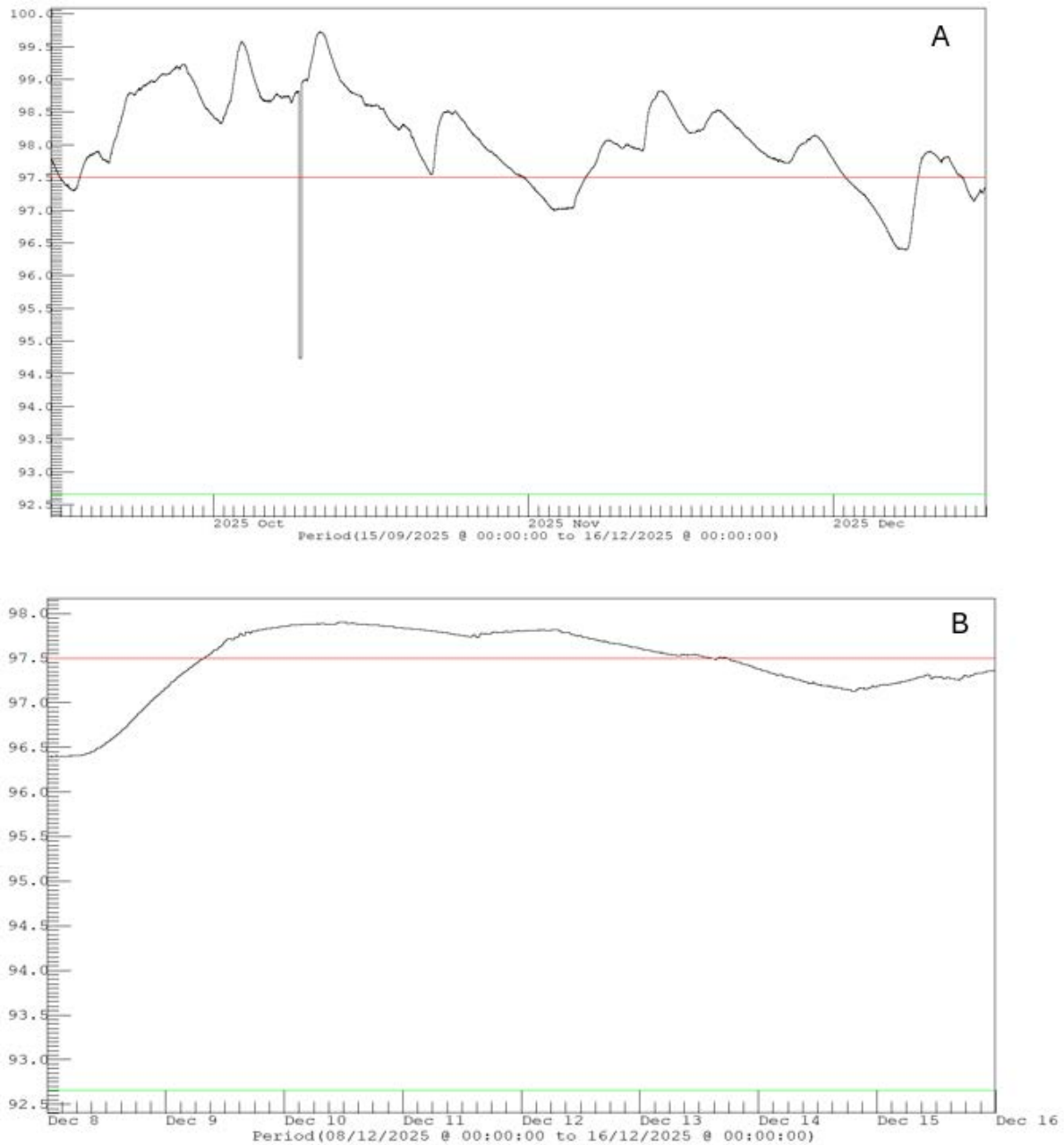


Figure 3.1: Lake level in the three months (A) and week (B) prior to sampling in December 2025. Red line shows the FSL and green line the MNOL.

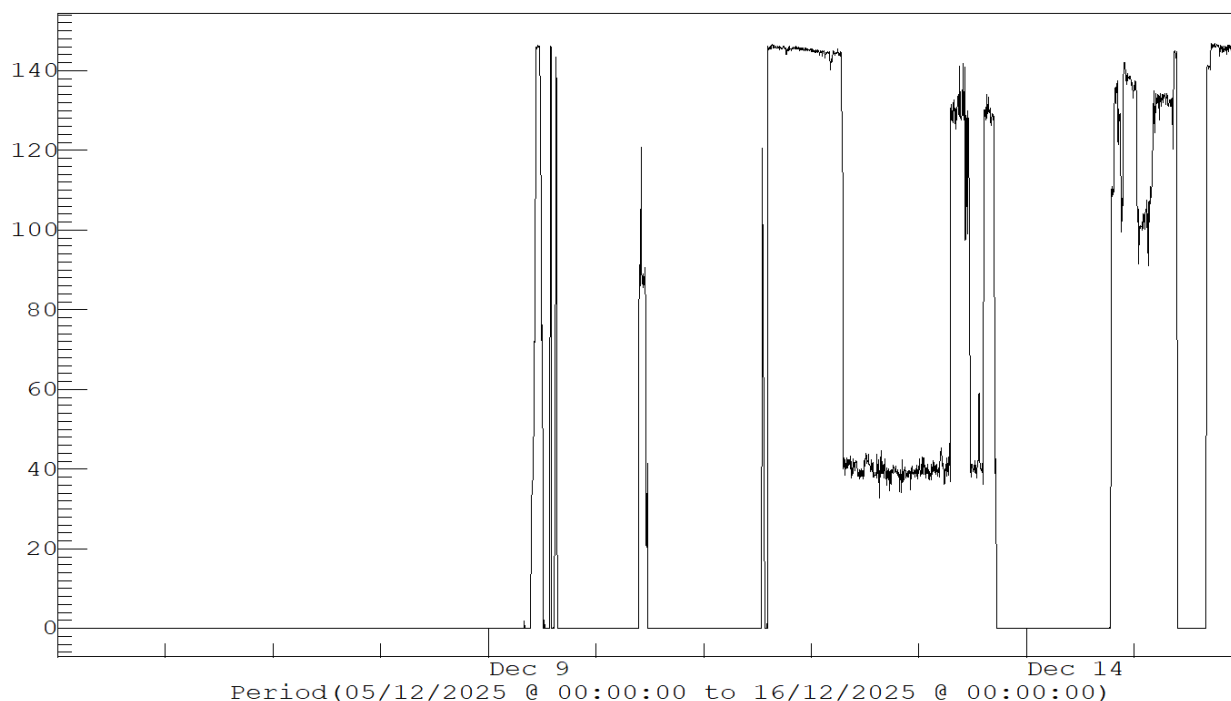


Figure 3.2: Discharge (m^3/s) from Bastyan Power Station prior to and on the day of the survey (December 15) in 2025.

3.3 Conductivity

Electrical conductivity (EC) ranged from 36.2 to 57.4 $\mu\text{S}/\text{cm}$ in December 2025. EC was relatively low and consistent at the reference sites, increased slightly through the sites immediately upstream from the Bobadil outfall, and peaked at Site 8 immediately downstream of the outfall (Figure 3.4). From Site 8, EC generally declined downstream through the remaining sites immediately from the outfall, before increasing slightly at the first site downstream of Bobadil Creek and declining again at the two most downstream sites.

Bastyan Power Station had been operating in the hours immediately preceding the December 2025 survey but was not operating during sampling. The resulting reduction in downstream current and mixing may have contributed to the more pronounced EC peak immediately downstream of the Bobadil outfall. In comparison, the increase in EC immediately downstream of the outfall was less pronounced in September 2023 and November 2024, when the power station was operating during sampling. (Figure 3.4).

EC was substantially higher throughout the lake during the March 2024 survey, when Bastyan Power Station was not operating. The highest EC occurred at Site 4 (123.4 $\mu\text{S}/\text{cm}$), with similarly high concentrations at Sites 5 and 7. While the generally elevated EC across all sites indicates that broader lake conditions were also important during this survey, the substantial increase at sites immediately upstream of the outfall may be consistent with upstream dispersion of higher-EC water from the vicinity of the Bobadil outfall under low-current conditions (Figure 3.4).



Figure 3.3: Bobadil discharge into Lake Pieman between sites 7 and 8.

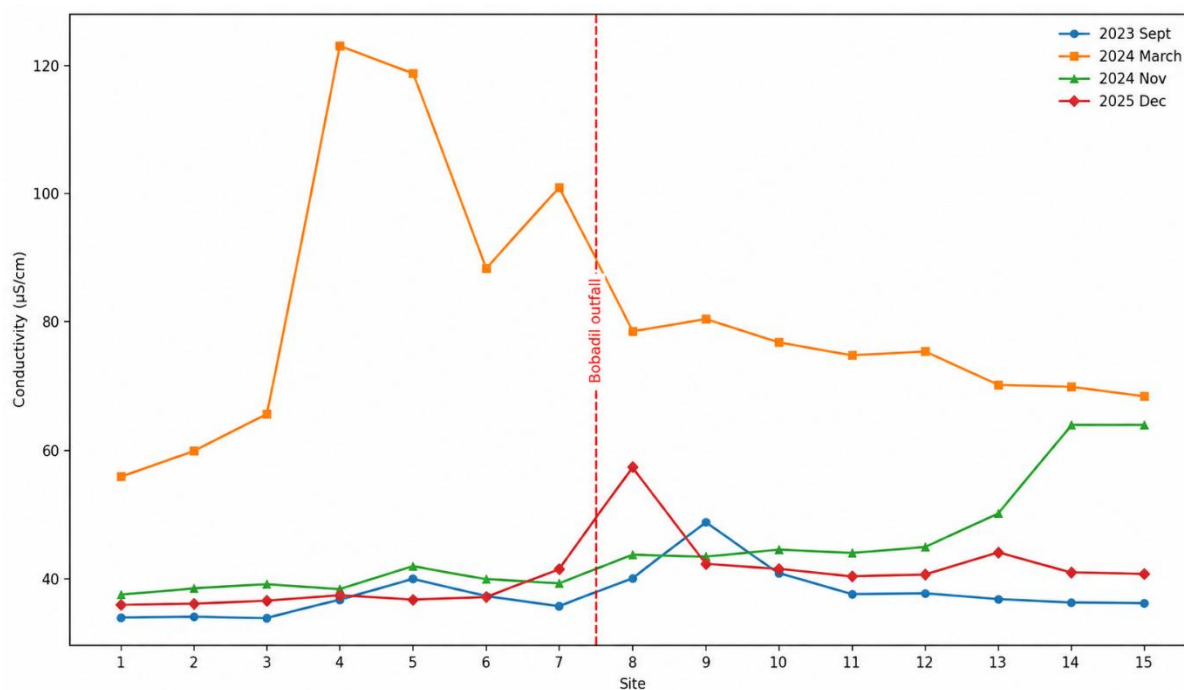


Figure 3.4: Spot conductivity measurements at the monitoring sites during the biomonitoring surveys in September 2023, March 2024, November 2024 and December 2025. The red dashed line shows the position of the outfall from Bobadil Polishing Ponds.

3.4 Benthic algae

The mean chlorophyll-*a* biomass measured from LWD and suspended tiles at each site during the December 2025 survey is presented in Table 3.1. Table B.1 presents the results from all years of monitoring. In contrast to previous years.

Overall, chlorophyll-*a* biomass on LWD was very low at all sites, with the highest value recorded at Site 1 (4.4 mg/m²). To provide context, the mean annual maximum algal biomass over the monitoring program is approximately 15 mg/m². The overall mean across all sites in December 2025 was 1.4 mg/m² (range 0.4–4.4 mg/m²), which was the second-lowest overall mean recorded during the 21 surveys undertaken over the 20-year monitoring program (Table B.1).

Mean chlorophyll-*a* biomass on LWD was highest at the reference sites (mean = 2.6 mg/m²), followed by sites immediately downstream of the outfall (mean = 1.3 mg/m²), sites downstream of Bobadil Creek (mean = 1.1 mg/m²) and sites immediately upstream of the outfall (mean = 0.91 mg/m²) (Figure 3.5). A Welch one-way ANOVA found no statistically significant difference in mean chlorophyll-*a* biomass among the four site groups ($p = 0.60$). A Kruskal–Wallis test, used as a non-parametric comparison, similarly found no significant difference among groups ($p = 0.43$). However, the small number of sites within each group (three to five) resulted in relatively low statistical power.

Twelve of the 15 suspended tiles were recovered during the survey. High lake levels may have obscured the tiles at Sites 1, 7 and 14, although prolonged spilling before the survey may also have dislodged the tile boxes. Except for Site 2, chlorophyll-*a* biomass on the suspended tiles was at least approximately an order of magnitude higher than that recorded from the corresponding LWD samples (Table 3.1). This higher biomass was expected because the suspended tiles, unlike LWD, remain submerged despite changes in lake level. Consequently, they are not subject to the periodic dewatering that limits the usefulness of LWD sampling in the lake, as discussed in Section 4.2.

Mean chlorophyll-*a* biomass on the suspended tiles was lowest at the reference sites (11.6 mg/m²), increasing to 28.7 mg/m² immediately upstream of the outfall, 44.8 mg/m² immediately downstream of the outfall and 38.6 mg/m² downstream of Bobadil Creek (Figure 3.6). A Welch one-way ANOVA found no statistically significant difference among the four site groups ($F_{3,3.02} = 2.13$, $p = 0.274$). However, statistical power was low because only two to four tiles were recovered from each site group, and there was considerable variability within the sites downstream of the outfall.

3.4.1 Long term algal trends

Over the entire monitoring program, the mean chlorophyll-*a* concentration from LWD has been highest at the reference sites but this is mainly due to some very high outlying results at individual sites between 2015 and 2017 (Figure 3.7; Table B.1). The mean chlorophyll-*a* values are similar between the other site groups, although the next highest mean has been at the sites downstream of Bobadil Creek and again this is mainly due to some high outliers in individual years (Figure 3.7; Table B.1).

The median (which better represents the central tendency of the scores than the mean as the median is less influenced by outlying results) chlorophyll-*a* values over the entire monitoring program are similar between the site groups (median show as the horizontal line in the boxes in Figure 3.7) and between individual sites with the exception of site 15 which has generally had low chlorophyll-*a* values compared to the other sites (Table B.1). Potential reasons for variable patterns in chlorophyll-*a* values between sites, within sites and between sampling years is provided in Section 4.

The availability of sunlight is a major determinant for the growth of benthic algae in lakes and rivers. The three reference sites have a predominantly north and west facing aspect. The remaining sites, particularly those immediately up and downstream the Bobadil outfall, have a more easterly facing aspect and therefore are more shaded than the reference sites. It is possible that the higher mean concentration of chlorophyll-*a* at the reference sites over the entire program is related to increased light availability.

Table 3.1: Chlorophyll-*a* biomass recorded from LWD and suspended tiles during the survey in December 2025. Suspended tiles could not be located at sites 1,7 and 14.

Site group	Site	LWD	Tile
		Chl- <i>a</i> (mg/l)	
Reference	1	4.4	-
	2	2.48	5.6
	3	0.84	17.6
Immediately upstream outfall	4	0.40	20.0
	5	1.96	36.0
	6	0.88	30.0
	7	0.40	-
Immediately downstream outfall	8	0.88	92.0
	9	1.08	36.8
	10	0.68	22.0
	11	2.88	29.2
	12	0.92	44.0
Downstream Bobadil Creek	13	1.52	25.2
	14	0.96	-
	15	0.8	52.0

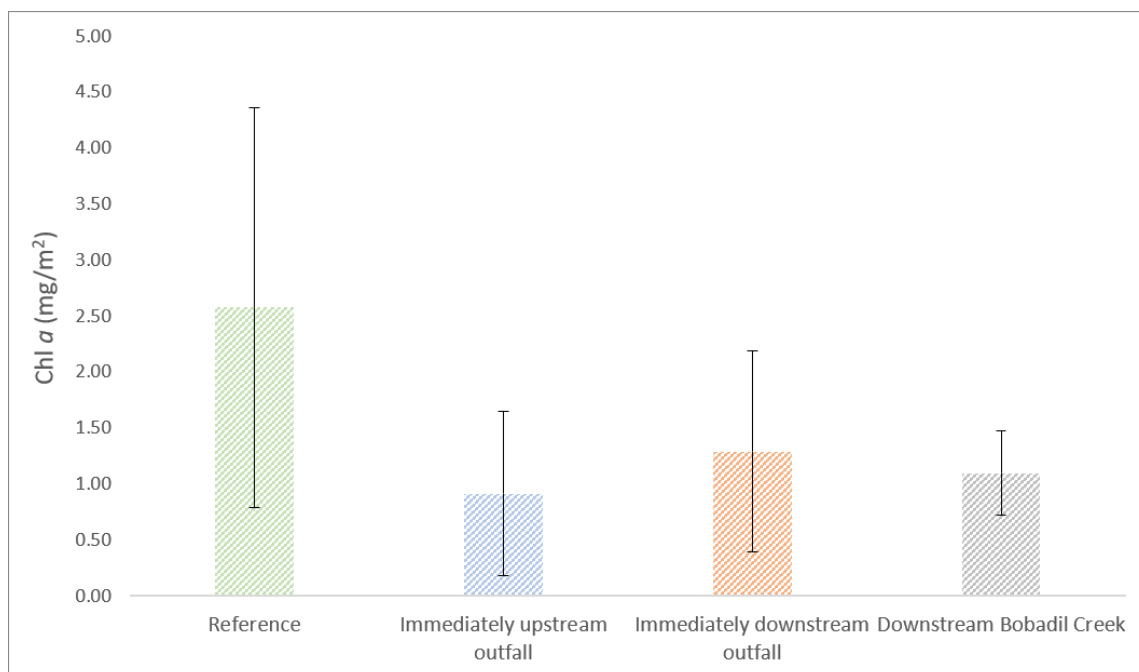


Figure 3.5: Mean chlorophyll-*a* biomass recorded from LWD among the site groups in December 2025. Standard deviation bars are shown.

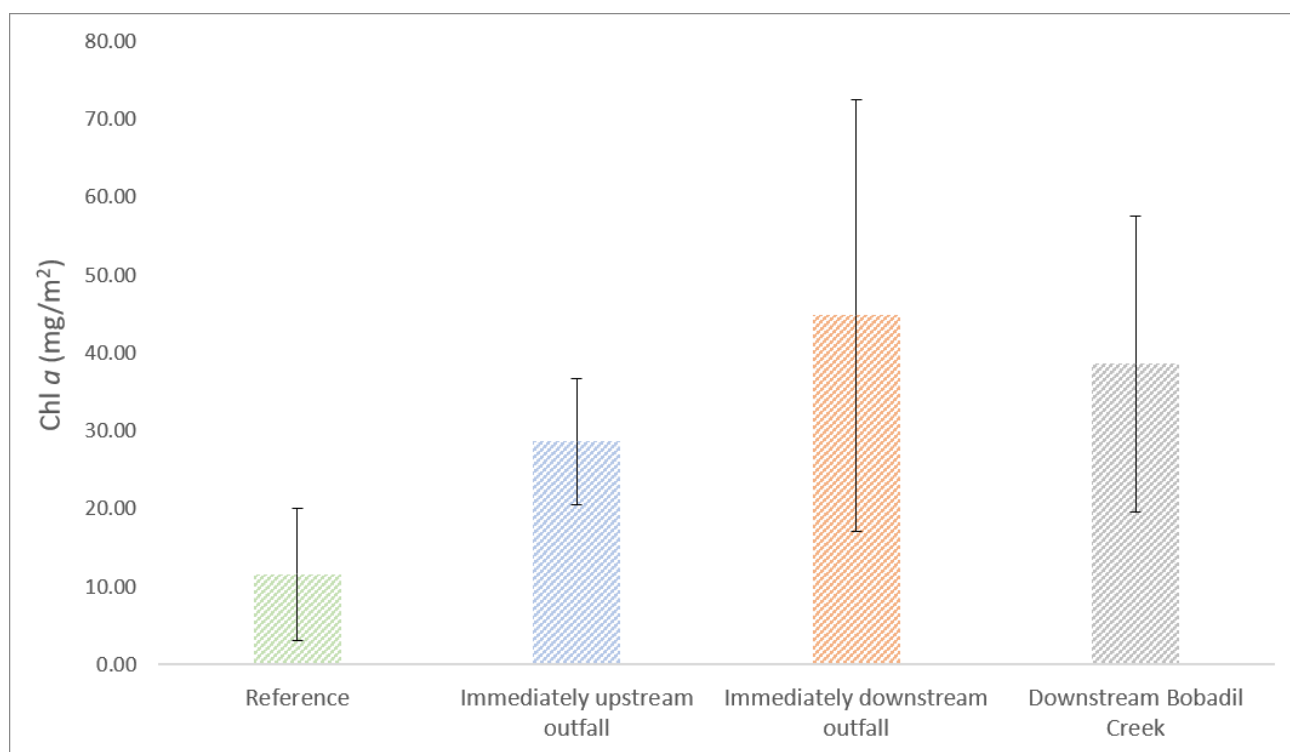


Figure 3.6: Mean chlorophyll-*a* biomass recorded from tiles among the site groups in December 2025. Standard deviation bars are shown.

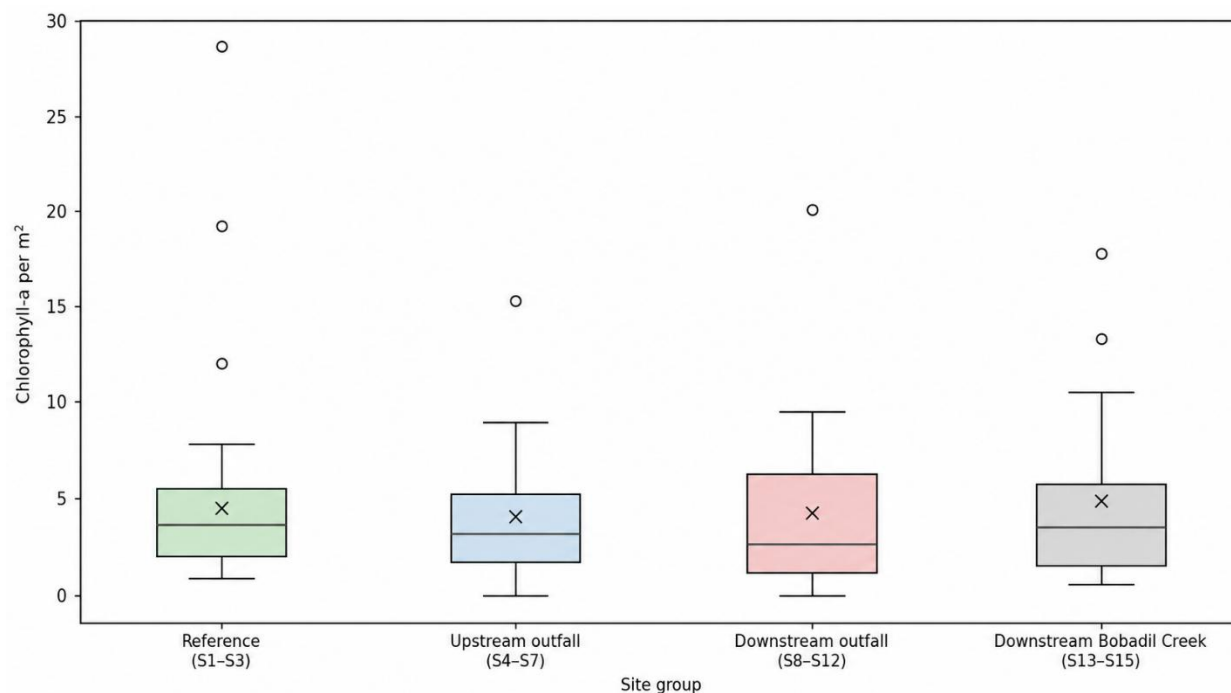


Figure 3.7: Box plot of mean chlorophyll-*a* biomass recorded over the entire monitoring program (2006 – Dec 2025). Plot shows the monthly median (grey line), mean (x mark), the spread between the 25th and 75th quartiles (extent of the bar). The whiskers represent 1.5 the interquartile range and dots represent outlying points.

3.5 Benthic macroinvertebrates

A total of 17 taxa were recorded across the site groups in 2025 (Table C.1). The number of taxa recorded in 2025 was similar among the site groups and was broadly consistent with that recorded over the 20-year monitoring program (Figure 3.8; Figure 3.9). The median number of taxa recorded across all sites in 2025 was seven taxa, equal to the long-term median of seven taxa. Median richness within individual site groups ranged from six to seven taxa in 2025, compared with long-term medians of seven to eight taxa.

Macroinvertebrate abundance in 2025 was similar among the four site groups, with mean abundance ranging from 12.3 individuals at the reference sites to 17.0 individuals downstream of Bobadil Creek (Figure 3.10). Median abundance ranged from 13 to 18 individuals, with no clear spatial pattern associated with the outfall.

Overall abundance in 2025 was low relative to the full 20-year monitoring record (Table C.2; Figure 3.10; Figure 3.11). The mean abundance across all sites was 14.3 individuals and the median was 15 individuals, compared with a long-term mean of 49.8 and median of 27 individuals. However, abundance has generally been substantially lower during the latter part of the monitoring program (Entura 2026). Since 2015, mean abundance across surveys has averaged approximately 18 individuals, compared with approximately 79 individuals during the earlier monitoring period. The 2025 results were therefore below the long-term abundance recorded across the complete monitoring program but broadly consistent with the lower abundances that have characterised the monitoring program since approximately 2015 (Entura 2026).

The 2025 shoreline macroinvertebrate community was dominated by Oligochaeta worms and chironomid fly larvae, with Oligochaeta occurring at all 15 sites and generally comprising the most abundant individual taxon (Table C.1). Chironomids were also widespread, particularly Orthoclaadiinae, which occurred at 13 of the 15 sites, and Tanypodinae, which occurred at 10 sites. Atyidae crustaceans were also widely distributed, occurring at 12 sites. Most other taxa occurred at relatively low abundance and at fewer sites.

Community composition was broadly similar among the reference sites and the sites immediately upstream and immediately downstream the Bobadil outfall, with Oligochaeta generally dominant and Orthoclaadiinae, Tanypodinae and Atyidae making up much of the remaining fauna. The sites downstream of Bobadil Creek differed slightly, with Tanypodinae the most abundant taxon, followed by Oligochaeta, Atyidae and Orthoclaadiinae. The greater abundance of Tanypodinae in this group was influenced by the high abundance recorded at Site 15. (Table C.1).

Table 3.2: Mean abundance and diversity at the site groups from the December 2025 survey

Site group	Total abundance	Diversity
All sites	14.3	6.9
Reference	12.3	6.0
Immediately upstream outfall	15.5	7.3
Immediately downstream outfall	13.0	6.8
Downstream Bobadil Creek	17.0	7.3

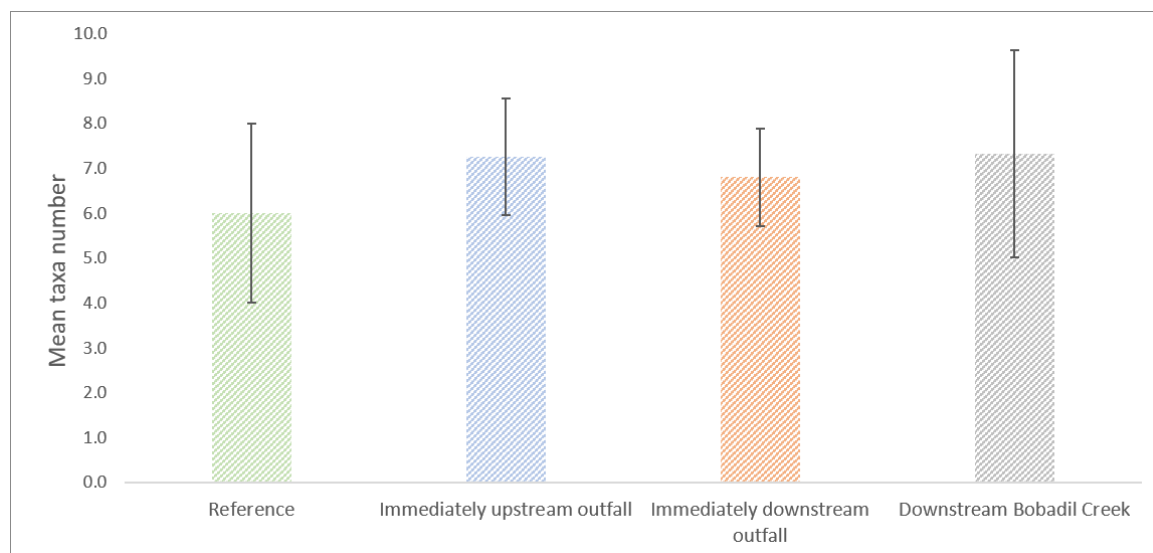


Figure 3.8: Mean number of taxa at each site group from the December 2025 survey. Error bars show the standard deviation.

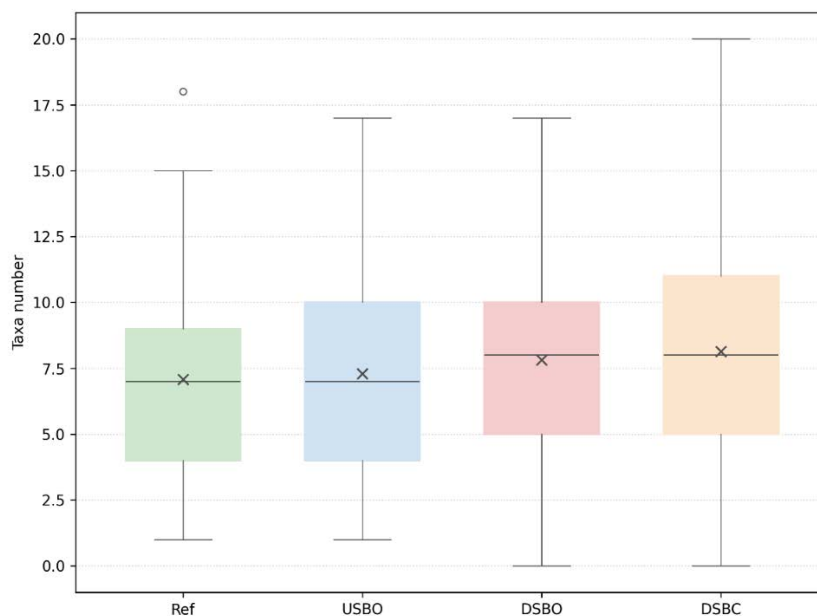


Figure 3.9: Box plot of total macroinvertebrate diversity recorded over the monitoring program (2005 – 2025). Plot shows the monthly median (line within the box), mean (x mark), the spread between the 25th and 75th quartiles (extent of the bar). The whiskers represent 1.5 the interquartile range and dots represent outlying points.

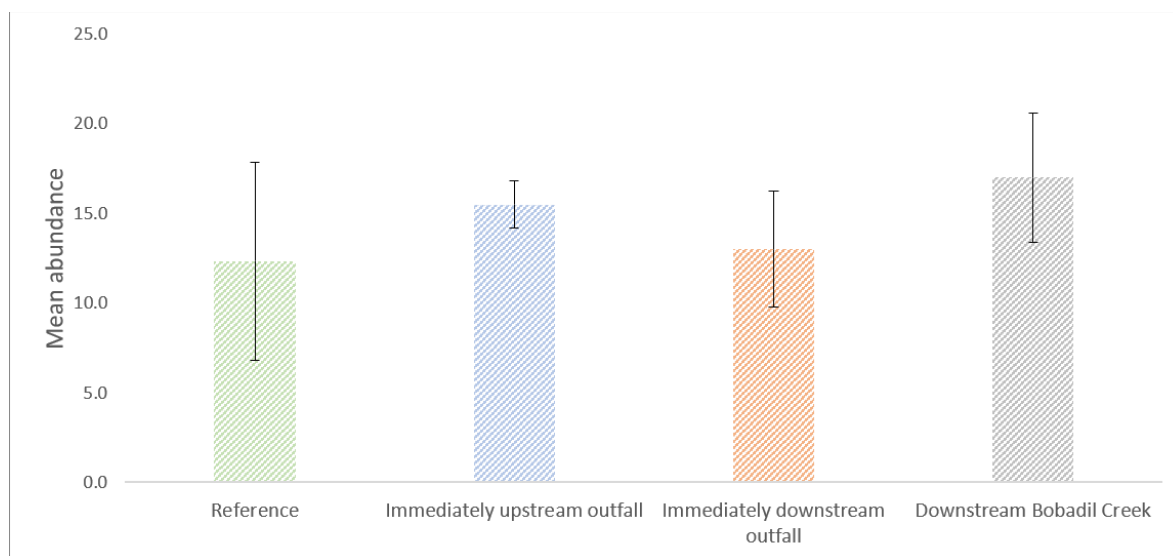


Figure 3.10: Mean abundance at each site group from the December 2025 survey. Error bars show the standard deviation

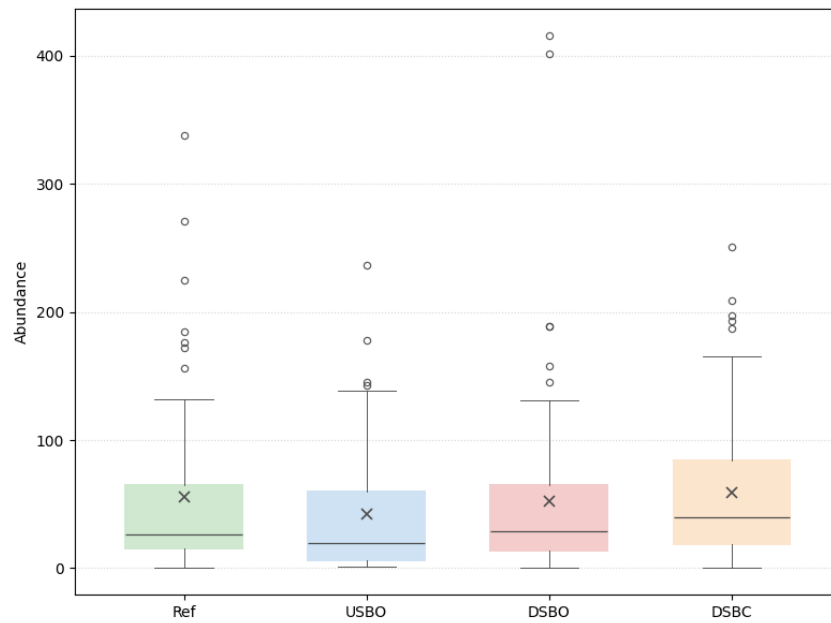


Figure 3.11: Box plot of total macroinvertebrate abundance recorded over the monitoring program (2005 – 2025). Plot shows the monthly median (line within the box), mean (x mark), the spread between the 25th and 75th quartiles (extent of the bar). The whiskers represent 1.5 the interquartile range and dots represent outlying points.

Table 3.3: Habitat conditions recorded at the sites.

Site group	Site No.	Bank slope	Bed material in sampling zone	Large woody debris
Reference	1	Steep: 30 - 50	Bedrock, boulder, cobble, sand and silt with moderate cover of detritus	Occasional fallen trees, diagonally
	2	Steep: 40 - 50	Boulder, cobble, pebble, gravel, sand and silt with low cover of overlying detritus	Low abundance, single fallen tree in sampling area
	3	Steep 70 - 90 slope	Bedrock and boulder embedded in clay, low cover of detritus	Abundant LWD
Immediately upstream outfall	4	Steep 40-60	Gravels, sand silt and compacted clay; abundant cover of detritus; <i>Isolepis</i> present	Abundant LWD
	5	Steep 40-60	Silt and compacted clay, <i>Isolepis</i> present, low cover of detritus, <i>Isolepis</i> present	Abundant LWD both fallen and standing dead trees
	6	Steep 60-80	Pebbles, gravels, sand, silts on compacted clay, low cover of detritus	Abundant LWD both fallen and standing dead trees
	7	Steep 40-60	Occasional cobbles, pebbles, silts and sands on consolidated clay, low cover of detritus	Moderately abundant LWD comprising fallen logs
Immediately downstream outfall	8	Steep 70 - 80	Occasional boulders, cobbles, pebbles and silt on consolidated clay, low cover of detritus	Mod abundance of LWD fallen and standing trees
	9	Steep 70 - 80		Mod abundance of LWD fallen and standing trees
	10	Steep 80 - 90		Mod abundance of LWD fallen and standing trees
	11	Steep 70 - 80		Mod abundance of LWD fallen and standing trees
	12	Steep 70 - 80		Mod abundance of LWD fallen and standing trees
Downstream Bobadil Creek	13	Flatter bench 5 - 20 in sampling area	Silty substrate, abundant detritus and <i>Isolepis</i> sp.	Abundant LWD both fallen and standing dead trees
	14	Steep slope 40 - 60	Cobble and pebble embedded in clay, moderate detritus	Abundant LWD both fallen and standing dead trees
	15	Steep slope 60 - 80	Cobble and pebble, mostly from revetment for offtake, low detritus cover.	Low abundance of fallen and standing trees

4. Discussion

The December 2025 survey provided no evidence of a toxicological effect attributable to the Bobadil outfall on algal biomass or macroinvertebrate communities along the adjacent shoreline of Lake Pieman.

There was no evidence of a decline in macroinvertebrate abundance or taxa richness associated with the outfall which is consistent with the results of the preceding 20 years of monitoring (Entura 2026). Similarly, there was no apparent or statistically significant difference in chlorophyll-*a* biomass measured from LWD among the site groups. Chlorophyll-*a* biomass on the suspended tiles was higher at sites adjacent to and further downstream of the outfall; however, differences among the site groups were not statistically significant. The spatial pattern recorded from the suspended tiles and potential explanations for this are discussed below.

Filtered metal concentrations in the Bobadil discharge indicate that, in the absence of dilution, copper, lead and zinc are the principal metals that may pose a risk to the biological values of Lake Pieman (Entura 2026). However, a recent review of the water-quality data concluded that zinc concentrations within Lake Pieman cannot be directly linked to discharge from the Bobadil TSF (Entura 2026).

Zinc concentrations in the lake, including at sites upstream of the Bobadil outfall, are higher than can be accounted for by the Bobadil discharge and the available mixing within the lake under either power-station-on or power-station-off conditions. Regardless of the source of the additional metals entering the lake, all parameters other than zinc have consistently remained below the applicable ANZG (2018) 95% species protection DGVs and/or more site-specific guideline values that account for factors such as pH, hardness and DOC (Entura 2026). Total zinc concentrations have remained below the applicable guideline values in approximately 85–91% of lake samples. Concentrations predicted for the Bobadil discharge following nominal 10-fold mixing in Lake Pieman were below the zinc guideline in 99% of samples. Collectively, the water-quality results indicate a poor relationship between metal concentrations in the Bobadil discharge and those measured within Lake Pieman and, more importantly, indicate that water quality within the lake poses an overall low risk to the aquatic ecosystem (Entura 2026).

Chlorophyll-*a* biomass on the suspended tiles in December 2025 showed an overall increase with distance downstream, with the lowest biomass recorded at the reference sites and higher biomass at the three site groups farther downstream. The highest biomass was recorded at Site 8 (92 mg/m²), immediately downstream of the outfall which was substantially higher than those recorded at the other sites in this group. However, the overall longitudinal pattern was not dependent on the Site 8 result, with median biomass increasing progressively from 11.6 mg/m² at the reference sites to 30.0 mg/m² immediately upstream of the outfall, 36.8 mg/m² immediately downstream of the outfall and 38.6 mg/m² downstream of Bobadil Creek. There is no obvious mechanism by which the principal contaminants in the outfall would be expected to explain the elevated algal biomass recorded downstream. At elevated bioavailable concentrations, copper and zinc are toxic to algae and have been shown to inhibit algal growth and reduce periphyton biomass (Atazadeh et al. 2009).

The observed longitudinal pattern in algal biomass on the tiles may instead be influenced by differences in hydraulic exposure. Sites closest to Bastyan Power Station experience greater current velocities

during generation, with hydraulic shear expected to generally decrease farther downstream². Greater scour of the suspended tiles at upstream sites could therefore limit standing algal biomass. The loss of the tile assembly at Site 1 during the December 2025 survey and the very low biomass recorded at Site 2 are consistent with, although do not demonstrate, this hypothesis. In the absence of site-specific hydraulic and nutrient data, the cause of the observed spatial pattern cannot be determined.

Overall, the 20-year biomonitoring program has provided no clear evidence of toxicological impacts from the Bobadil outfall on shoreline biological condition in Lake Pieman. Macroinvertebrate metrics have generally indicated condition similar to reference sites in terms of abundance and taxa richness, or in some cases better condition based on community composition (Entura 2026).

The only relatively consistent pattern identified during the monitoring program was a decline in LWD chlorophyll-*a* biomass from 2016 onwards at sites immediately upstream of the outfall and at all downstream sites. This decline coincided with cessation of wastewater discharge to the Bobadil outfall and has been attributed to the resulting reduction in nutrient inputs to Lake Pieman. Although several of the affected sites are located upstream of the outfall, dispersion of outfall water occurs upstream when Bastyan Power Station is not operating, which occurs for approximately 40% of the time. These sites may therefore also have been influenced by nutrients discharged with the wastewater. Supporting this hypothesis, a corresponding decline in algal biomass was not evident at the reference sites located several kilometres farther upstream. However, the absence of a long-term nutrient dataset and the substantial influence of lake-level fluctuations on LWD sampling mean that a causal relationship between wastewater diversion and the observed decline in algal biomass cannot be demonstrated.

Mild to moderate nutrient enrichment can also increase macroinvertebrate abundance and, in some circumstances, taxa richness. Both metrics declined during the latter part of the monitoring program; however, similar declines were also evident at the reference sites. This suggests that broader lake-scale or temporal factors, rather than changes in nutrient inputs associated specifically with the Bobadil outfall, were likely to have contributed to the decline.

4.1.1 Limitation of shoreline biomonitoring in lake environments

The generally poor condition of the shoreline macroinvertebrate community in Lake Pieman is typical of Tasmanian hydropower storages with large operating ranges. Repeated and rapid fluctuations in water level restrict the establishment of riparian and aquatic vegetation that would otherwise stabilise shoreline substrates and provide habitat. Wave action and fluctuating water levels also promote shoreline erosion and the removal of soil and organic material. As a result, much of the shoreline comprises rock or compacted clay substrates with relatively little shelter, food or structural complexity for aquatic and terrestrial organisms. Repeated wetting and drying further limits the establishment of shoreline biota and contributes to naturally low abundance and diversity.

Apart from the Lake Pieman biomonitoring program, there are no comparable long-term datasets for shoreline macroinvertebrates in Tasmanian hydropower storages. However, one-time surveys undertaken in Lake Cethana, Lake Plimsoll and Lake Murchison, which also have large operating ranges and steep, eroded shorelines, have recorded similarly low macroinvertebrate abundance and diversity. In contrast, hydropower storages with more restricted operating ranges, including Bronte Lagoon, Brady's Lake, Lake Binney, Tungatinah Lagoon, Mossy Marsh Lagoon and Lake Mary, generally support

² However, local hydraulic conditions are likely to vary considerably among sites because of shoreline morphology, embayments, standing timber and other features.

more structurally diverse shoreline habitats and more abundant and diverse macroinvertebrate communities (William Elvey, personal observation).

4.1.1.1 Limitations of the sampling methodology in Lake Pieman

The inherent environmental variability associated with the operation of Lake Pieman as a hydropower storage is likely to substantially reduce the ability of the monitoring program to detect biological effects attributable to the Bobadil outfall. Consistent sampling conditions cannot be achieved either among sites or at individual sites between surveys because of the dynamic nature of lake levels. These fluctuations cannot reasonably be controlled for but can substantially alter shoreline habitat conditions and the environmental conditions experienced by algae and macroinvertebrates prior to sampling. Algae are particularly sensitive to these changes because biomass is influenced by substrate stability, duration of inundation and depth within the photic zone.

The processes described above result in unstable shoreline habitats with low structural complexity and limited areas suitable for productive benthic algal and macroinvertebrate communities. This is particularly evident along the steep-sided shorelines that dominate Lake Pieman immediately downstream from Bastyan Dam and in the vicinity of the Bobadil outfall. The high spatial and temporal variability in these habitat conditions is therefore likely to substantially reduce the sensitivity of the biomonitoring program to biological effects associated with the outfall.

NRE Tas has recently reviewed the algal scrape method used in the Lake Pieman monitoring program, originally developed by Davies and Gee (1994). Following this review, NRE Tas and other environmental agencies have discontinued use of the method in their own monitoring programs because of limitations associated with sample recovery. For example, studies undertaken in New Zealand found that 30–50% of chlorophyll could be lost when the sampling pad was removed from the substrate and retrieved through the water column. NRE Tas now favours methods in which rocks are removed from the water and algae are collected from a known surface area. However, this approach is not practicable for submerged snags, while moveable rocks suitable for sampling are uncommon along the Lake Pieman shoreline.

A further limitation is the variable nature of snag habitat among sites. Some sites contain predominantly horizontal submerged timber, whereas others contain standing dead trees. This affects the orientation and depth of the substrate available for sampling, its distance from the shoreline and the degree of shading from terrestrial vegetation. These differences introduce additional variability that makes it difficult to obtain directly comparable algal samples among sites and surveys. The suspended tiles which were deployed in 2024 partially address this issue; however, the data from the tiles cannot be readily compared to the sampling of algae from the LWD.

4.1.2 Purpose and benefits of the biomonitoring program

The operational regime of Lake Pieman as a hydropower storage is likely to limit the ability of the shoreline biomonitoring program to distinguish biological effects associated with the Bobadil outfall from the substantial background variability generated by lake operations. The wider applicability of these data is also limited, as the physical and biological effects of hydropower operations on artificial storages are already well understood globally.

4.1.3 Recommendation

The Lake Pieman shoreline biomonitoring program was established to assess potential biological effects associated with discharge from the Bobadil outfall. After 20 years of monitoring, there has been no clear evidence of toxicological impacts on shoreline macroinvertebrate communities or benthic algal biomass attributable to the outfall. This may reflect the absence of a biologically significant toxicological effect, or the limited ability of the monitoring program to distinguish such an effect from the high natural and operational variability of the shoreline environment.

The available water-quality data support the former interpretation. Metal concentrations measured within Lake Pieman cannot be directly related to the Bobadil discharge, and concentrations of most metals measured in the discharge are below applicable DGVs even before dilution within the lake is considered. When available dilution is considered, predicted concentrations are below the applicable 95% species protection DGVs.

Considering the biological and water-quality evidence together, there appears to be limited benefit in continuing the existing routine shoreline biomonitoring program. Although the program has detected temporal and spatial variation in biological condition, it has not demonstrated an ability to reliably distinguish biological changes attributable to toxicants in the Bobadil discharge from those associated with lake-level fluctuations, hydrodynamic conditions and other sources of environmental variability. Continuation of the program is unlikely to provide substantially greater confidence regarding the ecological effects of the outfall

5. References

APHA 1993. Standard Methods for Water and Wastewater Analysis. APHA-AWWA, Vol. 19., Princetown USA.

Atazadeh, I., Kelly, M., Sharifi, M. & Beardall, J. (2009). The effects of copper and zinc on biomass and taxonomic composition of algal periphyton communities from the River Gharasou, Western Iran. *Oceanological and Hydrobiological Studies*, 38, 3–14. DOI: 10.2478/v10009-009-0027-3

Davies P.E, Cook L.S.J and Sloane T. 2005. Definition of Bobadil discharge mixing zone in Lake Pieman by in-lake biological sampling. Report to Zinifex Pty Ltd, Rosebery Mine. March 2005. 22 pp.

Davies P.E., Cook L.S.J and Sloane T. 2011. Lake Pieman - Bobadil discharge zone Biomonitoring Report 2010/11. Report to MIM Pty Ltd, Rosebery Mine. July 2011. 20 pp.

Davies AL and Gee JHR 1993. A simple periphyton sampler for algal biomass estimates in streams. *Freshwat. Biol.* 30, 47-51.

Entura 2023. Lake Cethana PHES: Aquatic Baseline Report and Impact Assessment. Report to Hydro Tasmania, July 2023. 157 pp.

Entura 2024. Lake Pieman Biomonitoring. Bobadil discharge: 2023 survey. Report to MMG Pty Ltd, Rosebery Mine. February 2024, 43 pages.

Entura 2026. Lake Pieman Biomonitoring Program: Review. Report to MMG Pty Ltd, Rosebery Mine. August 2026. 61 pp.

Mallick, S. 2020. Lake Pieman - Bobadil discharge zone Biomonitoring Report 2020. Report to MMG Pty Ltd, Rosebery Mine. November 2020. 8 pp.

Mallick, S. 2022 Lake Pieman - Bobadil discharge zone Biomonitoring Report 2022. Report to MMG Pty Ltd, Rosebery Mine. March 2022. 18 pp.

Marchant R. 1989. A subsampler for samples of benthic invertebrates. *Aust. Soc. Limnol. Bull.* 12, 49-52.

Appendices

A Site photos

A.1 Reference sites



Figure A.1: Site 1



Figure A.2: Site 2



Figure A.3: Site 3

A.2 Sites immediately upstream the Bobadil outfall



Figure A.4: Site 4



Figure A.5: Site 5



Figure A.6: Site 6



Figure A.7: Site 7

A.3 Sites immediately downstream the Bobadil outfall



Figure A.8: Site 8 (Bobadil outfall can be seen in the background)



Figure A.9: Site 9



Figure A.10: Site 10



Figure A.11: Site 11



Figure A.12: Site 12

A.4 Sites downstream Bobadil Creek

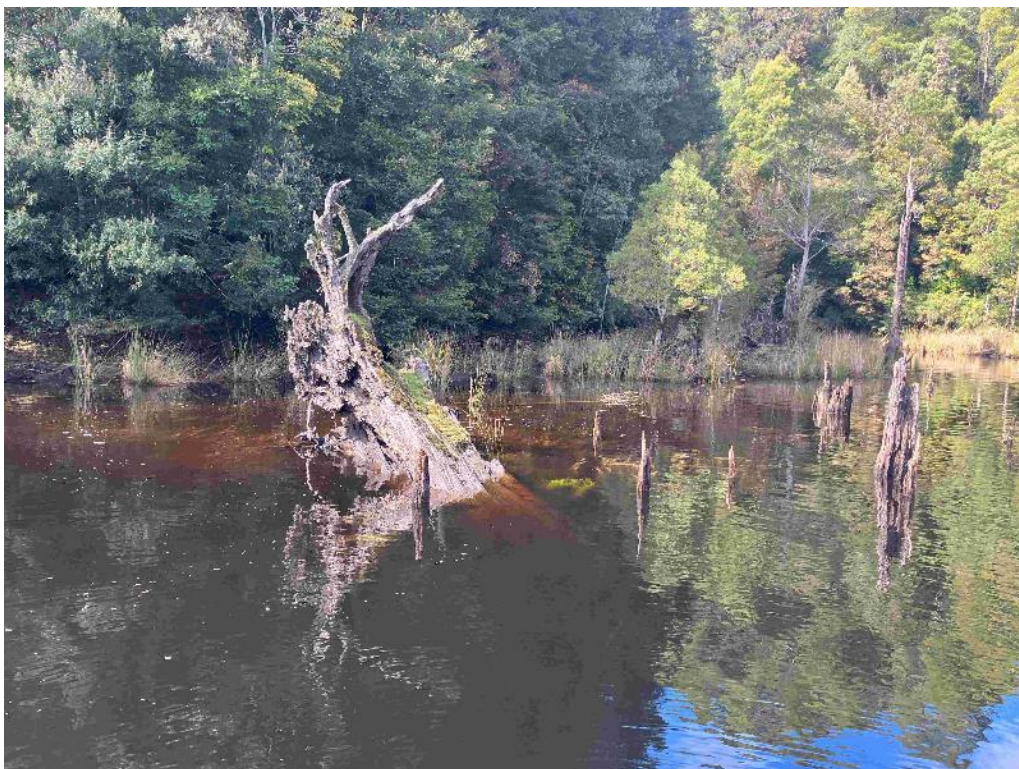


Figure A.13: Site 13



Figure A.14: Site 14



Figure A.15: Site 15

B Benthic algae data



Table B.1: Chlorophyll-*a* concentrations at each site (mg/m2) from 2005 to 2025

	Location	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2022	2023	2024	2025	Mean per site
Reference	1	2.45	1.8	3.81	0.65	1.52	1.14	6.7	6.42	6.32	8.87	17.8	2.99	33.48	2.99	3.54	0	11.43	8.4	1.6	4.4	6.15
	2	2.77	7.51	1.09	10.34	2.89	0.49	3.97	2.99	7.84	10.34	21.01	2.18	36.2	1.63	4.36	2.18	11.16	2.4	0.4	2.48	6.69
	3	0.76	5.01	1.69	5.5	1.63	1.53	5.61	5.17	5.93	16.55	18.46	3.54	16.33	1.91	2.99	0.82	0.82	0.36	0.36	0.84	4.90
Immediately upstream outfall	4	1.2	5.33	2.5	0.76	2.67	1.74	9.96	10.73	2.29	6.42	6.32	1.09	3.81	3.54	1.63	0.54	2.72	0.4	0.4	0.4	3.40
	5	2.67	10.07	4.19	0.76	7.57	2.5	12.68	9.53	5.93	5.12	14.92	4.36	2.45	1.91	1.36	1.36	2.18	5.6	0.8	1.96	5.05
	6	0.82	6.42	5.06	1.63	2.18	3.75	3.48	16.5	5.93	3.65	6.15	1.09	2.45	2.18	1.09	10.62	1.63	0.36	0.36	0.88	4.07
	7	3.05	7.08	9.04	1.85	3.7	6.75	9.64	24.17	8.06	0.98	2.99	1.36	3.54	13.61	3.54	0.27	11.43	3.6	1.2	0.4	6.14
Immediately downstream outfall	8	4.19	4.96	4.74	1.79	5.23	11.49	2.39	9.09	2.99	2.01	5.12	2.18	3.27	0.82	3.81	1.91	3.81	0.8	0.36	0.88	3.95
	9	18.95	3.38	4.25	3.92	19.71	5.88	18.02	32.23	1.2	3.43	7.84	2.18	2.99	0	0.82	0	3.27	2.4	0.8	1.08	7.01
	10	11.54	1.91	5.01	20.96	7.29	2.45	6.75	19.16	0.98	1.36	9.04	2.99	2.99	0.54	0	0	1.91	0.8	0.4	0.68	5.30
	11	1.47	6.64	3.43	1.96	2.88	7.78	7.18	16.77	2.07	1.58	3.48	8.17	2.45	2.99	1.09	1.91	0	2	0.4	2.88	4.26
	12	1.74	2.67	4.79	4.95	5.06	2.89	4.74	21.29	4.46	3.21	21.61	7.08	2.99	2.18	2.99	1.36	13.07	0.4	0.36	0.92	5.99
Downstream Bobadil Creek	13	8.87	3.76	3.97	16.11	4.46	2.89	10.45	17.2	2.34	7.62	19.87	1.91	2.72	4.9	0.27	3.54	21.23	1.6	0.8	1.52	7.38
	14	5.88	5.94	4.36	8.82	6.75	2.62	6.42	17.31	7.02	5.01	13.66	5.99	20.42	0.82	0.82	3.54	2.99	0.36	0.36	0.96	6.65
	15	0.6	0.76	1.74	2.72	0.82	1.25	0.82	17.96	1.63	0.38	6.59	1.91	6.26	1.09	1.09	0	7.08	0.36	0.36	0.8	3.42
	Mean per year	4.5	4.9	4.0	5.5	5.0	3.7	7.3	15.1	4.3	5.1	11.7	3.3	9.5	2.7	2.0	1.9	6.3	2.0	0.6	1.4	5.48

C Macroinvertebrate data

Table C.1: Macroinvertebrates recorded during the December 2025 survey

Phylum or Class	Order	Family	Site														
			Reference			Immediately upstream outfall				Immediately downstream outfall					Downstream Bobadil Creek		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Annelida	Oligochaeta		1	7	4	7	5	2	8	4	3	3	5	2	3	4	3
Nematoda					1	1		2		1		2				1	
Turbellaria							2			2			1		1		
Arachnida	Acarina			2	1		1	2	2		1	1		1		1	2
Collembola					1		1					2				2	
Gastropoda		Planorbidae						1						2			
Crustacea	Amphipoda	Ceinidae					1									1	
		Paramelitid											2	1			
	Decapoda	Atyidae	1		1	2		2	1	2	1	1	2		3	4	1
Insecta	Hemiptera	Veliidae					1	2				1	3				1
	Collembola			1	1				1								
	Diptera	Chironomidae															
		Sub-fam: Orthocladinae	1	3	5	1	2		3	1		4	2	2	2	1	4
		Sub-fam: Chironominae		2					1		2						
		Sub-fam: Tanypodinae	3	1		3		2		2			2	3	1	2	9
		Empididae															
		Ceratopogonidae				1		2									
		Tipulidae															
	Trichoptera	Leptoceridae			1		1				1			1	3	1	
	Coleoptera	Dytiscidae adult						2		1				1		1	
		Total Abundance	6	16	15	15	14	17	16	13	8	14	17	13	13	18	20
		N Taxa	4	6	8	6	8	9	6	7	5	7	7	8	6	10	6

Table C.2: Abundance data at the sites and site groups over the entire monitoring period. Note earlier reports reported on zooplankton but the counts of these have been removed from this table.

Year	Reference			Immediately upstream outfall				Immediately downstream outfall					Downstream Bobadil Creek		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2005	25	25	21	38	25	7	5	131	25	27	25	103	70	27	65
2006 (April)	176	47	225	237	100	117	84	95	103	51	128	122	197	209	90
2006 (Oct)	17	67	185	108	145	104	118	402	83	416	122	128	251	90	82
2008	33	16	29	6	32	70	22	38	30	36	9	28	39	25	30
2009	30	40	39	15	25	46	36	28	48	47	24	39	107	21	46
2009 (Sept)	28	52	96	46	61	129	139	93	36	115	91	189	105	33	90
2010 (May)	18	19	17	60	10	7	14	42	87	19	49	26	103	43	12
2011 (April)	18	338	97	97	10	130	59	65	189	66	52	99	165	109	21
2012 (March)	64	271	156	20	129	44	178	61	96	158	53	145	69	187	90
2013 (April)	13	86	172	22	53	29	56	27	28	56	32	13	50	49	17
2014 (April)	109	120	132	33	87	75	143	50	84	100	50	27	58	148	40
2015 (April)	29	16	10	19	34	40	10	36	13	35	22	51	54	67	40
2017 (May)	15	61	59	15	17	11	26	25	12	32	19	25	25	37	14
2018 (Oct)	5	2	1	6	13	3	2	2	2	2	1	6	9	6	6
2019 (Oct)	25	18	5	8	6	3	5	7	20	7	14	5	29	11	9
2020 (Oct)	43	70	1	6	5	2	5	2	16	5	20	8	39	1	7
Feb (2022)	35	47	3	5	16	4	3	2	12	16	14	3	193	49	7
Sept (2023)	21	22	6	6	6	17	11	20	52	17	10	17	19	37	19
March (2024)	10	14	17	10	18	8	76	72	33	37	8	23	55	9	40
Nov (2024)	0	3	2	1	4	3	2	0	1	3	2	9	5	0	0
Dec (2025)	6	16	15	15	14	17	16	13	8	14	17	13	13	18	20

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**Appendix F Biological Condition of the Ring and Stitt Rivers: Spring 2025 and Autumn 2026
(Entura, 2026)**

Biological condition of the Ring and Stitt rivers

Spring 2025 and autumn 2026 surveys

9 September 2026

Prepared by Hydro-Electric Corporation ABN48 072 377 158

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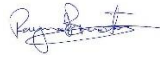
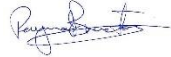
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Executive summary

The 2025–26 monitoring confirms a clear contrast between the Ring and Stitt rivers. The Ring River remains substantially impaired by legacy mine-related contamination, particularly downstream of Baker Creek, with macroinvertebrate indicators showing poor to extremely poor biological condition.

In the Stitt River, biological condition has improved over the longer term, particularly since 2021. The 2025–26 results indicate that condition is generally better in the upper and middle river, including at S3 and S4 downstream of the 2/5 Dam TSF, and poorer in the lower river at S5, S5.5 and S6. This pattern indicates that the strongest contemporary biological impairment occurs farther downstream rather than immediately below the 2/5 Dam TSF.

Integration of the biological and water-quality data indicates that increasing exposure to mine-related contaminants is associated with declining macroinvertebrate condition. The strongest deterioration occurs downstream of Rosebery and Primrose creeks, where cadmium and lead increase markedly and copper and zinc remain elevated. The poorer biological condition at the lower sites is most consistent with exposure to a mixture of metals, with cadmium and lead appearing to be particularly important contributors to impairment in the lower river.

Seasonal differences were also evident, with consistently high flows before the spring 2025 survey likely contributing to poorer macroinvertebrate results and weaker relationships with water quality. Relationships between metal exposure and biological condition were clearer in autumn 2026.

Fish monitoring is less sensitive and more variable than macroinvertebrate monitoring, but longer-term trends in brown trout abundance are broadly consistent with improving river health in the Stitt River upstream of the Rosebery Creek inflow.

Overall, the monitoring indicates substantial long-term improvement in the Stitt River, while biological impairment remains evident in the lower river where additional legacy and current mine-related contaminant inputs occur.

1. Introduction

MMG is required to undertake biological monitoring in the Stitt and Ring rivers in spring and autumn each year under its principal Environmental Protection Notice (EPN 7153/3). The monitoring comprises physico-chemical spot water quality measures; instream habitat assessments; qualitative fish surveys; quantitative macroinvertebrate sampling (Surber sampling); and qualitative macroinvertebrate sampling (AusRivAS method).

The monitoring program was established in 2004 (Davies et al. 2004) and has been undertaken in most years since then. The overall design of the program has remained the same although some parameters and analyses have changed over time.

The specific aims of the surveys are to:

- describe the condition of the habitat, water quality and biological communities in the Stitt and Ring rivers;
- evaluate changes over time which may be attributable to habitat and water quality conditions that are influenced by management actions associated with MMG's operations.

The Ring River has been found to be in a highly degraded ecological condition with low abundances and diversity of macroinvertebrates throughout, and a complete absence of fish (Davies et al. 2005a, b; 2006a; 2007 – 2017). The ecological condition of the Stitt River has consistently been better than the Ring, although sites in the lowest reaches continue to be rated as impaired, particularly prior to improvements in tailings and water management.

This report presents the results of biomonitoring undertaken in spring 2025 and autumn 2026 and provides analysis and discussion of the 2025–26 results in comparison with previous monitoring periods.

1.1 Water Quality Background

1.1.1 Stitt River

The Stitt River receives mine-related contaminants (MRCs) from a range of historical and contemporary sources associated with the Rosebery mine and township (including historical workings, waste rock, fill, seepage and groundwater pathways) (Koehnken 2026).

These inputs vary spatially along the river and have also changed over time in response to improvements in site water management. Consequently, the existing biological condition of the Stitt River reflects the cumulative influence of multiple contaminant sources rather than a simple upstream–downstream response to the 2/5 Dam Tailings Storage Facility (TSF) (Koehnken 2026).

Water quality upstream of the principal mine-related inputs is generally characteristic of relatively undisturbed west coast streams. Monitoring at WL8, upstream of the 2/5 Dam TSF, has recorded naturally variable pH, very low electrical conductivity, low acidity and alkalinity, and generally low metal concentrations. The 2025–26 monitoring results were consistent with the historical record at this site and were considered typical of west coast rivers (Koehnken 2026). These results support the use of the upstream Stitt River sites S0/SR01, ML02, S1/ML04 and S2/WL8 as reference sites for assessing downstream changes in water quality and biological condition.

Historically, the 2/5 Dam TSF and associated mine-water management infrastructure contributed contaminants to the Stitt River. However, water management at the mine has progressively improved, including increased collection and treatment of stormwater and redevelopment of the 2/5 Dam TSF (Koehnken 2026). More recent works have further reduced uncontrolled seepage from the TSF. Separation and collection of TSF seepage in the Murchison Highway area during 2021–22 resulted in substantial reductions in metals, sulphate and acidity at the former seepage monitoring site MHS2, while additional seepage collection works installed in 2022–23 isolate seepage and return it to the TSF for treatment. During the 2025–26 monitoring year there was no discharge of decant water from the 2/5 Dam TSF to the Stitt River and no overflow from the seepage collection pond (Koehnken 2026).

The available water-quality data nevertheless indicate that the 2/5 Dam area remains a diffuse source of contaminants to the Stitt River. Zinc concentrations increase between the upstream WL8 site and SR02 downstream of the TSF, and zinc mass-balance calculations for 2025–26 indicate an average increase of approximately 3 kg/day between these sites (Koehnken 2026). This increase was considered likely to reflect diffuse emissions from the TSF area, including seepage and groundwater pathways (Koehnken 2026). Groundwater monitoring also indicates that seepage management works have reduced contaminant movement around parts of the TSF, with zinc concentrations in several bores substantially lower than historical values (Koehnken 2026).

Importantly, the 2/5 Dam TSF is not the only, and may not be the dominant current, source of MRCs affecting the lower Stitt River. Water quality continues to deteriorate downstream as the river receives inputs from contaminated groundwater, stormwater, historic waste rock and fill, disturbed land around Stitt Park and the Rosebery township, and contaminated tributaries. The largest increase in zinc load identified in the 2025–26 Stitt River mass balance occurred downstream of the principal 2/5 Dam influence, between SR03 and U/S Pie (Koehnken 2026). Approximately 8 kg/day of the increase during the monitoring year was attributed to Rosebery Creek, compared with approximately 3 kg/day between WL8 and SR02 near the TSF (Koehnken 2026).

Rosebery Creek is therefore likely to represent an important current source of MRCs to the lower Stitt River. Water quality is relatively good in its upper catchment but deteriorates substantially downstream due to diffuse mine-related and urban inputs. In 2025–26, total zinc concentrations immediately upstream of the Stitt River at RC2 ranged from 2.8 to 5.3 mg/L. Long-term monitoring since 2014 indicates a median zinc load of approximately 12 kg/day and an average of 18.5 kg/day from Rosebery Creek immediately upstream of its confluence with the Stitt River (Koehnken 2026). The increase in zinc and sulphate within Rosebery Creek is attributed primarily to diffuse sources and groundwater inputs rather than direct surface runoff from the 3 Level Waste Rock Dump, as runoff from that facility is generally collected and treated. Township runoff is also identified as a contributor (Koehnken 2026).

Primrose Creek provides an additional MRC input to the lower Stitt River. Primrose Creek enters the Stitt River downstream of S5.5/US Pie and upstream of S6 and SR05. The catchment receives mine-site stormwater, including discharge from AC2.1, where water in 2025–26 was typically acidic, with pH around 4, and had elevated electrical conductivity (Koehnken 2026). Monitoring within Primrose Creek indicates that water quality remains within its historical range; however, the current monitoring sites do not completely characterise the quality or contaminant load of the water ultimately entering the Stitt River because additional inflows occur downstream of the monitoring locations (Koehnken 2026).

Other diffuse sources also remain relevant. In particular, seepage monitored at MHS3 is considered to originate from historic fill around Stitt Park rather than directly from the 2/5 Dam TSF, and metal concentrations remained similar to the previous year during 2025–26 (Koehnken 2026). This illustrates the difficulty of attributing downstream water-quality effects to any single source in an area with a long history of mining, waste-rock placement, land disturbance and urban development.

Overall, the available evidence indicates a longitudinal gradient in mine-related contamination within the Stitt River. The upstream reach from S0/SR01 to S2/WL8 provides the least affected condition. Mine-related contaminant inputs become evident downstream from approximately S3/SR02, including residual diffuse influence from the 2/5 Dam TSF and other mine-related sources. Additional inputs accumulate downstream through S4/SR03 and S5, while the lower river downstream of S5 and S5.5 receives major additional inputs from Rosebery Creek, Primrose Creek and other diffuse mine- and township-related sources. Consequently, biological condition in the lower Stitt River is likely to reflect cumulative exposure to multiple MRC sources, with the relative importance of the 2/5 Dam TSF having decreased over time as water-management controls have improved.

1.1.2 Ring River

The Ring River is impacted from historical mining operations from the decommissioned Hercules site which was an underground and open cut mine located on the western side of Mount Hamilton, approximately 10 kilometres (km) south of Rosebery. The mine operated from the late 1800's until 1999 and MMG took ownership of the Rosebery mine lease 28M/1993 in 2009 which includes the Hercules site (Coffey 2021).

Baker Creek is the main watercourse draining from the Hercules site. Baker Creek receives runoff from across the disturbed mine area as well as acid mine drainage (AMD) discharge or runoff from the various adits and waste rock dumps (Coffey 2021). Baker Creek enters the Ring River between biomonitoring sites R2 and R3.

Baker Creek is the principal source of contaminants for the Ring River; however, other smaller watercourses drain contaminated water from the Hercules mine site, including Scotts Creek which is a highly altered creek that drains the western slope of Mount Hamilton and the former Williamsford township area. A branch of Scotts Creek receives road runoff and AMD discharged from the Hercules site and enters the Ring River between biomonitoring sites R1 and R2 (Coffey 2021).

The Ring River flows for approximately nine kilometres northwest from the Baker Creek inflow before entering Lake Pieman.

2. Methods

2.1 Field survey

The monitoring program comprises 16 sites in the following locations:

- Seven monitoring sites in the Ring River catchment which are impacted by historical mining operation and include five sites in the main river, one site in Baker Creek which enters between sites R2 and R3 and one site in Dolcoath Creek which enters between R5 and R6 (Table 2.1; Figure 2.1; Figure 2.3; Figure 2.4).
- Eight monitoring sites in the Stitt River catchment (Table 2.1; Figure 2.1; Figure 2.2):
 - Three reference sites in the Stitt River (Sites S0, S1, S2) (Figure 2.5);
 - Five impact sites in the Stitt River (Sites S3, S4, S5, S5.5 and S6) (Figure 2.6);
- One reference site in the Sterling River (Table 2.1; Figure 2.1; Figure 2.5).

As discussed above, the Stitt River receives contaminants from multiple historical and contemporary sources associated with mining and the Rosebery township. These include residual seepage associated with the 2/5 Dam TSF, contaminants entering via Rosebery Creek, mine-site and township stormwater, and seepage from areas where mine waste rock or fill has historically been deposited. The term “mine-related contaminants” (MRCs) is used throughout this report to collectively describe contaminants derived from these sources. The relative influence of individual MRC sources varies longitudinally, with S3 and S4 located downstream of the 2/5 Dam TSF but upstream of the major lower-river inputs from Rosebery and Primrose creeks.

The survey methods were applied consistently at each site, as described below. The spring survey was undertaken from 10 to 13 November 2025 and the autumn survey from 20 to 23 April 2026.

2.1.1 Stream habitat and water conductivity

A suite of habitat variables was collected at each site to describe and interpret riparian and instream conditions. Some of the habitat variables are also required as predictor variables in the AusRivAS models.

Parameters recorded include:

- stream geomorphology (flow types, gradient, bank character; instream substrate types);
- aquatic plants, algal cover; detritus and large woody debris;
- riparian condition (density; vegetation type; dominant species; stream shading);
- spot testing of water conductivity;
- Site photos.

Table 2.1: Monitoring site details

Site	Code	Location ¹	Easting	Northing	Catchment Area (km2)	Elevation	Site category/impact source
Ring River	R1	Williamsford Rd	376394	5368482	2.3	415	Historical impact upstream Baker and Scotts Ck.
	R2	Upstream Baker Creek inflow	375588	5367984	5.2	330	Historical impact downstream Scotts Ck. inflow
	R3	Downstream Baker Creek inflow	375544	5367898	7.1	325	Historical impact downstream Baker Ck inflow
	R5	Upstream Dolcoath Creek	371389	5370908	30.8	130	
	R6	Upstream Murchison Highway	371315	5371478	34.7	125	
Baker Creek	B1	Upstream Ring River junction	375538	5367925	1.7	328	Historical impact – Hercules Mine
Dolcoath Creek	D1	Upstream Ring River junction	371267	5371043	3.4	130	Historical impact
Sterling River	STR1	Upstream Murchison Highway	384432	5374891	16.5	165	Reference site
Stitt River	S0	At top bridge	379456	5371759	23.8	165	Reference – upstream MRCs
	S1	Upstream Mountain Creek	379676	5372833	33.5	180	
	S2	Upstream 2/5 Dam TSF Emergency Spillway	379338	5373188	35.9	180	
	S3	Downstream 2/5 Dam TSF Emergency Spillway	379064	5373171	36.6	160	Downstream MRCs
	S4	Upstream Rosebery Park footbridge	378292	5373518	36.6	160	
	S5	Upstream Park Road bridge and Rosebery Creek	378216	5373830	37.0	150	
	S5.5 [#]	Immediately downstream Rosebery Creek	378189	5373864	37.0	150	
	S6	Downstream Stitt Falls and Rosebery Creek	377901	5373828	37.0	150	

¹ The location names have been kept the same as previous assessments for consistency; however, the terms upstream and downstream tailings discharge may no longer be appropriate given there are no deliberate discharges from the 2/5 TSF under current operation. [#]Sampled for the first time in spring 2025.

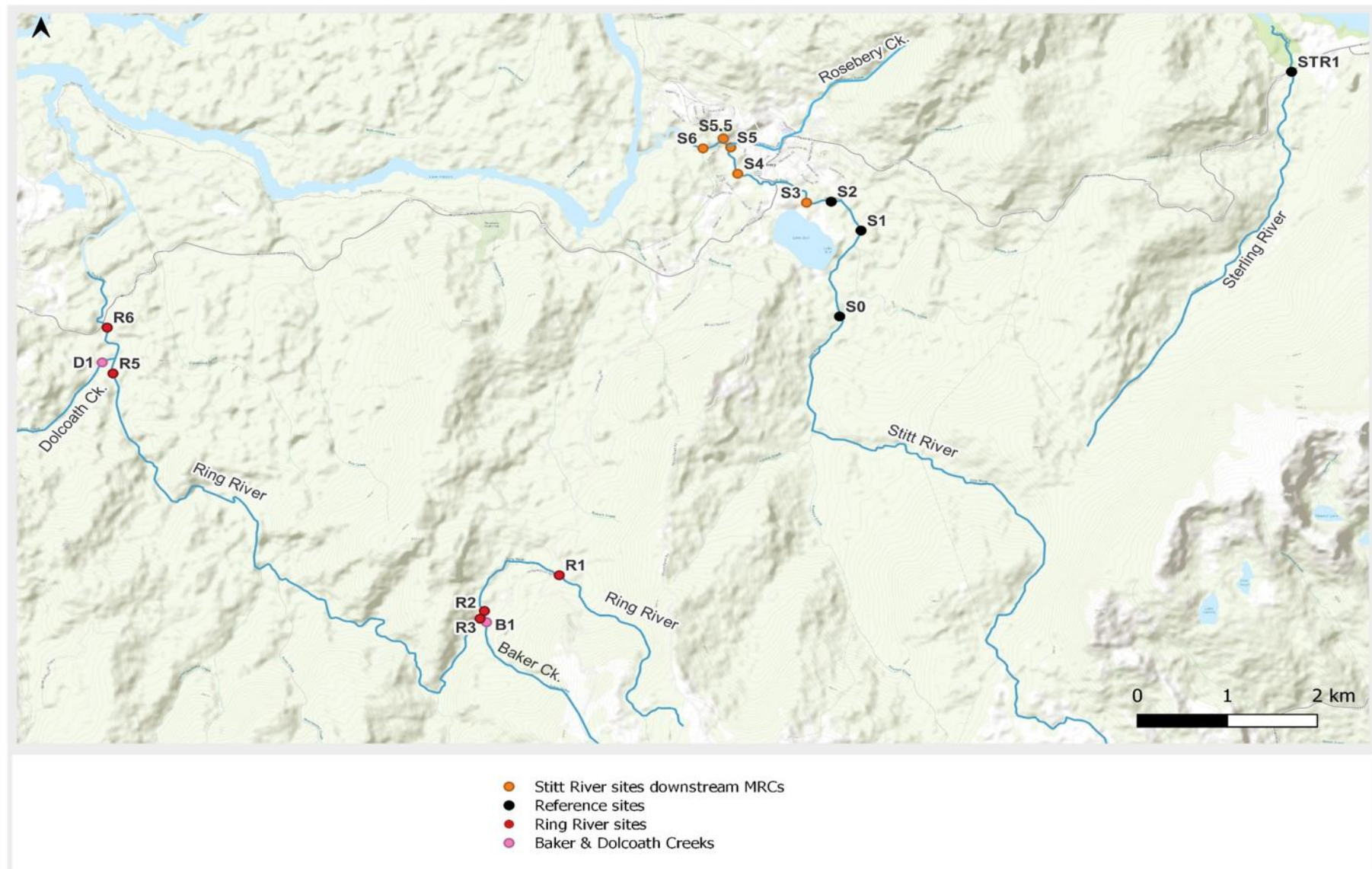


Figure 2.1: Location of monitoring sites in the Ring River catchment, Stitt River, and the Sterling River.



- Sitt River downstream MRCs
- Reference sites
- Long term water quality monitoring sites

Figure 2.2: Location of biomonitoring and long-term water quality sites on the Stitt River



Figure 2.3: Ring River catchment sites R1, R2, B1 and R3



Figure 2.4: Ring River catchment sites R5, D1 and R6

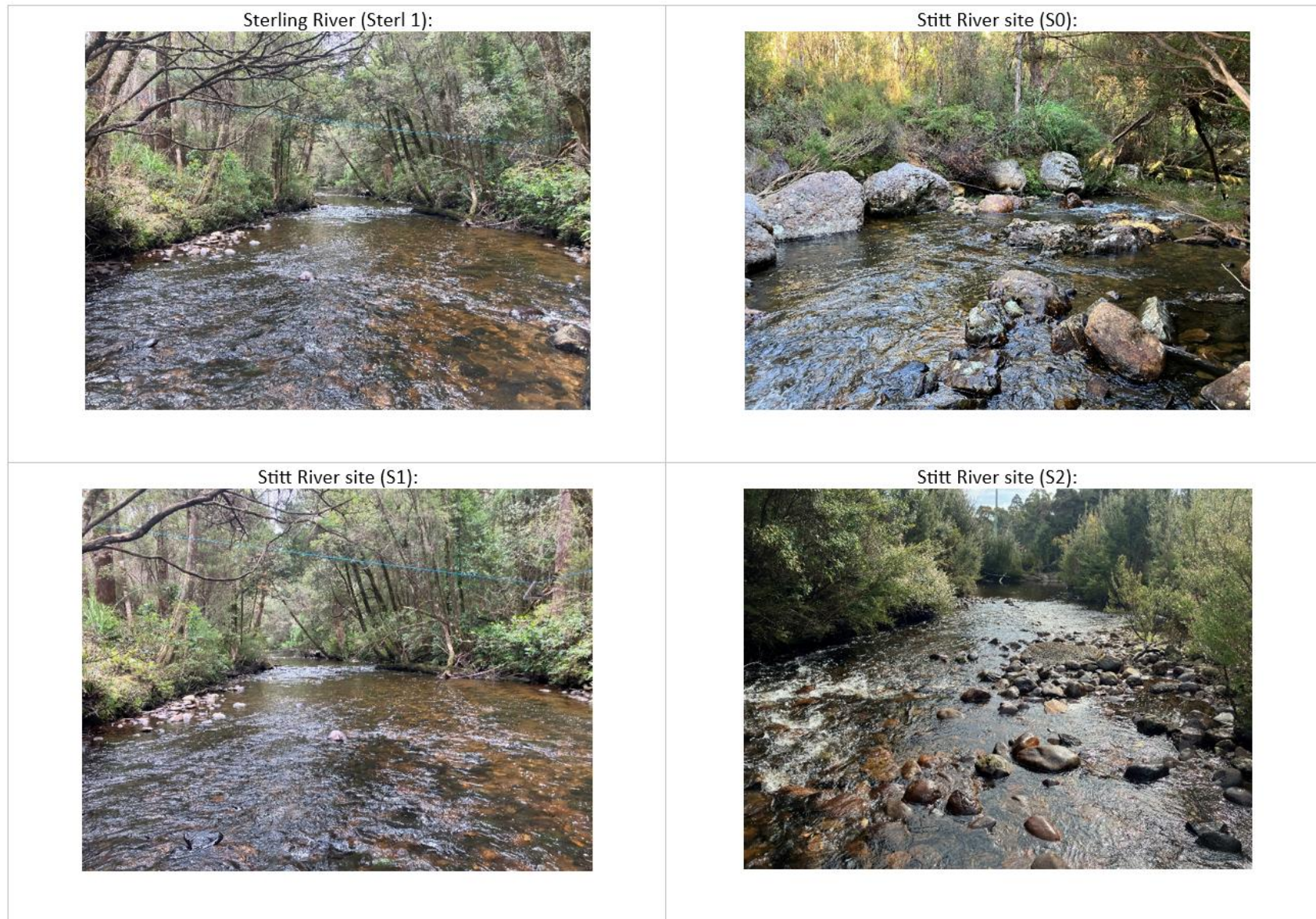


Figure 2.5: Sterling River and Stitt River sites S0, S1 and S2.

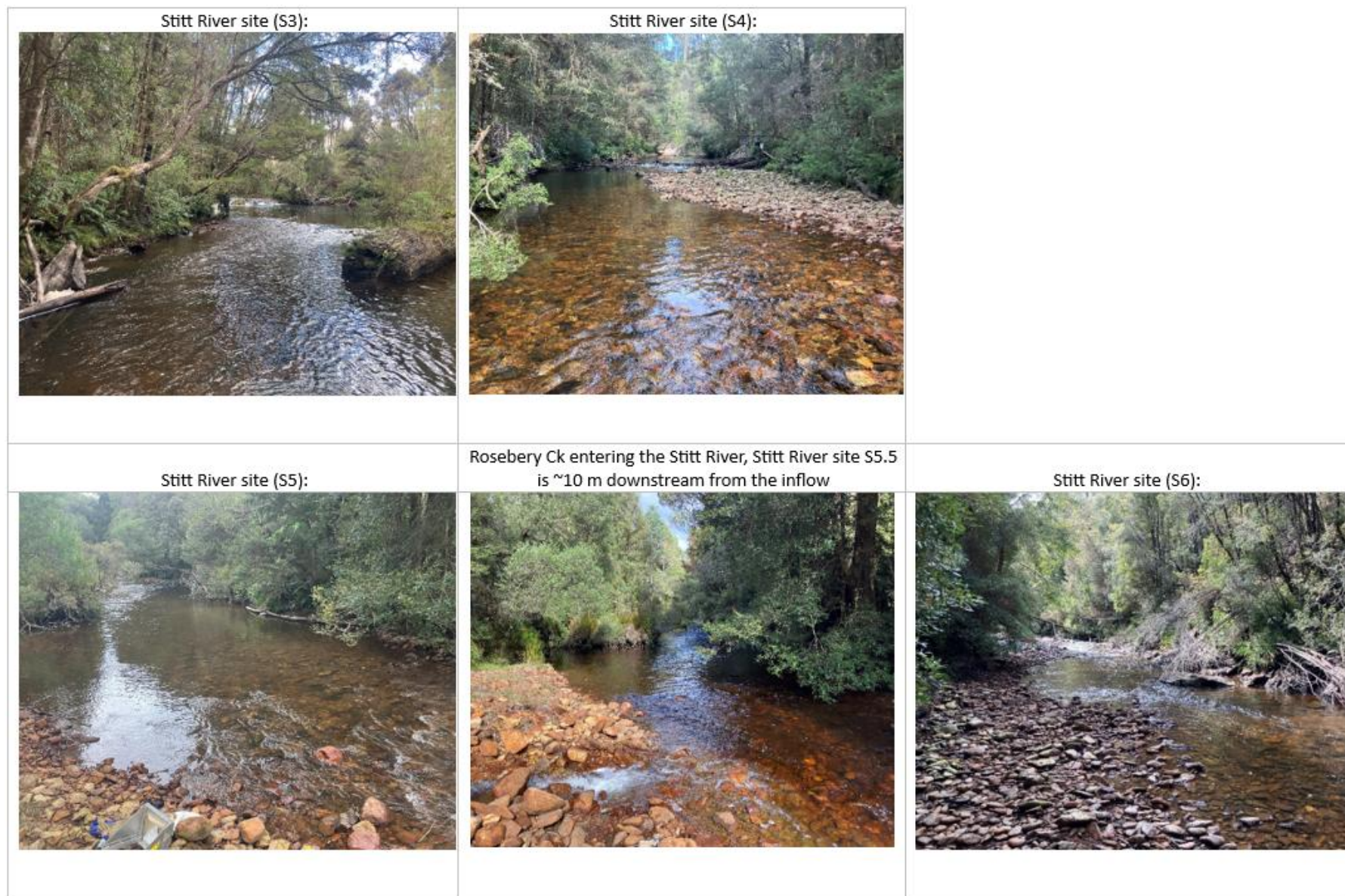


Figure 2.6: Stitt River sites S3, S4, S5, S5.5 and S6

2.1.2 Macroinvertebrates

Quantitative Surber sampling and semi-quantitative AusRivAS sampling was conducted at each site. Surber data provides an estimate of total abundance per unit area and this method is likely to improve the ability to detect rare taxa compared to the kick sampling and live pick methods used by AusRivAS (Storey et al. 1991). AusRivAS sampling provides indices of difference in community composition from an 'expected' fauna under undisturbed 'reference' conditions (Section 2.1.4.2).

2.1.2.1 Quantitative Surber sampling

At each site, 10 samples were taken from areas of riffles using a Surber sampler. Within the 30 x 30 cm quadrat of the sampler, the substrate is disturbed by hand to a maximum depth of 10 cm. The river flow washed the suspended detritus and invertebrates into the 500-micron mesh net which is attached directly downstream from the quadrat. The ten samples were pooled at each site to provide a single composite sample which was then placed in a zip lock bag and preserved with 70% ethanol.

2.1.2.2 AusRivAS kick sampling

Two kick samples were collected from riffle habitats (i.e., relatively high gradient, shallow, fast moving broken water over large pebbles, cobble or boulder substrate) at each site using the standard AusRivAS method (ausrivassurvey.org.au).

Each sample was live picked onsite, which involved transferring the sample from each net into a flat, white tray and picking individuals from the sample over a set time (thirty minutes); ensuring that the sample is representative of the relative abundance of each faunal group. Samples were stored in a 70% ethanol, 5% glycerol solution.

2.1.3 Fish

A fish survey was undertaken in the Sterling River and at the Stitt Rivers sites using a Smith-Root LR-20B or LR-24 backpack electrofisher (duty time using the 20-min CPUE method) within wadable areas at each site. With EPA approval, Sites S0 and S6 were removed from the fishing program in 2025 due to safety and representativeness considerations.

All fish caught were identified, counted, measured, and then released back into the river at the site of capture. All fish were caught and handled under the relevant permits:

- *Inland Fisheries Act 1995* exemption permit (No. D23-266898)
- *Animal Welfare Act 1993* animal research approval certificate (Animal Ethics Committee project no 4/2023-24).

The sites in the Ring River catchment were not electro-fished in 2025/26. Previous assessments have not recorded fish in the Ring River.

2.1.4 Laboratory

2.1.4.1 Surber samples

Each Surber sample was:

- floated in a calcium carbonate solution to separate inorganic and organic fractions;
- sub-sampled to 20% using a Marchant Box sub-sampler, representing a quadrat area of 0.36 m² (Marchant 1989);
- picked to remove all macroinvertebrates from the organic fractions;
- taxa collected were identified using stereo microscopy to the family and sub-family level required which is consistent with previous MMG bioassessment sampling events.

2.1.4.2 AusRivAS samples

The AusRivAS samples were identified to family level using stereo microscopy to the family or sub-family level except for Hirudinea, Oligochaeta, Nematoda and Arachnida which were identified to order. The level of identification depending on the type of taxa is consistent with the standard AusRivAS method (CEPA 1994; Krasnicki et al. 2002).

2.1.5 Analysis

The data from the Surber and AusRivAS samples were used to describe broad community patterns (diversity, composition and abundance) and two methods for rating river health: 1) outputs from the AusRivAS models, and 2) condition scores from the Tasmanian River Condition Index (TRCI) Aquatic Life. Note that the TRCI Aquatic Life Condition Assessment used in this assessment is an abridged version which only used outputs from the macroinvertebrate data for the reasons outlined below (Section 2.1.5.3)

2.1.5.1 Diversity, composition, and abundance measures

The quantitative Surber data were used to characterise macroinvertebrate abundance, while taxa richness was calculated from the combined taxa detected in the quantitative and AusRivAS samples. Because the two methods differ in sampling area and taxon detectability, combining presence records provides a more complete measure of observed richness at each site. Both sampling methods and sampling effort were consistent among sites.

Diversity and proportional abundance of families in sensitive aquatic insect orders; Ephemeroptera, Plectoptera and Trichoptera (EPT). EPTs are generally considered sensitive to changes in habitat or water quality and can therefore be used to detect impacts.

Signal scores

The Stream Invertebrate Grade Number Average Level (SIGNAL) is a scoring system developed by Chessman (1995; 2003) based on the sensitivities of macroinvertebrate families to common types of pollution. Each family of macroinvertebrates is assigned a grade (Pollution Sensitivity Grade Number) according to their tolerance, where a grade of 10 represents a high sensitivity to pollution and a grade of 1 represents a high tolerance to pollution.

The outputs for the AusRivAS O/Epa model include an O/E SIGNAL score as discussed below (Section 2.1.5.2). The Surber data was used to identify the taxa present which are classed as highly sensitive to poor water quality. The raw SIGNAL scores for families (Chessman 2003) were used to define a threshold for high sensitivity (SIGNAL SCORE ≥ 7). The families with high sensitivity were used to calculate two metrics for each site: 1) the proportion of the abundance of sensitive taxa to the total abundance; and 2) the proportion of the number of sensitive families to total family number.

2.1.5.2 Ausrivas models

The Tasmanian AusRivAS state-wide predictive models for presence absence were used to assess the biological health of each site. AusRivAS presence/absence (O/PA) models are based on large 'reference' site datasets that contain macroinvertebrate and habitat data from a set of unpolluted, 'least disturbed' reference sites (DPIPWE 2018). The model then generates a list of macroinvertebrate taxa expected to occur at the test site in the absence of environmental stress, such as pollution or habitat degradation (DPIPWE 2018).

The single-season spring and autumn models were used to derive an O/E (observed/expected) score (ausrivas.ewater.org.au), where the expected taxa were calculated using the probability of reference group membership in the predictive models that were most likely to represent the monitoring site in a 'natural' condition based on 'predictor' variables (i.e. habitat and topographic features of the site). The O/E scores were calculated as the ratio of observed/expected values. The O/E scores were divided into O/E bands that describe the relative health of the river (based on macroinvertebrate community composition) compared to the reference streams (Davies 2002, Table 2.2).

The other AusRivAS output, O/E SIGNAL, is the O/E ratio calculated for the site using the overall SIGNAL scores calculated from the lists of expected taxa and observed taxa and is an input to the TRCI. O/E SIGNAL weights the families by their sensitivity to water pollution. Accordingly, O/E SIGNAL can detect situations where water pollution has resulted in the loss of only a few, but very sensitive, families of macroinvertebrates.

Table 2.2: NRE Tas AusRivAS state-wide seasonal models O/E presence absence lower band of river health within riffle habitats

Band	DPIPWE AusRivAS state-wide seasonal model (Autumn O/PA) – lower band bound	Description
X	1.15	More diverse than reference
A	0.86	Equivalent to reference condition
B	0.58	<i>Significantly impaired or modified.</i>
C	0.3	<i>Severely impaired or highly modified.</i>
D	0	Extremely impaired

In previous assessments for this program, the presence absence model was not run until (or not reported on) the autumn 2015 survey. The analyses done prior to 2015 reported on the AusRivAS rank abundance models (O/Erk). Presence absence models (O/Epa) were run in autumn 2015 because this was the first time that the Tasmania River Condition Index (TRCI) was used in the analysis and TRCI uses the outputs from the AusRivAS O/Epa models. The O/Erk and the O/Epa models were reported on in the 2017/18 report, but the subsequent reports have only provided outputs for the O/Epa model.

2.1.5.3 Tasmanian River Condition Index (TRCI)

For the TRCI assessment, sampling and data analysis followed the protocol described by NRM South (2009, 2009a). The TRCI Aquatic Life Macroinvertebrate Indicator (MI) provides an integrated score for the condition of benthic macroinvertebrate communities. The score considers three aspects of the macroinvertebrate community as summarised below and in Table 2.3:

- Expectedness - the proportion of taxa expected to occur at the site under unimpaired conditions that are actually observed at the site (O/Epa scores), combined with the ratio of observed to expected scores for pollution sensitivity of the sampled community - the 'SIGNAL' score;
- Abundance - the density of individuals per unit area of riverbed derived from the Surber data;
- Composition - the proportion of environmentally sensitive taxa from the 'EPT' taxonomic grouping in the sample.

The above values were entered into the TRCI aquatic life condition scoring and integration algorithm (NRM South 2009) to generate scores for individual metrics and integrated scores and ratings for the overall condition of macroinvertebrates.

The intention of the TRCI Life score method was to combine metrics from macroinvertebrates, fish communities, and benthic algae data to provide an overall condition score. However, the native fish community at most riverine sites in Tasmania is heavily influenced by the presence of introduced trout which limit and or exclude native fish through predation and competition. Native fish are also often excluded from river sites due to the presence of barriers to upstream migration, particularly large instream hydropower dams. The native fish population in the Stitt River is influenced by both downstream barriers to migration and the presence of introduced brown trout (*Salmo trutta*) and hydropower dams in the Pieman River catchment.

Quantitative benthic algae sampling was undertaken in 2014/2015 to obtain estimates of chlorophyll-*a* per unit area; however, quantitative algal sampling has not been undertaken in subsequent surveys. Regardless, the method used to collect benthic algae for TRCI has recently been reviewed by NRE Tasmania and is no longer considered valid.

Table 2.3: Summary of metrics used to derive the TRCI macroinvertebrate condition rating.

Metric	What is it?	Reference condition
O/E : Observed to expected ratio	Proportion of expected families found (observed) in sample (based on presence/absence data). Range: 0 – approx. 1.3	Expected family list generated from reference site data set by AUSRIVAS model.
SIGNAL O/E: SIGNAL score Observed to expected ratio	Ratio of observed to expected (reference) SIGNAL score. Range: 0 – approx.. 1.3	Expected SIGNAL score generated from reference family list by AUSRIVAS model.
EPT Propn : Proportion of all families from the EPT orders.	The proportion of all families in sample occurring in the EPT orders. Range: 0 – 1.0	EPT scores observed at reference sites. Bound = lower 10 percentile.
Total abundance : Density of all macro-invertebrates	Abundance per m ² of stream bed of all macroinvertebrates. Range: 0 - 20,000+	Abundance values from reference site data set. Bounds = 90 and 10 percentile values.

2.1.6 Water quality analysis

The water-quality analysis initially focused on dissolved metals because these represent the most direct and readily interpretable indicators of MRC exposure in the Stitt River. Metals are known constituents of drainage associated with both historical and contemporary mining activities in the catchment, show clear spatial and temporal variation between monitoring sites, and have established aquatic ecosystem guideline values against which recent concentrations can be compared. They therefore provided the most appropriate first step for testing whether observed differences in macroinvertebrate condition were spatially consistent with contaminant exposure.

Copper and zinc concentrations were assessed against the current ANZG 95% freshwater DGVs. The current ANZG guidance allows hardness adjustment of the zinc DGV where water hardness exceeds the standard reference hardness of 30 mg/L as CaCO₃. Available calcium and magnesium data indicate that the Stitt River is a soft water system, with hardness < 30 mg/L as CaCO₃ and current ANZG guidance does not support increasing the zinc DGV on the basis of hardness.

More recent approaches to assessing copper and zinc toxicity recognise that metal bioavailability is influenced by a combination of pH, hardness and dissolved organic carbon (DOC) (Gadd, et al., 2024). Bioavailability-based guideline methods developed in New Zealand incorporate these parameters when deriving site-specific guideline values. This approach was not applied in the current assessment because contemporary DOC data were not available across the monitoring network. The current approved ANZG DGVs were therefore retained.

Spearman rank correlations were used to describe relationships between recent metal exposure and macroinvertebrate condition because the expected biological responses were not necessarily linear and the dataset included a small number of spatially ordered sites, tied values and concentrations at or near laboratory reporting limits. Spearman's ρ provides a non-parametric measure of the strength and direction of monotonic relationships and is therefore more appropriate than linear regression or R^2 for describing these site-scale associations. The correlations were interpreted descriptively, in conjunction with the longitudinal biological and water-quality patterns, rather than as evidence of independent causal relationships.

3. Results

3.1 Flow conditions prior to the surveys

Flow conditions were very high in the Stitt River catchment prior to the survey on November 10- 13 2025 (Figure 3.1). Mean flow during the three months preceding the survey was approximately 74% higher than the average of the three preceding equivalent periods in 2022, 2023 and 2024, while median flow was approximately 160% higher. Mean and median flows were the highest of the four periods examined, while Q10 flow was the second highest. Flows became increasingly elevated through September, October and November.

The Rosebery Creek record indicated that flows were substantially higher than during the equivalent periods. Compared with the mean of these three preceding periods, mean flow was approximately 2.6 times higher and median flow was approximately 4.2 times higher.

The longer White Spur Creek record provides stronger historical context for these conditions. During the three months preceding the survey, the mean flow and Q10 flow were the highest of the 30 equivalent

periods examined between 1996 and 2025. Median flow and other moderate and low flow statistics were also the highest of the 30 periods.

Collectively, the Rosebery Creek, Stitt River and White Spur Creek records indicate that the three months preceding the spring 2025 survey were characterised by unusually persistent, elevated flows rather than an exceptionally large individual flood event.

The Stitt River record indicated that flows during the three months preceding the autumn 2026 survey (20–23 April) were typical until early April; however, several high flow events occurred in the first two weeks of April with the peak flow event reaching nearly 23 m³/s (Figure 3.2). The event in April is the largest recorded from mid-March to mid-April over the four years of available record.

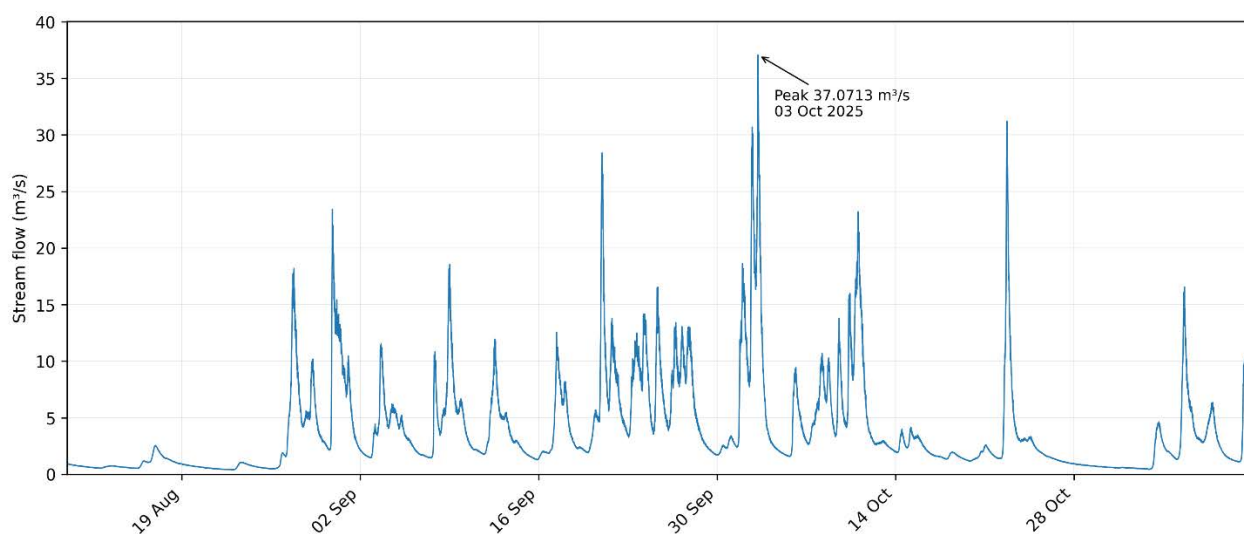


Figure 3.1: Flow hydrograph of the Stitt River above Rosebery for the three months prior to the Spring 2025 survey

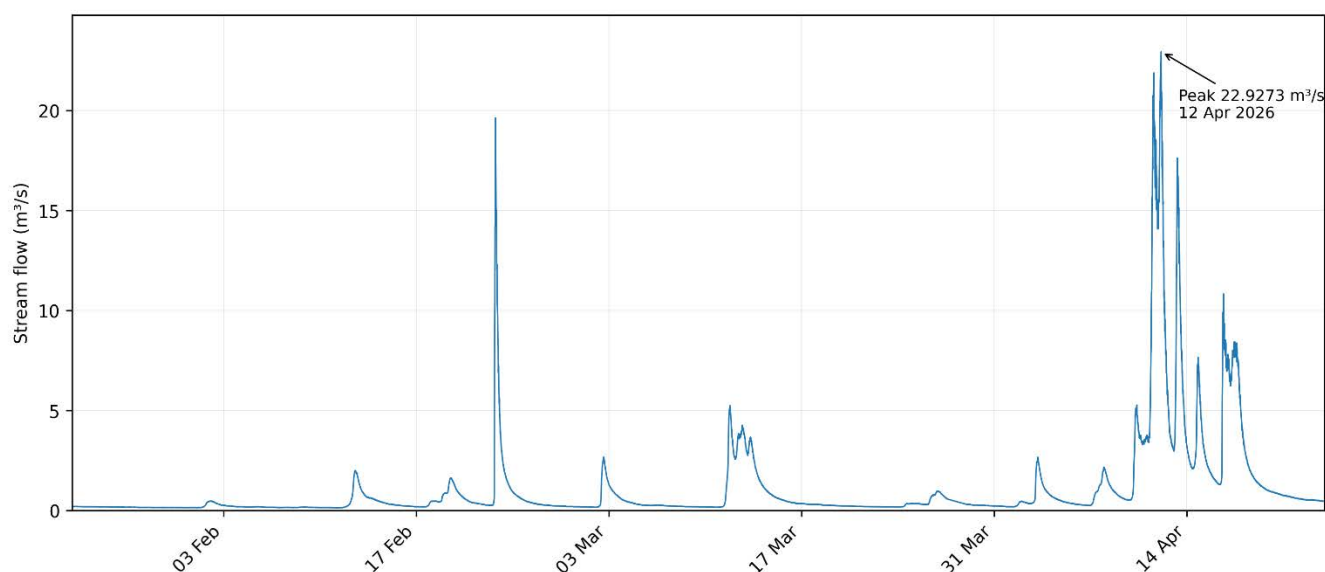


Figure 3.2: Flow hydrograph of the Stitt River above Rosebery for the three months prior to the autumn 2026 survey

3.2 Ring River

3.2.1 Conductivity

Conductivity levels in the Ring River ranged between 46 to 378 $\mu\text{S}/\text{cm}$ in spring 2025 and between 70 to 520 $\mu\text{S}/\text{cm}$ in autumn 2026 (Figure 3.3).

As for all previous surveys, conductivity increased substantially at the Ring River site (R3) immediately downstream the Baker Creek inflow in both spring and autumn (7 - 8 times higher than site R2) (Figure 3.3). Conductivity declines further downstream at sites R5 and R6 but was still substantially higher than the Ring River sites upstream in both seasons (Figure 3.3).

Conductivity in Baker Creek was typically very high in both seasons (512 $\mu\text{S}/\text{cm}$ in spring 2025 and 1133 $\mu\text{S}/\text{cm}$ in autumn 2025 (Figure 3.3). Conductivity in Dolcoath Creek was higher than all other Ring River sites other than R3 in both seasons (Figure 3.3).

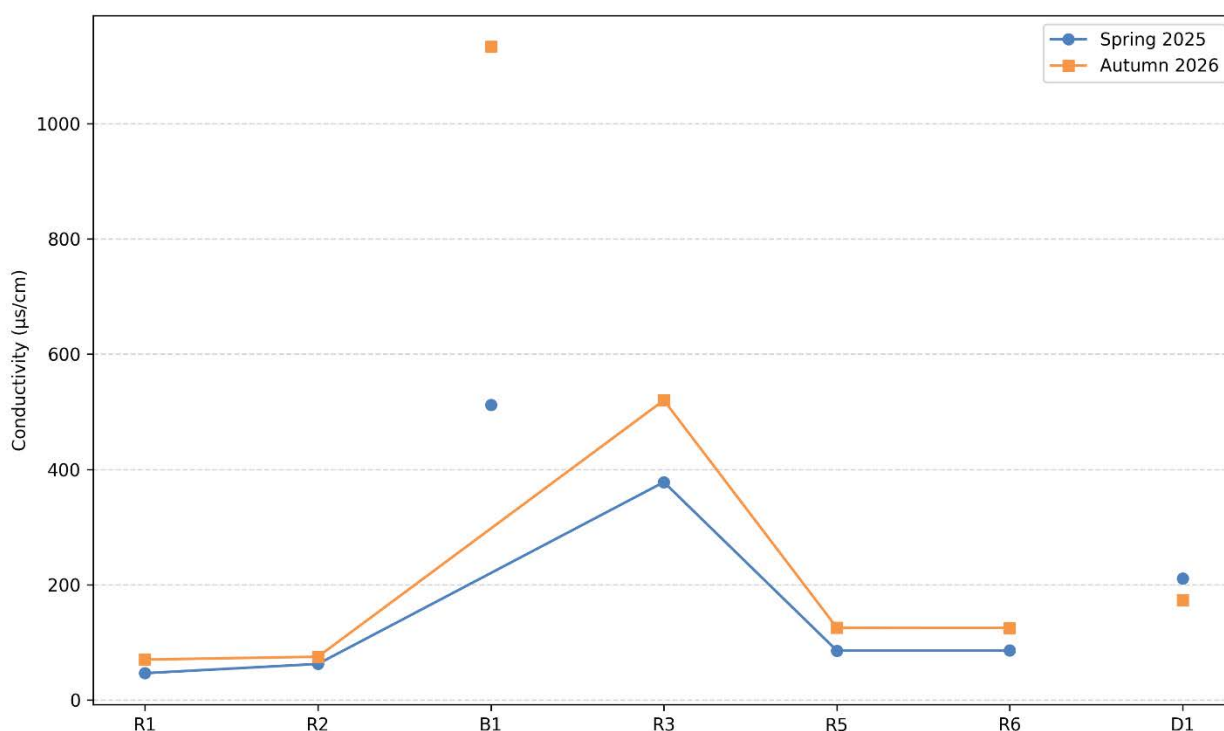


Figure 3.3: Conductivity ($\mu\text{S}/\text{cm}$) in spring 2025 and autumn 2026 at sampling sites in the Ring River catchment.

3.2.2 Macroinvertebrates

3.2.2.1 Abundance

The total abundance of macroinvertebrates was consistently low across all sites compared to what would be expected from a healthy river (i.e. at least 700 animals/ m^2) (Figure 3.4). Ring River Site 2 (R2) had by far the highest abundance in spring 2025 (510 animals/ m^2) and was also marginally higher in autumn 2026 (95 animals/ m^2). Abundances were consistently low in both seasons at the other Ring River sites (30 to 140 animals/ m^2) but were higher in spring than autumn at all sites other than R1. As has been reported previously, site R3 had the lowest abundances among the Ring River sites.

Abundance was extremely low in Dolcoath Creek in spring 2025 while no animals were recorded in autumn 2026. No animals were recorded in Baker Creek in either season.

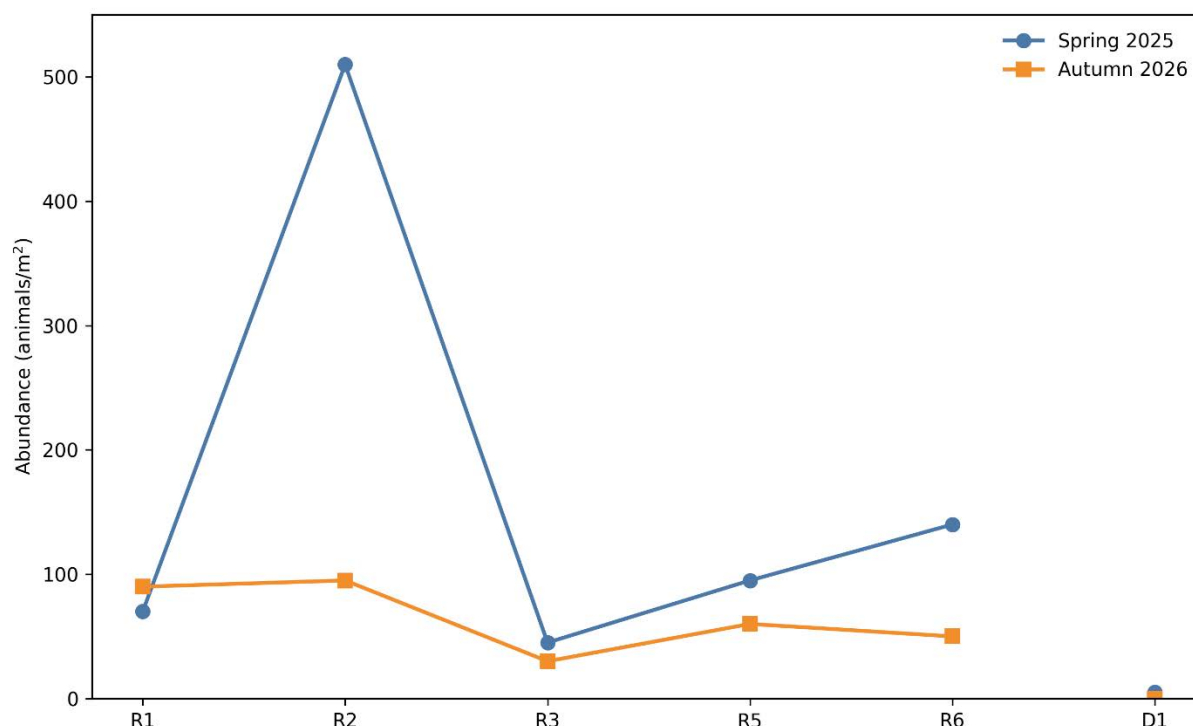


Figure 3.4: Total abundance (number of animals/m²) of macroinvertebrates in the Ring River catchment in spring 2025 and autumn 2026.

3.2.2.2 Taxa richness

Based on the combined Surber and AusRivAS data, taxa richness was generally low (<15 taxa) at all sites, other than R2 in spring 2025, where 20 taxa were recorded (Figure 3.5). In the Ring River, as in previous years, richness was highest at R1 and R2 upstream of Baker Creek, lowest at R3, and intermediate at the two sites further downstream (R5 and R6). Taxa richness was higher in spring than autumn at R2 and R3 and in Dolcoath Creek, but was identical between seasons at R1, R5 and R6. Dolcoath Creek, as in previous years, supported very few taxa. No taxa were recorded in Baker Creek in either season.

Although taxa richness was lower when the Surber and AusRivAS datasets were considered separately than when the results were combined, both sampling methods produced broadly similar spatial, seasonal and longitudinal patterns. Richness was generally highest at the upstream Ring River sites, particularly R2, lowest at R3 downstream of Baker Creek, and intermediate at R5 and R6 further downstream. Both methods also indicated generally lower richness in autumn than spring, particularly at R2 and R3, while Dolcoath Creek consistently supported very few taxa. These similarities indicate that the broader patterns evident in the combined dataset were not dependent on either sampling method alone.

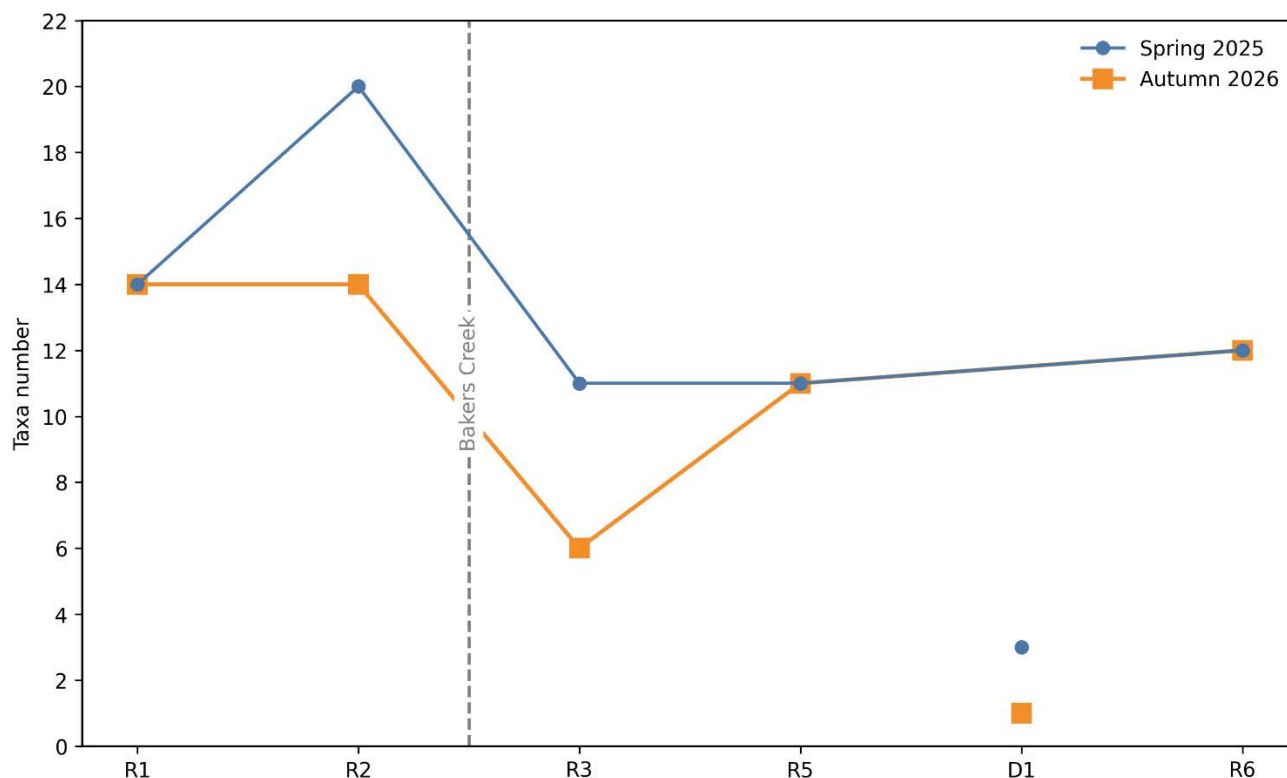


Figure 3.5: Taxa richness recorded from the Surber samples in the Ring River catchment in spring 2025 and autumn 2026. Taxa richness represents the total number of unique taxa detected from the combined Surber and AusRivAS samples at each site.

3.2.2.3 Composition

Macroinvertebrate communities were generally dominated by a relatively small number of taxa, particularly Gripopterygidae, Notonemouridae, Eustheniidae, Orthocladinae and Scirtidae, although their relative abundance varied markedly among sites and seasons. R1 and particularly R2 generally supported the most diverse assemblages and a broader range of EPT taxa, including Eustheniidae, Gripopterygidae, Notonemouridae, Leptophlebiidae, Hydrobiosidae and Philorheithridae. Community composition became substantially more restricted at R3, R5 and R6, with several taxa recorded at R1–R2 absent or poorly represented farther downstream.

Leptophlebiidae were notably sparse throughout and were not recorded at sites downstream from R2, while Eustheniidae declined strongly downstream despite being prominent at R1 and R2. In contrast, taxa such as Gripopterygidae, Notonemouridae and some chironomids persisted at several impacted sites, indicating substantial differences in tolerance within the assemblage. D1 supported an extremely depauperate community in both surveys, with only a few individuals and very few taxa recorded.

3.2.2.4 AusrivAS

The AusrivAS O/E scores and condition bands for the spring and autumn presence/absence models are provided in tables (Table 3.1 and Table 3.2) and graphically (Figure 3.6). Figure 3.7 shows all the data for the O/Epa O/E scores and condition bands since this model has been used in the biomonitoring program (2015 – 2026). The raw macroinvertebrate data is provided in Appendix A.

All sites fell within the impaired condition bands in spring 2025 and autumn 2026 with most sites recording severely impaired scores (band C) or extremely impaired scores (band D) for both replicates in both seasons (Table 3.1 and Table 3.2). The exception to this was a replicate at Site R1 (autumn 2026) and R2 (spring 2025) which recorded band B (significantly impaired) scores (Table 3.1 and Table 3.2).

In both season, river health scores declined substantially at the Ring River sites R3 to R6 which are downstream from the Baker Creek inflow (Figure 3.6).

The mean O/Epa river health scores from spring 2025 and autumn 2026 were consistent with the results from previous years (Figure 3.7) as summarised below:

- Site R1 has been in the significantly impaired range (band B) on 10 occasions and in the severely impaired (band C) on eight occasions since 2015 including three consecutive surveys from autumn 2025 to autumn 2026;
- Site R2 has been in the severely impaired range (band C) on 14 of 18 occasion and in the significantly impaired range on four occasions, all of which occurred have occurred since 2023, including the spring survey in 2025.
- Site R3 has been in the extremely impaired range (band D) on all sampling occasions except for the spring 2021 survey which was assessed as severely impaired (band C).
- Site R5 and R6 have mainly been in the extremely impaired range which continued in spring 2025 and autumn 2026.
- Baker Creek has only had scores in the extremely impaired band (no invertebrates were recorded for spring 2025 and autumn 2026 surveys) and Dolcoath Creek has also mainly been in this band including in spring 2025 and autumn 2026 survey.

The Ring River AusRivAS results have shown no clear or consistent seasonal pattern. Although autumn O/E scores have been slightly higher than spring in several years at R1 and R2, this pattern was not consistent across the other sites, with R5 and R6 showing no comparable autumn increase.

Table 3.1: AusRivAS O/Epa model O/E scores, condition bands, number of taxa and EPT proportion for the spring 2025 survey.

Watercourse	Site	Sample number	Spring 2025 river health outputs		Number of taxa	EPT proportion
			O/E	Band		
Ring River	R1	a	0.35	C	7	0.43
		b	0.48	C	10	0.40
	R2	a	0.68	B	15	0.40
		b	0.55	C	10	0.40
	R3	a	0.29	C	6	0.33
		b	0.14	D	4	0.75
	R5	a	0.27	D	7	0.43
		b	0.21	D	6	0.33
	R6	a	0.14	D	5	0.60
		b	0.07	D	5	0.60
Baker Creek	B1	-	-	-	-	-
Dolcoath Creek	D1	-	0.07	D	3	0.33

Table 3.2: AusRivAS O/Epa model O/E scores, condition bands, number of taxa and EPT proportion for the autumn 2026 survey.

Site	Site	Sample number	Autumn 2026 river health outputs		Number of taxa	EPT proportion
			O/E	Band		
Ring River	R1	a	0.4	C	8	0.63
		b	0.59	B	7	0.43
	R2	a	0.33	C	6	0.67
		b	0.42	C	6	0.67
	R3	a	0.25	D	4	0.50
		b	0.08	D	2	1.00
	R5	a	0.25	D	5	0.60
		b	0.08	D	1	1.00
	R6	a	0.18	D	3	0.67
		b	0.27	D	4	0.50
Baker Creek	B1	-	-	-	-	-
Dolcoath Creek	D1	-	0.08	D	1	0

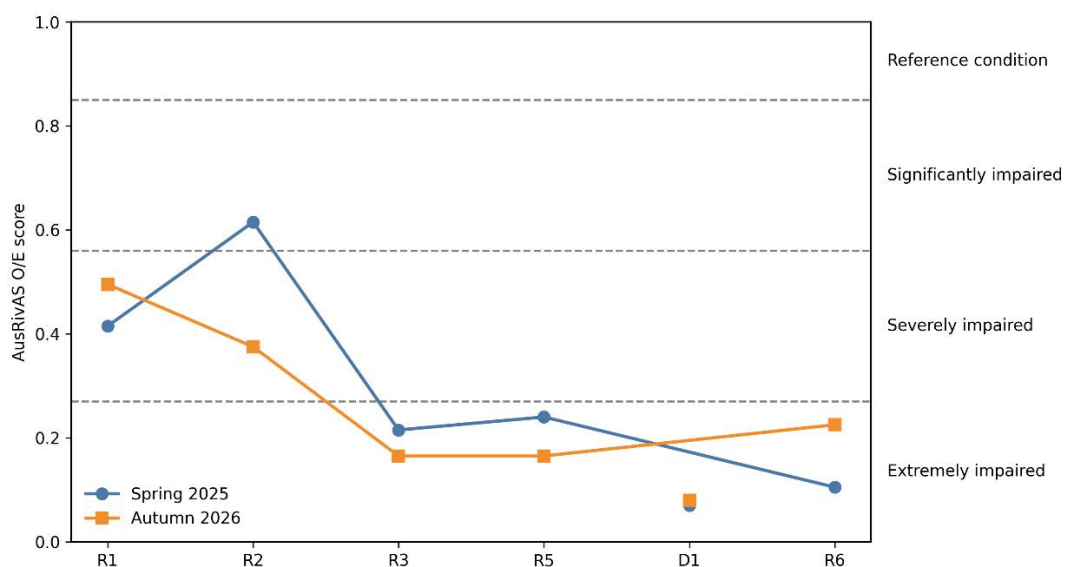


Figure 3.6: Mean AusRivAS O/Epa model O/E scores for the spring 2025 and autumn 2026 survey.

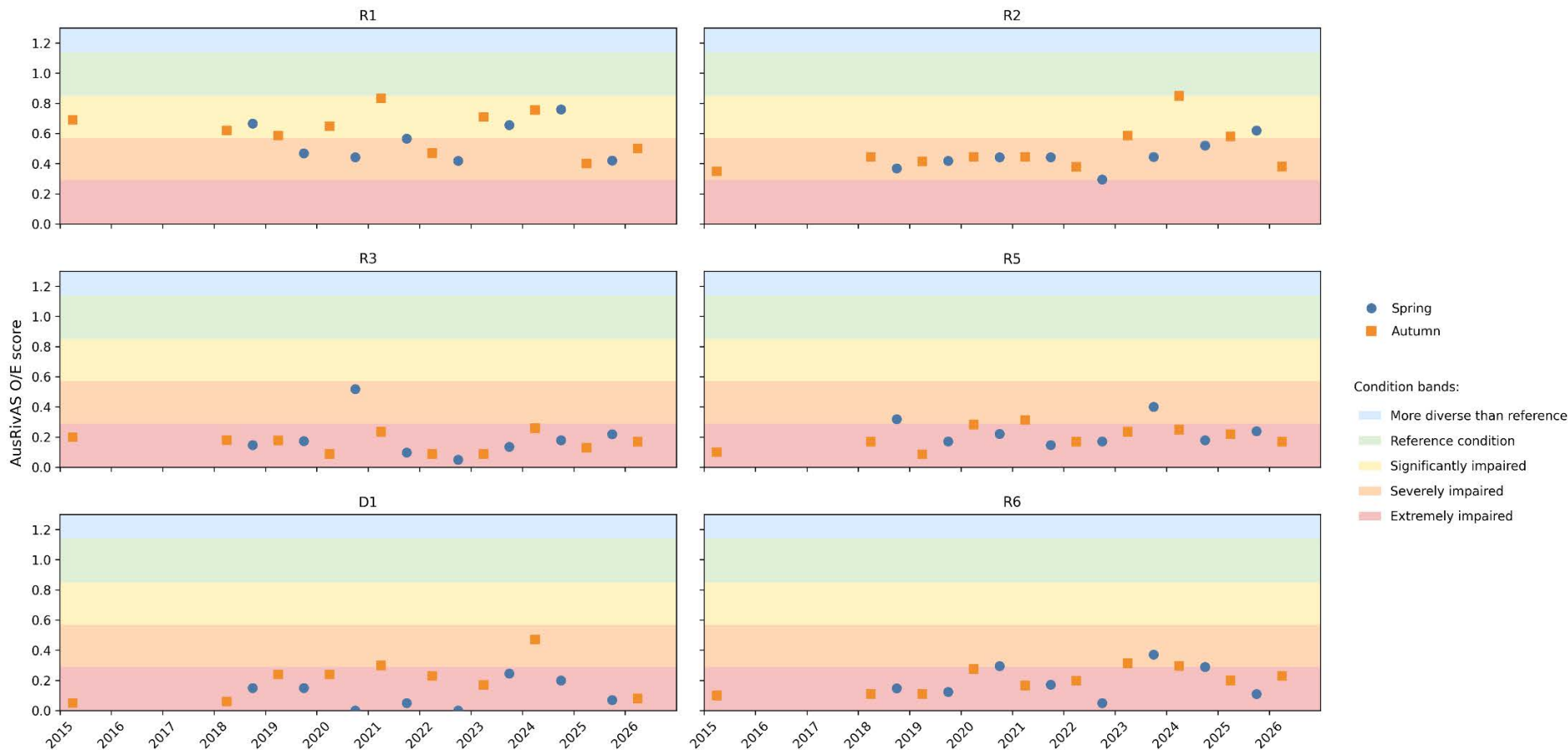


Figure 3.7: AusRivAS O/Epa model O/E scores and condition bands for Ring River sites R1, R2 and R3 from 2015 to 2025 (based on average score of two samples at each site).

3.2.2.5 TRCI macroinvertebrate condition score

The TRCI macroinvertebrate condition scores for spring 2025 and autumn 2026 are shown in Table 3.3 and Table 3.4. The raw data outputs and breakdown of the scoring system used to allocate a score for *Expectedness* (combination of the AusRivAS O/Epa O/E and SIGNAL scores), *Abundance* (total abundance from the Surber samples), and *Composition* (ratio of the proportion of EPT families to total families from the AusRivAS data) are provided in Appendix A.1.

The condition of all sites on the Ring River was rated as Poor in both seasons (Table 3.3; Table 3.4). The poor rating is based on a combination of low O/E scores from the AusRivAS models (all sites were in the impaired bands) and low total abundance of macroinvertebrates from the Surber samples (all sites were well below the minimum threshold of 700 animals/m² which the TRCI assessment states for a site to be equivalent to reference condition).

The condition of Dolcoath Creek was rated as poor in spring 2025 and very poor in autumn 2026. In spring 2025 this site had moderate *Expectedness* and *Composition* and low *Abundance* scores and in autumn 2026 was assessed as extra low for Composition (Table 3.3; Table 3.4).

Table 3.3: TRCI Macroinvertebrate scores for spring 2025

Site	Site code	Expectedness	Abundance	Composition	Score	Condition
Ring River	R1	M	L	H	40	Poor
	R2	M	L	H	40	Poor
	R3	M	L	H	40	Poor
	R5	M	L	H	40	Poor
	R6	M	L	H	40	Poor
Dolcoath Creek	D1	M	L	M	35	Poor

Table 3.4: TRCI Macroinvertebrate scores for Autumn 2026

Site	Site code	Expectedness	Abundance	Composition	Score	Condition
Ring River	R1	M	L	H	40	Poor
	R2	M	L	H	40	Poor
	R3	M	L	H	40	Poor
	R5	M	L	H	40	Poor
	R6	M	L	H	40	Poor
Dolcoath Creek	D1	M	XL	M	35	Very poor

3.3 Stitt River

3.3.1 Conductivity

Conductivity levels in the Stitt River ranged from 37 to 71 $\mu\text{S}/\text{cm}$ in spring 2025 and 54 to 73 $\mu\text{S}/\text{cm}$ in autumn 2026 (Figure 3.8).

There was a trend for increasing conductivity with distance downstream for both seasons. In spring 2025, conductivity spiked from site S0 to S1 and at the new site which is located immediately downstream from the Rosebery Creek inflow (Site 5.5). In autumn 2026, conductivity was relatively stable from sites S0 to S4 but spiked at from sites S5 to S6.

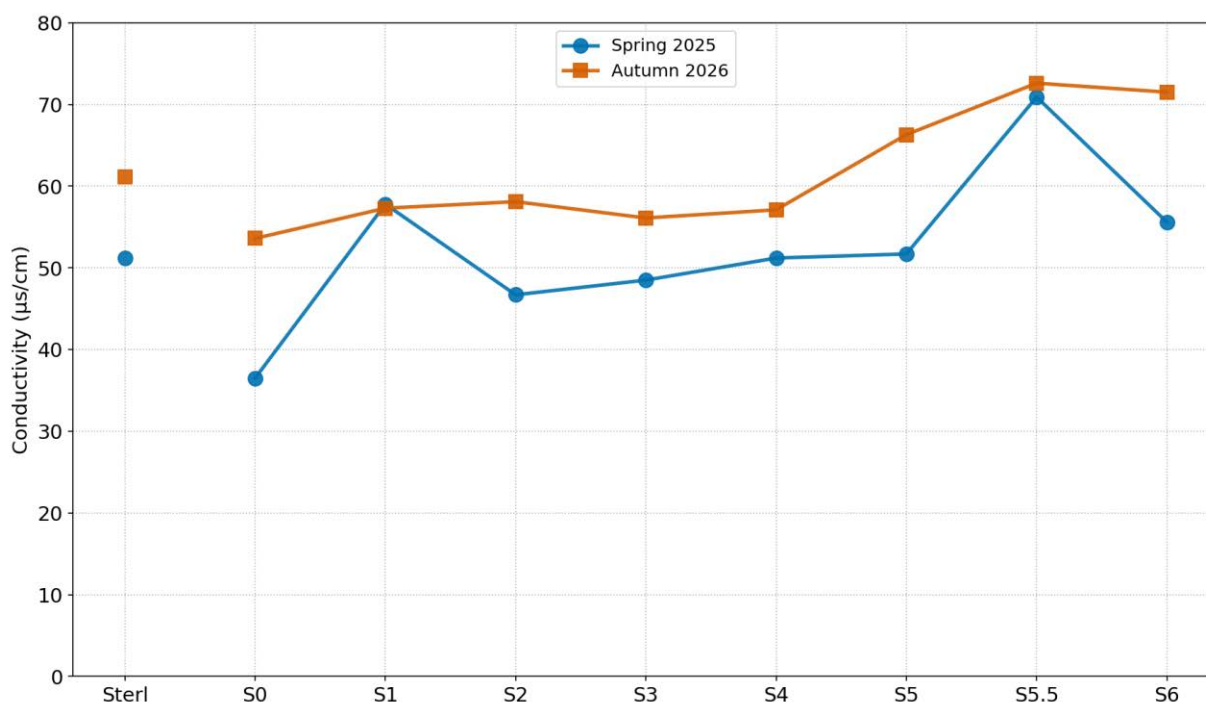


Figure 3.8: Conductivity ($\mu\text{S}/\text{cm}$) in spring 2025 and autumn 2026 at the Sterling River and Stitt River sampling sites.

3.3.2 Macroinvertebrates

3.3.2.1 Abundance – Surber data

Overall, the autumn survey generally supported higher macroinvertebrate abundance than the spring survey, although this seasonal increase was not uniform among sites. Importantly, all sites in both seasons remained well below the long-term reference abundance of 950 animals/m² (Figure 3.9). This indicates that the relatively low abundance was a feature of the broader survey period rather than being restricted to the sites downstream potential sources of MRCs (S3 – S6). High flows occurred prior to the surveys in both seasons which is likely to have impacted the abundance of macroinvertebrates through scours.

In spring 2025, abundance in the Stitt River showed a general decline with distance downstream with S0 the highest (435 animals/m²), intermediate at sites S1, S2, S3, S4 and S5.5 with abundances ranging from 110 to 235 animals/m², before declining to particularly low abundances at S5 (75 animals/m²) and S6 (70 animals/m²). The Sterling River reference abundance was also relatively low in spring, at 240 animals/m².

In autumn 2026, abundance was higher than in spring at most sites, but the spatial pattern was less consistent. The largest abundance occurred at S1 (615 animals/m²), followed by S2 (400), S3 (385) and S6 (340 animals/m²). Abundance generally declined from S1 through to S5.5, where the lowest autumn value was recorded (65 animals/m²), before increasing again at S6. Compared with spring, abundance increased markedly at S1, S2, S3, S5 and S6, while S4 changed little. In contrast, abundance declined at S0 and S5.5.

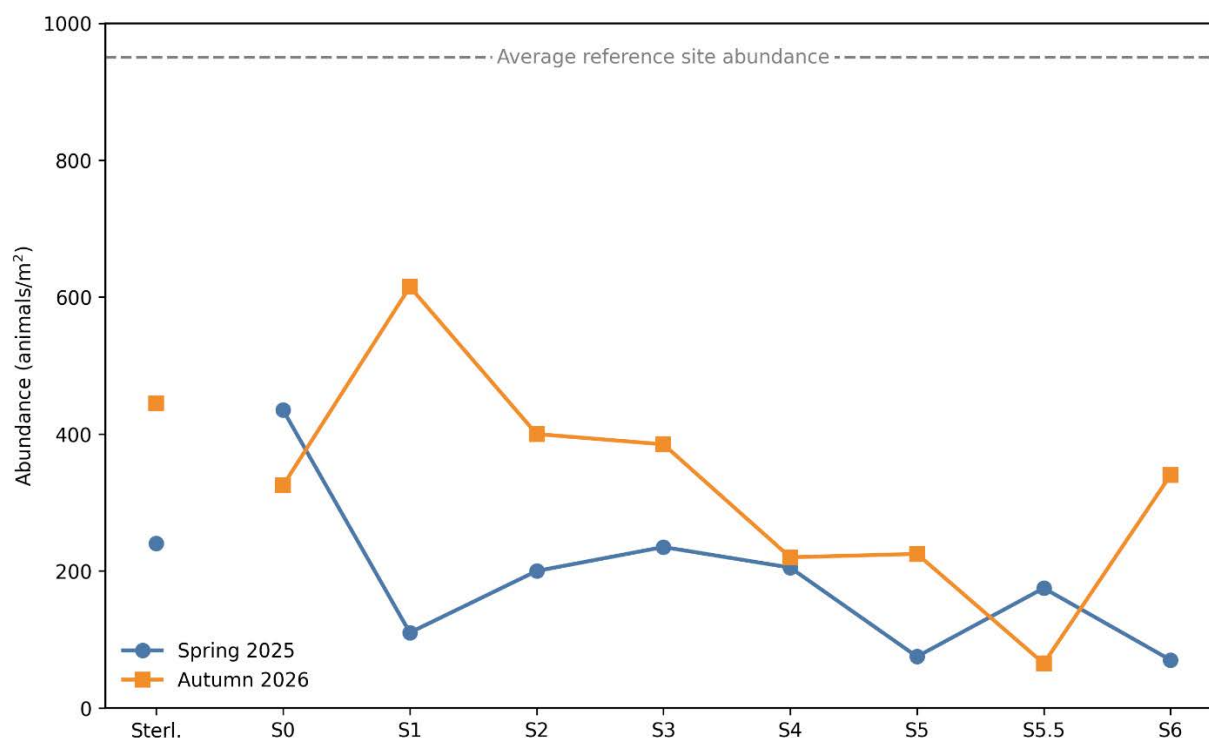


Figure 3.9: Total abundance (number of animals/m²) of macroinvertebrates in the Sterling River and Stitt River sites in spring 2025 and autumn 2026. Dashed line shows the average total abundance of Surber data collected from the reference sites from 2003 – 2025).

3.3.2.2 Taxa richness

Taxa richness based on the combined Surber and AusRivAS data was generally high at the reference and upstream sites and tended to decline in the lower Stitt River sites downstream from potential sources of MRCs, although the strength of this pattern differed between seasons.

In spring 2025, richness was highest at S0 (26 taxa), followed by Sterling (22), S3 (22), S1 and S4 (21), and S2 (19). Richness declined further downstream, to 17 taxa at S5, 18 at S5.5 and a minimum of 15 at S6 (Figure 3.10). The downstream decline was therefore most apparent from S4 to S6.

In autumn 2026, richness was higher than the spring survey at most sites. The Sterling River, and the two most upstream Stitt River sites recorded 24 – 25 taxa, while S2–S5 recorded 20–22 taxa. Richness again declined at the two lowermost sites, with 19 taxa recorded at both S5.5 and S6. Overall, the combined data indicate that S3–S5 retained a relatively diverse assemblage compared to the reference sites, while low richness was consistently recorded at S5.5 and S6.

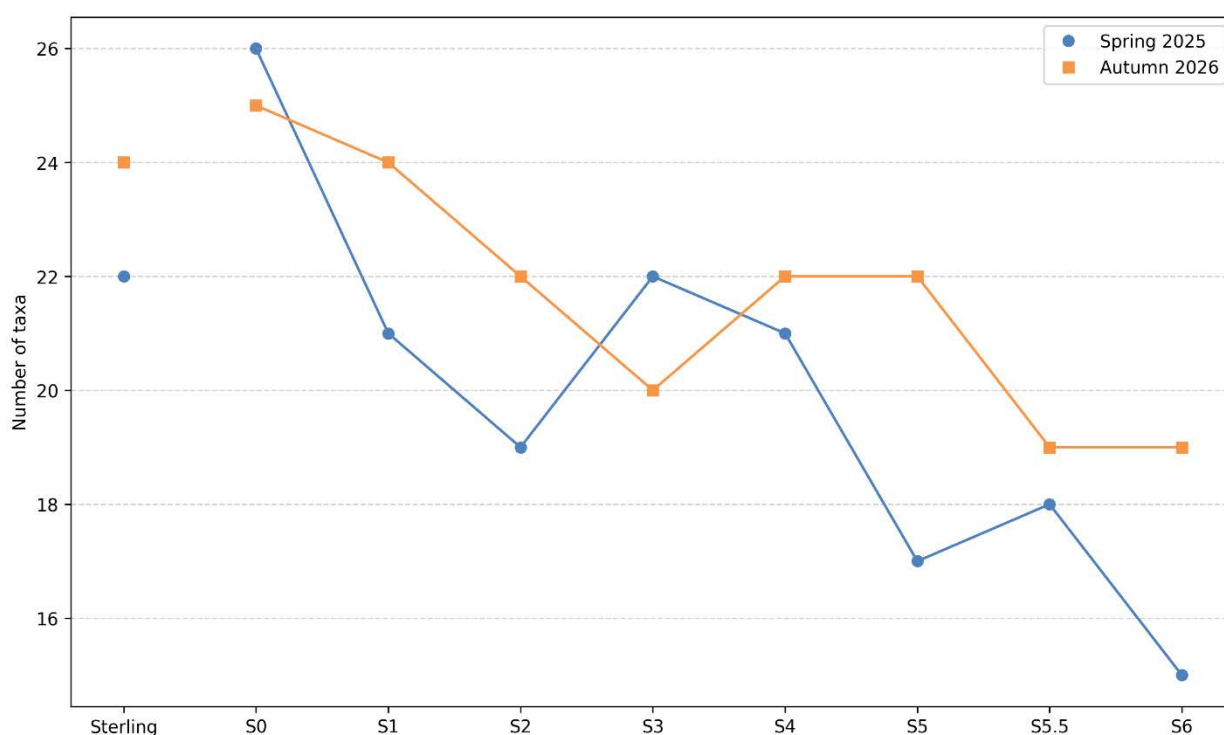


Figure 3.10: Taxa richness recorded in the Sterling and Stitt River catchments in spring 2025 and autumn 2026. Taxa richness represents the total number of unique taxa detected from the combined Surber and AusRivAS samples at each site.

3.3.2.3 Composition

Surber data

Macroinvertebrate assemblages across the Sterling River and Stitt River sites were characterised by a relatively consistent group of common taxa, although their relative abundances varied substantially among sites and between surveys. Leptophlebiidae were one of the most abundant and widespread groups and were particularly prominent at S0 and S2 in spring 2025 and at Sterling and S0 – S3 in

autumn 2026. Other widespread taxa included Oligochaeta, Gripopterygidae, Orthocladiinae, Chironominae, Scirtidae and Elmidae larvae. Elmidae larvae were particularly abundant at S3 in both surveys, while Scirtidae were generally uncommon in spring but became abundant at several sites in autumn 2026. Hydrobiosidae, Leptoceridae, Philorheithridae, Paramelitidae and Baetidae were also relatively frequent components of the assemblage, although their distributions were less uniform.

Several taxa showed clearer differences between the reference/upstream sites and sites S3–S6. Leptophlebiidae remained present well into the downstream reaches but generally declined in abundance downstream of S3. In autumn 2026, for example, 14 – 23 individuals were recorded at each of Sterling and S0 – S2 and 18 at S3, compared with six at S4, eight at S5, two at S5.5 and none at S6. Baetidae mayflies also showed strong upstream association: they were recorded from S0 and S2 in the spring quantitative samples but were absent from S3–S6, while in autumn they were present at all four reference/upstream sites but occurred at much lower abundance at S3–S5 and were absent from S5.5 and S6.

Eustheniidae were also strongly associated with the upstream sites, particularly in autumn 2026 when they occurred at Sterling and all three upstream Stitt River sites but were absent from the quantitative samples at S3–S6. Paramelitidae, Leptoceridae, Philorheithridae and Psephenidae were similarly generally better represented at the reference/upstream sites, although occasional individuals occurred downstream. In contrast, some taxa were locally more abundant downstream. Elmidae larvae were especially abundant at S3, Scirtidae were abundant at S3, S4, S5 and S6 in autumn 2026, Oligochaeta were particularly abundant at S4 in autumn, and Gripopterygidae were prominent at S5.5 in spring. Overall, S3 retained a number of taxa characteristic of the reference/upstream assemblage, whereas changes in community composition were generally more pronounced from S4 downstream, with the strongest differences evident at S5.5 and S6.

Ausrivas data

The AusRivAS samples showed a broadly similar pattern in community composition to the quantitative samples. In spring 2025, assemblages were dominated by Leptophlebiidae, Hydrobiosidae and Gripopterygidae, all of which occurred at every site, while Baetidae, Paramelitidae, Eustheniidae, Elmidae, Philorheithridae, Podonominae and Orthocladiinae were also widespread. Leptophlebiidae and Hydrobiosidae remained prominent in autumn 2026, together with increased representation of Leptoceridae, Gripopterygidae, Elmidae and Scirtidae. Consequently, the downstream assemblages retained many taxa occurring at the reference and upstream sites, with differences among sites generally reflecting changes in relative abundance rather than wholesale replacement of the fauna.

Several taxa nevertheless showed consistent spatial differences. Eustheniidae and Paramelitidae were generally best represented at Sterling and/or S0–S2 and declined substantially from S4 downstream, particularly at S5, S5.5 and S6. Baetidae showed a less consistent response at S3 and S4 but were also poorly represented at S5 and S5.5 and absent from S6 in both seasons. In contrast, Scirtidae became increasingly prominent downstream and were particularly abundant at S6 in both surveys. Hydrobiosidae, Leptoceridae and Gripopterygidae remained well represented at several downstream sites and in some cases comprised a large proportion of the assemblage. Leptophlebiidae also remained abundant in the AusRivAS samples at several downstream sites, particularly S5 and S5.5 in autumn 2026, although their quantitative abundance in the Surber samples declined towards the lower sites.

Overall, the AusRivAS data therefore supported the broader changes identified from the quantitative samples, with S3 retaining many characteristics of the upstream assemblage and progressively greater compositional differences generally apparent from S4 downstream, particularly at S5.5 and S6. The

potential linkages between water quality conditions and the macroinvertebrate communities in the Stitt River is discussed Section 3.3.3.

3.3.2.4 *AusRivAS*

The AusRivAS O/E scores and condition bands for the spring and autumn O/Epa models are provided in tables (Table 3.5 and Table 3.6) and graphically (Figure 3.11). Figure 3.12 show all the O/E scores and condition bands since the O/Epa model has been used in the biomonitoring program (2015 – 2026). The raw macroinvertebrate data is provided in Appendix A.

In spring 2025, both replicate AusRivAS samples from each reference site were rated as equivalent to reference condition (band A), except at the most upstream Stitt River site (S0), where both replicates fell within band B (significantly impaired). Most sites downstream of MRC sources, from S3 to S5.5, were also assessed as band B, while the most downstream site, S6, fell within band C (severely impaired).

In autumn 2026, both replicates from the three Stitt River reference sites were assessed as at least band A, as were both replicates from the first two Stitt River sites downstream of MRC sources, S3 and S4. The Sterling River reference site was rated band B for both replicates, as was S5. Unexpectedly, O/E scores were higher at S5.5 and S6, with each site having one replicate in band A and the other in band B.

The patterns in mean O/Epa river health scores from 2015 to 2026 are summarised below and shown graphically in Figure 3.12.

Long term trends: reference sites

The Sterling River reference site has been within the reference-condition range (band A) on 10 of 18 sampling occasions since 2015, within the significantly impaired range (band B) on six occasions, and within the severely impaired range (band C) on two occasions (Figure 3.12). The relatively frequent impaired ratings at this unregulated reference site are unusual, as there are no obvious catchment impacts that would explain the reduced condition. This includes the band B rating recorded during the most recent survey in autumn 2026.

Site S0 in the Stitt River has been within reference condition, or more diverse than reference, on 14 of 18 occasions and within the significantly impaired range on four occasions (Figure 3.12). Site S1 has been within reference condition, or more diverse than reference, on 15 of 18 occasions and within the significantly impaired range on three occasions. Site S2 has been within reference condition, or more diverse than reference, on 10 of 18 occasions and within the significantly impaired range on eight occasions.

Long term trends: sites downstream from MRCs:

Each of sites S3 and S4 has been within reference condition, or more diverse than reference, on eight of 18 occasions and within the significantly impaired range on 10 occasions (Figure 3.12). The impaired condition recorded at both sites in spring 2025 was the first since spring 2023.

Site S5 has most commonly been within the significantly impaired range but was assessed as equivalent to reference condition in 2015 and on four consecutive sampling occasions during 2023 and 2024. The site subsequently returned to band B during the three surveys from autumn 2025 to autumn 2026 (Figure 3.12).

The mean O/E score at S6 has been within the significantly impaired range on all sampling occasions except spring 2018, when it was assessed as extremely impaired (band D), and autumn 2024, when it was assessed as equivalent to reference condition. However, the mean O/E score was only marginally below the band A threshold in both autumn 2025 and autumn 2026.

Seasonal trends

A seasonal pattern was apparent in the historical AusRivAS results, with O/E scores consistently higher in autumn than in spring at all sites other than S5 (Figure 3.12). Although autumn O/E scores were generally higher than spring scores, considerable variation also occurred among years within each season.

Table 3.5: AusRivAS O/Epa model O/E scores, condition bands, number of taxa and EPT proportion for the spring 2025 survey in Sterling and Stitt River catchments.

Site	Sample number	Spring 2025		Number of taxa	EPT proportion
		O/E	Band		
Sterling	a	0.87	A	15	0.47
	b	0.94	A	17	0.47
S0	a	0.67	B	14	0.50
	b	0.73	B	15	0.53
S1	a	0.94	A	15	0.40
	b	0.87	A	16	0.50
S2	a	0.86	A	13	0.62
	b	0.86	A	13	0.54
S3	a	0.68	B	11	0.55
	b	0.91	A	18	0.50
S4	a	0.81	B	12	0.50
	b	0.59	B	10	0.40
S5	a	0.73	B	11	0.36
	b	0.8	B	15	0.40
S5.5	a	0.6	B	11	0.36
	b	0.73	B	12	0.42
S6	a	0.47	C	10	0.50
	b	0.34	C	7	0.57

Table 3.6: AusRivAS O/Epa model O/E scores, condition bands, number of taxa and EPT proportion for the autumn 2026 survey in the Sterling and Stitt River catchments.

Site	Sample number	Autumn 2026		Number of taxa	EPT proportion
		O/E	Band		
Sterling	a	0.72	B	15	0.60
	b	0.8	B	14	0.50
S0	a	1.11	A	20	0.40
	b	1.04	A	16	0.50
S1	a	1.17	X	19	0.58
	b	1.17	X	17	0.47
S2	a	0.95	A	13	0.54
	b	1.1	A	16	0.50
S3	a	0.95	A	15	0.53
	b	1.27	X	17	0.47
S4	a	1.06	A	16	0.38
	b	1.06	A	15	0.53
S5	a	0.73	B	13	0.54
	b	0.8	B	14	0.57
S5.5	a	0.8	B	13	0.46
	b	1.02	A	14	0.57
S6	a	0.88	A	15	0.47
	b	0.8	B	13	0.38

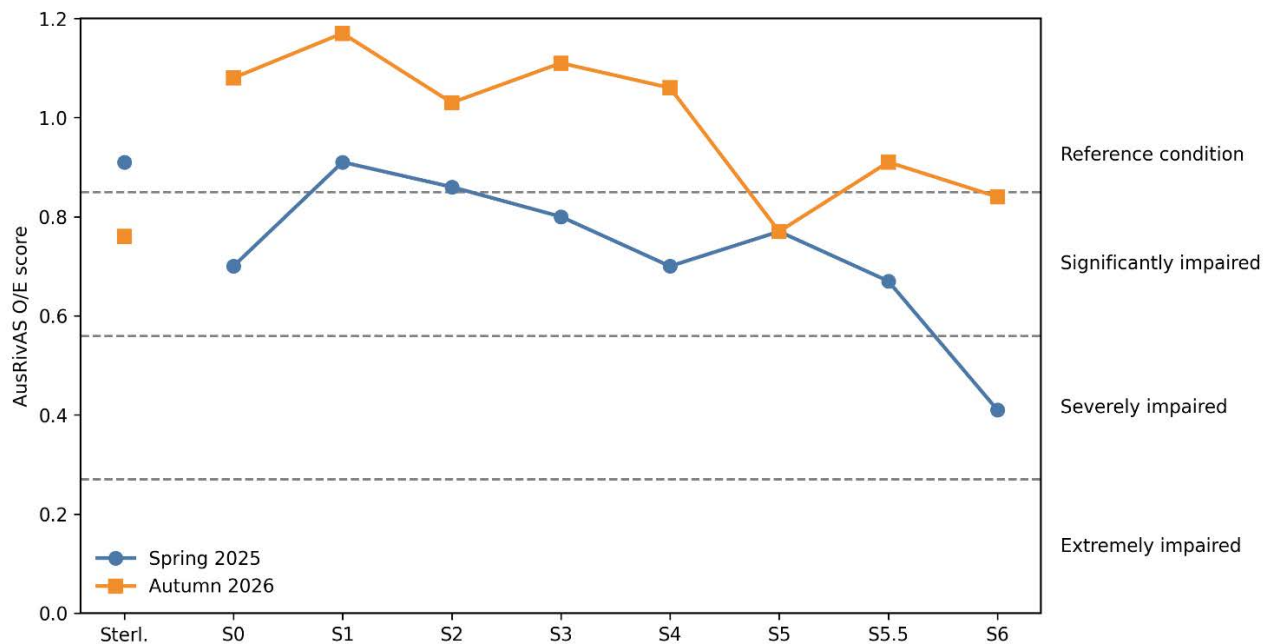


Figure 3.11 AusRivAS O/Epa model average O/E scores for the spring 2025 and autumn 2026 survey in the Sterling and Stitt River catchments.



Figure 3.12: AusRivAS O/Epa model O/E scores and condition bands for the Sterling River and Stitt River site S0 from 2015 to 2026 (based on average score of two samples at each site).

3.3.2.5 TRCI

The TRCI macroinvertebrate condition scores for spring 2025 and autumn 2026 are shown in Table 3.7 and Table 3.8. The raw data outputs and breakdown of the scoring system used to allocate a score for *Expectedness* (combination of the AusRivas O/Epa O/E and signal scores), *Abundance* (total abundance from the Surber samples), and *Composition* (ratio of the proportion of EPT families to total families from the AusRivas data) are provided in Appendix B.1.

In Spring 2025, the TRCI condition scores for *Expectedness* were only rated as high in at the Sterling River, S1 and S2 with all other sites assessed as moderate due to AusRivas scores in the impaired range (Table 3.7). The score for abundance was low at all sites as no site recorded the 700 animals/m² which is the lower threshold for reference condition. By contrast all sites achieved a high score for composition because EPT families formed at least 35% of the families present (Appendix B.1). No site achieved an overall “Good” condition score. The Sterling River, S1 and S2 recorded an overall Moderate condition score while the remaining sites were assessed as Poor condition.

As for spring 2025, no site achieved an overall Good condition rating in autumn 2026 (). Six of the sites achieving a good Expectedness score and all sites were rated high for Composition; however, no site recorded an abundance ≥ 700 animals/m² and therefore a Moderate condition score was the highest achievable with all sites assessed as Moderate aside from the Sterling River reference site, S5 and S6 which recorded impaired AusRivas scores and an overall Poor TRCI condition score.

Prior to 2023/24, TRCI condition scores were only calculated on the autumn data, and this is available for autumn 2018 to autumn 2026 (Table 3.9). The condition ratings have varied between and within sites over time; however, a moderate rating has been applied more often than either good or poor ratings at nearly all the sites (Table 3.9). In nearly every instance, a medium rating was caused by a low abundance score, rather than either a low expectedness or composition score. This may indicate that abundances are naturally low in the Stitt River given that a low abundance rating has been common in the reference sites.

Table 3.7: TRCI Macroinvertebrate scores for spring 2025

<i>Macroinvertebrate condition score</i>						
Site	Code	Expectedness	Abundance	Composition	Score	Condition
Sterling R.	Sterl	H	L	H	70	Moderate
Stitt R.	S0	M	L	H	40	Poor
	S1	H	L	H	70	Moderate
	S2	H	L	H	70	Moderate
	S3	M	L	H	40	Poor
	S4	M	L	H	40	Poor
	S5	M	L	H	40	Poor
	S5.5	M	L	H	40	Poor
	S6	M	L	H	40	Poor

Table 3.8: TRCI Macroinvertebrate scores for autumn 2026

<i>Macroinvertebrate condition score</i>						
Site	Code	Expectedness	Abundance	Composition	Score	Condition
Sterling R.	Sterl	M	L	H	40	Poor
Stitt R.	S0	H	L	H	70	Moderate
	S1	H	L	H	70	Moderate
	S2	H	L	H	70	Moderate
	S3	H	L	H	70	Moderate
	S4	H	L	H	70	Moderate
	S5	M	L	H	40	Poor
	S5.5	H	L	H	70	Moderate
	S6	M	L	H	40	Poor

Table 3.9: Available TRCI condition scores for autumn from 2018 to 2025 for the Sterling and Stitt rivers

Site	Autumn 2018	Autumn 2019	Autumn 2020	Autumn 2021	Autumn 2022	Autumn 2023	Autumn 2024	Autumn 2025	Autumn 2026
Sterling	Mod	Good	Mod	Mod	Poor	Good	Mod	Poor	Poor
S0	Mod	Mod	Mod	Mod	Poor	Mod	Mod	Good	Moderate
S1	Good	Mod	Good	Mod	Mod	Mod	Mod	Good	Moderate
S2	Mod	Mod	Good	Mod	Poor	Mod	Mod	Good	Moderate
S3	Mod	Good	Good	Poor	Poor	Mod	Good	Good	Moderate
S4	Mod	Mod	Mod	Mod	Poor	Mod	Mod	Good	Moderate
S5	Poor	Mod	Mod	Poor	Poor	Mod	Good	Poor	Poor
S5.5	-	-	-	-	-	-	-	-	Moderate
S6	Poor	Poor	-	Poor	Poor	Mod	Mod	Poor	Poor

3.3.3 Water Quality

3.3.3.1 Metal concentrations and DGV exceedances

The frequency of metal concentrations exceeding the default ANZG 95% freshwater DGVs showed a strong longitudinal pattern along the Stitt River. Aluminium and zinc were the most widespread exceedances (Table 3.10). Dissolved aluminium exceeded the applicable DGV in approximately 95–100% of samples at all sites, including the upstream reference sites. Zinc exceedances were also common within the reference reach, increasing from 24% at S0/SR01 to approximately 66% at ML02 and S1/ML04 and 90% at S2/WL8. Aluminium and, to a lesser extent, zinc therefore provide relatively poor discrimination between reference and mine-influenced sites when considered solely on the basis of DGV exceedance frequency.

Cadmium, copper, lead and total iron showed clearer spatial differentiation (Table 3.10). At the upstream reference sites, dissolved cadmium and lead exceedances were rare, copper exceedances occurred in approximately 7–12% of samples and total iron exceedances in approximately 6–7% of samples. A multi-metal exceedance pattern became evident farther downstream, initially at SR02, and became progressively stronger through the lower Stitt River. At S5.5/U/S Pie and S6, cadmium, copper, lead and zinc frequently exceeded their respective DGVs, indicating sustained exposure to a mixture of mine-related metals.

The overall pattern is characterised by relatively low cadmium, copper, lead and iron exceedance frequencies within the upstream reference reach, increasing metal exposure through the mine-affected reach and the strongest multi-metal signal within the lower river. The differences among metals also indicate that contaminant inputs do not increase uniformly downstream and are consistent with contributions from multiple mine-related contaminant sources.

3.3.3.2 Long-term and contemporary metal patterns

Long-term monitoring indicates substantial changes in metal concentrations at some sites, particularly SR02, whereas elevated concentrations have persisted farther downstream. To distinguish these temporal changes from the contemporary longitudinal pattern, annual median concentrations at key long-term sites are shown in Figure 3.13, while the 2025–26 spatial pattern through the Stitt River is

shown in Figure 3.14. The upstream reference sites showed broadly similar long-term water-quality patterns and therefore S2/WL8 was selected as the representative upstream reference site for long term trends in the description and plots. This reference site is also the most appropriate spatial comparison because it is the nearest reference site upstream of SR02 and the 2/5 Dam TSF influence.

3.3.3.3 Aluminium

Dissolved aluminium concentrations have been elevated throughout the Stitt River long term monitoring sites, including at the upstream reference sites (Table 3.10; Figure C.1). During 2025–26, concentrations showed relatively little longitudinal differentiation compared with the other metals examined (Figure C.2). Median concentrations were broadly similar from S0 through S5, with only a modest increase at S5.5 and no further increase at S6. Consequently, aluminium did not show the pronounced downstream step changes evident for cadmium, lead, copper or zinc.

The longer-term records showed a similarly consistent pattern. Annual median dissolved aluminium concentrations at S2/WL8, SR02 and S4/SR03 generally overlapped, while concentrations at S5.5/U/S Pie were somewhat higher in some years.

3.3.3.4 Copper

Dissolved copper concentrations were generally low within the upstream reference reach, with annual median concentrations below the 1.4 µg/L DGV despite occasional individual exceedances (Table 3.10). The clearest long-term change occurred at SR02, where concentrations were substantially higher and more variable during the earlier monitoring period (Figure 3.13). Annual medians generally declined from approximately 2–4 µg/L during much of 2015–2018 to around 1 µg/L from approximately 2019 onwards, with a corresponding reduction in DGV exceedance frequency. Much of this improvement commenced before the additional seepage-management works undertaken during 2021–2023, indicating that it reflects progressive improvements in mine-water management over a longer period rather than a response to a single intervention.

The temporal pattern farther downstream was different. Annual median copper concentrations at S4/SR03 generally remained above the DGV and showed no clear sustained long-term decline, while concentrations at S5.5/U/S Pie were higher again. Although median concentrations at S5.5 decreased during the most recent monitoring period, the available record is currently insufficient to determine whether this represents a sustained improvement.

The 2025–26 monitoring provides a clear contemporary spatial contrast for the sites downstream sources of MRCs. Copper concentrations were lowest at S3 and progressively increase at the sites further downstream with the highest levels at S6 (Figure 3.14). Overall, the copper results indicate substantial long-term improvement at SR02 but continued elevated exposure farther downstream. This spatial difference in temporal response is consistent with reduced contaminant inputs associated with improved management of the 2/5 Dam TSF, while indicating continuing influence from other mine-related contaminant sources within the lower Stitt River.

Table 3.10: Stitt River metal DGV exceedances by site. Values are % of assessable samples exceeding the DGV, with exceedance count / total sample count in brackets. Shading is used only to aid visual interpretation of exceedance frequency.

Sampling period	Site	Al dissolved	Cd dissolved	Cu dissolved	Fe total	Pb dissolved	Zn dissolved
2013–2026	S0 / SR01	94.6% (333/352)	1.5% (5/329)	12.1% (43/354)	7% (27/387)	0.3% (1/354)	24.1% (79/328)
2013–2026	ML02	95.1% (270/284)	0.4% (1/262)	7% (20/285)	6.4% (19/295)	0.4% (1/285)	65.6% (172/262)
2013–2026	S1 / ML04	96.2% (329/342)	0% (0/319)	7.3% (25/342)	5.9% (21/354)	0.3% (1/342)	65.8% (210/319)
2011–2026	S2 / WL8	96.1% (442/460)	1.8% (8/437)	7.8% (36/462)	5.9% (28/474)	0.7% (3/461)	89.9% (393/437)
2025–2026	S3	100% (38/38)	0% (0/38)	15.8% (6/38)	26.3% (10/38)	0% (0/38)	100% (38/38)
2013–2026	SR02	97.9% (372/380)	19.8% (71/358)	45.4% (174/383)	30.8% (120/389)	8.1% (31/383)	100% (358/358)
2018–2026	S4 / SR03	97.2% (242/249)	15.6% (39/250)	95.6% (239/250)	34.4% (86/250)	0.4% (1/250)	99.6% (249/250)
2025–2026	S5	100% (36/36)	13.9% (5/36)	100% (36/36)	30.6% (11/36)	0% (0/36)	100% (36/36)
2020–2026	S5.5 / U/S Pie	100% (86/86)	82.8% (72/87)	98.9% (86/87)	47.7% (42/88)	66.7% (58/87)	100% (87/87)
2025–2026	S6	100% (29/29)	96.6% (28/29)	100% (29/29)	51.7% (15/29)	93.1% (27/29)	100% (29/29)
2020–2026	SR05	100% (25/25)	32% (8/25)	60% (15/25)	53.7% (44/82)	40% (10/25)	100% (28/28)

Shading key:

<15%	15–25%	>25–40%	>40%
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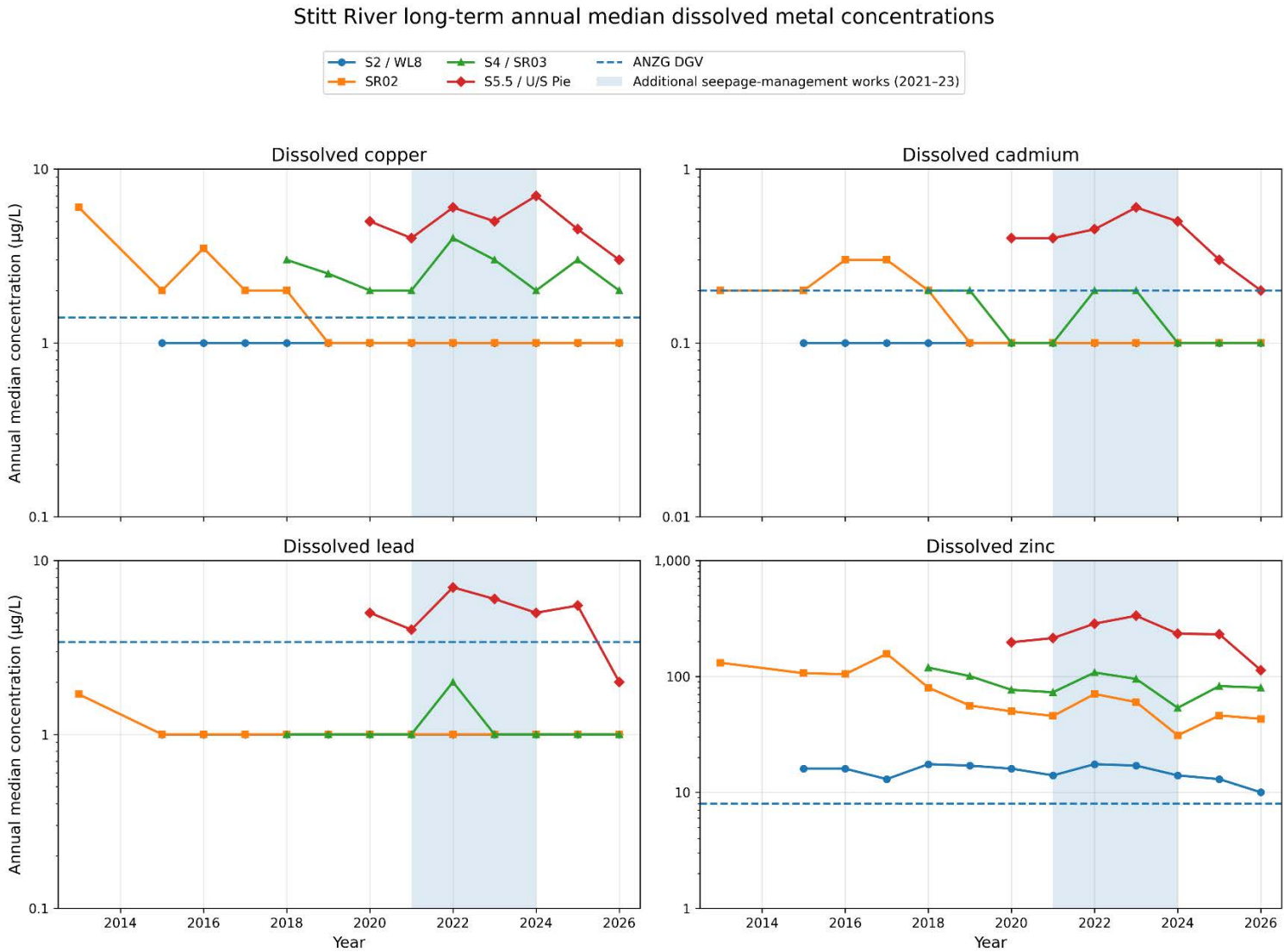


Figure 3.13: Long-term annual median dissolved cadmium, copper, lead and zinc concentrations (log) at selected Stitt River monitoring sites. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values, and the shaded period indicates the additional 2/5 Dam TSF seepage-management works undertaken during 2021–23

Stitt River contemporary longitudinal dissolved metal concentrations, 2025–2026

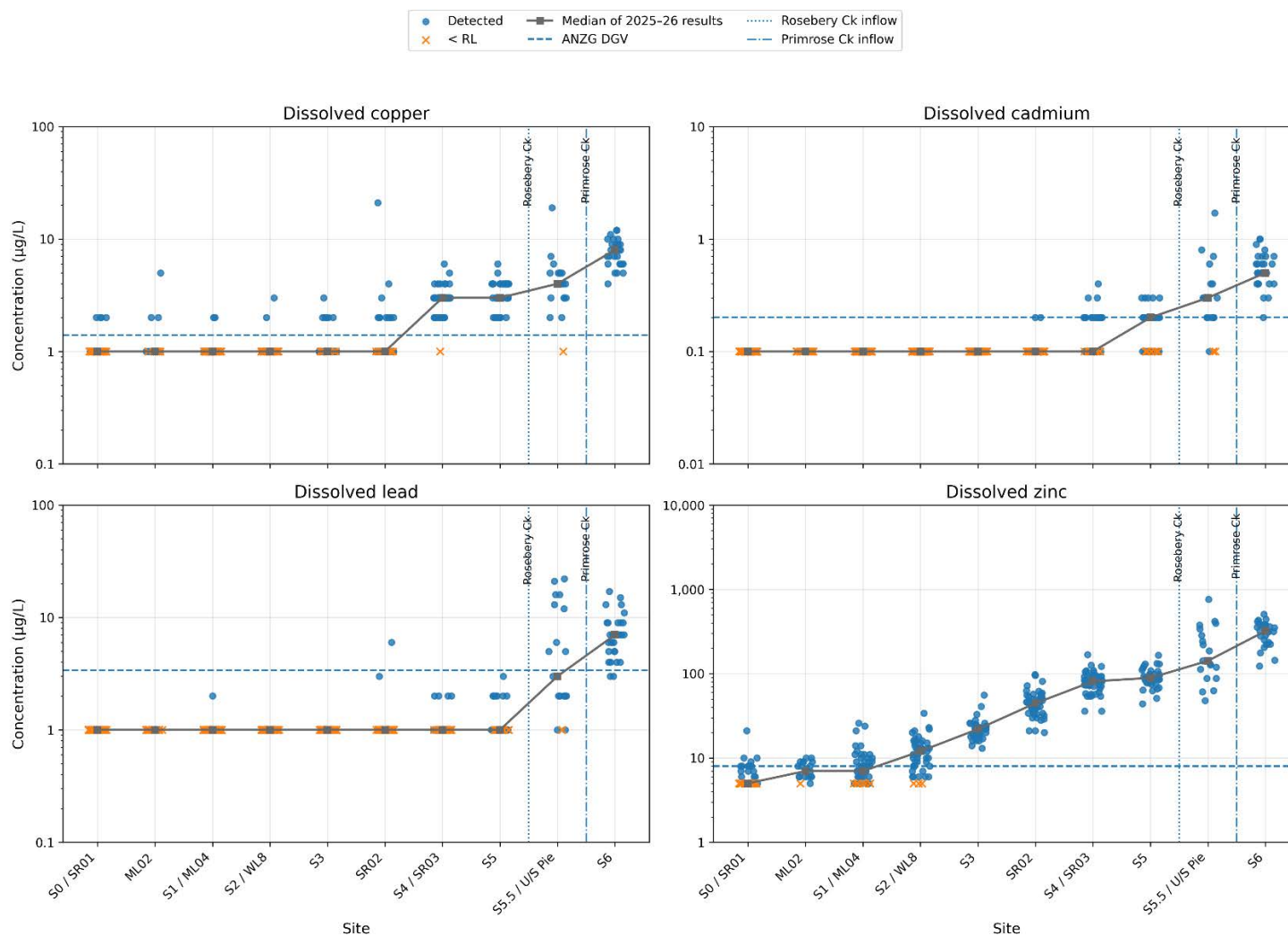


Figure 3.14 Longitudinal dissolved-metal concentrations in the Stitt River during 2025–26. Individual detected concentrations are shown as blue circles, results below the laboratory reporting limit as orange crosses, and site medians as dark-grey squares joined by a dark-grey line. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values.

3.3.3.5 Cadmium

Dissolved cadmium concentrations have generally been low within the reference sites, with annual medians around 0.1 µg/L and below the 0.2 µg/L DGV. Some spatial variability was nevertheless evident, particularly at S2/WL8, where occasional elevated concentrations and DGV exceedances have occurred historically.

A stronger historical cadmium signal occurred at SR02 (Figure 3.13). Annual medians were approximately 0.2–0.3 µg/L between 2013 and 2018 but declined to approximately 0.1 µg/L from 2019 onwards and remained at this level through 2026. S4/SR03 showed a more variable pattern, while S5.5/U/S Pie remained substantially higher for much of its monitoring record. At S5.5, annual medians increased to approximately 0.6 µg/L in 2023 before declining through 2024–26, providing evidence of a more recent improvement in lower-river cadmium concentrations.

The contemporary spatial pattern was particularly clear. Cadmium concentrations were low at S3, somewhat higher at S5 and increased markedly at S6, where almost all results exceeded the DGV (Figure 3.14). This S3–S5–S6 gradient closely parallels the contemporary copper pattern and indicates that substantial cadmium inputs remain within the lower Stitt River despite the longer-term improvement at SR02.

3.3.3.6 Lead

Lead showed a distinctly different spatial pattern from copper and cadmium. Concentrations were generally low throughout the reference sites, with annual medians around the analytical reporting limit and very few DGV exceedances (Table 3.10). Elevated concentrations occurred periodically at SR02 during the earlier monitoring record, but annual medians have generally remained low and elevated individual results have become less frequent. S4/SR03 was similarly characterised by generally low lead concentrations.

A pronounced increase occurred at the most downstream sites. At S5.5 / U/S Pie, two-thirds of assessable samples exceeded the 3.4 µg/L DGV and annual medians were approximately 4–7 µg/L between 2020 and 2025 (Figure 3.13). The 2025 - 2026 spatial pattern is particularly clear: no lead exceedances were recorded at S3 or S5, whereas 27 of 29 samples at S6 exceeded the DGV (Figure 3.14).

Lead therefore provides a strong indication that an important contemporary contaminant input occurs downstream of S5, rather than showing the progressive pattern from the vicinity of the 2/5 Dam TSF evident for some other metals.

3.3.3.7 Zinc

Zinc differs from the other key dissolved metals because elevated concentrations occurred at reference and the sites downstream the sources of MRCs (Table 3.10). DGV exceedance frequency and annual median concentrations increased progressively downstream from S0/SR01 to S2/WL8, demonstrating that elevated zinc cannot be attributed solely to mine-related inputs occurring downstream of the reference sites.

Nevertheless, substantial additional increases occur through sites downstream sources of MRCs. At SR02, zinc concentrations were high and variable during the earlier monitoring period, with annual medians generally exceeding 100 µg/L during the mid-2010s. Concentrations decreased substantially from approximately 2018–20 onwards and have generally remained around 30–70 µg/L during the more recent record (Figure 3.13). S4/SR03 remained higher, while the highest long-term concentrations

occurred at S5.5/U/S Pie. More recent reductions were also evident at S5.5, although concentrations remained well above the DGV.

The 2025–26 sites showed a pronounced contemporary longitudinal gradient, with median concentrations of approximately 20–25 µg/L at S3, 80–100 µg/L at S5 and 250–350 µg/L at S6 (Figure 3.14). Thus, although zinc is less useful than cadmium, copper or lead for distinguishing mine-related influence solely on the basis of DGV exceedance, the magnitude of zinc concentrations still shows substantial additional downstream loading through the mine-affected reach.

3.3.3.8 Total iron

Total iron showed a weaker longitudinal pattern than cadmium, copper, lead or zinc. Annual median concentrations at the upstream reference sites were typically around 130–220 µg/L and generally below the 280 µg/L DGV, although occasional high individual concentrations occurred. The occurrence of such events within the reference reach indicates that elevated total iron is not restricted to mine-affected sites and may partly reflect natural or event-related particulate inputs (Table 3.10).

At SR02, annual median concentrations remained generally close to the DGV and did not show the pronounced decline evident for copper and cadmium (Figure C.3). However, there was a marked reduction in the occurrence of extreme concentrations: 17 pre-2021 results exceeded 600 µg/L compared with only two from 2021 onwards (Figure C.4).

S5.5/U/S Pie remained moderately elevated relative to the upstream sites but showed no convincing recent downward trend, while the 2025–26 sites showed only a modest downstream increase compared with the much stronger gradients evident for the dissolved metals (Figure C.5). Iron therefore provides less spatial discrimination of current mine-related influence but indicates that the occurrence of major episodic iron-loading events has decreased substantially over the monitoring period.

3.3.3.9 Overall water-quality pattern

Taken together, the monitoring results indicate both substantial long-term improvement and continuing spatial variation in metal exposure within the Stitt River. The clearest long-term improvements have occurred at SR02, particularly for copper, cadmium and zinc, with reductions commencing from approximately the late 2010s. This indicates a substantial reduction in the historical metal signal immediately downstream of the 2/5 Dam TSF.

In contrast, elevated metal concentrations continue farther downstream. Copper remains elevated through S4/SR03 and S5, while cadmium, copper, lead and zinc show their strongest contemporary multi-metal signal at S5.5/U/S Pie and S6. Lead is particularly informative because concentrations remained low at S5 but increased markedly at the downstream sites. The differing behaviour of individual metals indicates that the contemporary water-quality pattern cannot be explained by a single contaminant source.

Overall, the results are consistent with a reduced contemporary influence from contaminant inputs associated with the 2/5 Dam TSF relative to the historical record, together with continuing inputs from additional mine-related contaminant sources within the lower Stitt River. The distinction between these spatial patterns is examined further in relation to the macroinvertebrate results in Section 3.3.4.

3.3.4 Relationships between recent metal exposure and macroinvertebrate condition

The analyses presented below supplement, rather than replace, the established biological condition metrics used in the Stitt River monitoring program. Their purpose is to examine whether spatial variation in macroinvertebrate condition and community composition during the 2025–26 surveys was associated with recent dissolved-metal exposure and to provide a more integrated interpretation of biological and water-quality condition.

Recent exposure was represented by the median dissolved concentration of cadmium, copper, lead and zinc during the three months preceding each biological survey. This period was selected to provide an indication of typical recent exposure over a period likely to be relevant to the sampled macroinvertebrate community, while reducing the influence of individual short-duration concentration peaks. Relationships were examined for each metal individually and using combined exposure indices calculated as the sum of each metal concentration normalised to its respective default guideline value. Indices were calculated for Cd + Cu + Pb and for Cd + Cu + Pb + Zn. These indices are used as relative measures of combined exposure and should not be interpreted as formal mixture-toxicity indices or ecological thresholds.

Relationships were assessed using Spearman rank correlation coefficients. These are used descriptively because the analysis includes a relatively small number of sites within a longitudinal river system and several metal concentrations were at or close to analytical reporting limits. Accordingly, the analysis is intended to identify consistent spatial associations rather than demonstrate causation.

3.3.4.1 Overall macroinvertebrate condition

Macroinvertebrate condition generally declined with increasing recent metal exposure, although the strength of the relationship differed among biological metrics and between seasons.

AusRivAS O/E scores showed consistent negative relationships with recent dissolved-metal concentrations (Table 3.11). The strongest relationships were with copper, with Spearman ρ values of -0.76 in spring and -0.83 in autumn, and cadmium, particularly in autumn (-0.60 and -0.82 respectively). Zinc was also negatively associated with O/E (-0.60 spring; -0.79 autumn), while the relationship with lead was weaker because median lead concentrations remained low at most sites and increased markedly only at S6. The Cd + Cu + Pb exposure index was strongly negatively associated with O/E in both seasons (ρ = -0.76 spring; -0.85 autumn). Inclusion of zinc produced similarly negative, although slightly weaker, relationships (-0.60 and -0.79).

Combined taxa richness also declined with increasing recent metal exposure (Table 3.11). Copper showed a strong negative relationship in spring (ρ = -0.84), while zinc showed strong relationships in both seasons (-0.85 spring; -0.86 autumn). The Cd + Cu + Pb + Zn index was strongly negatively associated with taxa richness in both spring and autumn (ρ = -0.85 and -0.86 respectively).

The clearest community-level response was recorded for combined EPT richness (Table 3.11). Copper was strongly negatively associated with EPT richness in both spring and autumn (ρ = -0.92 and -0.87), as was zinc (-0.90 in both seasons). The Cd + Cu + Pb index produced similarly strong relationships (-0.92 spring; -0.86 autumn), while inclusion of zinc resulted in ρ values of approximately -0.90 in both seasons.

In contrast, total Surber abundance showed weaker and more variable relationships with recent metal exposure (Table 3.11). Copper and zinc generally showed negative associations with abundance, but relationships were less consistent than for AusRivAS O/E, taxa richness and EPT richness. This indicates that total abundance alone was a relatively insensitive measure of the spatial biological response, as

relatively high abundance could occur where the community was dominated by taxa that persisted under elevated metal exposure.

The relationships between the three most responsive overall biological metrics and the combined four-metal exposure index are presented in Figure 3.15.

3.3.4.2 Community composition

The Surber data indicated that the relationship with recent metal exposure was expressed not only through changes in richness and condition scores, but also through a change in the composition of the macroinvertebrate community.

For this analysis, Leptophlebiidae, Baetidae, Eustheniidae and Paramelitidae were grouped as taxa showing a strong negative relationship with metals. Gripopterygidae, Scirtidae, Elmidae and chironomids were grouped as selected taxa persisting through the impacted reach. Remaining taxa were grouped as other taxa. The “other taxa” describe the families which showed no consistent longitudinal or metal-related pattern.

The spring community showed considerable spatial variability (Figure 3.16). Taxa showing a strong negative relationship with metals accounted for approximately 48% of Surber abundance at S0 and 57% at S2, but only a small proportion of the sample at S1. Their contribution was generally lower through the downstream reach, although the spring pattern was influenced by low and spatially variable abundance at several upstream sites.

A clearer longitudinal pattern was evident in autumn. Taxa showing a strong negative relationship with metals comprised approximately 57% of total Surber abundance at S0, 32–35% at S1 and S2 and 27% at S3 (Figure 3.16). Their contribution declined to approximately 18% at S4 and 15% at S5.5, and none of these taxa were recorded at S6. In contrast, taxa persisting through the impacted reach remained an important component of the downstream community.

This change was not simply a consequence of decreasing total macroinvertebrate abundance. For example, total abundance at S6 was substantially higher in autumn than at S5.5, but the composition of the community differed markedly. Leptophlebiidae, Baetidae, Eustheniidae and Paramelitidae were absent from the S6 Surber sample, while Scirtidae, Elmidae and Gripopterygidae remained well represented. The results therefore indicate a progressive restructuring of the macroinvertebrate community with increasing downstream metal exposure rather than a uniform decline in the abundance of all taxa.

3.3.4.3 Responses of selected taxa

The taxon-level analyses provided further evidence that the observed community response reflected differential responses among macroinvertebrate groups.

Combined mayfly abundance, comprising Leptophlebiidae and Baetidae, generally declined through the downstream reach. The autumn pattern was particularly clear, with relatively high abundance at S0–S3 followed by substantially lower abundance from S4 downstream, declining to two individuals at S5.5 and no mayflies at S6. Combined mayfly abundance was strongly negatively associated with recent copper and zinc exposure in autumn, with the strongest relationship recorded for zinc and the Cd + Cu + Pb + Zn index ($p = -0.93$).

Eustheniidae showed an even stronger spatial restriction. In autumn, abundance declined from 11 individuals at S0 to three at S1 and one at S2, with no individuals recorded from S3 downstream. Eustheniidae abundance was strongly negatively associated with zinc ($\rho = -0.86$ autumn), copper (-0.70) and the combined metal indices. The sparse spring distribution resulted in weaker relationships during that survey.

Gripopterygidae showed a contrasting response. They remained present throughout the river, including within the more highly exposed downstream reach, and showed little consistent relationship with individual metals or combined exposure indices. Their persistence indicates that the downstream biological response was selective rather than representing a general loss of all EPT taxa.

Paramelitidae also showed a pronounced autumn response. Abundance was greatest at the upstream sites and declined downstream, with no individuals recorded at S5, S5.5 or S6. Strong negative relationships were recorded with zinc ($\rho = -0.96$), copper (-0.90), the Cd + Cu + Pb index (-0.92) and the Cd + Cu + Pb + Zn index (-0.96). The spring response was weaker because Paramelitidae abundance was low throughout the river.

The longitudinal abundance patterns of these selected taxa are shown in Figure 3.17.

Table 3.11: Spearman rank correlations between recent metal exposure and macroinvertebrate metrics

Macroinvertebrate metric	Cd		Cu		Pb		Zn		Cd + Cu + Pb		Cd + Cu + Pb + Zn	
	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn	Spring	Autumn
AusRivAS O/E	-0.60	-0.82	-0.76	-0.83	-0.58	-0.41	-0.60	-0.79	-0.76	-0.85	-0.60	-0.79
Total Surber abundance	-0.33	-0.41	-0.70	-0.56	-0.58	0.08	-0.69	-0.58	-0.70	-0.57	-0.69	-0.57
Combined taxa richness	-0.38	-0.67	-0.84	-0.57	-0.58	-0.51	-0.85	-0.86	-0.84	-0.62	-0.85	-0.86
Combined EPT richness	-0.42	-0.77	-0.92	-0.87	-0.42	-0.51	-0.90	-0.90	-0.92	-0.86	-0.90	-0.90
Combined mayfly abundance	-0.30	-0.77	-0.52	-0.86	-0.41	-0.58	-0.48	-0.93	-0.52	-0.86	-0.48	-0.93
Eustheniidae abundance	-0.33	-0.57	-0.54	-0.70	-0.22	-0.28	-0.66	-0.86	-0.54	-0.70	-0.66	-0.86
Griopterygidae abundance	-0.19	0.04	0.05	-0.11	-0.42	0.34	-0.07	-0.32	0.05	-0.11	-0.07	-0.32
Paramelitidae abundance	0.14	-0.85	-0.59	-0.90	0.10	-0.43	-0.67	-0.96	-0.59	-0.92	-0.67	-0.96

Note: Values are Spearman rank correlation coefficients (ρ), calculated separately for spring 2025 and autumn 2026 using eight paired site observations per season ($n = 8$). Recent metal exposure was represented by the median dissolved-metal concentration during the three months preceding each biological survey. Combined indices are the sums of individual metal concentrations normalised to their respective default guideline values. Negative values indicate decreasing biological metric values with increasing metal exposure. Cells with $|\rho| \geq 0.80$ are highlighted as the strongest observed relationships.

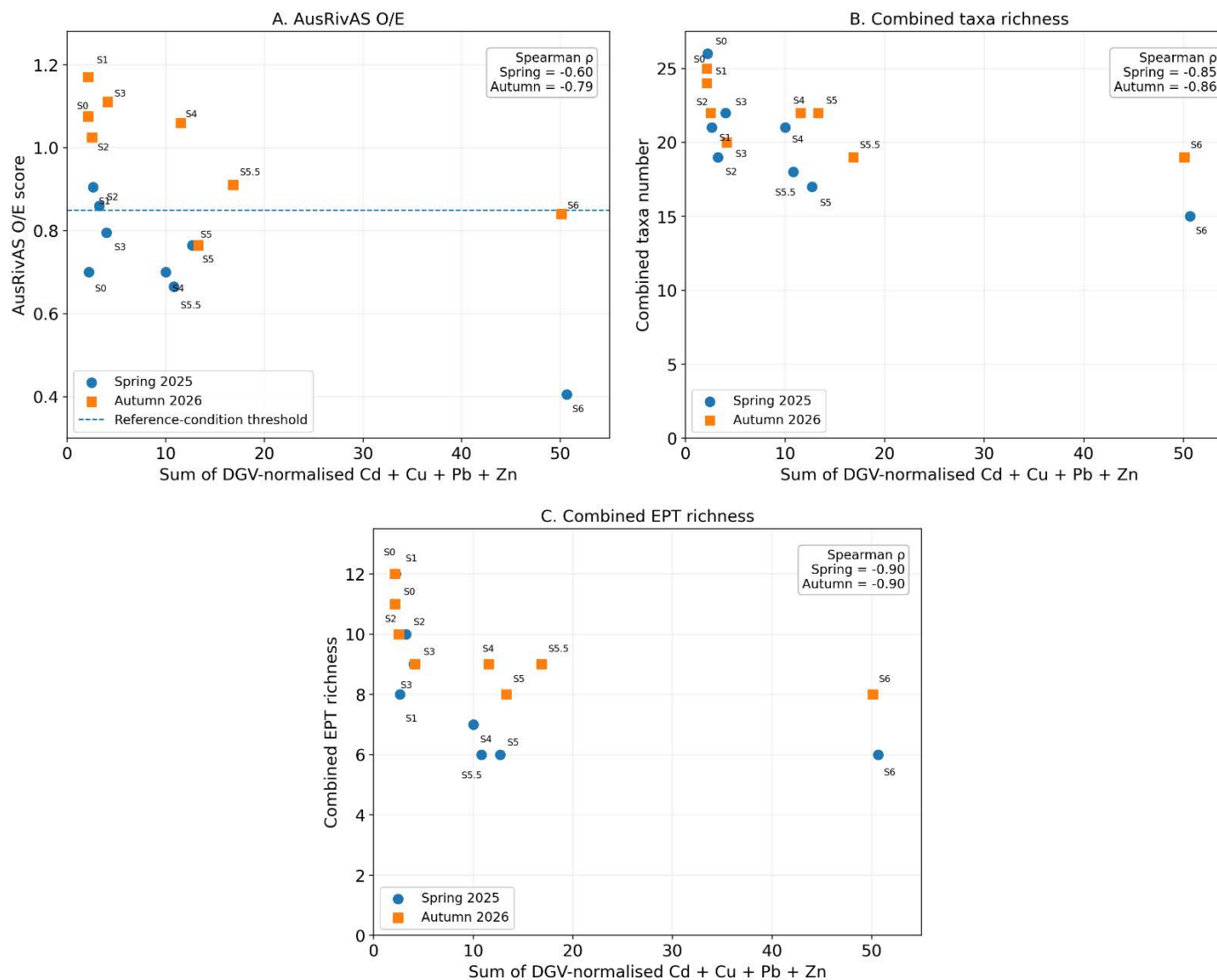


Figure 3.15: Relationships between AusRivAS O/E score (A), combined taxa richness (B) and combined EPT richness (C) and the sum of DGV-normalised median dissolved cadmium, copper, lead and zinc concentrations during the three months preceding the spring 2025 and autumn 2026 biological surveys.

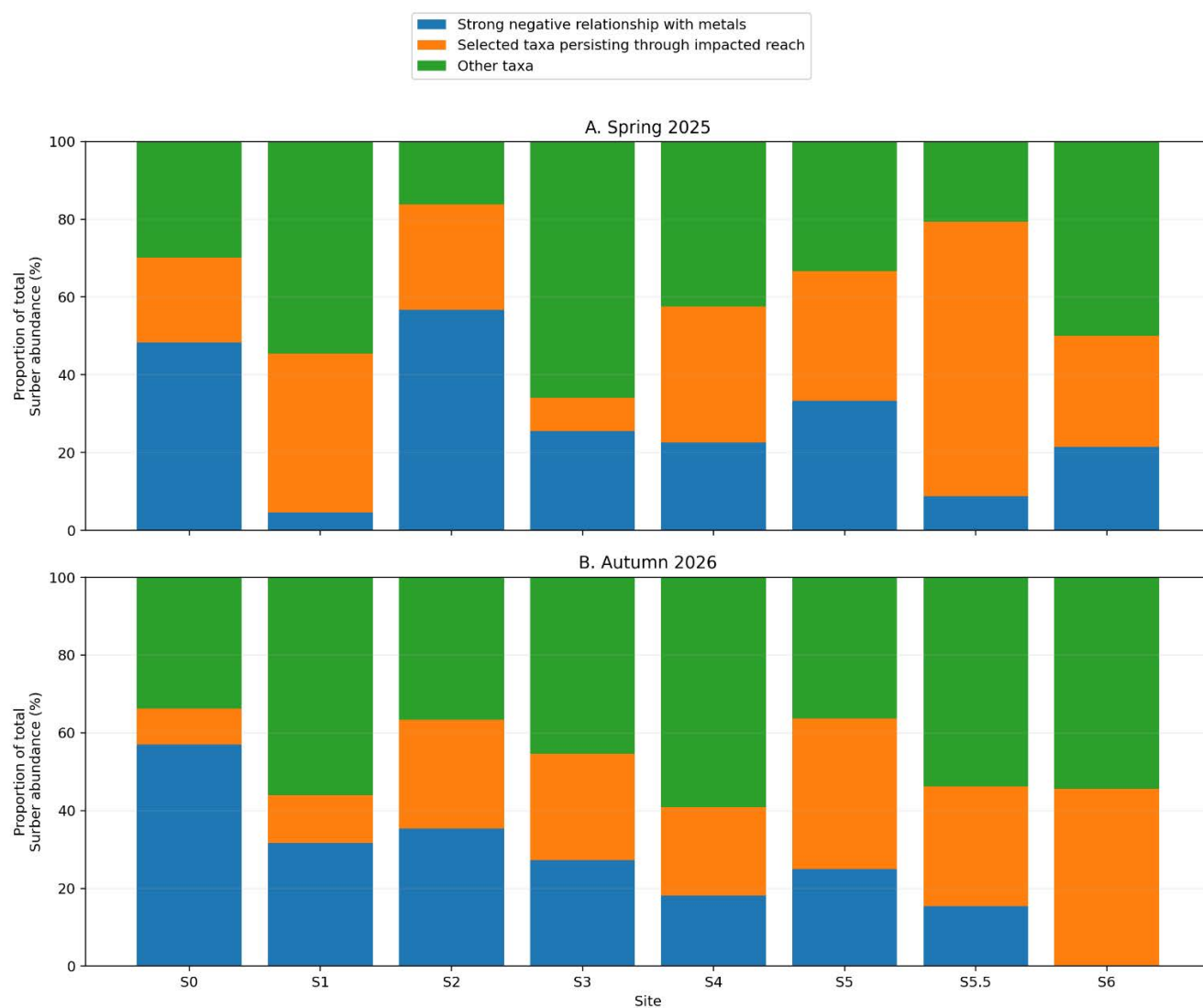


Figure 3.16: Proportional composition of Surber macroinvertebrate samples in spring 2025 and autumn 2026.

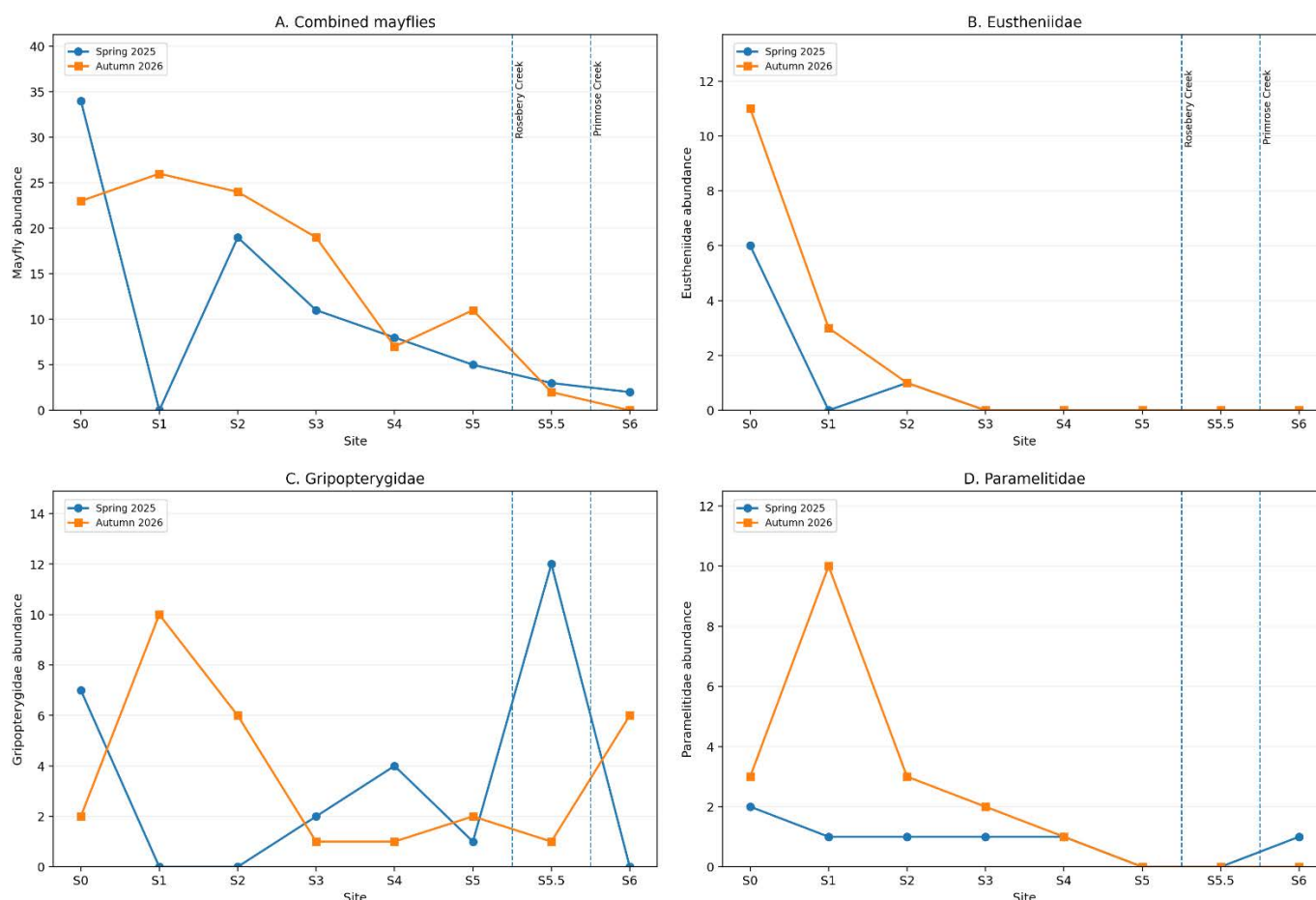


Figure 3.17: Surber abundance of selected macroinvertebrate taxa along the Stitt River in spring 2025 and autumn 2026.

3.3.5 Fish

As is typical for the Stitt River sites, introduced brown trout (*Salmo trutta*) were the only species recorded in spring 2025 and autumn 2026 (Table 3.12). A range of size classes of brown trout were recorded from juveniles to adult. The conditions for electrofishing in spring 2025 were poor due to elevated river flows which reduced fishing efficiency at all sites and flows were too high to fish site S4.

From 2006 to 2022, the mean abundance of trout has generally been substantially lower at the sites downstream sources of MRCs compared to the reference sites (Figure 3.18). However, this was not the case for the previous monitoring period in spring 2023 and autumn 2024 (Entura 2024). In spring 2023, the mean number of trout caught per site was higher at sites downstream sources of MRCs compared to the reference sites which has not occurred since the monitoring program began (Entura 2024). In autumn 2024, the mean catch was similar between the reference sites and sites downstream MRCs (Entura 2024).

In spring 2025, the catches were low across all sites except S3 where 15 trout were recorded. The mean number of trout was higher at the sites downstream from MRCs compared to the reference sites (Figure 3.19). This pattern was reversed in autumn 2026 (Figure 3.19).

Figure 3.20 provides a visual representation of the mean catch per survey at the reference sites S1 and S2 and the absolute catch at S3 and S5 since the monitoring program began. These sites were chosen

because fishing conditions are generally good (i.e. most areas of the channel can be accessed) and are comparable between the sites. Sites S0 and S6 have been removed from the monitoring program and Site S4 was excluded from this analysis because it is difficult to survey effectively due to steep gradients and or long sections of deep run/pool habitat which either cannot be surveyed effectively or cannot be accessed at all under higher flows.

Catches at site S3 have been highly variable since the monitoring program began but have generally been lower than the catches at the reference sites from 2006 to autumn 2022 (Figure 3.20). From spring 2022 to autumn 2026 the catches at S3 have been higher than the catches at S1 and S2 on five of seven occasions including the spring 2025 survey (Figure 3.20). Very few fish were caught at site S5 from 2006 to spring 2020. There has been a noticeable increase in fish at sites S3 and S5 from 2021 to 2026 and this site S5 has recorded the highest number of fish among the Stitt River sites on five of seven occasions since spring 2022, including the autumn 2026 survey (Figure 3.20).

Table 3.12: Brown trout caught in spring 2025 and autumn 2026 in the Sterling and Stitt rivers. S4 could not be sampled in spring due to high flow conditions.

Type	Site	Spring 2025	Autumn 2026
Reference sites	Sterling R.	3	16
	Stitt R. S1	8	10
	Stitt R. S2	3	6
Downstream tailings dam	Stitt R. S3	15	5
	Stitt R. S4	NA	1
	Stitt R. S5	3	11

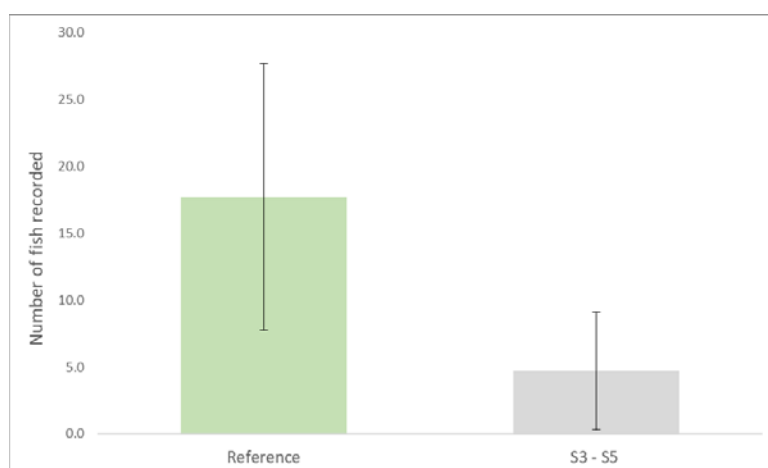


Figure 3.18: Mean number of brown trout caught at reference sites (Sterling, S0 – S2) and Stitt River sites downstream sources of MRCs (S3 – S5) from 2006 – 2022. Error bars show the standard deviation.

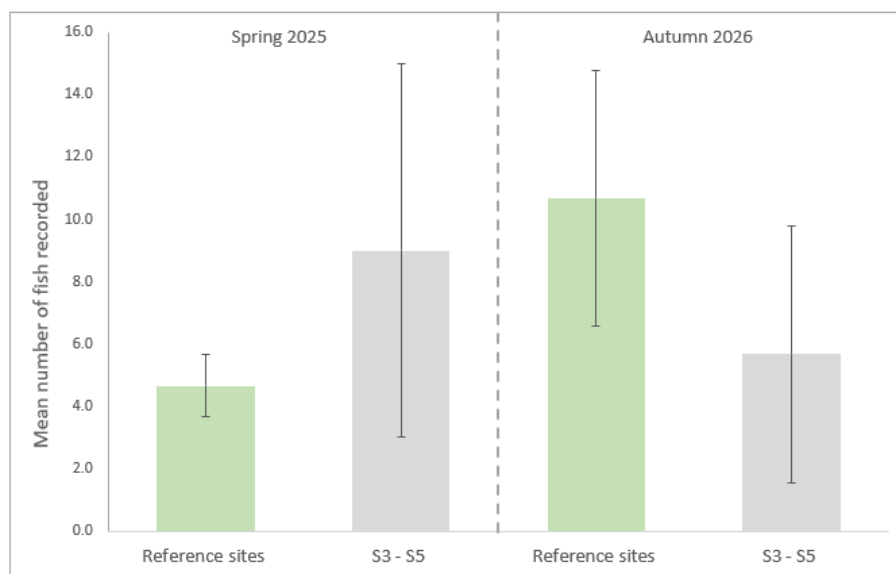


Figure 3.19: Mean number of brown trout caught at reference sites (Sterling and S2) and Stitt River sites downstream sources of MRCs (S3 – S5) in spring 2025 and autumn 2026. Error bars show the standard deviation.

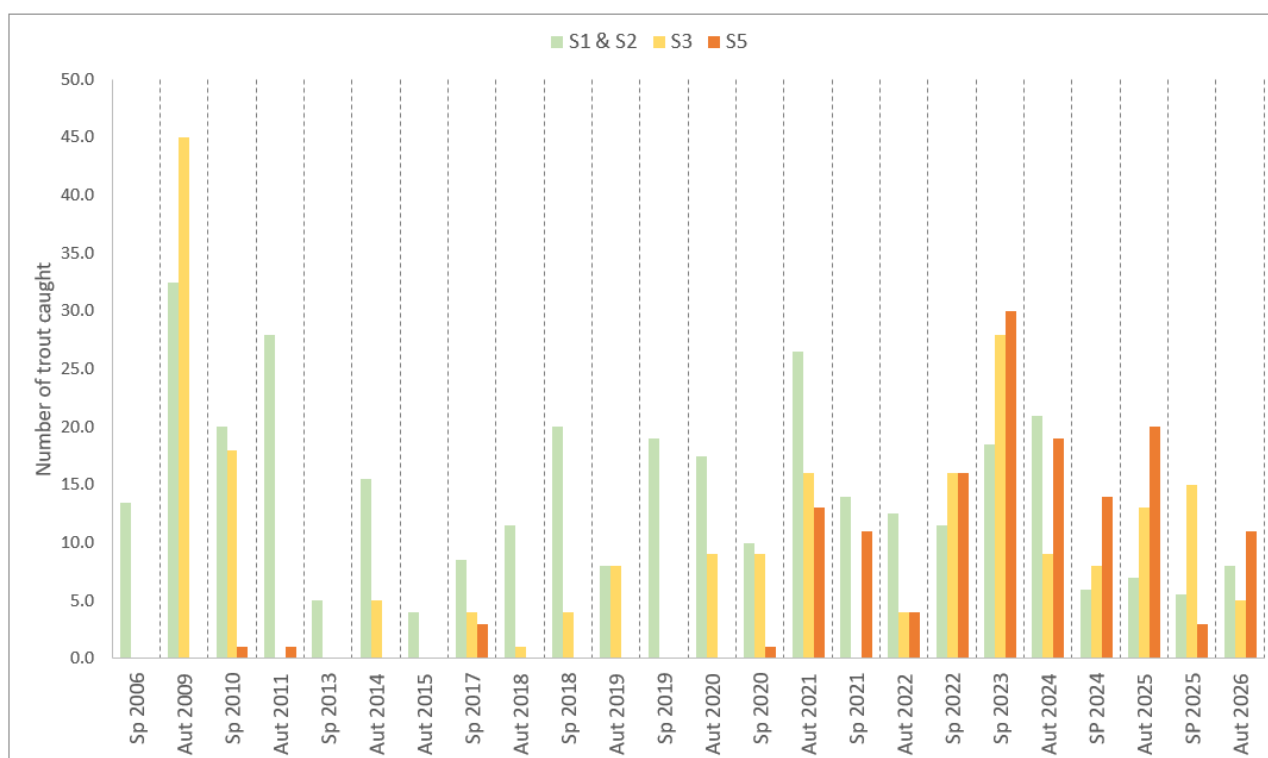


Figure 3.20: Abundance of trout recorded in the Stitt River reference sites (average of catches at S1 and S2) and sites downstream sources of MRCs (site S3 and S5) from 2006 to 2026.

4. Discussion

As noted in previous assessments, the Stitt River is in substantially better biological condition than the Ring River (FBM 2023). Sites within the Ring River catchment remain impaired; however, macroinvertebrate and fish populations in the Stitt River downstream of MRC sources have shown improvement since monitoring commenced in 2005, particularly in recent years. The two most downstream Stitt River sites continue to show poorer biological condition, which appears to be associated with cumulative historical and contemporary MRC inputs within the lower catchment, particularly contaminants entering via Rosebery and Primrose creeks. Integration of the water-quality dataset with the biological assessment has substantially improved interpretation of the spring 2025 and autumn 2026 monitoring results.

4.1 Ring River

Legacy pollution associated with the Hercules Mine, particularly contamination entering via Baker Creek, continues to affect the Ring River catchment. All macroinvertebrate indicators assessed, including total abundance, taxonomic richness, community composition, AusRivAS and TRCI macroinvertebrate condition scores, indicate that the Ring River sites remain in poor to extremely poor condition. The greatest impairment occurs downstream of Baker Creek, which remains a major source of contaminants.

Although all sites remain impaired, several macroinvertebrate indicators suggest that the two Ring River sites upstream of the Baker Creek inflow (R1 and R2) are in better condition than sites farther downstream. These upstream sites supported a greater overall number of families and a broader range of EPT taxa. However, AusRivAS O/E scores were poor at all sites and were lower at R1 and R2 than in the spring 2024 survey (Entura 2025). Baker and Dolcoath creeks also remain in a highly degraded condition.

4.2 Stitt River

4.2.1 Macroinvertebrate condition

Macroinvertebrate abundance, taxonomic richness, community composition, AusRivAS and TRCI condition scores showed a broadly consistent spatial pattern across the spring 2025 and autumn 2026 surveys. Biological condition was generally higher at the reference and upper Stitt River sites, including S3 and S4 downstream of the 2/5 Dam TSF, and lower from S5 downstream, particularly at S5.5 and S6. This indicates that the strongest biological changes occurred within the lower Stitt River rather than immediately downstream of the 2/5 Dam TSF.

Macroinvertebrate abundance was lower in spring than autumn and was low relative to previous surveys in both seasons. Lower spring abundance has been recorded previously in the Stitt and Sterling rivers and is likely influenced by scour associated with the typical pattern of high spring flows (Entura 2025). Flows during the three months preceding the spring 2025 survey were particularly elevated, and physical disturbance is therefore likely to have contributed to the low spring abundance. Flows during summer and much of autumn were generally low and stable; however, an unusually large high-flow event occurred approximately one week before the autumn survey and may also have reduced abundance and, potentially, taxonomic richness. The autumn longitudinal pattern was nevertheless broadly consistent with previous surveys, with abundance generally lower downstream of MRC sources. S6 was an exception, supporting relatively high abundance despite its downstream location, illustrating that abundance alone did not consistently reflect biological condition.

Taxonomic richness was also generally lower than in previous survey periods when compared using the individual sampling methods. For the 2025–26 surveys, combined richness based on the unique taxa recorded across the Surber and AusRivAS samples was also examined to provide a more complete representation of site diversity. In both seasons, richness generally declined through the lower Stitt River. In spring, S5–S6 supported fewer taxa than the reference sites and S3–S4. A similar pattern occurred in autumn, although richness at S5 was relatively high, with the clearest reductions occurring at S5.5 and S6.

Community composition provided a particularly clear indication of longitudinal change. The upstream/reference sites and S3 retained relatively diverse assemblages containing taxa such as Leptophlebiidae, Baetidae, Eustheniidae and Paramelitidae. These taxa generally declined downstream, with Eustheniidae and Paramelitidae largely restricted to the upper river and Leptophlebiidae and Baetidae becoming progressively less abundant towards the lower sites. In contrast, Gripopterygidae, Scirtidae, Elmidae and chironomids persisted through, or were locally abundant within, the lower river. Both the Surber and AusRivAS data therefore indicate a progressive shift in community composition from approximately S4 downstream, becoming most pronounced at S5.5 and S6. The response represented a change in the identity and relative representation of taxa rather than a uniform reduction in total macroinvertebrate abundance.

AusRivAS condition scores were generally poorer in spring 2025 than in autumn 2026. Most reference sites remained within reference condition in spring, while sites downstream of MRC sources were generally impaired and S6 was severely impaired. Condition improved substantially in autumn, with S3 and S4 within the reference band and comparable with the upstream reference sites. S5 remained impaired, while S5.5 and S6 each produced one impaired and one reference condition replicate. The average O/E score at S5.5 was just within reference condition, while S6 was just below the reference-condition threshold. These results indicate substantial seasonal variation in AusRivAS condition while retaining the broader pattern of poorer condition within the lower river.

TRCI scores showed a similar seasonal improvement but were constrained by the low macroinvertebrate abundances recorded in both surveys. No site achieved good condition. In spring, most reference sites were rated moderate while sites downstream of MRC sources were generally poor because of the combination of low abundance and reduced AusRivAS condition. Most sites improved to moderate condition in autumn, consistent with the improvement in AusRivAS scores, although S5, S6 and the Sterling River remained in poor condition. The poor AusRivAS and TRCI results at the Sterling River were not associated with the longitudinal pattern observed in the Stitt River, and the reason for its reduced condition is unclear.

4.2.1.1 Limitations of the TRCI aquatic life index

Moderate TRCI condition ratings have been common at the monitoring sites since 2018, including at reference sites on the Sterling and Stitt rivers. In most instances, moderate ratings have resulted from low abundance scores while expectedness and composition scores remained high. This pattern suggests that naturally lower macroinvertebrate abundance or productivity within these catchments may constrain TRCI condition ratings.

The use of a fixed abundance threshold that does not account for regional differences in productivity may therefore limit the usefulness of the TRCI Aquatic Life Index for the MMG monitoring program. Metrics based on the occurrence of expected taxa or community composition, including AusRivAS O/E, and EPT metrics, may provide more informative measures of biological condition in this setting.

The SIGNAL index was not developed specifically to assess the effects of metal toxicity. High SIGNAL O/E scores indicate that assemblages retain a relatively high representation of taxa generally associated with good water quality, particularly in relation to common stressors such as nutrient enrichment, salinity and increased turbidity. However, sensitivity to metals does not necessarily align with the SIGNAL sensitivity grades assigned to individual taxa. Consequently, high SIGNAL O/E scores should not be interpreted as evidence that elevated metal concentrations are having little or no effect on the macroinvertebrate community.

Limitations of the TRCI Aquatic Life Index have also been recognised by the Water Management Branch of NRE Tas, which does not currently use the index within its own river-health monitoring programs (Scott Hardie, WMB, personal communication). The Aquatic Life Index was trialled within the Ringarooma River catchment, where it was concluded that refinement of the underlying rule sets would be required before the index could provide a useful assessment tool (DPIPWE 2014).

These limitations do not reduce the value of quantitative Surber sampling. Surber abundance data provide an important measure of benthic productivity and are substantially more suitable than qualitative AusRivAS samples for quantitative analysis of macroinvertebrate abundance and community composition.

4.2.2 Relationships between macroinvertebrate condition and mine-related contaminants

Across the different levels of biological organisation, poorer macroinvertebrate condition was generally associated with increasing recent dissolved-metal exposure. AusRivAS O/E, combined taxa richness and combined EPT richness all declined with increasing metal concentrations and combined metal exposure, while total abundance showed a weaker and less consistent response. Community-composition data provided further support for this relationship, with increasing downstream exposure associated with a progressive reduction or loss of several taxa that were well represented in the upper river, particularly Leptophlebiidae, Baetidae, Eustheniidae and Paramelitidae. In contrast, Gripopterygidae, Scirtidae, Elmidae and chironomids persisted through, or were locally abundant within, the more contaminated downstream reach. The biological response therefore appears to reflect a change in community composition and loss of particular taxa rather than a uniform reduction in the total number of macroinvertebrates.

The relationships were clearest in autumn 2026. Although a substantial high-flow event occurred shortly before the autumn survey, the preceding three-month period was not characterised by the persistently elevated flows recorded before the spring survey. The confounding influence of hydrological disturbance was therefore less pronounced overall than in spring. In autumn, several biological metrics showed strong negative relationships with recent copper, zinc and combined-metal exposure, while cadmium also showed strong relationships for a number of metrics and individual taxa. Lead produced weaker statistical relationships across the full site series, largely because concentrations remained at or close to the reporting limit at most sites before increasing markedly in the lower river. The weaker correlation for lead therefore does not necessarily indicate low biological relevance; rather, its spatial distribution provides particularly useful information on the location of lower-river contaminant inputs.

The water-quality and biological patterns also demonstrate why the observed impairment cannot readily be attributed to a single metal, although the spatial evidence indicates that cadmium and lead are likely to be important contributors. Copper, cadmium, lead and zinc all increase to varying degrees through the sites downstream of MRC inputs and are therefore spatially correlated. However, the most pronounced increases in cadmium and lead occur at the two sites downstream of S5, coincident with a marked deterioration in macroinvertebrate condition. This correspondence provides strong evidence that cadmium and lead are at least partly responsible for the biological impairment within the lower

Stitt River. Copper and zinc are also likely to contribute to toxicological stress. Copper increases substantially between S3 and S4 and remains elevated farther downstream, while zinc is elevated throughout much of the river and also increases markedly through the reach influenced by MRCs. The comparatively good biological condition at S3 and S4 despite these elevations indicates that neither copper nor zinc alone adequately explains the much poorer condition observed at S5.5 and S6. The observed effects are therefore most likely to reflect exposure to a mixture of metals, with cadmium and lead emerging as particularly important components of that mixture in the lower river. The relative contribution of each metal cannot be resolved from the present field data, particularly because biological communities integrate exposure over time and the monitoring data capture only part of the temporal variability experienced by the fauna.

The comparison between S4 and S5 further indicates that the biological response does not follow a simple site-by-site relationship with contemporaneous median metal concentrations. Recent copper and zinc concentrations were broadly similar at the two sites and cadmium and lead changed relatively little, yet biological condition was generally poorer at S5. Possible explanations include differences in the duration or variability of exposure, cumulative effects of upstream exposure, contaminants or physicochemical conditions not represented by the selected metal metrics, or other habitat and hydrological influences. The available data do not allow these factors to be separated, but the S4–S5 comparison cautions against interpreting biological condition solely from median dissolved-metal concentrations.

A clearer correspondence between water quality and biological condition occurs downstream of Rosebery Creek. Lead concentrations were low at S5, with no DGV exceedances during 2025–26, but increased substantially downstream of the Rosebery Creek inflow. Cadmium also increased, while copper and zinc remained elevated. At S5.5, taxonomic and EPT richness were reduced and several taxa characteristic of the upper river were poorly represented, despite the autumn AusRivAS O/E result indicating better condition than some of the other biological metrics. This highlights the value of considering multiple measures of biological condition rather than relying on a single index.

The strongest correspondence occurred at S6, downstream of both Rosebery Creek and Primrose Creek and therefore integrating contaminant inputs from both tributaries together with upstream Stitt River inputs. Cadmium, lead and zinc concentrations were substantially higher than at the upper Stitt River sites, while copper also remained elevated. S6 simultaneously showed some of the clearest evidence of biological impairment, including low taxa and EPT richness, reduced or absent Leptophlebiidae, Baetidae, Eustheniidae and Paramelitidae, and poor overall biological condition, including severe AusRivAS impairment in spring and poor TRCI condition. The relatively high total abundance recorded at S6 in autumn does not contradict this pattern because the community was dominated by taxa that persisted through the reach influenced by MRCs, further demonstrating that richness and community composition were more informative indicators of impairment than total abundance alone.

Taken together, the spatial evidence indicates that the contemporary biological pattern cannot be explained simply as a downstream response to the 2/5 Dam TSF. SR02 has shown substantial long-term improvement in copper, cadmium and zinc concentrations, while S3 and S4 generally supported macroinvertebrate communities in substantially better condition than the lower sites despite being downstream of the TSF and exposed to elevated concentrations of some metals. This does not exclude a continuing contribution from diffuse seepage or groundwater associated with the TSF, nor imply that metal concentrations at S3 and S4 are biologically benign. However, the strongest contemporary water-quality and biological changes occur farther downstream and are spatially associated with additional MRC inputs, particularly those entering via Rosebery Creek and, cumulatively, Primrose Creek.

Among the measured metals, cadmium, copper, lead and zinc are all plausible contributors to the observed biological effects. Cadmium and lead show particularly informative spatial increases coincident with the strongest biological deterioration in the lower river, while copper and zinc are likely to contribute to the overall toxicological stress associated with the multi-metal mixture. Zinc is less useful for source discrimination because elevated concentrations also occur within the upper river. Dissolved aluminium was elevated throughout the Stitt River, including at the reference sites, and showed relatively little longitudinal correspondence with biological condition. Total iron likewise showed a weaker relationship with the biological gradient. Aluminium and iron therefore appear less likely to be principal drivers of the contemporary lower-river pattern, although their contribution to cumulative or episodic stress cannot be excluded. Figure 4.1 provides a conceptual diagram to summarise the main spatial patterns identified in the Stitt River monitoring program.

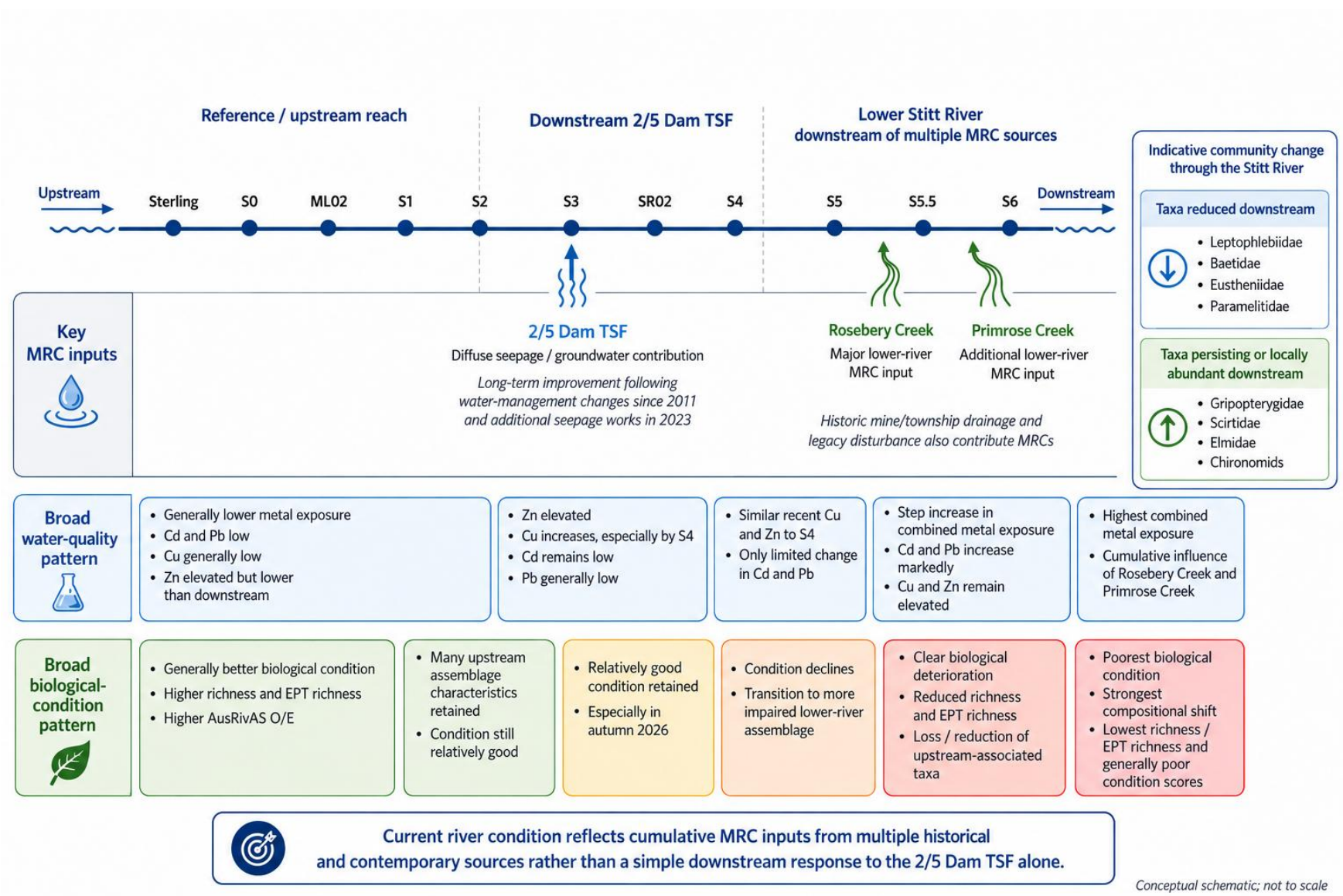


Figure 4.1: Conceptual model of spatial relationships between MRC inputs, water quality and macroinvertebrate condition in the Stitt River.

4.2.3 Fish populations

Fish data can be difficult to interpret in biomonitoring assessments because fish communities are more difficult to sample consistently and efficiently than macroinvertebrate communities. In Tasmania, the distribution of native fish is also strongly influenced by the presence of introduced species and by hydropower dams, which restrict, and in many cases prevent, the upstream migration of native species.

Within the MMG fish-monitoring program, brown trout (*Salmo trutta*) are the species most likely to provide a useful indicator of potential changes in habitat suitability and water quality. Short-finned eels have occasionally been recorded at some sites; however, these are likely to originate from stocking programs that relocate captured eels into hydropower impoundments. Native climbing galaxias (*Galaxias brevipinnis*) and spotted galaxias (*Galaxias truttaceus*) have also occasionally been recorded, but their occurrence has been too infrequent for them to provide a useful biomonitoring indicator.

Despite these limitations, the abundance of brown trout has generally increased at sites downstream of sources of MRCs. Spring 2023 was the first survey in which mean trout abundance at these sites exceeded that recorded at the reference sites. Mean abundance was nearly identical between the two site groups in autumn 2024, suggesting that the spring 2023 result was not an isolated occurrence. Fish sampling in spring 2025 was affected by high-flow conditions; nevertheless, mean trout abundance remained higher at sites downstream of MRC sources than at the reference sites. This pattern was reversed in autumn 2026.

Overall, although fish abundance is inherently more variable and difficult to interpret than the macroinvertebrate indicators, the long-term fish results are broadly consistent with the macroinvertebrate evidence of improving river health in the Stitt River downstream of the upper MRC sources and upstream of the Rosebery Creek inflow.

4.3 Recommendations

- Continue water quality monitoring at the newly established sites S3, S5 and S6. These sites have improved the spatial resolution of the monitoring program compared with the long-term water quality monitoring network by filling gaps between biomonitoring sites and potential sources of MRCs.
 - Add DOC to the routine Stitt River water quality monitoring so that the next reporting period can assess whether pH, hardness and DOC data support development of bioavailability adjusted zinc and copper guideline values for interpreting ecological risk.
- Continue to integrate biomonitoring results with the detailed water quality dataset in future reporting. This could be expanded to include:
 - consideration of other physicochemical parameters that may influence biological condition; or metal bioavailability, particularly pH, hardness, DOC, electrical conductivity and sulphate.
 - assessment of longer-term relationships between water quality and biological condition, with particular focus on changes associated with modifications to the 2/5 Dam TSF and changes in other contemporary or legacy MRC sources and pathways.
- Consider running the rank-abundance (O/Erk) AusRivAS models in addition to the presence-absence models. This would provide an additional line of evidence for assessing changes in macroinvertebrate condition within the monitoring program.
- Consider further taxonomic identification to species level for selected macroinvertebrate families. Species within the same family may differ in their tolerance to water quality conditions and MRCs,

and these differences are masked when analyses are undertaken at family level. Species-level identification of selected groups may therefore provide additional insight into differences among sites and improve the ability to detect impacts associated with MRCs.

- Consider undertaking trend analysis to test the statistical significance of changes in macroinvertebrate indicators over time. Trend analysis is used by NRE Tas to detect and report changes in river health at long-term monitoring sites. In recent years, Entura has also applied this approach to Hydro Tasmania's long-term monitoring sites using Time Trends Software (v8.0; Jowett Consulting).

5. References

CEPA (1994) *National river and management program monitoring river health initiative: river bioassessment manual*, Commonwealth Environmental Protection Agency, Canberra.

Chessman, B. C. (1995). Rapid assessment of rivers using macroinvertebrates: A procedure based on habitat-specific sampling, family level identification and a biotic index. *Australian Journal of Ecology* 20: 122-129.

Chessman, B. C. (2003a). New sensitivity grades for Australian river macroinvertebrates. *Marine and Freshwater Research* 54: 95-103.

Coffey (2021) Hercules mine – Preliminary contamination assessment. Report for MMG, 12 February 2021.

DPIPWE (2014). Condition of rivers in the Ringarooma River catchment and impacts of water use. Water Assessment Aquatic Ecology Report Series, Report No. WA 14/01. Water and Marine Resources Division. Department of Primary, Industries, Parks, Water and Environment, Hobart, Tasmania.

Entura (2024). Biological Condition of the Ring and Stitt Rivers: Survey of aquatic biota, Spring 2022 and Autumn 2023. Final Report (16 September 2024) to MMG Rosebery, 56 pp

Entura (2025) Biological Condition of the Ring and Stitt Rivers: Survey of aquatic biota, Spring 2024 and Autumn 2025. Final Report (12 September 2025) to MMG Rosebery, 56 pp

Gadd J; Hickey C; Snelder T. 2024. Acute copper and zinc water quality guideline values for Aotearoa. Acute copper and zinc water quality guideline values for Aotearoa: User guide. Report for Ministry for the Environment, 8 November 2024. 12 p. <https://environment.govt.nz/publications/acute-copper-and-zinc-water-quality-guideline-values-for-aotearoa-user-guide>

Koehnken, L. (2024). Annual Water Quality Monitoring Review 2023-2024, Report to MMG, 30th August 2024.

Koehnken, L. (2026). MMG Rosebery Annual Water Quality Monitoring Review 2025 to 2026, Report to MMG, 22nd July 2026.

Krasnicki, T., Pinto, R. & Read, M. (2002). Australia-Wide Assessment of River Health: Tasmanian Bioassessment Report (TAS Final Report). Monitoring River Health Initiative Technical Report No. 5. Commonwealth of Australia and Department of Primary Industries, Water and Environment, Canberra, ACT and New Town, Tasmania.

Mallick SA 2021. Biological Condition of the Ring and Stitt Rivers: Survey of aquatic biota, Spring 2022 and Autumn 2023. Final Report to MMG, Rosebery, 23 pp

Marchant R (1989) 'A subsampler for samples of benthic invertebrates', *Bulletin of the Australian Society of Limnology*, 12: 49-52.

NRM South (2009). Tasmanian River Condition Index Reference Manual. NRM South. Hobart.

NRM South 2009a. Tasmanian River Condition Index Aquatic Life Field Manual. NRM South. Hobart

Storey AW, Edward DHD, Gazey P. 1991. Surber and kick sampling: a comparison for the assessment of macroinvertebrate community structure in streams of south-western Australia. *Hydrobiologia* 211: 111-121.

Appendices

A Ring River macroinvertebrate data

Table A.1: Ring River Surber data spring 2025

Class	Order	Family or sub-Family	R1	R2	R3	R5	R6	B1
Annelida	Oligochaeta			3		1		
Arachnida	Acarina		1		1	1	1	
Crustacea	Amphipoda	Paramelitidae	1	2				
Insecta	Plecoptera	Eustheniidae	2	4			2	
		Gripopterygidae		1	1	1	1	
		Notonemouridae	4	2	1	4	14	
	Ephemeroptera	Leptophlebiidae		3				
	Lepidoptera	Pyralidae				1	1	
	Collembola		1			7	3	
	Diptera	Chironominae	1	2	2			1
		Orthocladiinae	1	65	2	2	5	
		Tipulidae		3	1		1	
		Empididae			1			
	Trichoptera	Hydrobiosidae		3				
		Hydropsychidae		1				
		Leptoceridae				1		
		Philorheithridae	1	1				
	Coleoptera	Scirtidae	2	12		1		
		Total taxa	9	13	7	9	8	1

Table A.2: Ring River Surber data autumn 2026

Class	Order	Family or sub-Family	R1	R2	R3	R5	R6	B1
Annelida	Oligochaeta		2	1			1	
Arachnida	Acarina				1	1		
Crustacea	Amphipoda	Paramelitidae		2				
Insecta	Plecoptera	Eustheniidae	2	1		4	1	
		Gripopterygidae	3	3	2			
		Notonemouridae	1					
	Ephemeroptera	Leptophlebiidae	2			3		
		Baetidae		1		1		
	Collembola			1		1	2	
	Diptera	Orthocladiinae	4	3	1		2	
		Podonominae	1					
		Tipulidae				1	1	
		Empididae		1				
	Trichoptera	Hydropsychidae				1		
		Leptoceridae		1			1	
		Trich. unid. pupae	2					
	Coleoptera	Elmidae larvae					1	
		Scirtidae	1	5	2		1	
		Total taxa	9	10	4	7	8	0

Table A.3: Ring River – spring 2025 AusRivAS sample data. AusRivAS replicate abundances are shown as a / b; – denotes no individuals in one replicate. Blank cells indicate no individuals in either replicate.

Class	Order	Family or sub-Family	R1	R2	R3	R5	R6	B1
Annelida	Oligochaeta	Oligochaeta	– / 1	1 / –				
Arachnida	Acarina	Acarina		1 / –				
Crustacea	Amphipoda	Paramelitidae	1 / 1	1 / –				
Insecta	Plecoptera	Eustheniidae	9 / 6	5 / 8	2 / –		– / 1	
		Austroperlidae	– / 1					
		Gripopterygidae	15 / 2	4 / 20	1 / 1	9 / 7		
		Notonemouridae	2 / 1	10 / 4	– / 1	2 / 4	8 / 3	
	Ephemeroptera	Leptophlebiidae		– / 4				
	Lepidoptera	Pyrilidae					– / 1	
	Collembola	Collembola				– / 1		
		Orthocladinae	1 / –	8 / 9	1 / –	2 / 8		
		Podonominae		3 / 1		1 / 5		
		Simuliidae		1 / 2				
		Tipulidae	– / 1					
		Athericidae	– / 1	1 / –	1 / –	1 / –	1 / –	
	Trichoptera	Calamoceratidae		1 / –				
		Hydrobiosidae		3 / –	– / 1			
		Hydropsychidae					1 / –	
		Leptoceridae		4 / –		1 / –	1 / –	
		Philopotamidae					– / 1	
	Coleoptera	Elmidae adults		– / 1	1 / –			
		Scirtidae	2 / 1	9 / 4				
		Total taxa	6 / 9	14 / 9	5 / 3	6 / 5	4 / 4	0

Table A.4: Ring River – autumn 2026 sample data. AusRivAS replicate abundances are shown as a / b; – denotes no individuals in one replicate. Blank cells indicate no individuals in either replicate.

Class	Order	Family or sub-Family	R1	R2	R3	R5	R6	D1
Annelida	Oligochaeta		1 / –					
Arachnida	Acarina				1 / –			
Crustacea	Amphipoda	Paramelitidae	1 / –	1 / –				3
Insecta	Plecoptera	Eustheniidae	13 / 12	3 / 5		1 / 1	– / 1	
		Austroperlidae	2 / –					
		Gripopterygidae	– / 5	8 / 5	3 / 4	1 / –	1 / 1	
		Notonemouridae	4 / 2	– / 1				
	Diptera	Chironominae	– / 1					
		Orthocladiinae	– / 1	– / 1				
		Podonominae	– / 1			1 / –		
		Tipulidae	2 / –		1 / –			
		Athericidae				1 / –	1 / –	
		Dip. unid. Pup.	– / 1			1 / –		
	Trichoptera	Calocidae				1 / –		
		Ecnomidae		1 / –				
		Hydropsychidae	2 / –	1 / –	1 / 1			
		Leptoceridae					1 / –	
		Philorheithridae	1 / –	– / 1				
	Coleoptera	Elmidae adults					– / 1	
		Dytiscidae					– / 1	
		Scirtidae	3 / 3	3 / 3				
		Total taxa	9 / 8	6 / 6	4 / 2	6 / 1	3 / 4	1

A.1 TRCI Expectedness, Abundance and Composition scores

Table A.5: Spring 2025

<i>Raw scores for O/Epa; Signal; EPT proportion; and Abundance</i>					
Site	Code	Mean O/Epa	Mean Signal O/E	Mean EPT proportion	Abundance (per m ²)
Ring R.	R1	0.42	1.02	0.41	70
	R2	0.62	1.01	0.40	510
	R3	0.22	1.17	0.54	45
	R5	0.24	0.98	0.38	95
	R6	0.11	1.15	0.60	140
Dolcoath Ck.	D1	0.07	0.86	0.33	5

<i>Scores and ratings for Expectedness</i>					
Site	Code	Expectedness			
		O/Epa	Signal O/E	Score	Rating
Ring R.	R1	L	H	30	M
	R2	M	H	65	M
	R3	L	H	30	M
	R5	L	H	30	M
	R6	L	H	30	M
Dolcoath Ck.	D1	L	H	30	M

<i>Scores and ratings Abundance and composition</i>					
Site	Code	Abundance		Composition	
		Score	Rating	Score	Rating
Ring R.	R1	10	L	>0.35	H
	R2	40	L	>0.35	H
	R3	10	L	>0.35	H
	R5	10	L	>0.35	H
	R6	40	L	>0.35	H
Dolcoath Ck.	D1	10	L	0.25 - 0.34	M

Table A.6: Autumn 2026

<i>Raw scores for O/Epa; Signal; EPT proportion; and Abundance</i>					
Site	Code	Mean O/Epa	Mean Signal O/E	Mean EPT proportion	Abundance (per m ²)
Ring R.	R1	0.50	1.01	0.53	90
	R2	0.38	1.06	0.67	95
	R3	0.17	1.07	0.75	30
	R5	0.17	1.44	0.80	60
	R6	0.23	1.11	0.58	50
Dolcoath Ck.	D1	0.08	0.86	0.00	0

<i>Scores and ratings for Expectedness</i>					
Site	Code	Expectedness			
		O/Epa	Signal O/E	Score	Rating
Ring R.	R1	L	H	30	M
	R2	L	H	65	M
	R3	L	H	30	M
	R5	L	H	30	M
	R6	L	H	30	M
Dolcoath Ck.	D1	L	H	30	M

<i>Scores and ratings Abundance and composition</i>					
Site	Code	Abundance		Composition	
		Score	Rating	Score	Rating
Ring R.	R1	10	L	>0.35	H
	R2	10	L	Composition	H
	R3	10	L	>0.35	H
	R5	10	L	>0.35	H
	R6	10	L	>0.35	H
Dolcoath Ck.	D1	0	XL	0.25 - 0.34	M

B Stitt River macroinvertebrate data

Table B.1: Stitt River Surber data spring 2025

Class	Order	Family or sub-Family	Sterl.	S0	S1	S2	S3	S4	S5	S5.5	S6
Annelida	Oligochaeta		3	3		4	2	6	3	3	2
Arachnida	Acarina			1							
Crustacea	Amphipoda	Paramelitidae		2	1	1	1	1			1
Insecta	Plecoptera	Eustheniidae		6		1					
		Austroperlidae		1							
		Gripterygidae	7	7			2	4	1	12	
		Notonemouridae	2	1		1					2
	Ephemeroptera	Leptophlebiidae	5	30		16	11	8	5	3	2
		Baetidae		4		3					
		Chironominae	4	5	4	2	1	2	1	1	
		Orthocladiinae	11	5	4	5	1	4		8	1
		Podonominae		1				3	1		
		Tanypodinae								1	
		Simuliidae		2							
		Tipulidae			1						1
		Ceratopogonidae		2			2	2			1
		Empididae						1			
		Dip. unid. pupae	1			3		1		1	
		Conoesucidae		3							
		Hydrobiosidae	1	1				3		1	
		Hydropsychidae		4	3						
		Leptoceridae		2		1	2	2			1
		Philorheithridae	3		1				1		
	Coleoptera	Elmidae adults	3	1				1	1		
		Elmidae larvae	2	3	7		24	1		3	
		Scirtidae	1	1	1	3		1	2	2	3
		Psephenidae	4	2			1	1			
		Dytiscidae	1								
		Total taxa	13	21	8	10	9	15	7	9	8

Table B.2: Stitt River Surber data autumn 2026

Class	Order	Family or sub-Family	Sterl.	S0	S1	S2	S3	S4	S5	S5.5	S6
Mollusca	Bivalvia	Sphaeriidae					1				
Annelida	Oligochaeta	Oligochaeta	4	2	4	3	3	13	1	3	3
Arachnida	Acarina	Acarina					1		1		1
Crustacea	Amphipoda	Paramelitidae	2	3	10	3	2	1			
Insecta	Plecoptera	Eustheniidae	1	11	3	1					
		Austroperlidae				1					
		Gripopterygidae	3	2	10	6	1	1	2	1	6
		Notonemouridae							1	1	1
	Ephemeroptera	Leptophlebiidae	14	15	23	16	18	6	8	2	
		Baetidae	3	8	3	8	1	1	3		
		Chironominae	14	3	14			3	4		
		Orthoclaudiinae	11	1	3	6	1	1	5	3	3
		Podonominae		1	1	3		1			
		Simuliidae	1			3	1	1	1	2	
		Tipulidae						1			
		Athericidae							1		2
		Blephariceridae		2							
		Dip. Unid. Pup.				1			1		
		Calocidae			2						
		Conoesucidae	2		1						1
		Hydrobiosidae	5		1	2	8	2	1	1	3
		Hydropsychidae	4	4	18						13
		Leptoceridae	1	3	6	6	1	1			1
		Philopotamidae				1					
		Philorheithridae	6	2	6	3		2			3
	Coleoptera	Elmidae adults	5	1	3	3	3	1			3
		Elmidae larvae	10	4	13	4	17	2	5		6
		Scirtidae	1	2	1	7	19	7	10		22
		Psephenidae	2	1	1	3			1		
		Total taxa	18	17	19	19	14	16	15	7	14

Table B.3: Stitt River – spring 2025 AusRivAS sample data. AusRivAS replicate abundances are shown as a / b; – denotes no individuals in one replicate. Blank cells indicate no individuals in either replicate.

Class	Order	Family or sub-Family	ST1	S0	S1	S2	S3	S4	S5	S5.5	S6
Nematoda										1 / –	1 / –
Annelida	Oligochaeta		18 / 6		4 / 4	4 / –	2 / 1	1 / 3	5 / 1	1 / –	2 / –
Arachnida	Acarina			1 / –			– / 1				
Crustacea	Amphipoda	Paramelitidae	1 / 5	1 / –	2 / 10	15 / 7	6 / 4	1 / –	– / 1	– / 1	
Insecta	Plecoptera	Eustheniidae	1 / –	1 / 8	2 / 6	5 / 7	4 / 3	2 / –		1 / –	
		Austroperlidae		– / 1	– / 1		– / 1				
		Gripopterygidae	– / 4	5 / 12	5 / 13	7 / 8	11 / 16	6 / –	1 / 4	7 / 16	1 / –
		Notonemouridae	2 / –								2 / –
	Ephemeroptera	Leptophlebiidae	20 / 20	12 / 33	10 / 12	10 / 6	12 / 20	15 / 7	13 / 12	5 / 9	5 / 2
		Baetidae	2 / 1	4 / 3	4 / 3	4 / 3	8 / 13	– / 1	6 / 2	– / 1	
	Odonata	Telephlebiidae		3 / –	– / 3		– / 1	– / 1	– / 1		
	Collembola				– / 1						– / 1
	Diptera	Chironominae	1 / 2	– / 4	1 / 2				1 / –	1 / 1	
		Orthoclaadiinae	2 / 4	– / 4	8 / 4	1 / 1	– / 1	1 / –	1 / 1	5 / 4	
		Podonominae	1 / 1	4 / –	2 / 3	2 / 8	1 / 5	2 / –	4 / 2	1 / 2	
		Tanytopodinae	– / 1								
		Simuliidae		– / 1	1 / –	– / 1					
		Tipulidae	– / 1	– / 2	1 / 2			1 / 1	1 / 1		1 / –
		Athericidae			1 / –		1 / –	– / 1	– / 3	– / 1	1 / 1
		Ceratopogonidae		– / 3		– / 2				1 / –	
	Trichoptera	Calocidae	– / 1								
		Conoesucidae		1 / –							
		Hydrobiosidae	12 / 9	5 / 8	4 / 10	16 / 30	21 / 6	16 / 25	15 / 9	2 / 8	2 / 1
		Hydropsychidae		– / 1	– / 7	2 / –	– / 1				
		Leptoceridae	3 / 2			1 / 6	2 / 1	1 / 1	– / 6		– / 4
		Philopotamidae	– / 1	– / 1		1 / –					
		Philorheithridae	4 / 5	3 / –	3 / 4	– / 2	– / 1	2 / –	– / 1	– / 2	1 / 1
	Coleoptera	Elmidae adults	1 / –	1 / 3	1 / –	5 / 4	5 / 5	4 / 8	4 / 1	– / 1	
		Elmidae larvae		1 / –			– / 1				
		Scirtidae	2 / 2	– / 1			– / 1	– / 1	3 / –	3 / 3	6 / 6
		Psephenidae	1 / 1	1 / –					– / 1		
		Total taxa	15 / 17	14 / 15	15 / 16	13 / 13	11 / 18	12 / 10	11 / 15	11 / 12	10 / 7

Table B.4: Stitt River – autumn 2026 AusRivAS sample data. AusRivAS replicate abundances are shown as a / b; – denotes no individuals in one replicate. Blank cells indicate no individuals in either replicate.

Class	Order	Family or sub-Family	ST1	S0	S1	S2	S3	S4	S5	S5.5	S6
Annelida	Oligochaeta			1 / 1	2 / 6	2 / 1	2 / 4	3 / 5		1 / –	1 / 1
Arachnida	Acarina		1 / 2	2 / 2	1 / 2		– / 2	– / 1	3 / –	1 / –	1 / –
Crustacea	Amphipoda	Paramelitidae	8 / 7	14 / 6	6 / 5	4 / 2	8 / 9	1 / –		1 / –	– / 1
Insecta	Plecoptera	Eustheniidae	4 / –	5 / 13	4 / 4	9 / 15	2 / 5	1 / 5	1 / 1	– / 2	
		Austroperlidae	1 / –	2 / –	1 / –						
		Gripopterygidae	5 / –	4 / 5	9 / 5	9 / 12	16 / 12	– / 9	3 / 3	6 / 3	5 / 1
		Notonemouridae							– / 1		1 / –
	Ephemeroptera	Leptophlebiidae	33 / 19	8 / 8	5 / 9	4 / 7	12 / 16	12 / 5	19 / 25	20 / 17	3 / 3
		Baetidae	– / 1	7 / 25	4 / 5	– / 4	3 / 10	9 / 5	1 / 1	– / 2	
	Odonata	Telephlebiidae		2 / 1					1 / –		
	Diptera	Chironominae	– / 1	3 / 2	1 / –	2 / 2		1 / 1			
		Orthoclaadiinae			– / 2	2 / 1	– / 1		– / 2	– / 3	5 / 2
		Podonominae		1 / 4	1 / 3	– / 1	8 / 5	2 / 6	1 / –	1 / 1	
		Simuliidae		1 / 1	– / 1		– / 5	1 / –		– / 3	1 / 1
		Tipulidae	– / 3	1 / –	– / 5	3 / –	1 / 1	1 / 2	– / 1	– / 1	1 / –
		Athericidae	1 / –			– / 1		1 / –	1 / 1	1 / –	11 / 5
		Blephariceridae		1 / –							
		Ceratopogonidae							– / 1		
	Trichoptera	Calocidae	2 / 1								
		Conoesucidae		– / 1	2 / –	4 / 2	– / 1	– / 1			1 / 2
		Hydrobiosidae	13 / 21	12 / 5	10 / 18	24 / 13	18 / 14	3 / 14	7 / 9	6 / 10	22 / 17
		Hydropsychidae		– / 4	1 / –		1 / –	– / 1		1 / 1	
		Hydroptilidae	1 / 1		1 / 2						
		Leptoceridae	10 / 12	3 / 2	8 / 14	12 / 12	12 / 17	9 / –	21 / 22	12 / 15	9 / 2
		Philopotamidae		1 / –							
		Philorheithridae	3 / 12		3 / 2	1 / 3	4 / 6	12 / 3	3 / 3	3 / 5	7 / –
	Coleoptera	Elmidae adults	5 / 2	3 / 3	7 / 9	6 / 6	7 / 6	12 / 8	6 / 4	5 / 3	3 / 4
		Elmidae larvae			2 / –		1 / –				
		Scirtidae	1 / 2	1 / –	1 / 1	– / 1	4 / 4	9 / 4	7 / 7	2 / 6	10 / 12
		Psephenidae	1 / 1	1 / –				1 / –			– / 1
		Total taxa	15 / 14	20 / 16	19 / 17	13 / 16	15 / 17	16 / 15	13 / 14	13 / 14	15 / 13

B.1 TRCI Expectedness, Abundance and Composition scores

Table B.5: Spring 2025

<i>Raw scores for O/Epa; Signal; EPT proportion; and Abundance</i>					
Site	Code	Mean O/Epa	Mean Signal O/E	Mean EPT proportion	Abundance (per m ²)
Sterling R.	Sterl.1	0.91	0.94	0.47	240
Stitt R.	S0	0.70	1.04	0.52	435
	S1	0.91	0.97	0.45	110
	S2	0.86	1.01	0.58	200
	S3	0.80	1.04	0.53	235
	S4	0.70	0.99	0.45	205
	S5	0.77	0.92	0.38	75
	S5a	0.67	0.96	0.39	175
	S6	0.41	1.10	0.54	70

<i>Scores and ratings for Expectedness</i>					
Site					
	Code	Expectedness		Score	Rating
		O/Epa	Signal O/E		
Sterling R.	Sterl.1	H	H	100	H
Stitt R.	S0	M	H	65	M
	S1	H	H	100	H
	S2	H	H	100	H
	S3	M	H	65	M
	S4	M	H	65	M
	S5	M	H	65	M
	S5a	M	H	65	M
	S6	L	H	30	M

<i>Scores and ratings Abundance and composition</i>					
Site					
	Code	Abundance		Composition	
		Score	Rating	Score	Rating
Sterling R.	Sterl.1	40	L	>0.35	H
Stitt R.	S0	40	L	>0.35	H
	S1	40	L	>0.35	H
	S2	40	L	>0.35	H
	S3	40	L	>0.35	H
	S4	40	L	>0.35	H
	S5	10	L	>0.35	H
	S5a	40	L	>0.35	H
	S6	10	L	>0.35	H

Table B.6: Autumn 2026

<i>Raw scores for O/Epa; Signal; EPT proportion; and Abundance</i>					
Site	Code	Mean O/Epa	Mean Signal O/E	Mean EPT proportion	Abundance (per m ²)
Sterling R.	Sterl.1	0.76	1.05	0.55	445
Stitt R.	S0	1.08	1.01	0.45	325
	S1	1.17	0.99	0.52	615
	S2	1.03	0.99	0.52	400
	S3	1.11	1.02	0.50	385
	S4	1.06	0.99	0.45	220
	S5	0.77	1.10	0.55	225
	S5a	0.91	1.04	0.52	65
	S6	0.84	0.99	0.43	340

<i>Scores and ratings for Expectedness</i>					
Site	Code	Expectedness		Score	Rating
		O/Epa	Signal O/E		
Sterling R.	Sterl.1	M	H	65	M
Stitt R.	S0	H	H	100	H
	S1	H	H	100	H
	S2	H	H	100	H
	S3	H	H	100	H
	S4	H	H	100	H
	S5	M	H	65	M
	S5a	H	H	100	H
	S6	M	H	65	M

<i>Scores and ratings Abundance and composition</i>					
Site	Code	Abundance		Composition	
		Score	Rating	Score	Rating
Sterling R.	Sterl.1	40	L	>0.35	H
Stitt R.	S0	40	L	>0.35	H
	S1	40	L	>0.35	H
	S2	40	L	>0.35	H
	S3	40	L	>0.35	H
	S4	40	L	>0.35	H
	S5	40	L	>0.35	H
	S5a	10	L	>0.35	H
	S6	40	L	>0.35	H

C Water quality plots

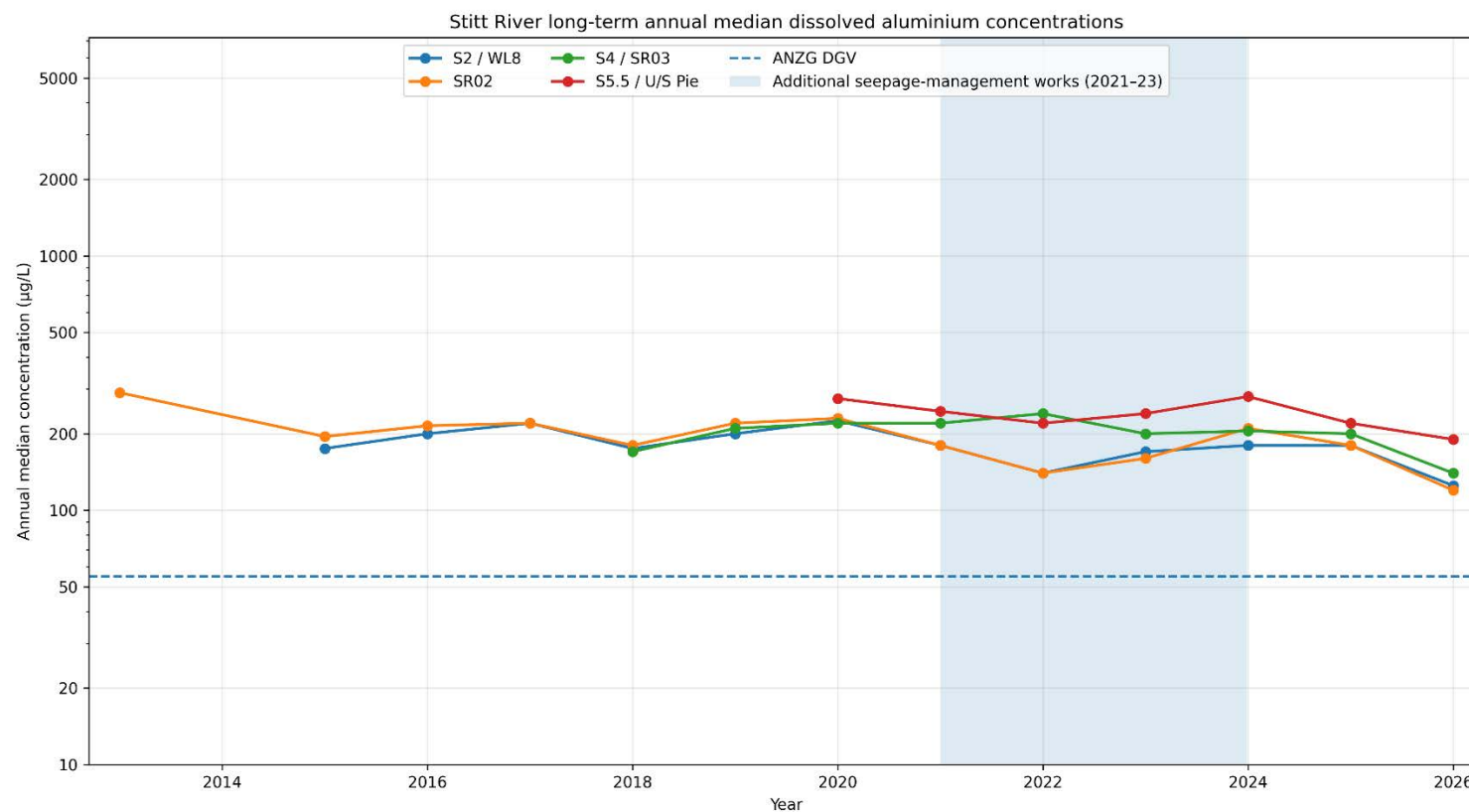


Figure C.1: Long-term annual median dissolved aluminium at selected Stitt River monitoring sites. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values, and the shaded period indicates the additional 2/5 Dam TSF seepage-management works undertaken during 2021–23

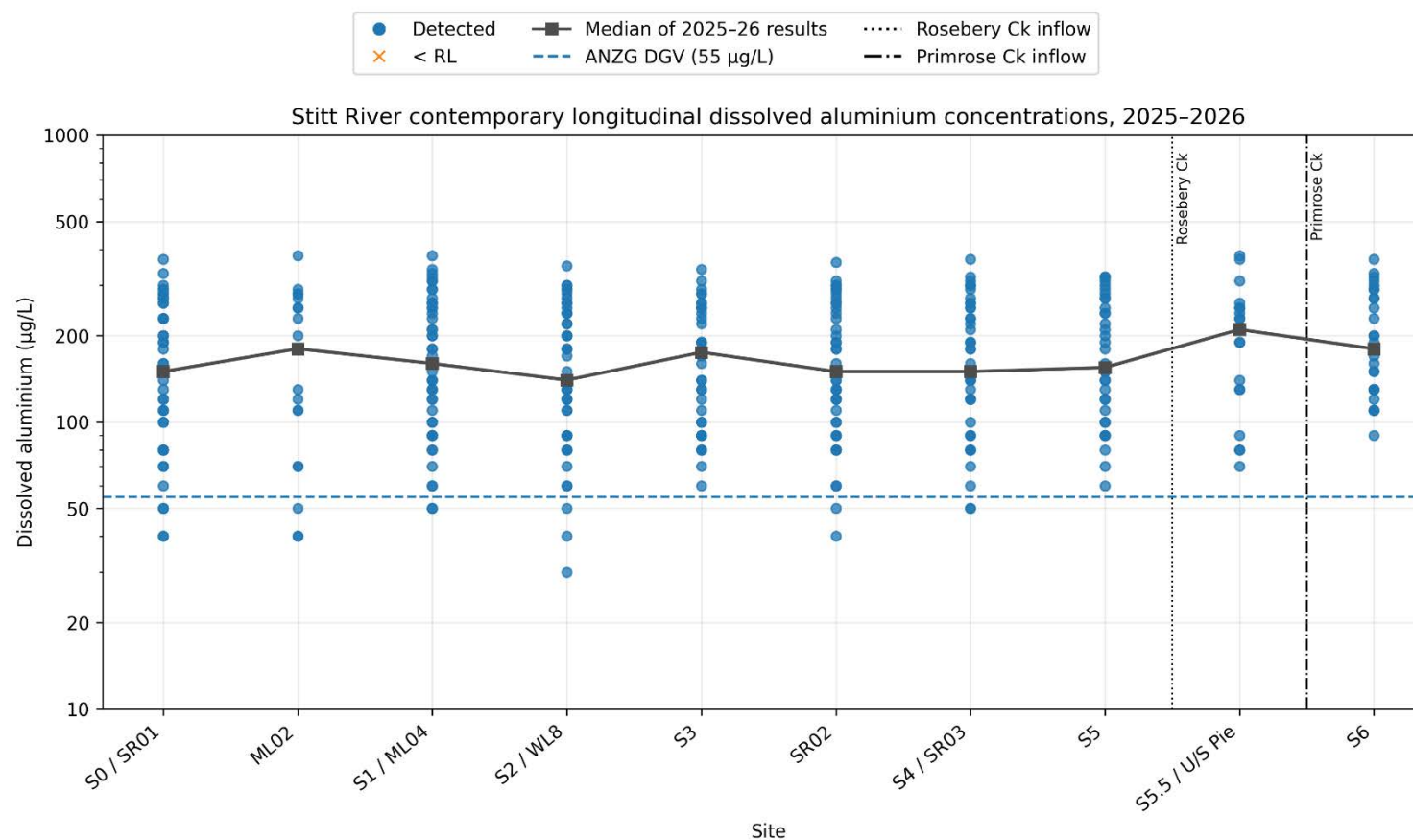


Figure C.2: Longitudinal dissolved aluminium concentrations in the Stitt River during 2025–26. Individual detected concentrations are shown as blue circles, results below the laboratory reporting limit as orange crosses, and site medians as dark-grey squares joined by a dark-grey line. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values.



Figure C.3: Long-term annual median total iron concentrations (log) at selected Stitt River monitoring sites. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values, and the shaded period indicates the additional 2/5 Dam TSF seepage-management works undertaken during 2021–23.

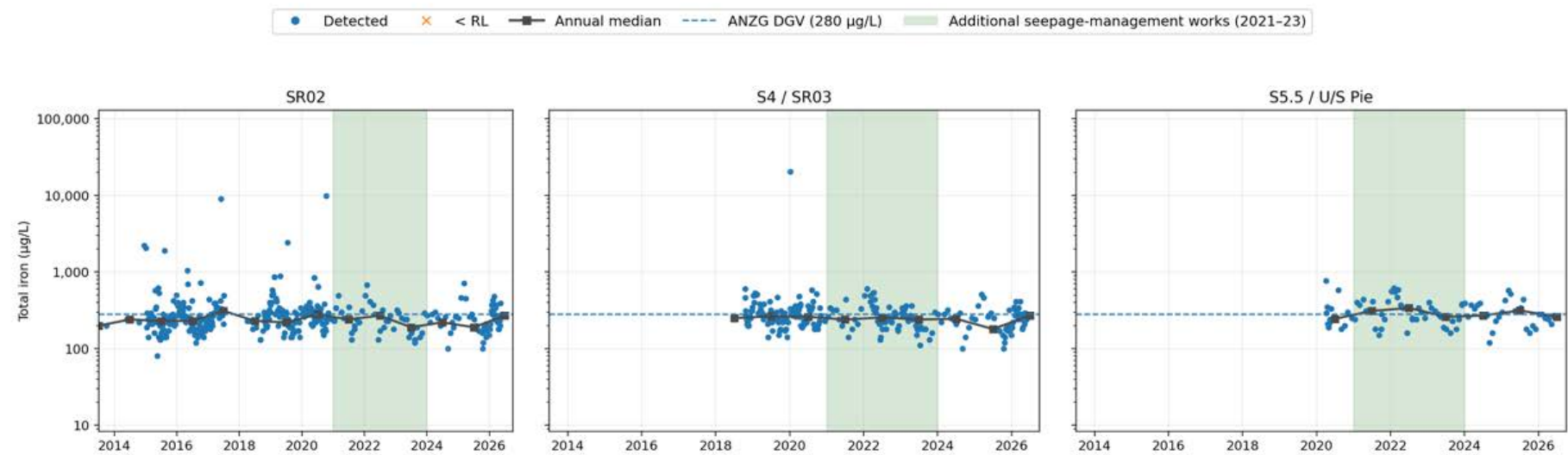


Figure C.4: Long-term raw data for total iron concentrations (log) at selected Stitt River monitoring sites. Dashed horizontal lines indicate the applicable ANZG 95% freshwater default guideline values, and the shaded period indicates the additional 2/5 Dam TSF seepage-management works undertaken during 2021–23.



**Design
for a better
future /**

**Annual Air Quality
Monitoring Report – FY
2025/2026**

MMG Rosebery Mine

wsp

Issued: September 2026

Question today *Imagine tomorrow* Create for the future

Annual Air Quality Monitoring Report – FY 2025/2026 MMG Rosebery Mine

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2	24/09/2026	Revision 2

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Abbreviations

AAQM	Ambient air quality monitoring
AAQMS	Ambient air quality monitoring station
AQMS	Air quality monitoring station
AQO	Air quality objective
AS	Australian Standard
AS/NZS	Australian/New Zealand Standard
DDG	Dust deposition gauge
EPA	Environment Protection Authority
EPN	Environment Protection Notice
FY	Financial year
HVAS	High Volume Air Sampler / High Volume Air Sampling
ICPMS	Inductively coupled plasma mass spectrometry
MMG	MMG Limited
NATA	National Association of Testing Authorities
PCE	Permit Conditions - Environmental
PM	Particulate matter
PM2.5	Particulate matter with an equivalent aerodynamic diameter less than 2.5 microns
PM10	Particulate matter with an equivalent aerodynamic diameter less than 10 microns
SSI	Size selective inlet
TIM	Total insoluble matter
TSP	Total suspended particulate matter
UTM	Universal Transverse Mercator
WSP	WSP Australia Pty Limited
As	Arsenic
Cd	Cadmium
Cu	Copper
Pb	Lead
Mn	Manganese
Zn	Zinc
deg C	Degrees Celsius

g/m ² /month	Grams per square metre per month
kPa	Kilopascal
L/min	Litres per minute
m	Metre
mg	Milligram
ug/m ³	Microgram per cubic metre

Executive summary

MMG's Rosebery Mine operates under environmental approval and licensing requirements administered by the Tasmanian Environment Protection Authority (EPA) contained in the following permits:

- Permit Conditions - Environmental (PCE) 9084
- Environment Protection Notice (EPN) 7153/3
- Permit Conditions - Environmental (PCE) 11514.

The operating conditions require MMG Rosebery Mine to conduct air quality monitoring and reporting in and around the town of Rosebery for total suspended particles (TSP), particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM₁₀), deposited dust and metals including arsenic, cadmium, copper, lead, manganese and zinc.

The permitting contains Compliance Limits which must not be exceeded beyond the site boundary and Trigger Levels, which if exceeded, require timely investigation and remedial action to prevent further occurrences where required.

The air quality monitoring results for the financial year 1 July 2025 to 30 June 2026 (the reporting period) compared to the Compliance Limits are presented in the tables below.

Maximum measured concentration at any air quality station – July 2025 to June 2026

Parameter	Units	Averaging period	Maximum measured level	Compliance level	Exceedances
TSP	(µg/m ³)	annual	29	90	Nil
PM ₁₀	(µg/m ³)	24-hour	54	150	Nil
Lead (as TSP)	(µg/m ³)	90-day	0.12	1.5	Nil
Dust deposition	g/m ² /month	Annual	1.2	4	Nil
Dust deposition (above background)	g/m ² /month	Annual	0.89	2	Nil

Maximum measured concentration at Baillieu Street – July 2025 to June 2026

Parameter	Units	Averaging period	Maximum measured level	Compliance level	Exceedances
TSP	(µg/m ³)	annual	14	90	Nil
PM ₁₀	(µg/m ³)	24-hour	33	50	Nil
	(µg/m ³)	annual	10	25	Nil
Arsenic ¹ (as PM ₁₀)	(µg/m ³)	annual	0.00055	0.015	Nil
Cadmium ¹ (as PM ₁₀)	(µg/m ³)	24-hour	0.0014	0.03	Nil
	(µg/m ³)	annual	0.00019	0.005	Nil
Copper ¹ (as PM ₁₀)	(µg/m ³)	24-hour	0.011	1	Nil
Lead (as TSP)	(µg/m ³)	90-day	0.011	1.5	Nil
Manganese ¹ (as PM ₁₀)	(µg/m ³)	24-hour	0.017	0.3	Nil
		annual	0.0041	0.15	Nil
Zinc ¹ (as PM ₁₀)	(µg/m ³)	24-hour	0.069	50	Nil
	(µg/m ³)	annual	0.018	2	Nil

Notes:

(1) Compliance levels and maximum measured value applies to only Baillieu Street.

There were no exceedances of the Compliance Limits for any parameter at any locations during the reporting period 1 July 2025 to 30 June 2026.

MMG Rosebery Mine also maintains a Dust Mitigation Management Plan (MMG, 2025a) to manage dust emissions associated with site operations and satisfy the requirements of EPN 7153/3. The plan incorporates a range of operational controls and mitigation measures designed to minimise dust generation and reduce the potential for off-site impacts

During the reporting period there was a single day where an exceedance of the 60-minute DustTrak inspection level was recorded at the Baillieu Street monitoring station; however, no mitigation-level exceedances were recorded. The monitoring results indicate that dust emissions were well managed during the reporting period.

One community complaint relating to alleged visible dust emissions was received during the reporting period. MMG investigated the complaint and concluded no material off-site dust impacts were identified.

The single air quality measurement exceedance, and isolated community complaint, which could not be substantiated with monitoring data, indicates that the dust management measures implemented at MMG Rosebery Mine continue to be effective in managing fugitive dust emissions from site operations.

MMG Rosebery Mine has demonstrated a low environmental risk to air quality and that the current dust mitigation controls are appropriate.

1 Introduction

MMG Limited (MMG) Rosebery Mine is one of Australia's longest-operating underground mining operations, located on the west coast of Tasmania near the township of Rosebery. The mine is an underground polymetallic mine producing zinc, copper and lead concentrates, along with valuable by-products including gold and silver.

The mining activities include ore extraction using mechanised underground mining methods and onsite processing through crushing and grinding and transportation by rail to the Port of Burnie for shipment.

MMG's Rosebery Mine operates under environmental approval and licensing requirements administered by the Tasmanian Environment Protection Authority (EPA). Air emission controls focus primarily on the management of particulate matter and metal-bearing dust generated from mining and mineral processing activities. MMG is required to conduct environmental monitoring and reporting and demonstrate compliance with regulatory air quality requirements.

MMG operate under Permit No. 1904 as varied by Environment Protection Notice (EPN) 7153/3 condition A5.2 and Permit No. 11514 Part B Permit Conditions - Environmental (PCE) condition A8.2.

The ambient air quality monitoring (AAQM) network consists of ambient air quality monitoring stations (AAQMS), for compliance monitoring, located in areas around the town of Rosebery and within the mine site boundary, monitoring for:

- Total suspended particulate matter (TSP) (5 sites)
- Particulate matter with an equivalent aerodynamic diameter less than 10 microns (PM_{10}) (5 sites)
- Continuous measurement of PM_{10} (5 sites)
- Deposited dust (12 sites).

Of the twelve dust deposition monitoring locations, seven are located at or beyond the site boundary (AD3, AD4, AD11, AD21, AD22, AD29 & BG3), and five are located within the site boundary (AD1.1, AD2.1, AD5, AD23 & A25).

The EPA operating permits require MMG to conduct an annual review of their ambient air quality monitoring performance.

WSP Pty Limited (WSP), was engaged by MMG to conduct the annual review of the air quality data and the mine's dust management performance in adequately fulfilling its environmental obligations. WSP are accredited by the National Association of Testing Authorities (NATA) (NATA accreditation No. 1910), to perform and report on the methods utilised by MMG for the conduct of ambient air quality monitoring and are therefore suitably qualified to conduct this review.

2 Ambient air quality monitoring

MMG Rosebery Mine's ambient air quality monitoring (AAQM) network consists of five monitoring sites measuring TSP and PM₁₀ for compliance using standard reference methods. Each site is co-located with a real-time light scattering particulate monitor (non-reference method) used for dust management purposes. An additional twelve sites are monitoring deposited dust using dust deposition gauges (DDG), including a reference site at the Rosebery golf course (BG3).

2.1 Monitoring locations

The air quality monitoring location name, description, coordinates and air quality parameters monitored for each site are provided in Table 2.1. The monitoring locations of the AAQMS are also presented on a map in Figure 2.1.

Table 2.1 AAQMS Monitoring details

Site name	Location	Description	UTM Coordinates Easting (m), Northings (m)	Monitoring parameters
AD1.1	On-site	Mines Office Building (SEAC)	378814, 5374203	Dust deposition ²
AD2.1	On-site	Core Shed	378627, 5374005	TSP, PM10, Metals Continuous PM Dust deposition ²
AD3	Boundary / off-site	Filter Plant	377705, 5374488	TSP, PM10, Metals Continuous PM Dust deposition ²
AD4	Off-site	Giblin Street	378608, 5373189	Dust deposition ²
AD5	On-site	Breaker Station/ Crusher	378652, 5374236	Dust deposition ²
AD11	Off-site	14 Cohen Street	377828, 5374289	Dust deposition ²
AD21	Off-site	6 Primrose Street	378867, 5373796	Dust deposition ²
AD22	Off-site	24 Dalmeny Street	379290, 5373601	Dust deposition ²
AD23	On-site	Filter Plant Carpark	377787, 5374519	Dust deposition ²
AD25	On-site	Passing bay on Filter Plant Road	378238, 5374277	Dust deposition ²
AD29	Off-site	Baillieu Street	377338, 5374464	Dust deposition ²
Giblin Street	Off-site	Giblin Street	378608, 5373181	TSP, PM10, Metals Continuous PM Dust deposition ²
Alec Street	Off-site	Alec Street	378965, 5373404	TSP, PM10, Metals Continuous PM
Baillieu Street	Off-site	Baillieu Street	377337, 5374461	TSP, PM10, Metals ¹ Continuous PM ₁₀
BG3	Off-site	Golf course	375507, 5372852	Dust deposition ²

Notes:

- (1) Metals: arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), manganese (Mn), zinc (Zn)
- (2) Deposited dust as total insoluble solids (TIM)

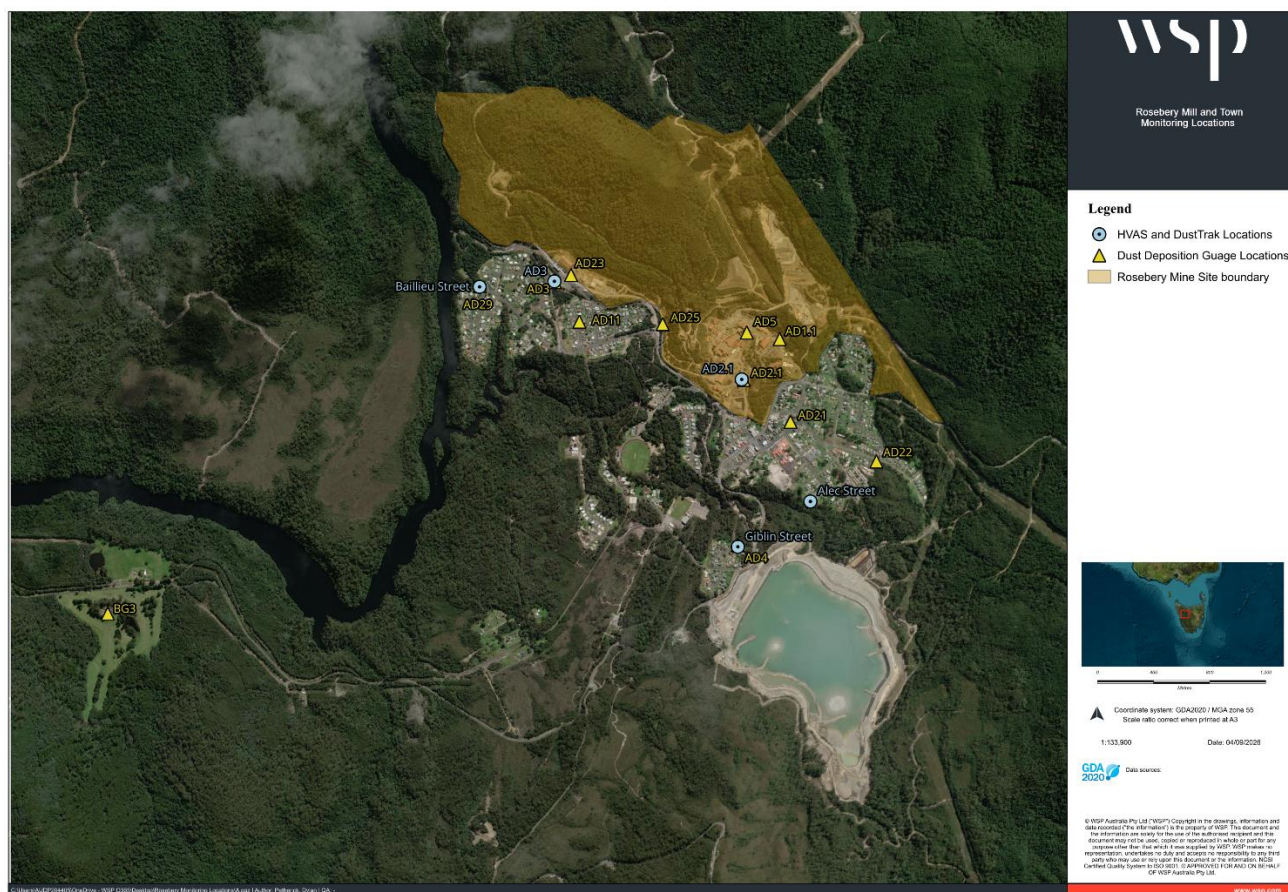


Figure 2.1 MMG Rosebery Mine AAQM site locations

2.2 Siting

The siting of the AAQMS was conducted with reference to Australian Standard AS/NZS 3580.1.1 “*Methods for Sampling and Analysis of Ambient Air – Part 1.1. Guide to Siting Air Monitoring Equipment*”. This standard provides general guidance for the siting of ambient air monitoring equipment and specific siting parameters for individual air pollutants. Table 2.2 provides a comparison between recommended criteria contained in the Standard for the parameters monitored at neighbourhood (NH) and peak monitoring stations with actual conditions at each AAQMS.

Table 2.2 Australian standard AAQMS siting criteria compliance

Site ^A	Station Type	Unrestricted 270° airflow around inlet	Greater than 50 m from road (≤ 10,000 vehicles /day)	Clear sky angle 120° ^C	No extraneous sources nearby	10 m from drip line of trees ^C	Unrestricted 360° airflow around inlet	>5 m from source
AD1.1	Peak	✓	B	✓	✓	✓	✓	✓
AD2.1	Peak	✓	B	✓	X	X	✓	X
AD3	Peak	✓	B	✓	✓	✓	✓	✓
AD4	NH	✓	B	X	✓	X	✓	✓
AD5	Peak	✓	B	✓	X	✓	✓	X
AD11	NH	✓	B	✓	✓	✓	✓	✓

Site ^A	Station Type	Unrestricted 270° airflow around inlet	Greater than 50 m from road ($\leq$ 10,000 vehicles /day)	Clear sky angle 120° ^C	No extraneous sources nearby	10 m from drip line of trees ^C	Unrestricted 360° airflow around inlet	>5 m from source
AD21	NH	✓	B	✓	✓	✓	✓	✓
AD22	NH	✓	B	x	✓	x	✓	✓
AD23	Peak	✓	B	✓	x	✓	✓	✓
AD25	Peak	✓	B	x	✓	x	✓	✓
AD29	NH	✓	B	✓	✓	✓	✓	✓
Giblin Street	NH	✓	B	x	✓	x	✓	✓
Alec Street	NH	✓	B	x	✓	x	✓	✓
Baillieu Street	NH	✓	B	✓	✓	✓	✓	✓
BG3	Background	✓	B	x	✓	✓	✓	✓

Notes:

- A where monitoring instruments are co-located, the site has been assessed holistically, not at each inlet.
- B Monitoring location is within 10m of a road, however daily vehicle numbers would be measured in tens or potentially hundreds, typically less than 1% of the siting requirement condition.
- C non-compliance due to nearby trees. The presence of trees is a common non-compliance for ambient air quality monitoring. For the purpose of this monitoring the impact of the trees are considered negligible and the monitoring location is considered suitable.

3 Air quality objectives

Air quality objectives (compliance limits and trigger levels) for MMG Rosebery for TSP, PM₁₀ and metals for monitoring sites AD2.1, AD3, Giblin Street and Alec Street are presented in Table 3.1. Air quality objectives for TSP, PM₁₀ and metals for Baillieu Street are presented in Table 3.2.

Compliance Limits are limits that must not be exceeded at or beyond the site boundary. Trigger Levels exceedances must be investigated as soon as practicable after the event recording the likely cause(s) of the exceedance identifying and implementing any reasonable remedial actions to prevent the exceedance from occurring again.

Table 3.1 Ambient air quality compliance and trigger levels for TSP, PM₁₀ and metals by HVAS (EPN-7153/3)

Pollutant	Averaging period	Compliance Limit ¹ µg/m ³	Trigger Level ¹ µg/m ³
TSP	24-hour	-	150
	Annual	90	-
PM ₁₀	24-hour	150	50
Lead (as TSP)	24-hour	-	8.7
	90-days	1.5	-
Cadmium (as PM ₁₀)	24-hour	-	0.003
Zinc (as PM ₁₀)	24-hour	-	15

(1) EPN 7153 Table 1

Table 3.2 Ambient air quality compliance and trigger levels for TSP, PM₁₀ and metals Baillieu Street

Pollutant	Averaging period	Compliance Limit ¹ (µg/m ³)	Trigger Level ¹ (µg/m ³)
TSP	24-hour	-	150
	Annual	90	-
PM ₁₀	24-hour	50	50
	Annual	25	-
Arsenic (as PM ₁₀)	24-hour	-	0.03
	Annual	0.015	-
Cadmium (as PM ₁₀)	24-hour	0.03	0.003
	Annual	0.005	-
Copper (as PM ₁₀)	24-hour	1	1
Lead (as TSP)	24-hour	-	8.7
	90-days	1.5	
Manganese (as PM ₁₀)	24-hour	0.3	0.3
	Annual	0.15	-
Zinc (as PM ₁₀)	24-hour	50	15
	Annual	2	

(1) PCE-11514 Table 2

Compliance limits and Trigger levels for monthly dust deposition are presented in Table 3.3. The compliance limits require the deposition rate to be assessed as an annual average with and without background correction. For each sampling month, the background level is defined as the minimum of the measured dust deposition rates across the monitoring sites.

The off-site dust deposition monitoring locations are AD3 (site boundary), AD4, AD11, AD21, AD22, AD29 and BG3 (background site). The on-site dust deposition monitoring locations are AD1.1, AD2.1, AD5, AD23 and AD25.

Only dust deposition gauges at or beyond the site boundary are subject to the Compliance Limits and Trigger Level specified by EPN 7153/3 and PCE 11514.

Table 3.3 Dust deposition compliance limits

Pollutant	Compliance limit	Trigger level
Deposited dust	2.0 g/m ² /month as an annual average increase above background at/or beyond the site boundary.	2.0 g/m ² /month as an increase above background at/or beyond the site boundary (monthly trigger level).
	4.0 g/m ² /month as an annual average at/or beyond the site boundary.	4.0 g/m ² /month as total deposition experienced at/or beyond the site boundary (monthly trigger level).

4 Methodology

4.1 Particulate matter (TSP and PM₁₀)

TSP and PM₁₀ concentrations in ambient air are determined using a High-Volume Air Sampling (HVAS). Ambient air is drawn through a sample inlet at a known constant flowrate for a 24-hour period. The suspended particulate matter is collected on a pre-weighed filter for gravimetric analysis. The concentration of particulate matter is calculated from the mass of particulate matter collected divided by the volume of air sampled.

The PM₁₀ HVAS is fitted with a size selective inlet (SSI), which separates particles with an equivalent aerodynamic diameter greater than 10 microns from the sample stream.

The TSP monitoring method is based on the requirements contained with Australian Standard AS 3580.9.3: "Methods for Sampling and Analysis of Ambient Air. *"Determination of Suspended Particulate Matter – Total Suspended Particulate Matter (TSP) – High Volume Sample Gravimetric Method"*.

The PM₁₀ monitoring method is based on the requirements contained within Australian Standard AS/NZS 3580.9.6 *"Determination of Suspended Particulate Matter – PM₁₀ High Volume Sampler (HVS) – Gravimetric Method"*.

Gravimetric analysis of HVAS was performed by ALS Environmental (NATA Laboratory Accreditation No. 825).

4.2 Deposited particulate matter

Dust deposition is associated with airborne particles large enough to undergo gravitational settling at an appreciable rate. This principally relates to particles with an equivalent aerodynamic diameter greater than 20 µm.

Deposited particulate matter is monitored using dust deposition gauges (DDG). DDGs consist of a funnel of known area horizontally located on the top of a collection bottle two metres above ground. Particulates that settle onto the funnel surface are collected in the bottle and the mass of collected particulates is determined gravimetrically. The gauges are usually deployed for a period of 30 days ± 2 days, and the deposition rate is determined as grams of particulate matter deposited per square metre per month (g/m²/month).

The test method used was in accordance with Australian Standard AS 3580.10.1 *"Methods for Sampling and Analysis of Ambient Air: Method 10.1 Determination of Particulates – Deposited Matter – Gravimetric Method"*.

Gravimetric analysis of DDG for total insoluble matter was performed by ALS Environmental (NATA Laboratory Accreditation No. 825).

4.3 Continuous particulate monitoring

Continuous PM₁₀ particles were measured using DustTrak DRX laser light scattering monitor. Ambient air is drawn through an omni-directional heated sample inlet at a flowrate of 2.0 litres per minute (L/min) before entering an optical sensing stage where airborne particulate matter is measured by light scattering photometry. Sample heated inlets were installed on 25 August 2025.

DustTrak units are calibrated on an annual basis by Kenelec Scientific (NATA Laboratory Accreditation No. 15814). On completion of annual calibration, the units are sent to EPA Tasmania for site specific calibration using wood fire smoke haze calibration factors. This factor enables the DustTrak to better represent particle concentrations in areas with higher incidence of wood smoke haze.

Periodic performance and maintenance checks for sample flowrate, zero checks, sample inlet cleaning and instrument condition are conducted by MMG staff. The real-time DustTrak data is transformed into 15-minute and 60-minute averages with this data remotely polled and displayed within the Environmental Department office. The DustTrak data is not used for compliance purposes, but for real time dust event alerts and operational investigations.

4.4 Metals

HVAS sample filters were analysed for metals by nitric acid digestion and analysis by inductively coupled plasma mass spectrometry (ICPMS) Analysis was performed by ALS Environmental (NATA Laboratory Accreditation No. 825).

5 Results

A summary of the monitoring results for the reporting period 1 July 2025 to 30 June 2026 are presented in the following sections.

5.1 Compliance Limits

5.1.1 Particulate matter (TSP & PM₁₀ and lead)

TSP and PM₁₀ were monitored by HVAS over a 24-hour period on a one day in six days cycle. The maximum concentrations of TSP (annual average), PM₁₀ (24-hour average) and the Lead (as TSP) (90-day rolling average) for the reporting period, 1 July 2025 to 30 June 2026, at monitoring stations AD2.1, AD3, Giblin Street and Alec Street are presented in Table 5.1 alongside the Compliance Levels.

Table 5.1 HVAS Maximum TSP, PM₁₀ and Lead Concentrations - July 2025 to June 2026

Parameter	Averaging period	Concentration (µg/m3)#						Compliance Level (µg/m3)		
		AD2.1		AD3		Giblin Street		Alec Street		
TSP	Annual	29	✓	15	✓	12	✓	14	✓	90
PM ₁₀	24-hour	41	✓	26	✓	24	✓	54	✓	150
Lead (as TSP)	90-day	0.10	✓	0.12	✓	0.016	✓	0.017	✓	1.5

Notes:

Micrograms per cubic metre at 0°C and 101.3 kPa

Values rounded to two significant figures.

✓ Passes Compliance Limit

✗ Fails Compliance Limit

Baillieu Street AAQM site was established during September 2025, with the first HVAS sample collected on the 15 September 2025. The maximum concentrations of TSP (annual average), PM₁₀ (24-hour average) and the metals (24-hour and annual averages) for the reporting period, 15 September 2025 to 30 June 2026, at Baillieu Street monitoring station are presented in Table 5.2 compared to the Compliance Levels.

Table 5.2 Maximum measured concentration at Baillieu Street – September 2025 to June 2026

Parameter	Averaging period	Concentration (µg/m3)#		Compliance Level (µg/m3)
		Baillieu Street		
TSP	Annual	14	✓	90
PM ₁₀	24-hour	33	✓	50
	Annual	10	✓	25
Arsenic (as PM ₁₀)	Annual	0.00055	✓	0.015
Cadmium (as PM ₁₀)	24-hour	0.0014	✓	0.03
	Annual	0.00019	✓	0.005
Copper (as PM ₁₀)	24-hour	0.011	✓	1.0
Lead (as TSP)	90-day	0.011	✓	1.5

Parameter	Averaging period	Concentration (µg/m3)#	Compliance Level (µg/m3)
		Baillieu Street	
Manganese (as PM ₁₀)	24-hour	0.017 ✓	0.30
	Annual	0.0041 ✓	0.15
Zinc (as PM ₁₀)	24-hour	0.069 ✓	50
	Annual	0.018 ✓	2.0

Notes:

Micrograms per cubic metre at 0°C and 101.3 kPa

Values rounded to two significant figures.

✓ Passes Compliance Limit

✗ Fails Compliance Limit

Time series plots for TSP and PM₁₀ for the reporting period 1 July 2025 to 30 June 2026 at each monitoring location are presented in Figure 5.1 and Figure 5.2.

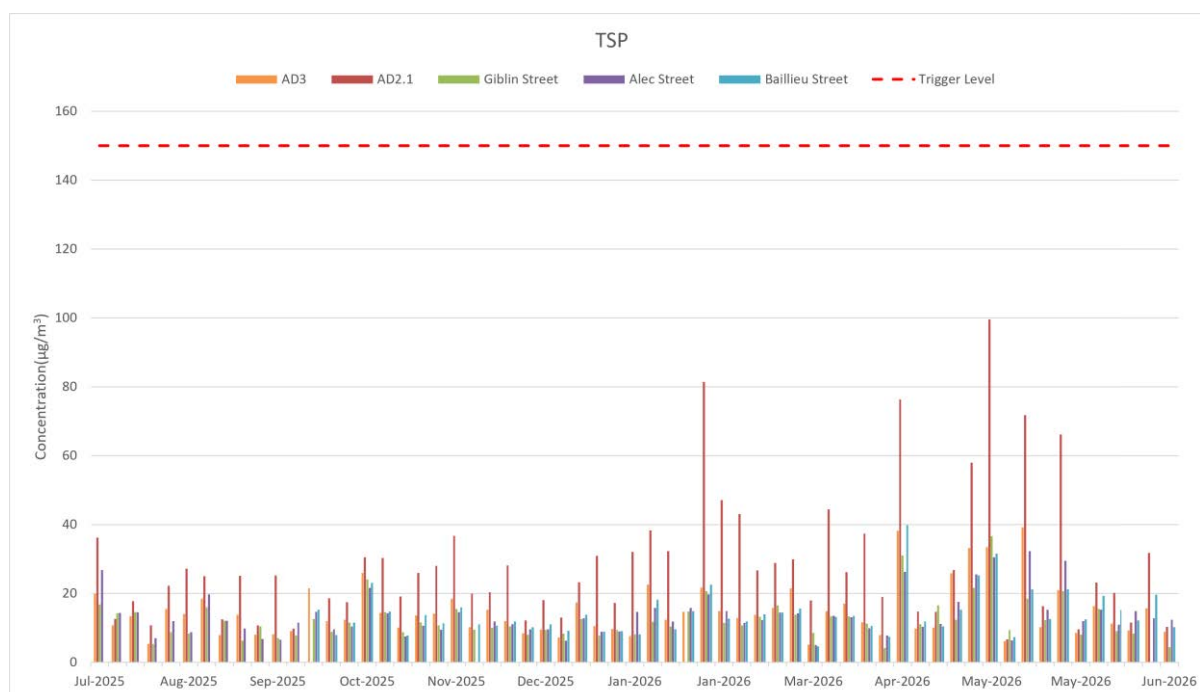


Figure 5.1 TSP FY2025-2026 (24-hour average) results against Trigger Level (EPN 7153/3 and PCE 11514)

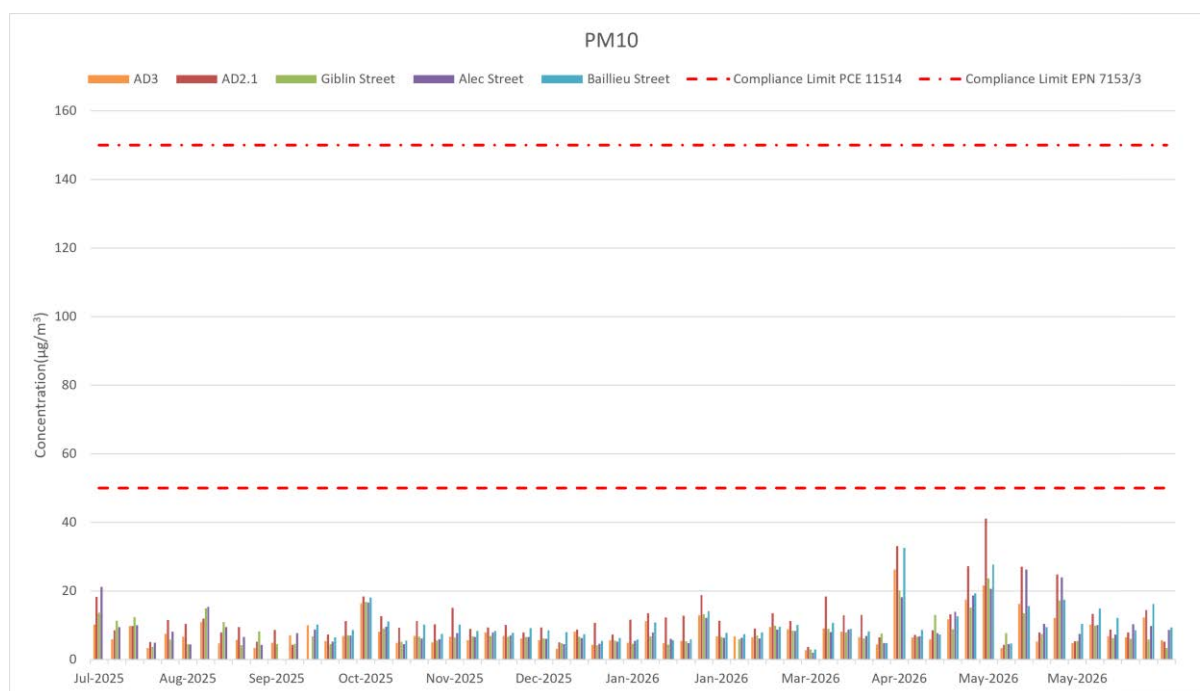


Figure 5.2 PM₁₀ FY2025-2026 (24-hour average) results against Compliance Limits (EPN 7153/3 and PCE 11514)

5.1.2 Dust deposition

Dust deposition was monitored monthly at seven off-site locations (AD3, AD4, AD11, AD21, AD22, AD29, BG3). Table 5.3 presents the annual average total dust deposition rate for each monitoring site.

The January 2026 deposited dust sample collected at AD22 resulted in an exceedance of the monthly Trigger Level. An investigation into the exceedance found that the DDG was heavily contaminated with bird droppings in December 2025 and January 2026. The December 2025 sample was unable to be analysed by the analytical laboratory. The January 2026 TIM was 15.4 g/m²/month compared to an average of 0.4 g/m²/month for the rest of the year. Given that December 2025 was affected by bird droppings and could not be analysed, and the observation for January 2026 was affected by bird droppings, the January 2026 sample has been flagged as invalid, and the results removed from the annual average.

Table 5.3 Total dust deposition rate (annual average)

Site	Total insoluble solids (g/m ² /month)							
	AD3	AD4	AD11	AD21	AD22	AD29	BG3	Compliance Level
Annual average	0.51	0.89	0.41	1.2	0.63*	0.36	1.1	4

Note:

* Annual average result excludes contaminated sample (January 2026)

There were no exceedances of the annual average total dust deposition rate Compliance Level at any location for the reporting period (refer to notes Table 5.3).

The air quality criteria specified in EPN 7153/3 and PCE 11514 requires the dust deposition rate above background to be reported. For each sampling month, the background level is defined as the minimum of the measured dust deposition rates across the monitoring sites. The monthly deposited dust above background for each location was calculated by subtracting the monthly background deposition rate from the deposition rate at each location. Table 5.4 presents the annual average dust deposition rate above background for each monitoring site.

Table 5.4 Dust deposition rate above background (annual average)

Site	Total insoluble solids (g/m ² /month)							Compliance Level
	AD3	AD4	AD11	AD21	AD22	AD29	BG3	
Annual average	0.22	0.60	0.12	0.89	0.34*	0.07	0.84	2

Note:

* Annual average result excludes contaminated sample (January 2026)

There were no exceedances of the annual average dust deposition rate above background Compliance Level at any location for the reporting period (refer to notes Table 5.4).

The monthly dust deposition results for sites at or beyond the site boundary are presented in Figure 5.3 (total insoluble matter) and Figure 5.4 (total insoluble matter above background).

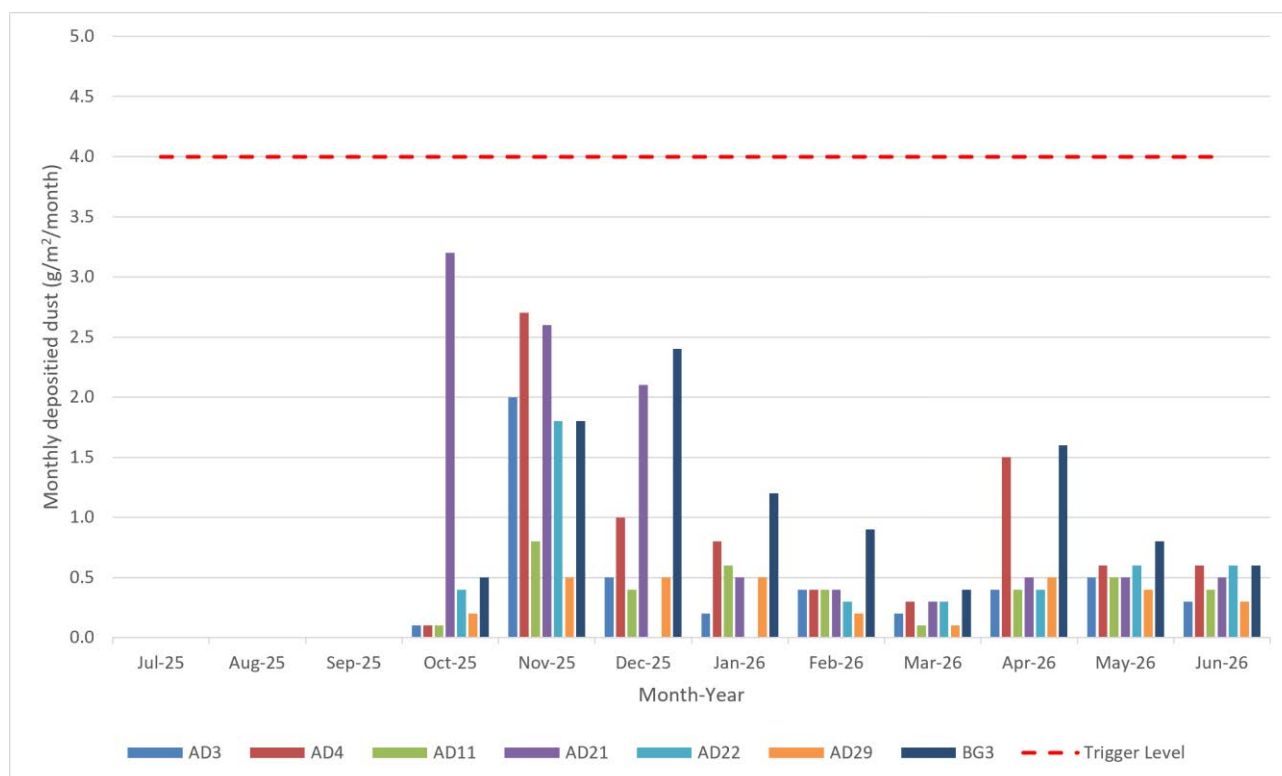


Figure 5.3 Total monthly dust deposition

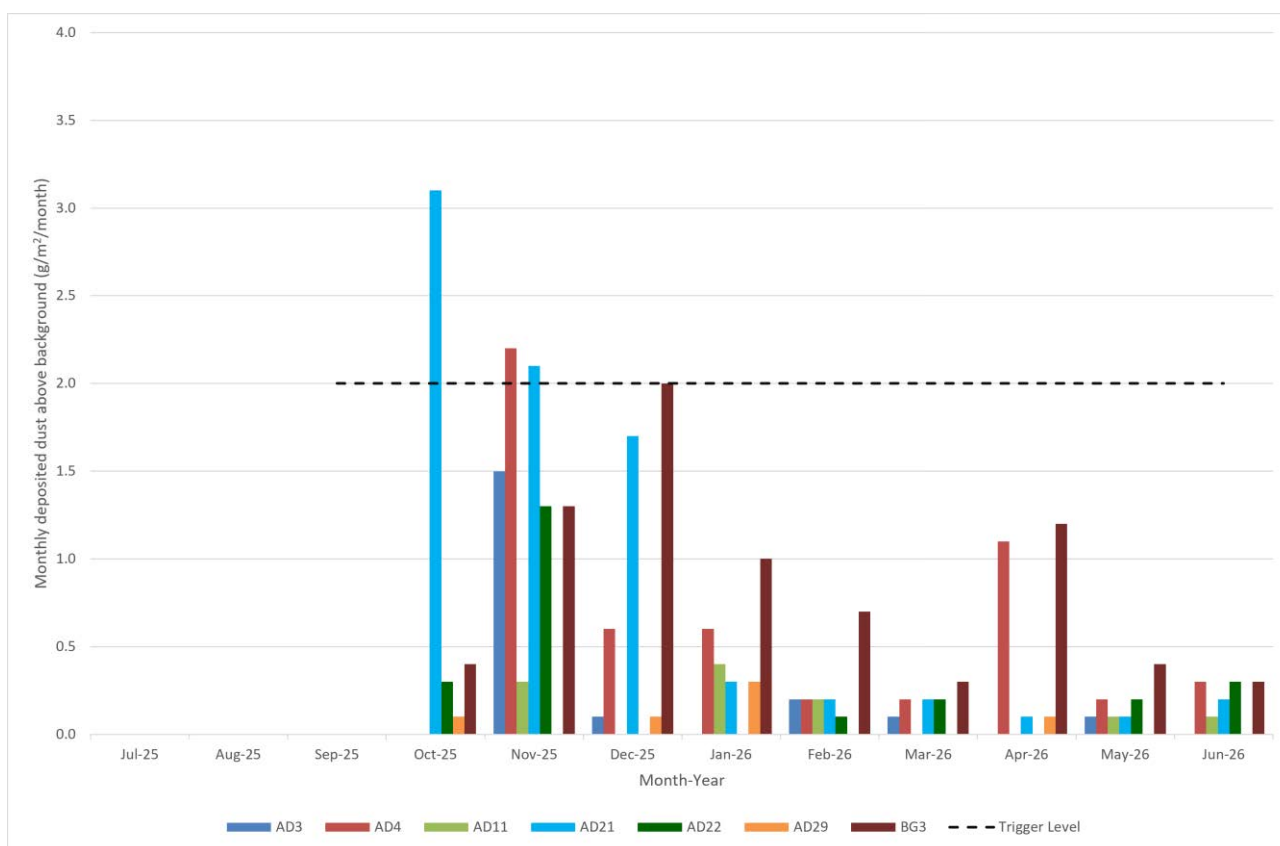


Figure 5.4 Monthly dust deposition above background

5.2 Trigger levels

5.2.1 TSP, PM₁₀ and metals

The maximum concentrations of TSP, PM₁₀ and metals for the reporting period, 1 July 2025 to 30 June 2026, at all monitoring stations are presented in Table 5.5 compared to the Trigger Levels.

Table 5.5 Maximum measured concentration at any station compared to Trigger Levels – July 2025 to June 2026

Parameter	Averaging Period	Concentration (µg/m3)#								
		AD2.1		AD3		Giblin St		Alec St		Trigger Level
TSP	24-hour	100	✓	39	✓	37	✓	32	✓	150
PM ₁₀	24-hour	41	✓	26	✓	24	✓	54	✗	50
Lead	24-hour	0.89	✓	1.7	✓	0.033	✓	0.039	✓	8.7
Cadmium	24-hour	0.0012	✓	0.0026	✓	0.0003	✓	0.0014	✓	0.003
Zinc	24-hour	0.38	✓	1.1	✓	0.034	✓	0.042	✓	15

Notes:

Micrograms per cubic metre at 0°C and 101.3 kPa

Values rounded to two significant figures.

✓ Passes Compliance Limit

✗ Fails Compliance Limit

There was one exceedance of the PM₁₀ Trigger Level at Alec Street during September 2025. An investigation found that the co-located TSP sampler had a concentration lower than the PM₁₀ concentration, which indicates one of the results may be incorrect. PM₁₀ is a subset of TSP and therefore the co-located PM₁₀ results should not be greater than TSP under controlled conditions. The ratio of PM₁₀ to TSP for this result is 8.2 compared to an average for the reporting period of 0.78, excluding this result. Based on the evidence it appears the PM₁₀ exceedance is an anomalous result due to a possible field or operator handling error.

All other parameters were compliant with their respective Trigger Levels at all stations.

Table 5.6 Maximum measured concentration at Baillieu Street compared to Trigger Levels – September 2025 to June 2026

Parameter	Averaging Period	Concentration (µg/m3)#		
		Baillieu St		Trigger Level
TSP	24-hour	40	✓	150
PM ₁₀	24-hour	33	✓	50
Lead	24-hour	0.10	✓	8.7
Arsenic	24-hour	0.0019	✓	0.03
Cadmium	24-hour	0.0014	✓	0.003
Copper	24-hour	0.011	✓	1
Manganese	24-hour	0.017	✓	0.3
Zinc	24-hour	0.069	✓	15

Notes:

Micrograms per cubic metre at 0°C and 101.3 kPa

Values rounded to two significant figures.

✓ Passes Compliance Limit

✗ Fails Compliance Limit

There were no exceedances of the Trigger Level for any parameter at Baillieu Street during the reporting period.

5.2.2 Deposited dust

The maximum concentrations of deposited dust for the reporting period, 1 July 2025 to 30 June 2026, at all monitoring stations are presented in Table 5.7 compared to the Trigger Levels. There were no exceedances of the monthly total deposited dust Trigger Level during the reporting period.

Table 5.7 Total dust deposition rate (g/m²/month) (Monthly average)

Period	AD3	AD4	AD11	AD21	AD22	BG3	AD29	Trigger Level	Exceedances
Jul-2025								4	-
Aug-2025								4	-
Sep-2025								4	-
Oct-2025	0.1	0.1	0.1	3.2	0.4	0.5	0.2	4	0
Nov-2025	2.0	2.7	0.8	2.6	1.8	1.8	0.5	4	0
Dec-2025	0.5	1.0	0.4	2.1		2.4	0.5	4	0

Period	AD3	AD4	AD11	AD21	AD22	BG3	AD29	Trigger Level	Exceedances
Jan-2026	0.2	0.8	0.6	0.5		1.2	0.5	4	0
Feb-2026	0.4	0.4	0.4	0.4	0.3	0.9	0.2	4	0
Mar-2026	0.2	0.3	0.1	0.3	0.3	0.4	0.1	4	0
Apr-2026	0.4	1.5	0.4	0.5	0.4	1.6	0.5	4	0
May-2026	0.5	0.6	0.5	0.5	0.6	0.8	0.4	4	0
Jun-2026	0.3	0.6	0.4	0.5	0.6	0.6	0.3	4	0

Table 5.8 presents the monthly deposited dust results above background at all monitoring stations. There were three exceedances of the monthly average above background Trigger level during the reporting period one exceedance during October 2025 (AD21) and two exceedances during November 2025 (AD4 and AD21). All other monitoring stations were below the monthly average Trigger Level for the reporting period.

Table 5.8 Total dust deposition rate (g/m²/month) above background (Monthly average)

Period	AD3	AD4	AD11	AD21	AD22	BG3	AD29	Trigger Level	Exceedances
Jul-2025	-	-	-	-	-	-	-	2	-
Aug-2025	-	-	-	-	-	-	-	2	-
Sep-2025	-	-	-	-	-	-	-	2	-
Oct-2025	0.0	0.0	0.0	3.1	0.3	0.4	0.1	2	1
Nov-2025	1.5	2.2	0.3	2.1	1.3	1.3	0	2	2
Dec-2025	0.1	0.6	0.0	1.7	-	2.0	0.1	2	0
Jan-2026	0.0	0.6	0.4	0.3	-	1.0	0.3	2	0
Feb-2026	0.2	0.2	0.2	0.2	0.1	0.7	0	2	0
Mar-2026	0.1	0.2	0.0	0.2	0.2	0.3	0	2	0
Apr-2026	0.0	1.1	0.0	0.1	0.0	1.2	0.1	2	0
May-2026	0.1	0.2	0.1	0.1	0.2	0.4	0	2	0
Jun-2026	0.0	0.3	0.1	0.2	0.3	0.3	0	2	0

Investigations into the dust deposition above background Trigger Level exceedances observed during October 2025 and November 2025 were conducted as required by EPN 7153/3. The investigations included a review of the DDG sampling procedures, laboratory analysis, results from other network sites, historical data, HVAS results, real-time dust monitoring results, meteorological conditions and other potential dust sources on-site and off-site.

The investigation found that the elevated results observed during October 2025 and November 2025 were not indicative of elevated dust emissions from MMG Rosebery mining operations.

5.2.3 Real time monitoring

MMG Rosebery Mine maintains a Dust Mitigation Management Plan (MMG, 2025a) to manage dust emissions associated with site operations and satisfy the requirements of EPN 7153/3. The plan incorporates a range of operational controls and mitigation measures designed to minimise dust generation and reduce the potential for off-site impacts.

The Dust Mitigation Management Plan includes:

- Identification of potential dust emission sources associated with site operations.
- The real-time monitoring network (five DustTrak's co-located with the HVAS monitors and site meteorological monitoring).
- Inspection and mitigation trigger levels for the management of dust emissions.
- Response procedures for elevated particulate matter concentrations.
- Consideration of meteorological conditions likely to contribute to dust generation and transport.

The inspection and mitigation trigger levels adopted within the Dust Mitigation Management Plan are presented in Table 5.9.

Table 5.9 Real Time dust trigger levels

Averaging Period	Inspection level ($\mu\text{g}/\text{m}^3$)	Mitigation level ($\mu\text{g}/\text{m}^3$)
15 minutes	300	500
60 minutes	200	250

The number of inspection-level and mitigation-level alerts recorded during the reporting period are summarised in Table 5.10. The assessment was based on the 15-minute and 60-minute rolling averages recorded by the telemetry network. Annual plots are provided in Figure 5.5 and Figure 5.6. The monitoring network is used to provide early indication of elevated particulate matter concentrations. In 2020, site-specific background particulate calibration factors were applied to the DustTraks to reduce inspection and mitigation alerts associated with wood smoke from nearby residences. Annual calibration validation is undertaken to confirm the ongoing suitability of these correction factors.

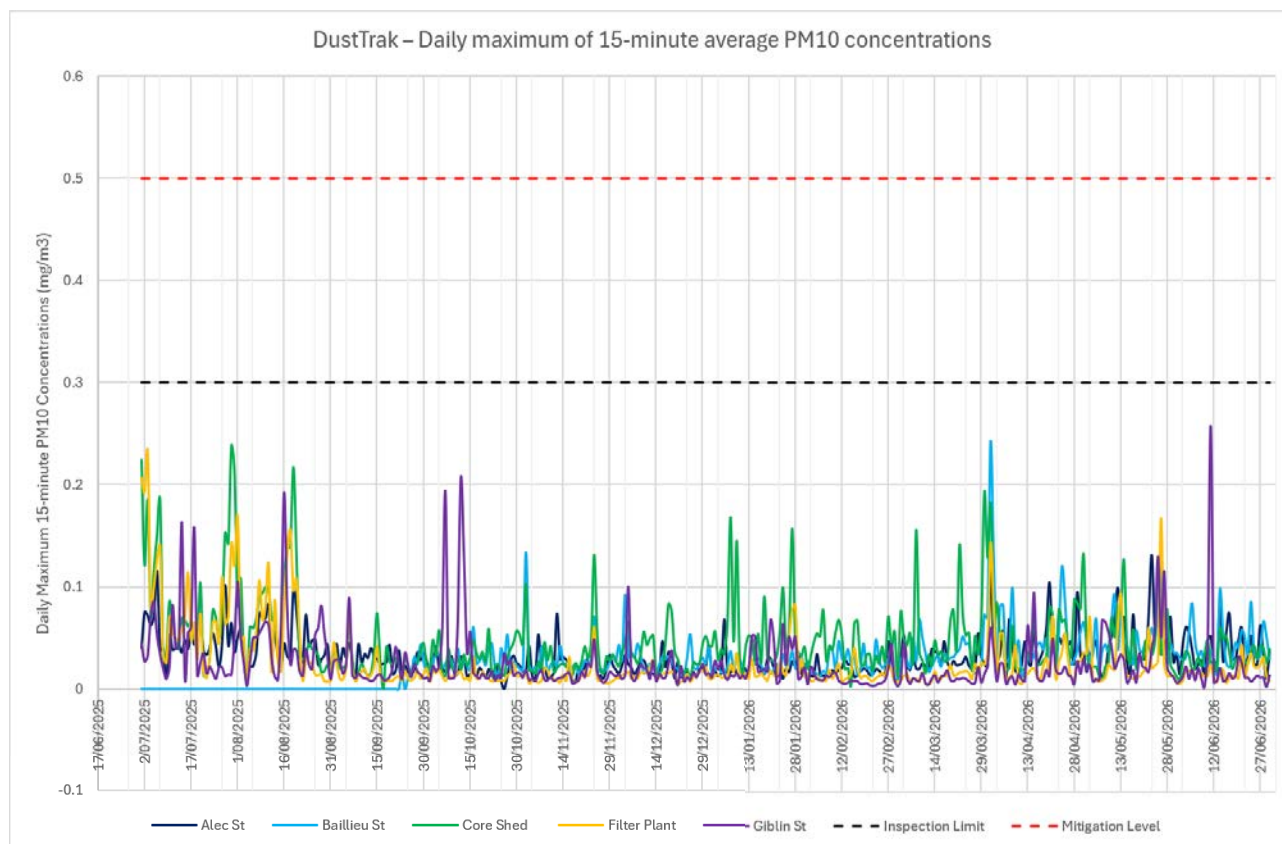


Figure 5.5 DustTrak Data: 15-minute average (July 2025 – June 2026)

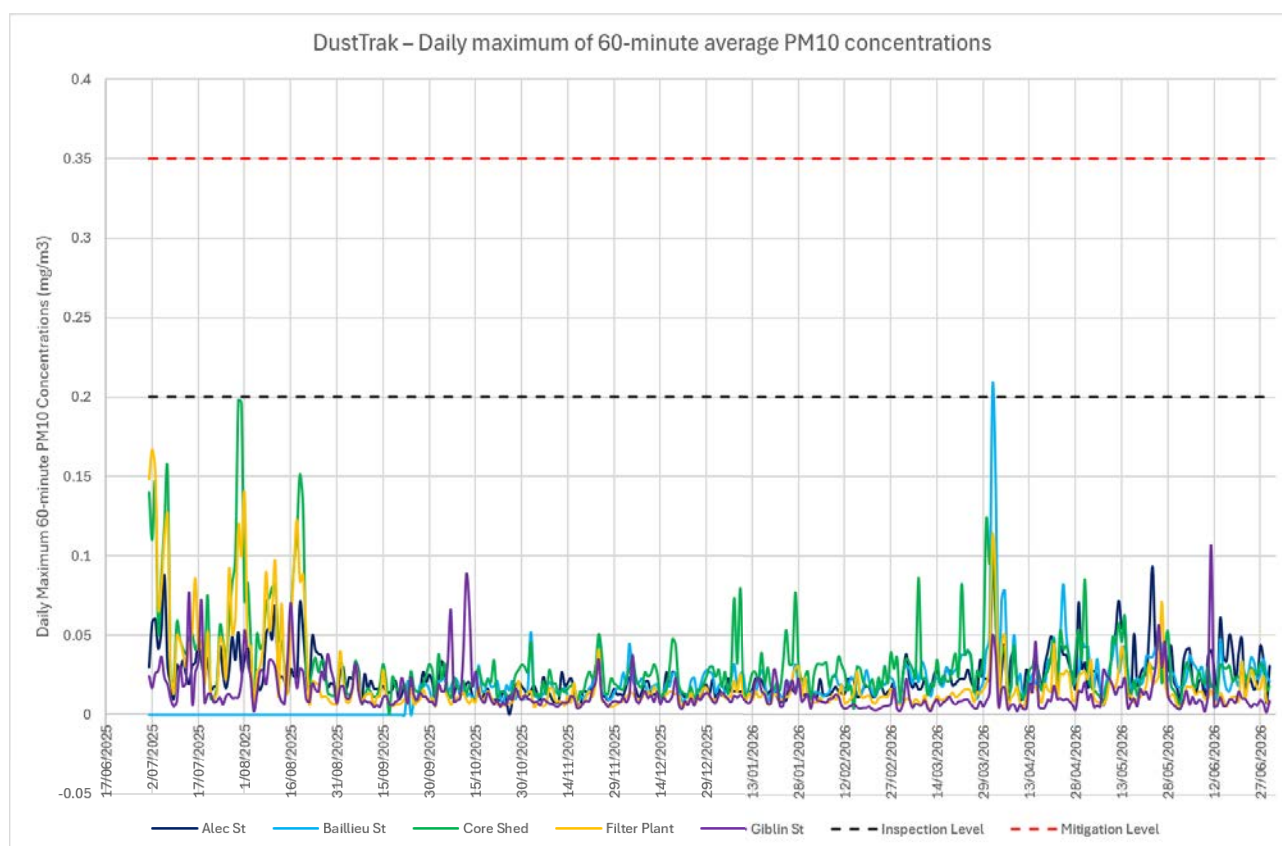


Figure 5.6 DustTrak Data: 60-minute average (July 2025 – June 2026)

In FY25/26, twelve exceedances of the 60-minute inspection level were recorded at the Baillieu Street DustTrak on 1 April 2026 between the period of 22:56 to 23:07. No exceedances of the 15-minute inspection level or any mitigation levels were recorded during the reporting period.

Elevated PM concentrations recorded during this period were assessed as being predominantly attributable to regional bushfire smoke rather than site-related activities. MMG's investigation reviewed meteorological conditions, monitoring data, site observations and available visual evidence (Figure 5.7), which indicated smoke transport from a bushfire source located west-southwest of the monitoring network. This conclusion is supported by the concurrent occurrence of elevated concentrations across the local area, visible smoke impacts, and the absence of corresponding increases at monitoring locations not affected by the prevailing wind conditions. Rainfall following the event further suppressed particulate levels, resulting in a return to background conditions. Accordingly, the monitoring data for this period are considered to have been materially influenced by an external bushfire event.

This compares with FY24/25, during which inspection-level alerts were recorded across the monitoring network due to regional bushfire activity, and FY23/24, when no inspection or mitigation-level alerts were recorded.



Figure 5.7 Photograph – MMG staff captures bushfire smoke 31/03/2026

Table 5.10 Number of alerts and active days

	Averaging period	Monitoring Site ID				
		Alec Street	AD29 (Baillieu St)	AD2.1 (Core Shed)	AD3 (Filter Plant)	Giblin St
Number of alerts						
Inspection level	15-minute	0	0	0	0	0
	60-minute	0	12	0	0	0
Mitigation level	15-minute	0	0	0	0	0
	60-minute	0	0	0	0	0
Number of alert days						

	Averaging period	Monitoring Site ID				
		Alec Street	AD29 (Baillieu St)	AD2.1 (Core Shed)	AD3 (Filter Plant)	Giblin St
Inspection level	15-minute	0	0	0	0	0
	60-minute	0	1	0	0	0
Mitigation level	15-minute	0	0	0	0	0
	60-minute	0	0	0	0	0
Data capture ¹		100%	100%	99.6%	100%	100%

Note:

(1) Data capture for Baillieu St commenced 25/09/2025

5.3 Data capture

Data capture is defined as the number of valid data periods collected divided by the number of available data periods.

TSP and PM₁₀ data capture at location AD2.1 was below 100% due to sampler malfunction in September 2025. TSP data capture at Alec Street was below 100% due to sampler malfunction at Alec Street during November 2025. TSP and PM₁₀ data capture for all remaining HVAS locations were 100%.

Data capture for dust deposition gauges at all locations was below 100% due to high levels of rainfall during July and August 2025 resulting in no valid samples being collected and the trial investigations conducted in September 2025 resulting no valid sample being collected.

The December 2025 and January 2026 samples at AD22 were considered invalid due to bird droppings. A summary of the data capture for the reporting period 1 July 2025 to 30 June 2026 is shown in Table 5.11.

Table 5.11 Data capture

Parameter	Averaging period	Station	Collected periods	Available periods	Data capture [#]
TSP	24-hour	AD2.1	59	61	97%
	24-hour	AD3	61	61	100%
	24-hour	Giblin Street	61	61	100%
	24-hour	Alec Street	60	61	98%
	24-hour	Baillieu Street ¹	49	49	100%
PM ₁₀	24-hour	AD2.1	60	61	98%
	24-hour	AD3	61	61	100%
	24-hour	Giblin Street	61	61	100%
	24-hour	Alec Street	61	61	100%
	24-hour	Baillieu Street	49	49	100%
DDG	1-month	AD3	9	12	75%
	1-month	AD4	9	12	75%
	1-month	AD11	9	12	75%
	1-month	AD21	9	12	75%

Parameter	Averaging period	Station	Collected periods	Available periods	Data capture [#]
	1-month	AD22	7	12	58%
	1-month	AD29	9	12	75%
	1-month	BG3	9	12	75%

Notes:

(1) Baillieu Street HVAS installed 15/09/2025

Rounded to two significant figures

Table 5.12 presents a summary of the missing data for each parameter across the air monitoring network and the reason for the data exception.

Table 5.12 Data exceptions

Date from	Date to	Site	Parameters	Reason
1/07/2025	31/08/2025	All DDG sites	Insoluble solids	DDG rain overflow
1/09/2025	30/09/2025	All DDG sites	Insoluble solids	Reduced sampling period ¹
15/09/2025	16/09/2025	AD2.1	TSP, PM ₁₀	Electrical fault
8/11/2025	9/11/2025	Alec Street	TSP	Power failure
1/12/2025	31/12/2025	AD22	Insoluble solids	Sample contamination ²
1/01/2026	31/01/2026	AD22	Insoluble solids	Sample contamination ²
19/01/2026	20/01/2026	AD2.1	TSP	Filter loading error

Notes:

(1) Limited sampling period for investigative purposes

(2) Contamination due to bird droppings

5.3.1 Network upgrades and continual improvement

MMG undertook an upgrade of their DDG network during the FY2025/26 assessment period. The upgrade modified the collection system to utilise larger 5 L collection bottles, following losses of deposited dust samples due to overflow during periods of high rainfall.

WSP evaluated the potential for overflow assuming use of the larger 5 L collection bottle. The evaluation included an analysis of historical rainfall data recorded at the 7L Carpark, Bobadil and 2/5 Dam meteorological stations between July 2021 and June 2026, and the collection area of a standard 150 mm diameter dust deposition gauge funnel. This funnel has a catchment area of 0.01767 m², calculated as $\pi \times (0.15/2)^2$. Assuming all rainfall captured by the funnel is retained within the collection bottle and no evaporation occurs, the rainfall required to fill a 5 L bottle is calculated as follows:

$$\text{Rainfall depth} = \frac{\text{Bottle volume}}{\text{Funnel area}}$$

$$= \frac{0.005 \text{ m}^3}{0.01767 \text{ m}^2} = 0.283 \text{ m}$$

$$\text{Overflow threshold} = 283 \text{ mm}$$

This overflow threshold assumes that all rainfall intercepted by the funnel is retained in the collection bottle and does not account for evaporation or other losses. Consequently, the assessment represents a conservative estimate of overflow potential.

Figure 5.8 presents the monthly rainfall recorded at the three meteorological stations between July 2021 and June 2026 together with the calculated overflow threshold. Review of the historical record identified 26 individual station-month exceedances of the 283 mm threshold from a total of 180 station-month observations. This represents approximately 14% of all observations and indicates that monthly rainfall with the potential of filling a 5 L DDG bottle is not likely, but nor is it uncommon within the high-rainfall environment of western Tasmania.

It should be noted that no overflow events were recorded following upgrade to 5 L bottles during this assessment period. This demonstrates that the DDG network upgrade has improved the resilience of the deposited dust monitoring program under high rainfall conditions and is expected to improve long-term data completeness during future wet seasons.

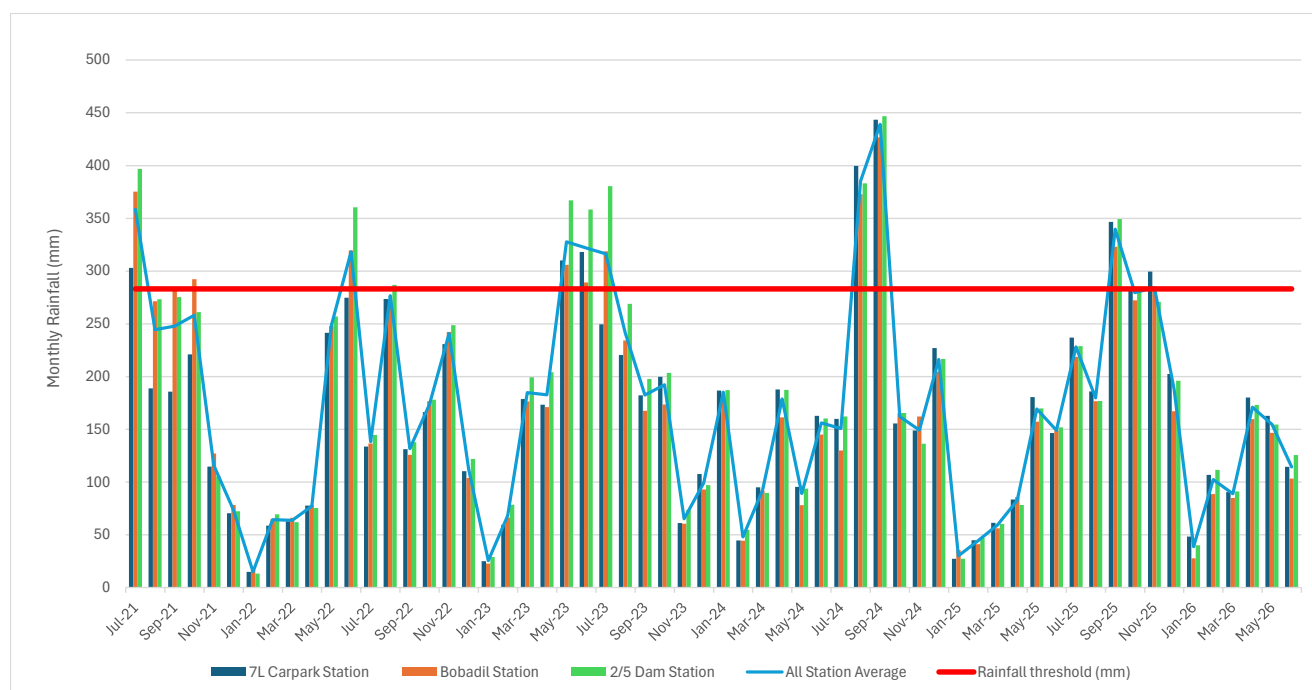


Figure 5.8 Monthly rainfall (mm) by location

While the risk of a DDG overflow is still possible, the meteorological conditions responsible for these events are also the conditions that minimise the risk of fugitive dust emissions and off-site dust impacts. Elevated rainfall increases surface moisture content across exposed ground, roads, stockpiles and operational areas, resulting in increased particle cohesion and reduced entrainment of dust by wind or vehicle movements. Rainfall also promotes atmospheric scavenging through wet deposition processes, reducing airborne particulate concentrations and limiting transport distances from emission sources.

Accordingly, the periods most likely to generate DDG overflow are also periods associated with the lowest potential for dust generation, dispersion and deposition impacts at sensitive receptors. From an environmental risk perspective, months exceeding the 283 mm overflow threshold are therefore considered unlikely to coincide with periods of elevated dust nuisance or compliance risk.

5.4 Calibration and maintenance checks

Routine maintenance and calibration checks on all monitoring equipment are conducted to ensure data quality. These measures include:

Data and reporting

- Weekly verification quality checks of the DDG, HVAS and DustTrak data.
- Weekly analysis of the data trends to identify outliers and any inconsistent or incorrect results.
- Analysis of laboratory duplicates.
- Monthly dust reports as required by EPN 7153/3 A5-2 and PCE 11514 A8-2.

HVAS

- External calibration by NATA Accredited Laboratory (Ecotech).
- Routine sample flowrate checks by MMG staff.
- Routine instrument condition checks (orifice plate, filter seals) by MMG staff.

DustTrak

- Routine flowrate checks by MMG staff.
- Sample inlet cleaning
- Water catch pot inspection and cleaning
- External servicing and calibrations by TSI Kenelec and EPA Tasmania Air Division

5.5 Field blanks

Field and trip blanks are collected at regular intervals to undergo laboratory analysis along with submitted samples for quality assurance purposes. Table 5.13 presents the criteria for change in mass for TSP and PM₁₀ field blanks.

Table 5.13 Blank filter criteria

HVAS	Filter type	Laboratory blanks (mg)	Field blanks (mg)
TSP/ PM ₁₀	Quartz or glass	±5	±8

The HVAS filter blanks are collected on a frequency of 1 in 20 samples corresponding to every second sampling event.. Gravimetric analysis for the reporting period 1 July 2025 to 30 June 2026 reported compliance with criteria for all field blanks collected.

Deposited dust samples include a Trip Blank prepared by the analytical laboratory for each monthly sampling event.

6 Assessment of dust management performance

6.1 Summary of inspection and mitigation levels

Review of the air quality monitoring data collected during FY25/26 indicates that the dust management measures implemented at MMG Rosebery Mine continue to be effective in managing fugitive dust emissions from site operations. A single exceedance of the 60-minute DustTrak inspection level was recorded at the Baillieu Street monitoring station; however, no mitigation-level exceedances were recorded. The monitoring results indicate that dust emissions were well managed during the reporting period.

One community complaint relating to alleged visible dust emissions was received during the reporting period 1 July 2025 to 30 June 2026 (Table 6.1). MMG investigated the complaint using meteorological data, air quality monitoring results, operational records including site observations. Based on the available evidence, no material off-site dust impacts were identified. MMG also received community feedback regarding the location of a proposed dust deposition gauge. This related to monitoring equipment placement rather than air quality impacts.

Table 6.1 Community complaints received during the reporting period

Category	Date Received	Details
Community Feedback	12/09/2025	A concern raised by a resident regarding the proposed location of a dust deposition gauge associated with the dust monitoring network upgrade. The concern related to monitoring equipment placement rather than dust emissions or air quality impacts.
Air Quality	28/02/2026	A complaint was received via EPA Tasmania regarding alleged visible dust emissions observed from the Hospital Roadside of the mine site. MMG undertook an investigation and did not identify evidence of material off-site dust impacts associated with the reported event.

6.2 Recommendations for Future Dust Management

Based on the monitoring results and assessment undertaken for the reporting period, no changes to the current dust management framework are recommended. MMG should continue implementing the existing dust management, monitoring and mitigation measures, including proactive dust suppression during dry and windy conditions. Consistent with previous recommendations, the Dust Mitigation Management Plan inspection and mitigation trigger levels should be reviewed in 2027 to confirm they remain appropriate and effective in supporting the ongoing management of fugitive dust emissions from site operations.

7 Summary and conclusions

7.1 Compliance Limits

Table 7.1 and Table 7.2 presents the maximum measured levels of TSP, PM₁₀, metals and deposited dust across all air quality monitoring stations and Baillieu Street AQMS respectively during the reporting period 1 July 2025 to 30 June 2026 compared with the respective compliance levels.

Table 7.1 Maximum measured concentration at any air quality station – July 2025 to June 2026

Parameter	Units	Averaging period	Maximum measured level	Compliance level	Exceedances
TSP	(µg/m ³)	annual	29 (AD2.1)	90	Nil
PM ₁₀	(µg/m ³)	24-hour	54 (Alec Street)	150	Nil
Lead	(µg/m ³)	90-day	0.12 (AD3)	1.5	Nil
Dust deposition	g/m ² /month	Annual	1.2 (AD21)	4	Nil
Dust deposition (above background)	g/m ² /month	Annual	0.89 (AD21)	2	Nil

Table 7.2 Maximum measured concentration at Baillieu Street – July 2025 to June 2026

Parameter	Units	Averaging period	Maximum measured level	Compliance level	Exceedances
TSP	(µg/m ³)	annual	14	90	Nil
PM ₁₀	(µg/m ³)	24-hour	33	50	Nil
	(µg/m ³)	annual	10	25	Nil
Arsenic ¹	(µg/m ³)	annual	0.00055	0.015	Nil
Cadmium ¹	(µg/m ³)	24-hour	0.0014	0.03	Nil
	(µg/m ³)	annual	0.00019	0.005	Nil
Copper ¹	(µg/m ³)	24-hour	0.011	1	Nil
Lead	(µg/m ³)	90-day	0.011	1.5	Nil
Manganese ¹	(µg/m ³)	24-hour	0.017	0.3	Nil
		annual	0.0041	0.15	Nil
Zinc ¹	(µg/m ³)	24-hour	0.069	50	Nil
	(µg/m ³)	annual	0.018	2	Nil

Notes:

(1) Compliance levels and maximum measured value applies to only Baillieu Street.

There were no exceedances of the Compliance Limits for any parameter at any locations during the reporting period 1 July 2025 to 30 June 2026.

7.2 Trigger levels

Table 7.3 presents the maximum measured levels of TSP, PM₁₀, metals and deposited dust across all air quality monitoring stations during the reporting period 1 July 2025 to 30 June 2026 compared with the respective Trigger Levels.

Table 7.3 Maximum measured concentration at any air quality station – July 2025 to June 2026

Pollutant	Averaging period	Maximum measured value	Trigger level	Trigger level exceedances
TSP	24-hour	100 (AD2.1)	150	Nil
PM ₁₀	24-hour	54 (Alec St)	50	1
Lead	24-hour	1.7 (AD3)	8.7	Nil
Arsenic ¹	24-hour	0.0019 (Baillieu St)	0.03	Nil
Cadmium	24-hour	0.0026 (AD3)	0.003	Nil
Copper ¹	24-hour	0.011 (Baillieu St)	1	Nil
Manganese ¹	24-hour	0.017 ((Baillieu St))	0.3	Nil
Zinc	24-hour	1.1 (AD3)	15	Nil
Dust deposition	1-month	3.2 (AD21)	4	Nil
Dust deposition (above background)	1-month	3.1 (AD21)	2	3

Note:

(1) Applicable to Baillieu Street only

There was one exceedance of the PM₁₀ Trigger Level at Alec Street during September 2025. An investigation found that the co-located TSP sampler had a concentration lower than the PM₁₀ concentration and concluded a possible field or operator handling error had occurred.

There were three exceedances of the monthly dust deposition above background Trigger Level during the reporting period. One exceedance occurred during October 2025 (AD21) and two exceedances during November 2025 (AD4 and AD21).

All other sites and parameters were below their respective Trigger Levels.

7.3 Conclusion

The MMG Rosebery Mine has demonstrated it has met the conditions of its operating licences and permits by:

- No exceedances of Compliance Levels¹
- No exceedances of Trigger Levels for TSP, PM₁₀ and metals²
- No exceedances of Trigger Level for deposited dust due to mine activities³
- Data capture greater than 90%

¹ Except for deposited dust at AD22, subject to investigation recommendations.

² Except for PM₁₀ at Alec Street – possible field handling error.

³ Three exceedances of Trigger Level. MMG investigation concluded the exceedances were not due to mine activities.

- Dust management practices effective at reducing Trigger Level exceedances
- Trigger Levels exceedances investigations and actions conducted in a timely manner.

The review of the FY2025/26 monitoring period suggests MMG Rosebery air quality monitoring network provides a reliable framework for identifying dust risks associated with mining operations and assessing potential impacts at nearby receptors. The network combines compliance-grade HVAS monitoring for TSP, PM₁₀ and metals, deposited dust gauges located on-site, at the site boundary and within the township, and real-time DustTrak monitoring for operational response. This combination provides long-term compliance assessment and early detection of elevated dust events, while allowing comparison between operational, community and background locations to distinguish mine-related impacts from regional sources.

During FY2025/26, the network successfully identified and supported investigation of elevated particulate and dust deposition events, including anomalous monitoring results, deposited dust trigger exceedances and a bushfire smoke event. Investigations incorporated monitoring data, meteorology, operational records and spatial comparisons across the network, demonstrating the monitoring program's ability to identify potential issues and determine likely causes.

Monitoring results indicate that MMG's dust management measures remain effective in controlling fugitive dust emissions and protecting nearby sensitive receivers. The combination of proactive dust suppression, real-time monitoring, trigger-based response procedures and consideration of meteorological conditions provides a management framework that assists in early intervention to avoid or minimise off-site impacts occur. The absence of substantiated dust impacts associated with the single community complaint received during the reporting period further supports the effectiveness of the current dust control strategy.

7.4 Recommendations

7.4.1 DDGs

MMG currently does not analyse DDG that have over flowed due to high rainfall. Australian Standard AS3580.10.1 only excludes soluble solids due to gauge overflow. WSP recommends that MMG investigate the potential for including TIM when gauges overflow. Alternatively, DDG could be collected at an increased frequency during months with high rainfall and combine analysis results.

Historical dust deposition monitoring data suggests the current DDG network may not adequately represent true background conditions. The BG3 monitoring site, designated as the network background location, has routinely recorded deposited dust levels comparable to, and in some instances greater than, community monitoring locations. WSP understands EPA Tasmania's review of historical monitoring data identified that BG3 exhibited a higher mean monthly deposition rate than monitoring locations, including the Alec Street and 2/5 Dam monitoring areas. A potential explanation was the influence of wind-blown dust originating from the nearby Renison mining operation. The observation that the designated background site may be influenced by external mining-related sources introduces uncertainty into the suitability of the broader deposited dust monitoring network locations and purpose. This is explored further in Section 7.4.2.

7.4.2 Network review

WSP has considered the historical monitoring program documentation, licence and approval documents, and the current monitoring network layout, and believes the monitoring network would benefit from a holistic review to ensure monitoring objectives, monitoring locations and station purposes remain aligned with current site operations and the surrounding community setting. While the network has evolved in response to operational changes and regulatory requirements, there appears to be some ambiguity regarding the classification and function of several monitoring locations. WSP suggests particular focus be directed to AD3 and AD25, including whether they are most appropriately classified as on-site, off-site or boundary monitoring locations and, in addition to their classification, whether alternative locations could provide greater value in meeting the objectives of the monitoring program.

AD3 is considered appropriately located to represent an off-site receptor location. Historical documentation identifies AD3 (Beech Drive) as a key monitoring location within the Rosebery township and one of the principal sites used to assess particulate concentrations and dust deposition at sensitive residential receptors. Although the location is relatively close to mining infrastructure, it is situated adjacent to the rail corridor separating the residential environment from the mine site. WSP understands the location was intentionally selected to assess potential impacts from operations, including the filter plant, on the surrounding community. However, its position between site operations and the rail corridor, with the majority of residential receptors located beyond the rail line, means that the monitor measures dust concentrations before they reach the broader residential area. As a result, the monitor may record concentrations that are conservative relative to actual community exposure and may not be fully representative of dust levels experienced by the wider township.

The role of AD25 is less clearly defined, with the monitoring location exhibiting characteristics of both a boundary monitor and a near-source monitor. Based on the historical descriptions and network mapping, WSP understands AD25 was established to improve understanding of dust movement between mine operations and nearby residential areas. While currently classified as an on-site monitor, its location near the operational interface provides information more consistent with a boundary monitoring function. The location is suitable for identifying dust concentrations leaving operational areas and can provide useful information regarding source-receptor pathways. However, it is less representative of community exposure than other township-based monitoring stations. Accordingly, AD25 may benefit from a review of both its purpose and location to ensure it continues to deliver information that supports the objectives of the broader monitoring network. WSP also notes that its current position is likely to present an ongoing challenge in maintaining adequate sky angle clearance due to the proximity of surrounding vegetation and future tree growth.

From a network design perspective, the current arrangement appears capable of distinguishing between operational emissions and community exposure. However, the historical development of the network suggests monitoring locations have been added incrementally over time in response to specific operational issues, approval requirements and regulatory requests. Consequently, there is value in undertaking a comprehensive review of the monitoring network against current mine layouts, prevailing meteorological conditions, dust source characteristics, sensitive receptor locations and defining monitoring locations as source, boundary or community receptors rather than using 'on-site' and 'off-site' classifications.

Beyond the suitability of monitoring locations, there is an opportunity to improve the distinction between compliance monitoring and operational dust management. WSP considers that compliance assessment goals should remain focused on boundary and community receptor monitoring locations, where air quality criterion, licence limits and trigger levels are intended to protect sensitive receivers and assess potential off-site impacts. DDG and HVAS locations sited beyond the site boundary and near receptors, continue to provide the most meaningful measure of community exposure and environmental performance.

On-site monitoring locations, and boundary locations, serve a fundamentally different purpose to community monitoring stations and should be viewed primarily as operational management tools rather than compliance monitoring locations. Air quality criteria, trigger levels and reporting obligations are intended to assess potential environmental impacts beyond the site boundary at sensitive receptors, where community exposure may occur. In contrast, particulate concentrations measured within the operational footprint are heavily influenced by localised activities, proximity to emission sources and site-specific operating conditions, and therefore are not representative of off-site air quality or community exposure.

While on-site and boundary line DDG and HVAS monitoring may provide some information for understanding emission sources and supporting operational decision-making, WSP does not consider these locations appropriate for assessment against regulatory air quality criteria, compliance limits or trigger levels. Rather, on-site monitoring should be retained by MMG as a management tool to support investigation of dust-generating activities, identification of emerging emission trends and implementation of proactive operational controls, rather than assessment against regulatory compliance criteria or formal reporting of environmental performance.

To improve their operational dust management capability, MMG should consider progressively replacing the existing on-site particulate monitoring network with near-reference real-time particulate monitors (such as E-BAM instruments), at suitable locations with integrated meteorological sensors (primarily wind speed and direction). Unlike the current DustTrak network, the integration of continuous particulate concentrations with synchronised wind speed and wind direction data would enable more effective identification of emission sources and transport pathways in real time.

A suitably distributed network of real-time near-reference monitors would allow development of a source-attribution framework based on local meteorological conditions and particulate responses. This approach would enable identification of probable emission source sectors, assist in distinguishing mine-derived dust from regional or external particulate sources, and support implementation of a site-wide Trigger Action Response Plan (TARP) based on operational trigger levels. Such a system would provide substantially greater value for day-to-day dust management than reliance on monthly deposition data and would facilitate proactive intervention before particulate emissions have the potential to affect boundary or community locations.

8 Limitations

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Appendix H Rosebery Mine Environmental Noise, Ground Vibration and Air Blast Overpressure Annual Monitoring Data Review (Tarkarri, 2026)

MMG Limited

Rosebery mine

Environmental noise, ground vibration
and air blast overpressure annual
monitoring data review
2025-2026



Report No. 7183_AC/VIB_R

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September 2026

Tarkarri
Engineering

Air Quality • Acoustics • Environment • Vibration





DOCUMENT CONTROL

MMG LIMITED ROSEBERY MINE ENVIRONMENTAL NOISE, GROUND VIBRATION AND AIR BLAST OVERPRESSURE ANNUAL MONITORING DATA REVIEW 2025-2026

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1	0	Project/Client File
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Keywords		
dB A – Decibels A-weighted. A-weighting – Weighting of the audible frequencies reflective of the response of the human ear to noise. L_{Aeq,T} – Equivalent continuous A-weighted sound pressure level over a given time (T). L_{A90,T} – A-weighted sound pressure level exceeded for 90 % of a given time period (T), typically known as the background. L_{A10,T} – A-weighted sound pressure level exceeded for 10 % of a given time period (T). GV – Ground vibration as peak particle velocity in mm/s ABO – Air blast overpressure as dB Lin. Peak.		



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References

- [1] Environment Division, Department of Environment, Parks, Heritage and the Arts (July 2008) Noise Measurement Procedures Manual, 2nd Edition.
- [2] 7067_ACVIB_R_MMG - Rosebery mine environmental noise, ground vibration and air blast overpressure annual monitoring data review 2024-2025.
- [3] 5955_AC_R_MMG - Rosebery mine environmental noise survey 2024.



Executive Summary

Tarkarri Engineering was commissioned to conduct an annual review of noise, ground vibration and air blast overpressure data collected over the 2025-26 financial year at MMG's Rosebery mine.

Average L_{Aeq} , L_{A90} and L_{A10} 10/15-minute levels at monitoring locations N2, N3 and N4 that were similar to those measured in the previous year^[2]. Reductions of approximately 2–3 dBA were observed at N1 and N5. Evening levels at Mt Black continued to be higher than levels prior to last years review.

Ground vibration levels recorded during blasting times at the mine were below the allowable limits. Air blast overpressure levels were monitored at two locations, with the new 7L location approved by the EPA from September 2025. ABO levels exceeded the lower EPN ABO limit fewer than the allowable 5% at both locations. No exceedances, due to MMG operations, of the upper EPN limit of 120 dBL were detected.

No breaches were monitored during blasting works at the new 3L portal.



1 Introduction

MMG Rosebery commissioned Tarkarri Engineering to undertake an annual review of continuous environmental noise monitoring, and ground vibration (GV) and air blast overpressure (ABO) monitoring of blasting activities at their Rosebery mine. The review is a requirement under MMG Rosebery's Environmental Protection Notice (EPN) 7153/3, condition G7.

The relevant sections of the EPN regarding the annual review and environmental noise, GV and ABO conditions are:

G7 Annual Monitoring Review and Management Report

- 1 Unless otherwise specified in writing by the Director, an Annual Monitoring Review and Management Report, covering a 12 month review period from 1 July of the preceding year to 30 June of the following year, must be submitted to the Director by 30 November 2011 and every subsequent year by September 30 thereafter. The Annual Monitoring Review and Management Report must be made publicly available by the person responsible for the activity.
- 2 The Annual Monitoring Review and Management Report must be compiled for the activity using the ISO 14001 Environmental Management System (EMS) Framework to demonstrate continual improvement and compliance with legal requirements (including this Notice) and must include, but not be limited to:
 - 2.6 a review of the monitoring requirements contained within Attachment 2 of this Notice for the review period, including a detailed comparative review of monitoring locations, including discharge and ambient monitoring points that illustrate significant trends. Include a review of the accuracy of the sampling procedures, sampling schedule, sample locations and test methods applied;

Noise Control

N1 Continuous Noise Monitoring

- 1 Unless otherwise approved in writing by the Director:
 - 1.1 noise emissions from the activity must be monitored applying the MMG Rosebery Mine continuous monitoring program at the locations specified in Table 13 of Attachment 2 and locations shown on Attachment 7, based on equivalent continuous (Leq) and L10 and L90 A-weighted sound pressure levels measured over a period of 15 minutes or an alternative time interval specified by the Director;
 - 1.2 noise level measurements must be taken in the presence of ambient noise normally existent in the area;
 - 1.3 measured noise levels are to be adjusted for tonality and impulsiveness in accordance with the *Tasmanian Noise Measurement Procedures Manual 2004*, or any future revision of this manual, issued by the Director;
 - 1.4 all methods of measurement must be in accordance with the *Tasmanian Noise Measurement Procedures Manual 2004*;
 - 1.5 noise from the activity must not cause an environmental nuisance, at any domestic residence or commercial activity in other ownership;
 - 1.6 an indicator of whether environmental noise nuisance has occurred will be based on the record of any noise complaints received by MMG Rosebery Mine; and
 - 1.7 If a noise complaint is received, the person responsible must:
 - 1.7.1 address the complaint including the use of appropriate dispute resolution if required; or if necessary; and
 - 1.7.2 implement noise abatement measures so that nuisance noise emissions from the activity do not result in ongoing environmental nuisance occurring
 - 1.8 Results of the continuous noise monitoring program and noise related complaints must be reported in the Annual Monitoring Review and Management Report.



Blasting

B1 Blasting Control

Ground vibration due to blasting must not result in environmental nuisance occurring at any domestic residence or commercial activity in other occupation or ownership. Ground vibration management must be controlled by the combination of monitoring, at the location shown on Attachment 7 and for the parameters specified in Table 13 of Attachment 2.

B2 Blasting - noise and vibration limits

- 1 Blasting on The Land must be carried out in accordance with blasting best practice environmental management (BPEM) principles, and must be carried out such that, when measured at the curtilage of any residence (or other noise sensitive premises) in other occupation or ownership, airblast overpressure and ground vibration comply with the following:
 - 1.1 for 95% of blasts, airblast overpressure must not exceed 115dB (Lin Peak);
 - 1.2 airblast overpressure must not exceed 120dB (Lin Peak);
 - 1.3 for 95% of blasts ground vibration must not exceed 5mm/sec peak particle velocity; and
 - 1.4 ground vibration must not exceed 10mm/sec peak particle velocity.
- 2 All measurements of airblast overpressure and peak particle velocity must be carried out in accordance with the methods set down in *Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration*, Australian and New Zealand Environment Council, September 1990.

ATTACHMENT 2 (9 OF 9)

NOISE & VIBRATION MONITORING SCHEDULE

Table 13 Noise and vibration monitoring

Location	Description	Continuous Measurement
N1	Police house	Noise: LAeq, LA10, LA90
N2	Cohen Street	Noise: LAeq, LA10, LA90
N3	Clemons Street	Noise: LAeq, LA10, LA90
V1	Hospital	Peak Particle Vibration: mm/sec

This technical memo presents the results of the annual review for the period 1 July 2025 to 30 June 2026.

2 Site description

The MMG Rosebery mine is located on the lower south-west slope of Mount Black. The township of Rosebery borders the mine's above ground ore processing and train loading facilities to the south, south-west and west. Tailings storage facilities for the mine are located approx. 1.7 km north-west of the Rosebery township and to the south of the township on the southern side of the Murchison Hwy.

The mine produces zinc, lead, copper concentrates and gold dore bars via mechanised underground mining methods and employs crushing, grinding and flotation processes in their above ground processing facility.

Unattended monitoring of environmental noise is conducted at 5 locations across the township of Rosebery with GV and ABO monitored at a single location.

NB: ABO is monitored at two locations, with a new location at the 7L Administration Building roof. From the date of EPA approval on 30th September 2025, 7L roof is considered the



compliance monitoring location for ABO. For the 2025/26 reporting period, both 7L and the Medical Centre ABO will be assessed, allowing a transitional period between both locations and clarifying the suitability of the new 7L ABO measurement location.

Table 2-1 presents spatial information for the environmental noise, GV and ABO monitoring locations. The table also provides location information on the weather stations for the mine that were used to filter environmental noise data. Figure 2-1 and 2-2 provide aerial views showing the monitoring locations with residential zones shaded in yellow.

Table 2-1: Information on environmental noise, GV and ABO and weather monitoring locations.

Environment noise; GV and ABO; and weather monitoring location information		
Number	Location	Coordinates (MGA)
Environmental noise		
N1	Police House	378530, 5373726
N2	Cohen St	377812, 5374410
N3	Mt Black	379195, 5374213
N4	Murchison St	379063, 5374101
N5	Alec St	378988, 5373396
GV and ABO		
V1	Hospital	378827, 5374072
ABO (New EPA approved location as of 30 September 2025)		
V2	7L Admin Roof	378717, 5374176
Weather stations		
W1	Bobadil	376839, 5376290
W2	Overflow Carpark	378748, 5374012
W3	2/5 Dam	378491, 5372628

 EPN 7153/3 monitoring locations.

NB: Positions N4 and N5 are additional monitoring locations not specifically required under EPN 7153/3. They were implemented to monitor truck movements to and from the level 3 waste rock dump (WRD) (truck movements to and from this area seldomly occur as the WRD is no longer used) in the case of position N4 and the construction of the 2/5 Tailings Storage Facility (TSF) (as required under Permit Conditions Environmental no. 9084 (R1)), in the case of position N5.

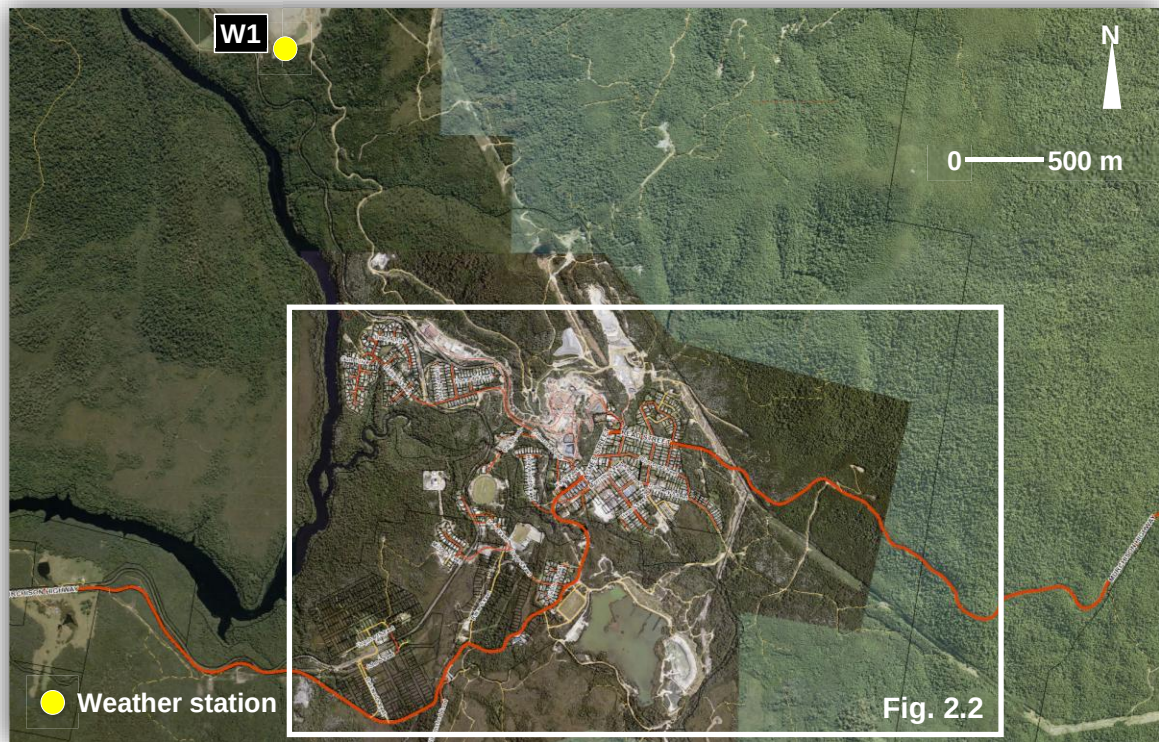


Figure 2-1: Aerial view of Rosebery and surrounds with the location of weather station 1 and the extent of Figure 2.2 marked.



Figure 2-2: Aerial view of Rosebery with environmental noise; GV and ABO; and weather monitoring locations marked.



3 Environmental noise monitoring

Unattended continuous noise monitoring is conducted at 5 locations across the township of Rosebery as shown in Figure 2.2. Acoustic Research Laboratories Ngara Type 1 noise loggers are used to record fast response A-weighted sound pressure levels with 15/10-minute equivalent continuous (L_{eq}), min, max and 8 Ln-statistic levels (including L_{A90} , L_{A10}) extracted during post download data processing.

NB: On 2 February 2026, the data interval was changed from 15-minutes to 10-minutes, following recommendations made by Tarkarri Engineering in previous reviews. Aligning the interval with the 10-minute measured weather data improves temporal consistency and increases the accuracy of the dataset after filtering.

Field calibrations are completed approximately weekly, and factory calibration completed once every 2 years by a National Association of Testing Authorities (NATA) accredited laboratory. All monitored data presented here was from NATA laboratory calibrated loggers (calibration certificates, including field calibrators units, are provided in the appendix of this report).

The 5 environmental noise monitoring stations are in general accordance with requirements of section 4 and section 5.2 of the *Tasmanian Noise Measurement Procedures Manual, 2nd Edition* (July 2008)^[1].

Available 15-minute/10-minute interval data sets for each measurement location were filtered for erroneous data and poor weather conditions (i.e. winds speeds in excess of 5 m/s and precipitation), based on 10-minute weather data recorded at the three weather stations shown in Figures 2.1 and 2.2.

3.1 Data sets

Table 3-1 presents overall data availability as a percentage of the 42,024 possible 15-minute/10-minute intervals available for analysis over the past monitoring year. Available data has subsequently been filtered against adverse weather conditions, measurement overload errors and measurement drift.

Table 3-1: Environmental noise monitoring data set summary.

Environmental noise monitoring data set summary				
Location	Recorded intervals		Intervals post filtering	
	count	%	count	%
Alec St	40,199	95.7	31,133	74.1
Cohen St	41,990	99.9	32,693	77.8
Mt Black	40,997	97.6	31,926	76.0
Murchison St	37,708	89.7	29,154	69.4
Police House	41,923	99.8	32,616	77.6

Data availability was generally greater than 96%, with the exception of Murchison St, which achieved only 90% availability due to several weeks of missing data throughout the review period caused by conversion errors and equipment malfunctions.

After filtering out intervals affected by adverse weather conditions, meter overloads, and data drift, approximately 74–78% of the possible intervals remained available for analysis. Murchison St was again an exception, with only 69% of intervals available due to its lower level of recorded data.



This represents a 4% reduction compared with the 2024–25 report^[2], which can be attributed to a greater proportion of data being excluded because of adverse weather conditions.



3.2 Summary Monitoring results

Table 3-2 provides annual arithmetically averaged L_{Aeq} , L_{A90} and L_{A10} 15-minute/10-Minute levels calculated from the filtered data sets for each measurement location. Levels for the day, evening and night periods are provided with each period defined as follows:

- Day: 0700 to 1800 hrs
- Evening: 1800 to 2200 hrs
- Night: 2200 to 0700 hrs.

Annual average levels from the 2024/2025 year^[2] are also provided for comparative purposes.

Table 3-2: Environmental noise monitoring summary data.

Environmental noise monitoring summary data, average 15/10-minute Ln-statistics (dBA)										
Location	Period	2025/2026			2024/2025			Difference (dB)		
		L_{Aeq}	L_{A90}	L_{A10}	L_{Aeq}	L_{A90}	L_{A10}	L_{Aeq}	L_{A90}	L_{A10}
Police House	Day	51	45	52	52	47	53	-1	-2	-1
	Evening	50	45	51	52	47	53	-2	-2	-2
	Night	48	45	48	49	47	50	-1	-2	-2
Cohen St	Day	52	50	53	52	49	53	0	1	0
	Evening	51	49	51	50	49	51	1	0	0
	Night	50	49	51	50	49	50	0	0	1
Mt Black	Day	43	38	44	43	37	44	0	1	0
	Evening	42	38	43	42	37	43	0	1	0
	Night	38	36	39	38	36	39	0	0	0
Murchison St	Day	46	41	46	47	40	47	-1	1	-1
	Evening	45	40	44	46	40	45	-1	0	-1
	Night	42	40	41	41	39	42	1	1	-1
Alec St	Day	44	38	45	45	39	46	-1	-1	-1
	Evening	40	37	41	43	38	44	-3	-1	-3
	Night	39	36	40	40	37	41	-1	-1	-1

Average annual noise levels were generally within 1 dB of levels seen in the last reporting period^[2]. The exception to this was the Police House with a 2 dB drop across most noise level statistics, while Alec St had a reduction of 3 dB during evening L_{Aeq} and L_{A10} stats.

The following subsections provide graphs of monthly average $L_{Aeq,15min/10min}$ day, evening, and night levels (from filtered data) measured at each of the 5 monitoring locations.



3.2.1 Police House

Figure 3-1 presents monthly average 15/10-minute day, evening, and night L_{Aeq} levels at the Police House monitoring location.

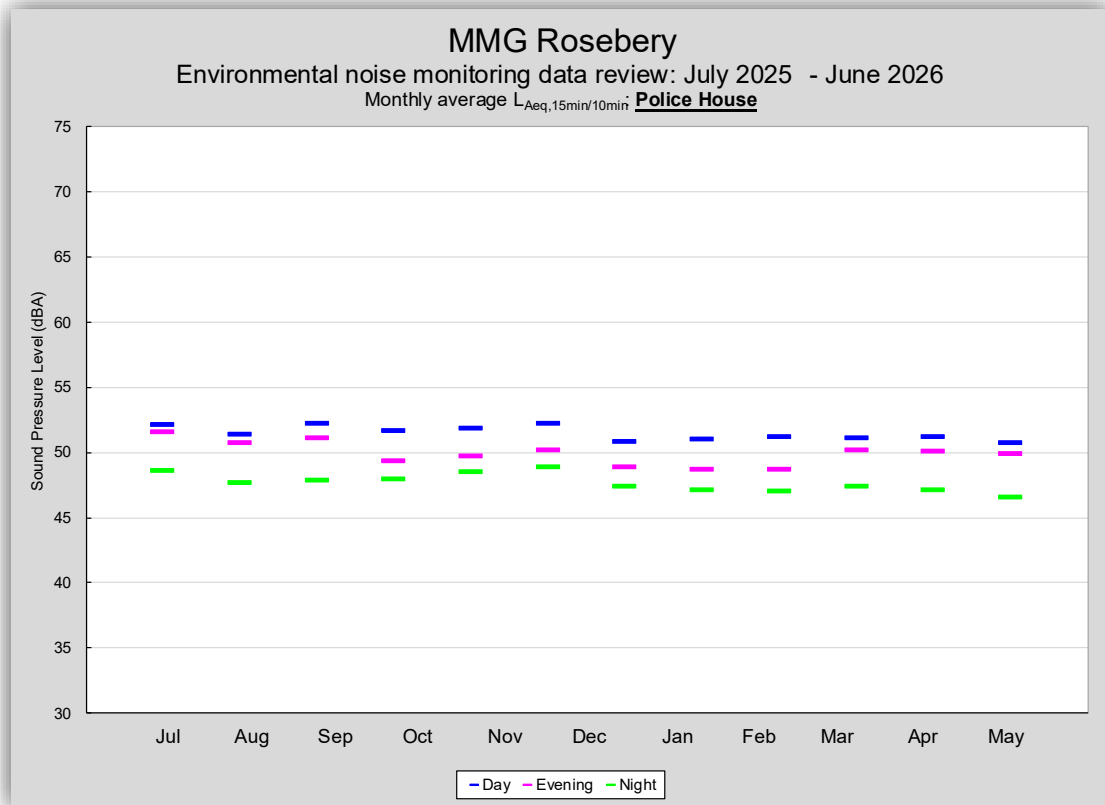


Figure 3-1: Monthly average $L_{Aeq,15min/10min}$ levels for day, evening and night periods, Police House (N1).

Monthly average $L_{Aeq,15min}$ noise levels were relatively stable throughout the year. During most of the year, average levels were between 51 – 52 dBA during the day and 46 – 49 dBA at night suggesting a relatively stable noise environment.

Background noise levels were consistently about 2 dB lower than the previous years reporting period^[2]. This reduction may indicate a decrease in the influence of a consistent noise source within the surrounding area. Overall, noise levels were consistently 1-3 dB less than last years^[2], with the most notable reductions observed during the winter months.



3.2.2 Cohen St

Figure 3-2 presents monthly average 15/10-minute day, evening, and night L_{Aeq} levels at the Cohen St monitoring location.

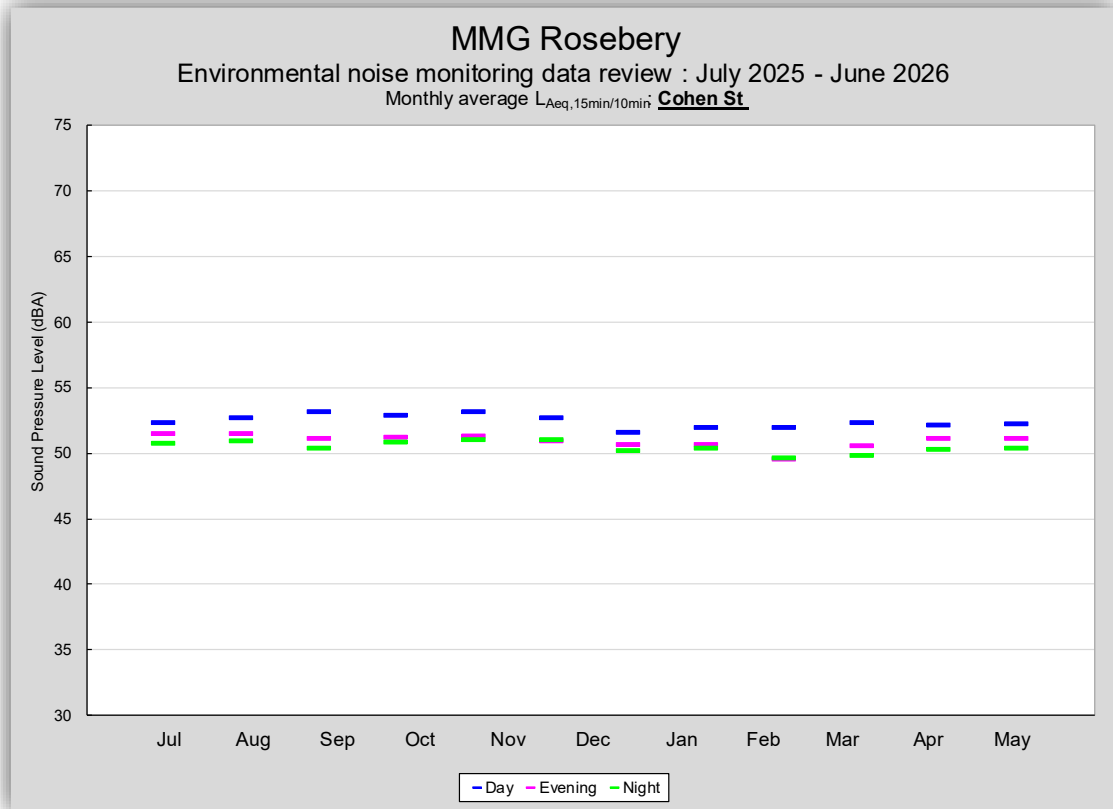


Figure 3-2: Monthly average $L_{Aeq,15min/10min}$ levels for day, evening and night periods, **Cohen St** (N2).

Monthly average L_{Aeq} noise levels remained consistent throughout the reporting period, with average levels typically varying by no more than 3 dBA across monthly and diurnal periods. Measured levels ranged from 53 dBA during the daytime to 49 dBA during the night-time, indicating a relatively stable noise environment.

The monitoring location is situated in close proximity to the MMG filter plant, indicating that noise emissions from the associated fans and pumps are likely to be the dominant contributors to the measured noise environment. The minimal variation in monthly noise levels compared with the previous reporting period^[2] further supports this assessment, indicating that the filter plant remains a consistent contributor to the local noise environment.

This monitoring location is also in close proximity to Position 4 identified in the 2024 Environmental Noise Survey^[3]. Noise sources identified at the MMG filter plant during that survey included pump noise, fan tones and low-frequency (LF) tones.



3.2.3 Mt Black

Figure 3-3 presents monthly average 15/10min-minute day, evening, and night L_{Aeq} levels at the Mt Black monitoring location.

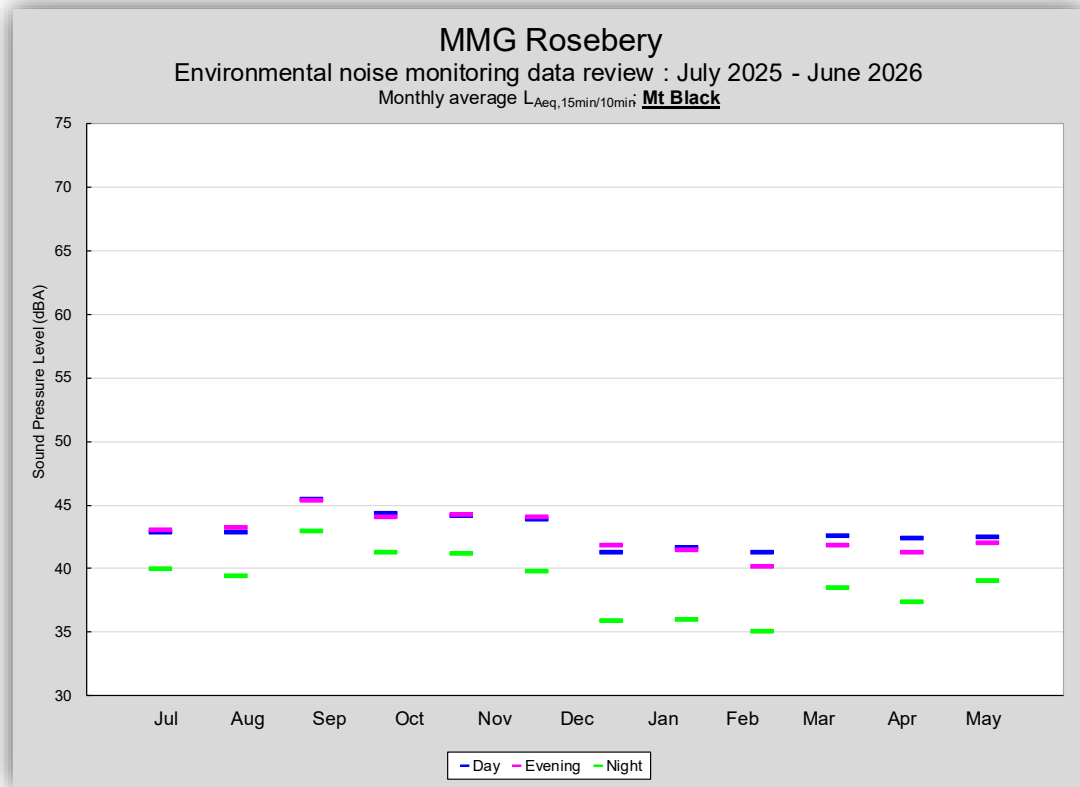


Figure 3-3: Monthly average $L_{Aeq,15/10min}$ levels for day, evening and night periods, **Mt Black** (N3).

Daytime and evening monthly L_{Aeq} levels were similar at this location throughout the year, with daytime levels no more than 2 dBA higher than evening levels and generally 3–4 dB higher than nighttime levels. The trend in nighttime L_{Aeq} levels is almost identical to that observed at Mt Murchison (see Section 3.2.4), suggesting that variations in water flow in Rosebery Creek control nighttime noise levels in the area. Traffic and mine operations are likely to be the main difference between night and day/evening noise levels.

Day levels were generally similar to the 2024-25 review^[2], while evening levels remained higher than those recorded in assessments prior to last year's review. The increases observed during the evening period may be associated with the southern upcast fan, as this is noted as audible around this recording location. Other possible sources may be works involved with the 3L waste rock dump portal, or sources external to MMG.



3.2.4 Murchison St

Figure 3-4 presents monthly average 15/10min-minute day, evening, and night L_{Aeq} levels at the Murchison St monitoring location.

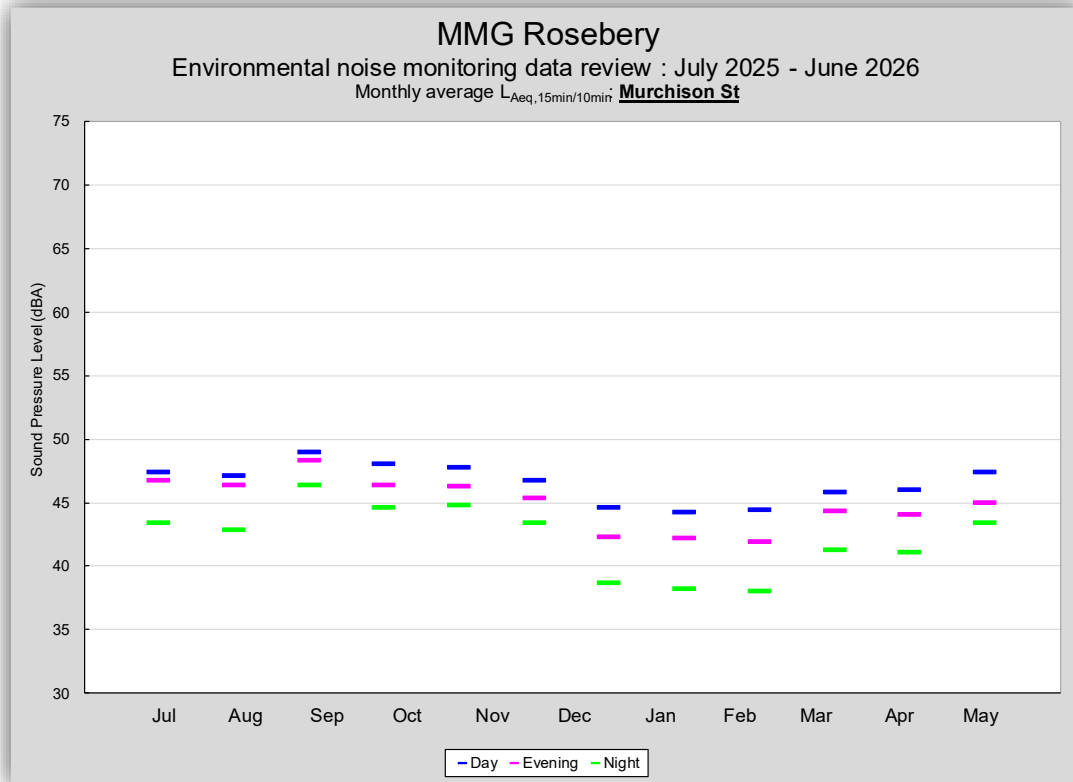


Figure 3-4: Monthly average $L_{Aeq,15min/10min}$ levels for day, evening and night periods, Murchison St (N4).

Noise levels were similar to those recorded during the previous monitoring period^[2]. Seasonal variations in noise levels were also consistent with those recorded at Mt Black, located approximately 170 m northeast of the Murchison Street monitoring station, although levels at this location were generally 2–4 dB higher. Night-time noise levels are considered to be primarily influenced by water flow in Rosebery Creek, while traffic and MMG operations are likely to contribute to noise levels during the daytime and evening periods.



3.2.5 Alec St

Figure 3-5 presents monthly average 15/10-minute day, evening, and night L_{Aeq} levels at the Alec St monitoring location.

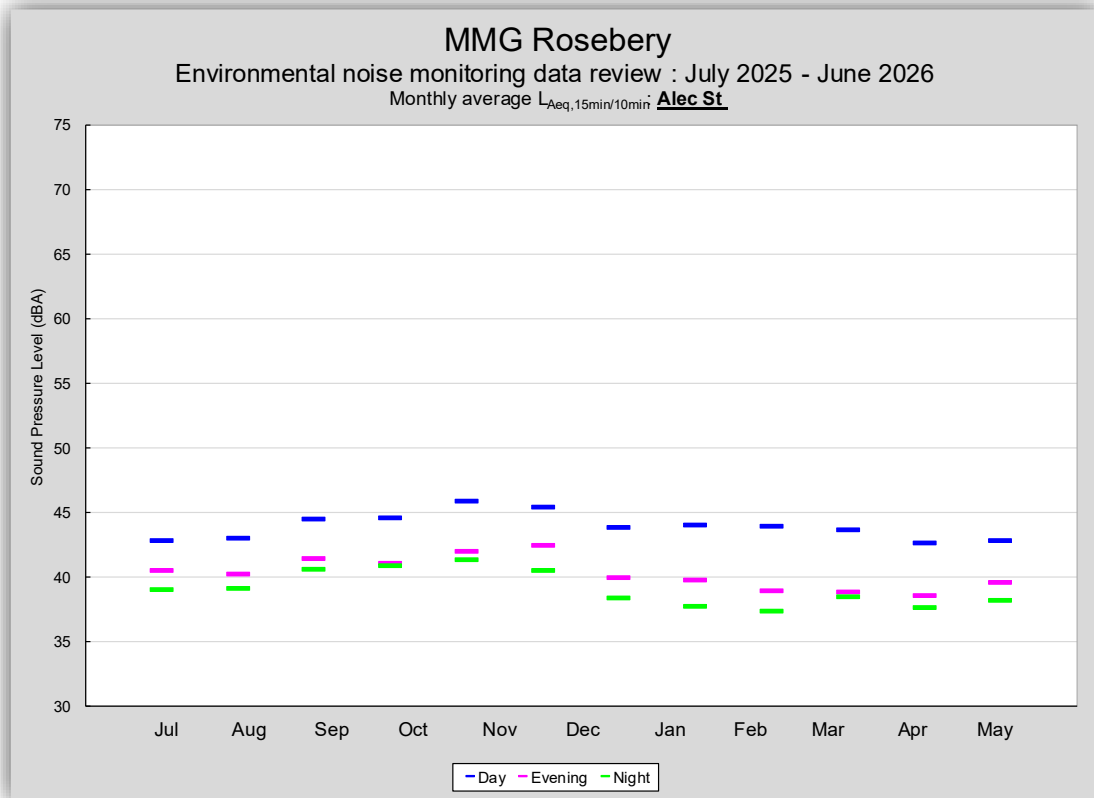


Figure 3-5: Monthly average $L_{Aeq,15min/10min}$ levels for day, evening and night periods, Alec St (N5).

Like previous years^[2], average day L_{Aeq} levels were consistently 2 - 4 dBA higher than evening levels. Elevated noise levels were recorded from September through December compared with other months. Overall noise levels decreased relative to previous years^[2], with evening measurements showing the largest reduction, approx. 3 dB over the reporting period. Both L_{Aeq} and L_{A10} levels were approximately 3 dBA lower, suggesting a reduction in shorter-duration noise events near the measurement location. Reduction in daytime noise levels over the last two years may be due to the completion of stage 2 and subaerial works at 2/5 TSF. Changes in day and evening levels may also be attributed to reductions in lower highway activity.

Variation in night-time noise levels were similar to patterns seen at the Mt Black and Murchison monitoring locations where local creek flow appears to control the night noise environment. This suggests that changes in water flow in the nearby Stitt River is the controlling noise source overnight.



4 Blast Monitoring

GV and ABO is currently going through a transitional period, in which locations have either changed or will be changing within the next reporting year.

Ground vibration (GV) is monitored at a single location on the western side of Rosebery Hospital. Airblast overpressure (ABO) is monitored at two locations: the existing monitoring location at the hospital and the new monitoring location established on the roof of the 7L Administration Building.

Following EPA approval on 30 September 2025, the 7L Administration Building roof has been designated as the compliance monitoring location for ABO. For the 2025/26 reporting period, ABO results from both the 7L roof and the Medical Centre monitoring location have been assessed. This transitional approach provides an opportunity to compare the two monitoring locations and assess the suitability of the 7L roof location for ongoing compliance monitoring.

A new GV monitoring location at 2A Colebrook Street is currently undergoing the EPA approval process. Once the Colebrook site is ready for GV monitoring and approved, equipment will be moved from the Hospital to the new location. GV monitoring will then proceed solely at 2A Colebrook Street

At the Rosebery Hospital, an Instanetl Minimate Pro 4 monitor was used with an International Society of Explosives Engineers (ISEE) standard triaxial geophone and ISEE linear microphone. The 7L Administration Building roof location utilises an Instanetl Minimate Plus monitor with a linear microphone.

1-minute peak particle velocity (mm/s) and peak linear sound pressure levels (dBL) have been recorded and utilised for this reporting period.

Blasting at the mine occurs during 2 time periods on a daily basis as follows:

- 0645 to 0700 hrs
- 1845 to 1900 hrs

Monitoring is undertaken in general accordance with the relevant guidelines including the *Australian and New Zealand Environment Council (ANZECC) Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (September 1990), *Australian Standard AS 2187.2-2006 Explosives storage and use. Use of explosives* and the *Tasmanian Quarry Code of Practice* (May 2017).

The measurement of GV and ABO is in general accordance with the provisions of the Appendix J sections J3.2 and 3.3 of AS 2187.2-2006. Exception to this is the location of the microphone at the Rosebery Hospital, which is close (approx. 5 – 10 cm) to the western wall of the building.

All equipment is calibrated annually by SAROS and all data presented here is within the period of calibration. Using SAROS follows recommendations by Tarkarri Engineering, where previously a NATA accredited laboratory was required under EPN conditions. An EPA exemption for the NATA calibration condition in the EPN was received 30/09/2025.

4.1 Data set

Of the 1-minute data intervals in the monitoring year, 98.3% of data was available for analysis from the Hospital GV and ABO location, while the 7L ABO monitoring location had 93.5%. This is a significant increase from previous surveys^[2].

No significant periods of missing data were noted at the Hospital. The following summarises the significant period of missing data from the July 2025 - June 2026 period:

- Rosebery Hospital (V1):



- 09/08/2026 – 11/08/2026
 - Loss of data due to a failed internal battery during a power outage. This issue has been resolved.
- 7L Admin building (V2):
 - 09/10/2026 – 29/10/2026
 - The unit was away for calibration.

When ABO data was not available at the 7L building, data from the Rosebery Hospital location was utilised for assessment.

4.2 Ground vibration monitoring

Figure 4-1 presents 1-minute peak particle velocity levels measured at the Hospital monitoring location (the highest value of the three orthogonal measurement directions was selected for each interval) during scheduled blast times. Results are assessed against the following limits applicable under EPN 7153/3:

- 5 mm/s for 95 % of blasts
- 10 mm/s for 100 % of blasts

Both limits are marked on the graph (Figure 4-1).

NB: While data was provided for all time intervals during the reporting period, only the data 30 minutes either side of blast times was assessed.

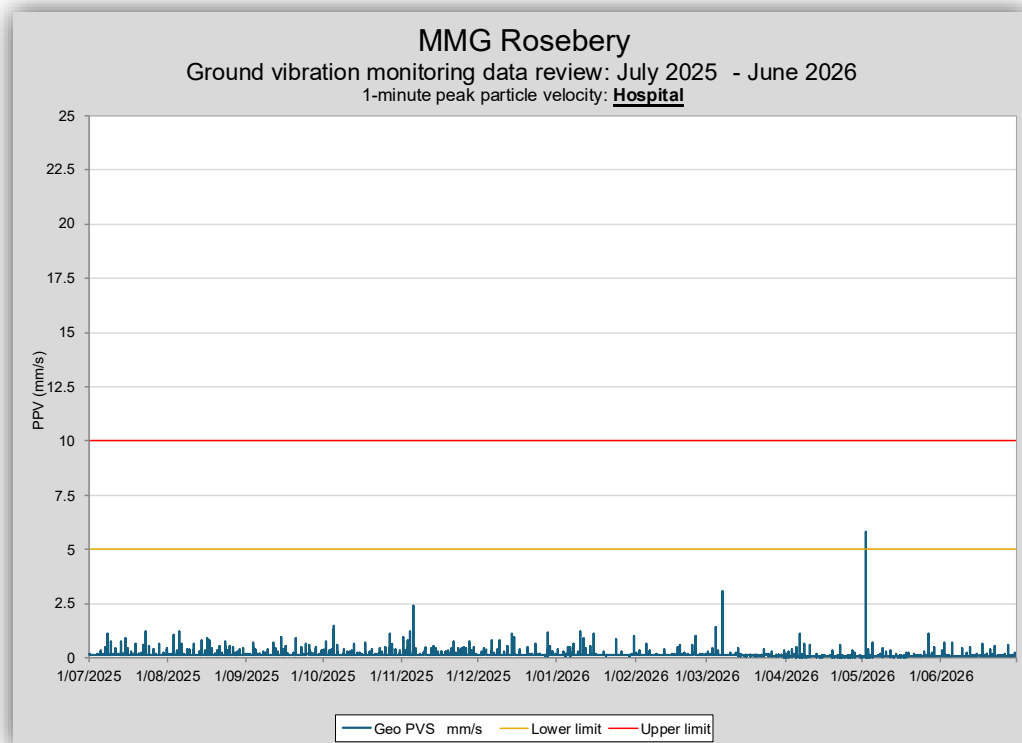


Figure 4-1: 1-minute peak particle velocity levels during scheduled blasting times, Hospital (V1).

From the above, Tarkarri Engineering notes one exceedance of the EPN limit of 5 mm/s occurred during scheduled blasting times.



- The maximum recorded was 5.819 mm/s on 02/05/2026 at 06:47.
 - Blasting was noted at 06:47:34, with which followed a 2.2ML seismic event at 06:47:36.

The exceedance represents **0.13% of the total recorded blasts** during the reporting period. Accordingly, the 5 mm/s ground vibration criterion was achieved for **99.87% of blasts**, demonstrating that the EPN requirement for the 5 mm/s limit to not be exceeded by more than 5% of blasts was met.

4.3 Air blast overpressure monitoring

Figure 4-2 presents 1-minute peak linear sound pressure levels measured at the **Hospital** monitoring location at scheduled blasting times. Figure 4-3 presents 1-minute peak linear sound pressure levels measured at the **7L** monitoring location at scheduled blasting times. Results are assessed against the following limits applicable under EPN 7153/3:

- 115 dBL for 95 % of blasts
- 120 dBL for 100 % of blasts

Both limits are marked on graphs for the Hospital ABO (2) and the 7L ABO (Figure 4-3). Missing data at the 7L location, from 9-29 August 2026 is marked. For assessment purposes, data measured at the Rosebery Hospital from this same time period will be used.

NB: While data was provided for all time intervals during the reporting period, only the data 30 minutes either side of blast times was assessed. All data has been filtered for adverse weather conditions.

NB: Maximum wind speeds of 18m/s and over were filtered out, however Peak wind gusts are higher which may result in exceedances of both the lower and upper ABO limits.

4.3.1 7L Admin Building ABO

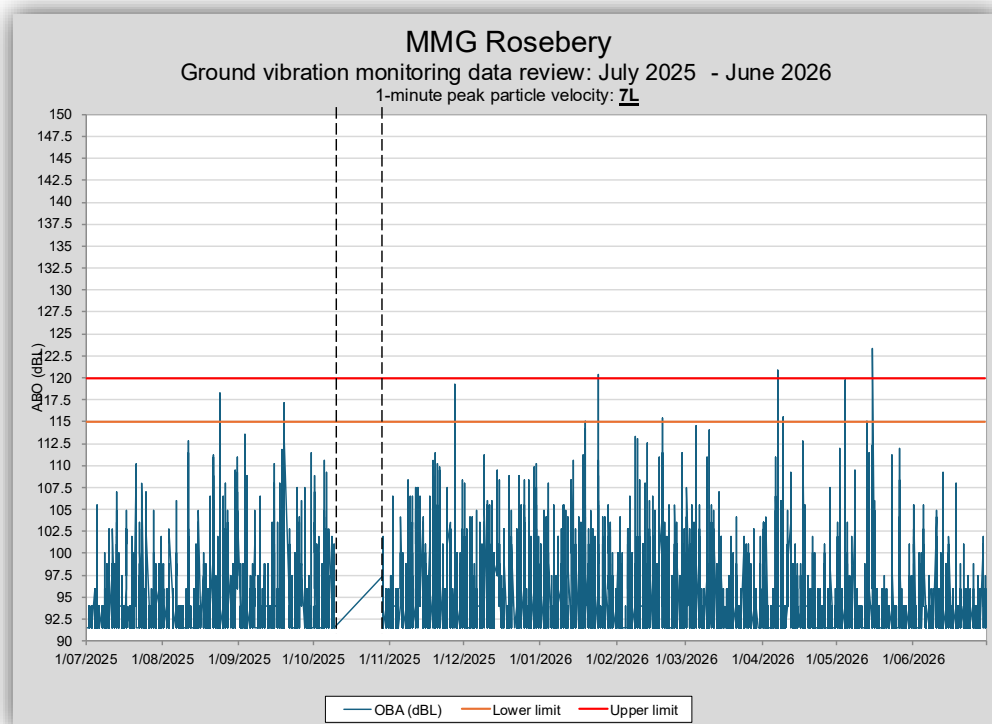




Figure 4-2: 1-minute peak linear sound pressure levels during scheduled blasting times, 7L (V2).

The lower limit (115 dB) was exceeded on 13 separate occasions, or 1.8% of total blasts. This is deemed acceptable as it is well below the allowable 5% of total blasts for the monitoring period (it is also likely that these exceedances were not generated by blasting at the mine but rather generated by sources local to the monitor).

The upper limit (120 dB) was exceeded on the following 3 occasions:

- 15th May 2026 @ 18:54 = **123.4 dB**
- 7th April 2026 @ 07:14 = **120.9 dB**
- 24th January @ 06:51 = **120.4 dB**

The breaches identified above do not correlate with the seismic data or the recorded blast times. Accordingly, sources external to MMG are considered the likely sources of the noise.

The upper limit (120 dB) was **not exceeded**.

4.3.2 Rosebery Hospital ABO

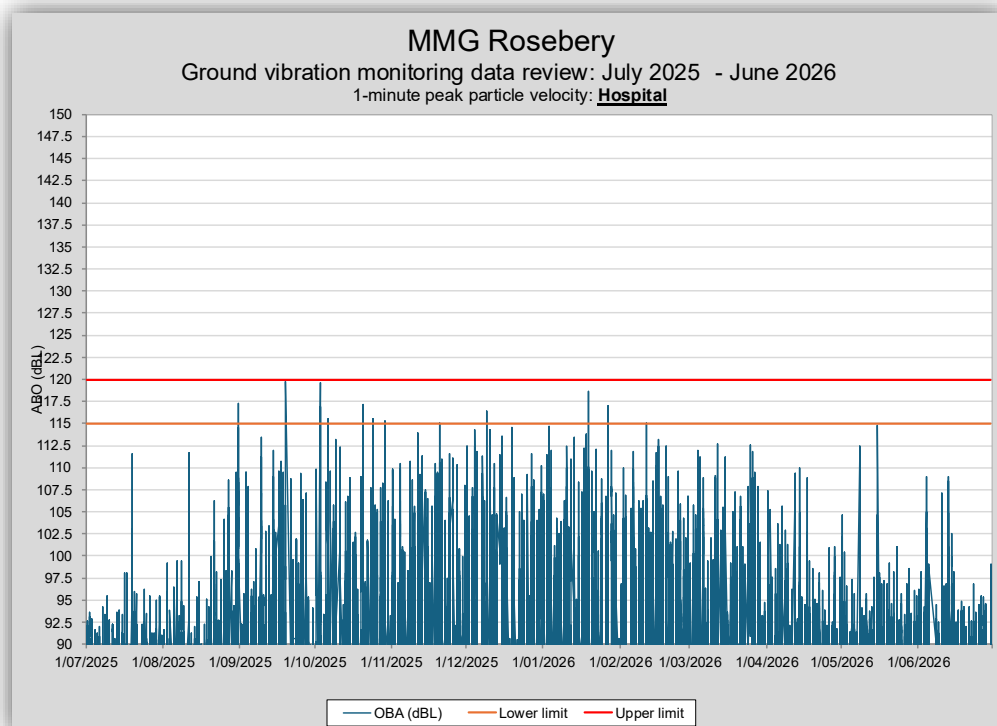


Figure 4-3: 1-minute peak linear sound pressure levels during scheduled blasting times, Hospital (V1).

The lower limit (115 dB) was exceeded on 14 separate occasions, or 1.9% of total blasts. This is deemed acceptable as it is well below the allowable 5% of total blasts for the monitoring period (it is also likely that these exceedances were not generated by blasting at the mine but rather generated by sources local to the monitor).

The upper limit (120 dB) was **not exceeded**.



4.4 3L Waste Rock Dump Portal

A new portal at the 3L waste rock dump is being developed at the MMG Rosebery Mine. Firing times for blasting are separate to the normal blasting times for the mine. Table 4-1 below shows no breaches were monitored during blasting times of the 3L waste rock dump portal. Both the Hospital (V1) and 7L (V2) ABO locations are presented.

Table 4-1: 3L Waste Rock Dump Portal blast data.

3L Waste Rock Dump Portal blast data				
Blast	Date/Time	ABO (dBL)		GV (mm/s)
		Hospital (V1)	7L (V2)	Hospital (V1)
Firing 1	25/04/2026 14:15	106.60	106.00	0.04
Firing 2	27/04/2026 16:30	108.60	100.00	0.10
Firing 3	30/04/2026 14:29	110.40	107.00	0.07
Firing 4	2/05/2026 12:46	106.80	101.00	0.13
Firing 5	3/05/2026 16:11	104.20	101.00	0.19
Firing 6	4/05/2026 15:45	105.60	101.00	0.16
Firing 7	8/05/2026 15:29	108.90	101.90	0.12
Firing 8	10/05/2026 9:20	115.10	107.50	0.18
Firing 9	11/05/2026 8:16	112.00	102.80	0.14
Firing 10	13/05/2026 8:30	104.30	100.00	0.22
Firing 11	14/05/2026 12:33	102.30	101.00	0.11
Firing 12	15/05/2026 14:50	106.10	102.80	0.08
Firing 13	16/05/2026 12:59	115.10	106.50	0.10
Firing 14	17/05/2026 15:39	110.50	101.00	0.14
Firing 15	19/05/2026 9:44	114.00	105.50	0.17
Firing 16	20/05/2026 16:39	115.90	105.50	0.17
Firing 17	22/05/2026 8:53	111.90	103.50	0.12
Firing 18	23/05/2026 16:13	110.80	101.90	0.14
Firing 19	25/05/2026 8:49	114.40	104.20	0.12
Firing 20	26/05/2026 8:15	109.30	101.90	0.11
Firing 21	27/05/2026 8:49	108.30	101.00	0.11
Firing 22	28/05/2026 8:56	110.60	101.90	0.13
Firing 23	29/05/2026 15:02	106.60	101.00	0.09
Firing 24	30/05/2026 14:42	103.30	97.50	0.11
Firing 25	31/05/2026 14:17	110.30	106.50	0.13
Firing 26	05/06/2026 11:05	105.40	100.00	0.10
Firing 27	06/06/2026 06:55	-	107.00	-
Firing 28	07/06/2026 12:56	112.20	104.20	0.06
Firing 29	07/06/2026 15:08	-	103.50	-
Firing 30	09/06/2026 02:22	109.10	106.00	0.19
Firing 31	10/06/2026 08:58	101.90	98.80	0.09
Firing 32	25/06/2026 20:39	114.10	106.50	0.10
Firing 33	27/06/2026 17:23	108.80	101.00	0.10



Firing 34	28/06/2026 18:28	108.10	101.90	0.09
Firing 35	29/06/2026 17:43	117.40	110.90	0.09

5 Community noise and vibration nuisance

MMG Rosebery received two complaints in relation to noise emanating from mining activity. Both complaints were promptly investigated, and engagement with complainant's continued until all complaints were resolved. All community complaints and associated investigations are recorded and tracked within MMG's stakeholder management software, Borealis.

One complaint, involving the same event, in relation to vibration was also received.

Table 5-1: Community noise and vibration nuisance events.

Community noise and vibration nuisance events			
Date	Complaint	Investigation	Corrective Action
11/07/2025	Noise complaint from Rosebery resident. Use of vibrating roller at dam causing excessive noise and vibration at 02:43. Resident was not notified of works.	Road maintenance on the dam wall was being conducted on the same day with a grader and roller.	EPA advised that as it is part of normal operations, works completed by 5pm would be preferred. Any heavy vehicle works planned for the 2/5 dam are to be communicated to the complainant going forward.
31/07/2025	Noise complaint from Rosebery resident. Use of engine breaks by Gradco trucks at 2/5 dam.	EPA called to notify MMG of a complaint regarding Gradco trucks leaving the 2/5 dam using their engine breaks when not loaded.	Drivers asked to limit engine break use if not required when leaving 2/5.

6 Conclusions

Tarkarri Engineering has conducted a review of environmental noise, GV and ABO monitoring data recorded by MMG Rosebery between 1 July 2025 and 30 June 2026.

The environmental noise monitoring data generally showed annual average L_{Aeq} , L_{A90} and L_{A10} 10/15-minute levels at monitoring locations N2, N3 and N4 that were similar to those measured in the previous year^[2]. Reductions of approximately 2–3 dBA were observed at N1 and N5. These reductions may be attributable to changes in noise emissions from the MMG facility and local sources, including traffic.

GV data showed that levels recorded during blasting times at the mine were below the EPN limits. The maximum recorded level was 5.819mm/s, with the single exceedance representing 0.13% of total recorded blasts.

ABO was monitored at two locations, with the previously used Hospital (V1) location being assessed against the new 7L (V2) to ensure the new 7L locations' suitability. Measured ABO levels during blast times did not always align with each other, however inconsistencies may be due to the microphone of the Hospital unit being too close to the facade of the building.

Upon review, the new 7L location is considered more suitable for ABO monitoring. Its roof-mounted position reduces the potential influence of nearby external noise sources. As noted previously, the Hospital location was positioned too close to the building façade, which may have resulted in increased measured noise levels in the absence of appropriate corrections.



ABO levels exceeded the lower EPN ABO limit at both monitoring locations for less than the allowable 5% of monitoring periods. Exceedances of the EPN limit of 120 dB were detected; however, comparison with seismic data and recorded blast times indicated that these exceedances did not correlate with MMG blasting activities and were therefore considered likely to have originated from sources external to MMG operations.

No breaches were recorded during blasting works at the new 3L portal.

7 Recommendations

7.1 Noise monitoring

Tarkarri Engineering notes that condition N1 1.3 states ‘measured noise levels are to be adjusted for tonality and impulsiveness in accordance with the Tasmanian Noise Measurement Procedures Manual 2004, or future revisions of this manual, issued by the Director’. For tonality to be addressed as required an ‘... A-weighted ... one-third octave spectrum must be measured’^[1], and for impulsiveness to be addressed as required measurements ‘...using a sound level meter set initially to fast and then impulse time response’^[1] must be taken. The current monitoring systems employed by MMG do not have the capability of measuring a 1/3-octave band spectrum or recording concurrent impulse time response noise levels.

NB: Tarkarri Engineering notes that without observation or directional noise measurement it would not be possible to determine the source of any tonal or impulsive noise emissions with any accuracy.

Loss of data and inconsistencies within the monitoring records were generally consistent with those observed during the previous monitoring year^[2]. Murchison St was an exception, with several weeks of missing data recorded during the monitoring period.

The data download and calibration procedures used by MMG for the noise monitoring stations should be reviewed regularly, with refresher training for personnel considered where appropriate to minimise data loss and inconsistencies.

The following reminders are provided based on issues identified in previous years:

- Ensure data remains on the sound level meter until it has been successfully transferred to MMG’s data repository and reviewed.
- Take care when handling microphones at each monitoring station, as they are delicate and can be easily damaged during calibration.
- Ensure the field calibrator is activated and operating correctly before commencing calibration, and take care during the calibration process.
- Check all connection points, including cable connections to the pre-amplifier and sound level meter, to ensure there is no water ingress, corrosion or other damage.

To investigate the increases at the Mt Black recording station, the following is recommended:

- Co-locate a meter to record noise files during the evening period. This will allow personnel to listen back to recordings; thus helping to determine the cause in increased noise levels.
- Assess evening data in the first quarter of the recording year to see if the trend of increased evening noise levels continues.
- If increased evening levels persist, conduct an environmental noise assessment focused around the Mt Black position, in particular during evening periods of normal MMG operations.



The implementation of these recommendations, in regards to Mt Black, will help to clarify the cause of evening increases, gathering a greater understanding of the noise environment external to the mine.

7.2 GV and ABO monitoring

The 7 Level roof location is considered suitable for ABO monitoring. Accordingly, monitoring at the Hospital location should cease, with data from the new EPA-approved monitoring location on the roof of the 7 Level Administration Building used for future compliance reviews. A new GV monitoring location at 2A Colebrook Street has also received EPA approval. MMG is currently awaiting installation of the supporting infrastructure required to establish the new monitoring location. Once established, the 2A Colebrook Street location will become the proposed compliance monitoring location for GV. Following installation, a transitional monitoring period is recommended, consistent with the approach adopted for the ABO monitoring location. During this period, GV measurements from both the existing and new monitoring locations should be assessed concurrently to facilitate comparison of the results and confirm the suitability of the new 2A Colebrook Street location for ongoing compliance monitoring.

To facilitate the transition, a rental monitoring unit should be acquired during the 2026–2027 review period. If the new monitoring location is established prior to the end of 2026, sufficient comparative data may be available to confirm its suitability for ongoing compliance monitoring during the next review.

It is recommended that monitoring be limited to blasting periods where practicable, reducing the amount of unnecessary data requiring processing and review. To minimise the risk of extended periods of missing data, the internal battery should be regularly checked to ensure sufficient capacity is available to maintain monitoring during power outages or other interruptions to the primary power supply.

Continued monitoring and ongoing assessment of the 3L portal blasting works is recommended. ABO and GV levels should continue to be noted during blast times with any breaches requiring further assessment.



8 Appendix

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Sound Calibrator
IEC 60942:2017
Calibration Certificate

Calibration Number **C24712**

Client Details

MMG
6 Hospital Road
Rosebury TAS, 7470

Equipment Tested/ Model Number :

Pulsar Model 105

Instrument Serial Number :

63709

Atmospheric Conditions

Ambient Temperature : 23.5 °C
Relative Humidity : 43.5 %
Barometric Pressure : 101 kPa

Calibration Technician : Peter Elters
Calibration Date : 24 Sep 2024

Secondary Check: Cooper Sallway
Report Issue Date : 26 Sep 2024

Approved Signatory :


Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
	94	1000	94.34	1000.30
	94	1000	93.99	1000.40

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	±0.10 dB	Temperature	±0.1 °C
Frequency	±0.07 %	Relative Humidity	±1.9 %
Distortion	±0.20 %	Barometric Pressure	±0.11 kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

**NATA**
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Sound Level Meter
IEC 61672-3:2013
Calibration Certificate

Calibration Number C24781

Client Details MMG - ROSEBERY MINE
6 Hospital Road
Rosebery TAS 7470

Equipment Tested/ Model Number : Ngara
Instrument Serial Number : 8780FE
Microphone Serial Number : 319691
Pre-amplifier Serial Number : 28099
Firmware Version : V12.6

Pre-Test Atmospheric Conditions
Ambient Temperature : 22.2 °C
Relative Humidity : 52.9 %
Barometric Pressure : 100.01 kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 23.5 °C
Relative Humidity : 50.3 %
Barometric Pressure : 99.9 kPa

Calibration Technician : Emanuel Eid
Calibration Date : 23 Oct 2024

Secondary Check: Cooper Sallway
Report Issue Date : 23 Oct 2024

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
		Temperature	±0.1 °C
		Relative Humidity	±1.9 %
		Barometric Pressure	±0.11 kPa
Electrical Tests	125Hz	±0.13 dB	
	1kHz	±0.13 dB	
	8kHz	±0.14 dB	

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Sound Level Meter

IEC 61672-3:2013

Calibration Certificate

Calibration Number C25067-V1

Client Details MMG
6 Hospital Road
Rosebery, TAS, 7470

Equipment Tested :	Manufacturer	Model	Serial
Instrument :	ARL	Ngara	878135
Microphone :	Rion	UC-59	26003
Pre-amplifier :	Rion	NH-17	28623
Firmware Version :	v12.6		

Pre-Test Atmospheric Conditions
Ambient Temperature : 23.1 °C
Relative Humidity : 53.9 %
Barometric Pressure : 100.09 kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22.7 °C
Relative Humidity : 53.2 %
Barometric Pressure : 100.11 kPa

Calibration Technician : Peter Elters
Calibration Date : 12-Feb-2025

Secondary Check: Rhys Gravelle
Report Issue Date : 13-Feb-2025

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
5kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C25065-V1

Client Details MMG
6 Hospital Road
Rosebery, TAS, 7470

Equipment Tested :	Manufacturer	Model	Serial
Instrument :	Pulsar	Model 105	78234

Atmospheric Conditions
Ambient Temperature : 23.7 °C
Relative Humidity : 56.3 %
Barometric Pressure : 100.07 kPa

Calibration Technician :	Jeff Yu	Secondary Check:	Rhys Gravelle
Calibration Date :	13-Feb-2025	Report Issue Date :	13-Feb-2025

Approved Signatory :  Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	93.98	1000.30

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Uncertainties of Measurement -			
Specific Tests		Environmental Conditions	
Generated SPL	±0.10 dB	Temperature	±0.1 °C
Frequency	±0.07 %	Relative Humidity	±1.9 %
Distortion	±0.20 %	Barometric Pressure	±0.11 kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Sound Level Meter
IEC 61672-3:2013
Calibration Certificate
Calibration Number C25151-V1

Client Details MMG - Rosebery Mine
6 Hospital Road
Rosebery TAS, 7470

Equipment Tested :	Manufacturer	Model	Serial
Instrument :	ARL	Ngara	878139
Microphone :	Rion	UC-59	22403
Pre-amplifier :	Rion	NH-17	28142
Firmware Version :	v12.6		

Pre-Test Atmospheric Conditions
Ambient Temperature : 22.8 °C
Relative Humidity : 49.7 %
Barometric Pressure : 100.98 kPa

Post-Test Atmospheric Conditions
Ambient Temperature : 22 °C
Relative Humidity : 50.6 %
Barometric Pressure : 100.99 kPa

Calibration Technician : Peter Elters
Calibration Date : 24-Mar-2025

Secondary Check: Cooper Sallway
Report Issue Date : 28-Mar-2025

Approved Signatory :  Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
5kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.10 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Sound Level Meter IEC 61672-3:2013 Calibration Certificate

Calibration Number C25221-V1

Client Details			
MMG - Rosebery Mine 6 Hospital Road Rosebery TAS, 7470			
Equipment Tested :	<i>Manufacturer</i>	<i>Model</i>	<i>Serial</i>
Instrument :	ARL	Ngara	8780FD
Microphone :	Rion	UC-59	19806
Pre-amplifier :	Rion	NH-17	28229
Firmware Version :	12.6		
Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature : 22.2 °C		Ambient Temperature : 22 °C	
Relative Humidity : 56.1 %		Relative Humidity : 56.2 %	
Barometric Pressure : 101.27 kPa		Barometric Pressure : 101.27 kPa	
Calibration Technician : Shaheen Boaz		Secondary Check: Cooper Sallway	
Calibration Date : 14-Apr-2025		Report Issue Date : 15-Apr-2025	
Approved Signatory : 		Ken Williams	

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	Pass	17: Level linearity incl. the level range control	N/A
13: Electrical Sig. tests of frequency weightings	Pass	18: Toneburst response	Pass
14: Frequency and time weightings at 1 kHz	Pass	19: C Weighted Peak Sound Level	N/A
15: Long Term Stability	Pass	20: Overload Indication	Pass
16: Level linearity on the reference level range	Pass	21: High Level Stability	Pass

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.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2013 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2013 and because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Uncertainties of Measurement -			
Acoustic Tests		Environmental Conditions	
125Hz	±0.13 dB	Temperature	±0.1 °C
1kHz	±0.13 dB	Relative Humidity	±1.9 %
5kHz	±0.14 dB	Barometric Pressure	±0.11 kPa
Electrical Tests	±0.13 dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Sound Calibrator

IEC 60942:2017

Calibration Certificate

Calibration Number C25152-V1

Client Details MMG - Rosebery Mine
6 Hospital Road
Rosebery TAS, 7470

Equipment Tested :	<i>Manufacturer</i>	<i>Model</i>	<i>Serial</i>
Instrument :	Pulsar	Model 105	75585

Atmospheric Conditions
Ambient Temperature : 23.2 °C
Relative Humidity : 50.3 %
Barometric Pressure : 101.17 kPa

Calibration Technician :	Peter Elters	Secondary Check:	Cooper Sallway
Calibration Date :	28-Mar-2025	Report Issue Date :	28-Mar-2025

Approved Signatory :  Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.05	1000.30

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Uncertainties of Measurement -			
Specific Tests		Environmental Conditions	
Generated SPL	±0.10 dB	Temperature	±0.1 °C
Frequency	±0.07 %	Relative Humidity	±1.9 %
Distortion	±0.20 %	Barometric Pressure	±0.11 kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



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Calibration Certificate

Description: Minimate Pro 4 Base Unit

Part Number: 720A2301

Serial Number: MP14425

Calibration Date: 23 March 2026

Test Reference	Model	Serial No.
Fluke Multimeter	8808A	2315028,2308077
Keithly 2400 Source Meter	2400	1287762

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

Saros further certifies that equipment references used to complete this calibration are traceable to registered equipment standards used by the National Institute of Standards and Testing

The manufacturer recommends the product be calibrated on an annual basis by an authorised service and calibration facility.

Certified by:

Andrew Niven

Saros (International) Pty Ltd
Unit 3, 11 Parkview Street
Milton QLD 4064

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service@saros.com.au



Certificate No. AU1307



Authorised Instantel Dealer and
Calibration and Service Facility



Calibration Certificate

Description: Series IV Linear Microphone 2-250 Hz

Part Number: 720A1801

Serial Number: SL13220

Calibration Date: 23 March 2026

Test Reference	Model	Serial No.
B&K High Pressure Mic Calibrator	4221	864030
B&K Microphone Unit	4193-L-004	2618263
B&K 1/2" Pressure Field Microphone	4193	2594081
B&K Microphone Pre Amplifier	2669L	2617689
B&K Nexus Conditioning Amplifier	2690-OS1	2627419
Fluke Multimeter	8808A	2315028,2308077
Crystal Instruments	Spider-81B	1310560
B&K 75VA Power Amplifier	2718	N/A

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

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Certificate No. AU1307



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Calibration Certificate

Description: Minimate Plus Base Unit

Part Number: 716A0403

Serial Number: BE14128

Calibration Date: 24 October 2025

Test Reference	Model	Serial No.
Fluke Multimeter	8808A	2315028,2308077
InstanTel Zero/Gain Test Jig	718A1510-10	N/A

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

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Certificate No. AU1307



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Calibration Certificate

Description: Linear Microphone 2-250 Hz

Part Number: 714A9801

Serial Number: BH10415

Calibration Date: 24 October 2025

Test Reference	Model	Serial No.
B&K High Pressure Mic Calibrator	4221	864030
B&K Microphone Unit	4193-L-004	2618263
B&K 1/2" Pressure Field Microphone	4193	2594081
B&K Microphone Pre Amplifier	2669L	2617689
B&K Nexus Conditioning Amplifier	2690-OS1	2627419
Fluke Multimeter	8808A	2315028,2308077
Crystal Instruments	Spider-81B	1310560
B&K 75VA Power Amplifier	2718	N/A

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

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Certificate No. AU1307



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Calibration Certificate

Description: Series IV Triaxial Geophone (ISEE Version)

Part Number: 720A2001

Serial Number: SE12560

Calibration Date: 12 February 2026

Test Reference	Model	Serial No.
LDS Shaker	V450	99333/1
LDS Shaker	V555	429000/1
Labworks Power Amplifier	PA138	138-1835
Linear Power Amplifier with FPS	LPA1000	N/A
Crystal Instruments	Spider-81B	1322944, 1310560
Signal Conditioner	482A21	02168, 08878, 10540
		11664, 11736, 11572
ICP Accelerometer	333B30	40895, LW67182
ICP Accelerometer	333B40	64868, 58615
ICP Accelerometer	333B05	51111, 51110
Fluke Multimeter	8808A	2315028, 2308077
Remote Facility Calibration Tool	721A1601	N/A

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

Saros further certifies that equipment references used to complete this calibration are traceable to registered equipment standards used by the National Institute of Standards and Testing

The manufacturer recommends the product be calibrated on an annual basis by an authorised service and calibration facility.

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Certificate No. AU1307



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Calibration Certificate

Description: Series IV Linear Microphone 2-250 Hz

Part Number: 720A1801

Serial Number: SL12573

Calibration Date: 12 February 2026

Test Reference	Model	Serial No.
B&K High Pressure Mic Calibrator	4221	864030
B&K Microphone Unit	4193-L-004	2618263
B&K 1/2" Pressure Field Microphone	4193	2594081
B&K Microphone Pre Amplifier	2669L	2617689
B&K Nexus Conditioning Amplifier	2690-OS1	2627419
Fluke Multimeter	8808A	2315028,2308077
Crystal Instruments	Spider-81B	1310560
B&K 75VA Power Amplifier	2718	N/A

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

Saros further certifies that equipment references used to complete this calibration are traceable to registered equipment standards used by the National Institute of Standards and Testing

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Certified by:

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Certificate No. AU1307



Authorised Instantel Dealer and
Calibration and Service Facility



Calibration Certificate

Description: Minimate Pro 4 Base Unit

Part Number: 720A2301

Serial Number: MP12546

Calibration Date: 12 February 2026

Test Reference	Model	Serial No.
Fluke Multimeter	8808A	2315028,2308077
Keithly 2400 Source Meter	2400	1287762

Saros certifies that the above product was calibrated by an authorised technician in accordance with manufacturer's specifications and to Australian Standards AS2187.2-2006. Calibration procedures were also conducted in accordance with AS/NZS ISO 9001:2015 quality standards.

Saros further certifies that equipment references used to complete this calibration are traceable to registered equipment standards used by the National Institute of Standards and Testing

The manufacturer recommends the product be calibrated on an annual basis by an authorised service and calibration facility.

Certified by:

Andrew Niven

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