MOOLARBEN COAL COMPLEX ANNUAL REVIEW 2022

Document	Version	Issue	Author	Approved
MCO_RPT_ANNUAL REVIEW 2022	1	April 2022	MCO	BW

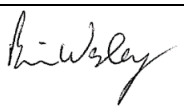
Name of operation	Moolarben Coal Complex
Name of operator	Moolarben Coal Operations Pty Ltd
Development consent / project approval #	05_0117 and 08_0135
Name of holder of development consent / project approval	Moolarben Coal Mines Pty Limited
Mining lease #	ML 1605, 1606, 1628, 1691, 1715
Name of holder of mining leases	Moolarben Coal Mines Pty Ltd, Yancoal Moolarben Pty Ltd and Kores Australia Moolarben Resources Pty Ltd
Water licence #	Refer Table 6
Name of holder of water licence	Moolarben Coal Operations Pty Ltd
Forward Work Program start date	01 July 2022
Forward Work Program end date	30 June 2025
Annual Review start date	1 January 2022
Annual Review end date	31 December 2022

I, Brian Wesley, certify that this audit report is a true and accurate record of the compliance status of Moolarben Coal Complex for the period January 1st 2022 to December 31 2022 and that I am authorised to make this statement on behalf of Moolarben Coal Operations.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 9.39 of the Environmental Planning and Assessment Act 1979. Section 9.42 provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of authorised reporting officer	Brian Wesley
Title of authorised reporting officer	General Manager
Signature of authorised reporting officer	
Date	28 April 2023

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1.0 STATEMENT OF COMPLIANCE

A summary of compliance with relevant approval conditions from 01 January 2022 to 31 December 2022 (the reporting period) is provided in **Table 1** and **Table 2**. A compliance table key is provided in **Table 3**.

Table 1: Statement of compliance

Approval	Compliance Status (Including Administrative Non-compliances)	Approval	Compliance Status (Including Administrative Non-compliances)
PA 05_0117	No	WAL36340	Yes
PA 08_0135	No	WAL37582	Yes
ML 1605	Yes	WAL37583	Yes
ML 1606	Yes	WAL39799	Yes
ML 1628	Yes	WAL41888	Yes
ML 1691	Yes	20BL173935	Yes
ML 1715	Yes	-	-

Table 2: Non-compliances

Approval	Condition Number	Condition description (summary)	Compliance status	Comment	Where addressed
PA 08_0135	Sch. 3. C. 27	Blasting Criteria	Non-Compliant	Airblast overpressure criteria exceedance	6.3.1
PA 05_0117	Sch. 5. C. 7	Water Quality	Non-Compliant	Release of out of specification treated water	7.3.2

Table 3: Compliance Table Key

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

2.0 INTRODUCTION

The Moolarben Coal Complex (MCC) is located approximately 40 kilometres north of Mudgee in the Western Coalfield of New South Wales **(Figure 1)** within the Mid-Western Regional Local Government Area. Local relevant land ownership within the immediate vicinity of the MCC is provided in **Appendix 1**.

Moolarben Coal Operations Pty Ltd (MCO) is the operator of the MCC on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Yancoal Moolarben Pty Ltd (YM) and a consortium of Korean power companies). MCO, MCM and YM are wholly owned subsidiaries of Yancoal Australia Limited (Yancoal).

Current mining operations undertaken across the MCC have approval until 31 December 2038. All mining operations are conducted in accordance with NSW Project Approval (05_0117) (Moolarben Coal Project Stage 1) as modified, and NSW Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified.

The current mining operations are undertaken in accordance with Approval Decisions (EPBC 2007/3297), (EPBC 2013/6926), (EPBC 2008/4444) and (EPBC 2017/7974) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Mining operations and exploration activities at the MCC are also conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1605, ML 1606, ML 1628, ML 1691, and ML1715 and Exploration Licences (EL) EL6288, EL7073 and EL7074 granted under the *Mining Act 1992*.

2.1 SCOPE

This Annual Review (AR) has been prepared by MCO (with input from experienced and qualified experts) to satisfy the reporting requirements of NSW Project Approval (05_0117) (as modified), NSW Project Approval (08_0135) (as modified), and water licences. The report presents a summary of the regulatory compliance, environmental performance, and community engagement activities for MCO.

The following key agencies and committees shall be provided with a copy of this report:

- NSW Department of Planning and Environment (DPE) (For Approval);
- NSW Department of Planning and Environment – Biodiversity, Conservation and Science (BCS);
- NSW Department of Planning and Environment – Water (DPE – Water);
- NSW Environment Protection Authority (EPA);
- Mid-Western Regional Council (MWRC); and
- Members of the MCC Community Consultative Committee (CCC).

In addition, an electronic copy will be made publicly available on the Moolarben Coal website (http://www.moolarbencoal.com.au/) in accordance with Schedule 5, Condition 11 (a) of PA05_0117 and Schedule 6, Condition 11 (a) of PA08_0135.

2.2 STRUCTURE OF THIS ANNUAL REVIEW

The remainder of the AR is structured as follows and is based on the *Annual Review Guidelines – Post-approval requirements for State significant mining developments* (NSW Department of Planning and Environment, 2015):

Section 3: Outlines the relevant statutory approvals.

Section 4: Outlines the activities undertaken at Moolarben Coal Complex for the period and those proposed for the next period.

Section 5: Actions required from previous Annual Review.

Section 6: Outlines environmental performance including meteorological, noise, blasting, air quality, biodiversity, heritage, bushfire and waste.

Section 7: Outlines the water management performance.

Section 8: Outlines subsidence performance.

Section 9: Outlines the rehabilitation management performance

Section 10: Outlines the community performance.

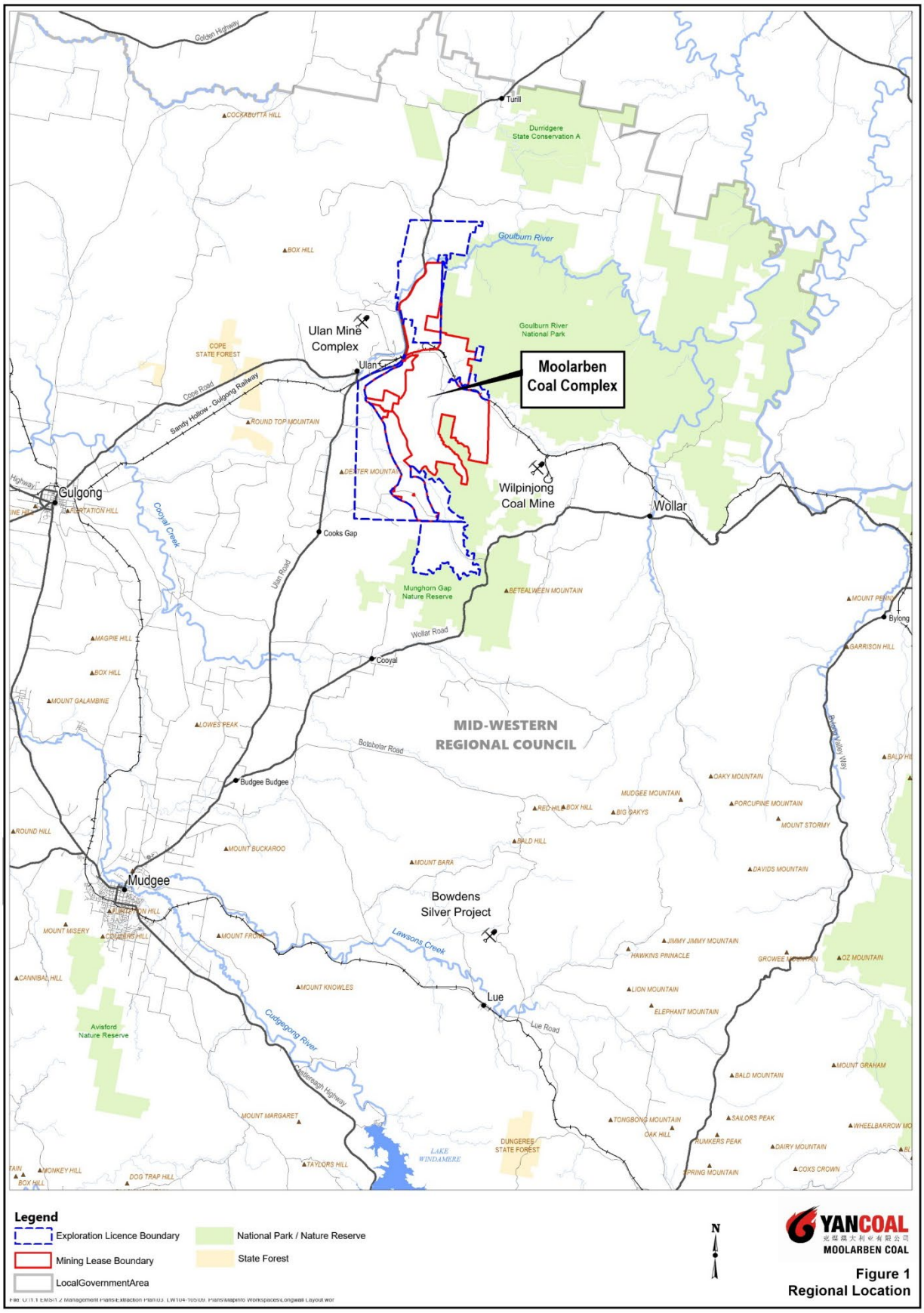
Section 11: Describes independent audit requirements.

Section 12: Provides a summary of incidents and non-compliances.

Section 13: Outlines activities to be completed in the next reporting period.

Appendices: Supporting information and monitoring data.

Figure 1 Moolarben Coal Complex – Site Location



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2.3 PROJECT DESCRIPTION

The MCC comprises the Moolarben Stage 1 and Stage 2 Projects. An overview of the complex is provided in **Figure 2**. The Stage 1 and Stage 2 operations are summarised in **Table 4** below.

Stage 1 at the Moolarben Coal Complex has been operating for several years and at full development will comprise three open cut mines (OC1, OC2, and OC3), a longwall underground mine (UG4), and mining related infrastructure (including coal processing and transport facilities).

Stage 2 at the Moolarben Coal Complex has commenced and at full development will comprise one open cut mine (OC4), two longwall underground mines (UG1 and UG2), and mining related infrastructure.

Table 4: Moolarben Coal Complex production overview

Relevant Approval Component	Moolarben Coal Project	
	Stage 1 **Project Approval (05_0117)**	**Stage 2** **Project Approval (08_0135)**
Operational Mine Life	Mining operations can be carried out until 31 December 2038.	
Hours of Operation	Mining operations can be carried out 24 hours a day, 7 days a week.	
Coal Extraction Limits	Up to 10 Mtpa of ROM coal can be extracted from the open cut mining operations in any calendar year from Stage 1.	Up to 16 Mtpa of ROM coal can be extracted from the open cut mining operations in any calendar year from Stage 2.
	Up to 8 Mtpa (total) of ROM coal can be extracted from the underground mining operations at the Moolarben Coal Complex in any calendar year.	
Coal Processing and Offsite Transport	Up to 16 Mtpa (total) of ROM coal from the Moolarben Coal Complex can be washed in the calendar year. Not more than 8 laden trains on average or 11 laden trains maximum to leave the complex per day.	
	All coal is to be transported from the Moolarben Coal Complex by rail.	All coal extracted from the site is sent to the Moolarben Stage 1 mine surface infrastructure area for processing and/or transport to market.

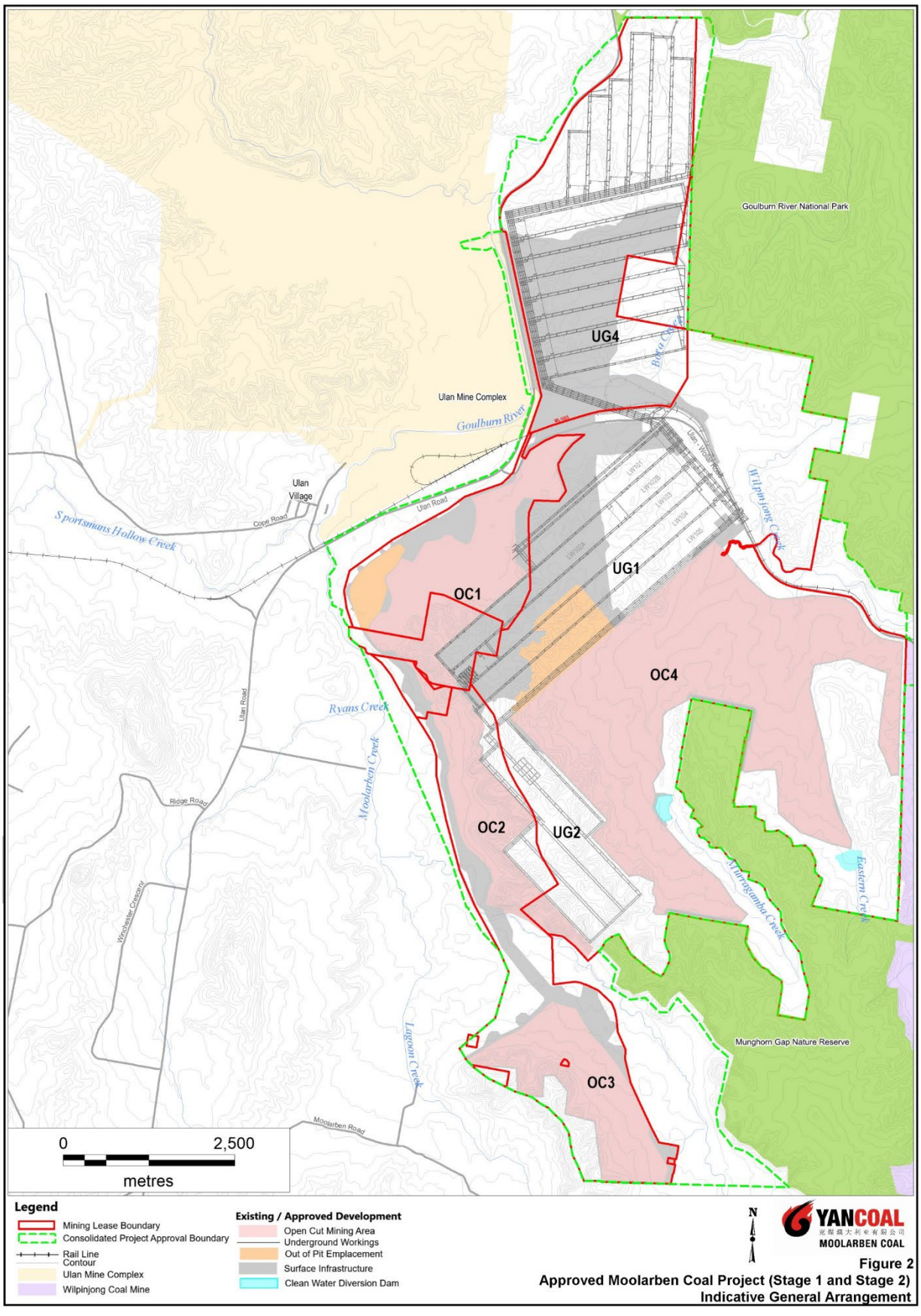
2.4 KEY MINE CONTACT PERSONNEL

The following table provides contact details for key personnel responsible for environmental management across the Moolarben Coal Complex.

Table 5: Mine Contact Personnel

Position/Area of Responsibility	Name	Contact Number(s)	Email Address
General Manager	Brian Wesley	02 6376 1500	brian.wesleyl@yancoal.com.au
Environment and Community Manager	Trent Cini	02 6376 1436	trent.cini@yancoal.com.au
Environment and Community Superintendent	Rebecca Shanks	02 6376 1492	rebecca.shanks@yancoal.com.au
Environment and Community Complaints Line	1800 556 484		
Postal Address	Locked Bag 2003, Mudgee, NSW, 2850		

Figure 2: Project General Arrangement



3.0 APPROVALS

3.1 SUMMARY OF APPROVALS

Project Approvals, Mining Leases, and other Licences relevant to MCO are provided in **Table 6**. Current Project Approvals, EPBC Approvals, Exploration Licences, and Mining Leases are available at www.moolarbencoal.com.au

Table 6: Relevant Approvals, Leases and Licences

Approval	Description	Expiry Date
Project Approval – NSW Department of Planning and Environment		
05_0117	Stage 1 as modified	31 December 2038
08_0135	Stage 2 as modified	31 December 2038
Mining Lease – NSW Department of Regional NSW – Resources Regulator		
ML1605	Underground 4, CHPP and infrastructure areas	20 December 2028
ML1606	OC1, OC2, UG1 and associated infrastructure	20 December 2028
ML1628	OC1, OC2, OC3, UG1 and UG4	24 February 2030
ML1691	OC2, OC3, UG1, UG2 and associated infrastructure	23 September 2034
ML1715	OC2, OC4, UG1, UG2 and associated infrastructure	31 August 2036
Moolarben Coal Forward Program – NSW Department of Regional NSW – Resources Regulator		
FWP0001052	Stage 1 and Stage 2 operations	30 June 2025
Exploration Licences – NSW Department of Regional NSW – Resources Regulator		
EL6288	Coal Exploration Licence	23 August 2023
EL7073	Coal Exploration Licence	12 February 2026
EL7074	Coal Exploration Licence	12 February 2026
Environment Protection Licence – NSW Environment Protection Agency		
EPL12932	Licence authorising the carrying out of scheduled activities	N/A
Environment Protection and Biodiversity Conservation Act – Commonwealth Department of Climate Change, Energy, the Environment and Water		
2007/3297	Stage 1 coal mines and associated infrastructure	31 December 2027
2008/4444	Stage 2 coal mines	31 December 2065
2013/6926	Modify and extend the Stage 1 Moolarben Coal Project.	31 December 2064
2017/7974	Modify and extend the Stage 1 and Stage 2 Moolarben Coal Project	31 December 2050
Water Licences – NSW Department of Planning and Environment – Water		
WAL19424	Wollar Creek Water Source	N/A
WAL36340	Wollar Creek Water Source	N/A
WAL37582	Upper Goulburn River Water Source	N/A
WAL19052	Upper Goulburn River Water Source	N/A
WAL37583	Wollar Creek Water Source	N/A
WAL39799	Sydney Basin - North Coast Groundwater Sources	N/A
WAL41888	Upper Goulburn River Water Source	N/A
20BL173935	Monitoring Bore Licence	N/A

During the reporting period the following amendments to approvals were granted:

- Moolarben Coal Forward Program 2022-2025; and
- Environment Protection Licence EPA variation for Additional Temporary Discharge Points.

3.2 ANNUAL REPORTING

Table 7 provides a checklist of AR requirements and performance conditions along with the relevant sections within this report.

Table 7: Annual Review Requirements

Approval Type & Reference		Annual Review Section
Project Approval 05_0117 Condition 4 Schedule 5	*By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary. This review must:*	
	a. describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;	4.2 & 4.3
	b. include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the	6 to 10
	• *the relevant statutory requirements, limits or performance measures/criteria;*	
	• *the monitoring results of previous years; and*	
	• *the relevant predictions in the EA;*	
	c. identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	1, 6 to 10 & 12
	d. identify any trends in the monitoring data over the life of the project;	6 to 10 6 to 10
	e. identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	6 to 10 & 13
	f. describe what measures will be implemented over the next year to improve the environmental performance of the project.	
Project Approval 08_0135 Condition 4 Schedule 6	*By the end of March each year, or other timing as may be agreed by the Secretary, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary. This review must:*	
	a. describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year;	4.2 & 4.3
	b. include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the	6 to 10
	• *the relevant statutory requirements, limits or performance measures/criteria;*	
	• *the monitoring results of previous years; and*	
	• *the relevant predictions in the EA;*	
	c. identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;	1, 6 to 10 & 12
	d. identify any trends in the monitoring data over the life of the project;	6 to 10
	e. identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and	6 to 10 6 to 10 & 13
	f. describe what measures will be implemented over the next year to improve the environmental performance of the project.	

4.0 OPERATIONS SUMMARY

4.1 MINING OPERATIONS

Details of production and associated waste generated by the site for the reporting period and next reporting period are provided in **Table 8**.

Table 8 : Production Summary

Material	Approved Limit (PA 05_0117 & 08_0135)	Reporting Period		
		Previous Period (actual)	Current Period (actual)	Next Period (forecast)
Waste Rock/ Overburden (BCM)	N/A	43,866,072	48,384,347	81,338,106
Open Cut ROM Coal (t) (OC1, 2 & 3)	10,000,000	4,398,171	2,608,110	4,216,882
Open Cut ROM Coal (t) (OC4)	16,000,000	9,710,770	8,073,076	11,284,361
Open Cut ROM Coal (t)	16,000,000	14,108,941	10,681,187	15,501,243
Underground ROM Coal (t)	8,000,000	6,259,630	6,207,429	4,803,000
Coal Washing (t)	16,000,000	14,373,346	10,881,108	15,463,613
Rejects (Co Disposal)	N/A	2,281,064	1,935,690	2,476,451
Product Coal (t)	N/A	18,354,580	14,887,453	17,807,170

4.2 REPORTING PERIOD ACTIVITIES

This section provides further detail on the activities undertaken in the reporting period. **Figure 3** presents the areas of activity.

4.2.1 EXPLORATION

Exploration activities were undertaken in EL6288, EL7073, ML1605, ML1628 and ML1715 during the reporting period. This consisted of a total of 7 exploration holes within EL6288, 3 exploration holes within EL7073, 19 exploration holes within ML1605, 5 exploration holes within ML1628, and 3 exploration holes within ML1715.

4.2.2 LAND DISTURBANCE

During the reporting period 213ha was disturbed taking the total mine footprint to 2,030ha with the majority of the increased land disturbance associated with the progression of mining. The areas disturbed this reporting period are shown in **Figure 3**.

All land disturbance is undertaken in accordance with the Ground Disturbance Permit (GDP) process. This includes pre-clearance surveys, heritage clearance, erosion and sediment control plans, confirmation of land ownership and disturbance extents reviewed to ensure compliance with relevant management plans (Surface Water, Heritage, Biodiversity and Rehabilitation Management Plans) and approvals.

Topsoil, mulch and select salvageable hollows were reclaimed and direct placed on rehabilitation areas or stockpiled for future use.

4.2.3 CONSTRUCTION

Construction works undertaken during the reporting period included the progression of mining infrastructure for Open Cut 3 (OC3) and Open Cut 4 (OC4). Mine infrastructure works included water management infrastructure and ancillary works. Construction activities commenced or undertaken in the period included:

- Upgrade of the Water Treatment plant and associated infrastructure;
- Upgrade works associated with the CHPP; and
- Construction of water management infrastructure.

4.2.4 MINING OPERATIONS

Mining activities were undertaken in accordance with relevant project approvals and the approved FWP. During the reporting period general mining activities included:

- Overburden removal from OC2, OC3 and OC4 using excavator and truck fleets;
- Overburden removal from OC3 and OC4 using cast and dozer push;
- Coal extraction from OC2, OC3 and OC4;
- Drilling and blasting select overburden and coal;
- Spoil emplacement in-pit in OC2, OC3, and OC4;
- Bulk spoil reshaping and rehabilitation;
- Construction and operation of water management works;
- Continued underground development in UG4; and
- Extraction of UG1 LW105 and UG4 LW401.

4.2.5 COAL PROCESSING AND TRANSPORT

Open Cut ROM coal for washing was transported from the ROMs via conveyor to the CHPP for processing. ROM coal was transported from the UG ROM to the product stockpile via conveyor. Washed product coal was transported to the product coal stockpile prior to railing. Coarse rejects were co-mingled with dewatered fine rejects and transported by conveyor to the Rejects Bin and trucked back to the open pit for selective placement with mine spoil.

All product coal was loaded onto trains via the Train Load-out in the Moolarben rail loop and transported via rail to port. MCO monitors the amount of coal transported from site each year and the date/time of each movement. During the period, the maximum number of train movements per day was 9 with an average of 4.45 per day.

4.2.6 REHABILITATION

Rehabilitation works during the reporting period were undertaken within OC2, OC4, maintenance of existing rehabilitated areas, and progressive rehabilitation of construction areas. More detail of rehabilitation activities during the reporting period is provided in **Section 9.0**.

4.3 NEXT REPORTING PERIOD

The proposed mining sequence for 2023 is detailed in the currently approved 2022 – 2025 FWP dated July 2022. The status of proposed activities at the end of 2022 are provided in **Figure 3**.

MCO will continue to operate 24 hours per day, 7 days per week with blasting limited to the hours and frequency detailed in PA 05_0117 Schedule 3, Condition 9 & 10 and PA 08_0135 Schedule 3, Condition 10 & 11.

4.3.1 EXPLORATION

Proposed exploration activities during 2023 will primarily focus on EL6288 and EL7073 surrounding the OC3 area, ML1605, and ML1715. All exploration carried out on MCO Exploration Licence areas will adhere to the relevant regulatory requirements which may include approval through the Resource Regulator's application to undertake Assessable Prospecting Operations.

4.3.2 LAND DISTURBANCE

During the next reporting period, approximately 264ha will be disturbed for open-cut mining across OC3, OC4, and UG4 surface infrastructure and ancillary activities. The areas to be disturbed are shown in **Figure 3.**

4.3.3 CONSTRUCTION

Proposed construction works during the next reporting period includes mine sustaining infrastructure. Construction activities include:

- Completion of upgrades to the Water Treatment plant and associated infrastructure;
- Construction of water management infrastructure; and
- Completion of upgrade works associated with the CHPP.

4.3.4 MINING OPERATIONS

Mining operations for the next period are shown in **Figure 3** and include:

- Drilling and blasting select overburden and coal;
- Overburden removal from OC3 and OC4 using dozer, excavator and truck fleets;
- Spoil emplacement in-pit in OC2, OC3 and OC4;
- Coal extraction from OC3, and OC4;
- Bulk spoil reshaping and rehabilitation;
- Construction and operation of water management works;
- Continued underground development within UG4; and
- Continued longwall mining operations in UG4 LW401-LW408.

4.3.5 COAL PROCESSING AND TRANSPORT

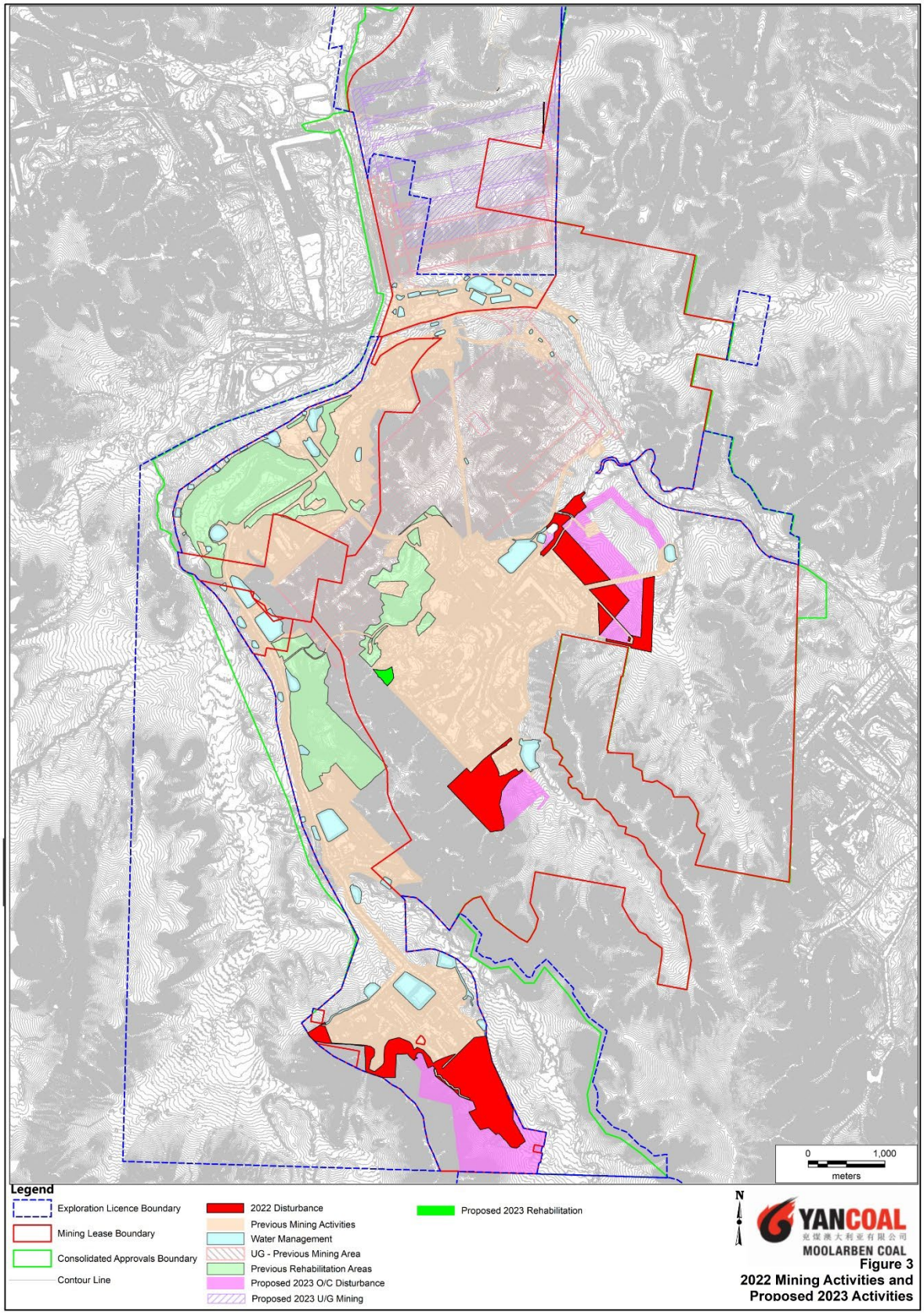
Open Cut ROM coal for washing will be transported from the ROMs via conveyor to the CHPP for processing. Underground coal and open cut bypass coal will be transferred with the UG coal handling system. Product coal will be stored on the product coal stockpile prior to transport. Coarse rejects will be co-mingled with dewatered fine rejects and transported by conveyor to the Rejects Bin from where it will be trucked back to the open pit for selective placement within mine spoil.

All product coal will be loaded onto trains in the MCC rail loop and transported via rail. All train movements will be conducted in accordance with the conditions of approval.

4.3.6 REHABILITATION

Rehabilitation on mined areas proposed for the next reporting period will be undertaken in OC2, OC3 and OC4. Rehabilitation activities may include landform establishment, growth medium development, ecosystem and landuse establishment and rehabilitation maintenance if required.

Figure 3: 2022 Mining Activities and Proposed 2023 Activities



5.0 ACTIONS REQUIRED FROM PREVIOUS REPORTING PERIOD

The 2021 AR was submitted to the RR and DPE on 31 March 2022 in accordance with Schedule 5 Condition 4 of PA05_0117 and Schedule 6 Condition 4 of PA08_0135. The 2021 AR was accepted and approved by the DPE on 29 April 2022. On 1 June 2022, the RR notified MCO that the 2021 AR was to the satisfaction of the Minister for Regional NSW.

There were no actions issued to MCO regarding the 2021 AR, and the 2021 AR was placed on the MCO website within one month of approval.

Actions outlined by MCO in the 2021 AR are provided in **Table 9**.

Table 9 : Actions from Previous Annual Review

Action Required from previous Annual Review	Requested by	Action Taken by MCO	Section of AR addressing this action
Review and revise all environmental management plans as necessary	MCO	Complete	Sections 6 to 9
Review PZ058a monitoring as part of next Groundwater Management Plan Review	MCO	Action Ongoing	Section 7.4
Install VWP to replace PZ103B	MCO	Complete	Section 7.4
Continued progressive rehabilitation.	MCO	Action Ongoing	Section 9
Establishment and baseline monitoring associated with UG4 where not completed.	MCO	Action Ongoing	Section 8

6.0 ENVIRONMENTAL PERFORMANCE

In accordance with the MCC Project Approvals, MCO has developed a series of Environmental Management Plans in consultation with the relevant government agencies. Current approved plans are available for review via the MCO website - http://www.moolarbencoal.com.au

To measure compliance with the project approvals, various licences, and site management plans, MCO undertakes a comprehensive environmental monitoring program. The locations of environmental monitoring undertaken during the 2022 reporting period are identified in **Appendix 2**. This section provides summary details on:

- **Section 6.1** - Meteorological overview
- **Section 6.2** - Noise;
- **Section 6.3** – Blasting;
- **Section 6.4** – Air quality;
- **Section 6.5** – Biodiversity; and
- **Section 6.6** – Heritage.

Water, subsidence, rehabilitation and community aspects are reported in **Sections 7.0, 8.0, 9.0** and **10.0** respectively.

6.1 METEOROLOGICAL SUMMARY

Meteorological monitoring is undertaken at Automatic Weather Station (WS) WS03 (Ulan Road) in accordance with NSW Project Approval and EPL requirements. Additional weather stations may be used to supplement weather data as required including WS04 located near OC2, and WS05 located near OC3. The localities of the stations are illustrated in **Appendix 2** Meteorological parameters recorded by WS03 include:

- wind speed at 10 m;
- wind direction at 10 m;
- sigma theta;
- temperature at 2 m and 10 m;
- relative humidity at 2 m;
- solar radiation at 2 m; and
- Rainfall

WS03 rainfall and temperature records for 2022 are summarised in **Table 10**. A total of 1182.8mm of rainfall was recorded in 2022, with October the wettest month (180.8mm) and June the driest (15.2mm). The total rainfall at MCO for 2022 was 531.6mm above the annual average rainfall at the Gulgong Post Office of 651.2mm and exceeded the MCO rainfall total of 2021 (899.4mm). Notably the 2022 total rainfall received at MCO was the highest annual rainfall received at MCO in the past 10 years.

Temperature recorded at WS03 ranged from -3.4°C in July to 33.7°C in January. The lowest minimum temperature of -3.4°C was slightly warmer than the lowest minimum of -4.5°C recorded in 2021. The highest maximum temperature of 33.7°C was noticeably less than the highest maximum temperature of 36.5°C recorded in 2021.

From January to April and then October and December north east and easterly winds were predominant with south westerly and southerly winds predominant from May through to November. Meteorological data and monthly wind roses are presented in **Appendix 3A**.

Table 10: Meteorological Summary (WS03)

Month	Rainfall (mm)	Cumulative Rainfall (mm)	Long-term average Rainfall (mm)	Max Temp (°C) @ 2m	Min Temp (°C) @ 2m
Jan-22	137.4	137.4	77.0	33.7	11.6
Feb-22	18.8	156.2	77.3	32.9	8.3
Mar-22	162	318.2	88.5	30.6	6.8
Apr-22	97.8	416	36.7	26.8	2.9
May-22	48.2	464.2	30.3	25.4	-0.9
Jun-22	15.2	479.4	50.0	17.9	-3.3
Jul-22	172.2	651.6	43.6	18.4	-3.4
Aug-22	108.8	760.4	30.9	21.5	-1.8
Sep-22	86.2	846.6	54.6	21.5	0.2
Oct-22	180.8	1027.4	51.5	25.1	2.8
Nov-22	61.6	1089	76.2	31.7	1.9
Dec-22	93.8	1182.8	72.2	32.5	3.9
Total		**1182.8**	**688.7**		

6.2 NOISE

MCO manages noise in accordance with the MCO Noise Management Plan (NMP) (Version 5). The NMP was most recently revised and approved in October 2020. The NMP was developed by MCO with advice from experienced and qualified experts (SLR Consulting Australia Pty Ltd) to satisfy Condition 7, Schedule 3 of PA 05_0117 (as modified) and Condition 8, Schedule 3 of PA 08-0135.

During the reporting period, major noise producing activities included operations within:

- OC2, OC3, and OC4;
- Surface operations associated with UG1 and UG4;
- The CHPP and rail load-out facilities; and
- Construction activities.

Operational processes for MCO to reduce noise emissions included:

- Use of sound attenuated major equipment;
- Operation of some support fleet during the daytime only;
- Use of shielded areas in adverse weather conditions;
- Use of real-time noise monitoring data and Mine Production Environmental Assistants to assist operational personnel in proactive and reactive management of noise impacts;
- Use of predictive noise models to assess predicted noise risks associated with meteorological influences;
- Sound power testing equipment; and

- Routine maintenance of equipment, including sound attenuation components.

6.2.1 REAL- TIME NOISE MONITORING

The NMP identifies response triggers for real-time noise via four monitoring stations (refer **Appendix 2** for localities). When a trigger has been reached, an SMS alarm is sent to operational personnel and members of the Environment and Community Department. The real-time monitoring network operated throughout the reporting period.

6.2.2 ATTENDED NOISE MONITORING

During the 2022 reporting period, attended environmental noise monitoring was conducted monthly (NA1, NA6 & NA12), with additional sites monitored quarterly (NA11) and annually Munghorn Gap Nature Reserve (MGNR) and Goulburn River National Park (GRNP). The purpose of attended noise monitoring is to quantify and describe the acoustic environment around MCO's operations and compare noise contribution from the MCC to the project Noise Criteria.

Noise Criteria are specified for day, evening, and night period for the amenity of neighbouring residences. Noise Criteria are expressed as $LAeq_{(15min)}$ and $LA1_{(1min)}$. **Table 11** provides a summary of project noise criteria and noise performance based on attended noise monitoring for 2022, together with management implications and proposed actions.

MCO complied with the project specific noise criteria at all monitoring sites during attended noise monitoring in the reporting period. A summary of results from attended noise monitoring undertaken during the period in accordance with the NMP is provided in **Appendix 3B**.

6.2.3 ATTENDED VALIDATION NOISE MONITORING

In accordance with the NMP, attended monitoring was undertaken during the reporting period at four locations (i.e. NA2, NA3, NA10 & NA12) to verify the results of real-time noise monitoring.

Validation monitoring continues to confirm that the current real-time monitors overestimated the MCO LAeq during the validation periods. The real-time data appeared to be routinely influenced by extraneous low frequency noise sources such as road traffic, aircraft, frogs, insects, and wind. Due to the inability to distinguish between contributing noise sources, the real-time data is not suitable for compliance purposes and cannot be relied upon to provide an accurate estimate of mine generated noise. Real-time monitoring remains suitable for management purposes.

6.2.4 COMPARISON AGAINST PREVIOUS YEARS

Attended noise monitoring results were reviewed against previous years to 2012. This review found a high level of variability in results. Of the results where a noise reading was determined (i.e. not inaudible and criteria applicable) there is some correlation between monitoring results and the distance of the receiver from the operations.

Attended noise monitoring undertaken at NA1 Ulan school between 2012 and 2022 during the day time period shows that MCO was inaudible during 100% of the samples, with no exceedances of criteria. Monitoring at NA6 Lower Ridge Road between 2012 and 2022 during the night period shows that MCO was inaudible during 66% of the samples, with no exceedances. Attended noise monitoring completed at NA12 Winchester Crescent between 2012 and 2022 during the night period shows that MCO was inaudible during 58% of the samples, with no sustained exceedances of criteria.

Annual attended noise monitoring results at the Goulburn River National Park and the Munghorn Gap Nature Reserve indicate that MCO was inaudible, with no exceedances recorded during monitoring.

Table 11 : Attended Noise Monitoring Summary

Aspect	Approved Criteria					Performance During the Reporting Period	Key Management implications	Implemented/ proposed management Actions
Attended Noise Monitoring	**Land No.**	**Day** [1] L_{A1eq} **(15min).**	**Evening**[2] L_{A1eq} **(15min).**	**Night**[3] L_{A1eq} **(15min).**	**Night**[3] L_{A1eq} **(1min).**	Monthly attended monitoring was undertaken at the three required noise compliance locations (NA1, NA6 & NA12) throughout 2022 as required by the NMP. Quarterly monitoring was completed at NA11 during 2022 as required by the NMP. Annual monitoring was undertaken at the two required noise compliance locations (GRNP & MGNR) during 2022 as required by the NMP. There were no recorded noise exceedances during the 2022 reporting period at the five noise compliance monitoring locations NA1, NA6, NA12, GRNP & MGNR. MCO continued to coordinate noise management with neighbouring mines. ***Note*** *approved noise compliance monitoring locations were selected as representative of residences* and are shown in **Appendix 2**.	Noise management controls effective.	Continue the implementation of the NMP. MCO will review, and if necessary revise, the NMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively.
	70	37	37	37	45			
	75	36	36	36	45			
	All other privately owned residences	35	35	35	45			
	Ulan Primary School	35 (internal) when in use			-			
	Ulan Anglican Church	35 (internal) when in use			-			
	Goulburn River National Park Munghorn Gap Nature Reserve	50 when in use			-			

1 Day is defined as the period between 7am-6pm Monday to Saturday, and 8am-6pm on Sundays and Public Holidays
2 Evening is defined as the period 6pm-10pm
3 Night is defined as the period from 10pm-7am Monday to Saturday, and 10pm-8am on Sundays and Public Holidays.

6.2.5 COMPARISON TO PREDICTED LEVELS

Predicted noise levels from Year 2019 of the Open Cut Optimisation Modification (Stage 1 Modification 14 and Stage 2 MOD 3) were compared against actual noise levels during 2022. The 2022 results indicated that MCO was generally lower than the predicted levels where meteorological conditions were relevant.

Measured operational levels are compared to predicted levels in **Table 12**. In this table, a 'positive' difference is where the measured level is greater than the predicted level. A 'negative' difference is where the measured levels are less than the predicted levels. Where the meteorological conditions (primarily wind direction and temperature gradient) during the attended monitoring do not correspond with those that are modelled, no further analysis is undertaken. Attended noise monitoring results are included in **Appendix 3B.**

Table 12: EA Predictions – Attended Noise Monitoring, Various Weather Conditions

	$dB(A)_{Leq\ (15min)}$[1]			$dB(A)_{LA1(1min)}$[1]		
	NA1 Ulan School	**NA6 Lower Ridge Rd**	**NA12 Winchester Cres**	**NA1 Ulan School**	**NA6 Lower Ridge Rd**	**NA12 Winchester Cres**
	Day	**Night**	**Night**	**Day**	**Night**	**Night**
January	NA	NC	NA	NA	NC	NA
February	NA	NA	NA	NA	NA	NA
March	NA	-20	NA	NA	-21	NA
April	NA	NA	NC	NA	NA	NC
May	NA	NA	-12	NA	NA	-15
June	NA	-14	-12	NA	-15	-14
July	NA	NC	NC	NA	NC	NC
August	NC	NA	NC	NA	NA	NC
September	NA	NA	-12	NA	NA	-13
October	NC	NA	NA	NA	NA	NA
November	NA	NA	NA	NA	NA	NA
December	NA	NC	NC	NA	NC	NC

[1.] NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison. NC indicates measured MCO noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (e.g. less than 30 dB), therefore measured and predicted noise levels were not comparable.

6.3 BLASTING

MCO manages blasting in accordance with the Blast Management Plan (BMP) (Version 6). The BMP was developed by MCO with advice from experienced and qualified experts (SLR Consulting Australia Pty Ltd) to satisfy Condition 15, Schedule 3 of PA 05_0117 (as modified) and Condition 16, Schedule 3 of PA 08-0135 (as modified).

Blasting criteria, blasting hours, blasting frequency, property inspection requirements and operating conditions are provided in Conditions 8 to 14, Schedule 3 and Conditions 9 to 15, Schedule 3 of the NSW Project Approvals (05_0117) and (08_0135) respectively.

The blast monitoring locations are identified in **Appendix 2**. During the reporting period blast monitoring included airblast overpressure and ground vibration at locations representative of privately owned residences, schools and aboriginal rock shelters.

6.3.1 SUMMARY OF BLAST MONITORING RESULTS

Blast monitoring compliance for the reporting period is presented in **Table 13** and a summary of blast monitoring results for the period is provided in **Table 14**. Individual blast results are provided in full at **Appendix 3C**. One exceedance of the blasting criteria occurred during the reporting period.

No blasting was undertaken within 500m of any public road, railway line, 330kV powerline or private land.

Table 13 : Blast Monitoring Summary (BM1, BM5, BM8)

Blast Summary	Number	Compliance (% Of Blasts)
Total Blasts	170	Compliant
Days with >2 blasts (PA05 Sch 3 C 10)	0[1]	Compliant
Annual average blasts per week	3.27	Compliant
Blasts outside blasting hours	0	Compliant
Airblast Overpressure >115 dB(Lin Peak) [2]	5[3]	Compliant (3%)
Airblast Overpressure >120 dB(Lin Peak)	1[4]	Non-compliant
Ground Vibration >5 mm/s [2]	0	Compliant (0%)
Ground Vibration >10 mm/s	0	Compliant
Reportable Fume Events	0	Compliant

[1] Misfires excluded as per PA05_0117 Sch 3 Con. 10 and PA08_0135, Sch. 3, Con. 11.
[2] Allowable exceedances of 5% of total blasts over a period of 12 months.
[3] Five blast events recorded in exceedance of 115dBL during the reporting period – one at BM1 located at Ulan School and three at BM5 located on Ridge Road and one at BM8 (located on MCO owned land) that were wind and/or storm affected.
4 Airblast overpressure exceedance on 20 May 2022. Airblast overpressure reading of 124.1 dB(Lin Peak)

Table 14 : Blast Monitoring Summary

Aspect	Approved Criteria				Performance During the Reporting Period	Trend/ Key Management Implications	Implemented/ proposed actions
Blast	Receiver	Air Blast Overpressure Level dB (Linear Peak) dBL[1]	Peak Particle Velocity – Ground Vibration mm/s[2]	Allowable Exceedance	Compliance monitoring was undertaken at the following representative locations for the 2022 reporting period • **BM1 – Ulan School** ○ Max. Overpressure = 116.2 dBL ○ Max Ground Vibration = 0.41 mm/s ○ Average Ground Vibration = 0.13 mm/s • **BM5 – Ridge Road** ○ Max. Overpressure = 124.1 dBL ○ Max Ground Vibration = 2.12 mm/s ○ Average Ground Vibration = 0.26 mm/s • **BM8 – Moolarben Road** ○ Max. Overpressure = 119.2 dBL ○ Max Ground Vibration = 0.76 mm/s ○ Average Ground Vibration = 0.13 mm/s A full blast summary is contained at **Appendix 3C**.	In accordance with condition 13 (c), Schedule 3 of project approval 05_0117 and condition 14 (d), schedule 3 of project approval 08_0135 MCO co-ordinates the timing of blasting onsite with the timing of blasting at Ulan and Wilpinjong mines to minimise cumulative impacts. Air blast over pressure and peak particle velocity continue to remain stable over the life of the operation at BM1 Ulan School and BM5 Ridge Road.	MCO will review and if necessary revise, the BMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively. During the reporting period MCO continued to maintain the blast monitoring network.
	Residence Privately Owned	120	10	0%			
		115	5	5% of the total number of blasts over a period of 12-months			
	All Public Infrastructure	-	50[3]	0%			

Notes - [1]- dB (Linear Peak) dBL = decibel linear peak [2]- mm/s = millimetres per second [3] - These criteria do not apply if the Proponent has a written agreement with the relevant owner, and has advised the Department in writing of the terms of this agreement. MCO has written agreements with TransGrid and Australian Rail Track Corporation (ARTC) to undertake blasting within 500 metres (m) of the Wollar-Wellington 330 kV transmission line and within 500 m of ARTC infrastructure, respectively.

6.3.2 COMPARISON TO PREVIOUS BLAST MONITORING AND PREDICTED LEVELS

A comparison of the 2022 blast results to the 2021 results and predications in the Environmental Assessment (EA) for Stage 1 Modification 14 and Stage 2 Modification 3 (Year 2019) are outlined in **Table 15** below.

Table 15 : Comparison to Blasting Results - BM1 & BM5 2021, 2022 and EA

Site	EA Vibration Predictions (mm/s) [2]	2021 vibration range (mm/s)	2022 vibration range (mm/s)	Comment on results
BM1 Ulan School	2.1	0.03 – 0.34	0.02 – 0.41	Generally consistent with previous results and lower than predictions.
BM5[3] Ridge Rd	3.0	0.01 – 0.73	0.01 – 2.12	Slightly higher than previous results and lower than predictions.
BM8 Moolarben Rd	3.7	0.01 – 0.82	0.00 – 0.76	Generally consistent previous results and lower than predictions.
Site	**EA Overpressure (dBL) [2]**	**2021 Overpressure range (dBL)[1]**	**2022 Overpressure range (dBL)[1]**	**Comment on results**
BM1 Ulan School	112	81.8 – 116.8	79.3 – 116.2	Generally consistent with previous results and predictions.
BM5[3] Ridge Rd	114	72.8 – 113.6	71.3 – 124.1	Slightly higher than previous results and consistent with predictions.
BM8 Moolarben Rd	115	70.9 – 114.5	75.7 – 119.2	Generally higher than previous results and consistent with predictions.

[1] Excludes environmental influenced results.
[2]Overburden blast design MIC 4,500 kg, 5% exceedance prediction.
[3]Modelled predictions taken from nearest private receiver ID No.70 adjacent from BM5

Blast Monitoring 80%ile and 50%ile trends since 2012 are depicted below in **Figure 4** and **Figure 5**. The monitoring data indicates a correlation between monitoring results and distance of the receiver from the blast locations. Within the graphs the five percent and maximum limit has been included for the blast overpressure graph and the five percent limit has been included within the ground vibration graph. Results have generally been below these criteria.

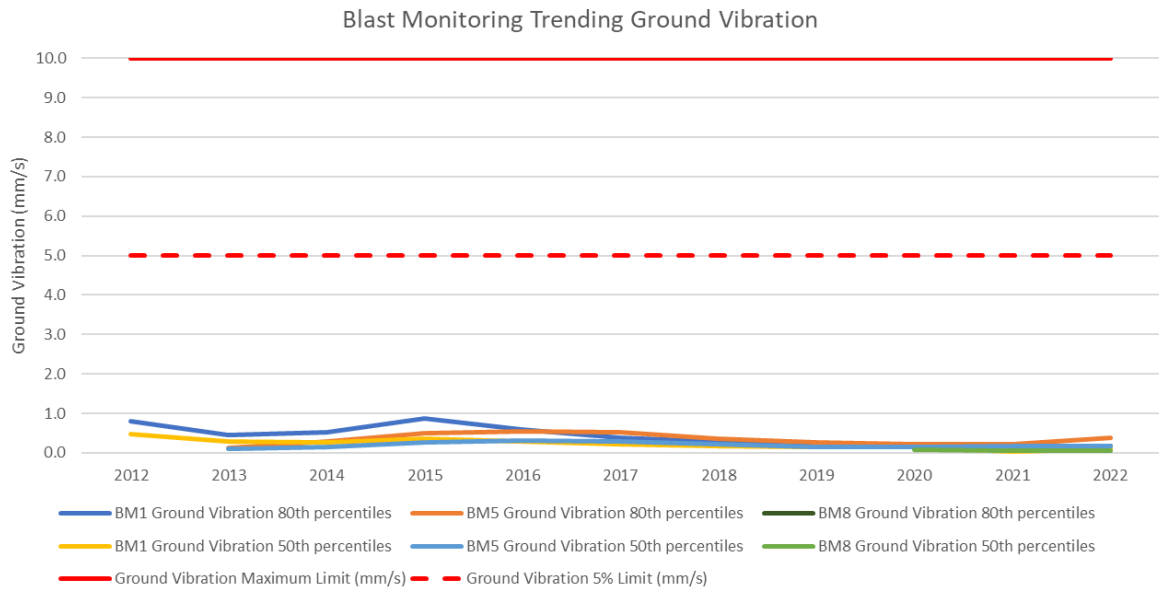


Figure 4 Blast Monitoring Trending Ground Vibration

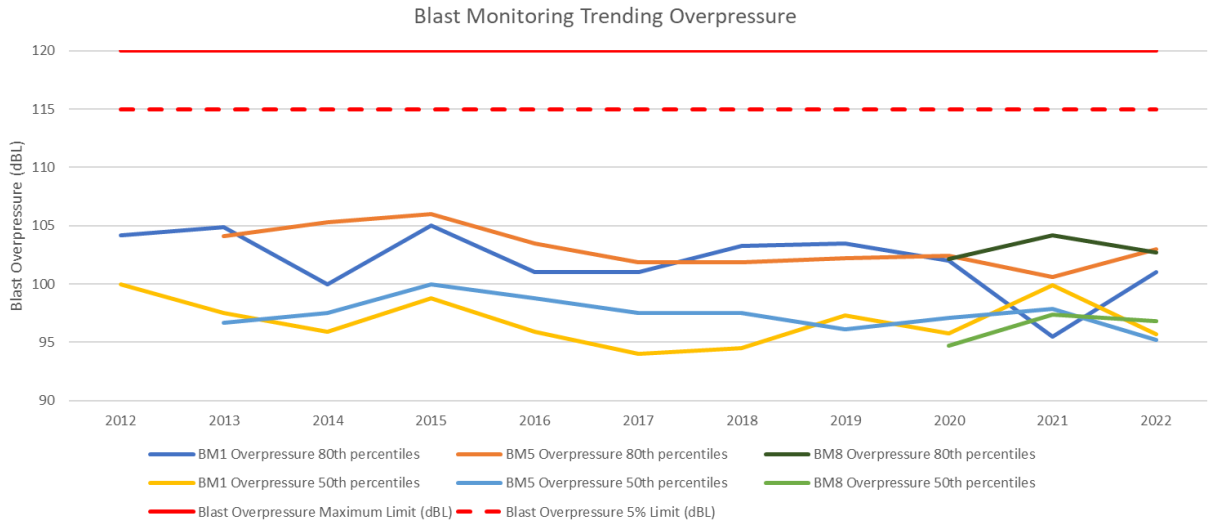


Figure 5 Blast Monitoring Trending Overpressure

6.4 AIR QUALITY

MCO manages air quality in accordance with Air Quality Management Plan (AQMP). The AQMP was most recently revised and approved in October 2020. The AQMP was developed by MCO with advice from experienced and qualified experts (Todoroski Air Sciences) to satisfy Condition 19, Schedule 3 of PA 05_0117 and Condition 22, Schedule 3 of PA 08-0135.

During the reporting period, MCO undertook air quality monitoring in accordance with the approved AQMP (Version 6). This included:

- Deposited particulate matter monitoring with Dust Depositional (DD) gauges at four locations around the Moolarben Coal Complex;
- PM_{10} – High Volume Sampling (HVAS) monitoring at two sites – Ulan Village (PM01) and south-west of Open Cut 1 and west of Open Cut 2 (PM02);
- PM_{10} – Real Time Monitoring via Tapered Element Oscillating Microbalance's (TEOMs) at three permanent locations around the Moolarben Coal Complex representative of private residences and one upwind of operations when winds towards private residences;
- $PM_{2.5}$ - Real Time Monitoring via a dual function Tapered Element Oscillating Microbalance's (TEOMs) at one location around the Moolarben Coal Complex representative of private residences;
- Total Suspended Particulate (TSP) matter calculated from TEOM PM_{10} monitoring results; and
- Meteorological monitoring is undertaken via Automatic Weather Stations (AWSs), with WS03 (located on Ulan Road) the principal station for reporting purposes.

The AQMP monitoring locations are identified in **Appendix 2**. The air quality monitoring program is outlined in **Appendix 3D**. A summary of air quality monitoring results for the reporting period is provided in **Table 16**, **Table 17** and **Appendix 3D**.

Table 16: Air Quality Monitoring Summary

Aspect		Approved Criteria	Performance during the Monitoring Period	Trend/ Key Management Implications	Implemented/proposed Management Action
	Monitoring Form				
Air Quality	**Dust Deposition**	4 g/m^2/month (max total)[1]	Annual averages for each dust depositional gauge are reported in **Table 18**. All dust depositional results for the reporting period were below the 4/g/m^2/month criterion. The 2g/m^2/month criterion was not triggered.	Annual average dust depositional results for the operation indicate a generally consistent trend over the period and remain well below the criteria.	MCO will review and if necessary, revise the AQMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively. During the reporting period MCO continued to maintain the air quality monitoring network.
		2 g/m^2/month above background average (Incremental increase)[2]			
	PM_{10}	50 µg/m^3 (24hr average)[2, 3]	All PM_{10} results were within criteria. Results due to extraordinary events are excluded from the dataset.	24-Hour average PM_{10} results for the operation indicate a slight decreasing trend over the period and remain well below the criteria.	
		25 µg/m^3 (Annual average) [1, 3]	The average PM_{10} results for the reporting period are presented in **Table 19**. All sites were below the Annual average criteria.	Annual average PM_{10} results for the 2022 reporting period indicate a continued steady trend at all locations when compared to 2021.	
	$PM_{2.5}$	25 µg/m^3 (24hr average) [2, 3]	All $PM_{2.5}$ results were within criteria. Results due to extraordinary events are excluded from the dataset.	24-Hour average PM2.5 results for the operation indicate a slight decreasing trend over the period remaining below the criteria.	
		8 µg/m^3 (Annual average) [1, 3]	The annual average $PM_{2.5}$ results for the reporting period are presented in **Table 20**. All results were within criteria.	Annual average $PM_{2.5}$ results for the 2022 reporting period indicate a stable trend when compared to 2021.	
	Total Suspended Particulate (TSP)	90 µg/m^3(Annual average) [1]	TSP results are presented in **Table 21.** TSP is calculated using the approved AQMP methodology based on PM_{10} constituting 40% of the total TSP. During the reporting period, all sites were calculated as being below the 90µg/m^3 criterion.	Annual average TSP results for the 2022 reporting period indicate similar results when compared to 2021 with all sites decreasing during the period.	

[1] Cumulative (i.e. incremental increase in concentrations due to the Moolarben mine complex plus background concentrations due to all other sources);
[2] Incremental impact (i.e. incremental increase in concentrations due to the Moolarben mine complex on its own) with up to 5 allowable exceedances over the life of the project
[3] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents, illegal activities or any other activity agreed by the Secretary.

6.4.1 DATA CAPTURE RATE

The following table (**Table 17**) provides details on the data capture rates for the reporting period. Data capture was impacted by maintenance, power loss and equipment failures.

Table 17 Data Capture Rate for PM_{10} & $PM_{2.5}$ Annual Averages

Location	2022 Data Capture Rate
TEOM 01 (Ulan School)	99%
TEOM 04 (Ulan Road)	98%
TEOM 06 (Ulan-Wollar Road)	99%
TEOM 07 (Ulan Road)[1]	97%
PM 01 (Ulan Village)	100%
PM 02 (Ridge Road)	100%

[1] TEOM monitors for both PM_{10} and $PM_{2.5}$

6.4.2 COMPARISON TO PREVIOUS AIR QUALITY MONITORING AND BACKGROUND LEVELS

Dust Deposition

A comparison of the 2022 dust deposition results with previous results from 2012 and predications in the Environmental Assessment (EA) for Stage 1 Modification 14 and Stage 2 Modification 3 (Year 2019) is provided in **Table 18.**

All deposition results are within criteria and were generally consistent with predicted results (**Table 18**). Data trends are presented in **Appendix 3D.**

Table 18: Comparison of Depositional Dust results

Dust Gauge	Annual Average (g/m2/month) (Criteria = 4 g/m²/month)												
	Back-ground	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	EA Prediction [1]
DG01[#]	1.2	0.3	0.5	0.8	0.6	0.5	0.6	0.9	1.3	0.9	0.5	0.6	1
DG04^	2.0	1.3	1.3	1.6	1.0	1.2	1.0	1.4	1.8	1.0	0.5	1.0	1
DG05^	1.8	0.8	1.0	2.0	0.8	1.3	1.5	1.8	1.5	1.3	0.9	0.7	1
DG09^	-	0.4	0.7	2.0	0.6	0.6	0.9	1.9	1.5	1.3	0.4	0.4	1

[1] EA predictions for 2019
[#] Background monitoring
^Representative of nearest non-mine owned residence

PM_{10}

A comparison of the 2022 PM10 results with previous results from 2012 and predications in the Environmental Assessment (EA) for Stage 1 Modification 14 and Stage 2 Modification 3 is provided in **Table 19.**

Results are within criteria and generally consistent with or below predicted results (**Table 19**) indicating that current air quality management practices are effective. Data trends are presented in **Appendix 3D.**

Table 19: Comparison of annual average PM_{10} Results

Unit	Annual Average (µg/m³)[4] (Criteria = 25 µg/m³)												
	Back-ground	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	EA Prediction[5]
Ulan School (TEOM01)	15.1	10.2	12.4	11.4	13.2	13.0	12.3	15.1	17.3	15.1	12.3	11.3	18
Ulan Road (TEOM04)	-[1]	8.9	10.8	12.7	9.0	11.6	15.1	18.7	20.0	14.1	11.4	10.6	17
Ulan-Wollar Road (TEOM06)	-[1]	-[2]	-[2]	-[2]	9.0	11.5	12.5	15.7	19.7	16.6	12.0	11.1	*
Ulan Road (TEOM07)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	11.2[3]	16.5	15.6	11.4	8.0	6.8	11
Ulan Village HVAS (PM01)	17.9	11.9	12.2	13.8	13.2	11.5	13.0	16.9[6]	18.9	11.8	7.9	7.1	18
Ridge Road HVAS (PM02)	-[1]	9.7	10.0	11.7	10.8	9.9	13.5	18.1[6]	18.7	12.4	8.5	7.4	13

[1] No background values as site established after 2009.
[2] No previous data as site not established.
[3] Calculated on 5 months of data.
[4] Annual Averages exclude extraordinary events such as bushfires and prescribed burns.
[5] EA predictions based on the Open Cut Optimisation Modification 2019 Scenario
[6] 2018 values previous reported including extraordinary events
*No EA prediction was made for TEOM06 as it is representative of conditions 'upwind' of MCO (ie not a private residence)

$PM_{2.5}$

A comparison of the 2022 PM2.5 results with previous results and predications in the Environmental Assessment (EA) for Stage 1 Modification 14 and Stage 2 Modification 3 (Year 2019) is provided in **Table 20.**

Results are within criteria and generally consistent with predicted results, with 2022 results being generally lower than previous years and predicated results (**Table 20**). Data trends are presented in **Appendix 3D.**

Table 20: Comparison of annual average $PM_{2.5}$ Results

Unit	Annual Average (µg/m³)[4] (Criteria = 8 µg/m³)												
	Back-ground	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	EA Prediction[5]
Ulan Road (TEOM07)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]	5.8[3]	5.6	4.4	3.5	5.5

[1] No background values as site established after 2009.
[2] No previous data as site not established.

[3] Calculated on 6 months of data.
[4] Annual Averages exclude extraordinary events such as bushfires and prescribed burns.
[5] EA predictions based on the Open Cut Optimisation Modification 2019 Scenario.

Total Suspended Particulates

TSP results (**Table 21**) are within criteria and generally consistent with predicted results.

Table 21: Comparison of annual average TSP results

Unit	Annual Average Calculated TSP (µg/m3) (Criteria = 90 µg/m3)												
	Back-ground	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	EA Predictions[4]
TEOM01 (Ulan School)	37.75	25.5	31	28.5	33	32.6	30.7	37.7	43.2	37.8	30.8	28.3	35
TEOM04 (Ulan Road)	0	22.25	27	31.75	22.5	29.0	37.9	46.8	50.1	35.3	28.5	26.5	37
TEOM06 (Ulan-Wollar Rd)	-[1]	-[2]	-[2]	-[2]	22.5	28.8	31.4	39.3	49.3	41.5	30.0	27.8	*
TEOM07 (Ulan Road)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	27.9[3]	41.3	39.0	28.5	20.0	17.0	24
PM01 (Ulan Village HVAS)	44.75	29.75	30.5	34.5	33	28.8	32.4	49.0[5]	47.3	29.5	19.8	17.8	35
PM02 (Ridge Road HVAS)	-[1]	24.25	26.25	29.25	27	24.8	33.7	45.3[5]	46.7	31.0	21.3	18.5	28

[1] No background values as site established after 2009.
[2] No previous data as site not established.
[3] Calculated on 5 months of data.
[4] EA predictions based on the Open Cut Optimisation Modification 2019 Scenario
[5] 2018 values previous reported including extraordinary events
*No EA prediction was made for TEOM06 as it is representative of conditions 'upwind' of MCO (ie not a private residence).

6.4.3 SPONTANEOUS COMBUSTION

The revised Air Quality Management Plan (Version 6) was approved in October 2020 with updates to include additional measures for the management of odour related to spontaneous combustion.

During the reporting period MCO continued to manage spontaneous combustion within Open Cut emplacement areas in accordance with the Air Quality Management Plan. Operational actions to manage instances of spontaneous combustion included:

- Restricting access to identified areas;
- Reviewing the risk to personnel, environment, community, and operations;
- Watering to cool known heating;
- Exposure, spreading, and excavation of the heating material;
- Applying further water;
- Cover with inert material, track roll and reshape; and
- Monitoring of area to identify any further areas of heating.

6.4.4 REVIEW OF PARTICULATE CONTROL EMISSIONS

MCC currently apply a number of air quality management measures designed to minimise the impact on the surrounding environment due to on-site activities. A review of particle control emissions at the MCC against industry best practice was completed by Todoroski Air Sciences on behalf of MCO in 2020. The review investigated the range of potential best practice dust controls applicable to the MCC and concluded, the air quality controls applied can be considered to be equivalent with industry best practice.

6.4.5 GREENHOUSE GAS

Yancoal's operations reported under the National Greenhouse and Energy Reporting Scheme for the 2021-22 financial year. MCC Scope 1 and Scope 2 emissions calculated for the 2021-22 financial year was 291,463t CO_2-e. MCC Scope 1 and Scope 2 emissions calculated for the 2020-21 financial year was 278,320t CO_2-e. The approximate 5% increase in emissions can be attributable to an increase in production fleet and diesel use. Scope 1 and Scope 2 emissions attributable to the MCC are generally consistent with Environmental Assessment predictions.

The Stage 2 Preferred Project Report Environmental Assessment (EA) for the facility prepared in 2008 is the most relevant EA to review the 2022 MCC Scope 1 and Scope 2 emissions. It estimated that the MCC would emit 265,560 t CO2e emissions. The greenhouse gas assessment included an estimate of Scope 1 and Scope 2 emissions however, the assessment did not include the increased open cut and underground production associated with Stage 1 Modification 14, and Stage 2 Modification 2. It should also be noted that the national greenhouse accounts factors are annually updated by the Department of Climate Change, Energy, the Environment and Water.

The NGER data reported by the MCC is subject to the rigour required under the NGER Act which includes third party assurance.

6.5 BIODIVERSITY

MCO manages biodiversity in accordance with the Biodiversity Management Plan (BioMP). The BioMP was developed by MCO with advice from experienced and qualified experts (EcoLogical Australia) to satisfy Condition 36, Schedule 3 of PA 05_0117 (as modified) and Condition 39, Schedule 3 of PA 08-0135 (as modified). In accordance with Condition 13(a), Schedule 2 of the Project Approvals (05_0117 and 08_0135), the BioMP is being staged and revisions of the plan will be submitted on a progressive basis. Offset management is also undertaken in accordance with relevant components of the Landscape Management Plan and Biodiversity Offset Management Plan (2008-4444) and Biodiversity Offset Management Plan (2013/6926).

The objectives of the management plans are to provide procedures and strategies to be implemented during the life of the Project to minimise biodiversity impacts on site (albeit in consideration of the approved impacts) and enhance biodiversity values on the offset areas. In addition to monitoring, the management plans describe procedures for:

- Vegetation Clearance Protocol – including Ground Disturbance Permits (GDPs), Pre-clearance surveys, habitat features, identification of suitable release locations;
- Collection and use of locally sourced native seed and supplementary tubestock;
- Strategies to manage vegetation onsite and improve vegetation connectivity; and

- Additional biodiversity measures – rehabilitation of the environmental bund, weed and pest management, surface water management and erosion control, management of grazing and agriculture, access restrictions, and bushfire management.

The objective of biodiversity monitoring is to evaluate the vegetation and fauna habitat condition at the Moolarben Coal Complex (including recovery and/or enhancement of native vegetation) and to identify appropriate management actions to be applied, where required. Biodiversity monitoring relating to the vegetation management zone also includes noxious weed and vertebrate pest monitoring. Monitoring will be used to measure success against the short, medium and long-term targets described in the management plans and identify the need for corrective actions.

Monitoring of mine rehabilitation areas is described in the Rehabilitation Management Plan.

6.5.1 BIODIVERSITY OFFSET SECURITY

Each biodiversity offset area (BOAs) will be secured and managed for long-term biodiversity conservation in accordance with appropriate and suitable legal instruments. Security mechanisms applicable to MCO BOAs include:

- Positive and Restrictive Covenants;
- Transfer to the National Parks Estate;
- Conservation Agreements; and
- Biodiversity Offsets Scheme Credits - Biodiversity Stewardship Agreement.

The management and security mechanisms for each approval and associated BOA, including status are provided in **Table 22**.

Table 22: Security Mechanism and Management Instrument

Environmental Approval	Offset Area	Security Mechanism	Status
NSW Stage 1 and EPBC 2007	Area 1 (Sydney Basin)	Covenant	Secured
NSW Stage 1 and EPBC 2007	Portion of Area 1 (Sydney Basin)	National Park Estate*	Transferred to NPE
NSW Stage 1 and EPBC 2007 and 2017	Area 2 (Moolarben)	Covenant	Secured
NSW Stage 1 and EPBC 2007	Portion of Area 2 (Moolarben)	National Park Estate* & State Conservation Area	Transferred to NPE
NSW Stage 1 and EPBC 2007	Area 3 (Property 6)	Covenant	Secured
NSW Stage 1 and EPBC 2013	Clarke	Covenant	Secured
NSW Stage 1 and EPBC 2013	Clifford	Covenant	Secured
NSW Stage 1 and EPBC 2013	Elward	Covenant	Secured

Environmental Approval	Offset Area	Security Mechanism	Status
NSW Stage 1 and EPBC 2013	Property 5	Covenant	Secured
NSW Stage 1 and EPBC 2013	Bobadeen (West and East)	Covenant	Secured
NSW Stage 1 Only	Moolarmoo	Covenant	Secured
NSW Stage 1 Only	Properties 24 and 25	Covenant	Secured
NSW Stage 2 and EPBC 2008	Onsite Offsets	Covenant	Secured
NSW Stage 2 and EPBC 2008	Old Bobadeen	Covenant	Secured
NSW Stage 2 and EPBC 2008	Libertus	Covenant	Secured
NSW Stage 2 and EPBC 2008	Ulan 18	Covenant	Secured
NSW Stage 2 and EPBC 2008	Dun Dun East	Covenant	Secured
NSW Stage 2 and EPBC 2008	Dun Dun West	Covenant	Secured
NSW Stage 2 and EPBC 2008	Avisford 1	National Park Estate**	Transferred to NPE
NSW Stage 2 and EPBC 2008	Avisford 2	Conservation Agreement	Secured
NSW Stage 1 and EPBC 2017	OC2/3 Rehabilitation	Rehabilitation Management Plan	Ongoing
NSW Stage 1 and EPBC 2017	Gilgal	Biodiversity Stewardship Agreement	Application submitted Ongoing

* To be managed by NPWS in accordance with the Goulburn River National Park and Munghorn Gap Nature Reserve Plan of Management (NSW National Parks and Wildlife Service).
** To be managed by NPWS in accordance with the Avisford Nature Reserve (ANR) Plan of Management (NSW National Parks and Wildlife Service).

6.5.2 BIODIVERSITY OFFSET WORKS UNDERTAKEN

During the reporting period weed and feral animal monitoring and control works were undertaken throughout the offsets. Wild dog and feral pig baiting programs were undertaken in conjunction with the NSW Local Land Service (LLS) and neighbouring landholders within biodiversity offset properties. Weed control works were undertaken throughout the offset areas focusing on Serrated Tussock, Blackberries, Blue Heliotrope, Tree of Heaven, St Johns Wort, African Lovegrass, Spiny Burr Grass and Prickly Pear. Native seed collection was continued within MCO owned lands and some offset areas.

Revegetation works were continued within the offsets with over 25,000 stems planted to supplement natural regeneration within the Dun Dun Biodiversity Offset cluster.

6.5.3 BIODIVERSITY OFFSET MONITORING

Flora and fauna monitoring during the reporting period included the Stage 1 Biodiversity Offset Areas (BOAs), Stage 1 Mod 9 offset areas, and the Stage 2 BOAs. Flora monitoring included monitoring of analogue sites located in National Parks or State Conservation Areas. Monitoring locations are provided in **Appendix 2**.

Offset monitoring included:

- Full floristic surveys
- Rapid assessment
- Fauna surveys targeting diurnal and nocturnal birds, reptiles, amphibians, mammals, microbats and habitat assessment

Monitoring is undertaken across two management zones that have been mapped within the BOAs. Each of these zones have defined strategic ecological management objectives, with an overall aim to achieve a sustainable landscape with improved overall ecological quality in the long term. The management zones are:

- Management Zone 1 (MZ1) – Enhancement of remnant vegetation; and
- Management Zone 2 (MZ2) – Regeneration/revegetation of grassland to forest/woodland.

6.5.3.1 Offset Monitoring Results

6.5.3.2 Stage 1 Offset Monitoring Outcomes

The Box Woodland MZ2 area within Area 1 BOA met all performance criteria outlined in the Land Management Plan (LMP).

The Red Gum Woodland MZ2 areas monitored during Spring 2022 within Area 1 and Area 3 BOAs met all performance criteria outlined in the LMP. The Red Gum Woodland areas monitored in Autumn within Area 1 and Area 3 BOAs met all criteria that apply at the current stage of development and are on a trajectory to meet all criteria in the long-term or have been actively revegetated to ensure all criteria are met.

The Sedimentary Ironbark Forest MZ2 areas within Area 1 BOA met all criterion that apply at the current stage of development and are on a trajectory to meet all criteria in the long-term.

The Alluvial Apple Woodland MZ2 areas within Area 2 BOA met all criteria that apply at the current stage of development and are on a trajectory to meet all criteria in the long-term. The Alluvial Apple Woodland MZ2 areas within Area 1 BOA met most of the criteria that apply at the current stage of development and have shown recent improvements in performance against the remaining criteria.

All MZ1 areas across all vegetation associations across all Stage 1 BOAs met the performance criteria outlined in the LMP (MCO 2013).

6.5.3.2.1 Trends in overall biodiversity values

BioBanking Assessment Methodology (BBAM) site values scores (SVSs) (OEH 2014) provide an integrated metric of the general biodiversity values of a zone regardless of vegetation type. They can be used to identify whether biodiversity values are being maintained or improved. For Stage 1

MZ1 areas, an assessment of SVSs demonstrated:

- An overall improvement in biodiversity values within Area 1 BOA, with SVSs close to analogue values.
- The maintenance of biodiversity values within Area 2 and Area 3 BOAs, with SVSs close to analogue values at Area 2 BOA.

For Stage 1 MZ2 areas, an assessment of SVSs demonstrated:

- SVSs within Area 1 and Area 3 BOA are relatively high and have improved slightly over time relative to analogue sites due to an improvement in several structural attribute scores including native overstorey cover and native groundcover.
- SVSs within Area 2 BOA have remained relatively stable.

6.5.3.3 MOD 9 Offset Monitoring Outcomes

6.5.3.3.1 Assessment against BOMP Completion Criteria for MZ2 areas

Completion criteria will have been achieved when the vegetation has either achieved the relevant BVT benchmark condition (for at least one upper structural layer and one ground cover class) or it can be demonstrated that it is on a self-sustaining trend towards the relevant benchmark condition.

All MZ2 areas within Clarke BOA achieved all completion criteria.

At Bobadeen BOA, all MZ2 areas within the Blakely's Red Gum – Yellow Box Grassy Open Forest vegetation community area achieved all completion criteria. For the remaining vegetation communities within Bobadeen BOA sites achieved native groundcover benchmark condition. However, no MZ2 areas have yet to reliably achieve native overstorey or mid-storey benchmark condition.

At Moolarmoo BOA, all MZ2 areas achieved native groundcover benchmark condition in at least one season. However, no MZ2 areas have yet to reliably achieve native overstorey or mid- storey benchmark condition.

At Property 5 BOA and Property 24 & 25 BOA, all MZ2 areas within the Blakely's Red Gum – Yellow Box Grassy open Forest vegetation community achieved all completion criteria.

The Rough-barked Apple – Silvertop Stringybark – Red Stringybark Grassy Open Forest vegetation community within MZ2 areas achieved native groundcover benchmark condition, but have not yet achieved native overstorey or mid-storey benchmark condition.

6.5.3.4 Trends in overall biodiversity values

BBAM SVSs were used to determine whether biodiversity values are being maintained or improved. For MOD9 MZ1 areas the monitoring demonstrated that:

- The maintenance of biodiversity values at Bobadeen, Clarke, Clifford, Elward, Moolarmoo and Property 24 & 25 BOAs relative to the analogue sites.
- Biodiversity values including species diversity and structure were trending towards the analogue SVSs at Property 5 BOA.

For MOD9 MZ2 areas the monitoring demonstrated that:

- The condition of the vegetation at Clarke BOA is relatively high with SVSs approaching and now mirroring those of MZ1 areas. This is also reflected in performance against the BOMP completion criteria in 2022. Native overstorey cover is increasing and overall conditions have improved slightly over time relative to analogues. However, areas still require some habitat augmentation.
- The SVS at Bobadeen, Moolarmoo, Property 5 and Property 24 & 25 BOAs have remained similar across monitoring years. Recent plantings are yet to contribute towards monitoring improvements.

6.5.4 Stage 2 Offset Monitoring Outcomes

6.5.4.1.1 Assessment against Stage 2 BOMP Performance Indicators and Completion Criteria

The MCO BOMP determined the monitoring program across the Stage 2 BOAs in 2022. The vegetation monitoring in autumn 2022 was the first round of monitoring and assessment against the approved performance measures in the BOMP. Fauna monitoring resumed in Spring 2022. The key findings from the 2022 monitoring against the Performance Indicators and Completion Criteria are summarised below.

- For Offset Outcome 1(a) (woodland/forest) areas at all relevant BOAs are:
  - Expected to meet the Performance Indicator within the six yearly assessment timeframe,
  - Currently achieving all Completion Criteria or are expected to achieve all criteria by the target date (2065).
- For Offset Outcome 1(a) (DNG) areas within:
  - Dun Dun West, Libertus, Onsite Offset and Ulan 18 had sufficient natural and/or assisted regeneration.
  - Dun Dun East did not have sufficient natural and/or assisted regeneration. This BOA has planned active revegetation that will assist in achieving Completion Criteria by the target date (2065).
  - Dun Dun East, Dun Dun West and On-site Offsets BOAs are on a trajectory to meet the Completion Criteria relating to the presence of overstorey species capable of providing habitat (foraging and/or roosting) for woodland birds and bats by 2065.
- All Offset Outcome 1(b) (woodland) areas at all relevant BOAs are:
  - Currently achieving or are expected to achieve all Completion Criteria by 2065.
- All Offset Outcome 1(b) (DNG) areas:
  - All relevant BOAs had sufficient natural and/or assisted regeneration .
  - Dun Dun East BOA is currently achieving or is on a trajectory to achieve all Completion Criteria by 2065.
  - Old Bobadeen BOA is currently achieving, or is on a trajectory to achieve, two out of four of the Completion Criteria by 2065.

6.5.5 ACTIONS FOR NEXT REPORTING PERIOD

During the next period activities to be undertaken include review of management plans and revision where necessary, continued monitoring, assisted regeneration planning and implementation, fencing, track and fire trail works, continued weed and feral animal control works, and progression of Gilgal Biodiversity Stewardship Agreement.

6.6 HERITAGE

MCO manages heritage in accordance with the Heritage Management Plan (HMP). The current HMP (Version 8) was approved in September 2020.

During the reporting period MCO continued the salvage and management of Aboriginal heritage sites associated with the project. The results of all survey and salvage activities during the period have been included in the MCO heritage database.

Annual inspections of historic heritage conservation areas were completed during 2022, the areas continue to be managed in accordance with the HMP.

6.6.1 ACTIONS FOR NEXT REPORTING PERIOD

Further salvage and management of Aboriginal and European heritage sites associated with the project may be completed during the next reporting period. Registered Aboriginal Party (RAP) groups will continue to be involved in due diligence and salvage works in accordance with the Heritage Management Plan.

6.7 BUSHFIRE

No major outbreaks of fire occurred at the MCC during the reporting period. MCO continued to implement the Bushfire Management Plan and conducted bushfire trail inspections and maintenance across Moolarben Coal owned lands. In the next reporting period inspection and maintenance works on fire trails will continue.

6.8 WASTE MANAGEMENT

During the reporting period MCO continued to maintain a Total Integrated Waste Management Service to manage all waste streams generated on site and to maximise recycling. This includes general waste, cardboard and paper recycling, batteries, waste oil and steel. The volumes of total waste and recycled material removed from site are shown in **Table 23**. During the reporting period 72 % of all waste removed from site was recycled. Waste volumes have been variable since 2012, with volumes increasing in association with the expansion of the operations, commencement of underground operations and construction works.

Table 23: Waste Removal Volumes removed during the reporting period

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Waste (t)	990.6	1379.6	1490.5	1276.7	2615.1	2612.9	2559.3	3087.1	3578.4	3485.2	3682.2
Recycled Waste (t)	778.2	1173.1	1346.5	1058.3	1730.2	1806.0	1851.4	2178.0	2408.9	2578.4	2669
Percentage Recycled	79%	85%	90%	83%	66%	69%	72%	71%	67%	74%	72%

7.0 WATER MANAGEMENT

MCO manages water in accordance with the Water Management Plan (WAMP). The WAMP (Version 6) and its component plans including Site Water Balance (SWB) (Version 4), Surface Water Management Plan (SWMP) (Version 6) and Groundwater Management Plan (GWMP) (Version 4). The SWMP was revised and approved in December 2022.

During the reporting period, MCO undertook water monitoring and data review in accordance with the WAMP. Surface water and groundwater monitoring sites are provided in **Appendix 2.** Surface water monitoring includes:

- Surface water quality and flow (monthly/6 monthly/event based);
- Stream health (annually);
- Channel stability (annually);
- Mine site water management structures quality (monthly); and
- Licensed discharge points.

Groundwater related monitoring includes:

- Groundwater levels/pressure (monthly);
- Groundwater quality (6 monthly);
- Groundwater take; and
- Potential seepage from mine water storages.

The groundwater monitoring includes the following lithological units:

- Quaternary alluvium;
- Tertiary aged unconsolidated sediments;
- Triassic sandstones;
- Permian coal measures;
- Ulan seam coal;
- Marrangaroo formation; and
- Basement units (consisting mostly of granites and metavolcanics).

During the period MCO continued to maintain and construct water storages (mine, brine, and sediment storages), extended the dewatering and transfer network and installed operational and construction related erosion and sediment controls.

Details of water licensing and associated take are provided in **Section 7.1**. A summary of the site water balance is provided in **Section 7.2**. A summary of surface water monitoring and groundwater monitoring results for the reporting period are provided in **Section 7.3** and **Section 7.4** respectively. Detailed surface water and groundwater monitoring results for the reporting period are provided at **Appendix 3F** and **Appendix 3G** respectively.

7.1 WATER LICENCES

A summary of water take and available water under water access licences for the reporting period (1 January to 31 December 2022), as well as a prediction for the next reporting period (1 January to 31 December 2023) is provided in **Table 24**. Water take is provided in six monthly periods to coincide with the water year (i.e. 1 July 2021 to 30 June 2022).

Table 24: Water Licences and Take

Water Access Licence	Description	Available Water (Units) [1]	2022 Estimated Water take (ML)[2]			2023 Forecast Water Take (ML)
			Jan – Jun	Jul - Dec	Total	
36340, 37583	Wollar Creek Water Source	436	19	40	59	67
37582, 19052, 41888	Upper Goulburn River Water Source	498	0.1	0.2	0.3	0.3
39799	Sydney Basin - North Coast Groundwater Sources	5,900	1,783[3]	1,969[3]	3,718[3]	3,271

[1] One unit equivalent to 1.0 ML as per the *Available Water Determination Order for Various NSW Unregulated and Alluvial Water Sources (No. 1) 2018* and *Available Water Determination Order for the North Coast Coastal Sands and the North Coast Fractured and Porous Rock Groundwater Sources 2018 for the 2020/21 water year. Available water is reported in IWAS including carry-over and temporary transfers.*

[2] Groundwater Model and water balance used to estimate water take by water source.

[3] No water was directly extracted from WAL 39799 tagged groundwater extraction bores.

Water take is estimated as part of the Annual Review after the end of the calendar year. MCO determines water take in accordance with the approved WAMP. Water take is either groundwater inflow removed from the operation, water extracted from licenced bores or modelled take from surface and alluvial aquifers. The review estimate incorporates site water balance reconciliations, recirculation to underground and water take for the period. Indirect or passive take is based on modelling predictions for the relevant period.

Water take by water source has been determined in consideration of the most recent Groundwater Model review associated with the OC3 Extension Project. The estimated water take during the 2022 calendar year has been summarised in **Table 24**.

The available water for 2021/22 water year for all water sources was greater than the water take. MCO will continue to take necessary action to ensure that it holds sufficient water entitlements.

7.2 WATER BALANCE

MCO monitors the water balance for the operation to assist forecasting and management of site water. The site water balance (**Table 25**) for the reporting period was prepared with input from suitably qualified and experienced consultants WRM and AGE. Site water storage increased by 1,098ML during the reporting period due to an increase in rainfall run-off and groundwater inflows. The main demands were coal processing and dust suppression. The Balance includes a variance of 1,287ML (17.1%).

During the Period, no water was extracted from licences Production Bores.

Table 25: Site Water Balance

Water Sources (Inflows)	Volume (ML)
UCML Water	0
Groundwater Extraction (bores)	0
Rainfall / runoff	3,732
Groundwater inflows	3,777
Total	7,509
Water Loss (Outflows)	
Evaporation	1,051
Seepage	0
Construction & dust suppression	1,129
Licensed Discharge	4,584
CHPP Demand	698
Underground demand	237
Total	7,699
Water Balance	
Inflows minus outflows	-190
Change in inventory	1,098
Balance	-1,287 (17.1%)

7.3 SURFACE WATER

7.3.1 SURFACE WATER QUALITY AND FLOWS

7.3.1.1 Surface Water Flows

The MCC is within the Upper Goulburn River and Wollar Creek catchments. Moolarben Creek and Sportsmans Hollow Creek are the primary tributaries of the upper Goulburn River catchment with Bora Creek a minor tributary. Wilpinjong Creek and its minor tributaries (Eastern and Murragamba Creeks) drain to the Wollar Creek. Most of the adjacent watercourses are ephemeral in nature.

In accordance with the SWMP, stream flow gauges have been installed in the ephemeral Wilpinjong, Murragamba, and Eastern Creeks. Creek flow is heavily influenced by rain events. Data has been supplemented with data from Ulan Coal Mines as required. The recorded stream gauging is provided in **Appendix 3F**.

7.3.1.2 Surface Water Quality

Surface water monitoring was undertaken in the Goulburn River, Moolarben Creek, Wilpinjong Creek, Murragamba Creek, and Eastern Creek in accordance with the SWMP. Results varied both spatially and temporally consistent with fluctuations associated with rainfall events in ephemeral watercourses.

Monitoring results during the reporting period were influenced by above average rainfall which continued from 2020 and 2021 through to 2022. The findings are described in **Section 7.3.1.3** below. Water quality data for the period is presented in **Figure 6, Figure 7, Figure 8 and Figure 9**Figure **8**. Monitoring data is provided in **Appendix 3F**.

Figure 6: Goulburn River Water Quality

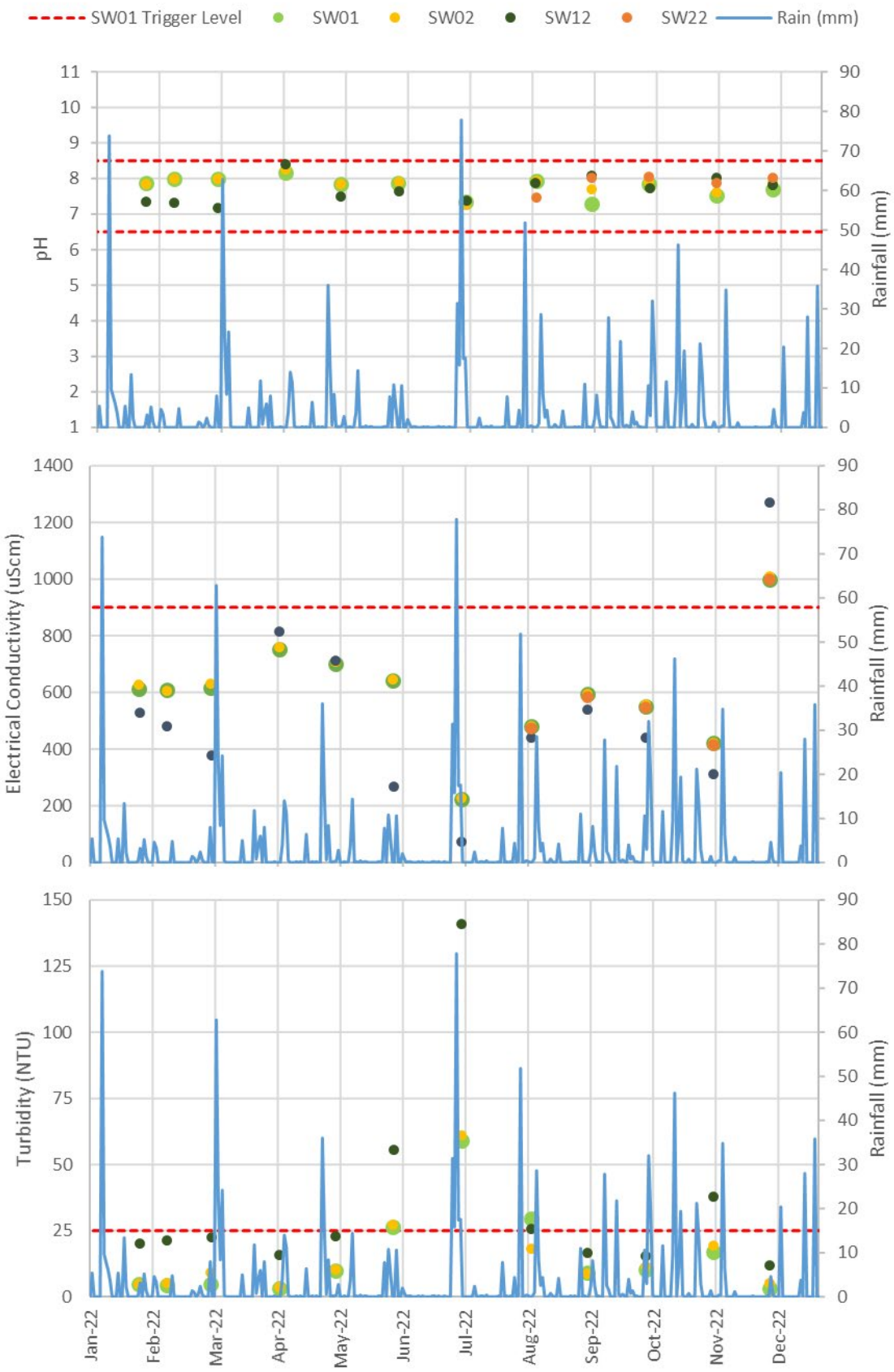


Figure 7: Moolarben and Lagoon Creek Water Quality

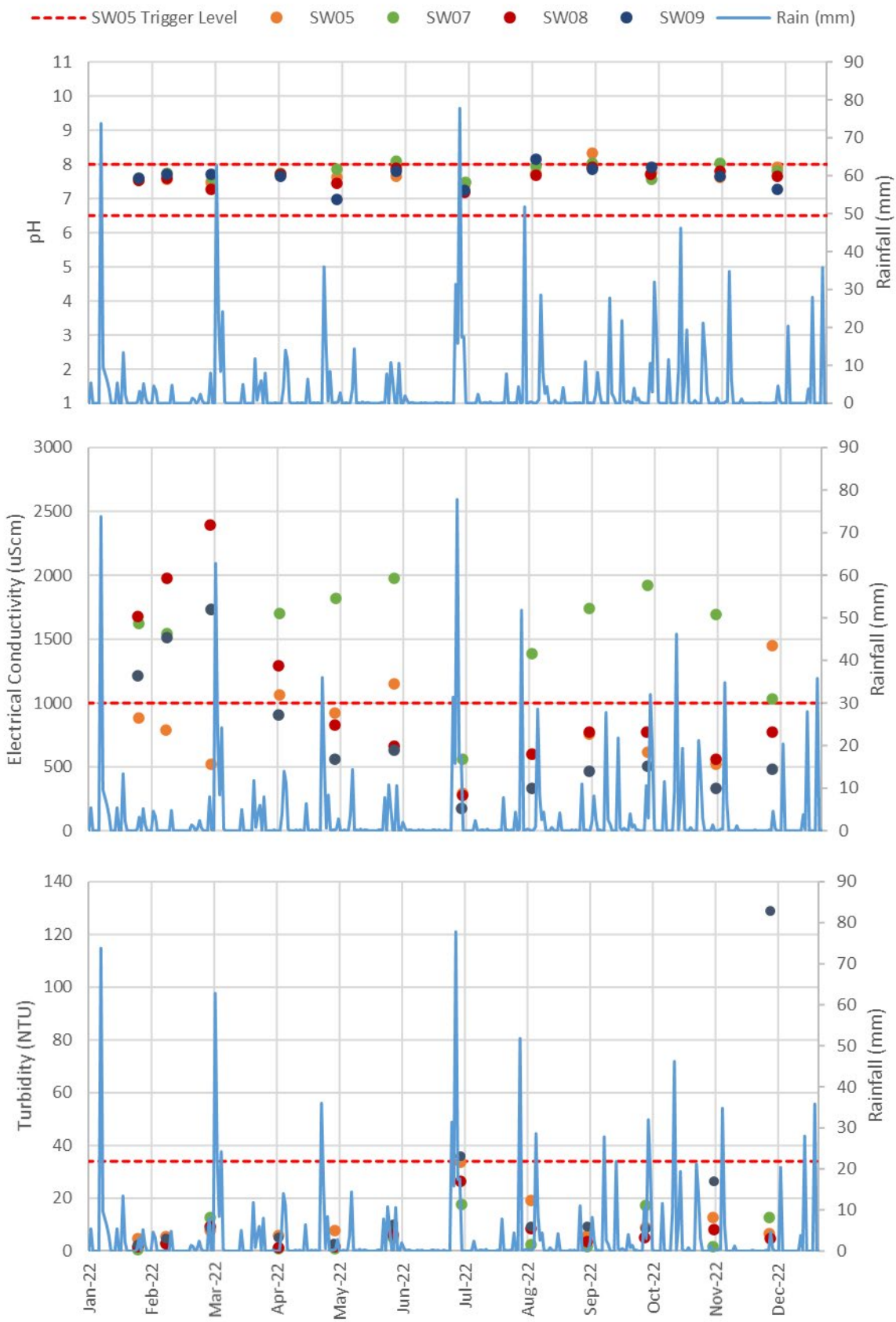


Figure 8: Murragamba, Eastern and Wilpinjong Creek Water Quality

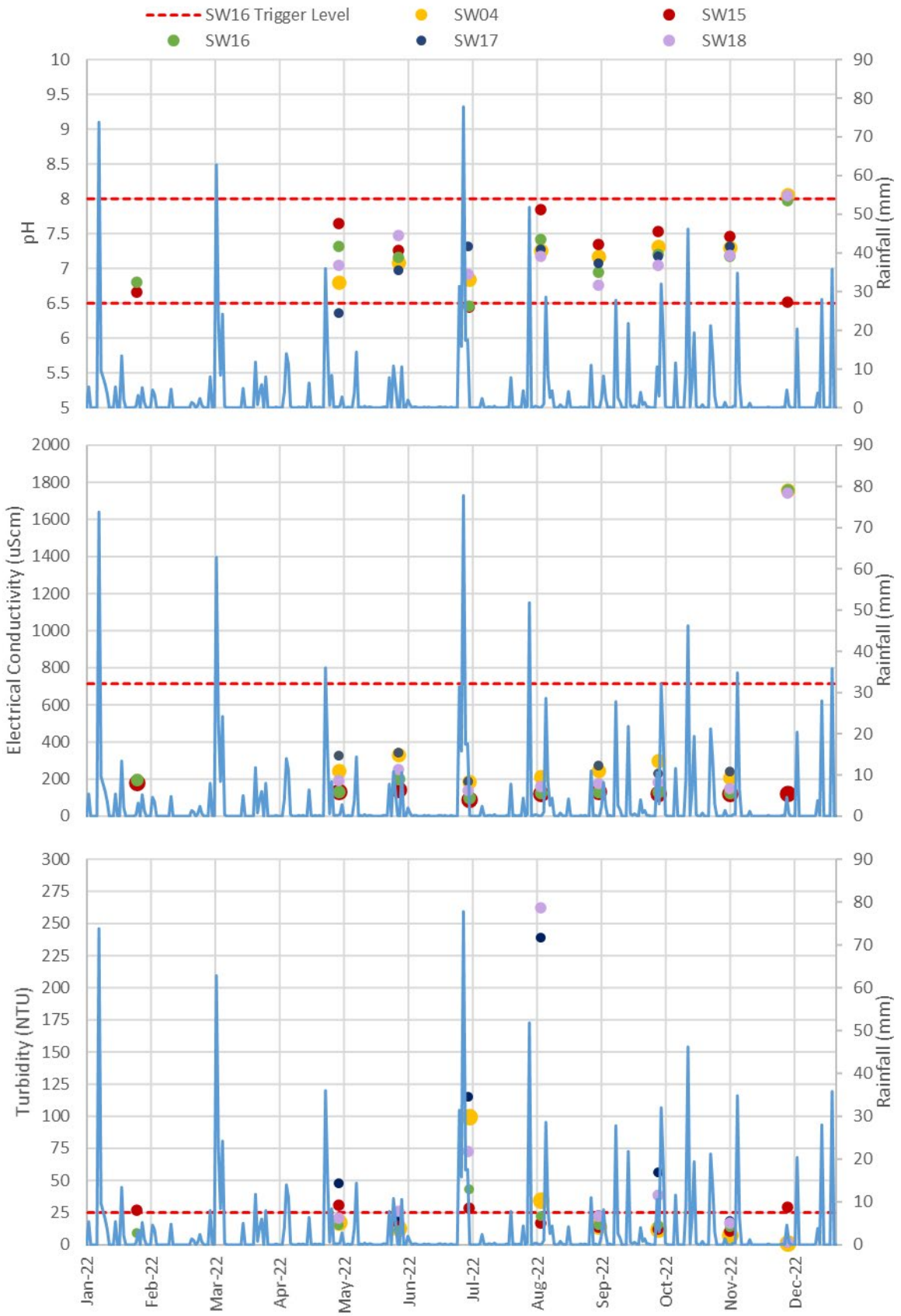
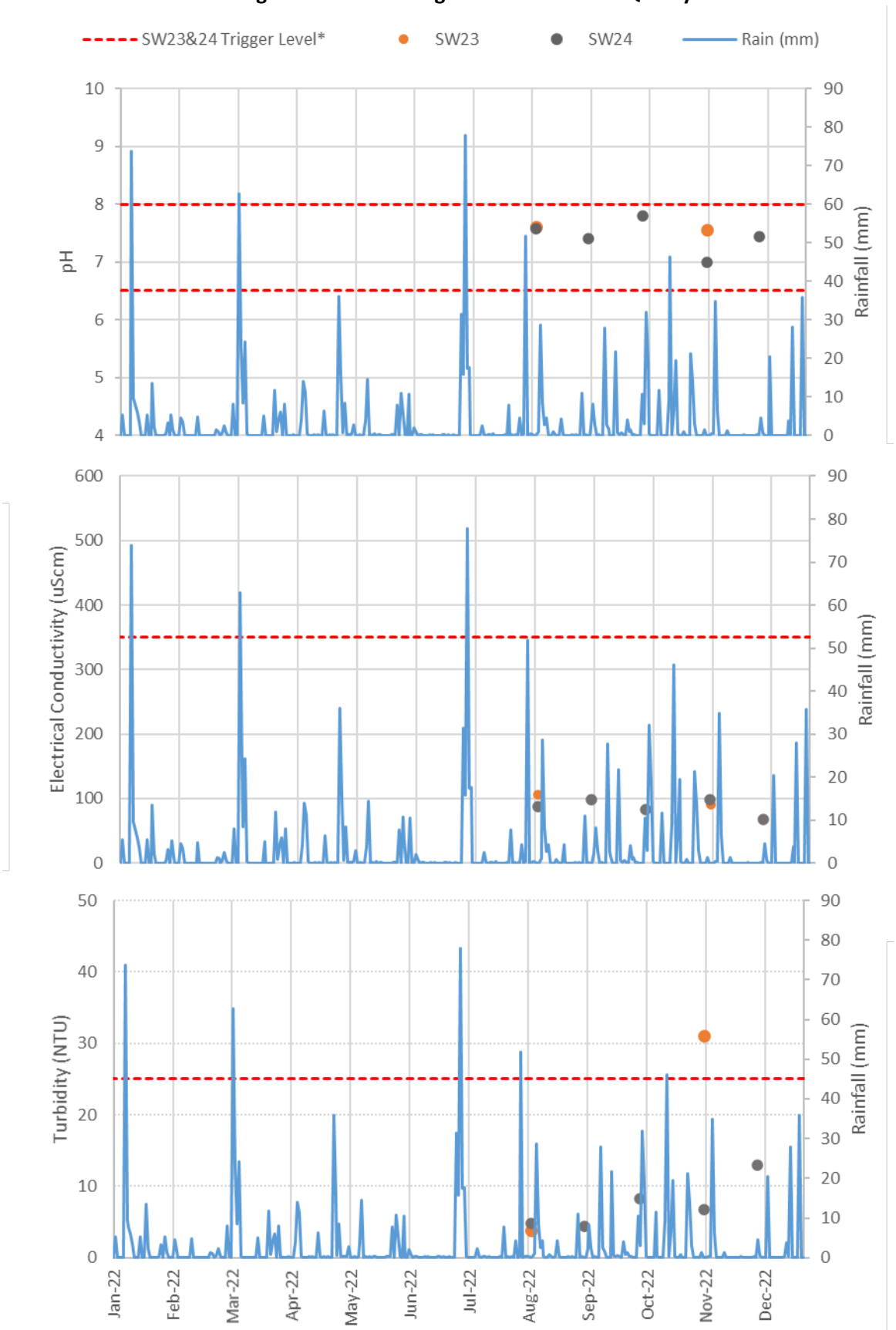


Figure 9: UG4 Drainage Line 1 & 2 Water Quality



** Triggers not applicable as mining has not commenced in LW406.*

7.3.1.3 Comparison to baseline and trends

Location	Trigger Investigation Values (20th / 80th %ile or ANZECC Guideline)		Performance during the Monitoring Period (01/01/2022 – 31/12/2022)	Trend/ Key Management Implications (Monitoring Period 01/01/2018 – 31/12/2022)	Implemented / proposed Management Action
Surface Water Quality					
Goulburn River Sites; SW01* SW02 SW12 SW22	PH	*6.5 – 8.5*	Surface water pH in the Goulburn River ranged from 7.3 to 8.0 (20%ile and 80%ile) during 2022. Readings were similar to historical data. All SW01 results were within the current trigger levels during the period.	pH readings range between 7.3 and 8.0 (20%ile and 80%ile) for SW01, SW02 and SW22 and between 6.8 and 7.6 (20%ile and 80%ile) for SW12. There is no discernible trend in pH at these locations over the last five years.	Continue the implementation of the SWMP. MCO will review, and if necessary, revise the SWMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively.
	EC	*900*	The EC readings were generally consistent with the samples over the last five years. EC ranged from 324 to 696 (20%ile and 80%ile) during the reporting period. SW01 EC results were below trigger levels for all months during the reporting period except December.	EC readings range between 529 and 828 µS/cm (20%ile and 80%ile) for SW01 and SW02 and between 317 and 645 µS/cm (20%ile and 80%ile) for SW12.The recorded EC values for Goulburn River are generally below the SW01 trigger level (900 µS/cm) over the last five years.	
	Turbidity	*25*	The turbidity samples over 2022 in the Goulburn River were generally consistent with historical data. Rainfall events prior to monthly monitoring contributed to higher turbidity levels at SW01 during 2022.	Turbidity readings range between 0.4 and 10.2 NTU (20%ile and 80%ile) for SW01 and SW02 and between 6.2 and 28.4 NTU (20%ile and 80%ile) for SW12.	
Moolarben and Lagoons Creek	PH	*6.5 – 7.7*	Surface water pH in the Moolarben and Lagoon creeks ranged from 7.3 to 8.0 (20%ile and 80%ile). Readings were generally within the historical range.	pH for all four monitoring locations was neutral to slightly alkaline ranging from 6.6 to 7.8 (20%ile and 80%ile). The pH at SW08 and SW09, upstream of the confluence of Lagoon Creek, is generally lower than at SW05 and SW07. There is no discernible trend in the results.	

Location	Trigger Investigation Values (20th / 80th %ile or ANZECC Guideline)		Performance during the Monitoring Period (01/01/2022 – 31/12/2022)	Trend/ Key Management Implications (Monitoring Period 01/01/2018 – 31/12/2022)	Implemented / proposed Management Action
Sites; SW05* SW07 SW08 SW09	EC	*1,000*	The EC readings at SW05 between April, June and December were above the SW05 trigger level (between 1,060 and 1,450 µs/cm), coinciding with periods of lower flow and the release from EPA LDP53 in December. Surface water EC in the upstream sites ranged from 362 to 1,804 µs/cm (20%ile and 80%ile) during 2022.	EC readings at SW05 range between 535 and 926 µS/cm (20%ile and 80%ile) and are generally lower than the SW05 trigger level. Upstream Lagoon Creek (SW07) and Moolarben Creek (SW08 and SW09), the EC readings are elevated ranging between 1,530 and 4,562 µS/cm (20%ile and 80%ile). EC is naturally elevated in these watercourses, with EC often higher at the upstream locations than the downstream locations.	
	Turbidity	*34*	Turbidity readings were all consistent with the historical data with elevated readings associated with rainfall events.	The 20th percentile turbidity readings for all four monitoring locations ranges between 0.6 and 5.7 NTU, while the 80th percentile ranges between 7.9 and 33.6 NTU. There is no discernible trend in turbidity at these locations over the last five years.	
Murragamba, Eastern and Wilpinjong Creek Sites; SW04 SW15 SW16* SW17 SW18	PH	*6.5-8.0*	Surface water pH in the Murragamba, Eastern and Wilpinjong Creek ranged from 6.6 to 7.6 (20%ile and 80%ile). Readings were generally within the historical range.	pH readings range between 6.7 and 7.3 (20%ile and 80%ile) for Murragamba Creek (SW04). Wilpinjong Creek (SW15, SW16 & SW18) has pH ranging between 6.3 and 7.1 (20%ile and 80%ile). Eastern Creek (SW17) has a pH ranging between 5.7 and 7.2 (20%ile and 80%ile). There is no discernible trend in pH at these locations over the last five years.	
	EC	*714*	The EC readings were generally consistent with historical data. EC ranged from 128 to 201 (20%ile and 80%ile) for SW16. All SW16 EC	The EC in Murragamba Creek ranges between 212 and 443 µS/cm (20%ile and 80%ile) for SW04. Wilpinjong Creek has EC ranging between 126 and 401 µS/cm (20%ile and 80%ile).	

Location	Trigger Investigation Values (20th / 80th %ile or ANZECC Guideline)		Performance during the Monitoring Period (01/01/2022 – 31/12/2022)	Trend/ Key Management Implications (Monitoring Period 01/01/2018 – 31/12/2022)	Implemented / proposed Management Action
			readings were within the trigger level and consistent with historical records.	Eastern Creek has EC ranging between 182 and 461 µS/cm (20%ile and 80%ile). There is no discernible trend in EC at these locations over the last five years.	
	Turbidity	*25*	Turbidity readings were all consistent with the historical data.	Murragamba Creek has turbidity readings between 11.9 and 53.4 NTU (20%ile and 80%ile). Wilpinjong Creek has a turbidity ranging between 10.4 and 51.6 NTU (20%ile and 80%ile). Eastern Creek has a turbidity ranging between 26.3 and 73.8 NTU (20%ile and 80%ile). There is no discernible trend in turbidity at these locations over the last five years.	
Drainage Line 1 & 2 SW23* SW24*	pH	*6.5 – 8.0***	Surface water pH in the UG4 Drainage Lines ranged from 7.3 to 7.6 (20%ile and 80%ile).	ND	
	EC	*350***	EC readings ranged between 80 and 103 (20%ile and 80%ile).	ND	
	Turbidity	*25***	Turbidity readings ranged from 4.7 to 25.7 (20%ile and 80%ile).	ND	

* Monitoring site associated with trigger investigation levels
** Triggers will be applicable from the commencement of LW406
ND No data (i.e. less than 24 monitoring points)

7.3.1.4 Rainfall Event Sampling

As per MCO's approved SWMP, rainfall sampling is undertaken where rainfall exceeds 30mm in 24 hours. During the reporting period, there were eleven occasions where rainfall events triggered the requirement to collect additional water samples. All samples were collected within the prescribed timeframes.

7.3.2 WATER DISCHARGES

MCO is licensed to discharge water in accordance with its Environment Protection Licence (EPL 12932) subject to various water quality and rainfall criteria.

During the reporting period MCO released water from EPA Licenced Discharge Points 1, 53 and 54. A total of 4,584 megalitres of water were released from MCO during 2022. All compliance limits were met during releases. Discharge results are presented in **Figure 12** to **Figure 24**. A summary of discharge results is provided in **Appendix 3F**.

During the reporting period one incident occurred that resulted in the release of water at LDP01 with free chlorine levels greater than ANZECC guidelines for 95% species protection.

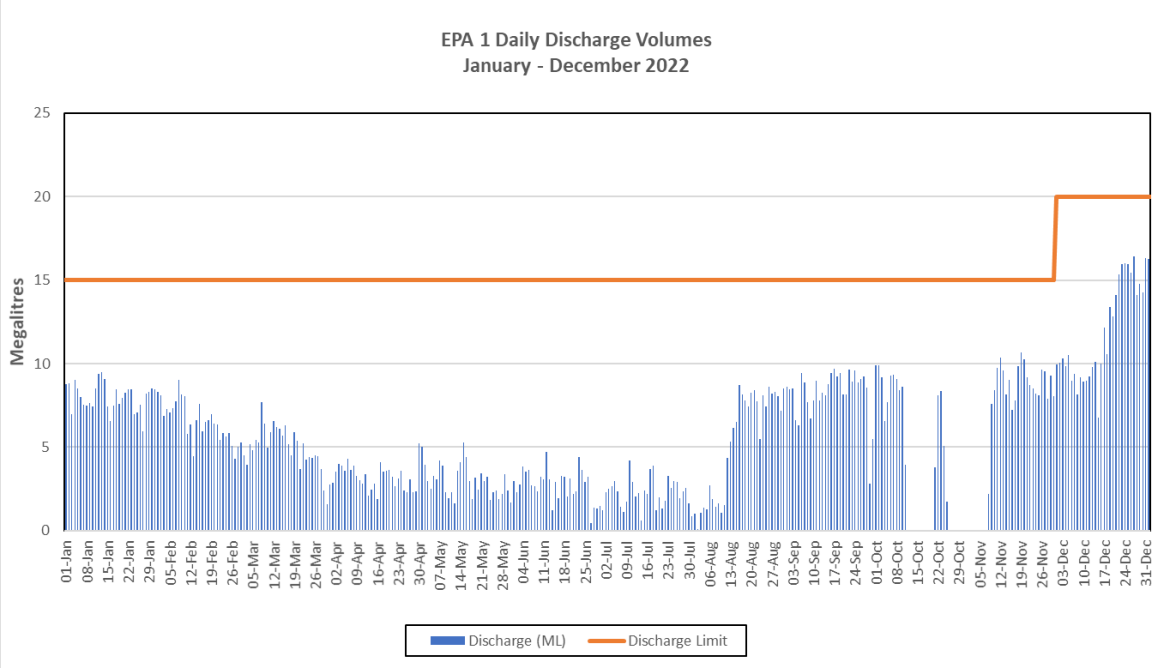


Figure 10 Daily Discharge Volumes[1] EPL LDP 1

1 As per the EPL 12932 approved 15 November 2022 Condition E1 the daily discharge volume limit increased to 20 ML/d.

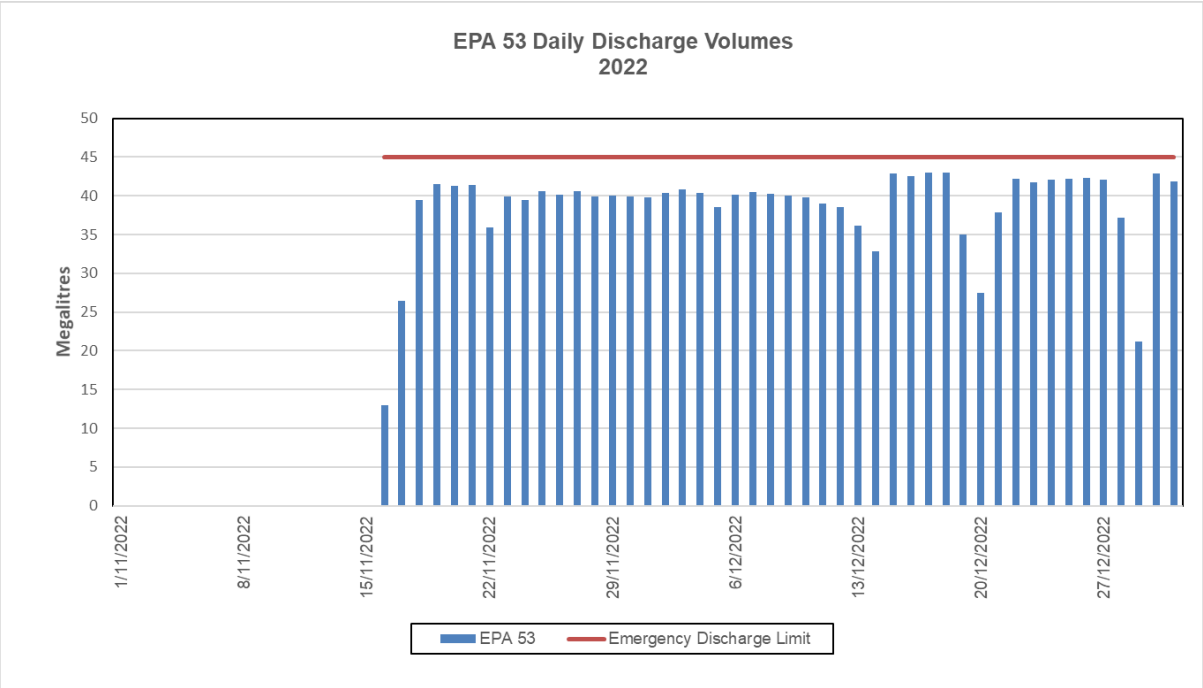


Figure 11 Daily Discharge Volumes EPL LDP 53

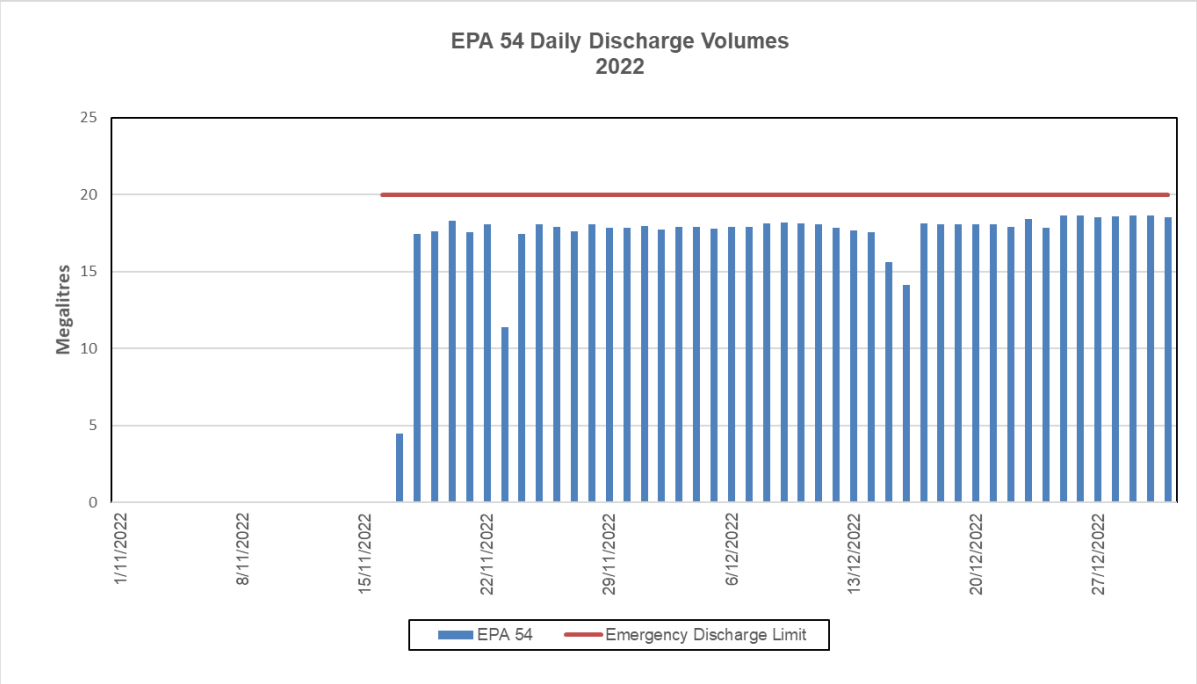


Figure 12 Daily Discharge Volumes EPL LDP 54

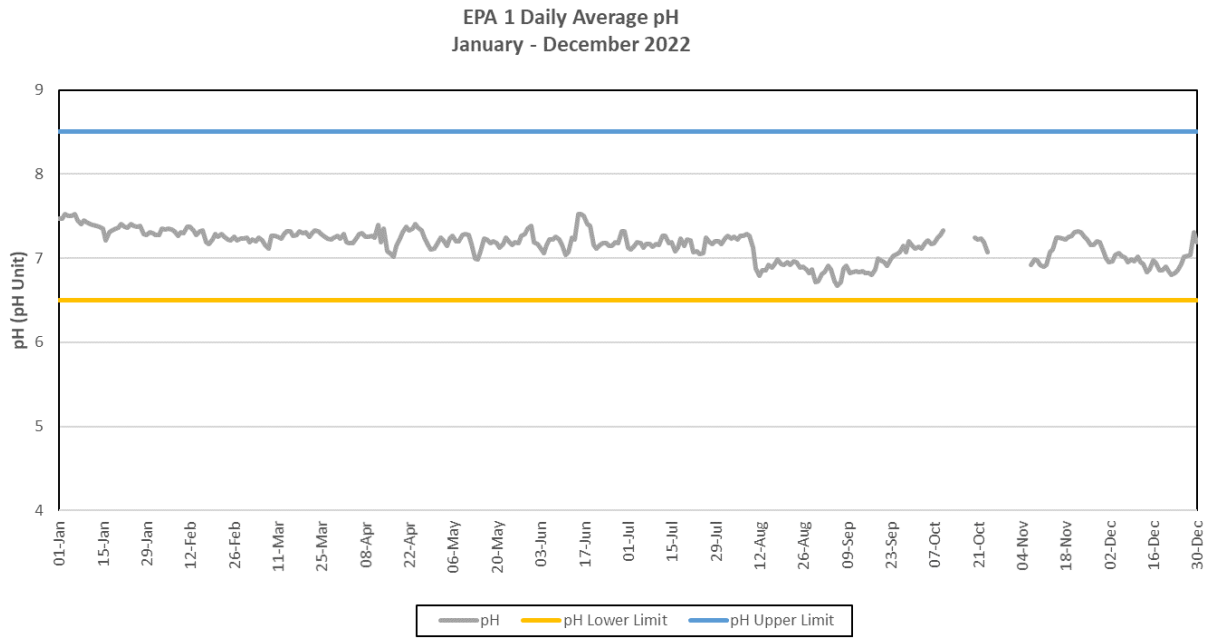


Figure 13: EPL LDP 1 Daily Average pH

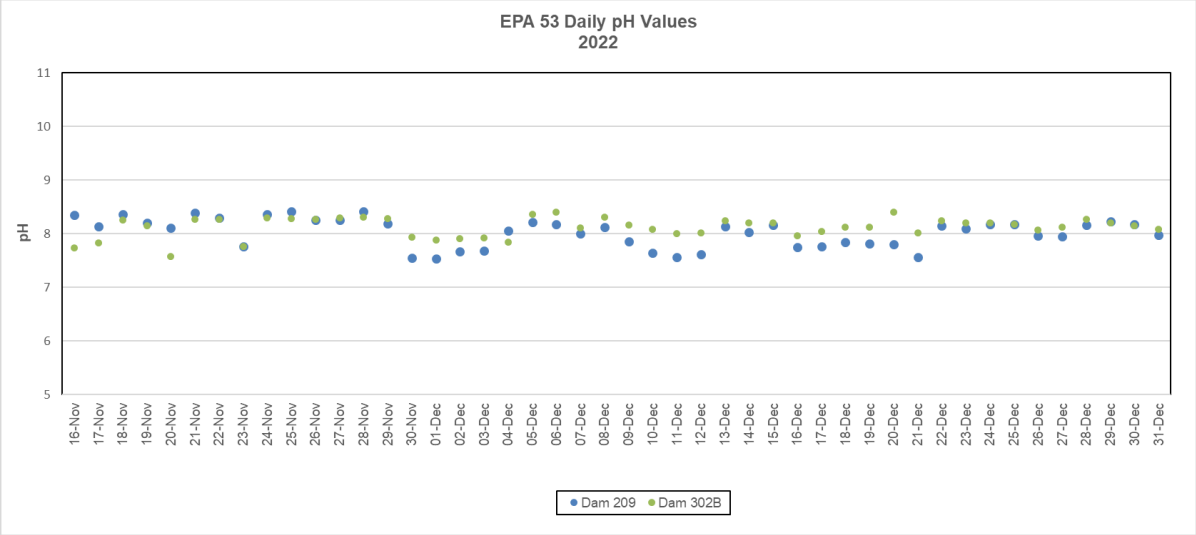


Figure 14: EPL LDP 53 Daily pH

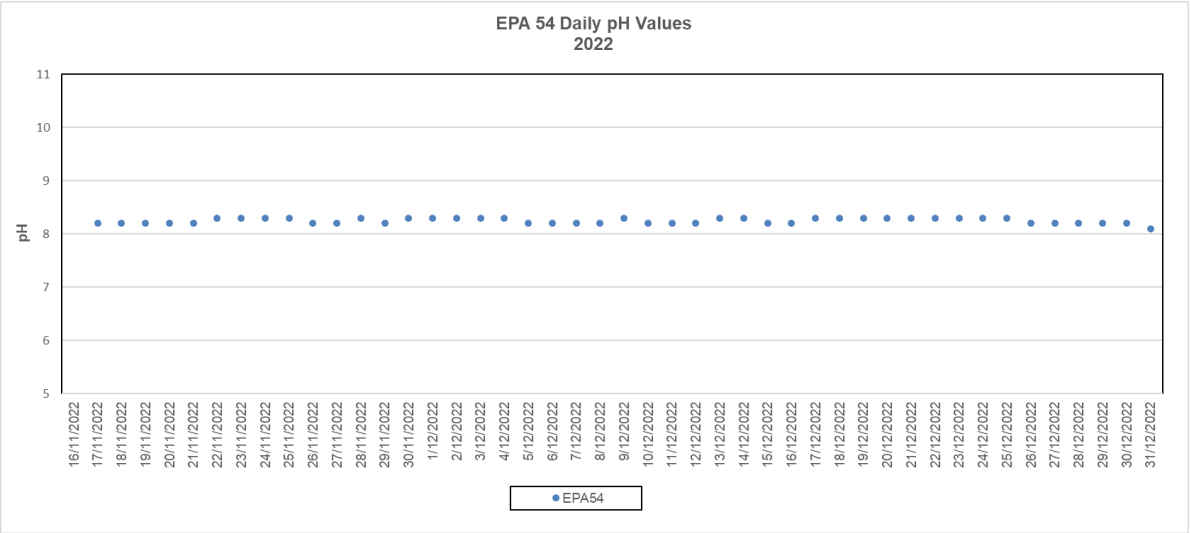


Figure 15: EPL LDP 54 Daily pH

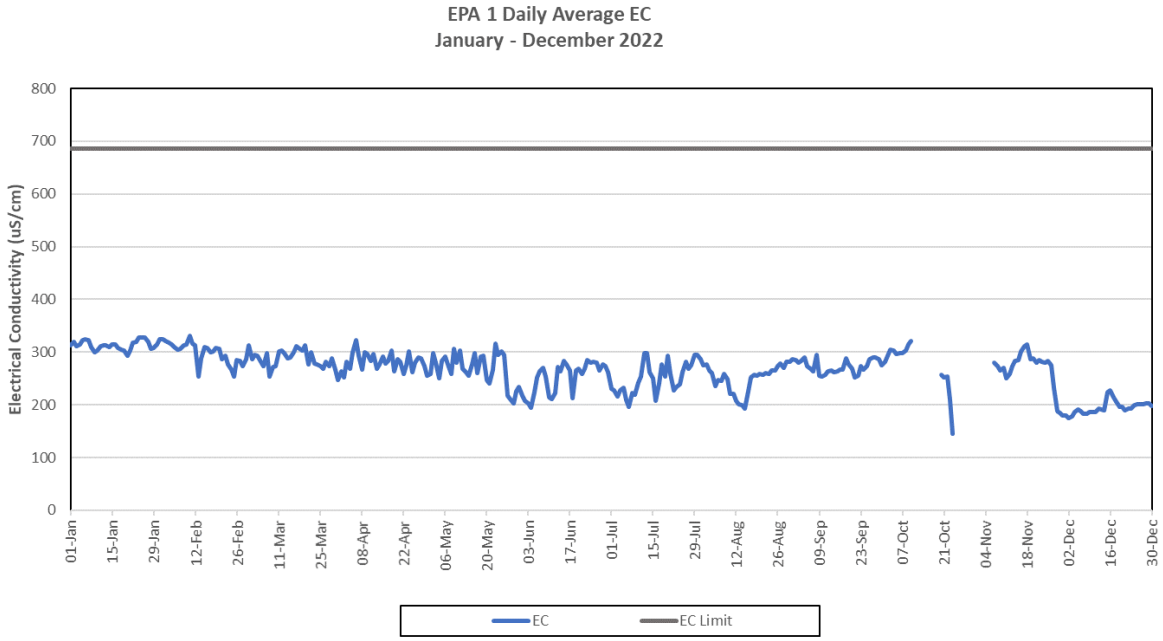


Figure 16: EPL LDP 1 Daily AverageEC (µs/cm)

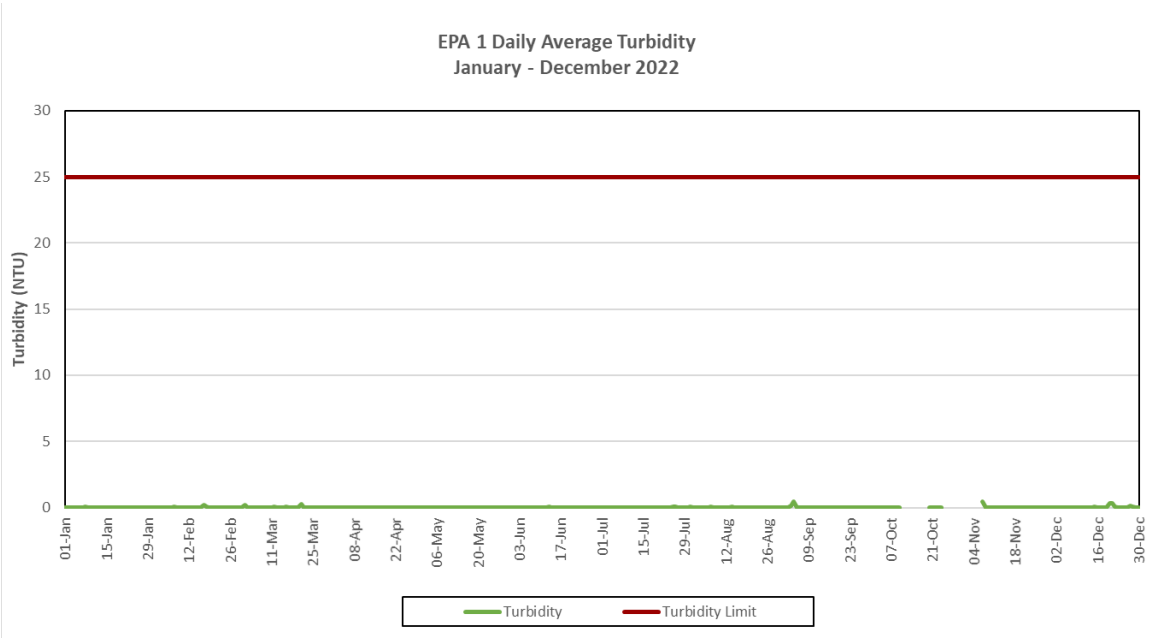


Figure 17: EPL LDP 1 Daily Average Turbidity (NTU)

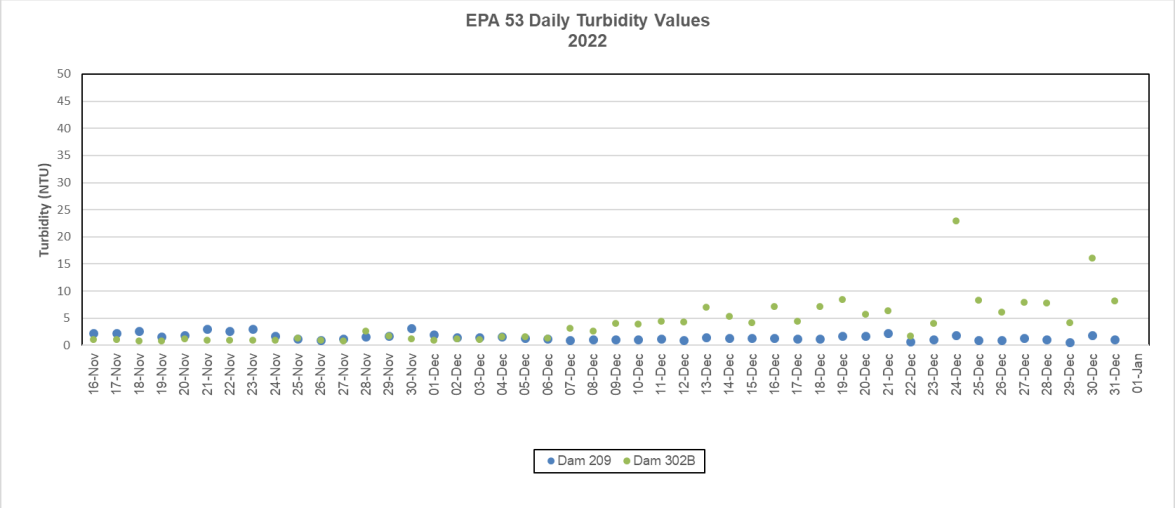


Figure 18: EPL LDP 53 Daily Turbidity (NTU)

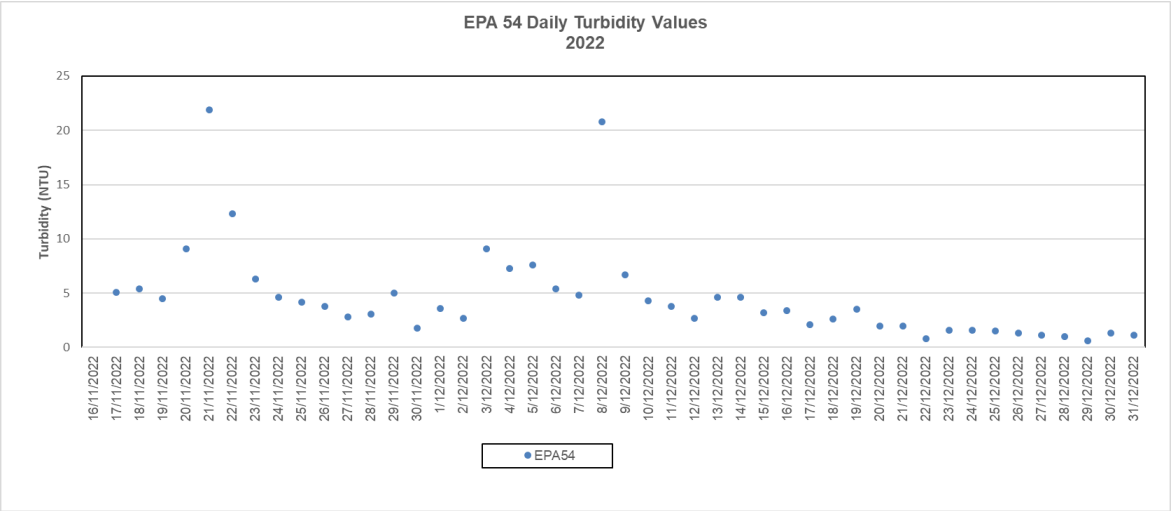


Figure 19: EPL LDP 54 Daily Turbidity (NTU)

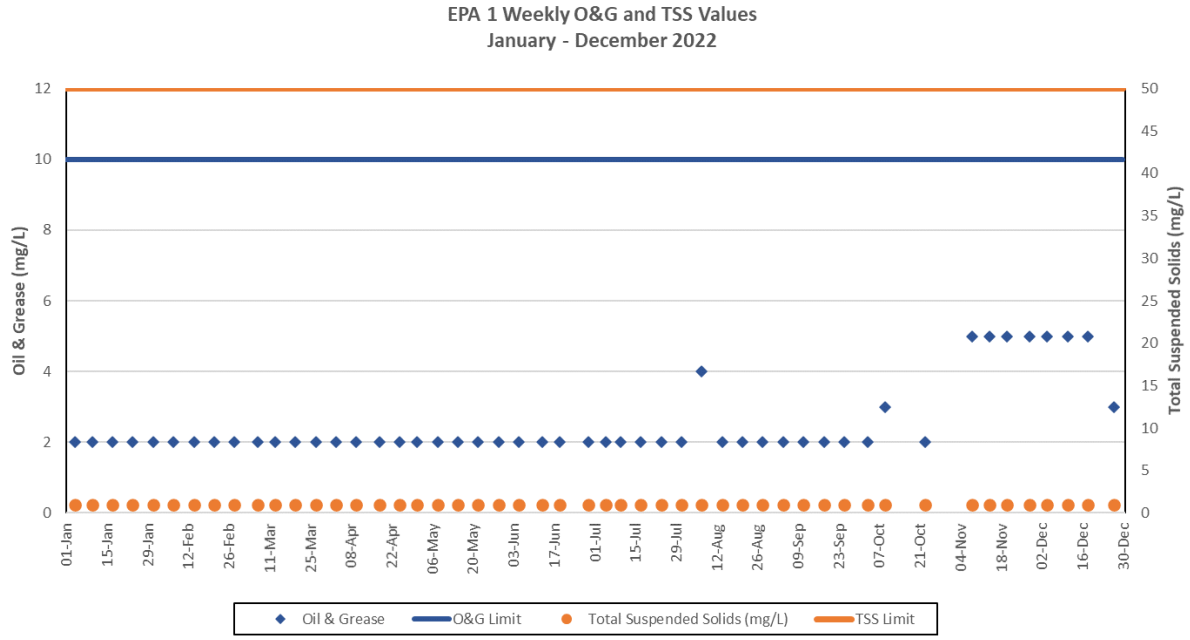


Figure 20: EPL LDP 1 Weekly Oil & Grease and Total Suspended Solids (mg/L)

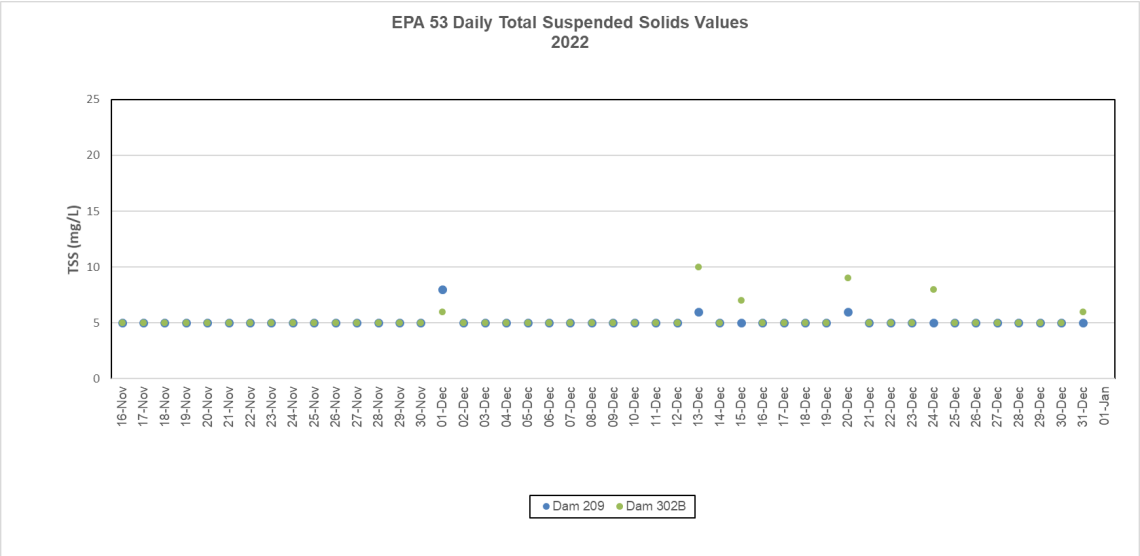


Figure 21: EPL LDP 53 Total Suspended Solids (mg/L)

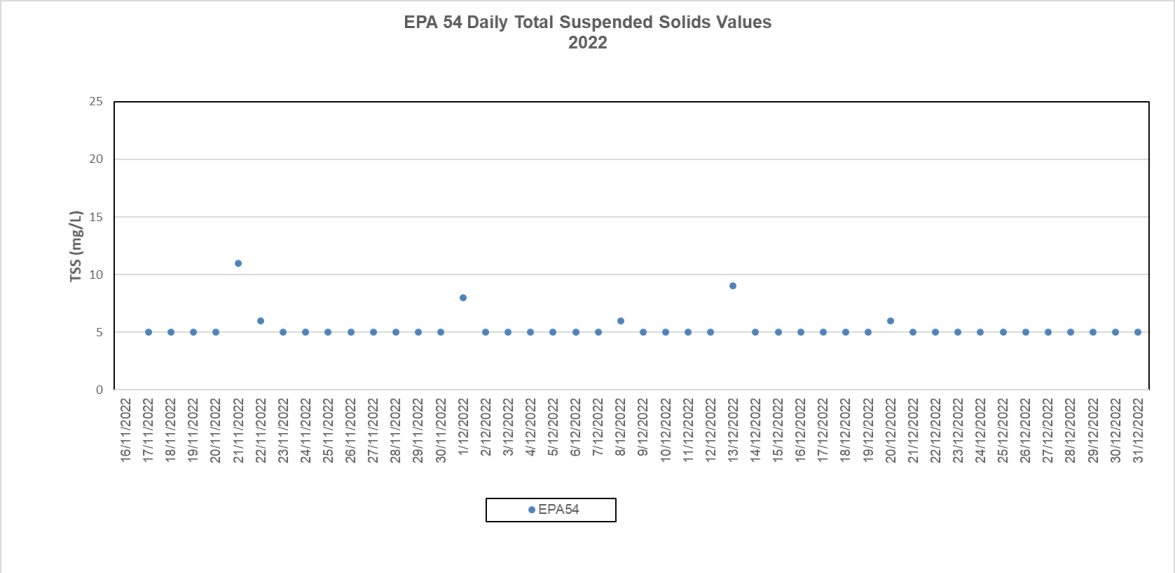


Figure 22: EPL LDP 54 Total Suspended Solids (mg/L)

7.3.3 STREAM HEALTH MONITORING

Stream health monitoring was undertaken in Autumn and Spring 2022 including Aquatic Habitat Condition (RCE Index), Aquatic Macroinvertebrate Diversity and Pollution Tolerance SIGNAL2 Scores. Trigger investigation values have been incorporated into the SWMP with investigations triggered when values fall below the trigger value. Scores from the Autumn and Spring monitoring programs all identified above these values.

7.3.3.1 Autumn 2022

Rainfall activity over the period leading into the autumn 2022 survey was characterised by wet conditions, with increasing frequency and magnitude of precipitation events observed over January to March, and while the weeks leading into the autumn 2022 survey saw consistent light showers the overall quantity of rainfall was low. Sampling for the autumn 2022 stream health monitoring was

undertaken between 11th and 14nd April. Summaries of stream health index results for all monitoring locations except for SH03 (insufficient water) are provided below.

- Aquatic Habitat Condition (RCE Index) – The autumn 2022 RCE values ranged between 46% and 79% over all monitoring sites (**Figure 3-e**). Compared to the previous spring 2021 survey, there were changes to RCE category scores at five of the 15 monitoring sites, with most changes in channel related condition of three RCE categories between consecutive surveys: bank undercutting, channel sediment accumulations and aquatic vegetation. Moolarben Creek catchment sites SH08 and SH12 recorded slight changes in RCE due to a change in category score for 'aquatic vegetation' as a result of fluctuations in the relative levels of filamentous green algae between surveys, as did Goulburn River sites SH05 and SH01B and downstream Wilpinjong Creek site SH17, which also recorded a reduced category score for 'Bank undercutting', due to minor increases in bank instability in the downstream half of the site. New sample sites SH21 (Moolarben Creek) and SH22 (Murdering Creek) recorded RCE values were within the range of the other Moolarben Creek catchment sites (at 59% and 54% respectively), supporting several condition attributes consistent with the other Moolarben Creek sites.

- Aquatic Macroinvertebrate Diversity – The autumn 2022 site macroinvertebrate diversity ranged between 18 taxa SH16 and 36 taxa at SH12 (**Figure 3-e**), and were above the established trigger values at SH02, SH06 and SH17. All of the nine sites for which pre-mining mean values exist recorded diversity results above their respective pre-mining average values with the exception of site SH06, and both SH12 (36 taxa) and SH10 (29 taxa) recorded their highest diversity values to date in autumn 2022. Excluding the new upper Moolarben Creek sample sites SH21 and SH22, the autumn 2022 mean (± standard deviation SD) site taxa diversity over all monitoring sites (26.2 ± 5.2 taxa per site) was the highest mean diversity since 2016.

- Pollution Tolerance SIGNAL-2 Scores – The autumn 2022 SIGNAL-2 values ranged between 3.06 at SH14 and 4.47 at Goulburn River site SH13 (**Figure 3-e**). The SIGNAL-2 values at SH02, SH06 and SH17 were above established trigger levels. All sites for which pre-mining average values exist recorded higher SIGNAL-2 scores compared to pre-mining average values, with SH04 and SH20 recording their highest values to date. Moolarben Creek upper catchment sites SH21 and SH22 recorded SIGNAL-2 results consistent with the Moolarben Creek sites in autumn 2022 (at 3.58 and 3.96 respectively).

7.3.3.2 Spring 2022

Following on from the 2022 autumn stream health survey, spring was characterised by an initial drying period followed by intense storm activity and consistent wet weather events. The period from July to September saw more than double the average rainfall which resulted in several flood events of varying magnitude. The 2022 spring stream health monitoring was undertaken on the 8th November. Summaries of stream health index results for all monitoring locations except for SH03 (insufficient water) are provided below.

- Aquatic Habitat Condition (RCE Index) – The spring 2022 site RCE scores ranged from 47% at SH20 and 81% at SH13 (**Figure 3-e**). There were no changes in site RCE scores between the autumn 2022 and spring 2022 surveys at four of the 16 monitoring sites, indicating a relative stability in channel and riparian condition. Changes in RCE scores between surveys were for

the most part attributable to flow impacts, in particular channel related categories, including sediment deposition (channel sediment accumulations) at six sites, levels of siltation (stream bottom) and detrital accumulation (stream detritus) at four sites each. Fluctuations in the levels of filamentous green algae and macrophytes resulted in changes at seven sites, however the variations were mostly minor (<1%).

- Aquatic Macroinvertebrate Diversity – The spring 2022 site macroinvertebrate diversity ranged from 21 taxa at SH16 to 34 taxa at SH17 (**Figure 3-e**) and were above the established trigger values at sites SH02, SH06 and SH17. Of the nine sites for which pre-mining values exist, sites SH01B and SH02 were the only sites which recorded macroinvertebrate diversity values below their respective pre-mining mean values. Several sites recorded their highest diversity values to date, including long-term monitoring sites SH04 (31 taxa), SH05 (33 taxa), SH06 (28 taxa), SH08 (31 taxa) and SH10, (30 taxa), plus Goulburn River site SH20 (33 taxa) and all four Wilpinjong Creek sites (range of 21 to 34 taxa). Excluding the new upper Moolarben Creek sample sites SH21 and SH22, the spring 2022 mean (± standard deviation SD) site taxa diversity over all monitoring sites (29.4 ± 3.6 taxa per site) was the highest mean diversity to date.

- Pollution Tolerance SIGNAL-2 Scores – The spring 2022 SIGNAL-2 values ranged between 3.54 at SH14 and 4.87 at SH12 (**Figure 3-e**), and were above the established trigger values at sites SH02, SH06 and SH17. All sites for which pre-mining average values exist recorded SIGNAL-2 values above their pre-mining average values, with several sites recording their highest SIGNAL-2 values to date, including Goulburn River site SH04 (4.10), Moolarben Creek sites SH06 (4.25), SH08 (4.17), SH10 (4.17) and Wilpinjong Creek site SH15 (3.65). The resulting spring 2022 mean site SIGNAL-2 value (4.07 ± 0.33) was the highest survey mean to date.

7.3.3.3 Trends

The 2022 sample year saw a continuation of above average rainfall conditions which would have maintained stream flows and aquatic habitats throughout the study area watercourses. Recent stream health monitoring surveys in 2020 and 2021 documented the post-drought recovery of aquatic habitats through improved stream health riparian, channel and macroinvertebrate indices, and the 2022 stream health results saw a continuation in the pattern of post-drought recovery.

Most sites have maintained stable, or gradually improving RCE scores, with subtle inter-seasonal variations owing to fluctuations in the relative levels of macrophytes and stream algae providing the main source of variation among sites. The other main source of temporal variation in RCE scores have been associated with flow events, and their impacts on channel bank and bed environments. Most of the Moolarben Creek sites have displayed resilience to flood events, recording consistent, and slightly improving RCE scores from the drought to post drought recovery period. Goulburn River sites have been subjected to localised bank erosion and incision, deposition and loss of mobile sandy sediments and detrital accumulations, but have also demonstrated gradual recovery post-incident.

The macroinvertebrate diversity and SIGNAL-2 results were above established trigger values for downstream sites in Moolarben Creek, the Goulburn River and Wilpinjong Creek systems for both the autumn and spring 2022 surveys. For sites in each of the study area creek and river catchments, the 2022 macroinvertebrate diversity results were relatively high compared to those recorded in 2018 and 2019, and consistent with the post-drought values from 2021. For most sites the SIGNAL-2 values were within the range of values recorded over recent monitoring surveys, and the overall site EPT taxa diversity values have increased over consecutive surveys since spring 2019.

There were no indications of MCO mine-related impacts to stream health or aquatic habitat conditions in 2022 with differences between sites generally relating to differences in the aquatic and riparian habitat attributes, and the contribution of sustained water levels to aquatic ecosystems.

7.3.4 CHANNEL STABILITY MONITORING

The channel stability monitoring program occurred between the 19th and 21st of July at locations in **Appendix 2**. Monitoring involved visual and written observational surveys of erosive and depositional features, cross sections at strategic locations and photographic records.

7.3.4.1 Monitoring results

Bora Creek channel stability monitoring results are comparable with previous monitoring. The 2022 monitoring did not identify signs of high-volume flow events that may have occurred since the 2021 monitoring. The average CSIRO classification for Bora Creek in 2022 was 'Potentially Stabilising'.

Moolarben Creek channel stability monitoring trend is considered comparable to the results previously recorded. At least six sites improved their stability scores when compared to 2021 due to increased ground vegetation observed in 2022. Baseline surveys for recent sites added in 2020 and 2021 have a CSIRO classification ranging from 'Very Active' to 'Very Stable'. The average CSIRO classification for Moolarben Creek in 2022 was 'Potentially Stabilising'.

Murragamba Creek channel stability monitoring trend is considered comparable to the results previously recorded. MuC-pt25 improved the stability score when compared to 2021 due to increased ground vegetation observed in 2022. The average classification for Murragamba Creek in 2022 was 'Stable'.

Wilpinjong Creek channel stability monitoring results trend is considered comparable to the results previously recorded. Eight sites improved their stability scores when compared to 2021 due to increased ground vegetation. The average CSIRO classification for Wilpinjong Creek in 2022 was 'Potentially Stabilising'.

Eastern Creek channel stability monitoring results identified continuation of morphological processes identified in previous monitoring. The 2022 scores are considered comparable to the results previously recorded. EC-pt01 improved the stability score when compared to 2021 due to increased ground vegetation observed in 2022. The average CSIRO classification for Eastern Creek in 2022 was 'Potentially Stabilising'.

7.3.4.2 Trends

Channel stability within each creek was variable during the period. Locations vulnerable to erosion were characterised by steep banks, little vegetative cover and exposed dispersive subsoil. More stable locations were characterised by vegetated banks with low gradient slopes. Sustained and periodic creek flows and widespread vegetative cover at nearly all of the monitoring sites can be attributed to improved climatic conditions with consecutive above annual average rainfall since February 2020. Creek instabilities recorded in 2022 were the result of at least one or several flow events that occurred during the monitoring period, triggered by significant rain events. The 2022 channel stability trends generally display an improvement overall.

7.3.5 EFFLUENT

During the period MCO continued to operate four sewerage treatment plants. Discharge quantity was within design limits during the period. Discharge quality is presented in **Appendix 3F**.

7.4 GROUNDWATER

MCO monitors a network of piezometers in accordance with the Groundwater Management Plan (GWMP). The monitoring program includes monthly monitoring of standing water level in standpipes, and daily pressure readings for vibrating wire piezometers (VWPs) which are downloaded each month. Trigger values have been established that, when exceeded, determine the need for investigation and possible response actions for potential impacts to groundwater levels in the alluvial and Triassic aquifers. The Permian strata does not include triggers as it is already extensively affected by past mining, is predicted to undergo further impact from ongoing mining, and contains groundwater of generally poor quality.

The Environmental Assessments of the Moolarben Coal Mine predict impacts to groundwater due to MCOs operations. Response triggers for groundwater levels within Quaternary alluvium and Triassic Sandstone aquifers take account of the minimal impact considerations in the Aquifer Interference Policy (DPI, 2012). Monitoring frequency and response triggers have been implemented to identify trends that could potentially lead to a private bore being impacted above the Aquifer Interference Policy considerations (i.e. greater than 2 m drawdown).

7.4.1 GROUNDWATER LEVELS

During the reporting period MCO continued to observe above average annual rainfall, continued mining impacts for approved MCO open cut and underground operations, and regional depressurisation due to neighbouring operations. During the reporting period MCO received above average rainfall as represented by the increasing Cumulative Rainfall Deviation (CRD) trend (**Figure 23**). MCOs mining operations during the period included mining in open-cuts OC2, OC3 and OC4 and secondary extraction in undergrounds UG1 LW105 and UG4 LW401 and development of first workings in UG4 (**Figure 3**). There is a long history of mining at the neighbouring Ulan Coal Open-cut and Underground, and at the Wilpinjong Coal Mine. Mining operations continued at both mines during the period.

Reduced standing water level/pressures for all piezometers for the period (including vibrating wire piezometers) are presented in **Appendix 3G**. Investigation trigger levels, along with observed groundwater levels are presented in **Table 26**.

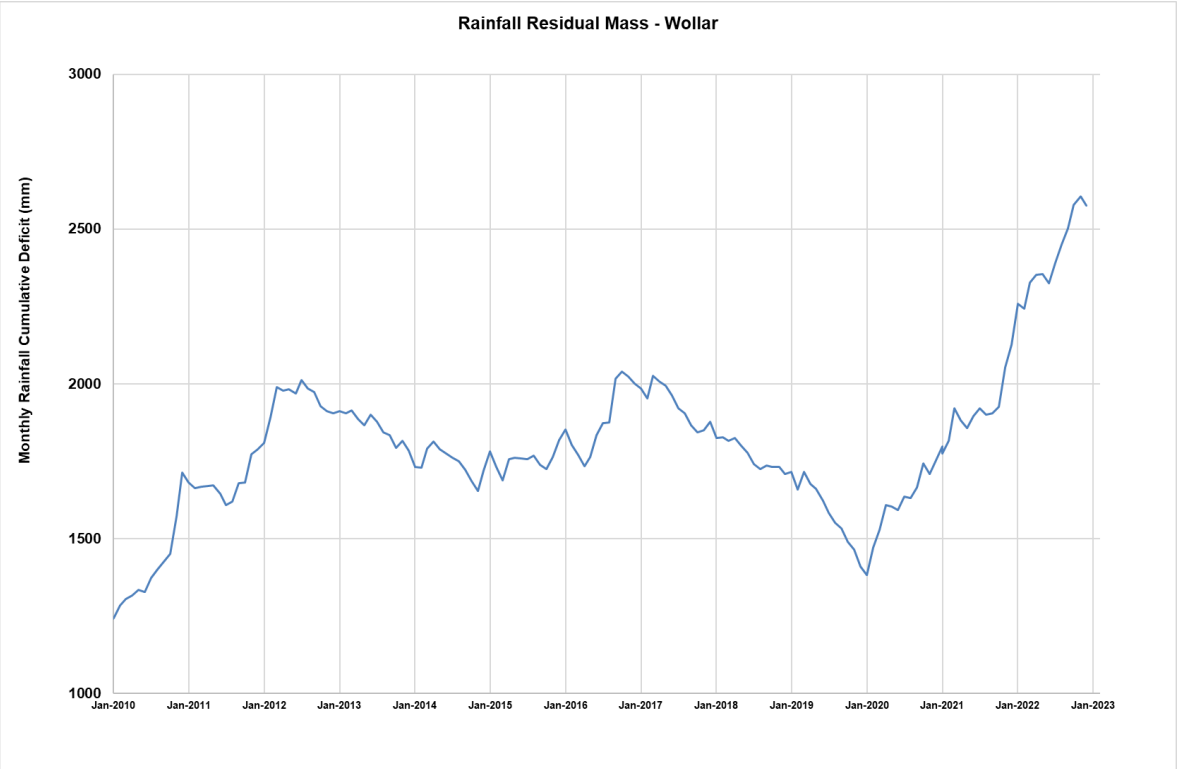


Figure 23: Rainfall Residual Mass - Wollar

Groundwater levels in the Ulan coal seam and Permian coal measures are extensively affected by past mining and are predicted to be further impacted from mining at Moolarben and neighbouring operations. During the reporting period, the Ulan Seam groundwater levels were influenced by open cut and underground mining, neighbouring operations and in some cases rainfall recharge. The influence of UG1 and UG4 secondary extraction, progressive UG4 development and open cut operations continued over the period. The greatest groundwater drawdowns observed in the Ulan seam during the reporting period are observed at proximity to the underground operations as mining progresses down dip (to the northeast), including development of the UG4 mains on the western side of UG4, and backroads on the eastern side. PZ101B, PZ103A, PZ192 and PZ193 provide evidence of 1 m to 4 m groundwater drawdown over the reported period. The rate of drawdown has generally slowed, which coincides with the progression of mining operations, following initial development of UG4 in 2021. Groundwater drawdown is expected to continue to propagate in an east to north easterly direction over time. Climatic influences have continued to be observed in Ulan Seam piezometers, especially in the vicinity of Ulan Seam subcrop, such as at PZ003 and PZ217 which are located to the east of OC3 and have observed groundwater level rises of 0.2 m to 2.7 m respectively. PZ111 which is located between MCO and Wilpinjong went dry in 2022 following its observed decline in 2021.

The Permian strata overlying the Ulan Seam comprises interbedded claystones, siltstones, sandstones and coal seams. Groundwater levels in the Permian exhibited a range of responses over the reporting period and are highly influenced by their proximity to mining, strata interval monitored and general location. Permian overburden VWP above UG1 remained dry throughout the reporting period. To the southeast of OC4 groundwater levels were observed to increase slightly, such as observations at standpipes PZ137, PZ112B and PZ106A. Drawdown of the Permian generally continued (during the period) in the vicinity of UG1, due to the extraction of LW105, further underground development and OC4 progression. This trend is observed in PZ189 and PZ186 Permian VWPs. Drawdown generally decreases with distance from mine operations, with notable exceptions such as PZ170 which is located

above and immediately adjacent to UG1, where an increase in groundwater levels have been observed and can be shown to have a strong correlation to climatic data. PZ179_33m and PZ105A_28m VWPs in the upper Permian, exhibited stable pore water pressures.

Groundwater drawdown was observed at the northern end of UG4 including PZ101B and PZ105_80m VWP, although the response was not consistent with Permian piezometers located closer to MCOs mining operations during the reporting period. The responses in the UG4 north piezometers will continue to be monitored. PZ102A, PZ103A and PZ103B were decommissioned in 2022 and replaced with VWPs PZ102C and PZ103D.

The Triassic aged sandstones overly the Permian coal measures. Saturation of the Triassic strata is predominantly limited to the northeastern extent of the Moolarben Coal Complex. Groundwater levels in piezometers monitoring the Triassic sandstone remained relatively stable over the reporting period, with the exception of PZ195 VWP, PZ195b, and PZ195c which are located approximately 80 m from the starting end of Longwall 402. During 2022, a drop of approximately 10 m in groundwater level was observed at PZ195 VWP (72m) post commencement of Longwall mining in UG4. This observation is consistent with current groundwater modelling predictions. At PZ192_68m VWP pressure continued to decline in response to the mining of LW401, with an annual drawdown of 1.2 m. Groundwater levels remained stable at PZ101C, PZ127_43m, PZ128_20m and PZ129_35m VWP during the reporting period. Groundwater levels remained generally static, albeit with minor rises of between 0.4 m and 0.8 m recorded at PZ179_29m, PZ101C, PZ103C and PZ105C. No Triassic sandstone groundwater level investigations were triggered during the reporting period.

Quaternary alluvial deposits in the vicinity of the Moolarben Coal Complex are associated with rivers and creeks, comprising fine to coarse grained sands and gravels within a silt/clay matrix. Tertiary sediments are associated with defined paleochannels and consist of poorly-sorted semi-consolidated quartzose sands and gravels in a clayey matrix. These sediments are unsaturated across a significant proportion of the paleochannels distribution. Groundwater levels in the alluvium and Tertiary paleochannel were mostly stable during the period. Groundwater level drawdown continued at PZ213, PZ214, PZ188 and PZ186A, with 0.3 m to 0.8 m observed during the period, likely in response to MCO operations. Groundwater levels at PZ203, PZ112B and PZ058A rose between 0.8 m and 1.8 m, while PZ184 and PZ211 remained dry during the reporting period. PZ058A is poorly connected to the palaeochannel as evidenced by the observed groundwater salinity at this location (approximately 15,000 to 16,000µs/cm) which is significantly higher than surrounding locations (including deeper stratigraphic units).

Groundwater levels in the granite exhibited an increasing trend during the reporting period consistent with climate data. Groundwater levels observed in the Marrangaroo conglomerate at PZ055 remained relatively steady during the period, with a minor rise of 0.5 m recorded, which is generally consistent with the longer-term trend at this location.

7.4.2 GROUNDWATER QUALITY

Groundwater quality monitoring is undertaken at standpipe piezometers in accordance with the GWMP. The monitoring network covers the major hydrogeological units and are broadly distributed across the project area. Parameters include physical parameters, major cations and anions, dissolved metals and nutrients. Site specific triggers for acidity (pH) and electrical conductivity (EC) have been developed for alluvial and Triassic aquifers across the Moolarben Coal Complex. A review of the groundwater quality performance is provided in **Table 27**. Water quality results from all piezometers are provided in **Appendix 3G**.

Groundwater quality measured from the Ulan Seam and Permian Coal measures during the period is generally consistent with previous monitoring results with no clear trends. To the east, Electrical Conductivity (EC) measured at PZ104 continued to fall during the reporting period, to below 1,000 µs/cm compared to more recent observations closer to 8,000 µs/cm. On investigation it was found that the casing installed on PZ104 had failed. Measured EC at PZ170 remained lower than historical data. Measured EC at PZ101B increased back to pre-2021 levels during the reporting period, to around 800 µs/cm.

Triassic sandstone water quality was generally consistent with historical monitoring results. Water samples measured at PZ101C record a decrease from a high of 792 µs/cm measured in 2021, back to more consistent historical levels. Monitoring results from all Triassic sandstone bores showed a slight rise in pH levels but remain within the historical measurement ranges. Alluvium and Tertiary paleochannel water quality results were generally consistent with historical results. PZ058A recorded EC levels at or below 12,500 µs/cm which is below the historical range of approximately 15,000-16,000 µs/cm. The measured groundwater EC at PZ058A is significantly higher than surrounding locations (including deeper stratigraphic units), which indicates the location receives less groundwater recharge (which would effectively freshen the unit) or is more prone to evapoconcentration of salts due to a combination of depth to water table, or low permeability. It also indicates a poor connection to the broader paleochannel. Water quality from the Marrangaroo conglomerate, as measured from PZ055 was consistent with sampling results from recent years. Granite water quality measured at PZ044 recorded stable EC levels and a very slight rise in pH, but within historical ranges.

7.4.3 PRIVATE GROUNDWATER USERS

MCO had negligible impact on private groundwater users during the reporting period. No compensatory water supply was required or supplied during the period.

7.4.4 POTENTIAL IMPACTS TO THE DRIP

The Drip is located over 3.5 km from current MCO mining operations. There is no evidence indicating that The Drip is being impacted by MCC operations.

7.4.5 ACTIONS FOR NEXT REPORTING PERIOD

During the next reporting period the following actions are proposed:

- Consider decommissioning of PZ058A as part of next Groundwater Management Plan Review.
- WAMP to be reviewed and revised as necessary.

Table 26: Water Levels – Triassic, Alluvium and Paleochannel Bore Performance

Location	Investigation Trigger Level (mAHD)	Minimum 2022 Groundwater Level/Pressure (mAHD)	Trend/ Key Management Implications	Implemented/proposed Management Action
Alluvium, Paleochannel and Marrangaroo Bores				
PZ55	418.1	424.0	Continued above average annual rainfall resulted in an increasing CRD. Monthly rainfall for the period continued to be average to above average. Piezometers in the vicinity of mining operations exhibited groundwater level drawdowns during the reporting period. Groundwater level drawdowns continued at PZ213, PZ214, and PZ188 with 0.3 m to 0.5 m observed, and likely in response to MCO operations. Groundwater levels at PZ203 remained stable. Overall groundwater levels and trends were generally consistent with groundwater model predictions, with actual drawdowns occurring earlier than modelled, and observed drawdown generally greater than modelled predictions at proximity to mining operations. Groundwater level/pressure monitoring indicate that MCO had negligible impact on private groundwater users. Groundwater monitoring results and level trends can be found in **Appendix 3G**.	Continue monitoring program. MCO will review and if necessary, revise, the GWMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively. Monitoring results to be included in the next periodic model validation and recalibration where required. During the reporting period MCO continued to maintain the groundwater monitoring network.
PZ058A	466.4	467.3		
PZ188	409.4	411.7		
PZ203	394.4	403.6		
PZ213	409.7	410.9		
PZ214	409.8	411.3		

Location	Investigation Trigger Level (mAHD)	Minimum 2022 Groundwater Level/Pressure (mAHD)	Trend/ Key Management Implications	Implemented/proposed Management Action
Triassic Bores				
PZ101C	376.8	380.0	Continued above average annual rainfall resulted in an increasing CRD. Monthly rainfall for the period continued to be average to above average. Groundwater levels at PZ101C and PZ129 (35m) remained stable and PZ105C increased by 0.8 m during the reporting period with overall trends consistent with modelled predictions and climatic data. Groundwater level trends were generally consistent with groundwater model predictions. Groundwater level/pressure monitoring indicate that MCO had negligible impact on private groundwater users. Groundwater monitoring results and level trends can be found in **Appendix 3G**.	Continue monitoring program. MCO will review, and if necessary, revise, the GWMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively. Monitoring results to be included in the next periodic model validation and recalibration where required. During the reporting period MCO continued to maintain the groundwater monitoring network.
PZ105C	367.4	375.5		
PZ129 (VWP-35m)	385.7 (dry)	389.97		

Table 27: Water Quality Performance

Location	Lithology	Investigation Trigger Level(s)		2022 Performance	Trend/ Key Management Implications	Implemented/proposed Management Action
		pH	EC (µs/cm)			
PZ044	Ulan Granite	5.7 – 7.2	3000	PZ044 and PZ055 water quality was consistent with recent monitoring results. No investigations were triggered.	Water quality for the period was generally consistent with previous monitoring results with some influence from rainfall recharge and mining influence. Groundwater quality trends will continue to be monitored. PZ058A replaced PZ058 and the EC investigation trigger requires update to reflect the different location. Water is of the same beneficial use category (saline). Water quality results from all piezometers are provided in **Appendix 3G**.	Continue monitoring program. MCO will review, and if necessary, revise, the GWMP in accordance with Schedule 5 condition 5 and Schedule 6 condition 5 of PA05_0117 and PA08_0135 respectively. Consider decommissioning of PZ058A as part of next Groundwater Management Plan Review. During the reporting period MCO continued to maintain the groundwater monitoring network.
PZ055	Indurated Conglomerate	5.1 – 6.3	2756			
PZ058a	Tertiary Aged Sediment	2.8 – 4.7	14765	PZ188 water quality was consistent with recent monitoring results. PZ058A continued to record a reduction in EC to 12,500 µs/cm below the historical range of 15-16,000 µs/cm. No investigations were triggered.		
PZ188	Tertiary Paleochannel	4.7 – 6.9	394			
PZ101C	Lower Triassic	6.1 – 7.7	810	Triassic sandstone water quality was consistent with recent monitoring results.		
PZ103C	Lower Triassic	5.2 – 6.8	448			
PZ105C	Lower Triassic	5.3 – 7.4	319			
PZ101B	Permian OB	6.2 – 7.7	928	Permian Coal measures water quality for the period is generally consistent with previous monitoring results.		
PZ109	Permian OB	6.3 – 8.4	1145			

8.0 MINE SUBSIDENCE

MCO undertakes secondary extraction in accordance with the UG1 Longwalls (LW) 101 to 105 Extraction Plan (2020) (the UG1 Extraction Plan) and UG4 Longwalls 401 to 408 Extraction Plan (2022) (the UG4 Extraction Plan). The UG1 Extraction Plan and associated sub-plans were prepared with input from experienced and qualified experts to satisfy Condition 5, Schedule 4 of PA 08_0135. The UG4 Extraction Plan and associated sub-plans were prepared with input from experienced and qualified experts to satisfy Condition 77(a), Schedule 3 of PA 05_0117.

During the reporting period, secondary extraction was undertaken in Longwall LW105 and LW401. Mining of longwall panel 105 was completed on June 2022. A longwall move was carried out in LW401 commencing on June 2022. As of the 31 December 2022 Longwall LW105 had retreated 2,682m. The combined total extracted length during the 2022 reporting period was 4,542m.

During the reporting period MCO continued to conduct monitoring of subsidence lines, flora and fauna habitats, cliffs, landscape features, and built features for LW102, LW104 and LW105 and LW401 to LW408. Monitoring of subsidence lines, surface water, groundwater, UG1 inflows and outflows continued. Built feature monitoring triggers were not exceeded in the period. Post mining inspections were carried out for flora and fauna above LW102, LW104 and LW105.

Subsidence monitoring included the 3D ground monitoring G, H, J and FF lines. Surveys of the A, C, E and I Lines are no longer required as these Lines are located above previously extracted longwall panels.

Monitoring line G is orientated transverse to the Longwalls and crosses LW104 and LW105. LW105 mined directly beneath this monitoring line during 2022. Line H is a monitoring line that is orientated transverse to the longwalls approximately 290 m from the finishing end of LW105. Line J is a 3D ground monitoring line located along the centreline of LW105 at the longwall finishing end. The base survey was carried out in July 2020 prior to LW104.

Subsidence impacts during the period were below predictions as shown in **Table 28.**

Table 28 Comparison of maximum observed and predicted vertical subsidence, tilt & strain for the G, H & J Line.

Survey Line	Type	Maximum vertical subsidence (mm)	Maximum tilt (mm/m)	Maximum tensile strain (mm/m)	Maximum compressive strain (mm/m)
G	Measured	2237	54	14	12
	Predicted	2300	55	28*	27*
H	Measured	2277	59	26	17
	Predicted	2200	65	>30*	>30*
J	Measured	2069	49	10	24
	Predicted	2200	>100	>30*	>30*

* denotes that the values represent the conventional strains based on the predicted curvatures multiplied by a factor of 10.

The maximum measured vertical subsidence of 2277 mm is slightly greater than the maximum predicted value of 2200 mm. This slight increase may be associated with open cut 4 which is located adjacent to LW105. It is considered that the ground movements measured along the H Line are

consistent with the predictions. A summary of performance against the relevant subsidence performance indicators and subsidence performance measures (i.e. the subsidence performance assessment), detailed in the UG1 Extraction Plan, UG4 Extraction Plan, Condition 1, Condition 3, Schedule 4 of Project Approval (08_0135) and Condition 73, Schedule 4 of Project Approval (05_0117) is provided in **Table 29** and **Table 30.**

Table 29: Assessment of Subsidence Performance Indicators Measures for UG1 – Natural, Heritage and Built Features

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Water Resources:					
Drainage Lines (DL1 – DL7)	*No greater subsidence impacts or environmental consequences than predicted in the EA*	• Change in visible erosion. • Development of, or change in, headcut erosion along DL6 and DL7. • Change in character, such as increased erosion or change in vegetation along drainage line. • Extensive duration of water ponding. • Downstream water quality (consistent with approved complex-wide SWMP). • Appearance of unsealed surface cracking across the bed of DL6 and DL7.	**No**	DL6 and DL7 are located within the extents of LW105 and was mined beneath during 2022 No impacts greater than predicted recorded. Pre and post mining inspections of DL6 and DL7 completed.	**No**
Land:					
Cliffs C7, C9 and C10	*Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs or fracturing, that in total do not impact more than 0.5% of the total face of such cliffs within any longwall mining domain)*	• Not applicable (NA) subsidence impact performance indicators have been developed as cliffs C7, C9 and C10 are located outside the Study Area of Longwalls LW101 to LW105.	**No**	Cliffs C7, C9 and C10 were located outside the mined extents of LW105 at the end of 2022, at distances greater than 800 m. It is unlikely that these cliffs experienced measurable ground movements due to the mining. No impacts greater than predicted recorded.	**No**
Other cliffs	*No greater subsidence impacts or environmental consequences than predicted in the EA*	• The total length of cliffs within the Longwalls 101-105 Study Area that experiences cliff instabilities (i.e. the exposure of a fresh face of rock and debris scattered around the base of the cliff) is to be less than 6 m.	**No**	No cliff lines are located above LW105. Ground movements measured during 2022 were similar to or less than those predicted	**No**
Minor cliffs Rock face features Steep slopes	*Minor environmental consequences (that is, occasional rockfalls, displacement of or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 5% of the total face area of each such type of*	• In each instance of an identified impact (occasional rockfalls, displacement of boulders or slabs, or fracturing) the affected percentage of the total face area of the feature affected will be determined. It is expected that occasional rockfalls or fracturing would not impact more than 5% of the total face area of rock ledges and overhangs in the Longwall mining domain.	**No**	Pre-mining surveys completed and monitoring sites established above LW105. Ground movements measured during 2022 were similar to or less than those predicted Post-mining survey completed. Rockfalls and cracking observed. No impacts greater than predicted recorded.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
	features within any longwall mining domain)				
Biodiversity:					
Threatened species, threatened populations, or endangered ecological communities	*Negligible subsidence impacts or environmental consequences*	Subsidence related impacts to threatened flora, fauna or EECs, including: • Areas of cracking or ponding that exceed predictions in the subsidence predictions and assessments of the impacts relating to the predicted subsidence above Longwalls 101 to 105; • Declining trend in canopy health or vegetation structure inconsistent with seasonal trends at analogue sites; • Deterioration in tree health outside natural variations (analogue sites to be used as a guide); • Areas of weed incursion and/or infestation; or • Mortality of more than a small number of threatened flora or fauna species attributed to subsidence impacts. • Evidence of impacts (attributable to subsidence) to more than 5% of features that provide potential bat roosting sites in the Longwalls 101 to 105 Study Area (i.e. cliffs and minor cliffs).	**No**	Pre-mining baseline floristic monitoring along transects above LW105 completed. Eleven baseline floristic sites have been established along ten transects above LW101 to LW105 Post-mining surveys for biodiversity were undertaken following LW105 completion. No performance measures had been exceeded.	**No**
Heritage Sites:					
Aboriginal heritage sites S2MC 236 (AHIMS Nos. 36 3 0016 and 36 3 0134)	*Negligible subsidence impacts or environmental consequences*	• Not applicable (NA) subsidence impact performance indicators have been developed as S2MC236 [AHIMS Nos. 36-3-0016 and 36-3-0134] are located outside the Study Area of Longwalls LW101 to LW105.	**No**	S2MC236 [AHIMS Nos. 36-3-0016 and 36-3-0134] are located outside the Study Area of Longwalls LW101 to LW105.	**No**
Historic Heritage Site 18	*No greater subsidence impacts or environmental consequences than predicted in the EA*	Subsidence related impacts to Heritage Site 18, including: • Cracking and loose stones that may become dislodged during mining.	**No**	No cracking or dislodged stones. No impacts greater than predicted recorded. Ground movements measured during 2022 were similar to or less than those predicted	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Mine Workings:					
First workings	*First working under an approved Extraction Plan beneath any feature where performance measures require negligible subsidence impacts or negligible environmental consequences to remain long-term stable and non-subsiding*	• First workings remain long-term stable and non-subsiding	**No**	First workings have been designed to meet the requirements of Condition 7, Schedule 4 of Project Approval (08_0135). First workings approvals were granted on the 24 March 2016, 4 May 2016, 31 August 2018 and 8 July 2019 by the Division of Resources and Geosciences, in accordance with the requirements under Condition 7, Schedule 4 of PA08_0135 and Condition 79 Schedule 3 of PA05_0117.	**No**
Second workings	*To be carried out only in accordance with an approved Extraction Plan*	• Not applicable (NA) subsidence impact performance indicators have been developed for this performance measure.	**NA**	Second workings have been carried out in LW105 in accordance with the approved *Longwalls 101-105 Extraction Plan* during the assessment period.	**No**
Key Public Infrastructure:					
Gulgong-Sandy Hollow Railway Line	*Always safe and serviceable. Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired*	• No defects or deformation of the rail track and associated infrastructure due to mining. • No visual displacement at joints or cracks in culverts.	**No**	The Sandy Hollow Gulgong Railway Line is located outside the Longwalls 101 to 105 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements Pre-mining monitoring lines established and surveys completed (including FF Line Extension). No triggers of FF Line indicating no defects, deformation or displacement of joints in culverts due to mining	**No**
Ulan-Wollar Road		• No additional visible pavement cracking or other defects of the road pavement (when compared against baseline conditions and sections of road outside the Study Area) resulting in deterioration of road quality. • No ponding of water on the road surface as a result of changes in grade from subsidence associated with Longwalls 101-105. • No joint displacement or cracking or other defects of the drainage structure (e.g. pipes/culverts) in excess of 5 mm.	**No**	The Ulan-Wollar Road is located outside the Longwalls 101-105 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. Pre-mining monitoring lines established and surveys completed (including FF Line Extension). No triggers of FF Line Extension indicating no additional cracking, defects, additional ponding, deformation or displacement of joints in culverts due to mining.	**No**

Subsidence Impact Performance Measure		**Subsidence Impact Performance Indicator**	**Indicators Exceeded?**	**Assessment of Subsidence Impact Performance Measures**	**Performance Measures Exceeded?**
		• Serviceability of guard rails, marker posts and signage are maintained.			
Transgrid		• the structural integrity of the 330 kV ETL (towers and transmission lines) is maintained; • the electrical clearance from land, vegetation and roads is maintained; and • the serviceability of the access roads/tracks is maintained.	**No**	The TransGrid powerline is located outside the Longwalls 101 to 105 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. Pre-mining monitoring lines established and surveys completed (including FF Line Extension). No triggers of FF Line Extension indicating no structural integrity changes due to mining Ground movements measured at the TransGrid towers are consistent with the predictions	**No**
Other Infrastructure:					
Murragamba Road	*Always safe.* *Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.* *Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	• Not applicable (NA) subsidence impact performance indicators have been developed for this performance measure as Murragamba Road is not publicly accessible.	**NA**	Murragamba Road is not publicly accessible. No observed impacts to Murragamba Road occurred during the assessment period as a result of LW105.	**No**
Low voltage electricity power line		• The structural integrity of the 66 kV/22 kV dual circuit powerline (power poles and transmission lines) is maintained. • The electrical clearance from land, vegetation and roads is maintained. • The serviceability of the access roads/tracks is maintained.	**No**	Pre-mining installation of tilt monitoring points in consultation with Essential Energy and baseline structure survey at each timber pole completed. Monitoring undertaken of Essential Energy poles, with ground movements measured at the Essential Energy poles and Substation consistent with the predictions provided Access maintained. No loss of service or observed impacts to the 66kV/22kV powerline and three associated power poles occurred during the assessment period, as a result of LW105.	**No**
Telecommunication cable	*Serviceability should be maintained wherever practicable. Loss of*	• Negligible transmission loss from mine subsidence impacts. • Negligible impacts on structural integrity of the cable lines from mine subsidence.	**No**	The telecommunication cable and optical fibre cable are located outside the Longwalls 101-105 Study Area,	**No**

Subsidence Impact Performance Measure		**Subsidence Impact Performance Indicator**	**Indicators Exceeded?**	**Assessment of Subsidence Impact Performance Measures**	**Performance Measures Exceeded?**
Fibre-optic cable	*serviceability must be fully compensated.* *Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*			but may be subject to far-field horizontal movements and non-conventional ground movements. Pre-mining monitoring lines established and surveys completed (including FF Line Extension). Pre-mining inspection and identification of potentially affected Telstra customers completed. No observed/recorded impacts to either the telecommunications line and/or the fibre optic cable occurred during the assessment period, as a result of LW105.	
Murragamba Trig Station		Subsidence related impacts to Murragamba Trig Station include changes to vertical and horizontal position. • The serviceability of the Murragamba Trig Station is maintained. • MCO to liaise with Subsidence Advisory NSW (formerly NSW Mine Subsidence Board [MSB]) regarding the re-establishment and/or replacement of the Murragamba Trig Station and/or other permanent marks, as necessary, on completion of subsidence.	**NA**	Murragamba Trig Station to be resurveyed at the completion of UG1 mining.	**No**
Other built features and improvements, including fences	*Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.* *Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	• No applicable (NA) subsidence impact performance indicators have been developed for this performance measure as no other non-mine owned built features and improvements are located within the Longwalls 101-105 Study Area.	**NA**	No other non-mine owned built features and improvements are located within the Longwalls 101 to 105 Study Area.	**No**
Public Safety:					
Public safety	*Negligible additional risk*	• No more than negligible additional risk to public safety.	**No**	Public safety is considered in the LW101 to 105 PSMP. No more than negligible additional risk to public safety has occurred during the assessment period, as a result	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
				of LW105, due to the remote location and restricted access of UG1 within MCO's open cut operation. There were no incidents regarding public safety as a result of LW105 during the assessment period.	

Table 30: Assessment of Subsidence Performance Indicators Measures for UG4 – Natural, Heritage and Built Features

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Natural and Heritage Features:					
The Drip and Goulburn River Gorge	*Nil impact or environmental consequences*	• Unpredicted loss of water supply to the Drip.	**No**	Pre-mining baseline monitoring completed during 2022. The drip and Goulburn River Gorge are located outside the extents of LW401 at the end of 2022, at distances greater than 4.3km. It is unlikely that this site experienced measurable ground movements due to the extraction of LW401. Monitoring surveys were completed during 2022. No impacts greater than predicted recorded.	**No**
Goulburn River and the bed of the Goulburn River	*Negligible impact or environmental consequences.* *Remain outside the zone of recorded subsidence damage for longwall mining*	• Unpredicted impacts on Goulburn River (cracking and or noticeable changes in erosion or pools). * • Performance indicators for relevant groundwater monitoring sites north of LW408 will be established prior to mining LW405.	**No**	Pre-mining baseline monitoring completed during 2022. Goulburn River is located outside the extents of LW401 at the end of 2022, at distances greater than 400m. It is unlikely that the Goulburn River experienced measurable ground movements due to the extraction of LW401. Monitoring surveys were completed during 2022. No impacts greater than predicted recorded.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Cliff Line 3	*Minimise subsidence damage*	• Cliff Line 3 impacts due to LW401-408 are less than 1.9m vertical conventional subsidence and 60mm/m conventional tilt.	**No**	Cliff C3 is located outside the mined extents of LW401 at the end of 2022, at distances greater than 2.2km. It is unlikely that this cliff experienced measurable ground movements due to the extraction of LW401.	**No**
Goulburn River National Park minor cliffs	*N/A*	• Negligible impact due to longwall mining for Minor Cliffs in Goulburn River National Park.	**No**	Nearest known minor cliff CL7 is located outside the mined extents of LW401 at the end of 2022, at distances greater than 1.1km. It is unlikely that this cliff experienced measurable ground movements due to the extraction of LW401.	**No**
Aboriginal heritage sites 264, 282, 283, 286 and 287	*Reduce the likelihood of subsidence damage to low.*	• Aboriginal heritage sites S1MC264, 282, 283, 286 and 287 are located to the north of the Study Area and the likelihood of impacts to these features is considered to be very low. Therefore, no performance indicators for S1MC264, 282, 283, 286 and 287 have been developed for LW401-408.	**No**	No observed impacts due to the extraction of LW401.	**No**
Aboriginal Heritage Site 280	*Reduce the likelihood of subsidence damage to moderate.*	• Revised subsidence likelihood reduced to moderate.	**No**	No observed impacts due to the extraction of LW401. Subsidence Monitoring and Mitigation Program developed for Aboriginal Heritage Site 280 for the extraction of LW402 and LW403	**No**
Historic heritage sites	*No greater subsidence impact or environmental consequences than predicted in the EA*	• There are no historic heritage sites within the Study Area or within the vicinity of the Study Area. Therefore, no performance indicators have been developed for LW401- 408.	-	Not applicable. There are no historic heritage sites within the Study Area or within the vicinity of the Study Area.	-
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible impact, negligible consequence or negligible loss	*To remain long-term stable and non-subsiding.*	• First workings remain long-term stable and non-subsiding	**No**	First workings have been designed to meet the requirements of Condition 79, Schedule 3 of Project Approval (05_0117). First workings approvals were granted on the 24 March 2016, 4 May 2016, 31 August 2018 and 8 July 2019 by the Division of Resources and Geosciences, in accordance with the requirements under Condition 7, Schedule 4 of PA08_0135 and Condition 79 Schedule 3 of PA05_0117.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Second workings	*To be carried out only in accordance with an approved Extraction Plan*	• Not applicable (NA) subsidence impact performance indicators have been developed for this performance measure.	**NA**	Second workings have been carried out in LW401 in accordance with the approved *Longwalls 401-408 Extraction Plan* during the assessment period.	**No**
Key Public Infrastructure:					
Gulgong-Sandy Hollow Railway Line	*Always safe and serviceable. Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired*	• The performance indicators proposed to ensure that the performance measures for the Sandy Hollow Gulgong Railway in relation to subsidence induced far field movements. • No defects or deformation of the rail track and associated infrastructure due to UG4 mining; and • No visual displacement at joints or cracks in culverts due to UG4 mining.	**No**	No observed or reported defects, deformation or displacement of joints in culverts due to extraction of LW401.	**No**
Wollar-Wellington 330kV Transmission Line		• The Wollar-Wellington 330kV transmission line is located 725m from LW401 and the likelihood of impacts to the towers is considered to be very low. • Therefore no performance indicators have been developed for the Wollar-Wellington 330kV transmission line.	**No**	No observed or reported impacts due to the extraction of LW401. No management measures have been developed. In consultation with TransGrid no BFMP was required due to no predicted impacts of the Wollar-Wellington 330kV transmission line.	**No**
Other Infrastructure:					
Roads: *Ulan Road* *Ulan Road Bridge over the Sandy-Hollow Rail Line* *Ulan Road Bridge over the Goulburn River*	*Safe, serviceable and repairable unless the owner agrees otherwise in writing.*	• No joint displacement or cracking or other defects of the drainage structure (e.g. pipes/culverts) in excess of 5 mm (when compared against baseline condition) due to UG4 mining. • The Ulan Road Bridge over the Sandy-Hollow Rail Line and the Ulan Road Bridge over the Goulburn River are unlikely to experience subsidence related movements. Therefore, no performance indicators have been developed the Ulan Road Bridge over the Sandy-Hollow Rail Line and the Ulan Road Bridge over the Goulburn River.	**No**	Ulan Road and bridges are located outside the Longwalls 401-408 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. No observed or reported impacts due to the extraction of LW401.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
Other built features and improvements, including fences: Telstra optical fibre telecommunication cable Telstra copper telecommunication cable Telstra telecommunication tower	*Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	The performance indicators proposed to ensure that the performance measures for the optical fibre, copper cables and tower are achieved in relation to subsidence induced far field movements, include: • Negligible transmission loss from mine subsidence impacts; • Negligible impacts on structural integrity of the cable lines from mine subsidence; and • Negligible impacts on structural integrity of the communications tower from mine subsidence.	**No**	The telecommunication cable, optical fibre cable and tower are located outside the Longwalls 401-408 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. No observed or reported impacts due to the extraction of LW401.	**No**
Other built features and improvements, including fences: Essential Energy 22kV line and power poles to telecommunication tower	*Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	The performance indicators proposed to ensure that the performance measures are achieved in relation to subsidence induced far field movements, include: • The structural integrity of the 22kV powerline (power poles and transmission lines) is maintained.	**No**	The Essential Energy 22kV line and power poles are located outside the Longwalls 401-408 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. No observed or reported impacts due to the extraction of LW401.	**No**
Other built features and improvements, including fences UCMPL Millers Dam Compound and associated infrastructure, Bridge, Bore and Monitoring Piezometers	*Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	The performance indicators proposed to ensure that the performance measures for UCMPL infrastructure within 400m of Longwalls 401-408 in relation to subsidence induced far field movements, include: • Subsidence monitoring indicates subsidence is consistent with approved impacts.	**No**	The UCMPL Millers Dam Compound and associated infrastructure are located outside the Longwalls 401-408 Study Area, but may be subject to far-field horizontal movements and non-conventional ground movements. No observed or reported impacts due to the extraction of LW401.	**No**
Other built features and improvements, including fences Dronvisa Quarry	*Serviceability should be maintained wherever practicable. Loss of*	The performance indicators proposed to ensure that the performance measures for Dronvisa Quarry achieved in relation to subsidence, include:	**No**	Dronvisa Quarry is located outside the mined extents of LW401 at the end of 2022, at distances greater than 440 m.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
	serviceability must be fully compensated. *Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.*	• Subsidence monitoring indicates subsidence is consistent with approved impacts. • Compensation Agreement between MCO and Dronvisa in place for predicted impacts to Dronvisa infrastructure serviceability and damage to the Quarry.		No observed or reported impacts due to the extraction of LW401.	
Public Safety:					
Public safety	*Negligible additional risk*	MCO will assess Longwalls 401- 408 against the following public safety performance indicator in the event that any hazard to the general public arising from subsidence impacts becomes evident: • No more than negligible additional risk to public safety.	**No**	Public safety is considered in the LW401 to 408 PSMP. No more than negligible additional risk to public safety has occurred during the assessment period, as a result of LW401. There were no incidents regarding public safety as a result of LW401 during the assessment period.	**No**

8.1.1 ACTIONS FOR NEXT REPORTING PERIOD

Activities in the 2023 reporting period include monitoring in accordance with approved subsidence management plans and remediation works, (e.g. tracks) as required.

8.1.2 SUBSIDENCE REMEDIATION

Minor subsidence management actions were required to be undertaken as a result of LW105 and LW401 extraction during the reporting period. These included maintenance of MCO managed access tracks and haul roads after subsidence.

9.0 REHABILITATION

MCO manages rehabilitation in accordance with Rehabilitation Management Plan (RMP) and Forward Program (FWP). The MCO Rehabilitation Management Plan (RMP) describes the management of rehabilitation at the Moolarben Coal Complex for Stage 1 and Stage 2.

The FWP was developed to meet the requirements of Mining Lease conditions at the MCC. The FWP describes the proposed Stage 1 and Stage 2 mining and rehabilitation activities for the period 1 July 2022 to 30 June 2025 (the FWP term). A description of the proposed rehabilitation activities during the FWP term is provided in the FWP. Mining and rehabilitation progression are shown on FWP Plans 2A, 2B and 3C. The FWP and RMP are available on the Moolarben Coal website (www.moolarbencoal.com.au).

9.1 MINING AND REHABILITATION STATUS

At the end of December 2022 MCO had a Total Mine Footprint of 2,030ha, approximately 339.88ha less than described in FWP. The reduction in disturbance resulted from the delayed progression of mining operations associated with impacts from above average rainfall. The area under rehabilitation preparation and active rehabilitation activities increased to approximately 411ha.

In addition, interim/temporary rehabilitation in the form of landscaping and planting has been completed around the main offices, environmental bunds and entry to the operational areas. External batters on dam walls and other infrastructure areas have also been temporarily rehabilitated.

The mining and rehabilitation status is presented in **Table 30**. The land preparation activities undertaken in the period and proposed areas in the next period are discussed in **Section 9.5** and **Section 9.6** and presented in **Figure 3**.

During the reporting period MCO continued to undertake monitoring and maintenance activities within the existing rehabilitated areas. This included the management of spontaneous combustion areas, supplementary seeding of areas with limited cover, placement of mulch, and weed and feral animal control activities.

Table 31: Mining and Rehabilitation Status

Mine Area Type	Previous Reporting Period (2021)	This Reporting Period (2022)	Next Reporting Period (2023)
Total Mine Footprint	1817	2030	2294
Total Active Disturbance	1426	1619	1803
Land being Prepared for Rehabilitation	30	53	129
Land under active Rehabilitation	361	358	362
Completed Rehabilitation	0	0	0

9.2 VEGETATION CLEARANCE AND TOPSOIL STRIPPING

Vegetation clearance was undertaken in accordance with the Vegetation Clearance Protocol and GDPs within the OC2, OC3, OC4 and infrastructure areas (**Figure 3**). Stripped topsoil was either placed in temporary stockpiles for later use, or placed directly on areas prepared for rehabilitation. Vegetation salvaged was either mulched or retained for use as habitat features within rehabilitation areas.

9.3 SEED COLLECTION

Native seed collection continued throughout the period with seed harvested from MCO owned lands. All activities were undertaken in accordance with the requirements of the Florabank Guidelines (2000). At December 2022 MCO's seed bank contained 339,632 grams of native seed for use in rehabilitation activities across the MCC.

9.4 REHABILIATION MONITORING

MCO undertakes a monitoring program of rehabilitation areas in accordance with the RMP. The monitoring program includes landscape function analysis, floristic monitoring, vegetation structure and growth, fauna monitoring and visual monitoring.

9.4.1 ECOSYSTEM FUNCTION ANALYSIS

EFA was undertaken at 27 EFA sites within the MCO open cut rehabilitation areas, as well as at four (4) analogue sites which are located within vegetation communities equivalent to the general rehabilitation target communities.

Landscape Function Analysis
LFA assessment allows for the calculation of a Landscape Organisation Index (LOI), reflecting the proportion of a transect occupied by patches. Patches are defined by soil surface elements, such as perennial ground cover, litter, logs or rocks that help retain soil and other resources at a site. A higher LOI implies a more stable transect that is less prone to erosion and resource loss.

At all Box Gum Grassy Woodland sites and most Sedimentary Ironbark Forest Sites, the LOI within rehabilitation was similar to that recorded at analogue sites. Box Gum Shrubby Woodland sites were more variable, with most sites recording an LOI between 85-90%, however an increase has been observed at most sites when compared against historic monitoring. The lowest LOI was recorded at recently established R28 due to a high bare soil contribution. LOI comparison to analogue sites is shown in **Figure 24**.Monitoring sites are presented in **Appendix 2**.

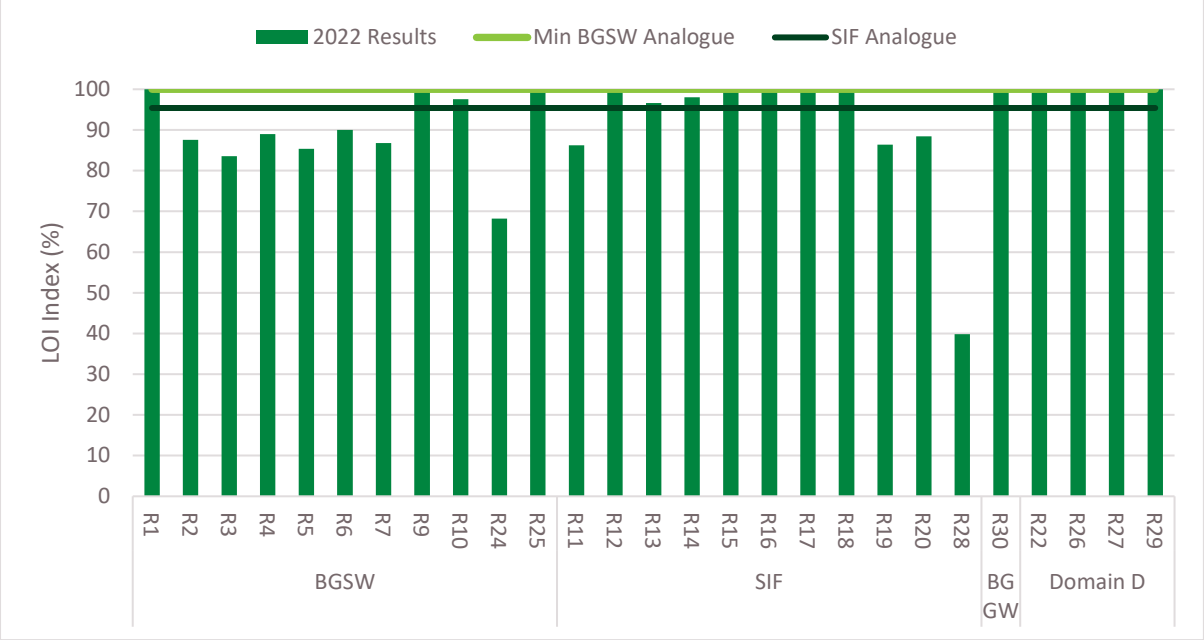


Figure 24: Landscape organisation indices (LOIs) for 2022 compared to analogue LOI values

Floristic Monitoring

During the 2022 monitoring of Box Gum Shrubby Woodland rehabilitation sites, native species richness ranged from 15 (R24) to 39 (R1) in autumn and 21 (R7) to 60 (R4) in spring. These results were generally comparable to analogue site results where native species richness ranged from 32 to 39 in autumn and 36 to 53 in spring.

During the 2022 monitoring of Sedimentary Ironbark Forest rehabilitation sites, native species richness ranged from 20 (R12) to 38 (R18) in autumn and 14 (R12) to 41 (R18) in spring. The results from analogue sites in autumn and spring were higher than most rehabilitation sites with 31 and 49 species respectively.

During the 2022 monitoring of the Box Gum Grassy Woodland rehabilitation site (R30), native species richness was 36 in spring and was comparable to the Box Gum Shrubby Woodland analogue sites (36 to 53 species).

Figure 21. presents the percentage of species within rehabilitation areas that are typical of the target vegetation community. Plant Community Types (PCTs) that matched the general associations of Box Gum Shrubby Woodland, Sedimentary Ironbark Forest and Box Gum Grassy Woodlands were compiled during the development of the RMP completion criteria, and a typical species list was collated from these using the PCT profiles in BioNet Vegetation Classification.

Nine (9) out of 11 Box Gum Shrubby Woodland sites have achieved this criterion in at least one season. The proportion of the woody stratum species typical of the target community (canopy and mid-storey species), which is most important in characterisation of vegetation community types, was 80% at site R24 and 66% at site R25. These sites are therefore considered to be representative of or trending towards the target community and further management is not considered necessary.

Seven (7) out of 11 Sedimentary Ironbark Forest sites have achieved this criterion in at least one season. The proportion of the woody stratum species typical of the target community 80% at R13, 71% at R16, 71% at R17 and 78% at R28. These sites are therefore considered to be representative of or trending towards the target community and further management is not considered necessary. The Box Gum Grassy Woodland site (R30) has achieved this criterion.

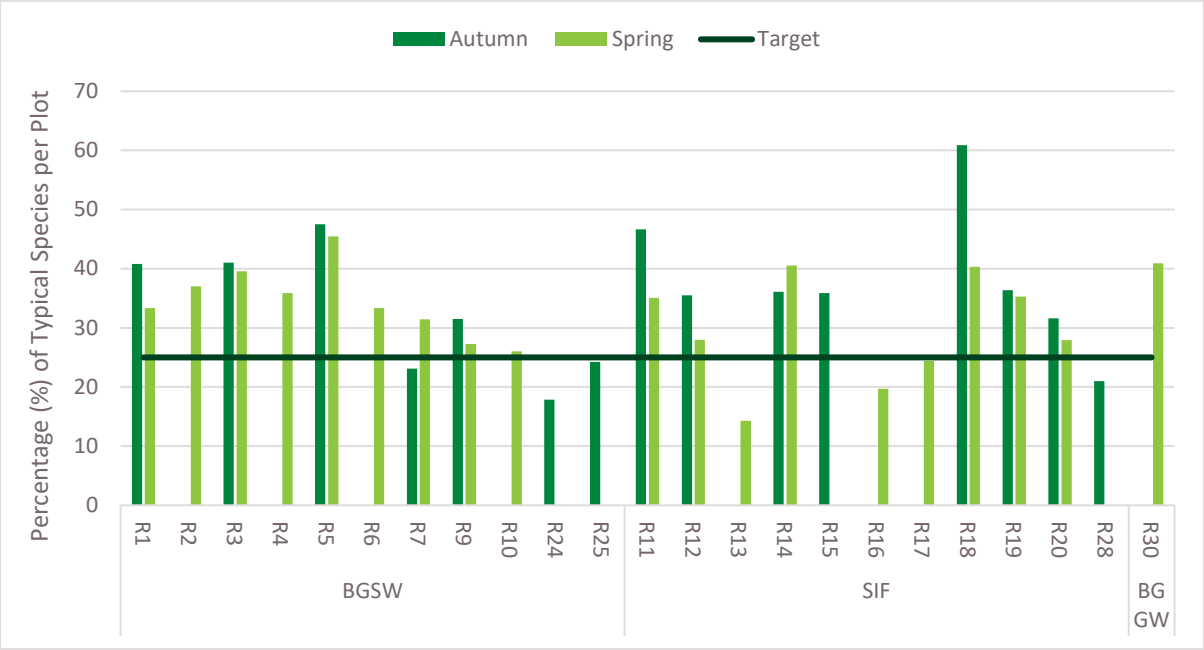


Figure 21: Percentage of typical species in the monitoring plots that are representative of the Plant Community Types during the 2022 monitoring.

Habitat Complexity

Habitat complexity was undertaken at all EFA monitoring sites using the scoring system provided in **Table 31.** This scoring system is applied to both EFA and analogue sites. Habitat complexity scores across 2022 monitoring compared to the analogue results are provided in **Figure 25.**

Table 32: Habitat complexity scoring system

Structure	Attributes and score			
	0	1	2	3
Tree canopy (%)	0	<30	30-70	>70
Shrub canopy (%)	0	<30	30-70	>70
Ground herbage	Sparse <0.5 m	Sparse >0.5 m	Dense <0.5 m	Dense >0.5 m
Logs, rocks, debris, etc (%)	0	<30	30-70	>70
Soil moisture	Dry	Moist	Permanent water adjacent	Water-logged

Most sites recorded a complexity score of four which is equal to or greater than the minimum score recorded at analogue sites within both target vegetation communities, and have recorded the same or increased habitat complexity scores compared to previous monitoring. The two sites which recorded lower values in 2022 were R20 and R29 which is due to the lower canopy, mid-storey and ground covers recorded at the site.

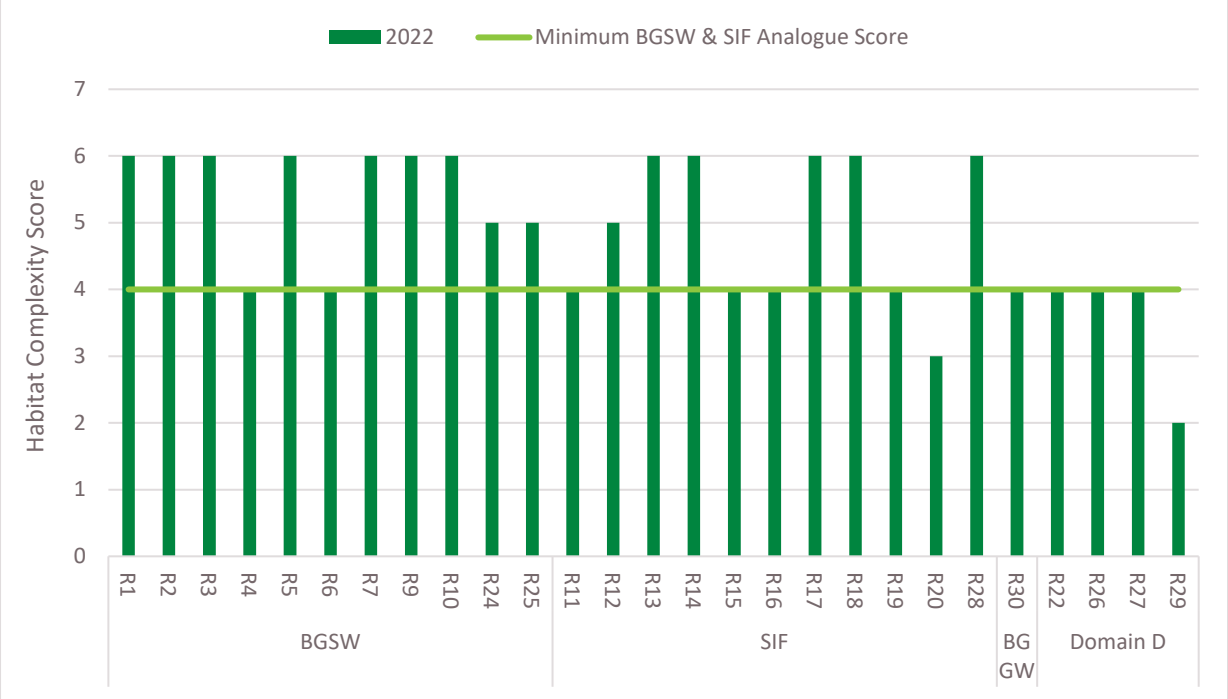


Figure 25: Habitat complexity scores recorded for rehabilitation sites in 2022 compared to analogue sites

(BGSW = Box Gum Shrubby Woodland, SIF = Sedimentary Ironbark Forest and BGGW = Box Gum Grassy Woodland)

Fauna Monitoring

Two amphibian species, 47 bird species, one reptile and nine microbat species were recorded during monitoring in 2022 including five threatened species being Speckled Warbler (Chthonicola sagittata), Little Eagle (*Hieraaetus morphnoides)*, Large-eared Pied Bat (*Chalinolobus dwyeri*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*) and Varied Sitella (*Daphoenositta chrysoptera*). A wide range of bird guilds were recorded during 2022 monitoring, including insectivores, nectivores and herbivores which forage at different stratum levels within vegetation. Bird species richness was consistent with 2021.

Visual Monitoring

Visual transect monitoring results from 2022 were largely consistent with previous years. The majority of transects recorded an overall rating of 'Good' for vegetation structure composition, soil compaction, microhabitat features and disturbance factors. 'Poor' scores were recorded for two transects (one in OC1, one in OC4) for active erosion and exotic species. The land stability issues and weed occurrence is likely due to the high rainfall experienced in the months preceding the monitoring.

Assessment of Rehabilitation Performance Indicators

Analysis of the Box Gum Shrubby Woodland, Sedimentary Ironbark Forest, Box Gum Grassy Woodland rehabilitation, and OC2/OC3 Ecosystem and species credit sites against the proposed completion criteria is presented in **Table 32**, **Table 33, Table 34** and **Table 35.**

Table 33: Box Gum Shrubby Woodland Rehabilitation Assessment

Proposed Completion Criteria	2022 Monitoring Outcome
Reconstructed landforms are stable with no evidence of slumping.	There were no signs of slumping landforms observed. **Outcome:** Proposed completion criteria achieved in 2022.
Gullies and rills occurring in monitoring transects are assessed to be limited and stabilising.	There were no signs of gullies or rills occurring along the monitoring transects. **Outcome:** Proposed completion criteria achieved in 2022.
'High Threat Exotic' (HTE*) weed presence and cover is monitored regularly. Priority and HTE weeds identified through monitoring have been controlled.	There were HTE present at all monitoring sites. The level of HTE is not significant and is managed through ongoing maintenance. **Outcome:** Proposed completion criteria achieved in 2022.
Vertebrate pest species presence and impacts are recorded and controlled.	Feral pests were recorded during monitoring, and some signs of damage in OC1, but the level of damage was not considered to be unacceptable. **Outcome:** Proposed completion criteria achieved in 2022.
Rehabilitation area at some point since seeding or final surface preparation has experienced a fire or declared drought or at least one year with annual rainfall in the first decile range and all other vegetation completion criteria have been met.	All rehabilitation campaigns have experienced an intense drought. **Outcome:** Proposed completion criteria partially achieved in 2022.
Priority weeds are controlled and HTE cover is maintained at < 15%.	At all sites, the HTE cover was below 15%. **Outcome:** Proposed completion criteria achieved in 2022.
Multiple fauna habitats are available within all rehabilitation areas.	During 2022 monitoring a ranged of fauna habitat was recorded. **Outcome:** Proposed completion criteria achieved in 2022.
Monitoring confirms multiple native fauna species are recorded utilising rehabilitation areas.	2022 monitoring confirmed that there were multiple species utilising the rehabilitation areas. **Outcome:** Proposed completion criteria achieved in 2022.
Stands[2] of *Allocasuarina* spp have been maintained within Box Gum Shrubby Woodland / Sedimentary Ironbark Forest rehabilitation areas on OC1.	There were stands of *Allocauarina spp* present during 2022 monitoring in OC1. **Outcome:** Proposed completion criteria achieved in 2022.
Revegetation areas contain flora species assemblages characteristic of or trending towards that of: Box Gum Shrubby Woodland communities[1] / Secondary Ironbark Forest communities[3] / Box Gum Grassy Woodland[1].	All sites in OC1 and OC4 achieved the greater than 25% of typical species composition. **Outcome:** Proposed completion criteria achieved in 2022.
Median foliage cover of the ecologically dominant layers (trees/shrubs/ground cover) and developing litter cover are within the 10th-90th percentile variation range of the Box Gum Shrubby Woodland Community / Secondary Ironbark Forest community / Box Gum Grassy Woodland Community Analogue sites.	The tree and shrub cover completion criteria were achieved in OC1 but not in OC4 rehabilitation. Ground cover and litter cover did not reach the criteria in either OC1 or OC4. **Outcome:** Proposed completion criteria partially achieved in 2022 in OC2 and not achieved in OC4.
Rehabilitation monitoring verifies that second generation seedlings of species characteristic of Box Gum Shrubby Woodland Communities / Secondary Ironbark Forest communities / Box Gum Grassy Woodland communities are present or likely to be, based on comparable older rehabilitation sites.	In OC1 there was signs of regeneration of characteristic species were observed at all sites, but there were no signs of second generation in OC4. **Outcome:** Proposed completion criteria achieved in 2022 in OC1 and not achieved in OC4.

Table 34: Sedimentary Ironbark Forest Rehabilitation Assessment

Proposed Completion Criteria	2022 Monitoring Outcome
Reconstructed landforms are stable with no evidence of slumping.	There were no signs of slumping landforms observed. **Outcome:** Proposed completion criteria achieved in 2022.
Gullies and rills occurring in monitoring transects are assessed to be limited and stabilising.	There were signs of gullies erosion in both OC1 and OC4 rehabilitation. **Outcome:** Proposed completion criteria not achieved in 2022.
'High Threat Exotic' (HTE*) weed presence and cover is monitored regularly. Priority and HTE weeds identified through monitoring have been controlled.	There were HTE present at all monitoring sites. The level of HTE is not significant and is managed through ongoing maintenance. **Outcome:** Proposed completion criteria achieved in 2022.
Vertebrate pest species presence and impacts are recorded and controlled.	Feral pests were recorded during monitoring, and some signs of damage in OC1, but the level of damage was not considered to be unacceptable. **Outcome:** Proposed completion criteria achieved in 2022.
Rehabilitation area at some point since seeding or final surface preparation has experienced a fire or declared drought or at least one year with annual rainfall in the first decile range and all other vegetation completion criteria have been met.	All rehabilitation campaigns have experienced an intense drought. **Outcome:** Proposed completion criteria partially achieved in 2022.
Priority weeds are controlled and HTE cover is maintained at < 15%.	At all sites, the HTE cover was below 15%. **Outcome:** Proposed completion criteria achieved in 2022.
Multiple fauna habitats are available within all rehabilitation areas.	During 2022 monitoring a ranged of fauna habitat was recorded. **Outcome:** Proposed completion criteria achieved in 2022.
Monitoring confirms multiple native fauna species are recorded utilising rehabilitation areas.	2022 monitoring confirmed that there were multiple species utilising the rehabilitation areas. **Outcome:** Proposed completion criteria achieved in 2022.
Stands[2] of *Allocasuarina* spp have been maintained within Box Gum Shrubby Woodland / Sedimentary Ironbark Forest rehabilitation areas on OC1.	There were stands of *Allocauarina spp* present during 2022 monitoring in OC1. **Outcome:** Proposed completion criteria achieved in 2022.
Revegetation areas contain flora species assemblages characteristic of or trending towards that of: Box Gum Shrubby Woodland communities[1] / Secondary Ironbark Forest communities[3] / Box Gum Grassy Woodland[1].	All sites in OC1 achieved the greater than 25% of typical species composition, although the two sites in OC4 are yet to reach the 25% criteria mark. **Outcome:** Proposed completion criteria achieved in 2022.
Median foliage cover of the ecologically dominant layers (trees/shrubs/ground cover) and developing litter cover are within the 10th-90th percentile variation range of the Box Gum Shrubby Woodland Community / Secondary Ironbark Forest community / Box Gum Grassy Woodland Community Analogue sites.	The ground and litter cover completion criteria were achieved in OC1 both OC4 rehabilitation. Tree and shrub cover did not reach the criteria in either OC1 or OC4. **Outcome:** Proposed completion criteria partially achieved in 2022.
Rehabilitation monitoring verifies that second generation seedlings of species characteristic of Box Gum Shrubby Woodland Communities / Secondary Ironbark Forest communities / Box Gum Grassy Woodland communities are present or likely to be, based on comparable older rehabilitation sites.	In OC1 there was signs of regeneration of characteristic species were observed at all sites, there was one site with signs of second generation in OC4. **Outcome:** Proposed completion criteria achieved in 2022 in OC1 and partially achieved in OC4.

Table 35: Box Gum Grassy Woodland Rehabilitation Assessment

Proposed Completion Criteria	2022 Monitoring Outcome
Reconstructed landforms are stable with no evidence of slumping.	There were no signs of slumping landforms observed. **Outcome:** Proposed completion criteria achieved in 2022.
Gullies and rills occurring in monitoring transects are assessed to be limited and stabilising.	There were signs of gullies erosion in both OC1 and OC4 rehabilitation. **Outcome:** Proposed completion criteria achieved in 2022.
'High Threat Exotic' (HTE*) weed presence and cover is monitored regularly. Priority and HTE weeds identified through monitoring have been controlled.	There were HTE present at all monitoring sites. The level of HTE is not significant and is managed through ongoing maintenance. **Outcome:** Proposed completion criteria achieved in 2022.
Vertebrate pest species presence and impacts are recorded and controlled.	Feral pests were recorded during monitoring, and some signs of damage in OC1, but the level of damage was not considered to be unacceptable. **Outcome:** Proposed completion criteria achieved in 2022.
Rehabilitation area at some point since seeding or final surface preparation has experienced a fire or declared drought or at least one year with annual rainfall in the first decile range and all other vegetation completion criteria have been met.	One campaign in OC4 (represented by site R30) may have experienced intense drought conditions, but the exact time of seeding during 2020 is unknown. All other areas have experienced an intense drought. **Outcome:** Proposed completion criteria partially achieved in 2022.
Priority weeds are controlled and HTE cover is maintained at < 15%.	At all sites, the HTE cover was below 15%. **Outcome:** Proposed completion criteria achieved in 2022.
Multiple fauna habitats are available within all rehabilitation areas.	During 2022 monitoring a ranged of fauna habitat was recorded. **Outcome:** Proposed completion criteria achieved in 2022.
Monitoring confirms multiple native fauna species are recorded utilising rehabilitation areas.	2022 monitoring confirmed that there were multiple species utilising the rehabilitation areas. **Outcome:** Proposed completion criteria achieved in 2022.
Revegetation areas contain flora species assemblages characteristic of or trending towards that of: Box Gum Shrubby Woodland communities[1] / Secondary Ironbark Forest communities[3] / Box Gum Grassy Woodland[1].	All sites in OC1 achieved the greater than 25% of typical species composition, although the two sites in OC4 are yet to reach the 25% criteria mark. **Outcome:** Proposed completion criteria achieved in 2022.
Median foliage cover of the ecologically dominant layers (trees/shrubs/ground cover) and developing litter cover are within the 10th-90th percentile variation range of the Box Gum Shrubby Woodland Community / Secondary Ironbark Forest community / Box Gum Grassy Woodland Community Analogue sites.	The shrub cover completion criteria were achieved in OC1 both OC4 rehabilitation. Tree, ground and litter cover did not reach the criteria in either OC1 or OC4. **Outcome:** Proposed completion criteria partially achieved in 2022.
Rehabilitation monitoring verifies that second generation seedlings of species characteristic of Box Gum Shrubby Woodland Communities / Secondary Ironbark Forest communities / Box Gum Grassy Woodland communities are present or likely to be, based on comparable older rehabilitation sites.	Due to the age of the rehabilitation, there have only been signs of first generation seedlings of species that are characteristic of Box Gum Grassy Woodland. **Outcome:** Proposed completion criteria not achieved in 2022.

Table 36: OC2/OC3 Ecosystem and Species Credit Rehabilitation Assessment

Proposed Completion Criteria	2022 Monitoring Outcome
Reconstructed landforms are stable with no evidence of slumping.	There was slumping of the landform observed in the south-eastern section of OC2 during both the autumn and spring monitoring. **Outcome:** Proposed completion criteria not achieved in 2022.
Gullies and rills occurring in monitoring transects are assessed to be limited and stabilising.	There were signs of gullies erosion in in the OC2 rehabilitation. **Outcome:** Proposed completion criteria not achieved in 2022.
'High Threat Exotic' (HTE*) weed presence and cover is monitored regularly. Priority and HTE weeds identified through monitoring have been controlled.	There were HTE present at all monitoring sites. The level of HTE is not significant and is managed through ongoing maintenance. **Outcome:** Proposed completion criteria achieved in 2022.
Vertebrate pest species presence and impacts are recorded and controlled.	Feral pests were recorded during monitoring, and some signs of damage in OC1, but the level of damage was not considered to be unacceptable. **Outcome:** Proposed completion criteria achieved in 2022.
Native Plant Species Richness is ≥ 20.5 at year 10 post mining.	Three of the five monitoring sites achieved greater than 20 native species richness. **Outcome:** Proposed completion criteria partially achieved in 2022.
≥ 15% of the total number of trees are the regionally relevant species** within koala FBA species credit areas.	There were no tree suitable for koala use of greater than 10cm DBH in the monitoring plots. **Outcome:** Proposed completion criteria not achieved in 2022.
Native Over Storey Cover between 3.75 and 80% at year 10 post mining operations.	All sites monitored had less than 3.75% overstory cover. **Outcome:** Proposed completion criteria not achieved in 2022.
Native Mid-Storey Cover between 1.25 and 40% at year 10 post mining operations.	All sites monitored had less than 1.25% mid-story cover. **Outcome:** Proposed completion criteria not achieved in 2022.
Native Ground Cover, Grass between 3 and 100% at year 10 post mining operations.	Of the five sites monitored, three had greater than 3% native grass ground cover. **Outcome:** Proposed completion criteria partially achieved in 2022.
Native Ground Cover, Shrubs between 0.5 and 20% at year 10 post mining operations.	One of the five monitoring sites achieved the criteria of grater that 3% native shrub ground cover. **Outcome:** Proposed completion criteria partially achieved in 2022.
Native Ground Cover, Other between 2 and 80% at year 10 post mining operations.	Four of the five sites monitored had greater than 2% of native other ground cover. **Outcome:** Proposed completion criteria partially achieved in 2022.
Total Length Fallen Logs (m) is 1.25 at year 10 post mining operations.	All sites monitored during 2022 recorded LWD of greater than 1.25m. **Outcome:** Proposed completion criteria achieved in 2022.
Exotic Plant Cover is <45% at year 10 post mining operations.	Three of the five monitoring sites in the 2022 monitoring achieved the criteria of less than 45% exotic plant cover. **Outcome:** Proposed completion criteria partially achieved in 2022.
Overall Site Value Score (OEH, 2015) (average of plots in vegetation zone) is ≥ 13.8 at 10 years post mining operations.	The overall Site Value Score for OC2 in 2022 was 17.7 and achieved the completion criteria. **Outcome:** Proposed completion criteria achieved in 2022.

* HTEs as per the BAM 2020
** Under the *State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2021.*
[1.] A range of characteristic means that at least 25% of the species present in rehabilitated areas are recognised as being typical of the vegetation communities that match the Box Gum Shrubby Woodland Association (inclusive of any additional species listed in Table 16 of the RMP)
[2.] Patches of three or more individual stems
[3.] A range of characteristic means that at least 25% of the species present in rehabilitated areas are recognised as being typical of the vegetation communities that match the Sedimentary Ironbark Forest Association (inclusive of any additional species listed in Table 17 of the RMP)

[4.] A range of characteristic means that at least 25% of the species present in rehabilitated areas are recognised as being typical of the vegetation communities that match the Box Gum Grassy Woodland Association (inclusive of any additional species listed in Table 18 of the RMP)
[5.] At least 50% of the vegetative cover.

9.5 REHABILITATION WORKS

Rehabilitation of disturbed lands are undertaken sequentially (or in phases) to achieve the final land use. A description of these phases of rehabilitation relevant to the MCC are provided in the FWP. A summary of rehabilitation phases completed during the reporting period included:

Decommissioning
There were no decommissioning activities undertaken at MCO.

Landform Establishment
53ha of landform establishment in OC2 and OC4 was completed during 2022. Final landforms were established to the relevant completion criteria including:

- Constructed landforms consist with surrounding topography;
- Slopes were generally less than 10° to 18°;
- Constructed landforms were free draining; and
- No hostile overburden material in the final surface layers.

Growth Medium Development
No Opencut areas underwent growth medium development during 2022.

Ecosystem and Landuse Establishment
358ha of rehabilitation in the ecosystem and landuse establishment phase located in OC1, OC2 and OC4 were maintained and further enhanced during 2022.

9.6 ACTIONS DURING NEXT PERIOD

Rehabilitation actions to be progressed in the next period include:

- Continued progressive rehabilitation;
- Continued weed and feral animal control; and,
- Continued monitoring of rehabilitation areas with low cover or density with consideration of supplementary seeding or planting of tubestock.

10.0 COMMUNITY

10.1 COMMUNITY ENGAGEMENT

During 2022, MCO continued to foster positive relationships with the local community through engagement and ongoing support provided to a range of community groups and events – including, but not limited to – St Matthews Catholic School, Mudgee, Rylstone and Gulgong Show Society. Gulgong Chamber of Commerce, Mudgee Rotary, Mudgee Lions Club, Mudgee Rescue squad, Survivor Life skills program, Gulgong Hospital Aux, Mudgee Touch Association and Sculptures in the Garden. In total, MCO provided $176,122 in community donations during 2022 to 44 community groups and events through its Community Support Program and other programs (**Appendix 5).**

Community/stakeholder related activities undertaken during the reporting period include:

- Max Potential Program at Club Mudgee
- 100 years of CWA Mudgee History Book;

- Upgrade to Gulgong Museum Façade; and
- Direct engagement with nearby landholders.

Moolarben continued to provide the community with information on its website (www.moolarbencoal.com.au). Information available included project approvals, CCC meeting minutes, community complaint records, environmental monitoring information, environmental audits, environmental management plans and annual reviews.

10.2 COMMUNITY COMPLAINTS

MCO maintains a 24-hour Environment and Community Complaints Hotline (1800 556 484). This Hotline is available to receive any complaints from neighbouring residents or interested stakeholders. Details for the Hotline are available on the MCO website and in community newsletters.

MCO has developed a Community Complaints Procedure which details how to receive, respond to, record, and action any community complaint received to site. This procedure also outlines the reporting requirements relating to community complaints, including:

- Monthly reporting of community complaints on the MCO website;
- Discussion of community complaints as part of the operational performance provided during CCC meetings; and,
- A summary of complaints is provided in the Annual Review and Annual Return (as part of EPL reporting).

During 2022, a total of 26 complaints were received in relation to MCO Operations by nine complainants. All complaints are investigated and included in the complaints register on the Moolarben Coal website (www.moolarbencoal.com.au). 62% of complaints were received by three complainants. Noise remained the primary issue of concern (31% of complaints) (**Figure 26**).

A comparison of complaints to previous years is presented in **Table 34**. There has been a general decrease in complaints during the period and continues the trend since 2015. A register of complaints is provided in **Appendix 4**.

The ongoing use of Mining and Production Environmental Assistants continues to provide real-time feedback to the mining operation and to inform proactive and reactive responses. Ongoing community and stakeholder liaison and consultation has continued.

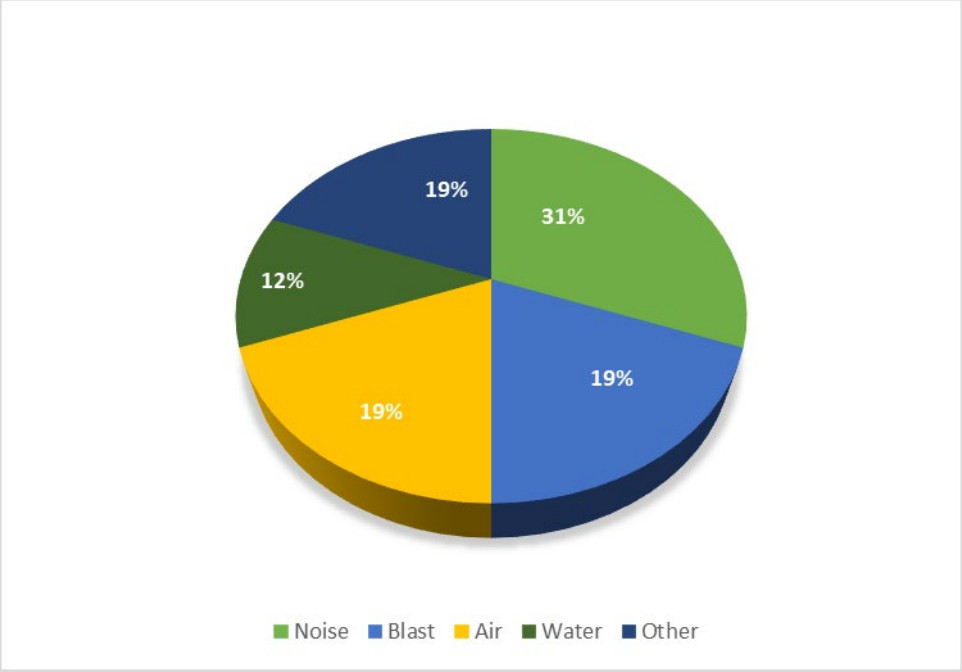


Figure 26: Community Complaints 2022 – Breakdown by Type

Table 34: Comparison of Community Complaints

Reporting Period	Noise	Blast	Air	Water	Other	Total
2013 - 2014	239	12	2	0	3	**256**
2015	274	6	2	0	4	**286**
2016	157	7	2	0	1	**167**
2017	108	3	1	2	1	**115**
2018	54	10	0	0	1	**65**
2019	33	1	4	0	0	**38**
2020	12	3	1	0	0	**16**
2021	22	1	3	0	13	**39**
2022	8	5	5	3	5	**26**

10.3 COMMUNITY CONSULTATIVE COMMITTEE (CCC)

In accordance with Condition 6, Schedule 5 of project approval (05_0117) and Condition 6, Schedule 6 of project approval (08_0135) the Community Consultative Committee (CCC) continued to meet during the 2022 reporting period. The purpose of a CCC is to provide a forum for open discussion between MCO, the community, the local council and other key stakeholders on issues directly relating to the project, including performance against any conditions, and to keep the community informed on these matters.

Members of the MCO CCC for 2022 are presented in **Table 35**. MCO conducted four CCC meetings during the reporting period with summaries provided in **Table 36.** Meetings were chaired by an independent chairperson with the minutes being available on the MCO website.

Table 35: CCC Members 2022

Name	Representing	Name	Representing
Aleshia Lonsdale	Mudgee Local Aboriginal Land Council	Helen Ungaro	Ulan Public School and Local Landholder.
Julia Imrie	Local Landholder and Business Owner	David Stokes	Local resident
Bev Smiles	Mudgee District Environment Group	Ms Lisa Andrews	DPIE endorsed Independent Chair.
Des Kennedy	Councillor, Mid-Western Regional Council	Katie Dicker[1]	Councillor, Mid-Western Regional Council
David Lowe	Mudgee Chamber of Commerce		

[1]Katie Dicker replaced John O'Neil as a CCC member at the CCC No. 60 meeting.

Table 36: CCC Meeting Summary

Date	Meeting Summary
17th March	General update on community interaction, operations and exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management, employment, and COVID-19 controls at MCO. Information on the Independent water quality study conducted. Update on the Underground 2 Modification. Update on the Open Cut 3 extension project.
7th June	General update on community interaction, operations and exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management, employment, and COVID-19 controls at MCO. Update on the Underground 2 Modification Update on the Open Cut 3 Extension Projects and overview of the 2021 Annual Review.
6th September	General update on community interaction, operations and exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management, employment, and COVID-19 controls at MCO. Update on the Underground 2 Modification. Update on the Open Cut 3 Extension Projects.
29th November	General update on community interaction, operations, exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management, employment, and COVID-19 controls at MCO. Update on the Underground 2 Modification. Update on the OC3 Extension Project. Information on the emergency water discharge license.

10.4 ULAN ROAD STRATEGY

The Mid Western Regional Council has continued maintenance works on Ulan Road. Moolarben continues to make financial contributions to the maintenance costs of the Ulan Road works detailed in the agreement.

18 properties along Ulan Road were previously identified for noise attenuation works. Works required at each of the properties was determined generally in accordance with the RMS guidelines. Works are required to be finalised on one remaining property with all other aspects completed.

11.0 INDEPENDENT AUDIT

In December 2021, an Independent Environmental Audit (IEA) was undertaken in accordance with Condition 9, Schedule 5 of PA 05_0117 (as modified) and Condition 9, Schedule 6 of PA 08_0135. The IEA was undertaken by Barnett and May. In general, operational environmental management activities observed during the site inspection were being carried out in a competent manner, with the non-compliances identified by the Auditors being the exception.

A copy of the IEA including the Audit findings can be found on MCO's Website (www.moolarbecoal.com.au)

The next Independent Audit will be required by December 2024.

12.0 INCIDENTS & NON-COMPLIANCES

There were two (2) incidents during the reporting period:

- On 20 May 2022 there was an exceedance of airblast overpressure criteria of 120 dB (Lin Peak) at Ridge Road (BM5), where the airblast pressure was recorded as 124.1 dB (Lin Peak).

- From 1 October to 11 October 2022, there was a release out of specification treated water from the water treatment plant. The released water contained Free Chlorine Levels above ANZECC guidelines for 95% species protection however, the levels were within range of the Australian Drinking Water Guidelines.

13.0 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

The following is a summary of measures to be implemented in the next reporting period.

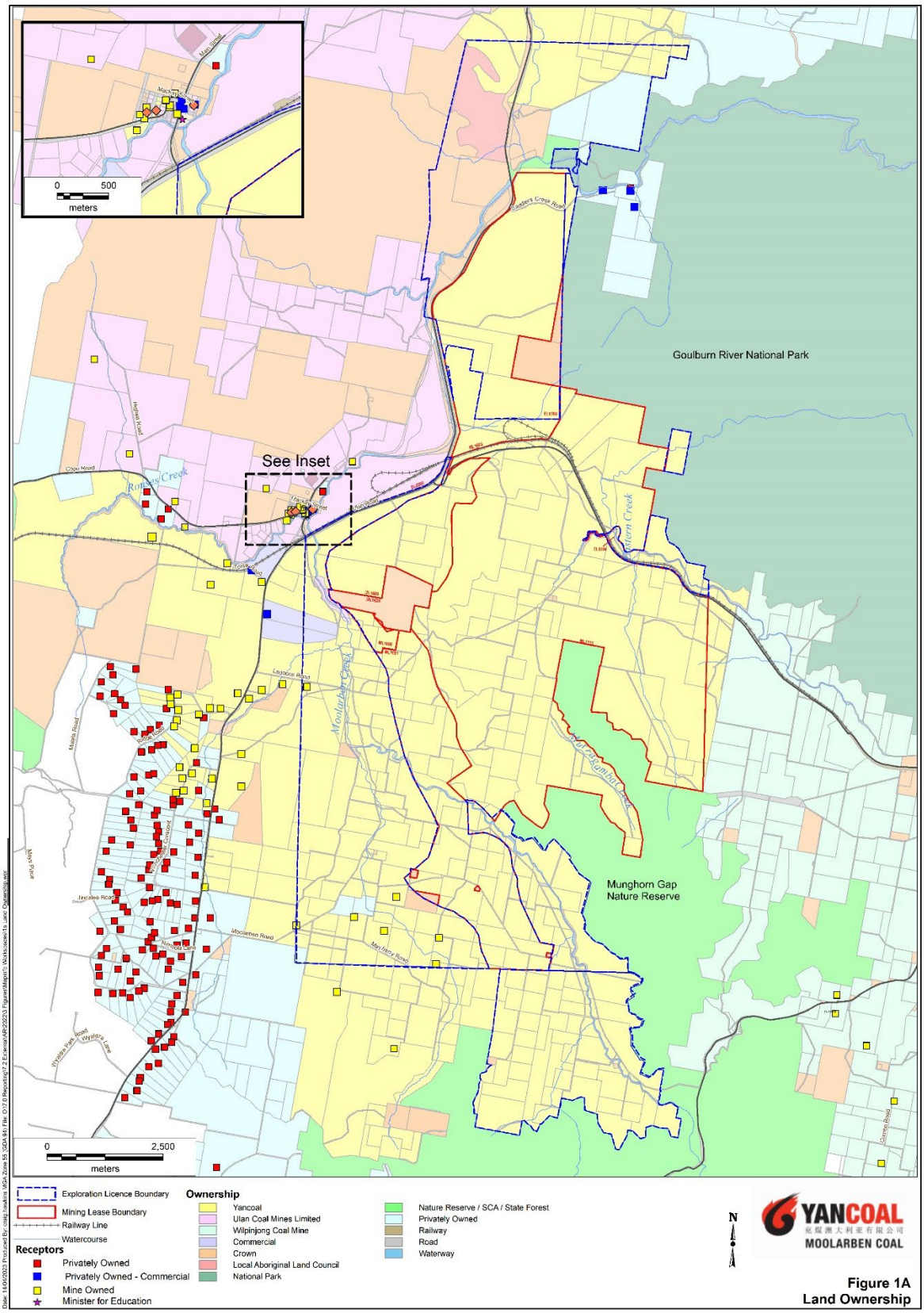
- Review and revise environmental management plans as necessary.
- Review PZ058a monitoring as part of next Groundwater Management Plan Review.
- Continued progressive rehabilitation.
- Continued establishment and baseline monitoring associated with UG4.

LIST OF APPENDICES

LIST OF FIGURES

APPENDIX 1. LAND OWNERSHIP

Figure 1-a Land Ownership



APPENDIX 2. MONITORING LOCATIONS

Figure 2-a Noise Monitoring Locations

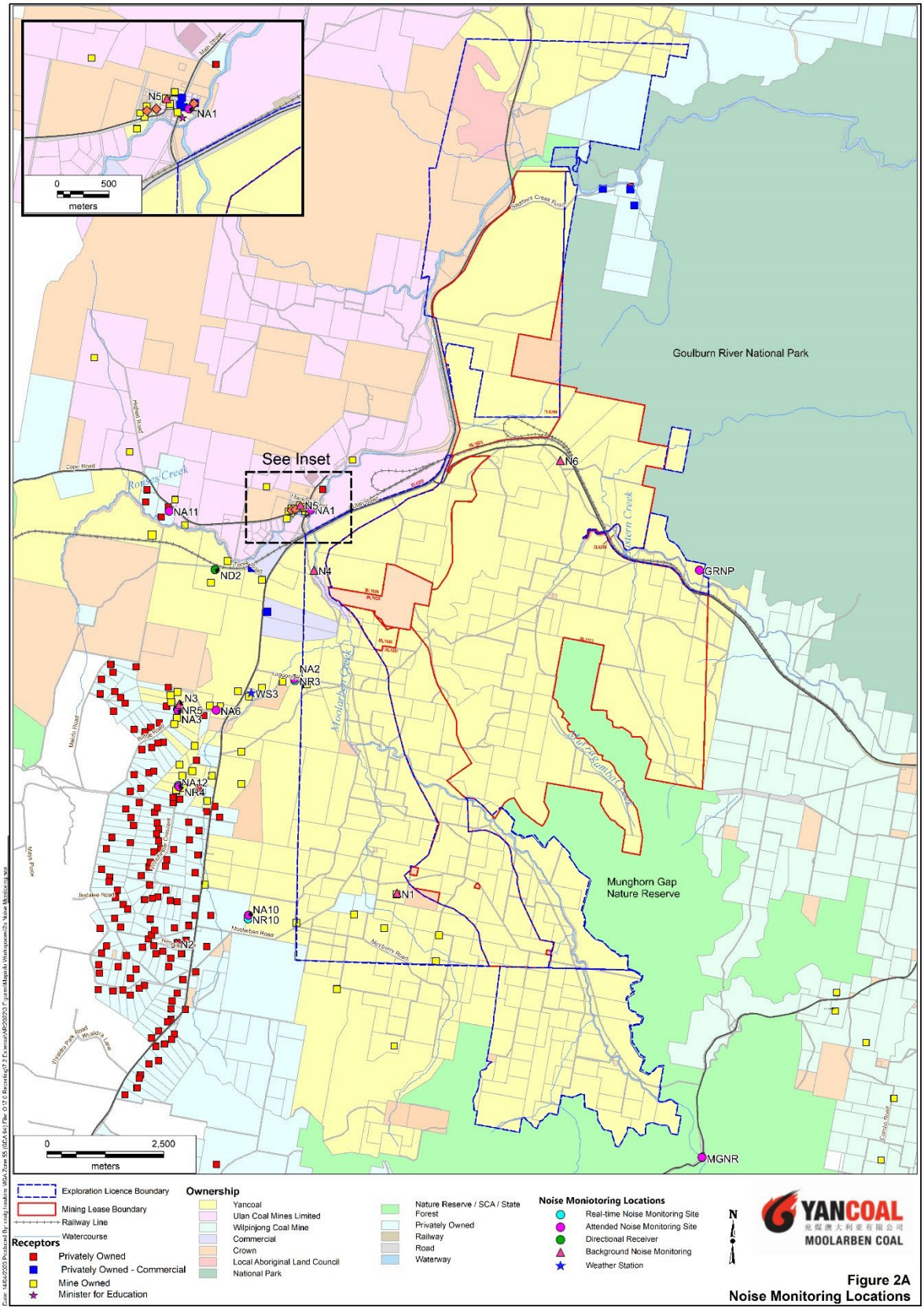


Figure 2-b Blast Monitoring Locations

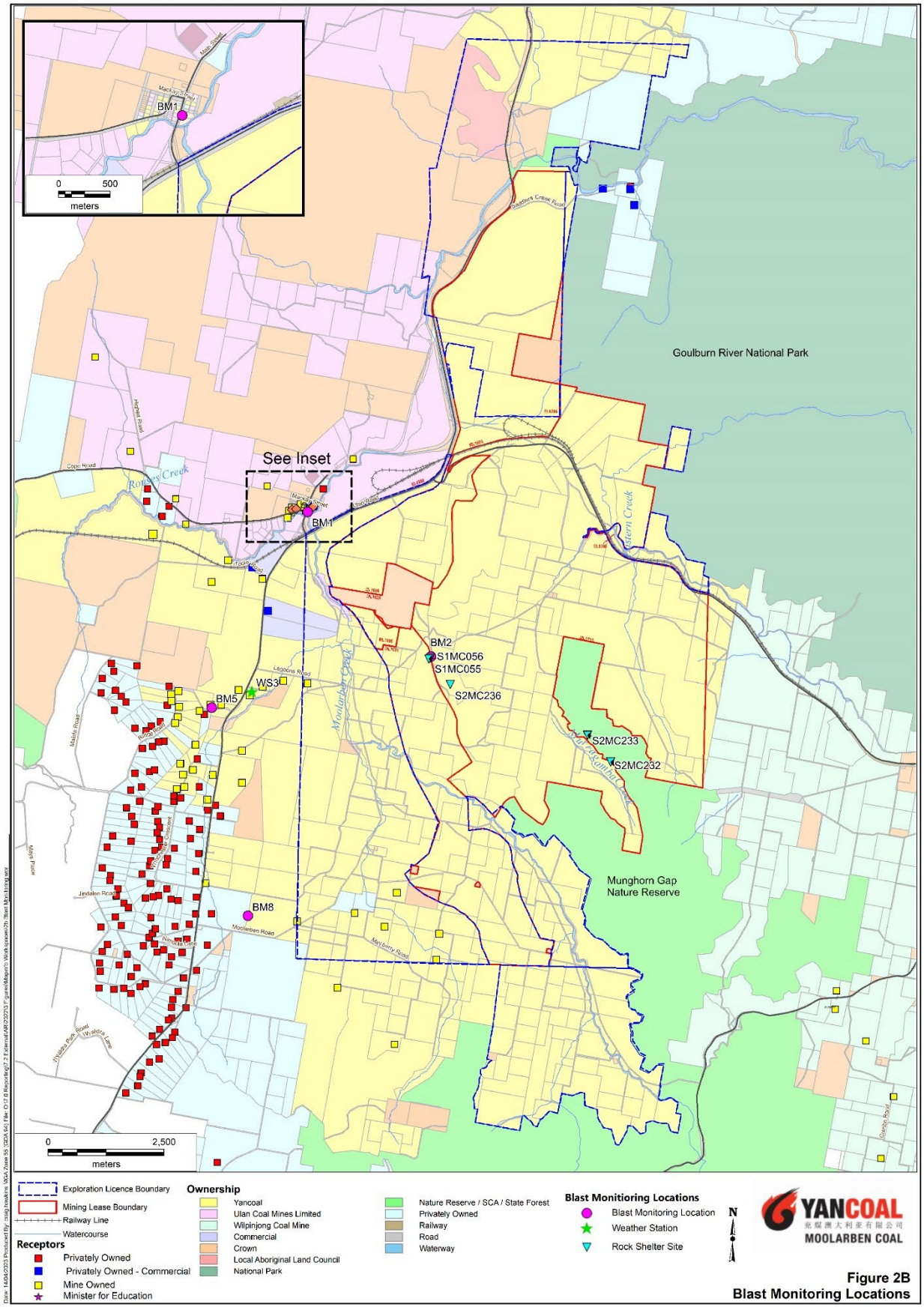


Figure 2-c Air quality Monitoring Locations

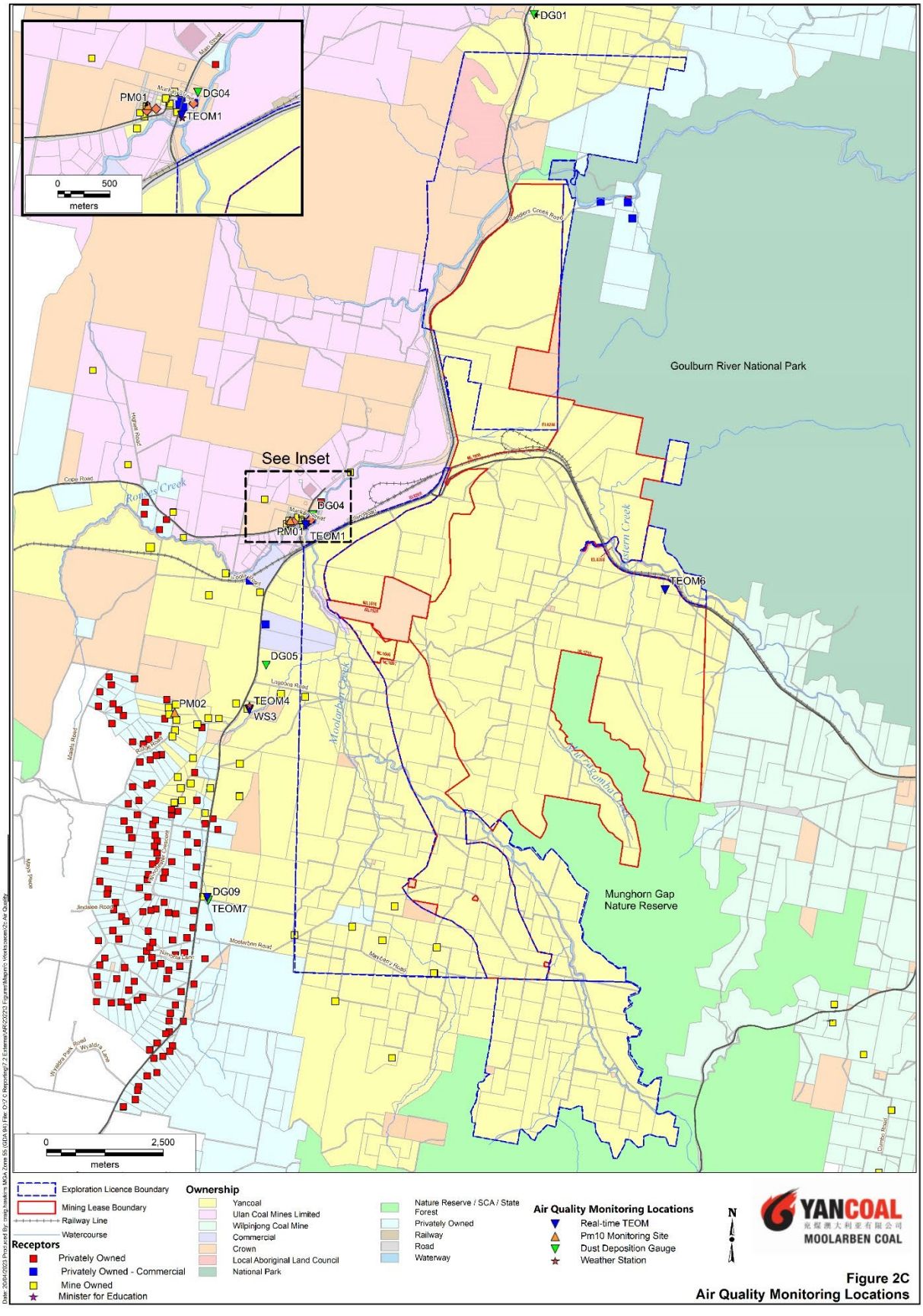


Figure 2-d MCO Northern Biodiversity Offset Area monitoring site locations

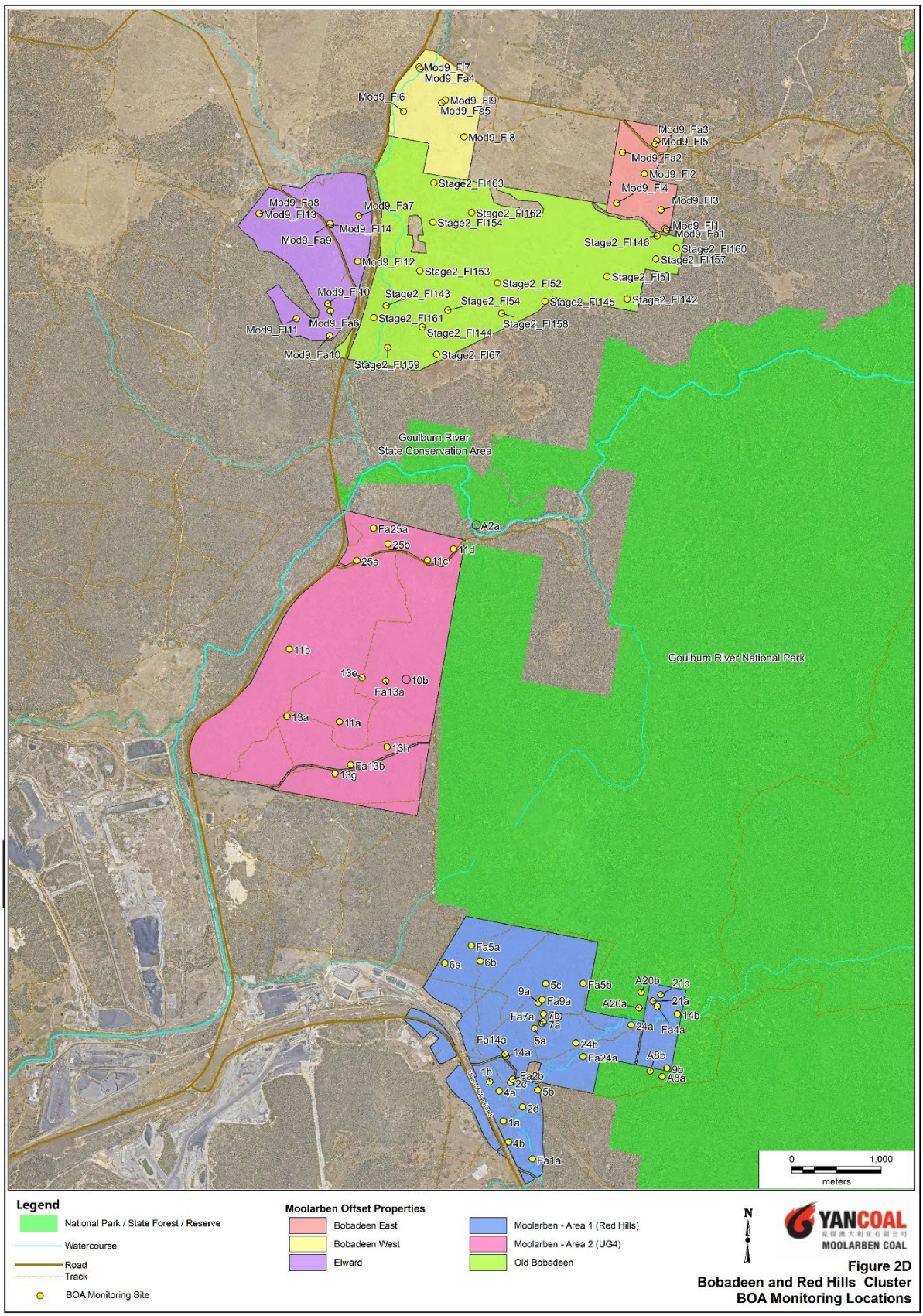


Figure 2-e MCO Western Biodiversity Offset Area monitoring site locations

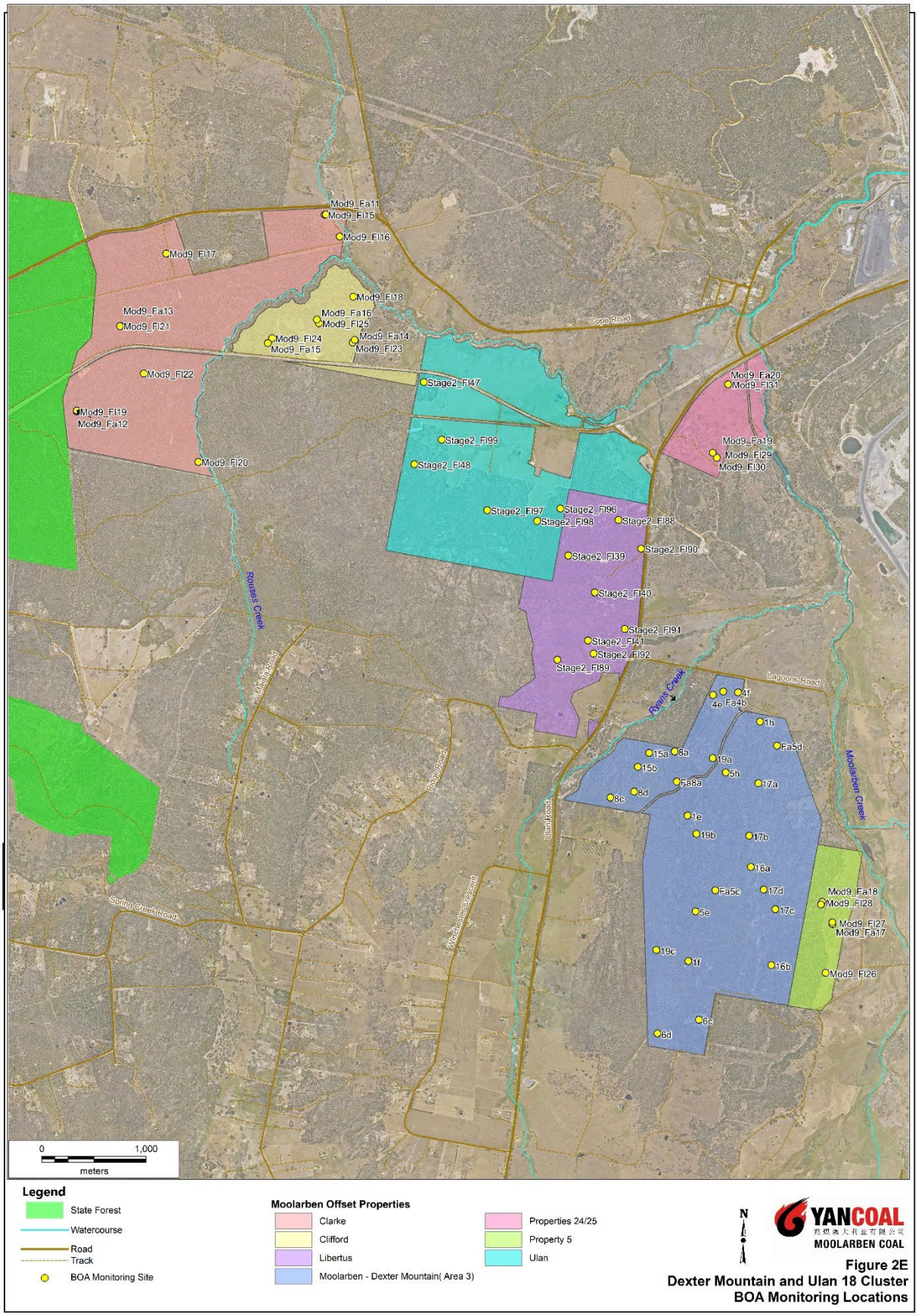


Figure 2-f MCO Southern Biodiversity Offset Area monitoring site locations

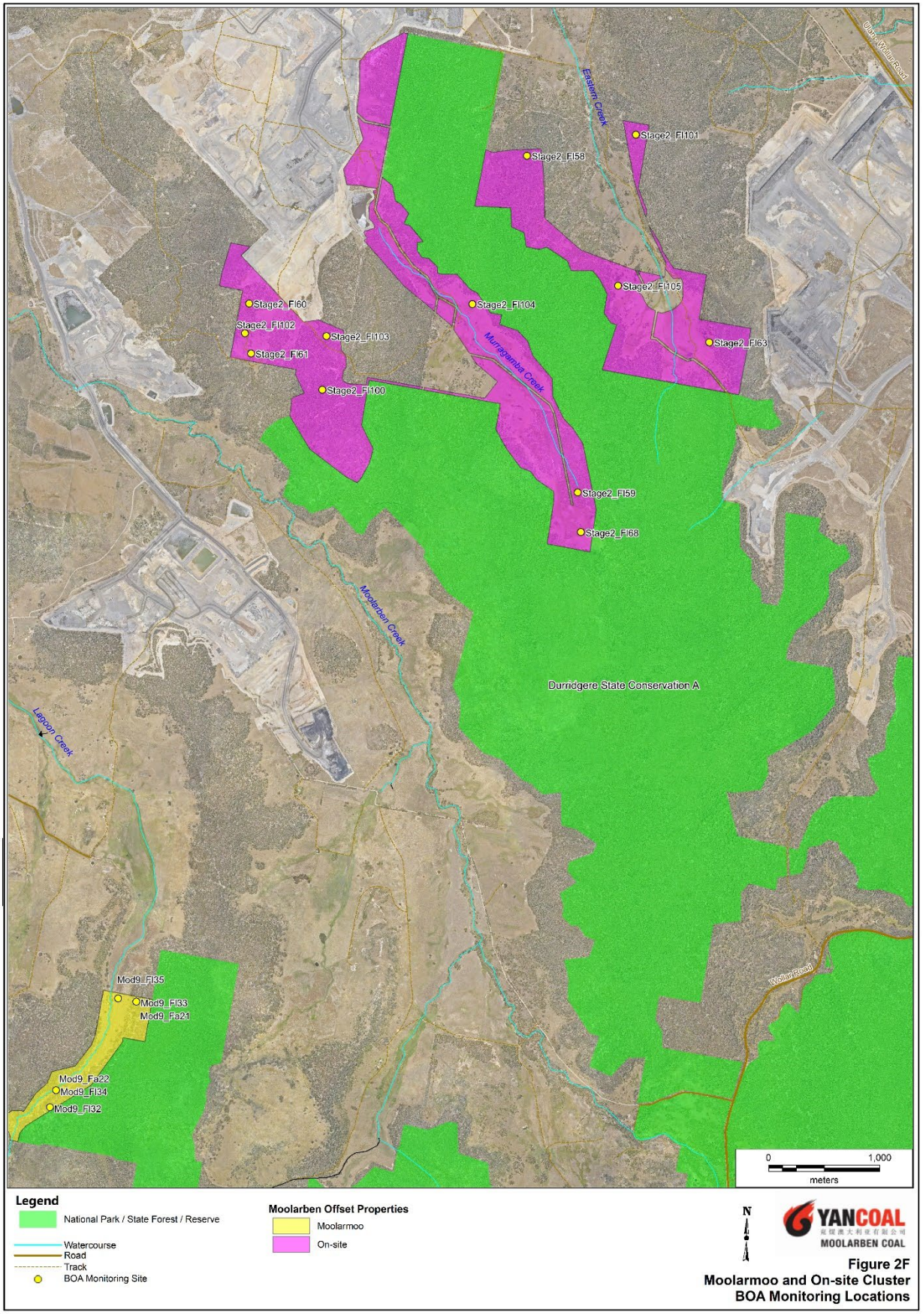


Figure 2-g MCO Remote Biodiversity Offset monitoring site locations

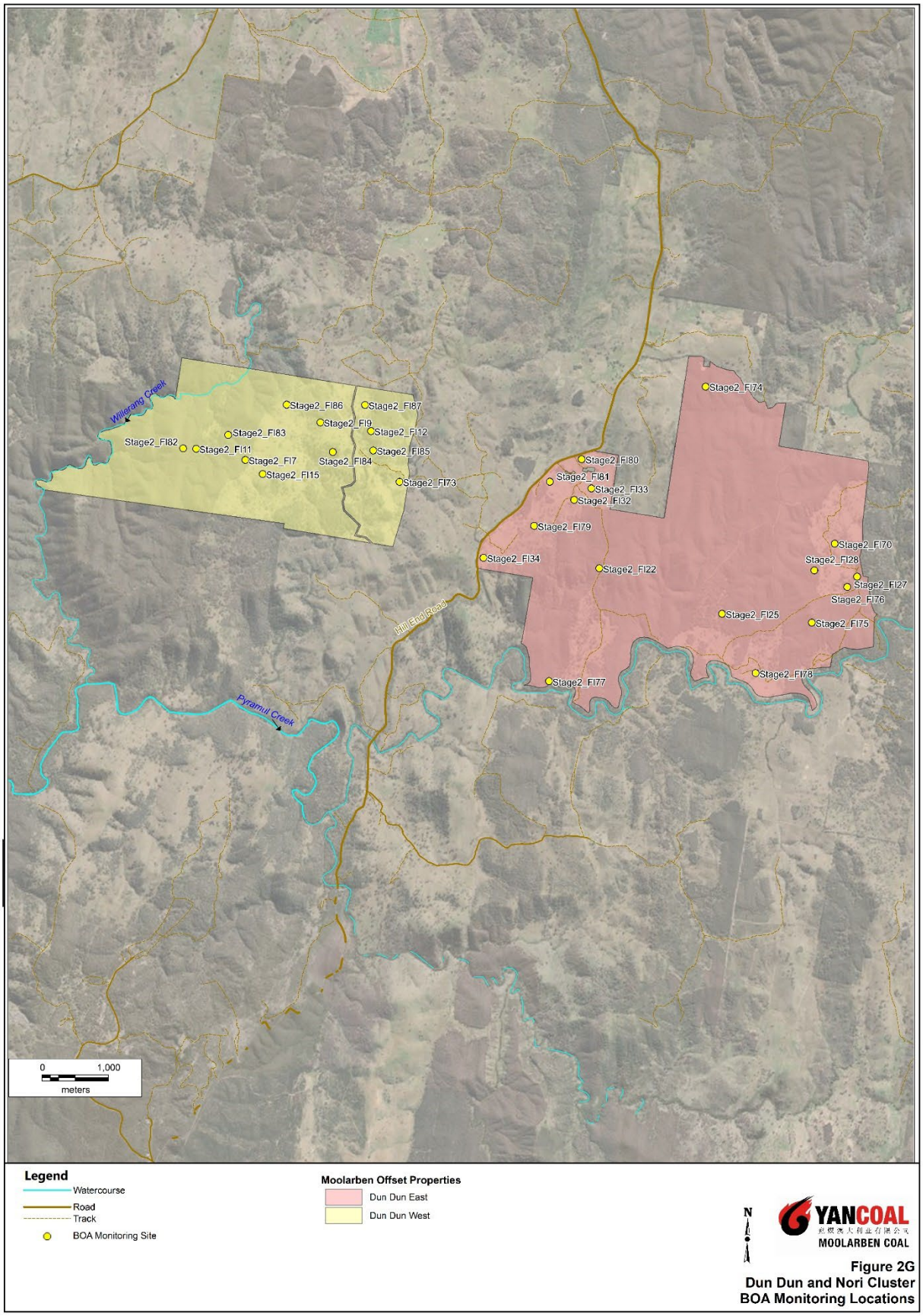


Figure 2-h MCO analogue monitoring site locations

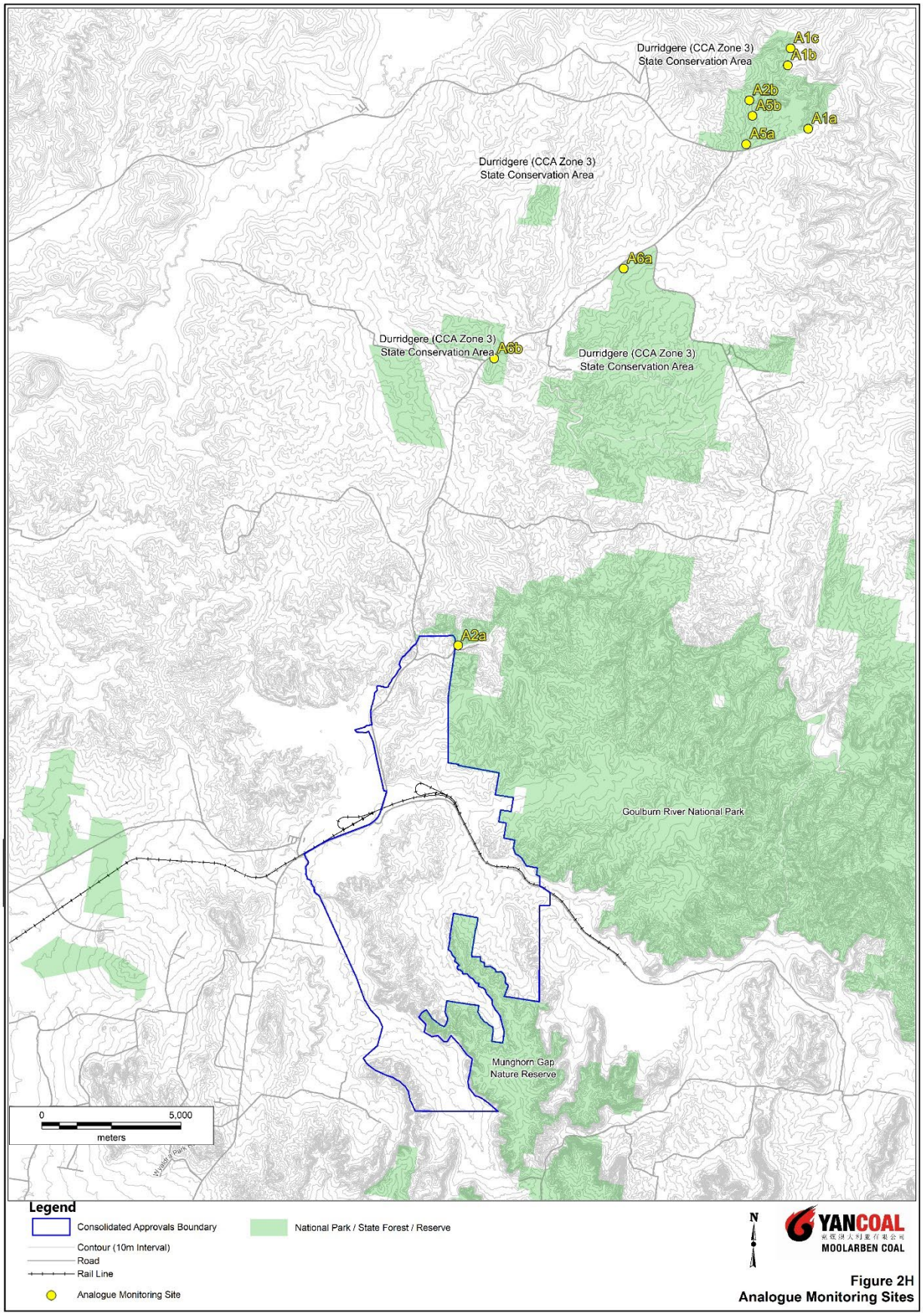


Figure 2-i Surface Water Monitoring Locations

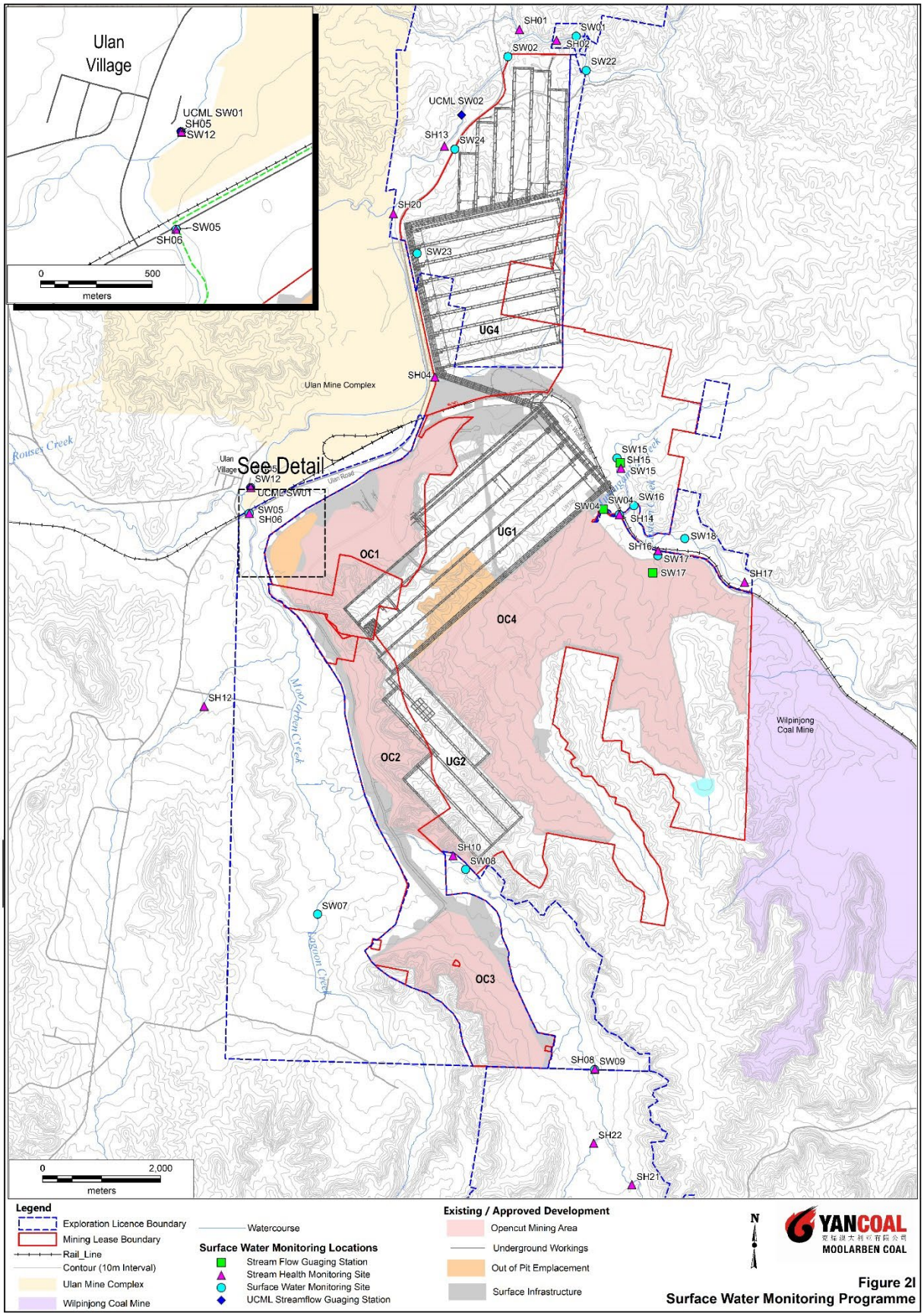


Figure 2-j Channel Stability Monitoring Locations

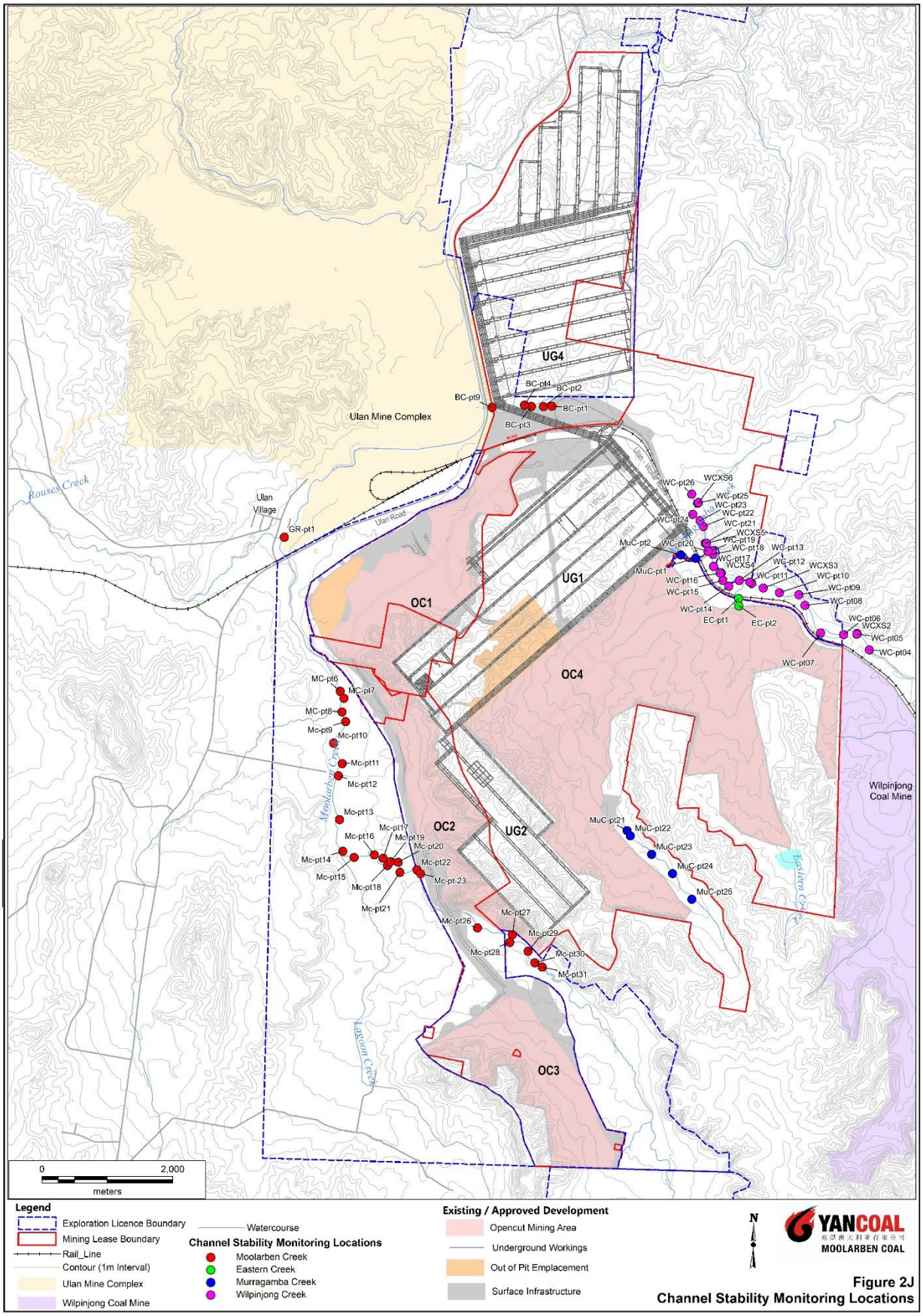


Figure 2-k Groundwater Monitoring Locations

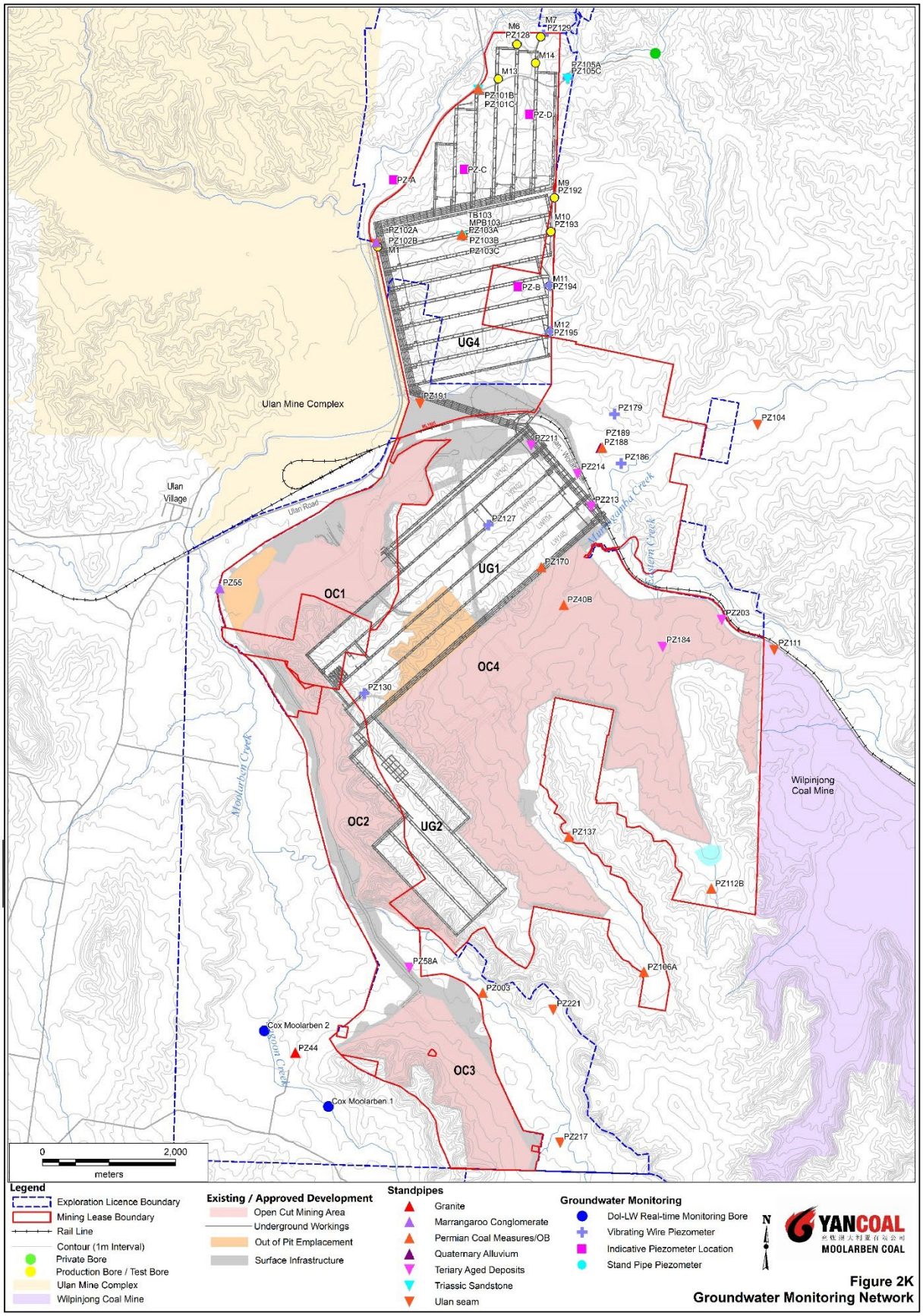
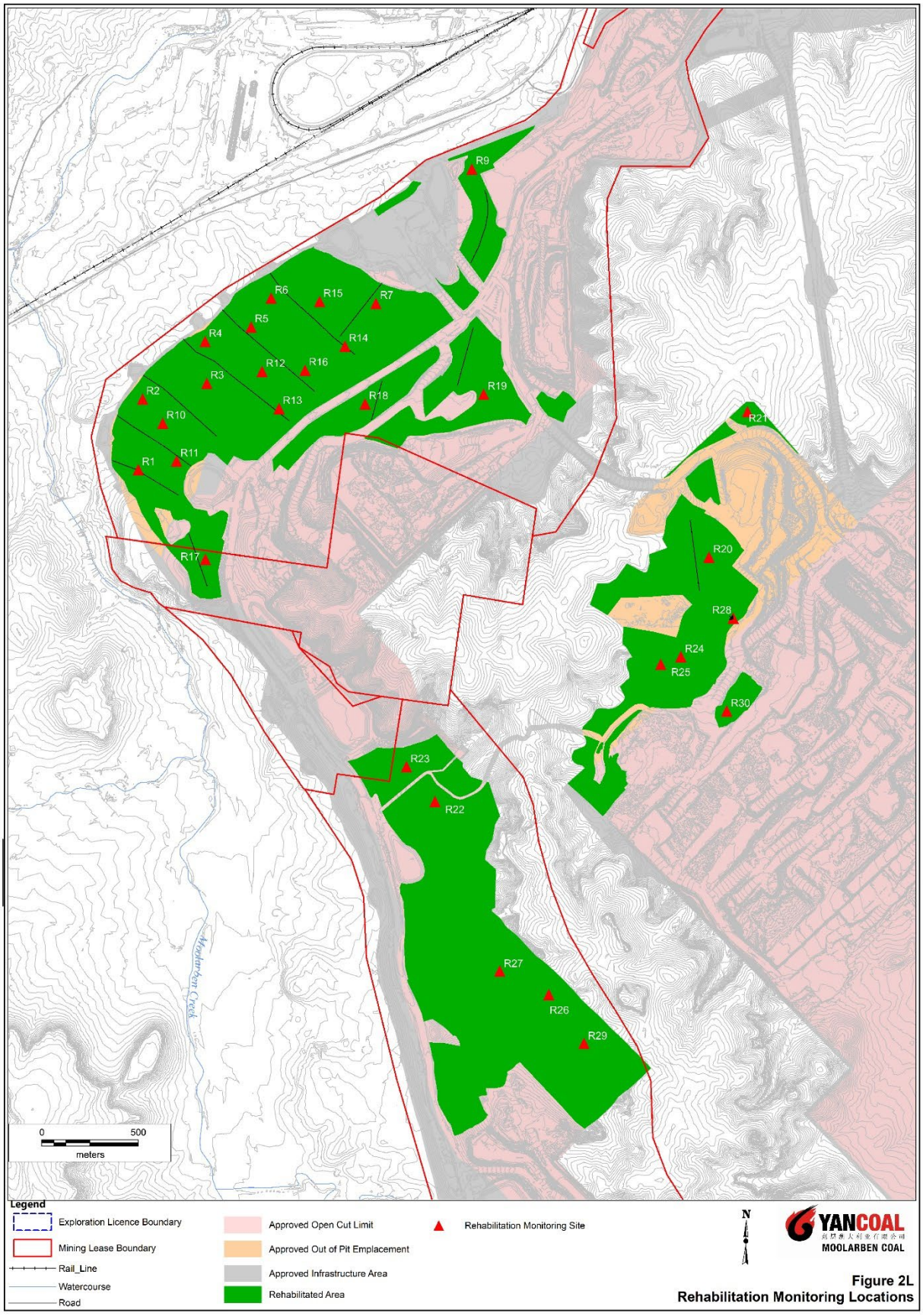


Figure 2-l Rehabilitation Monitoring Locations



APPENDIX 3. MONITORING DATA

APPENDIX 3A. DAILY METEOROLOGICAL DATA (WS03)

Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
1/01/2022	13.6	29.6	14.9	29	68.8	0
2/01/2022	13.1	31.6	14.2	30.8	73.4	5.4
3/01/2022	14.5	29.6	15.8	29.1	66.5	0
4/01/2022	13.4	29.2	14.5	28.6	64.1	0
5/01/2022	14.8	29.3	16.2	28.5	71.7	0
6/01/2022	19.3	30.4	19.8	29.8	70.1	0
7/01/2022	17.4	31.7	17.6	31.2	79.3	73.8
8/01/2022	17.2	27.4	17.7	28.4	79.7	9.6
9/01/2022	17.8	28.1	18.1	27.6	79.9	7.8
10/01/2022	20.5	28.9	20.5	28	81.9	6
11/01/2022	17.3	31	18	29.3	85.9	3.6
12/01/2022	16.3	28.7	17	27.3	76.6	0
13/01/2022	16.3	28.3	17.5	27.6	68.8	0
14/01/2022	17.4	30.1	18	27.9	71.6	0
15/01/2022	16.3	30.8	17.3	29.1	81	5.4
16/01/2022	15.1	33	15.9	32	67.6	0
17/01/2022	19.7	33.7	20	32	70.5	0
18/01/2022	18.3	24.5	18.8	24.4	87.5	13.4
19/01/2022	17.1	20.2	17.5	20.2	84.7	2.2
20/01/2022	15.5	23	16.2	22.5	64.3	0
21/01/2022	14.9	23.9	15.6	23.4	64.1	0
22/01/2022	12.4	24.6	13.5	24	68.8	0
23/01/2022	11.6	25	12.9	24.5	70.8	0
24/01/2022	16.1	25.6	16.8	25.1	72.9	0
25/01/2022	16.4	21.4	16.9	20.8	85.6	0.4
26/01/2022	16.9	25.6	18	25.2	78.5	3.2
27/01/2022	16.8	26	17.4	25.6	71.1	0
28/01/2022	16.3	31.4	17.5	29.1	79.2	5.2
29/01/2022	17.9	31.9	18.9	30.5	75.6	1.4
30/01/2022	16.7	29.6	17.6	29	72	0
31/01/2022	16.4	33	17.6	31.6	68.8	0
1/02/2022	16.3	30.6	17.2	29.8	72.8	0
2/02/2022	18.8	27.4	19.3	26.2	85.6	4.6
3/02/2022	14.7	24.9	15.9	23.3	76.9	3.4
4/02/2022	12	22.9	13.2	22.2	63.4	0
5/02/2022	10.3	22.2	11.5	21.7	65.9	0
6/02/2022	13.7	23.7	14.5	22.9	67.9	0
7/02/2022	12.5	24	13.3	23.3	70.6	0
8/02/2022	8.3	26	9.7	24.6	69.6	0
9/02/2022	8.7	30.7	10.2	29.6	61.6	0
10/02/2022	10.7	32.9	12.6	32.1	53.7	0
11/02/2022	15.8	28.3	16.4	27.8	70.5	4.8
12/02/2022	13.6	25.2	14.9	24.5	64.4	0
13/02/2022	13.7	25.8	14.7	25	64.4	0
14/02/2022	10.1	28.9	11.7	27.9	62.8	0
15/02/2022	11.2	30.2	12.5	29	63.8	0
16/02/2022	10.8	28.9	12.1	28	67.8	0
17/02/2022	12.3	32.6	13.4	31.7	59.5	0
18/02/2022	13.7	31.7	14.8	31.1	52.6	0
19/02/2022	17.6	25.3	18.1	24.6	67.8	0
20/02/2022	14.5	32.4	15.3	30.8	63	0
21/02/2022	17.2	31.2	17.7	29.4	67.3	1.4
22/02/2022	16.2	28.2	17.8	26.8	75.5	1
23/02/2022	18.3	27.5	18.9	26.7	70.7	0
24/02/2022	19.2	26.9	19.6	26.2	74.6	0.6
25/02/2022	18.3	24.4	18.7	23.9	80.3	2.4
26/02/2022	17.7	24.2	18.5	23.7	76.7	0.6
27/02/2022	17.9	28.1	18.5	27.3	70.6	0
28/02/2022	15.3	27.3	16.8	26.2	68.6	0
1/03/2022	15.4	28.1	17.2	27.3	72.7	0
2/03/2022	14.9	28.5	16	27.1	78.1	8

Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
3/03/2022	15.8	28.2	16.3	27.6	75.3	0.2
4/03/2022	17.8	29.8	18.8	29.1	70	0
5/03/2022	17.7	30.6	18	29.1	77.5	62.8
6/03/2022	6.8	22.7	15.7	24.1	87.9	22.4
7/03/2022	18.8	25.4	19.3	25	85.8	8.4
8/03/2022	17.8	25	18.3	24.5	91.4	24.2
9/03/2022	15.3	26.4	17	25.6	76.8	0.4
10/03/2022	14	24.8	14.4	23.6	72.5	0
11/03/2022	11	24.7	12.6	23.9	68.9	0
12/03/2022	11.6	25.3	13.4	24.4	66.4	0
13/03/2022	13.9	26.1	15	24.4	64.4	0
14/03/2022	10.8	25.6	11.6	24.8	69	0
15/03/2022	12.5	24.4	14.4	23.8	69.3	0
16/03/2022	14.2	26.4	15.5	25.5	70.3	0
17/03/2022	12.5	27.8	13.6	26.7	77.4	0
18/03/2022	16.7	27.9	17.4	26.6	75.7	5
19/03/2022	14.5	24.7	16	24	79.6	0
20/03/2022	9.3	29.1	10.4	28.1	68.6	0
21/03/2022	12.6	27.1	14.3	25.9	72.8	0
22/03/2022	10.6	30	11.9	29.2	69.7	0
23/03/2022	14.4	28.8	15.8	27.8	65.8	0
24/03/2022	14.4	22.6	14.6	21.7	82.4	11.8
25/03/2022	14	22.7	14.7	22.3	82.4	0.8
26/03/2022	14.2	18.8	14.8	18.6	82.5	4
27/03/2022	15	17.7	15.3	17.9	89	6
28/03/2022	14.6	24.6	15.3	23.9	80.6	0
29/03/2022	15.8	19.6	17	19.7	93.9	8
30/03/2022	12.4	24.9	13.5	24.7	77.6	0
31/03/2022	12.3	24.4	13.6	23.8	67.4	0
1/04/2022	6.8	20.2	8.1	19.8	70.5	0
2/04/2022	5.4	22.4	6.4	21.8	72.3	0
3/04/2022	4.6	22.6	5.7	21.8	73.2	0.2
4/04/2022	6.8	24.8	8.1	24.1	76.3	0
5/04/2022	10.7	26.5	12.9	25.8	62.4	0
6/04/2022	8.4	24.7	9.9	24	74.8	0
7/04/2022	15.7	20.2	16.1	20	82.3	4
8/04/2022	14.5	20.2	14.9	20.3	80.7	14
9/04/2022	15	23.6	15.5	22.9	77.1	11.2
10/04/2022	12.4	24.6	13.1	23.7	85.5	0.4
11/04/2022	10.3	26.8	11.2	25.9	75.7	0
12/04/2022	11	26.1	12.3	25	78	0
13/04/2022	12.6	20.9	13.4	20.5	76.4	0
14/04/2022	10.7	21.2	11.9	20.8	75.6	0.2
15/04/2022	9	23.4	10.7	22.4	77.4	0
16/04/2022	7	23.2	8.5	22.4	72.7	0.2
17/04/2022	6.3	24.7	8.1	24	74.6	0
18/04/2022	6.3	25.6	7.7	24.4	74.9	0
19/04/2022	8.5	25.6	9.7	24.7	74.6	6.4
20/04/2022	5.8	19	7.5	18.5	79.9	0.2
21/04/2022	2.9	21.7	4.4	20.7	71.2	0
22/04/2022	9.6	18.6	11.4	18.4	79	0.2
23/04/2022	11.4	19.3	13	19	74.5	0
24/04/2022	8.1	20	9.4	19.8	79.4	0.2
25/04/2022	8.5	20.6	9.5	19.9	73.7	0
26/04/2022	10.9	16.9	12	16.5	83.1	0
27/04/2022	12.6	14.5	13.2	14.8	95.5	36
28/04/2022	14.4	18	14.8	17.7	95.7	15.6
29/04/2022	13.8	23.7	14.5	22.6	88.3	0.6
30/04/2022	6.2	17.7	7	18.4	94.2	8.4
1/05/2022	3.2	20.1	4.2	19.5	82.3	0.2
2/05/2022	6.4	20.4	7.6	19.9	86.6	0.2
3/05/2022	6.5	22.3	7.3	21.6	85.1	0.2
4/05/2022	5.9	23.3	6.8	22	81.7	0.4
5/05/2022	8.2	20	9.2	19.6	79.1	2.8
6/05/2022	1.9	15.5	2.8	15.1	72.7	0
7/05/2022	-0.9	15	0.1	14.4	77.3	0

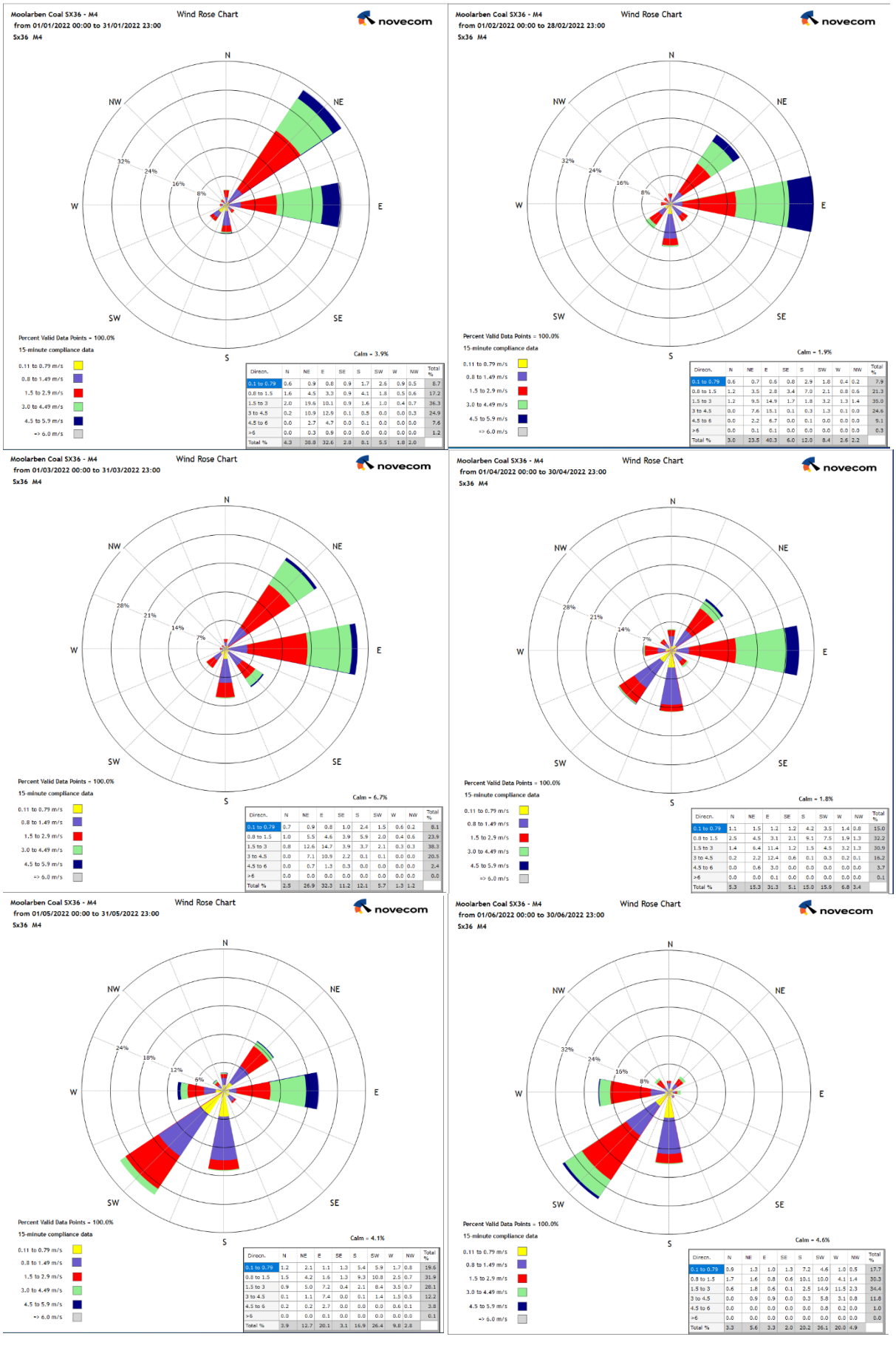
Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
8/05/2022	-0.3	17.1	0.9	16.5	78.1	0.2
9/05/2022	2.2	18.5	3.3	18.1	81.1	0
10/05/2022	8.1	19.2	9.8	18.8	78	0.2
11/05/2022	13.4	15.6	13.8	15.9	80.5	3.8
12/05/2022	13.1	15.7	13.6	16.1	94.2	14.4
13/05/2022	14.1	19.8	15	19.7	90.8	0
14/05/2022	12.5	25.4	13.7	24.7	86.4	0.2
15/05/2022	12.2	21.9	13.3	21.4	89.6	0
16/05/2022	6.8	20.5	7.9	20.1	83.3	0.4
17/05/2022	3.8	17.6	4.7	17.2	81.2	0
18/05/2022	2.2	16.2	3.4	15.9	78.7	0.2
19/05/2022	0.1	16	1.3	15.7	74.1	0.2
20/05/2022	3.1	14.5	5.2	14.4	81.8	0
21/05/2022	6.1	17.3	8	17	83.4	0
22/05/2022	6.2	16.3	7.4	16.1	82.7	0
23/05/2022	4	17.1	5.3	16.7	80.7	0
24/05/2022	4.7	15.9	6	15.5	88.3	0
25/05/2022	4.1	14.9	5.2	14.7	89.1	0.2
26/05/2022	6.3	21.2	7.7	20.3	83.9	0.2
27/05/2022	4.6	21.3	5.6	20.4	84.3	0.2
28/05/2022	6.8	17.2	7.8	16.9	87.7	7.8
29/05/2022	2.9	13.6	4.1	13.2	85.1	0
30/05/2022	2.7	14.2	3.7	13.7	87.2	10.8
31/05/2022	6.2	12.3	6.8	11.9	83.8	5.6
1/06/2022	4.1	10.1	5.2	9.4	70.4	0.2
2/06/2022	0.1	12.9	1.2	12.5	80.3	0
3/06/2022	0.3	11.8	1.3	11.4	92.7	10.6
4/06/2022	6	10.9	6.5	10.8	82	0
5/06/2022	2.3	12.2	3.6	11.6	82.8	0
6/06/2022	4.7	9.8	5.7	9.8	80.8	2
7/06/2022	4	11.8	4.7	11.3	77.9	0.8
8/06/2022	1.9	10.3	2.6	9.9	77.3	0
9/06/2022	5.8	10.1	6	9.7	66.1	0.2
10/06/2022	5.3	12.4	5.7	11.9	76.9	0.2
11/06/2022	5.8	11.4	6.3	11	74.7	0
12/06/2022	3.1	11	3.9	10.2	69	0
13/06/2022	-0.2	14.9	0.9	14.1	76.8	0
14/06/2022	-2.8	15.5	-1.7	14.7	82.9	0.2
15/06/2022	-2.4	15.5	-1.2	14.9	83.6	0
16/06/2022	-0.1	16.8	1.3	16.5	80.1	0.2
17/06/2022	3	15.9	4.2	15	82.6	0
18/06/2022	-0.7	17.3	0.2	17.2	81.6	0
19/06/2022	1.3	16.2	2.4	15.6	85.4	0
20/06/2022	1.9	15.3	3.4	15.2	87.1	0
21/06/2022	1.4	17.9	2.3	17.4	82.5	0.2
22/06/2022	0	16	1.3	15.5	79.4	0.2
23/06/2022	-0.8	14.4	0.6	14	82.5	0
24/06/2022	1.1	15.7	2.5	15	77.8	0.2
25/06/2022	0.3	17.1	1.6	16.7	81	0
26/06/2022	0.2	17.1	1.4	16.5	80.5	0
27/06/2022	0.2	14	2.1	13.4	76.9	0.2
28/06/2022	-3.3	14.2	-1.7	13.9	77	0
29/06/2022	3.2	14.8	4.4	14.2	82.9	0
30/06/2022	5.3	15	5.9	14.7	82.8	0
1/07/2022	7	9.4	7.9	10	93.6	31.4
2/07/2022	7.5	12.4	8.2	11.6	94.9	15.8
3/07/2022	8.7	11	9.2	10.9	99	77.8
4/07/2022	9	14	9.5	14.2	93.8	17.4
5/07/2022	10.3	12.5	10.9	13	89.7	17.6
6/07/2022	11.4	16.3	12.1	16.3	76.4	0.2
7/07/2022	6.4	16.1	7.2	15.9	72.6	0
8/07/2022	2.3	10.5	2.8	10.2	77.3	0
9/07/2022	0.3	12.7	2.3	12.1	76.2	0
10/07/2022	-2.3	13	-1.4	12.8	86.3	0
11/07/2022	-0.2	13.8	0.9	13.3	86	0.2
12/07/2022	1.7	12.8	2.5	11.6	91.7	2.4

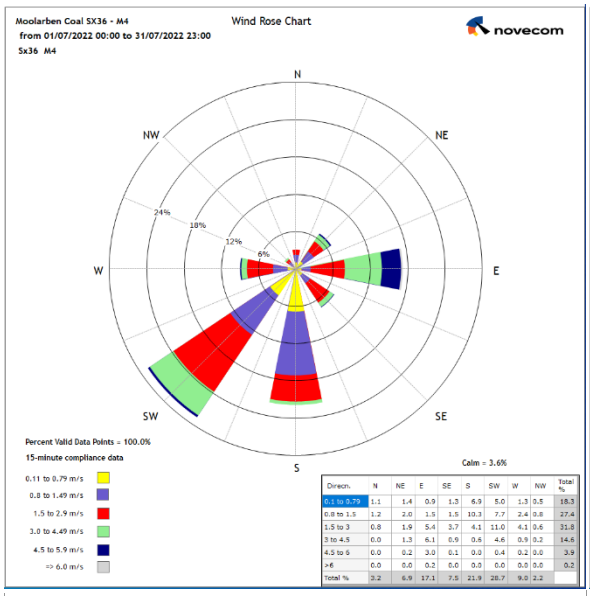
Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
13/07/2022	1.7	10.9	3.6	10.6	83.2	0.2
14/07/2022	-1	15.1	1	15	78	0
15/07/2022	-2.4	14.2	-1.2	14	80.9	0.2
16/07/2022	-3.4	15.4	-2.2	15	78	0.2
17/07/2022	-0.7	17.8	1	17.1	70.8	0
18/07/2022	1.2	12.1	3.4	12.9	66.5	0.4
19/07/2022	-3.4	11.7	-2.4	11.4	77.7	0
20/07/2022	6.6	13.9	7.3	13.5	71.5	0
21/07/2022	8.2	14.2	8.9	14.3	69.1	0
22/07/2022	7.4	15.9	9.4	15.6	70.6	0
23/07/2022	4.2	15.6	5.6	15.1	81.2	0
24/07/2022	1.6	15.8	2.5	15.4	85.9	0.2
25/07/2022	1.8	18.4	3.2	17.6	88.1	0
26/07/2022	6	13	6.3	12.8	79	7.8
27/07/2022	3	12.3	4	12	72.9	0
28/07/2022	2.8	14.7	4	14.2	81.7	0.2
29/07/2022	-0.2	14.7	1.3	14.4	73	0
30/07/2022	-3.2	13.6	-2	13	77.7	0.2
31/07/2022	-1.6	14	-0.4	13.8	82	0
1/08/2022	1.5	16.8	3.7	16	83.1	4.4
2/08/2022	-1.8	16.8	-0.8	15.9	74.6	0
3/08/2022	4.7	21.5	5.8	21	80.6	0.4
4/08/2022	9.7	17.7	12.2	18	89.8	51.8
5/08/2022	9.2	18.4	10.4	17.8	76.3	0
6/08/2022	5.9	15.6	7	14.9	72.5	0.2
7/08/2022	1.4	14.5	2.9	14.1	79.9	0.4
8/08/2022	-0.7	15.4	0.4	15.1	77.8	0.2
9/08/2022	-0.5	15.2	0.4	14.6	78.3	0
10/08/2022	-0.9	14.5	0.1	14	82.4	0.2
11/08/2022	6.8	16.6	7.7	15.6	77.7	1
12/08/2022	8.6	11	9	11.2	98	28.6
13/08/2022	6	15.3	6.1	15.1	81.4	8.4
14/08/2022	5.3	11.3	5.5	11.2	85.5	2.6
15/08/2022	6.4	13.5	6.8	12.8	84	4.4
16/08/2022	4.8	12.7	5.7	12.6	79.4	0.2
17/08/2022	-0.5	16.9	0.6	16.5	76.5	0
18/08/2022	2.4	19.1	3.4	18.3	76.5	0
19/08/2022	1.6	14.5	2.7	14.3	81.5	0.8
20/08/2022	-0.3	14.4	0.8	13.7	79.4	0.2
21/08/2022	1.4	17.8	2.3	16.8	77.6	0
22/08/2022	-0.7	17.6	0.1	16.8	70.4	0.2
23/08/2022	4.7	16.2	5.1	15.4	84.8	4.2
24/08/2022	0.8	12.8	1.7	12.3	68.8	0.2
25/08/2022	1.1	14.8	2.6	14.3	73	0
26/08/2022	0.9	16.7	1.9	15.8	77.9	0
27/08/2022	3.2	16.6	4.8	16.2	78.6	0
28/08/2022	4.1	21	5.2	20.3	74.2	0
29/08/2022	5.8	18	7.8	17.1	83.7	0.2
30/08/2022	6.1	18.2	8.9	17.6	80.9	0
31/08/2022	1.1	18.5	2.1	18.1	74.3	0.2
1/09/2022	7	20.7	8.1	19.6	71.9	0
2/09/2022	6.8	17.9	7.6	17	69.7	0
3/09/2022	7.1	12.2	7.3	12.3	80.9	11
4/09/2022	4	15.8	5.6	15.6	70.5	0
5/09/2022	0.2	17.4	1.2	16.8	71.3	0.2
6/09/2022	2.6	16.6	3.9	15.8	73.6	0
7/09/2022	2.5	17.3	3.2	16.5	80.5	0
8/09/2022	6.3	19.8	8	18.7	79.7	2.2
9/09/2022	9.9	19.3	10.3	18.5	78.5	8.2
10/09/2022	9.9	14.9	10.3	14.6	84.4	2.6
11/09/2022	3.4	16	5.3	15.5	74.3	0
12/09/2022	1.6	15.9	3.2	15.4	71.5	0.2
13/09/2022	2.3	17.1	3.4	16.5	69.6	0
14/09/2022	3.7	17.8	5.5	16.9	70.9	0
15/09/2022	8.8	12.9	9	13.4	93.2	27.8
16/09/2022	7.7	19.2	8.7	18.9	69.7	2.6

Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
17/09/2022	6	18	7.9	17.3	66.1	1.6
18/09/2022	7.2	17.9	8.1	17.1	65.8	0
19/09/2022	3.5	18.6	4.3	18	70.5	0
20/09/2022	0.2	20.5	1.1	19.9	68.3	0
21/09/2022	9.5	12.9	10.6	12.9	90.9	21.8
22/09/2022	8.9	18.1	10.4	17.8	84.2	0.6
23/09/2022	7.1	20.7	8	19.7	83.8	0.2
24/09/2022	6.5	20.4	7.5	20	76.6	0.6
25/09/2022	3.1	19.6	4.1	18.7	72	0.2
26/09/2022	4.1	19.1	4.9	18.4	75.5	0
27/09/2022	9.8	21.5	10.3	21.1	81.7	4
28/09/2022	5.9	17.8	6.6	16.2	75.7	0.8
29/09/2022	4.4	20.9	4.8	20.5	77.7	1.4
30/09/2022	6	18.4	6.8	18.2	74.4	0.2
1/10/2022	5.5	17.3	6.7	17	71.2	0.2
2/10/2022	4.7	19.1	6	18.2	66.9	0
3/10/2022	2.8	19.5	4	18.1	72.4	0
4/10/2022	4.2	22.4	5.1	21.1	65.2	0
5/10/2022	10.9	15	11.3	15.8	78.7	10.6
6/10/2022	11.1	14.9	11.5	15	88.6	3
7/10/2022	10.1	14.8	11.5	14.6	93.5	32
8/10/2022	11.1	21.2	11.6	20.6	86.2	19
9/10/2022	7.1	18.8	8	18.1	66.8	0.4
10/10/2022	6.8	18.6	7.4	17.8	72.8	0
11/10/2022	9.6	18.9	10.2	18.5	73	0
12/10/2022	6.6	20.8	8.1	20.3	71.1	0
13/10/2022	9.7	22.3	10.7	21.8	70.1	0
14/10/2022	7	18.7	8.3	19.1	72.5	11.6
15/10/2022	4.1	22.6	5.2	21.5	65	0.2
16/10/2022	5.3	21.8	6.2	20.5	65	0
17/10/2022	9.4	20.9	10.2	20.4	71	0
18/10/2022	11.2	22.6	11.8	21.8	72.5	0
19/10/2022	14.5	19.7	14.8	19.5	85.9	9.2
20/10/2022	14.9	18.5	15.1	18.4	84.9	46.2
21/10/2022	15.3	23.5	15.9	22.3	71	0.2
22/10/2022	13.5	24	14.4	23.1	77.3	6.4
23/10/2022	14.7	23.4	14.7	22.6	76	19.4
24/10/2022	14.8	24.8	15.2	23.4	74.7	0.4
25/10/2022	15.2	25.1	15.6	24.2	67.2	0
26/10/2022	12.3	24.9	13.7	24.1	63.9	0
27/10/2022	11.6	23.6	12.8	22	73.1	0.8
28/10/2022	7	20.6	8.4	19.7	62.7	0
29/10/2022	6.5	20.7	8.2	20	60.5	0
30/10/2022	5.2	23.5	5.9	22.1	65.3	0
31/10/2022	10.2	23.9	11.2	23	80.8	21.2
1/11/2022	6.1	18.1	6.7	18.7	70.1	13.8
2/11/2022	4.5	12.7	5.9	12.1	70.1	3
3/11/2022	3.6	18.1	4.6	17.5	69.2	0
4/11/2022	4.4	20.2	5.3	19.2	72.5	0
5/11/2022	7	22.9	9	22.2	62.7	0
6/11/2022	8.9	24.7	9.9	23.2	68.2	0
7/11/2022	12.9	23.5	12.9	22.1	75.1	1.4
8/11/2022	9.6	23	11	21.9	72	0
9/11/2022	8	23.4	9	22.7	64.7	0
10/11/2022	7.5	24.7	8.7	23.7	62.3	0
11/11/2022	10.2	23.4	11	21	77.5	0.4
12/11/2022	10.9	28.8	12	27.2	67.9	0.4
13/11/2022	14.1	20	15	20.1	81.7	34.8
14/11/2022	10.9	23.2	13.7	22.4	60.7	6.4
15/11/2022	9.2	21.3	10.3	20.5	65.5	0
16/11/2022	4.3	16.1	5.5	15.2	58.3	0
17/11/2022	1.9	20.2	2.7	18.7	60.5	0
18/11/2022	4.6	23	5.7	21.3	66.1	0
19/11/2022	8.4	27.8	9	26.7	63.2	1.2
20/11/2022	9.5	21.6	12.1	22.4	55.1	0
21/11/2022	8.5	19.8	10.3	18.9	53.7	0

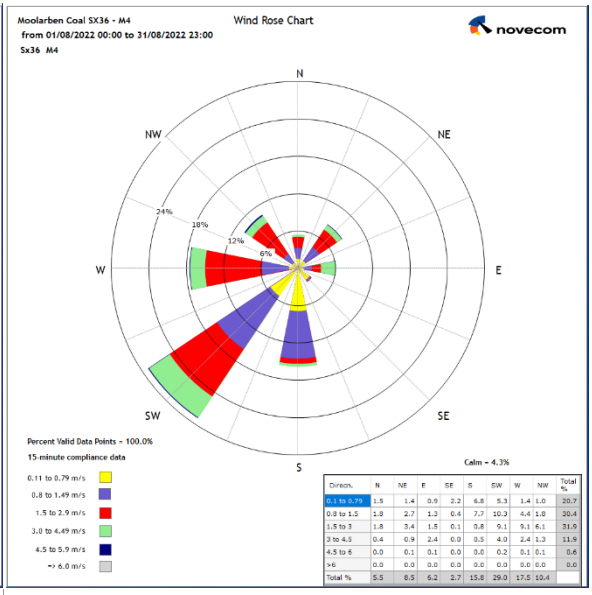
Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
22/11/2022	7.4	18.7	8	17.8	54.1	0
23/11/2022	7	22.9	7.7	21.8	65	0
24/11/2022	6.4	26.2	7.5	24.7	60.6	0
25/11/2022	7.7	26.4	8.8	25.2	58.1	0
26/11/2022	7.7	28.4	9.1	26.5	61.6	0
27/11/2022	12	31.7	12.9	30.7	59.4	0
28/11/2022	12	25.4	13.1	24.3	59.8	0.2
29/11/2022	8.5	26.7	10.1	25.2	52.7	0
30/11/2022	11.7	24	12.5	23.2	62.6	0
1/12/2022	10.4	21	11	20.3	66.3	0
2/12/2022	6.9	21.5	8.2	21.2	64.7	0
3/12/2022	8	24.2	9.5	23.4	62.9	0
4/12/2022	8.2	26.3	9.3	25	62.2	0
5/12/2022	8.8	31.1	10	29.8	56.2	0.2
6/12/2022	10.7	26.8	12.9	25.8	49.1	0
7/12/2022	7.9	24.5	9.4	23	71.2	4.6
8/12/2022	9.4	21.4	12	20.5	51.3	0.6
9/12/2022	3.9	24	4.9	22.7	56.9	0
10/12/2022	11.9	25.3	12.5	23.5	62.7	0
11/12/2022	8	32.5	9.1	30.9	58.9	0
12/12/2022	7.9	25.4	9.4	24.4	61.6	20.4
13/12/2022	4	24.5	5	23.2	56.4	0
14/12/2022	6.5	20.1	7.6	19.4	55.6	0
15/12/2022	4.1	23.9	6.5	21.8	51.4	0
16/12/2022	7.4	22.7	9.1	21.3	60.7	0
17/12/2022	6.5	23.5	7.9	22.5	60.6	0
18/12/2022	6.6	22.2	8.3	21.6	64.7	0
19/12/2022	5.7	22.4	7.6	21.7	58.3	0
20/12/2022	4.4	24.4	5.7	23.1	55.4	0
21/12/2022	6.6	25.6	8.5	24.8	56.8	0.2
22/12/2022	10.4	22.1	11.8	21.7	70	3.8
23/12/2022	13	27.5	13.6	26.7	66.2	0.2
24/12/2022	15.7	31.8	16	30.6	50	28
25/12/2022	14.1	31.7	15.4	31	62	0
26/12/2022	14.3	31.7	15.5	31.4	50.7	0
27/12/2022	11.5	30.4	13	30.1	49.6	0
28/12/2022	13.1	32.4	14.9	31.5	56.5	0
29/12/2022	13	32.4	14.7	31.5	47.3	35.8
30/12/2022	17.2	27.5	18.2	27.1	61.6	0
31/12/2022	16.3	29	17.2	28.5	63.2	0

Figure 3-a Monthly Wind Rose (WS03)

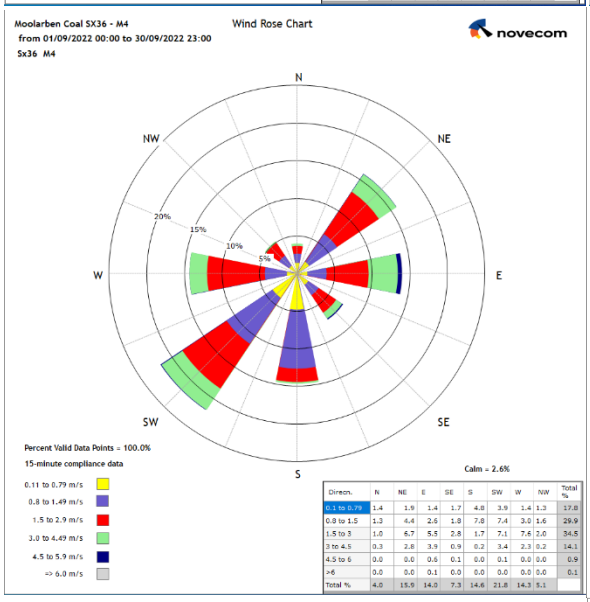




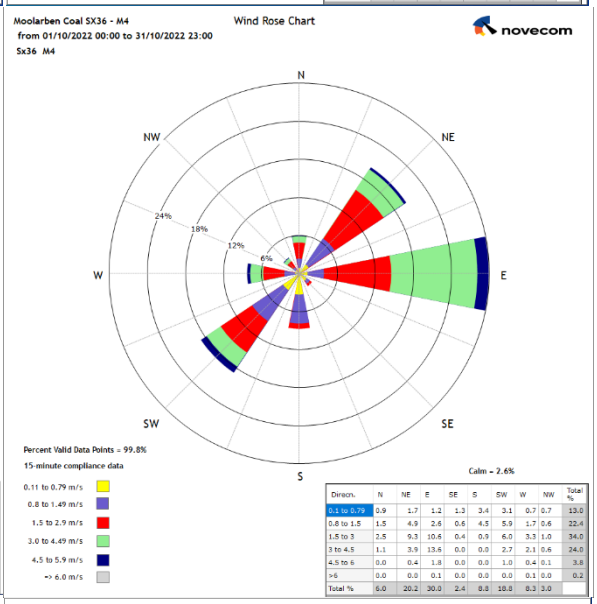
Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	1.1	1.4	0.9	1.3	6.9	5.0	1.3	0.5	18.3
0.8 to 1.5	1.2	2.0	1.5	1.5	10.3	7.7	2.4	0.8	27.4
1.5 to 3	0.8	1.9	5.4	3.7	4.1	11.0	4.1	0.6	31.8
3 to 4.5	0.0	1.3	6.1	0.9	0.6	4.6	0.9	0.2	14.6
4.5 to 6	0.0	0.2	3.0	0.1	0.0	0.4	0.2	0.0	3.9
>6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Total %	3.2	6.9	17.1	7.5	21.9	28.7	9.0	2.2	



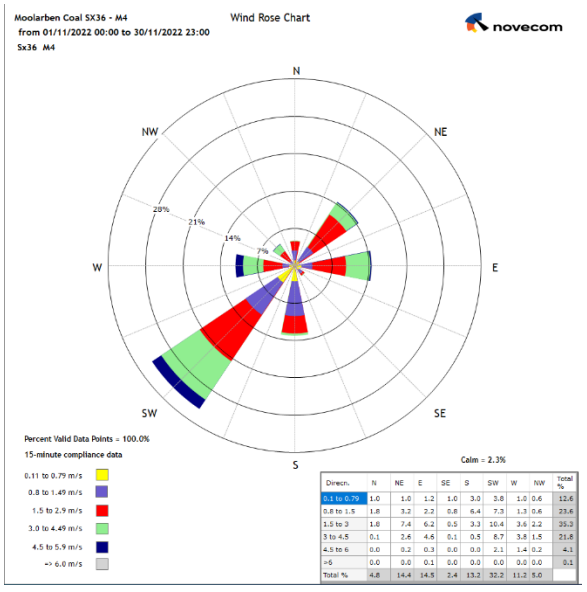
Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	1.5	1.4	0.9	2.2	6.8	5.3	1.4	1.0	20.7
0.8 to 1.5	1.8	2.7	1.3	0.4	7.7	10.3	4.4	1.8	30.4
1.5 to 3	1.8	3.4	1.5	0.1	0.8	9.1	5.1	6.1	31.9
3 to 4.5	0.4	0.9	2.4	0.0	0.5	4.0	2.4	1.3	11.9
4.5 to 6	0.0	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.6
>6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total %	5.5	8.5	6.2	2.7	15.8	29.0	17.5	10.4	



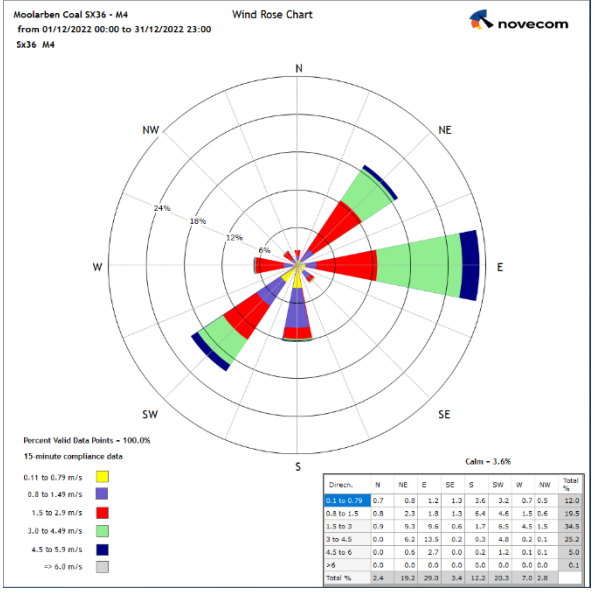
Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	1.4	1.9	1.4	1.7	4.8	3.9	1.4	1.3	17.8
0.8 to 1.5	1.3	4.4	2.6	1.8	7.8	7.4	3.0	1.6	29.9
1.5 to 3	1.0	6.7	5.5	2.8	1.7	7.1	7.6	2.0	34.5
3 to 4.5	0.3	2.8	3.9	0.9	0.2	3.4	2.3	0.2	14.1
4.5 to 6	0.0	0.0	0.6	0.1	0.0	0.1	0.0	0.0	0.9
>6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total %	4.0	15.9	14.0	7.3	14.6	21.8	14.3	5.1	



Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	0.9	1.7	1.2	1.3	3.4	3.1	0.7	0.7	13.0
0.8 to 1.5	1.5	4.9	2.6	0.6	4.5	5.9	1.7	0.6	22.4
1.5 to 3	2.5	9.3	10.6	0.4	0.9	6.0	3.3	1.0	34.0
3 to 4.5	1.1	3.9	13.6	0.0	0.0	2.7	2.1	0.6	24.0
4.5 to 6	0.0	0.4	1.8	0.0	0.0	1.0	0.4	0.1	3.8
>6	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.2
Total %	6.0	20.2	30.0	2.4	8.8	18.8	8.3	3.0	



Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	1.0	1.0	1.2	1.0	3.0	3.8	1.0	0.6	12.6
0.8 to 1.5	1.8	3.2	2.2	0.8	6.4	7.3	1.3	0.6	23.6
1.5 to 3	1.8	7.4	6.2	0.5	3.3	10.4	3.6	2.2	35.3
3 to 4.5	0.1	2.6	4.6	0.1	0.5	8.7	3.8	1.5	21.8
4.5 to 6	0.0	0.2	0.3	0.0	0.0	2.1	1.4	0.2	4.1
>6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total %	4.8	14.4	14.5	2.4	13.2	32.2	11.2	5.0	



Direcn.	N	NE	E	SE	S	SW	W	NW	Total %
0.1 to 0.79	0.7	0.8	1.2	1.3	3.6	3.2	0.7	0.5	12.0
0.8 to 1.5	0.8	2.3	1.8	1.3	6.4	4.6	1.5	0.6	19.5
1.5 to 3	0.9	9.3	9.6	0.6	1.7	6.5	4.5	1.5	34.5
3 to 4.5	0.0	6.2	13.5	0.2	0.3	4.8	0.2	0.1	25.2
4.5 to 6	0.0	0.6	2.7	0.0	0.2	1.2	0.1	0.1	5.0
>6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total %	2.4	19.2	29.0	3.4	12.2	20.3	7.0	2.8	

Appendix 3B. NOISE MONITORING RESULTS

Environmental Noise Monitoring – January 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 24th & 25th January 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:11am (25/1/22)	44	IA	35	IA	45	B / 2.8 / 072	Traffic (42), birds (39), insects (32), **MCO (<20)**
Winchester Crescent	10:00pm (24/1/22)	42	21	35	24	45	F / 1.6 / 026	Frogs (42), insects (34), traffic (28), **MCO (21)**
Lower Ridge Road	10:23pm (24/1/22)	42	IA	37	IA	45	D / 2.6 / 051	Frogs (41), insects (34), traffic (29), **MCO (<20)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was compliant at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	21	24	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

Environmental Noise Monitoring – February 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 10th & 11th February 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:01am (11/2/22)	50	IA	35	IA	45	D / 4.4 / 073	Traffic (50), birds (38), insects (33), mine (32), MCO (IA)
Winchester Crescent	10:01pm (10/2/22)	39	IA	35	IA	45	F / 2.6 / 076	Frogs (36), traffic (35), insects (25), MCO (IA)
Lower Ridge Road	10:21pm (10/2/22)	45	IA	37	IA	45	D / 3.3 / 099	Traffic (44), insects (36), frogs (29), mine (22), MCO (IA)
Cope Road / Toole Road	10:50pm (10/2/22)	60	IA	35	IA	45	D / 4.3 / 107	Traffic (60), frogs (44), mine (33), MCO (IA)

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations. Wind speeds from the MCO weather station were in the range 3-4 m/s and generally source to receiver. Winds at ground level at the monitoring points were mild, which suggests a positive vertical wind speed gradient and noise-enhancing conditions at the monitoring locations.

Notwithstanding the wind speed being outside the applicable meteorological conditions in Section 2.2, the measured MCO noise levels remained inaudible at all receivers.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	NA
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	IA	IA	-	Yes	NA
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	NA
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	NA
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – March 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 28th & 29th March 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:01am (29/3/22)	48	IA	35	IA	45	B / 1.1 / 121	Industrial (45), insects (44), traffic (37), birds (33), **MCO (IA)**
Winchester Crescent	10:04pm (28/3/22)	53	14	35	19	45	F / 1.2 / 112	Insects (53), frogs (40), traffic (37), **MCO (14)**
Lower Ridge Road	10:25pm (28/3/22)	42	17	37	21	45	E / 1.0 / 105	Insects (40), frogs (37), traffic (31), **MCO (17)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	14	19	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	17	21	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – April 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 28th & 29th April 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:10am (29/4/22)	45	IA	35	IA	45	A / 0.8 / 337	Birds (42), insects (40), traffic (36), industrial (30), mine (29), **MCO (IA)**
Winchester Crescent	10:20pm (28/4/22)	38	IA	35	IA	45	F / 0.5 / 184	Insects (37), traffic (31), frogs (25), mine (23), **MCO (IA)**
Lower Ridge Road	10:49pm (28/4/22)	53	IA	37	IA	45	F / 1.1 / 018	Traffic (53), frogs (37), mine (24), insects (22), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No)[5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – May 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 24th & 25th May 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:43am (25/5/22)	45	IA	35	IA	45	A / 2.3 / 065	Traffic (44), birds (36), insects (30), **MCO (IA)**
Cope Road/Toole Road	12:41am (25/5/22)	46	IA	35	IA	45	E / 0.0 / NA	Traffic (46), frogs (30), mine (22), **MCO (IA)**
Lagoons Road	12:11am (25/5/22)	35	34	35	38	45	F / 0.0 / NA	**MCO (34)**, traffic (27), frogs (25)
Winchester Crescent	11:01pm (24/5/22)	38	22	35	24	45	E / 0.8 / 180	Traffic (38), frogs (22), **MCO (22)**
Upper Ridge Road	11:46pm (24/5/22)	32	22	35	24	45	F / 0.4 / 143	Traffic (30), aeroplane (24), frogs (22), **MCO (22)**
Lower Ridge Road	11:24pm (24/5/22)	53	23	37	26	45	F / 0.6 / 159	Traffic (53), frogs (37), **MCO (23)**
Moolarben Road	10:10pm (24/5/22)	41	34	35	40	45	F / 0.5 / 213	Frogs (40), **MCO (34)**, insects (28)
Goulburn River National Park	11:16am (25/5/22)	49	IA	50	IA	NA	B / 3.2 / 085	Traffic (49), birds (41), **MCO (IA)**
Munghorn Gap Nature Reserve	10:32am (25/5/22)	44	IA	50	IA	NA	B / 3.2 / 077	Traffic (43), birds (37), roadworks nearby (24), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was compliant at all monitoring locations. All noise measurements were made under compliant meteorological conditions. Except during monitoring at Goulburn River National Park and Munghorn Gap Nature Reserve, wind speeds at the weather station were higher that 3m/s.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	IA	IA	-	Yes	No
N/A	Lagoons Road	NA2	Validation - Attended	Annually	34	38	-	Yes	No
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	22	24	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	22	24	-	Yes	No
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	23	26	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	34	40	-	Yes	No
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	IA	IA	All periods LAeq,15minute: 50 dB	Yes	NA
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	IA	IA	All periods LAeq,15minute: 50 dB	Yes	NA

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – June 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in **Table 3**.

Table 3
MCO Operational Noise Monitoring Results – 20th & 21st June 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:14am (21/6/22)	49	IA	35	IA	45	A / 1.0 / 028	Lawnmower nearby (48), traffic (44), birds (38), **MCO (IA)**
Winchester Crescent	10:04pm (20/6/22)	37	22	35	25	45	E / 1.2 / 200	Insects (35), traffic (34), **MCO (22)**
Lower Ridge Road	10:27pm (20/6/22)	46	23	37	27	45	E / 0.9 / 190	Traffic (46), frogs (31), insects (25), **MCO (23)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No)[5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	22	25	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	23	27	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – July 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 11th & 12th July 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:19am (12/7/22)	48	IA	35	IA	45	A / 0.6 / 051	Nearby stream (47), birds (40), traffic (35), **MCO (IA)**
Winchester Crescent	10:08pm (11/7/22)	36	IA	35	IA	45	E / 1.0 / 191	Traffic (36), frogs (23), **MCO (IA)**
Lower Ridge Road	10:30pm (11/7/22)	48	IA	37	IA	45	D / 1.0 / 200	Traffic (48), frogs (32), mine (22), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – August 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 18th & 19th August 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:21am (19/8/22)	47	IA	35	IA	45	A / 1.9 / 238	Traffic (47), nearby stream (40), birds (38), **MCO (IA)**
Winchester Crescent	10:02pm (18/8/22)	39	IA	35	IA	45	F / 0.5 / 087	Traffic (38), frogs (30), mine (24), **MCO (IA)**
Lower Ridge Road	10:26pm (18/8/22)	48	IA	37	IA	45	F / 0.6 / 182	Traffic (46), frogs (44), aeroplane (21), **MCO (IA)**
Cope Road / Toole Road	10:52pm (18/8/22)	52	IA	35	IA	45	F / 0.5 / 116	Traffic (52), frogs (40), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	IA	IA	-	Yes	No
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Cresoent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – September 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in **Table 3**.

Table 3
MCO Operational Noise Monitoring Results – 26th September 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	2:17pm	46	IA	35	IA	45	A / 2.0 / 218	Nearby stream (42), traffic (42), birds (39), industrial (31), **MCO (IA)**
Winchester Crescent	10:00pm	40	22	35	26	45	F / 0.5 / 169	Frogs (37), traffic (36), mine (29), **MCO (22)**
Lower Ridge Road	10:30pm	51	24	37	27	45	F / 0.9 / 216	Traffic (51), frogs (37), mine (30), **MCO (24)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO, when audible, did not exceed the applicable operational noise criterion at any monitoring location.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	22	26	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	24	27	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – October 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 26th & 27th October 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:00am (27/10/22)	50	IA	35	IA	45	B / 2.2 / 245	Birds (47), nearby stream (45), traffic (41), insects (29), **MCO (IA)**
Winchester Crescent	10:03pm (26/10/22)	43	IA	35	IA	45	F / 1.4 / 242	Frogs (43), insects (28), traffic (27), **MCO (IA)**
Lower Ridge Road	10:25pm (26/10/22)	51	IA	37	IA	45	F / 1.2 / 244	Traffic (50), frogs (43), insects (36), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – November 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 16th & 17th November 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:03am (17/11/22)	46	IA	35	IA	45	A / 2.2 / 211	Nearby stream (44), traffic (39), insects (37), birds (25), **MCO (IA)**
Winchester Crescent	10:01pm (16/11/22)	42	IA	35	IA	45	F / 0.9 / 154	Traffic (42), frogs (28), insects (23), **MCO (IA)**
Lower Ridge Road	10:23pm (16/11/22)	41	IA	37	IA	45	D / 1.0 / 165	Traffic (40), frogs (32), dogs (26), **MCO (IA)**
Cope Road / Toole Road	10:49pm (16/11/22)	57	IA	35	IA	45	F / 0.5 / 189	Traffic (57), frogs (41), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	IA	IA	-	Yes	No
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – December 2022

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 MCO Operations

Measured noise levels for each monitoring location are summarised in Table 3.

Table 3
MCO Operational Noise Monitoring Results – 6th & 7th December 2022

Location	Time	dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min)[1]	Criterion dB(A), L1 (1min)[1]	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Ulan Public School	9:00am (7/12/22)	47	IA	35	IA	45	A / 0.8 / 094	Birds (46), nearby stream (41), traffic (30), insects (28), lawnmower (25), **MCO (IA)**
Winchester Crescent	10:00pm (6/12/22)	52	IA	35	IA	45	E / 1.6 / 189	Residential (50), traffic (48), frogs (26), **MCO (IA)**
Lower Ridge Road	10:22pm (6/12/22)	47	IA	37	IA	45	E / 1.7 / 190	Traffic (46), frogs (41), insects (32), **MCO (IA)**

1. L1 (1 min) from MCO mine noise only.

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the mine noise from MCO was inaudible at all monitoring locations.

The noise measurements results in Table 3 (and site observations) show that noise from the operation of MCO under the operating and meteorological conditions at the times, did not exceed the L1 (1 min) criterion at any monitoring location.

EPL ID	Location	Site ID	Monitoring Type	Frequency	Measured Level[1,2,3] LAeq dB (15min)	Measured Level[1,2,3] LA1,dB (1min)	Noise Criteria[4]	Monitoring required during the period	Exceedance (Yes/No) [5]
44	Ulan Public School	NA1	Compliance - Attended	Monthly	IA	IA	Daytime (07:00 – 18:00) LAeq,15minute: 35 dB	Yes	No
N/A	Cope Road (Receiver 258)	NA11	Management - Attended	Quarterly	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	No
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	IA	IA	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	No
N/A	Moolarben Road (Receiver 28)	NA10	Validation - Attended	Annually	-	-	-	No	-
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	-	-	All periods LAeq,15minute: 50 dB	No	-

1. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions, and were not applicable for comparison
2. IA is Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
3. Site-only noise levels attributed to MCO, including modifying factors where applicable

4. As detailed in the EPL, noise emission limits apply under all meteorological conditions except:
   - Wind speeds greater than 3 m/s at 10 metres above ground level; or
   - Stability class F temperature inversion conditions, and wind speeds greater than 2 m/s at 10 metres above ground level; or
   - Stability class G temperature inversions
5. NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

APPENDIX 3C. BLAST MONITORING DATA

Date	Time	BM1 Ulan School		BM5 Ridge Road		BM8 Moolarben Road	
		Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)
4/01/2022	12:20	99.5	0.1	105.1	0.74	96.8	0.16
7/01/2022	13:07	94.8	0.09	87.8	0.35	99.4	0.09
8/01/2022	12:26	87.7	0.07	91	0.17	97.8	0.15
11/01/2022	12:12	81.1	0.03	71.3	0.21	96.4	0.02
12/01/2022	16:09	103.7	0.14	97.7	0.33	96.8	0.07
13/01/2022	13:06	89.1	0.1	95.4	0.12	92.6	0.09
15/01/2022	16:13	81.3	0.02	79.7	0.01	87.7	0
17/01/2022	12:00	90.7	0.13	98.3	0.27	105.8	0.5
18/01/2022	12:17	111.6	0.2	110.1	0.21	102.8	0.09
21/01/2022	12:09	101	0.2	102.6	0.25	109.4	0.09
24/01/2022	12:17	90.9	0.13	99.1	0.15	86.6	0.08
25/01/2022	16:20	96.6	0.28	102.4	0.27	98.4	0.61
25/01/2022	16:27	107.7	0.09	116.2	0.23	109.1	0.16
28/01/2022	16:07	100.4	0.14	95	0.18	94.3	0.07
29/01/2022	16:03	93.4	0.11	84.5	0.14	81.3	0.06
31/01/2022	12:07	93.5	0.14	95.6	0.24	99.7	0.12
1/02/2022	12:03	88.4	0.06	85.1	0.4	81.1	0.01
5/02/2022	12:39	98.3	0.15	101.1	0.23	101.7	0.08
5/02/2022	12:40	98.3	0.16	101.1	0.23	101.7	0.08
8/02/2022	13:14	93.1	0.16	97.8	0.31	102.7	0.15
8/02/2022	13:18	92.7	0.1	86.7	0.14	86.4	0.02
10/02/2022	12:06	84.8	0.07	91.2	0.06	82.9	0.06
14/02/2022	12:08	99.5	0.1	96.6	0.21	92.2	0.05
17/02/2022	12:37	99.2	0.29	99.7	0.44	99.4	0.14
21/02/2022	11:59	94.8	0.12	98.5	0.29	100.8	0.63
24/02/2022	16:03	97.5	0.06	105.2	0.02	97.8	0.01
26/02/2022	16:00	96.2	0.09	99.6	0.14	96.9	0.06
2/03/2022	15:43	96.1	0.11	94.9	0.09	90.9	0.16
3/03/2022	16:05	102.8	0.03	99.1	0.01	94.9	0.01
4/03/2022	13:33	97.2	0.03	95.4	0.01	87.2	0
7/03/2022	12:24	93	0.09	95.2	0.15	92.5	0.05
11/03/2022	16:05	97.5	0.16	94.8	0.23	90.2	0.07
17/03/2022	12:09	93	0.1	88.4	0.08	87.5	0.04
19/03/2022	12:06	90.9	0.06	93.7	0.05	98.1	0.05
22/03/2022	13:21	89.5	0.09	87.1	0.19	92.4	0.15
23/03/2022	16:03	100.5	0.25	90.8	0.42	86.8	0.1
23/03/2022	16:10	92.3	0.13	81.6	0.18	75.7	0.09
25/03/2022	12:11	89.4	0.06	108.9	0.08	96	0.03
26/03/2022	11:57	96.4	0.2	93	0.24	103.8	0.08
30/03/2022	12:09	95.6	0.11	92.2	0.2	91.2	0.03
30/03/2022	12:14	90.6	0.08	89.3	0.11	97.4	0.05
31/03/2022	13:18	95.5	0.09	95.4	0.19	91.6	0.06
4/04/2022	12:01	91.1	0.13	87.3	0.39	100	0.36
5/04/2022	12:06	86.5	0.07	76.5	0.09	84.8	0.08
7/04/2022	12:08	106.3	0.14	96.6	0.37	98.1	0.07
11/04/2022	12:42	105.4	0.37	114.8	0.54	102.8	0.21
11/04/2022	12:55	88.7	0.06	88.9	0.08	80.4	0.08

Date	Time	BM1 Ulan School		BM5 Ridge Road		BM8 Moolarben Road	
		Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)
19/04/2022	12:07	98.3	0.12	99.3	0.17	90.6	0.14
19/04/2022	16:06	88.5	0.1	95.7	0.21	102.5	0.14
20/04/2022	12:21	84.8	0.09	99.9	0.11	92	0.08
22/04/2022	16:06	95.7	0.12	99.6	0.17	101.1	0.04
23/04/2022	12:13	90.1	0.04	110.4	0.05	94.2	0.03
23/04/2022	16:21	101.1	0.1	96.9	0.1	90.8	0.05
26/04/2022	12:02	96.8	0.25	102.3	0.29	98.7	0.1
28/04/2022	12:14	91.9	0.21	92.6	0.38	94	0.11
4/05/2022	16:10	88.6	0.14	87.3	0.1	88.4	0.06
7/05/2022	12:04	98.7	0.06	92.5	0.16	95.1	0.17
9/05/2022	12:10	96.9	0.1	95.2	0.07	103.5	0.04
13/05/2022	16:15	95	0.12	98.6	0.13	97.8	0.06
14/05/2022	16:07	99.7	0.12	89.9	0.29	84.8	0.09
17/05/2022	12:10	100.7	0.3	94.1	0.41	93	0.05
20/05/2022	12:22	111.1	0.41	124.1	0.92	105.3	0.22
21/05/2022	16:17	116.2	0.14	103.5	0.25	99.1	0.1
24/05/2022	16:09	102.1	0.07	102.8	0.22	101.6	0.14
27/05/2022	12:16	89.8	0.09	93.7	0.38	99.6	0.58
30/05/2022	12:02	93	0.12	90.4	0.17	98.9	0.1
30/05/2022	12:09	90.5	0.16	101.1	0.19	94.4	0.04
9/06/2022	12:04	89.5	0.34	88.4	0.76	105.4	0.46
10/06/2022	16:06	96.8	0.06	89.1	0.04	100.3	0.03
14/06/2022	15:56	82.1	0.08	95	0.07	105.1	0.05
15/06/2022	16:01	85.5	0.11	81.9	0.09	76.9	0.02
15/06/2022	16:05	87.7	0.08	87.8	0.07	85.9	0.05
16/06/2022	16:00	88.9	0.07	94.7	0.06	93	0.03
17/06/2022	16:00	87.1	0.09	85.9	0.11	79.7	0.03
20/06/2022	16:15	90.1	0.08	90.3	0.08	83.9	0.06
21/06/2022	13:01	101.2	0.26	106.2	0.26	98.7	0.12
21/06/2022	16:01	95	0.13	90.6	0.13	87.1	0.33
24/06/2022	16:04	87.7	0.15	92.4	0.71	95.8	0.18
27/06/2022	12:05	89.8	0.09	91	0.11	87.5	0.04
28/06/2022	16:29	98.3	0.05	107.3	0.2	113.9	0.12
1/07/2022	12:10	104.1	0.13	103.3	0.07	97.5	0.03
8/07/2022	12:04	105.4	0.08	98.1	0.12	104.2	0.06
9/07/2022	12:45	101.1	0.1	100.7	0.17	93.1	0.06
11/07/2022	12:09	90.3	0.04	100.9	0.08	104.8	0.14
16/07/2022	16:16	86	0.04	84.3	0.05	84.2	0.03
18/07/2022	12:08	97	0.05	99.1	0.15	94.8	0.21
18/07/2022	16:30	108.1	0.28	104.4	0.57	105	0.2
23/07/2022	16:00	112.5	0.06	110.8	0.05	110.7	0.02
25/07/2022	16:03	91.3	0.14	83.7	0.14	87.1	0.08
26/07/2022	12:06	104.1	0.09	99.6	0.11	106.4	0.18
30/07/2022	16:43	94.4	0.1	95.5	0.12	88.1	0.04
30/07/2022	16:49	111.6	0.17	119.1	0.29	107	0.1
4/08/2022	11:27	83.2	0.11	81.4	0.25	101.1	0.27
4/08/2022	11:58	84.1	0.04	76.1	0.05	86.3	0.01
6/08/2022	16:08	100.7	0.22	93	0.9	98.1	0.22
6/08/2022	16:12	104.9	0.07	86.3	0.08	100.6	0.03

Date	Time	BM1 Ulan School		BM5 Ridge Road		BM8 Moolarben Road	
		Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)
8/08/2022	16:08	108.7	0.22	105.4	0.4	109.9	0.47
8/08/2022	16:14	92.7	0.1	95.6	0.21	98.7	0.5
9/08/2022	16:09	97.5	0.15	88.8	0.15	84.1	0.06
13/08/2022	16:01	95.6	0.18	93.7	0.34	101.6	0.08
16/08/2022	16:12	104.1	0.17	95.1	0.22	91.7	0.08
22/08/2022	12:10	100.2	0.04	107.5	0.14	105.6	0.1
24/08/2022	12:10	100.5	0.22	107.8	0.6	108.2	0.16
25/08/2022	12:09	104.2	0.07	91.3	0.01	86.3	0.01
25/08/2022	12:15	93.4	0.05	85.9	0.05	91.2	0.03
30/08/2022	12:10	89.3	0.16	87.5	0.21	87.6	0.09
31/08/2022	16:06	99	0.04	108.3	0.07	108.3	0.08
1/09/2022	16:08	102.5	0.13	105.6	0.23	96.1	0.1
5/09/2022	12:15	102.7	0.12	107.8	0.26	111	0.39
5/09/2022	16:09	101.9	0.09	92.7	0.17	87.6	0.07
6/09/2022	12:01	96.2	0.21	102.7	0.19	92	0.19
8/09/2022	13:09	98.7	0.13	100.5	0.1	94.4	0.06
12/09/2022	12:30	85.7	0.22	91.3	0.19	96.1	0.53
15/09/2022	15:11	85.8	0.1	93.9	0.21	98	0.16
17/09/2022	12:06	103.8	0.39	93.8	0.45	104	0.28
23/09/2022	12:05	96.1	0.29	106.6	0.59	108.6	0.76
23/09/2022	16:05	89	0.09	82.5	0.11	77.2	0.13
27/09/2022	11:59	88.7	0.09	90.8	0.23	92.3	0.15
29/09/2022	16:17	105	0.26	105.5	0.45	101	0.07
1/10/2022	16:01	101	0.04	102.1	0.06	103	0.12
4/10/2022	12:09	89.4	0.12	85.1	0.08	82.5	0.05
8/10/2022	16:23	96.1	0.26	108.4	0.59	119.2	0.17
10/10/2022	16:07	91.4	0.05	93.9	0.06	99.1	0.03
12/10/2022	12:14	85.3	0.05	94.1	0.11	93.3	0.07
13/10/2022	16:02	84.3	0.07	92	0.25	97.8	0.11
15/10/2022	16:01	88.9	0.09	79.1	0.12	77.6	0.08
17/10/2022	16:00	90.1	0.12	89.9	0.13	93.1	0.03
18/10/2022	13:09	109.2	0.16	104.9	0.2	94.4	0.09
24/10/2022	15:44	97.6	0.11	96.5	0.09	87.5	0.03
26/10/2022	16:11	92.2	0.05	93.5	0.11	103.1	0.07
28/10/2022	16:28	103.3	0.31	94.8	0.75	110.3	0.31
31/10/2022	12:05	97.5	0.05	97.5	0.05	97.5	0.05
31/10/2022	14:32	79.3	0.2	105.1	0.74	79.3	0.2
2/11/2022	12:13	96.9	0.1	92.7	0.25	106.2	0.15
2/11/2022	15:35	82.7	0.24	102.8	0.3	101.8	0.13
3/11/2022	16:08	96.2	0.06	91.2	0.1	93.8	0.14
4/11/2022	12:12	99.7	0.11	107.2	0.14	106.5	0.27
5/11/2022	16:53	90.5	0.1	90	0.06	86.8	0.03
7/11/2022	13:23	90.1	0.12	90	0.85	92	0.11
10/11/2022	12:09	100.9	0.17	105.8	0.84	100.1	0.05
10/11/2022	12:10	100.9	0.17	105.8	2.12	100.1	0.05
16/11/2022	12:34	99.1	0.39	101.5	0.86	102.4	0.24
17/11/2022	16:19	87.6	0.06	91.8	0.61	97.1	0.27
18/11/2022	16:02	88.4	0.08	95.4	0.15	88.2	0.11
21/11/2022	12:05	106.4	0.13	103.9	0.03	103.4	0.02

Date	Time	BM1 Ulan School		BM5 Ridge Road		BM8 Moolarben Road	
		Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)	Blast Overpressure (dBL)	Ground Vibration (mm/s)
22/11/2022	15:57	102.6	0.07	100.6	0.09	102.2	0.1
23/11/2022	15:51	96.2	0.05	102.7	0.05	102.7	0.08
24/11/2022	16:05	89.3	0.25	87.9	0.5	88.9	0.41
26/11/2022	16:09	86.2	0.1	93.2	0.08	89	0.05
28/11/2022	12:01	90.7	0.06	87.1	0.34	88.1	0.11
29/11/2022	12:08	86.1	0.08	91.3	0.07	85.1	0.02
30/11/2022	12:06	101.5	0.1	101	1.01	97	0.02
2/12/2022	11:57	100.9	0.1	111.2	0.1	100.1	0.04
2/12/2022	15:55	92	0.05	95.8	0.1	90	0.1
6/12/2022	12:08	88.7	0.09	92	1.2	76.9	0.24
6/12/2022	16:02	98.4	0.05	93	0.09	95	0.18
8/12/2022	12:15	99.9	0.11	96.3	0.16	93.1	0.13
9/12/2022	12:06	90.2	0.06	89.5	0.09	92.6	0.07
10/12/2022	12:00	109.6	0.19	103.8	0.47	96.8	0.18
13/12/2022	12:05	95.5	0.1	80.3	0.11	99.1	0.05
13/12/2022	15:58	96.9	0.07	76.9	0.1	104.7	0.03
16/12/2022	13:32	85.2	0.08	88.2	0.1	89.2	0.09
17/12/2022	16:05	91.1	0.05	102.4	0.1	98.3	0.04
19/12/2022	12:22	101	0.2	104.5	0.66	96.9	0.07
20/12/2022	11:59	92.4	0.1	97	0.69	90.1	0.07
21/12/2022	12:07	99.9	0.04	110.5	0.39	111.2	0.07
22/12/2022	15:01	102.7	0.07	109	0.09	112.1	0.18
24/12/2022	12:19	91.9	0.1	83.6	0.58	83.8	0.25
24/12/2022	12:25	96.8	0.3	97.5	0.32	93.9	0.1
31/12/2022	12:07	104.1	0.26	110.9	0.54	113.9	0.2

APPENDIX 3D. AIR QUALITY DATA

Table A : Summary of the MCO Air Quality-Monitoring Program

Monitoring Parameter	Monitoring Location	Frequency	Justification
Dust Deposition	DG01 – Bobadeen	Every 30 days ± 2 days	Background monitoring north of the Moolarben Coal Complex.
	DG04 – Ulan Village	Every 30 days ± 2 days	Representative of nearest non-mine owned residences to the north-west of the Moolarben Coal Complex.
	DG05 – Glenmoor	Every 30 days ± 2 days	Representative of nearest non-mine owned residences to the south-west and west of the Moolarben Coal Complex.
	DG09 – Wilga	Every 30 days ± 2 days	Representative of non-mine owned residences to the south-west and west of the Moolarben Coal Complex.
HVAS – PM10	PM 01 (Ulan Village)	Every 6 days	Indicative of potential impacts to nearest non-mine owned residences to the north-west of the Moolarben Coal Complex.
	PM 02 (Ridge Road)	Every 6 days	Background monitoring south-west and west of the Moolarben Coal Complex.
Real Time PM_{10}	TEOM 01 (Ulan School)	Real Time PM_{10}	Real time monitoring at Ulan Public School.
	TEOM 04 (Ulan Road)	Real Time PM_{10}	Real time monitoring representative of nearest non-mine owned residences to the west of the Moolarben Coal Complex.
	TEOM 07 (Ulan Road)	Real Time PM_{10}	Real time monitoring representative of non-mine owned residences to the south-west of and west of the Moolarben Coal Complex.
	TEOM 06 (Ulan-Wollar Rd)	Real Time PM_{10}	Real time monitoring not representative of private residences, used to measure “upwind” air quality.
Real Time $PM_{2.5}$	TEOM 07 (Ulan Road)	Real Time $PM_{2.5}$	Real time monitoring representative of non-mine owned residences to the south-west of and west of the Moolarben Coal Complex.

Table B : Summary of the MCO Air Quality-Monitoring Program – Dust Deposition

Dust Gauge	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul- 22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
DG1	86.7c	1.0	0.5	1.0	2.0	0.1	0.3	0.1	0.1	0.1	0.7	0.2
DG4	1.5	2.8	1.3	0.7	0.2	0.3	0.5	0.2	0.5	0.4	2.3	0.7
DG5	1.3	1.6	5.7c	0.7	0.6	0.3	0.3	0.2	0.4	0.4	1.2	0.9
DG9	0.3	0.5	0.7	0.4	0.3	0.3	0.2	0.1	0.1	0.2	1.0	1.2

C – Dust gauge deemed contaminated after analysis of influencing factors. The DG01 January sample was noted as being impacted by sand and slime, and the DG05 March sample was noted as being impacted by insects, vegetation, and slime.

Figure 3-b 2018 to 2022 Dust Depositional Results

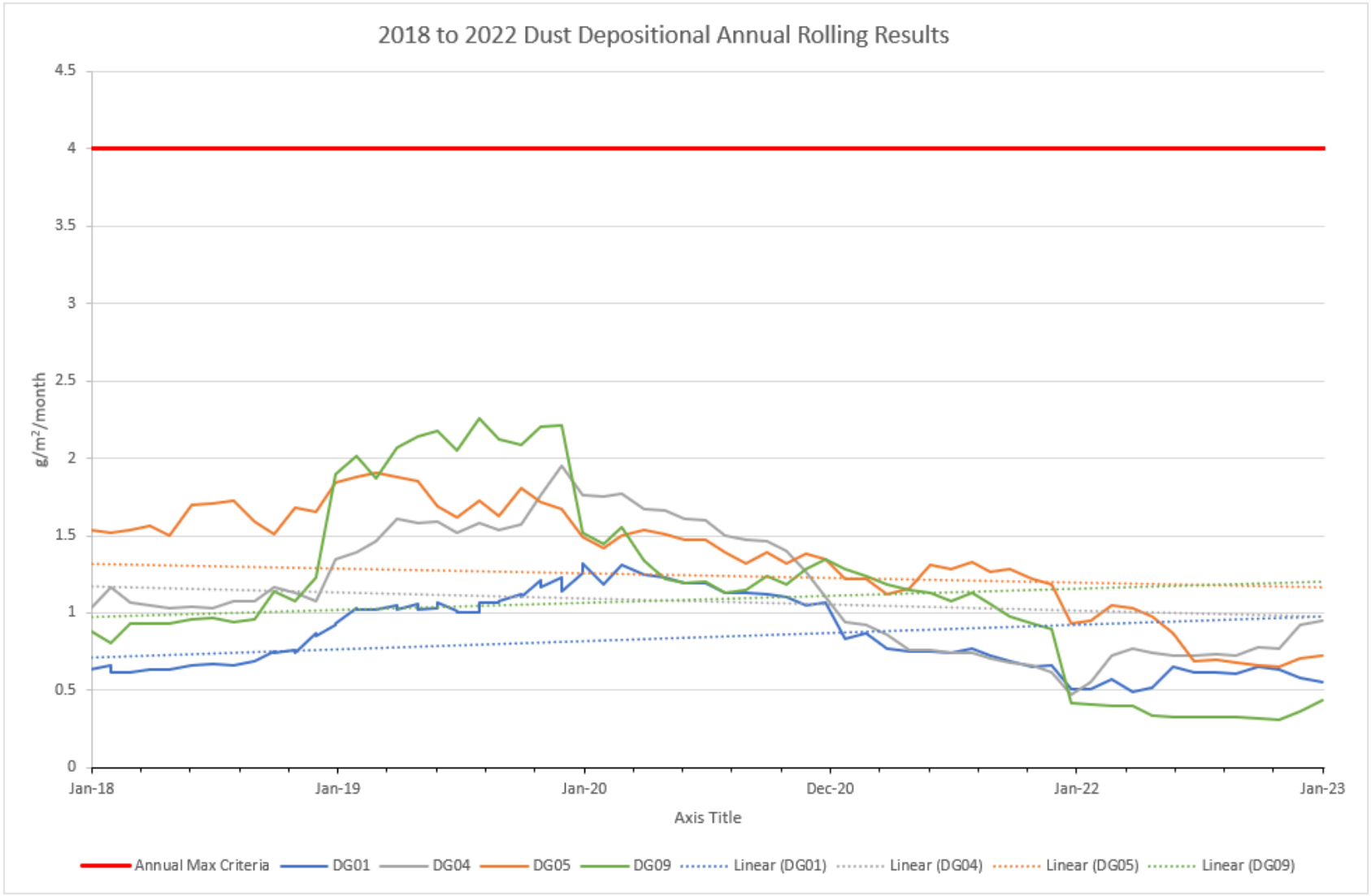


Table 3: TEOM Monitoring Data (Cumulative)

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
1/01/2022	16.8	18.5	10.8	4.3	14.1	
2/01/2022	19.8	17.2	14.1	8.1	19.4	
3/01/2022	-	17.6	11.5	4.5	12.0	Equipment Failure
4/01/2022	-	17.9	10.2	4.4	11.3	Equipment Failure
5/01/2022	-	13.2	6.7	3.0	8.0	Equipment Failure
6/01/2022	-	16.7	13.3	6.2	10.8	Equipment Failure
7/01/2022	10.6	11.2	9.5	5.2	10.0	
8/01/2022	6.8	6.3	4.5	2.7	6.0	
9/01/2022	11.6	11.3	8.5	6.4	10.0	
10/01/2022	14.4	15.9	12.2	7.4	12.3	
11/01/2022	16.4	15.6	14.4	8.5	14.9	
12/01/2022	16.5	18.6	13.5	7.7	14.2	
13/01/2022	13.2	13.5	11.0	5.5	9.5	
14/01/2022	14.7	14.1	11.9	5.8	10.3	
15/01/2022	15.7	15.2	-	-	14.2	Power Outage
16/01/2022	14.4	16.1	-	-	15.3	Power Outage
17/01/2022	24.8	24.6	-	-	22.5	Power Outage
18/01/2022	21.1	18.9	11.9	7.9	16.9	
19/01/2022	7.9	6.3	3.9	2.2	5.5	
20/01/2022	20.1	14.7	8.2	1.7	12.1	
21/01/2022	20.3	17.8	11.8	5.3	13.7	
22/01/2022	14.1	11.0	6.3	3.4	7.7	
23/01/2022	12.9	10.2	5.4	2.5	7.4	
24/01/2022	12.9	12.2	7.8	4.3	6.3	
25/01/2022	15.7	14.1	8.5	4.9	9.4	
26/01/2022	17.1	18.0	14.1	8.4	12.8	
27/01/2022	15.6	14.6	8.9	4.0	9.9	
28/01/2022	16.1	19.6	13.3	6.6	13.3	
29/01/2022	15.7	16.6	14.6	7.6	12.7	
30/01/2022	17.9	19.4	14.9	8.5	13.2	
31/01/2022	14.3	16.1	10.7	4.4	12.3	
1/02/2022	16	13.7	10.4	6.3	15.6	
2/02/2022	8.1	7.2	5.0	3.1	6.0	
3/02/2022	9.6	8.1	5.9	3.4	5.7	
4/02/2022	19.5	11.1	7.5	3.3	10.4	
5/02/2022	21	11.2	5.8	1.6	11.1	
6/02/2022	17.5	11.4	4.7	1.3	8.9	
7/02/2022	14.6	7.5	3.9	1.9	8.1	
8/02/2022	8.9	10.9	9.0	4.0	8.4	
9/02/2022	15.4	16.3	10.3	2.4	19.5	
10/02/2022	17.7	14.4	9.0	6.3	24.0	
11/02/2022	14.5	14.8	7.7	6.4	11.3	
12/02/2022	15.6	12.5	9.2	3.4	10.1	
13/02/2022	14.9	18.2	12.4	4.5	11.8	
14/02/2022	18.9	21.0	14.8	5.8	14.6	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
15/02/2022	21.6	24.3	16.8	6.4	16.2	
16/02/2022	17.6	-	16.1	6.8	13.4	Power Outage
17/02/2022	25.1	-	15.6	4.9	26.7	
18/02/2022	16	18.8	12.5	5.3	20.0	
19/02/2022	20.7	21.0	12.6	5.8	13.9	
20/02/2022	17.7	17.3	8.8	5.0	13.3	
21/02/2022	13.1	11.9	9.9	4.7	10.6	
22/02/2022	16.3	13.4	6.2	6.3	10.7	
23/02/2022	9.5	11.9	5.2	2.7	7.0	
24/02/2022	8.3	8.4	6.4	2.9	5.6	
25/02/2022	10.9	9.8	8.0	3.9	8.2	
26/02/2022	13.3	12.7	6.5	4.3	10.3	
27/02/2022	12.4	14.0	6.4	3.4	9.3	
28/02/2022	12	13.0	3.1	3.6	7.8	
1/03/2022	14.8	7.9	3.5	2.5	5.0	
2/03/2022	8.9	9.4	3.0	2.2	6.1	
3/03/2022	7.2	6.6	9.0	1.6	9.6	
4/03/2022	9	6.2	-	-	7.9	Power Outage
5/03/2022	10.7	11.5	8.1	5.3	8.2	
6/03/2022	6.8	6.8	5.8	4.7	32.9	
7/03/2022	8.2	6.8	4.3	3.4	10.1	
8/03/2022	10	9.5	4.6	3.3	10.5	
9/03/2022	10.4	8.8	5.0	2.4	8.9	
10/03/2022	14.5	13.8	7.8	4.2	10.5	
11/03/2022	18.7	21.5	10.5	5.9	14.0	
12/03/2022	14.2	14.3	7.3	3.8	10.3	
13/03/2022	13	14.2	4.7	1.3	9.0	
14/03/2022	13.2	13.5	6.6	4.6	8.7	
15/03/2022	17.3	15.8	7.5	4.2	11.0	
16/03/2022	15.8	16.7	8.0	4.2	11.0	
17/03/2022	16.4	18.0	9.1	4.7	16.2	
18/03/2022	15.9	14.2	9.8	6.0	13.2	
19/03/2022	13.3	11.3	7.3	4.5	10.9	
20/03/2022	16.9	18.4	10.1	5.2	15.8	
21/03/2022	19.3	23.5	13.0	6.2	16.4	
22/03/2022	18.7	20.3	11.6	5.0	19.8	
23/03/2022	23.4	20.8	13.7	7.1	26.5	
24/03/2022	8.3	9.2	5.3	3.2	5.8	
25/03/2022	11.8	11.9	5.2	3.5	8.7	
26/03/2022	10.3	8.9	4.4	2.7	7.6	
27/03/2022	8.9	8.4	3.8	2.2	8.0	
28/03/2022	10.7	9.2	5.5	3.7	8.8	
29/03/2022	10.1	8.2	2.9	1.4	8.7	
30/03/2022	13.2	10.9	6.7	3.4	12.8	
31/03/2022	9.5	7.5	3.7	2.6	12.0	
1/04/2022	8.5	7.2	3.5	2.3	11.3	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
2/04/2022	6.9	6.6	3.9	2.5	11.6	
3/04/2022	10.1	10.2	6.6	3.8	13.2	
4/04/2022	13.5	13.2	9.4	5.7	17.5	
5/04/2022	12.6	20.3	14.5	8.9	24.6	
6/04/2022	12.2	20.3	12.3	8.4	17.8	
7/04/2022	11.6	10.1	6.4	4.8	8.4	
8/04/2022	9.5	9.5	4.0	1.6	8.9	
9/04/2022	10.8	11.5	5.5	2.4	9.3	
10/04/2022	11.1	9.9	5.3	2.1	8.3	
11/04/2022	11.5	9.3	6.3	3.9	14.5	
12/04/2022	16.7	15.2	9.5	5.5	17.6	
13/04/2022	12.3	12.1	7.1	3.9	9.9	
14/04/2022	11.7	8.8	5.0	2.4	7.4	
15/04/2022	12.1	12	5.6	2.1	10.1	
16/04/2022	15.4	10.6	4.4	2.1	14.5	
17/04/2022	12.8	12.5	7.3	4.5	14.6	
18/04/2022	10.9	11.1	7.7	4.7	15.8	
19/04/2022	16.9	11.8	7.5	4.6	18.6	
20/04/2022	5.9	4.9	3.6	2.5	7.0	
21/04/2022	11.8	9.7	3.6	2.4	9.9	
22/04/2022	10.9	10	2.7	0.9	8.2	Power Outage
23/04/2022	11.2	9.6	5.0	3.0	8.4	Power Outage
24/04/2022	8.0	7.3	4.3	3.3	6.4	
25/04/2022	8.9	8.1	3.2	1.8	5.5	
26/04/2022	11.3	10	3.7	2.1	6.3	
27/04/2022	7.4	10.1	2.1	1.3	7.3	
28/04/2022	7.7	7.5	3.7	2.8	7.1	
29/04/2022	12.6	9.3	5.4	3.2	8.9	
30/04/2022	6.0	7.6	4.0	2.3	6.4	
1/05/2022	9.7	10.1	5.8	3.7	8.9	
2/05/2022	11.9	11.8	6.7	2.9	10.7	
3/05/2022	11.5	8.9	6.4	3.9	9.8	
4/05/2022	17.8	12.4	7.7	4.8	16.5	
5/05/2022	9.2	7.5	6.8	3.6	9.8	
6/05/2022	8.6	7.4	5.4	1.1	8.5	
7/05/2022	7.6	5.9	3.3	1.5	9.2	
8/05/2022	8.7	8.2	3.4	1.7	9.8	
9/05/2022	14.6	12.5	5.0	2.9	13.0	
10/05/2022	12.7	11.7	4.5	2.3	9.2	
11/05/2022	10.2	9.8	5.9	2.9	8.9	
12/05/2022	7.0	7.1	2.6	1.6	6.3	
13/05/2022	9.7	8.8	4.8	3.5	8.8	
14/05/2022	8.9	7.7	4.2	2.6	8.5	
15/05/2022	9.0	8.3	3.5	1.6	12.7	
16/05/2022	7.5	6.1	6.2	4.1	6.7	
17/05/2022	11.7	7.9	4.2	1.9	-	Power Outage

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
18/05/2022	7.4	3.1	4.2	2.2	-	Power Outage
19/05/2022	8.8	6.0	5.0	2.9	11.1	
20/05/2022	11.9	9.3	4.9	2.0	6.7	
21/05/2022	10.1	8.8	6.1	3.2	6.9	
22/05/2022	8.7	5.3	3.8	2.7	6.0	
23/05/2022	11.0	6.6	2.9	1.9	9.3	
24/05/2022	10.3	7.5	4.3	3.0	8.0	
25/05/2022	10.4	9.4	4.3	2.2	8.4	
26/05/2022	12.8	12.1	5.7	3.1	10.4	
27/05/2022	10.9	9.7	6.7	4.0	10.5	
28/05/2022	7.0	6.3	4.7	3.5	10.4	
29/05/2022	5.2	3.9	3.2	2.3	6.2	
30/05/2022	8.9	6.5	5.5	3.2	10.8	
31/05/2022	6.4	5.5	2.2	1.4	5.9	
1/06/2022	8.3	7.3	4.0	2.1	9.1	
2/06/2022	10.3	7.5	4.7	2.6	8.1	
3/06/2022	7.9	5.8	3.5	2.5	11.4	
4/06/2022	5.1	4.8	3.0	2.1	5.3	
5/06/2022	6.6	4.1	2.2	1.3	4.7	
6/06/2022	6.2	4.7	2.1	1.3	5.1	
7/06/2022	8.2	6.1	2.8	1.1	6.7	
8/06/2022	7.1	4.9	2.7	1.6	5.6	
9/06/2022	5.7	4.9	1.3	1.3	8.2	
10/06/2022	5.0	4.2	2.1	1.4	5.9	
11/06/2022	5.2	5.3	3.7	2.3	6.2	
12/06/2022	8.3	8.1	6.5	3.3	10.5	
13/06/2022	7.1	6.8	12.1	10.6	6.9	
14/06/2022	10.9	11.0	5.6	4.0	11.2	
15/06/2022	8.6	7.5	4.9	2.9	10.2	
16/06/2022	9.3	7.2	6.5	3.3	14.2	
17/06/2022	6.9	5.4	3.2	1.4	6.8	
18/06/2022	8.4	8.3	3.9	2.3	9.1	
19/06/2022	11.0	10.7	5.9	2.8	26.0	
20/06/2022	13.5	12.2	6.2	2.4	18.4	
21/06/2022	12.6	8.3	7.1	3.2	13.3	
22/06/2022	9.5	6.2	4.5	1.8	8.9	
23/06/2022	10.2	6.7	7.3	3.8	9.3	
24/06/2022	8.7	7.0	4.7	2.5	9.5	
25/06/2022	7.9	8.1	7.2	3.2	14.3	
26/06/2022	8.3	8.2	6.3	2.5	14.1	
27/06/2022	8.6	6.4	4.3	1.8	11.2	
28/06/2022	9.7	9.5	4.6	2.5	11.6	
29/06/2022	11.4	12.7	10.7	4.0	9.0	
30/06/2022	12.7	11.2	7.0	3.3	18.3	
1/07/2022	11.3	11.5	7.0	4.4	13.8	
2/07/2022	5.6	6.7	3.5	2.8	6.0	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
3/07/2022	5	4.3	2.4	2.1	4.8	
4/07/2022	4	3.9	-	-	4.7	Equipment Failure
5/07/2022	4	3.8	1.8	1.5	4.5	
6/07/2022	4.3	3.0	-	-	4.1	Equipment Failure
7/07/2022	6.6	4.9	2.2	1.4	6.1	
8/07/2022	8.9	7.2	4.2	2.2	8.3	
9/07/2022	7.3	6.3	4.0	2.5	8.5	
10/07/2022	8	6.2	2.3	1.4	7.5	
11/07/2022	14.2	7.4	4.1	1.7	8.7	
12/07/2022	10	6.4	5.2	3.8	18.9	
13/07/2022	6.5	4.9	3.3	2.8	6.7	
14/07/2022	9.7	6.4	3.6	2.8	7.0	
15/07/2022	9.2	6.5	3.2	1.9	10.4	
16/07/2022	6.8	5.5	3.8	2.7	8.5	
17/07/2022	8.4	6.9	4.7	2.4	9.4	
18/07/2022	7.7	5.9	3.7	1.8	9.5	
19/07/2022	10.2	8.2	3.2	1.5	8.8	
20/07/2022	8.8	9.0	3.7	1.5	6.7	
21/07/2022	10.4	9.4	4.5	1.6	8.1	
22/07/2022	12.1	10.3	4.9	1.2	9.4	
23/07/2022	10.7	8.5	5.3	3.0	9.2	
24/07/2022	11	10.1	5.4	2.9	16.7	
25/07/2022	11.3	10.1	5.9	3.4	13.2	
26/07/2022	9.5	7.5	4.4	2.5	11.9	
27/07/2022	9.8	8.1	3.8	1.5	11.9	
28/07/2022	9.1	5.2	3.2	1.0	8.1	
29/07/2022	8.2	6.2	4.1	1.9	11.4	
30/07/2022	10.6	10.7	6.7	3.1	14.0	
31/07/2022	16.3	12.3	8.3	4.1	14.8	
1/08/2022	10.5	6.9	3.8	2.0	9.7	
2/08/2022	11.7	6.4	2.4	1.0	9.8	
3/08/2022	15.2	8.6	5.8	4.1	17.6	
4/08/2022	9	9.2	-	-	11.2	Power Outage
5/08/2022	7.7	6.8	5.2	3.2	7.3	
6/08/2022	6.8	5.7	2.4	1.0	6.6	
7/08/2022	7.1	5.1	3.4	2.1	9.7	
8/08/2022	8.3	5.3	2.6	1.9	9.6	
9/08/2022	8.2	6.3	-	-	10.6	Power Outage
10/08/2022	7.3	7.8	2.1	0.7	9.7	
11/08/2022	13.8	12.3	7.2	3.1	11.0	
12/08/2022	1.8	4.6	2.7	1.9	7.8	
13/08/2022	0.2	3.5	2.1	1.6	3.8	
14/08/2022	0.2	3.4	1.3	1.0	3.1	
15/08/2022	1.9	4.0	1.6	0.8	4.5	
16/08/2022	2.9	4.7	1.5	1.0	6.2	
17/08/2022	6.7	5.7	2.0	1.2	6.4	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
18/08/2022	9.5	5.2	1.9	0.1	9.1	
19/08/2022	5.4	5.1	2.5	1.4	9.8	
20/08/2022	6.1	7.4	4.7	1.9	11.8	
21/08/2022	5.4	7.9	3.9	2.6	10.4	
22/08/2022	6.6	5.4	3.4	2.0	12.7	
23/08/2022	7.3	6.0	4.1	2.5	15.0	
24/08/2022	5.5	5.5	3.3	2.0	10.9	
25/08/2022	4.7	4.9	3.1	2.0	10.2	
26/08/2022	7.9	8.3	3.5	1.6	7.8	
27/08/2022	10.4	10.5	5.4	2.2	8.4	
28/08/2022	11.5	13.0	8.9	5.0	10.2	
29/08/2022	12.7	14.0	7.6	4.8	15.5	
30/08/2022	11.7	9.9	8.7	6.2	13.9	
31/08/2022	9.3	8.8	4.7	1.9	11.8	
1/09/2022	13.1	13.4	10.5	5.5	14.0	
2/09/2022	11.0	9.4	6.1	3.6	11.6	
3/09/2022	4.3	4.9	2.2	1.3	6.0	
4/09/2022	8.0	5.8	3.2	1.7	8.3	
5/09/2022	9.7	9.8	5.6	2.2	9.8	
6/09/2022	10.9	10.8	6.7	3.1	7.1	
7/09/2022	10.5	11.1	7.3	3.4	9.5	
8/09/2022	8.8	9.9	6.3	3.2	9.8	
9/09/2022	6.4	5.6	3.4	2.7	4.9	
10/09/2022	3.7	4.6	2.5	1.7	4.9	
11/09/2022	7.5	7.4	4.9	2.5	8.0	
12/09/2022	8.1	7.1	5.4	2.4	14.3	
13/09/2022	11.9	10.6	4.5	2.3	10.2	
14/09/2022	14.7	12.5	9.4	4.0	9.0	
15/09/2022	6.6	9.7	7.8	5.3	7.1	
16/09/2022	6.7	6.6	4.1	2.4	7.6	
17/09/2022	8.2	8.6	7.1	4.2	10.0	
18/09/2022	7.3	7.2	5.6	2.4	9.8	
19/09/2022	9.3	7.2	4.8	2.0	15.1	
20/09/2022	14.4	15.3	7.4	2.7	13.3	
21/09/2022	10.8	13.9	9.0	5.8	10.1	
22/09/2022	6.9	7.3	3.9	3.0	7.0	
23/09/2022	8.9	9.9	5.5	3.7	9.3	
24/09/2022	7.6	7.8	5.0	2.6	12.3	
25/09/2022	7.2	6.7	4.2	2.5	9.5	
26/09/2022	10.1	8.9	5.7	3.3	14.5	
27/09/2022	11.9	9.0	5.0	3.4	12.4	
28/09/2022	7.5	5.1	1.7	0.1	7.2	
29/09/2022	6.6	5.3	1.7	1.3	9.2	
30/09/2022	10.6	7.7	4.2	2.2	8.9	
1/10/2022	11.0	9.4	5.2	2.1	7.8	
2/10/2022	10.2	10.0	3.7	1.7	8.9	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
3/10/2022	9.8	12.4	7.8	4.0	9.3	
4/10/2022	15.9	14.1	9.8	4.6	14.0	
5/10/2022	8.8	8.7	4.2	2.4	7.5	
6/10/2022	7.1	9.4	6.0	4.6	6.9	
7/10/2022	8.3	9.7	4.5	3.3	7.4	
8/10/2022	5.6	6.6	5.1	4.0	5.4	
9/10/2022	5.7	5.4	3.4	2.2	5.2	
10/10/2022	11.6	12.6	9.2	5.2	11.2	
11/10/2022	12.6	13.4	8.3	3.7	9.5	
12/10/2022	13.2	12.9	9.7	4.2	7.3	
13/10/2022	9.5	16.5	9.9	2.5	6.4	
14/10/2022	6.2	6.1	6.9	3.5	7.0	
15/10/2022	7.3	6.8	6.2	3.4	12.1	
16/10/2022	8.2	7.8	6.6	3.2	14.1	
17/10/2022	12.3	10.1	5.5	3.0	10.1	
18/10/2022	14.4	14.3	9.9	5.4	9.9	
19/10/2022	8.2	9.2	6.4	4.6	7.0	
20/10/2022	-	5.0	-	-	-	Power Outage
21/10/2022	7.3	6.5	3.9	2.2	-	Power Outage
22/10/2022	7.6	7.9	4.0	2.2	5.8	
23/10/2022	6.9	6.1	3.2	2.0	5.1	
24/10/2022	10.7	9.9	6.7	3.6	6.9	
25/10/2022	9.5	7.2	5.3	3.2	8.0	
26/10/2022	8.2	5.9	5.0	2.3	8.6	
27/10/2022	8.5	6.4	3.4	1.3	11.3	
28/10/2022	11.1	8.2	8.8	2.8	12.0	
29/10/2022	8.3	7.9	6.8	2.6	11.1	
30/10/2022	10.2	8.6	8.4	2.6	14.7	
31/10/2022	14.6	10.6	7.1	4.1	15.9	
1/11/2022	6.6	5.8	4.4	2.6	6.0	
2/11/2022	7.8	6.8	4.0	2.1	6.3	
3/11/2022	9.2	7.3	3.8	2.4	12.9	
4/11/2022	13.3	13.9	9.4	4.8	12.7	
5/11/2022	13.3	15.3	10.1	4.2	9.3	
6/11/2022	12.7	8.0	9.7	3.4	11.0	
7/11/2022	12.6	9.0	9.2	4.4	10.6	
8/11/2022	13.1	16.9	7.6	3.4	8.3	
9/11/2022	14.4	15.7	13.3	5.3	10.9	
10/11/2022	16.3	10.0	12.1	4.0	9.1	
11/11/2022	14.3	10.7	12.6	6.2	11.9	
12/11/2022	13.0	9.1	8.5	4.3	12.0	
13/11/2022	11.9	9.2	11.2	7.1	11.1	
14/11/2022	10.6	9.8	7.1	2.7	9.8	
15/11/2022	8.6	11.7	5.0	2.1	10.9	
16/11/2022	9.4	15.8	5.6	1.9	14.2	
17/11/2022	9.5	22.3	5.1	1.7	13.3	

Date	Ulan School TEOM01 EPL 17	Lagoons Road TEOM04	Ulan Road TEOM07 EPL27		Ulan-Wollar Road TEOM06^ EPL15	Comment
	PM10 Daily Result (24hr Average Limit = 50µg/m³)			PM2.5 Daily Result (24hr Average Limit = 25µg/m³)	PM10 Daily Result (µg/m³)	
18/11/2022	15.4	8.4	13.7	4.5	11.6	
19/11/2022	13.5	13.3	11.5	4.3	10.9	
20/11/2022	10.7	25.0	8.1	3.6	19.7	
21/11/2022	11.6	19.6	8.4	2.8	23.8	
22/11/2022	10.8	15.9	7.3	2.7	17.1	
23/11/2022	11.6	17.6	6.3	2.8	21.5	
24/11/2022	10.0	16.9	6.1	3.0	22.7	
25/11/2022	11.0	17.2	7.8	3.0	27.7	
26/11/2022	14.8	14.2	12.1	4.9	21.9	
27/11/2022	21.9	15.0	13.7	5.6	29.8	
28/11/2022	9.6	8.5	7.7	3.1	17.4	
29/11/2022	13.0	19.8	9.2	3.1	18.4	
30/11/2022	20.8	22.7	17.7	6.2	16.3	
1/12/2022	18.2	16.9	12.2	5.3	13.6	
2/12/2022	17.1	9.5	8.5	4.1	11.8	
3/12/2022	15.7	9.7	11.6	6.0	11.7	
4/12/2022	15.2	8.1	12.1	3.8	10.3	
5/12/2022	20.2	7.6	15.5	4.8	25.9	
6/12/2022	16.6	20.4	12.4	5.2	23.3	
7/12/2022	16.2	16.5	12.1	4.8	19.5	
8/12/2022	10.6	11.6	-	-	15.0	Power Outage
9/12/2022	19.4	19.8	14.9	5.6	21.2	
10/12/2022	19.4	21.8	16.5	7.1	15.0	
11/12/2022	18.9	8.0	15.6	6.6	16.2	
12/12/2022	13.2	9.0	10.0	4.7	14.2	
13/12/2022	12.9	16.9	8.0	3.0	16.0	
14/12/2022	9.7	15.7	7.2	3.1	18.9	
15/12/2022	8.3	10.0	7.1	3.2	12.4	
16/12/2022	17.7	10.7	13.0	4.5	12.4	
17/12/2022	13.5	9.1	9.9	2.9	9.7	
18/12/2022	10.7	9.2	5.1	2.8	6.0	
19/12/2022	18.1	9.8	12.4	5.5	13.2	
20/12/2022	21.9	11.7	13.9	4.6	13.8	
21/12/2022	18.0	20.3	14.2	4.9	9.9	
22/12/2022	18.1	-	13.4	4.3	11.5	Equipment Failure
23/12/2022	13.2	-	9.5	5.8	11.5	Equipment Failure
24/12/2022	7.7	-	5.7	3.5	8.0	Equipment Failure
25/12/2022	8.5	-	8.0	6.0	8.2	Equipment Failure
26/12/2022	11.8	-	12.5	8.2	10.0	Equipment Failure
27/12/2022	16.4	-	8.8	2.7	12.8	Equipment Failure
28/12/2022	12.9	-	11.5	5.1	16.8	Equipment Failure
29/12/2022	21.2	19.5	12.2	6.2	27.0	
30/12/2022	20.5	19.5	14.9	6.4	16.0	
31/12/2022	18.1	19.7	13.9	7.1	13.7	

Notes:
All readings are cumulative (Moolarben Mine Contribution plus background). PM10 24 hour average criteria is cumulative. PM2.5 24 hour average criteria is Incremental Impact (Concentration due to Moolarben Mine Complex on its own).

^ TEOM06 is used to measure “upwind” air quality when wind is in the direction of private residences. It is not representative of private residences.

Figure 3-c 2018 to 2022 TEOM Rolling Average

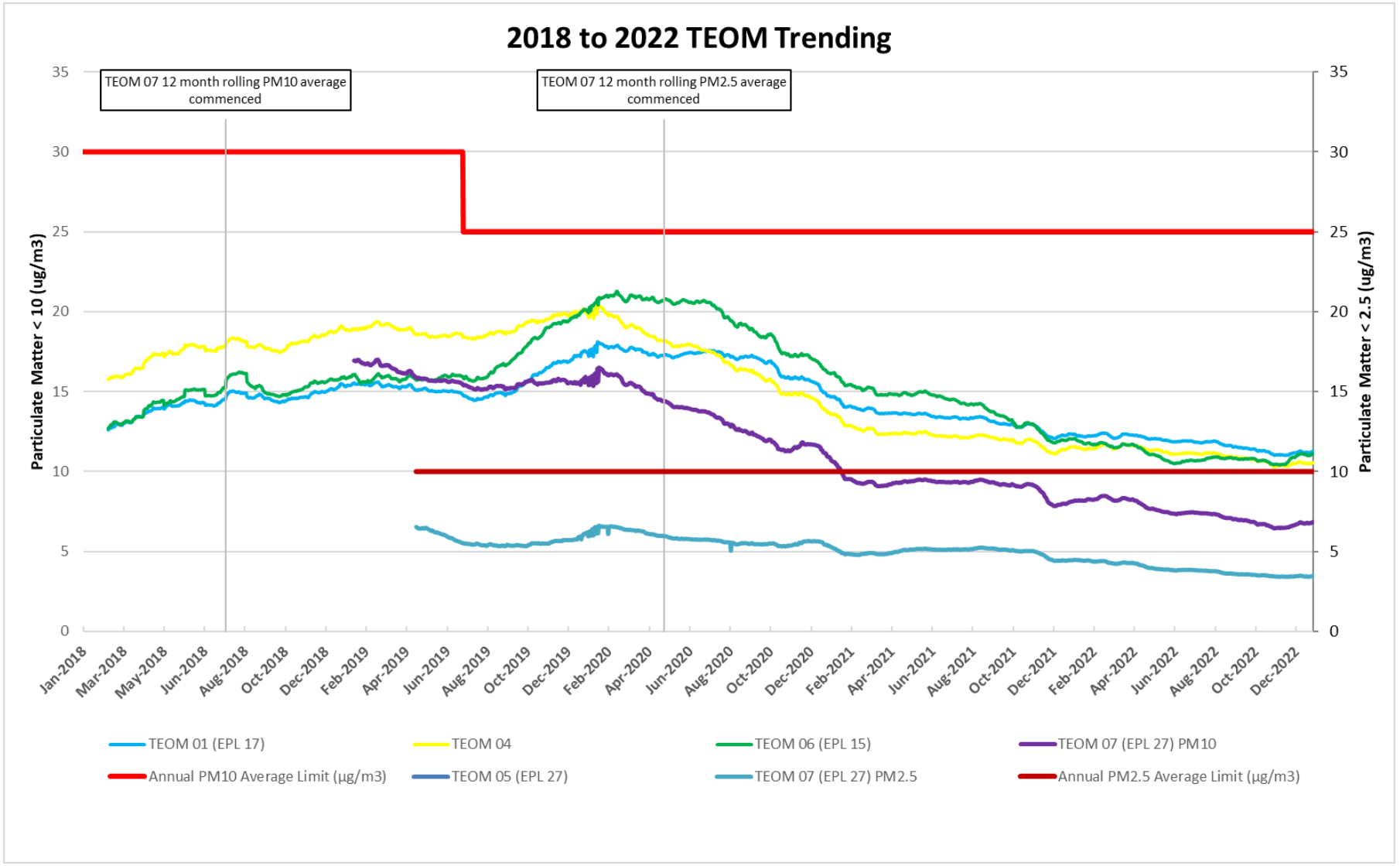
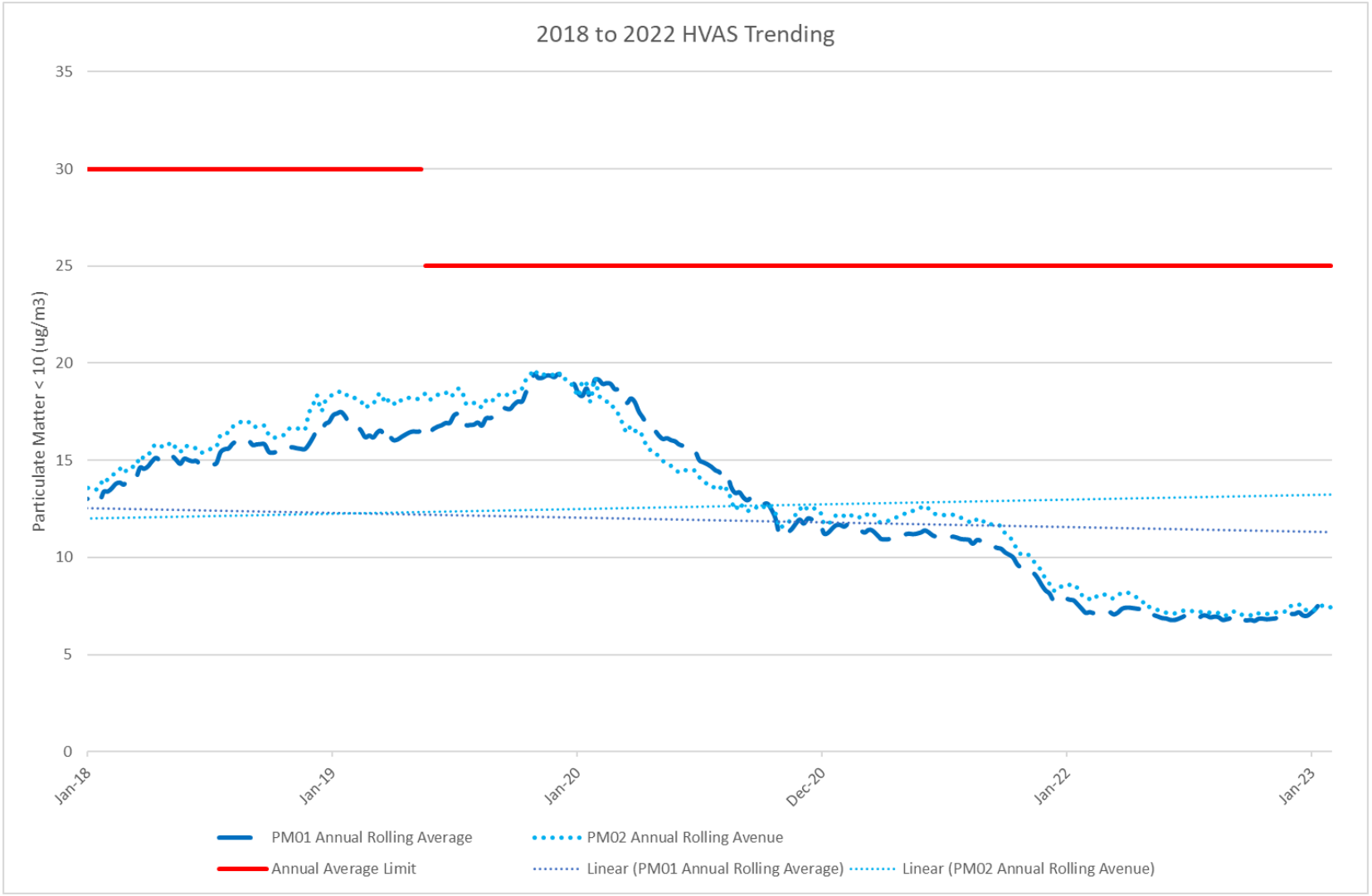


Table 4: HVAS monitoring results

Sampling Date	PM01	PM02
	Particulate Matter <10 µm (µg/m³)	Particulate Matter <10 µm (µg/m³)
4/01/2022	3.2	12.7
10/01/2022	10	11.2
16/01/2022	11.2	11.4
22/01/2022	9.1	6.4
28/01/2022	10.9	16.2
3/02/2022	8.4	5.7
9/02/2022	10.4	11.8
15/02/2022	17.8	20.6
21/02/2022	9.1	8.4
27/02/2022	7.7	10.8
5/03/2022	8.7	8
11/03/2022	14.3	18.1
17/03/2022	11.5	15
23/03/2022	18.9	17.1
29/03/2022	7.4	5.3
4/04/2022	7.6	6.8
10/04/2022	8.5	7.1
16/04/2022	12.5	9.4
22/04/2022	6.8	6.2
28/04/2022	4.1	2.7
4/05/2022	8.5	9.9
10/05/2022	8.8	7.2
16/05/2022	4.4	4.2
22/05/2022	6.6	4.4
28/05/2022	6.4	6.4
3/06/2022	5	4.4
9/06/2022	2.3	2.4
15/06/2022	3.9	4.7
21/06/2022	7.2	5.6
27/06/2022	5.7	1.8
3/07/2022	<0.1	<0.1
9/07/2022	3.2	4.2
15/07/2022	1.9	2.6
21/07/2022	8.7	3.3
27/07/2022	2.7	1.2
2/08/2022	1.3	1
8/08/2022	2.4	2.6
14/08/2022	0.9	1.8
20/08/2022	3.6	5.2
26/08/2022	3.4	3.4
1/09/2022	7.8	8.7
7/09/2022	7.9	9.9
13/09/2022	1.7	3.2
19/09/2022	3.4	3.4

Sampling Date	PM01	PM02
	Particulate Matter <10 µm (µg/m³)	Particulate Matter <10 µm (µg/m³)
25/09/2022	2.3	2.8
1/10/2022	5.9	4.4
7/10/2022	2.4	3.8
13/10/2022	6.9	9.4
19/10/2022	3.2	4
25/10/2022	2.7	2.6
31/10/2022	7.6	7.8
6/11/2022	6.9	9.2
12/11/2022	6	7.7
18/11/2022	10	15.4
24/11/2022	5.3	5
30/11/2022	17.6	22.4
6/12/2022	11.1	10.9
12/12/2022	10.2	7.3
18/12/2022	10	8.3
24/12/2022	5.5	4.4
30/12/2022	15.6	11

Figure 3-d 2018 to 2022 HVAS Trending



APPENDIX 3E. BIODIVERSITY MONITORING DATA

2022 Stage 1 and Stage 1 Mod 9 Autumn Flora Monitoring Results

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
BOA 1	**1a**	16.7	0	28	6	20	6	26	10	2
BOA 1	**1b**	17	1.5	20	4	8	0	60	8	0
BOA 1	**2c**	23.6	10	18	10	26	0	44	2	0
BOA 1	**4a**	7	1	28	0	4	30	14	18	6
BOA 1	**5a**	19.5	0	36	20	6	0	30	4	4
BOA 1	**5c**	11.5	4.9	24	2	26	0	32	16	0
BOA 1	**6a**	11.5	2.8	6	8	30	0	46	10	0
BOA 1	**6b**	19	5	4	2	34	0	52	4	0
BOA 1	**14a**	12.5	0	60	0	8	2	28	2	0
BOA 1	**24a**	0	0	26	0	4	20	30	20	0
BOA 2	**10a2**	11.3	4	14	10	20	0	48	6	2
BOA 2	**11a**	15	5	46	2	12	2	12	26	0
BOA 2	**11c**	13	0	12	2	20	2	50	0	14
BOA 2	**11d**	11.7	1.6	10	2	2	0	60	2	24
BOA 2	**12a**	11.4	14.5	14	8	10	0	26	6	30
BOA 2	**13a**	4.5	3.5	2	8	22	0	18	6	60
BOA 2	**13e**	7.5	1.8	2	28	36	0	18	10	6
BOA 3	**1e**	19.7	0.5	26	0	36	0	20	2	16
BOA 3	**1f**	9	4.5	58	20	12	0	6	4	0
BOA 3	**1h**	16	0	70	10	20	0	0	0	0
BOA 3	**4f**	0	0	56	10	10	2	20	0	2
BOA 3	**5e**	13	7.5	30	16	30	0	20	4	0
BOA 3	**6d**	12	5	18	2	36	0	44	0	0
BOA 3	**8a**	24	0	6	2	42	0	12	30	10
BOA 3	**8d**	14.5	1.5	18	10	28	0	44	0	0
BOA 3	**15a**	2.5	8.5	12	6	46	0	4	18	16

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
BOA 3	**16a**	1	6	16	0	50	0	2	6	26
BOA 3	**17a**	18.5	0	0	0	48	0	34	6	12
BOA 3	**17b**	4	0.5	8	0	56	0	6	2	28
BOA 3	**17c**	4.5	6	2	8	40	0	14	14	22
BOA 3	**19b**	4.2	1	46	2	44	0	6	0	0
BOA 3	**19c**	7.5	5	4	8	46	0	26	2	0
Bobadeen	**Mod9_Fl1**	13	0.6	50	0	30	0	18	2	0
Bobadeen	**Mod9_Fl2**	0	0	74	0	0	26	0	0	0
Bobadeen	**Mod9_Fl3**	14	0	72	2	8	0	18	0	0
Bobadeen	**Mod9_Fl4**	0	0	72	0	6	18	0	0	0
Bobadeen	**Mod9_Fl5**	0	0	56	0	12	32	0	0	0
Bobadeen	**Mod9_Fl6**	0	1.8	68	0	32	0	0	0	0
Bobadeen	**Mod9_Fl7**	5	0.1	50	0	10	40	0	0	0
Bobadeen	**Mod9_Fl8**	0	0	14	0	2	64	20	0	0
Bobadeen	**Mod9_Fl9**	0	2	42	0	14	40	4	0	0
Clarkes	**Mod9_Fl15**	0	0	64	0	26	0	4	6	0
Clarkes	**Mod9_Fl16**	6.5	0	52	0	36	0	10	2	0
Clarkes	**Mod9_Fl17**	10	5.6	20	0	4	0	72	2	2
Clarkes	**Mod9_Fl19**	8.4	0.6	0	0	46	0	30	2	0
Clarkes	**Mod9_Fl20**	12.5	10	2	8	32	0	56	2	2
Clarkes	**Mod9_Fl21**	11	11.5	10	12	30	2	40	4	2
Clarkes	**Mod9_Fl22**	14	3	4	0	34	0	56	4	2
Clifford	**Mod9_Fl18**	14.5	1.5	38	4	2	0	50	6	0
Clifford	**Mod9_Fl23**	13.5	1	42	2	18	0	36	0	0
Clifford	**Mod9_Fl24**	11.5	0	14	6	38	4	34	4	0
Clifford	**Mod9_Fl25**	14.5	0	14	8	34	0	42	0	2
Elward	**Mod9_Fl10**	12	1.7	4	0	52	0	22	4	0
Elward	**Mod9_Fl11**	2	0.1	40	6	48	0	6	0	0
Elward	**Mod9_Fl12**	13.5	3	56	0	28	0	10	6	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Elward	Mod9_Fl13	16	1	2	2	48	0	36	10	0
Elward	Mod9_Fl14	3.5	18.5	52	6	30	0	8	4	0
Moolarmoo	Mod9_Fl32	11.5	3	2	2	14	0	34	0	0
Moolarmoo	Mod9_Fl33	12	1.5	40	0	12	0	8	20	0
Moolarmoo	Mod9_Fl34	0	0	94	0	2	0	0	0	0
Moolarmoo	Mod9_Fl35	0	0	78	0	12	10	0	0	0
Property 24 & 25	Mod9_Fl29	24.5	0.6	40	10	10	2	32	0	0
Property 24 & 25	Mod9_Fl30	0	0	26	8	50	2	2	10	2
Property 24 & 25	Mod9_Fl31	0	0	54	2	44	0	0	0	0
Property 5	Mod9_Fl26	0	0	68	0	20	0	12	0	0
Property 5	Mod9_Fl27	0	0	46	0	32	0	22	0	0
Property 5	Mod9_Fl28	12.5	7.1	48	4	20	0	22	4	2

2022 Stage 2 Autumn Flora Monitoring Results

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Dun Dun East	Stage2_Fl29	24.5	1	8	0	4	0	68	0	0
Dun Dun East	Stage2_Fl26	33	0	0	0	0	4	88	8	0
Dun Dun East	Stage2_Fl107	22.5	0	64	0	2	2	32	0	0
Dun Dun East	Stage2_Fl108	30.5	0	0	0	2	0	78	18	0
Dun Dun East	Stage2_Fl109	0	0.2	58	6	0	10	12	0	2
Dun Dun East	Stage2_Fl110	0	0	62	2	0	22	6	6	0
Dun Dun East	Stage2_Fl111	0	2	48	0	20	24	4	2	0
Dun Dun East	Stage2_Fl112	0	0	44	0	0	56	0	0	0
Dun Dun East	Stage2_Fl20	15.8	0	44	0	10	10	28	6	0
Dun Dun East	Stage2_Fl36	10.5	4.4	54	12	2	0	28	2	0
Dun Dun East	Stage2_Fl113	9.5	2.9	80	2	0	0	8	4	4
Dun Dun East	Stage2_Fl114	0	0	98	2	0	0	0	0	0
Dun Dun East	Stage2_Fl71	0	2.3	68	6	8	14	4	0	0
Dun Dun East	Stage2_Fl37	0.7	0.2	62	0	0	38	0	0	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Dun Dun East	Stage2_Fl115	0	0	92	0	0	4	0	0	4
Dun Dun East	Stage2_Fl116	0	0	74	0	6	2	0	0	14
Dun Dun West	Stage2_Fl117	20	0	4	0	0	0	64	12	0
Dun Dun West	Stage2_Fl14	25.5	0.2	6	6	2	0	82	2	0
Dun Dun West	Stage2_Fl118	26.7	0	0	0	12	0	60	10	0
Dun Dun West	Stage2_Fl119	0	0	76	0	6	8	4	0	0
Dun Dun West	Stage2_Fl17	0	0	68	2	8	6	2	0	0
Dun Dun West	Stage2_Fl16	0	1.4	94	0	0	0	0	0	0
Dun Dun West	Stage2_Fl120	0	0	66	0	18	10	6	0	0
Dun Dun West	Stage2_Fl121	0	0	76	0	12	12	0	0	0
Dun Dun West	Stage2_Fl10	14.5	2.8	40	12	4	0	28	0	0
Dun Dun West	Stage2_Fl122	1	3.1	70	0	4	0	6	6	4
Dun Dun West	Stage2_Fl123	32.5	0	64	0	18	8	8	2	0
Dun Dun West	Stage2_Fl124	19	26.2	28	8	8	0	36	0	8
Libertus	Stage2_Fl125	8	3	18	4	36	0	12	10	0
Libertus	Stage2_Fl126	11	4	14	2	28	0	50	0	6
Libertus	Stage2_Fl127	13.5	15.2	12	8	16	0	42	0	22
Libertus	Stage2_Fl128	11.7	0	64	0	18	2	6	10	0
Libertus	Stage2_Fl129	0	0	60	8	0	26	4	2	0
Libertus	Stage2_Fl130	0	0	44	16	0	30	14	0	0
Libertus	Stage2_Fl131	22.8	10.2	54	6	10	4	24	2	0
Libertus	Stage2_Fl132	11.5	0	82	0	8	2	6	2	0
Old Bobadeen	Stage2_Fl142	19.2	17.7	54	32	2	0	6	4	0
Old Bobadeen	Stage2_Fl143	11.1	5.5	34	6	20	0	10	20	2
Old Bobadeen	Stage2_Fl144	8.2	1	36	4	18	0	30	6	6
Old Bobadeen	Stage2_Fl145	18.5	0	32	0	2	0	58	8	0
Old Bobadeen	Stage2_Fl146	19.5	0	58	0	30	0	12	0	0
Old Bobadeen	Stage2_Fl52	0	0.5	80	0	12	8	0	0	0
Old Bobadeen	Stage2_Fl67	0	0	66	0	0	8	26	0	0
Old Bobadeen	Stage2_Fl153	0	0	4	0	32	6	58	0	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Old Bobadeen	Stage2_Fl154	0	0	58	0	0	10	30	2	0
Onsite Offset	Stage2_Fl58	7.6	6.3	56	16	10	0	12	6	0
Onsite Offset	Stage2_Fl133	26	0	16	10	24	0	32	4	0
Onsite Offset	Stage2_Fl134	7.8	10.2	0	14	0	0	56	10	2
Onsite Offset	Stage2_Fl135	18	13.5	38	22	12	2	24	2	0
Onsite Offset	Stage2_Fl69	0	0	80	4	14	2	0	0	0
Onsite Offset	Stage2_Fl64	0	0	86	0	10	2	2	0	0
Onsite Offset	Stage2_Fl136	0	0	50	0	26	18	0	6	0
Onsite Offset	Stage2_Fl137	0	0	48	0	14	38	0	0	0
Onsite Offset	Stage2_Fl138	3.2	3.5	18	6	32	0	22	4	0
Onsite Offset	Stage2_Fl139	22.9	4.9	24	2	10	0	58	6	0
Onsite Offset	Stage2_Fl140	2.9	0.8	42	6	38	2	12	0	0
Onsite Offset	Stage2_Fl141	0	0	24	0	60	2	6	0	0
Ulan 18	Stage2_Fl147	10	2.3	0	14	6	0	70	4	4
Ulan 18	Stage2_Fl148	6.1	0.1	4	2	48	0	44	2	0
Ulan 18	Stage2_Fl149	0.8	2.7	0	0	28	0	32	2	10
Ulan 18	Stage2_Fl150	9.6	1.3	10	0	22	0	40	8	0
Ulan 18	Stage2_Fl151	13.7	0.2	22	0	40	8	30	0	0
Ulan 18	Stage2_Fl152	16.7	1.2	66	2	26	2	4	0	0
Ulan 18	Stage2_Fl45	0	0	36	0	8	56	0	0	0
Ulan 18	Stage2_Fl155	0	0	4	2	2	92	0	0	0
Ulan 18	Stage2_Fl43	0	0	42	2	8	48	0	0	0

2022 Stage 1 and Stage 1 Mod 9 Spring Flora Monitoring Results

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
BOA1	2d	28	5	28	2	18	2	50	0	0
BOA1	4b	5	11.5	22	0	0	22	42	14	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
BOA1	5b	28	17.5	4	22	18	0	56	0	0
BOA1	7b	0	12	50	6	10	4	12	8	4
BOA1	9a	3	10	50	0	10	38	2	0	0
BOA1	9b	4	0	22	2	24	0	20	28	0
BOA1	14b	13	25.5	10	0	32	14	36	8	0
BOA1	21a	0	2	54	6	14	16	6	4	0
BOA1	21b	0	0	60	0	14	12	4	6	4
BOA1	24b	0	4	52	0	6	4	16	22	0
BOA2	10b	6	12.5	6	38	14	0	22	10	0
BOA2	11b	11	13.5	40	2	4	0	38	10	0
BOA2	12b	inaccessible								
BOA2	13g	16		4	10	22	0	64	0	0
BOA2	13h	9	1.9	6	4	34	0	40	6	8
BOA2	25a	0	0.4	58	10	20	0	12	0	0
BOA3	4e	14	0	52	2	34	4	8	0	0
BOA3	5h	15	0.7	20	28	20	0	32	0	0
BOA3	6c	11	1.2	18	6	6	0	46	8	0
BOA3	8c	19	1.2	4	4	8	0	80	4	0
BOA3	15b	inaccessible								
BOA3	16b	5	0.6	16	12	24	0	18	30	0
BOA3	17d	4	3.3	6	32	22	0	6	4	30
BOA3	19a	9	11.9	20	8	26	0	20	18	8
Bobadeen	Mod9_Fl1	13	0	29	0	11	9	1	0	0
Bobadeen	Mod9_Fl3	0	0.5	7	0	32	3	6	2	0
Bobadeen	Mod9_Fl5	21	0	23	1	8	4	8	6	0
Bobadeen	Mod9_Fl9	0	5	14	4	30	0	42	8	2
Bobadeen	Mod9_Fl2	0	7.5	2	0	26	0	72	0	0
Bobadeen	Mod9_Fl4	0	4.4	12	16	14	0	42	4	12

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Bobadeen	Mod9_FI6	5	0	42	2	46	4	6	0	0
Bobadeen	Mod9_FI7	0	0.1	38	2	20	8	28	0	0
Bobadeen	Mod9_FI8	0	0	36	0	8	48	8	0	0
Clarkes	Mod9_FI15	0	0	0	14	46	0	26	10	0
Clarkes	Mod9_FI16	13	0	52	0	6	40	0	0	0
Clarkes	Mod9_FI19	33	0	52	2	8	38	0	0	0
Clarkes	Mod9_FI17	13	0	14	2	38	12	32	2	0
Clarkes	Mod9_FI21	28	0	28	0	2	56	14	0	0
Clarkes	Mod9_FI22	24	0	4	0	0	88	8	0	0
Clarkes	Mod9_FI20	28	0.7	8	4	12	66	10	0	0
Clifford	Mod9_FI18	20	2.7	6	6	22	0	40	4	0
Clifford	Mod9_FI23	35	0	18	4	58	0	8	10	0
Clifford	Mod9_FI24	24	3.5	50	12	18	0	18	2	0
Clifford	Mod9_FI25	19	0	0	14	46	0	26	10	0
Elward	Mod9_FI10	26	16.5	24	12	30	20	6	8	0
Elward	Mod9_FI11	5	0	32	0	48	2	18	0	0
Elward	Mod9_FI12	7	0	42	0	28	14	16	0	0
Elward	Mod9_FI13	21	1	28	0	14	2	54	2	0
Elward	Mod9_FI14	2	0.5	2	2	38	0	36	2	0
Moolarmoo	Mod9_FI32	27	1	4	12	32	0	46	6	0
Moolarmoo	Mod9_FI33	10	0.5	12	6	22	0	58	0	2
Moolarmoo	Mod9_FI34	0	0.5	0	6	14	4	64	12	0
Moolarmoo	Mod9_FI35	0	1	40	4	18	6	14	14	4
Property 24 & 25	Mod9_FI29	27	0.5	2	4	34	2	52	6	0
Property 24 & 25	Mod9_FI30	0	0	34	4	8	4	36	14	0
Property 24 & 25	Mod9_FI31	0	5	16	6	10	0	56	6	6
Property 5	Mod9_FI26	0	0	16	0	8	76	0	0	0
Property 5	Mod9_FI27	0	0	2	0	10	42	46	0	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Exotic Ground Cover	Litter	Bare soil	Crypto
Property 5	Mod9_FI28	21	0.5	42	0	32	18	8	0	0
Property 24 & 25	Mod9_FI29	27	0	48	4	12	4	28	2	0
Property 24 & 25	Mod9_FI30	0	0	14	0	52	18	6	10	0
Property 24 & 25	Mod9_FI31	0	0	26	0	10	48	16	0	0
Moolarmoo	Mod9_FI32	27	3	20	4	16	0	42	10	0
Moolarmoo	Mod9_FI33	10	9	30	2	20	6	2	10	0
Moolarmoo	Mod9_FI34	0	0	72	0	12	6	8	0	0
Moolarmoo	Mod9_FI35	0	0	64	0	28	8	0	0	0

Appendix 3F. SURFACE WATER MONITORING DATA

Table 5: 2022 Surface water quality data

Sample Point	Sample Date	pH (Field) (Unit)	pH (Lab) (Unit)	EC (Field) (µS/cm)	EC (Lab) (µS/cm)	TSS (mg/L)	TDS (mg/L)	Temperature (°C)	Turbidity (Lab) (NTU)	Al - T (mg/L)	Cu - T (mg/L)	Pb - T (mg/L)	Zn - T (mg/L)	Ni - T (mg/L)	Fe - T (mg/L)	Mn - T (mg/L)	As - T (mg/L)	Se - T (mg/L)	Cd - T (mg/L)	Cr - T (mg/L)	Li (mg/L)	Ba - T (mg/L)	Sr (mg/L)	DO (mg/L)	N - T (mg/L)	P - T (mg/L)
SW01	8/01/2022 10:45*	7.1	6.9	1070	235	208	449	25.0	433				0.019		11.8											
SW01	25/01/2022 9:00	7.9	7.8	613	613	5	394	21.5	5	0.09	0.001	0.001	0.005	0.005	1.04	0.082	0.002	0.01	0.0001	0.001	0.064	0.02	0.157	7.85	0.4	0.02
SW01	8/02/2022 10:00	8.0	7.9	631	609	5	356	20.0	5																	
SW01	2/03/2022 10:00	8.0	7.9	659	615	5	358	24.1	5																	
SW01	7/03/2022 10:10*	7.4	7.2	297	297	88	299	23.2	127				0.012		4.9											
SW01	5/04/2022 11:00	8.2	8.1	720	753	5	427	21.8	3																	
SW01	28/04/2022 14:00*	7.6	7.5	288	324	33	281	18.1	59				0.007		1.9											
SW01	3/05/2022 13:20	7.8	7.8	689	701	5	434	19.1	10							0.05										
SW01	1/06/2022 9:40	7.9	7.8	626	641	10	382	9.9	26	1.3	0.001	0.001	0.006	0.003	1.62	0.04	0.001	0.01	0.0001	0.001	0.03	0.021	0.164	10.47	0.7	0.04
SW01	2/07/2022 12:00*	7.8	7.6	535	569	22	326	10.8	40				0.005		1.3											
SW01	4/07/2022 14:50*	7.2	7.1	138	165	112	168	11.7	134				0.011		2.9											
SW01	5/07/2022 9:20	7.4	7.2	210	224	37	198	12.1	59																	
SW01	5/08/2022 11:40*	7.2	7.1	231	258	70	222	14.7	156				0.024		3.0											
SW01	9/08/2022 13:00	7.9	7.6	471	481	36	302	15.2	30																	
SW01	6/09/2022 9:20	7.3	7.8	548	595	5	303	11.2	9																	
SW01	16/09/2022 9:30*	7.0	7.3	255	286	96	240	13.5	132				0.01		3.2											
SW01	5/10/2022 11:10	7.8	7.9	522	550	5	298	14.1	10																	
SW01	9/10/2022 9:40*	6.9	7.2	212	243	46	217	14.3	78				0.007		2.3											
SW01	21/10/2022 10:00*	6.9	7.0	182	206	104	197	18.0	148				0.011		2.9											
SW01	8/11/2022 10:10	7.5	7.7	384	422	7	236	18.2	17																	
SW01	14/11/2022 10:10*	7.1	7.2	230	250	158	220	19.7	116				0.008		3.1											
SW01	6/12/2022 10:30	7.7	7.8	970	1000	6	550	23.9	3																	

SW01	30/12/2022 9:20*	7.8	7.7	1307	1290	16	842	22.9	11				0.005		0.9										
SW02	8/01/2022 11:00*	7.1	6.8	236	242	180	471	24.4	423				0.02		10.9										
SW02	25/01/2022 9:30	7.9	7.8	629	629	6	396	20.8	5	0.08	0.008	0.001	0.008	0.005	1.09	0.11	0.001	0.01	0.0001	0.001	0.071	0.019	0.163	7.58	0.4	0.01
SW02	8/02/2022 10:20	8.0	7.9	613	606	5	350	19.7	5																
SW02	2/03/2022 10:20	8.0	7.9	644	632	5	378	23.6	9																
SW02	7/03/2022 10:30*	7.5	7.4	315	314	59	330	22.6	119				0.011		5.9										
SW02	5/04/2022 11:20	8.2	8.1	7	758	5	436	21.1	4																
SW02	28/04/2022 14:30*	7.6	7.5	482	530	49	350	17.5	77				0.008		2.8										
SW02	3/05/2022 13:40	7.9	7.7	692	708	5	443	18.6	10																
SW02	1/06/2022 10:00	7.9	7.7	626	646	7	406	9.6	27	1.33	0.001	0.001	0.005	0.002	1.62	0.045	0.001	0.01	0.0001	0.001	0.028	0.02	0.164	10.27	0.7	0.03
SW02	2/07/2022 12:20*	7.7	7.3	506	554	29	326	10.8	43				0.005		2.0										
SW02	4/07/2022 15:10*	7.3	7.1	143	165	102	173	11.7	135				0.01		2.8										
SW02	5/07/2022 9:40	7.3	7.2	214	228	35	204	11.9	61																
SW02	5/08/2022 12:00*	7.3	7.1	228	258	68	225	13.8	155				0.012		2.9										
SW02	9/08/2022 13:30	7.9	7.7	471	481	5	308	15.2	18																
SW02	6/09/2022 9:40	7.7	7.8	563	595	5	325	11.6	9																
SW02	16/09/2022 9:50*	7.3	7.2	250	283	86	255	12.9	124				0.009		3.1										
SW02	5/10/2022 11:30	7.9	7.7	533	556	5	317	14.4	11																
SW02	9/10/2022 10:00*	7.1	7.0	203	225	43	172	14.6	75				0.008		2.0										
SW02	21/10/2022 10:30*	7.1	7.0	175	205	96	206	17.6	139				0.014		3.9										
SW02	8/11/2022 10:30	7.6	7.6	377	420	15	216	18.0	19																
SW02	14/11/2022 10:30*	7.2	7.2	229	251	110	226	19.9	142				0.01		4.2										
SW02	6/12/2022 10:50	7.9	7.9	988	1010	9	544	22.3	5																
SW02	30/12/2022 9:40*	7.8	7.7	1361	1340	11	903	23.0	3				0.005		0.7										
SW04	8/01/2022 12:20*	6.5	6.4	126	140	73	258	26.8	255				0.022		4.0										
SW04	7/03/2022 11:30	6.5	6.5	131	141	22	204	22.3	89				0.025		3.2										
SW04	28/04/2022 13:00	6.9	6.8	159	196	31	213	17.0	107				0.008		2.7										
SW04	3/05/2022 14:40	6.8	6.8	206	245	5	180	16.6	18																
SW04	1/06/2022 11:00	7.1	7.0	282	331	5	232	9.4	13	0.54	0.001	0.001	0.005	0.003	1.27	0.038	0.001	0.01	0.0001	0.001	0.001	0.023	0.087	7.16	0.6	0.02
SW04	2/07/2022 15:10*	7.1	7.1	317	355	5	194	10.6	11				0.005		1.4										

SW04	4/07/2022 12:50*	6.9	6.8	145	162	41	192	12.5	143				0.011		2.6											
SW04	5/07/2022 11:30	6.9	6.8	172	187	40	214	11.5	100																	
SW04	5/08/2022 16:20*	7.1	6.9	98	130	22	178	13.1	112				0.009		2.2											
SW04	9/08/2022 14:40	7.3	7.1	197	212	5	157	11.1	35																	
SW04	6/09/2022 14:30	7.2	7.1	211	244	9	152	13.8	14																	
SW04	16/09/2022 11:40*	7.0	7.0	84	116	34	184	14.3	110				0.01		2.2											
SW04	5/10/2022 15:40	7.3	7.3	261	298	6	193	14.2	12																	
SW04	9/10/2022 14:20*	7.1	7.1	90	119	9	155	18.1	74				0.007		1.1											
SW04	21/10/2022 17:15*	6.9	7.0	132	128	26	136	21.4	83				0.01		2.4											
SW04	9/11/2022 12:30	7.3	7.1	177	211	5	112	20.4	7																	
SW04	14/11/2022 12:50*	7.0	7.0	67	95	33	136	20.8	82				0.008		2.5											
SW04	7/12/2022 11:50	8.1	8.1	1732	1760	5	1070	21.5	2																	
SW04	30/12/2022 12:10*	8.2	8.2	2019	2000	5	1390	26.5	1				0.005		0.1											
SW05	8/01/2022 13:30*	7.2	7.1	648	681	52	673	27.8	78				0.009		2.8											
SW05	25/01/2022 13:40	7.5	7.5	869	881	5	496	21.8	5	0.25	0.001	0.001	0.005	0.002	0.88	0.169	0.001	0.01	0.0001	0.001	0.004	0.021	0.27	5.47	1.2	0.03
SW05	8/02/2022 11:50	7.6	7.5	775	787	5	452	21.8	6																	
SW05	2/03/2022 13:00	7.5	7.4	537	521	5	314	24.5	8																	
SW05	7/03/2022 13:00*	7.4	7.3	890	859	53	565	21.7	40				0.005		2.2											
SW05	5/04/2022 14:50	7.7	7.7	1060	1060	5	651	20.3	6																	
SW05	28/04/2022 12:00*	7.3	7.6	779	832	16	509	16.4	27				0.005		1.1											
SW05	3/05/2022 10:50	7.6	7.6	911	926	5	564	15.2	8																	
SW05	1/06/2022 11:40	7.7	7.8	1186	1150	9	674	9.6	9	0.6	0.001	0.001	0.005	0.002	0.67	0.043	0.001	0.01	0.0001	0.001	0.003	0.022	0.345	10.08	0.7	0.03
SW05	2/07/2022 11:10*	7.4	7.4	448	480	16	308	10.2	60				0.008		1.1											
SW05	4/07/2022 14:10*	7.5	7.3	197	208	44	170	11.9	58				0.006		1.5											
SW05	5/07/2022 14:00	7.4	7.4	281	289	18	232	12.1	34																	
SW05	5/08/2022 12:15*	7.5	7.3	268	294	34	191	13.7	91				0.008		1.9											
SW05	9/08/2022 9:40	7.8	7.6	591	603	20	334	11.9	19																	
SW05	6/09/2022 11:00	8.3	8.2	729	757	5	390	12.5	6																	
SW05	16/09/2022 12:00*	7.4	7.6	585	622	29	398	14.1	28				0.005		1.0											
SW05	5/10/2022 15:50	7.8	7.8	577	617	5	364	14.5	9																	

SW05	9/10/2022 12:10*	7.8	7.5	289	317	26	223	16.3	55				0.01		1.1											
SW05	21/10/2022 14:20*	7.7	7.2	260	256	36	210	22.0	73				0.007		1.8											
SW05	8/11/2022 11:10	7.6	7.7	473	522	10	339	19.1	13																	
SW05	14/11/2022 13:10*	7.4	7.5	442	469	37	286	20.3	46				0.007		1.8											
SW05	6/12/2022 12:40	7.9	7.8	1451	1450	12	856	23.9	7																	
SW05	30/12/2022 12:30*	7.7	7.5	1038	1040	64	726	24.8	79				0.005		1.7											
SW07	8/01/2022 15:00*	7.6	7.5	1804	1790	25	1270	29.6	10				0.005		0.2											
SW07	25/01/2022 13:00	7.6	7.6	1568	1620	5	938	20.6	1	0.01	0.001	0.001	0.005	0.002	0.1	0.98	0.002	0.01	0.0001	0.001	0.004	0.018	0.581	5.51	1.3	0.05
SW07	8/02/2022 14:10	7.7	7.6	1541	1540	8	860	21.5	3																	
SW07	2/03/2022 14:10	7.6	7.5	1616	1730	42	1000	23.8	13																	
SW07	7/03/2022 13:30*	7.8	7.7	2549	2420	5	1540	20.8	2				0.005		0.2											
SW07	5/04/2022 14:10	7.7	7.7	1669	1700	5	992	19.1	1																	
SW07	28/04/2022 11:30*	7.5	7.5	1337	1350	6	805	17.0	5				0.014		0.2											
SW07	3/05/2022 12:20	7.9	7.8	1847	1820	5	1150	15.0	1																	
SW07	1/06/2022 13:30	8.1	7.8	2071	1980	18	1140	8.3	5	0.32	0.001	0.001	0.015	0.006	0.46	0.512	0.001	0.01	0.0001	0.001	0.003	0.035	0.688	10.14	0.3	0.03
SW07	2/07/2022 10:40*	7.8	7.6	1909	2030	6	1040	10.1	6				0.011		0.4											
SW07	4/07/2022 13:35*	7.4	7.5	370	385	8	284	14.0	42				0.006		1.1											
SW07	5/07/2022 15:35	7.5	7.5	542	562	8	376	13.0	18																	
SW07	5/08/2022 13:20*	7.4	7.5	564	586	5	361	16.0	30				0.008		0.9											
SW07	9/08/2022 10:00	7.9	7.8	1357	1390	5	770	11.0	2																	
SW07	6/09/2022 12:00	8.0	8.0	1721	1740	5	920	14.6	2																	
SW07	16/09/2022 12:20*	7.8	7.8	877	884	13	500	18.9	10				0.008		0.6											
SW07	5/10/2022 16:40	7.6	7.5	184	1920	36	1120	13.7	17																	
SW07	9/10/2022 12:50*	7.6	7.8	555	571	5	329	19.0	9				0.005		0.6											
SW07	21/10/2022 14:40*	7.8	7.4	579	562	6	318	23.8	7				0.007		0.8											
SW07	8/11/2022 11:40	8.0	8.1	1611	1690	5	845	21.9	2																	
SW07	14/11/2022 13:40*	7.3	7.5	419	625	5	348	23.5	6				0.005		0.8											
SW07	6/12/2022 13:10	7.8	7.8	1023	1030	38	528	22.9	13																	
SW07	30/12/2022 13:00*	7.8	7.8	3930	3870	5	2580	22.7	3				0.005		0.6											
SW08	8/01/2022 14:10*	7.4	7.4	678	697	13	489	27.1	17				0.005		2.1											

SW08	25/01/2022 11:45	7.5	7.6	1676	1680	5	946	20.5	2	0.01	0.004	0.001	0.005	0.008	0.47	0.116	0.001	0.01	0.0001	0.001	0.002	0.02	0.462	6.04	1.0	0.01
SW08	8/02/2022 13:20	7.6	7.6	1837	1980	5	1080	22.8	3																	
SW08	2/03/2022 11:50	7.3	7.5	2306	2390	5	1350	25.5	9																	
SW08	7/03/2022 12:00*	7.9	7.4	801	780	8	487	21.2	19				0.005		1.3											
SW08	5/04/2022 10:00	7.7	7.6	1282	1290	5	742	14.8	1																	
SW08	28/04/2022 9:40*	7.4	7.4	411	441	8	288	15.5	19				0.005		0.9											
SW08	3/05/2022 10:10	7.5	7.5	806	829	5	525	13.5	2																	
SW08	1/06/2022 14:00	7.9	7.6	635	664	5	408	9.2	6	0.16	0.001	0.001	0.005	0.003	0.89	0.021	0.001	0.01	0.0001	0.001	0.001	0.013	0.171	10.2	0.4	0.04
SW08	2/07/2022 9:30*	7.7	7.5	822	881	5	453	10.6	5				0.005		0.6											
SW08	4/07/2022 10:00*	7.1	7.1	145	159	40	127	11.5	68				0.006		1.9											
SW08	5/07/2022 13:30	7.2	7.2	261	275	13	223	12.4	27																	
SW08	5/08/2022 16:30*	7.3	7.3	335	367	11	276	13.5	39				0.005		1.5											
SW08	9/08/2022 8:30	7.7	7.5	567	602	5	334	12.6	9																	
SW08	6/09/2022 12:40	7.9	7.7	746	769	5	404	12.9	4																	
SW08	16/09/2022 14:20*	7.7	7.6	330	365	16	244	15.0	27				0.005		1.5											
SW08	5/10/2022 9:10	7.7	7.6	756	774	5	418	13.3	5																	
SW08	9/10/2022 11:20*	7.5	7.3	210	235	8	186	15.2	55				0.005		1.6											
SW08	21/10/2022 12:10*	7.3	7.2	202	231	52	162	17.6	79				0.007		2.6											
SW08	8/11/2022 13:50	7.8	7.8	526	561	5	294	19.1	8																	
SW08	14/11/2022 14:10*	7.8	7.4	259	277	54	221	20.9	73				0.006		2.8											
SW08	6/12/2022 14:20	7.6	7.8	730	769	5	398	24.1	5																	
SW08	30/12/2022 14:00*	7.8	7.8	871	867	5	470	24.4	2				0.005		0.4											
SW09	8/01/2022 14:30*	7.3	7.3	941	965	7	646	28.2	7				0.005		1.7											
SW09	25/01/2022 12:10	7.6	7.6	1280	1210	6	690	20.8	2	0.32	0.002	0.001	0.005	0.004	1.3	2.06	0.001	0.01	0.0001	0.001	0.001	0.032	0.355	6.07	1.2	0.02
SW09	8/02/2022 13:40	7.7	7.6	1514	1510	5	784	21.9	5																	
SW09	2/03/2022 12:20	7.7	7.7	1956	1730	7	918	24.0	9																	
SW09	7/03/2022 12:20*	7.5	7.5	696	668	5	416	20.8	14				0.005		2.6											
SW09	5/04/2022 9:40	7.7	7.6	870	903	7	506	16.8	5																	
SW09	28/04/2022 10:00*	7.3	7.1	396	437	10	290	16.3	12				0.005		1.7											
SW09	3/05/2022 9:50	7.0	7.4	539	564	11	348	13.1	3																	

SW09	1/06/2022 15:00	7.8	7.4	606	631	8	390	9.0	10	0.2	0.001	0.001	0.005	0.003	1.46	0.174	0.001	0.01	0.0001	0.001	0.001	0.025	0.14	9.53	0.5	0.04
SW09	2/07/2022 13:35*	7.7	7.5	358	365	8	202	13.7	9				0.006		0.9											
SW09	5/07/2022 10:30	7.3	7.1	161	178	16	158	11.4	36																	
SW09	5/08/2022 15:20*	7.0	7.1	171	201	7	166	14.1	45				0.005		1.8											
SW09	9/08/2022 9:10	8.2	7.3	339	333	5	213	11.4	9																	
SW09	6/09/2022 13:00	7.9	7.6	469	468	11	250	14.0	9																	
SW09	16/09/2022 13:40*	7.4	7.4	322	365	12	252	17.1	17				0.005		1.4											
SW09	5/10/2022 17:20	7.9	7.6	505	509	5	280	13.4	8																	
SW09	9/10/2022 11:00*	7.0	7.1	314	330	6	212	16.4	10				0.005		1.0											
SW09	21/10/2022 11:50*	7.0	7.0	144	209	40	152	18.2	52				0.005		2.2											
SW09	8/11/2022 14:40	7.6	7.4	324	336	15	256	21.5	26																	
SW09	14/11/2022 14:30*	7.5	7.2	176	196	67	189	21.8	128				0.008		4.2											
SW09	6/12/2022 14:45	7.3	7.4	458	480	208	248	27.9	129																	
SW09	30/12/2022 14:30*	7.8	7.7	541	529	5	292	26.8	8				0.005		1.7											
SW12	8/01/2022 13:45*	6.6	6.4	94	102	46	311	26.4	175				0.01		4.9											
SW12	25/01/2022 14:00	7.3	7.4	533	527	9	336	21.0	20	0.92	0.002	0.001	0.005	0.002	2.02	0.192	0.001	0.01	0.0001	0.001	0.003	0.017	0.154	6.72	1	0.03
SW12	8/02/2022 12:10	7.3	7.3	448	482	6	329	24.6	21																	
SW12	2/03/2022 14:40	7.2	7.3	384	378	10	286	24.3	23																	
SW12	7/03/2022 13:10*	7.2	7.1	646	622	29	448	21.5	68				0.006		4.0											
SW12	5/04/2022 14:40	8.4	8.2	614	813	5	486	22.6	16																	
SW12	28/04/2022 11:50*	7.6	6.6	71	98	82	311	16.5	225				0.008		6.0											
SW12	3/05/2022 11:10	7.5	7.4	685	712	10	477	15.4	23																	
SW12	1/06/2022 12:00	7.6	7.0	245	267	14	264	9.6	56	3.07	0.001	0.003	0.006	0.002	2.66	0.042	0.001	0.01	0.0001	0.002	0.003	0.02	0.061	9.37	0.4	0.04
SW12	2/07/2022 11:00*	7.6	6.8	156	136	48	205	10.0	111				0.008		3.4											
SW12	4/07/2022 12:50*	6.8	6.6	56	73	88	148	12.8	152				0.01		3.5											
SW12	5/07/2022 16:00	7.4	6.7	73	75	118	205	12.6	141																	
SW12	5/08/2022 12:40*	7.5	6.8	101	133	68	188	15.3	163				0.007		2.6											
SW12	9/08/2022 10:30	7.9	7.6	414	440	5	295	16.4	26																	
SW12	6/09/2022 11:30	8.1	7.9	517	539	9	361	13.9	17																	
SW12	16/09/2022 12:40*	7.5	6.8	81	105	66	178	15.0	100				0.007		3.2											

SW12	5/10/2022 16:00	7.7	7.7	426	440	14	286	14.6	15																	
SW12	9/10/2022 12:20*	6.8	6.9	72	95	41	167	19.6	83				0.005		2.1											
SW12	21/10/2022 15:20*	7.7	6.8	98	95	47	149	21.3	110				0.007		4.0											
SW12	8/11/2022 12:20	8.0	7.5	214	311	23	202	18.7	38																	
SW12	14/11/2022 13:20*	7.3	6.9	91	113	100	186	20.1	109				0.008		3.6											
SW12	6/12/2022 12:50	7.8	7.9	1240	1270	16	702	23.2	12																	
SW12	30/12/2022 13:15*	7.5	7.4	900	898	64	598	25.3	47				0.005		1.2											
SW15	8/01/2022 11:10*	6.5	6.4	87	100	24	137	2393.0	41				0.005		5.4											
SW15	25/01/2022 10:30	6.7	6.4	197	183	30	180	20.2	27	0.08	0.001	0.001	0.005	0.005	12.3	1.14	0.002	0.01	0.0001	0.001	0.001	0.053	0.069	1.89	1.1	0.06
SW15	7/03/2022 10:40*	6.2	6.1	70	83	9	80	22.4	29				0.005		3.1											
SW15	28/04/2022 12:20*	7.1	6.6	112	147	22	150	16.2	57				0.005		5.7											
SW15	3/05/2022 14:00	7.7	6.6	100	131	26	90	18.7	31																	
SW15	1/06/2022 11:20	7.3	6.7	113	145	11	127	9.4	17	0.51	0.001	0.001	0.005	0.002	2.66	0.026	0.001	0.01	0.0001	0.001	0.001	0.013	0.019	8.17	0.2	0.02
SW15	2/07/2022 14:15*	7.4	6.6	122	149	79	106	10.6	40				0.005		2.7											
SW15	4/07/2022 10:35*	6.5	6.2	60	73	10	96	11.4	27				0.005		1.6											
SW15	5/07/2022 11:50	6.5	6.2	73	91	5	150	11.9	28																	
SW15	5/08/2022 14:00*	7.2	6.0	74	101	5	139	14.9	30				0.005		1.7											
SW15	9/08/2022 13:50	7.8	6.4	118	122	5	100	12.6	17																	
SW15	6/09/2022 13:40	7.3	6.5	103	131	5	126	13.7	14																	
SW15	16/09/2022 10:50*	6.8	5.9	66	97	13	156	14.1	19				0.005		2.1											
SW15	5/10/2022 13:00	7.5	6.5	120	125	5	143	13.9	13																	
SW15	9/10/2022 13:20*	6.5	6.1	84	101	8	164	19.6	21				0.005		3.5											
SW15	21/10/2022 15:40*	6.3	6.0	86	83	26	144	23.8	29				0.005		3.7											
SW15	9/11/2022 10:50	7.5	6.6	103	125	5	178	22.9	10																	
SW15	14/11/2022 11:50*	6.5	6.3	72	94	40	152	21.2	38				0.005		5.3											
SW15	7/12/2022 10:10	6.5	6.4	102	123	15	78	18.0	29																	
SW15	30/12/2022 11:00*	6.9	6.6	124	118	12	146	22.6	24				0.005		5.7											
SW16	8/01/2022 11:30*	6.7	6.6	119	133	44	162	23.8	142				0.01		6.9											
SW16	25/01/2022 10:40	6.8	6.8	189	200	10	159	20.8	9	0.08	0.001	0.001	0.005	0.007	4.38	0.573	0.001	0.01	0.0001	0.001	0.001	0.039	0.07	5.51	0.7	0.01
SW16	7/03/2022 10:50*	6.7	6.5	86	98	21	145	22.2	50				0.009		3.9											

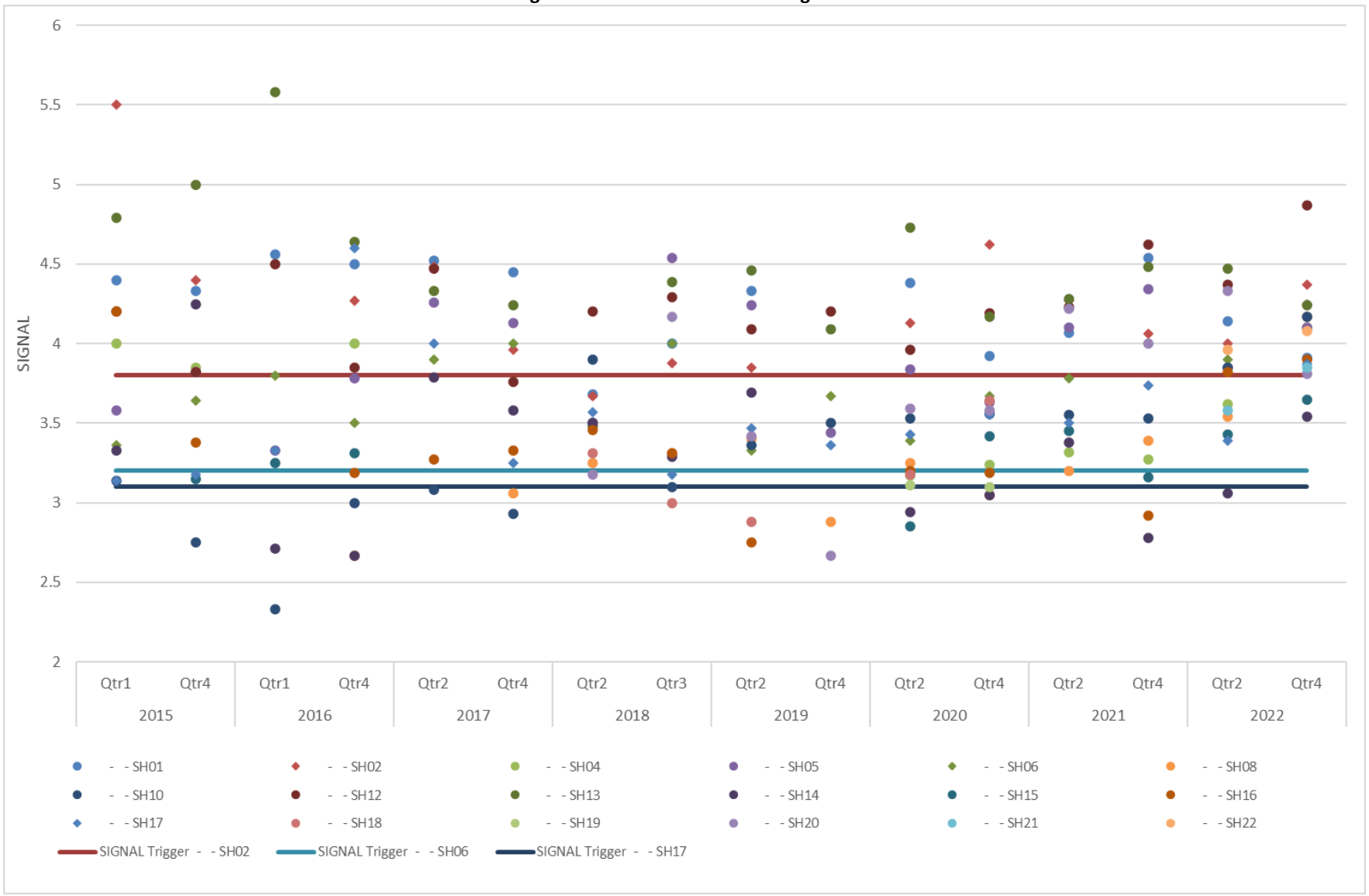
SW16	28/04/2022 12:30*	7.1	6.9	139	177	22	174	16.7	69				0.005		3.5										
SW16	3/05/2022 14:10	7.3	6.8	99	134	5	90	16.6	15																
SW16	1/06/2022 11:30	7.2	7.2	160	202	5	298	9.4	11	0.3	0.001	0.001	0.005	0.002	2.17	0.034	0.001	0.01	0.0001	0.001	0.001	0.016	0.043	9.89	0.1	0.03
SW16	2/07/2022 14:30*	7.3	7.2	220	252	8	152	10.6	13				0.005		1.7										
SW16	4/07/2022 10:45*	6.5	6.4	63	80	18	93	11.0	46				0.005		1.7										
SW16	5/07/2022 12:00	6.5	6.3	82	99	6	155	11.7	43																
SW16	5/08/2022 14:10*	7.3	6.2	70	100	5	141	14.6	35				0.005		1.7										
SW16	9/08/2022 14:00	7.4	6.6	118	128	5	99	11.1	22																
SW16	6/09/2022 13:50	7.0	6.7	105	136	5	140	14.0	16																
SW16	16/09/2022 11:00*	6.5	6.2	65	97	15	168	13.7	31				0.005		2.3										
SW16	5/10/2022 13:50	7.2	6.8	123	134	5	146	13.0	16																
SW16	9/10/2022 13:40*	6.5	6.3	79	101	11	163	19.7	31				0.005		3.0										
SW16	21/10/2022 15:50*	6.7	6.2	89	84	34	144	23.7	46				0.006		3.4										
SW16	9/11/2022 11:40	7.2	6.7	97	127	5	173	21.5	14																
SW16	14/11/2022 12:10*	7.0	6.9	67	93	28	138	20.5	72				0.007		3.3										
SW16	7/12/2022 11:00	8.0	7.9	1762	1760	5	1030	20.1	2																
SW16	30/12/2022 11:20*	8.1	8.1	2007	1970	5	1380	24.2	1				0.005		0.2										
SW17	8/01/2022 12:00*	6.4	6.3	176	187	30	220	28.3	143				0.024		5.7										
SW17	7/03/2022 11:20*	6.3	6.2	175	183	27	345	22.5	153				0.042		7.2										
SW17	28/04/2022 12:50*	7.0	6.5	140	192	28	391	16.8	229				0.032		6.3										
SW17	3/05/2022 14:30	6.4	6.4	198	324	6	265	18.7	48																
SW17	1/06/2022 10:50	7.0	6.3	313	342	6	263	9.3	22	1.17	0.002	0.001	0.017	0.013	1.5	0.089	0.001	0.01	0.0001	0.002	0.002	0.009	0.047	10.1	0.2	0.02
SW17	2/07/2022 15:00*	6.8	6.3	247	275	21	188	10.9	35				0.017		1.8										
SW17	4/07/2022 12:20*	7.0	7.2	175	196	94	120	13.8	139				0.021		3.0										
SW17	5/07/2022 11:00	7.3	7.1	172	189	69	227	11.7	115																
SW17	5/08/2022 16:10*	7.3	6.6	158	186	12	168	14.7	57				0.02		1.3										
SW17	9/08/2022 14:30	7.3	6.9	152	156	174	190	13.3	239																
SW17	6/09/2022 14:20	7.1	7.0	253	275	5	194	16.2	23																
SW17	16/09/2022 11:30*	6.8	6.8	97	124	53	140	15.5	57				0.019		1.7										
SW17	5/10/2022 15:30	7.2	7.0	207	229	6	189	14.4	56																

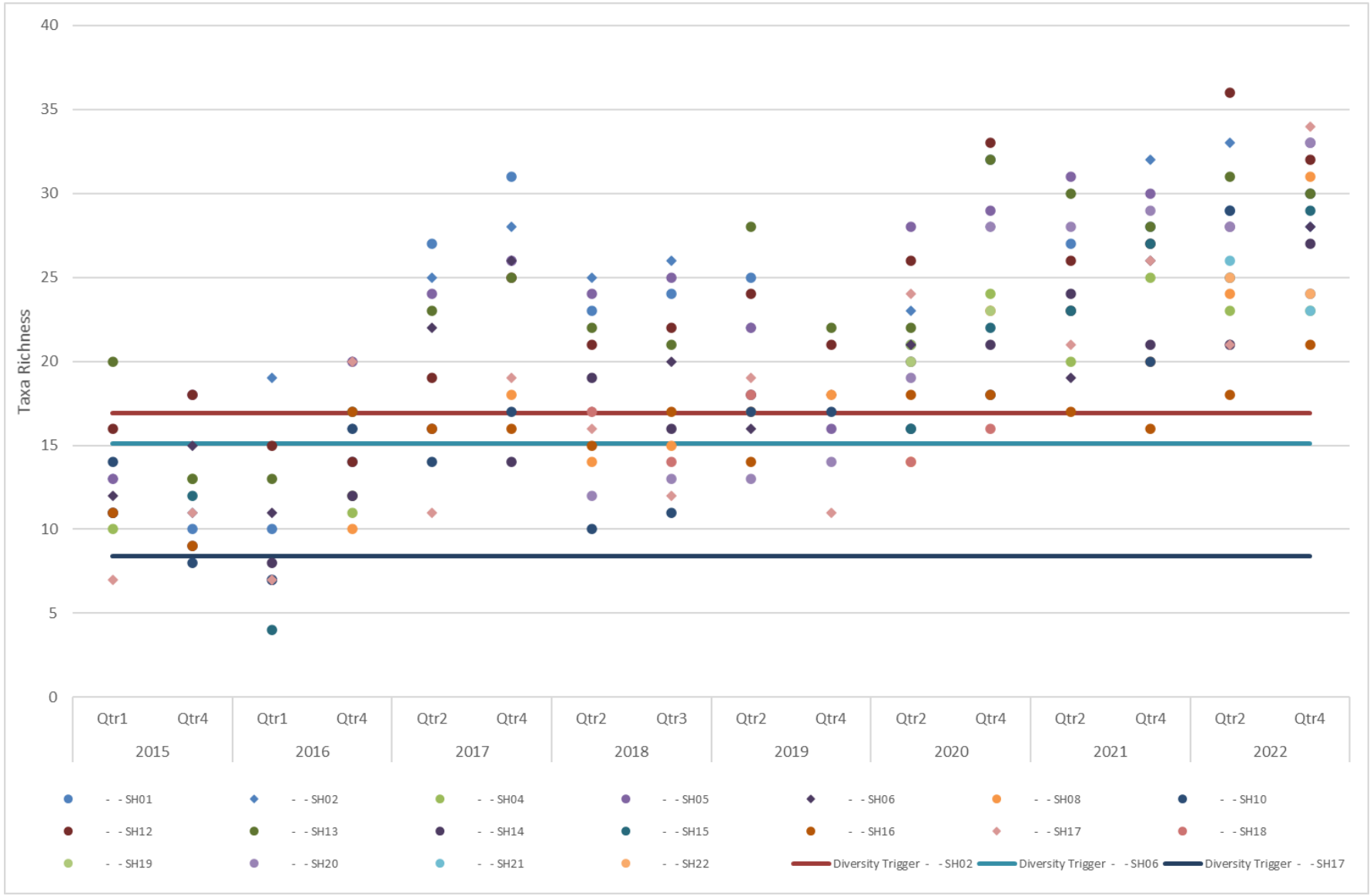
SW17	9/10/2022 14:10*	6.8	7.1	105	129	101	159	19.6	112				0.015		1.6										
SW17	21/10/2022 17:00*	6.8	6.9	150	140	41	117	23.0	42				0.013		1.2										
SW17	9/11/2022 12:20	7.3	7.3	220	241	5	136	23.2	18																
SW17	14/11/2022 12:40*	6.9	7.0	79	102	128	118	22.5	99				0.014		2.7										
SW18	8/01/2022 11:45*	6.6	6.5	137	145	46	112	25.2	164				0.016		6.2										
SW18	7/03/2022 11:10*	6.3	6.2	105	116	19	142	22.7	68				0.039		3.7										
SW18	28/04/2022 12:40*	7.0	6.9	1945	231	11	180	16.6	53				0.008		2.4										
SW18	3/05/2022 14:20	7.0	6.8	158	194	5	138	17.8	21																
SW18	1/06/2022 10:40	7.5	6.7	214	254	7	182	9.1	26	1.12	0.001	0.001	0.008	0.007	2	0.013	0.001	0.01	0.0001	0.002	0.001	0.016	0.05	9.08	0.2	0.02
SW18	2/07/2022 14:45*	7.0	6.8	200	228	18	145	10.5	46				0.009		2.7										
SW18	4/07/2022 12:00*	6.8	6.7	95	114	50	95	13.6	76				0.011		2.1										
SW18	5/07/2022 11:15	6.9	6.7	122	138	20	191	11.6	72																
SW18	5/08/2022 14:40*	6.4	6.2	85	117	5	141	15.6	44				0.009		1.3										
SW18	9/08/2022 14:10	7.2	6.8	132	159	100	171	13.8	262																
SW18	6/09/2022 14:00	6.8	6.7	149	178	6	150	15.4	22																
SW18	16/09/2022 11:20*	6.5	6.2	72	102	22	153	14.0	34				0.008		2.2										
SW18	5/10/2022 14:30	7.1	6.8	167	182	5	157	14.6	39																
SW18	9/10/2022 14:00*	6.8	6.7	101	122	29	109	19.0	68				0.01		2.3										
SW18	21/10/2022 16:50*	6.4	6.2	108	100	30	137	22.9	45				0.009		2.8										
SW18	9/11/2022 12:00	7.2	6.9	124	148	5	176	22.6	17																
SW18	14/11/2022 12:30*	6.7	6.6	77	100	55	138	21.5	63				0.009		3.7										
SW18	7/12/2022 11:20	8.0	8.0	1712	1740	5	1030	20.7	2																
SW18	30/12/2022 11:50*	8.3	8.4	1975	1990	5	1350	27.1	2				0.005		0.3										
SW22	5/08/2022 11:00*	7.0	7.2	236	263	72	217	13.7	124				0.013		2.7										
SW22	9/08/2022 12:10	7.5	7.8	454	475	5	280	12.4	19																
SW22	6/09/2022 10:00	8.0	7.9	544	585	5	320	11.7	9																
SW22	16/09/2022 10:00*	7.1	7.4	237	272	91	160	13.8	130				0.009		2.9										
SW22	5/10/2022 12:00	8.1	7.9	526	548	5	334	14.2	10																
SW22	9/10/2022 10:20*	7.5	7.3	212	234	49	173	14.7	78				0.008		2.4										
SW22	21/10/2022 10:40*	7.5	7.1	168	195	121	213	18.2	171				0.014		4.4										

SW22	8/11/2022 10:40	7.9	7.8	375	416	8	246	20.3	19																		
SW22	14/11/2022 10:50*	7.6	7.3	219	240	165	218	18.9	153				0.011		4.5												
SW22	6/12/2022 11:10	8.0	8.0	1001	1000	5	526	21.8	3																		
SW22	30/12/2022 10:10*	7.9	7.8	1346	1320	16	864	23.7	14				0.005		0.9												
SW23	5/08/2022 9:30*	6.0	5.9	78	93	5	111	13.2	8				0.005		1.0												
SW23	9/08/2022 11:20	7.6	6.1	98	106	5	93	12.3	4																		
SW23	16/09/2022 10:10*	6.8	5.9	58	87	5	108	14.6	7				0.005		1.4												
SW23	9/10/2022 10:30*	6.9	6.0	58	84	5	140	14.2	10				0.005		1.7												
SW23	21/10/2022 11:00*	6.2	5.9	49	70	9	132	18.0	19				0.005		2.0												
SW23	8/11/2022 10:55	7.6	6.8	65	91	82	100	18.7	31																		
SW23	14/11/2022 11:10*	6.5	6.1	59	83	5	144	19.4	8				0.005		3.1												
SW24	5/08/2022 10:30*	6.2	5.6	78	105	5	110	12.8	13				0.005		1.5												
SW24	9/08/2022 11:50	7.6	6.1	82	88	5	70	13.3	5																		
SW24	6/09/2022 8:50	7.4	6.1	67	99	5	90	9.8	4																		
SW24	16/09/2022 9:10*	6.1	5.4	83	109	20	170	12.3	18				0.005		2.7												
SW24	5/10/2022 10:40	7.8	6.2	78	83	5	76	13.4	8																		
SW24	9/10/2022 9:20*	6.3	5.5	73	99	12	198	13.1	14				0.005		4.0												
SW24	21/10/2022 9:40*	6.1	6.0	54	78	38	142	16.8	27				0.005		4.5												
SW24	8/11/2022 9:20	7.0	6.0	71	99	9	160	16.1	7																		
SW24	14/11/2022 9:30*	6.4	5.6	73	96	50	195	18.2	21				0.005		6.4												
SW24	6/12/2022 10:00	7.4	6.7	52	68	44	58	20.8	13																		

Notes:
Sampling events where location were too low to sample have not been included.
* Dates are from Rainfall Events.

Figure 3-e Stream Health Trending data




Taxa Richness
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- - SH12
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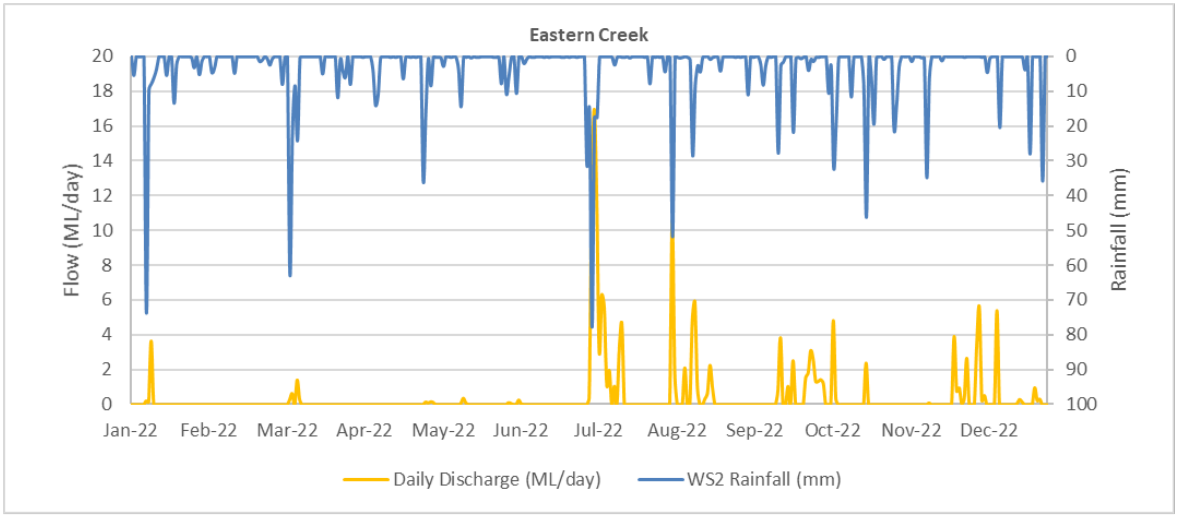
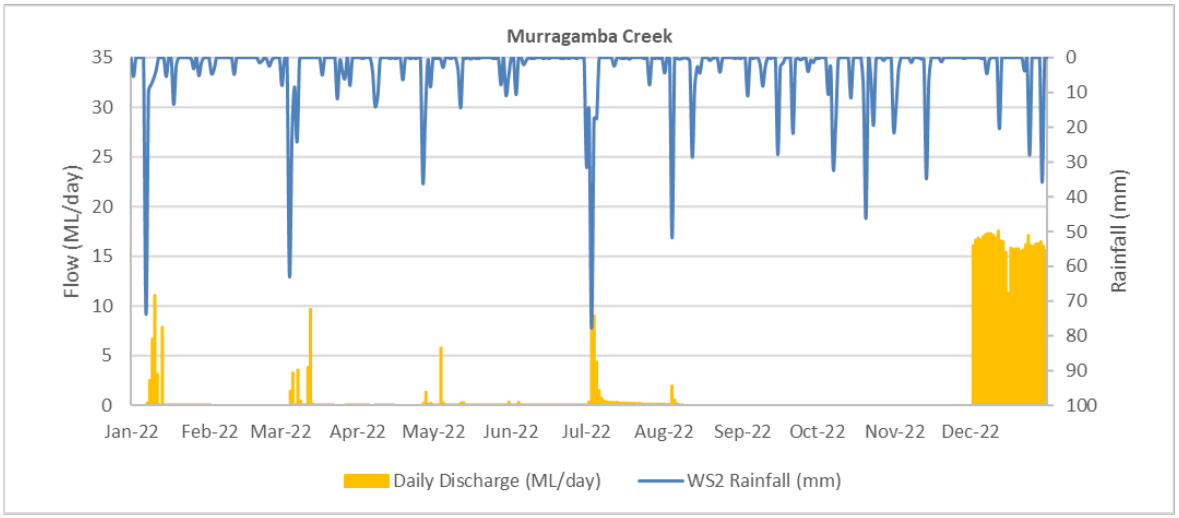
- - SH14
- - SH15
- - SH16
- - SH17
- - SH18
- - SH19
- - SH20
- - SH21
- - SH22
Diversity Trigger - - SH02
Diversity Trigger - - SH06
Diversity Trigger - - SH17

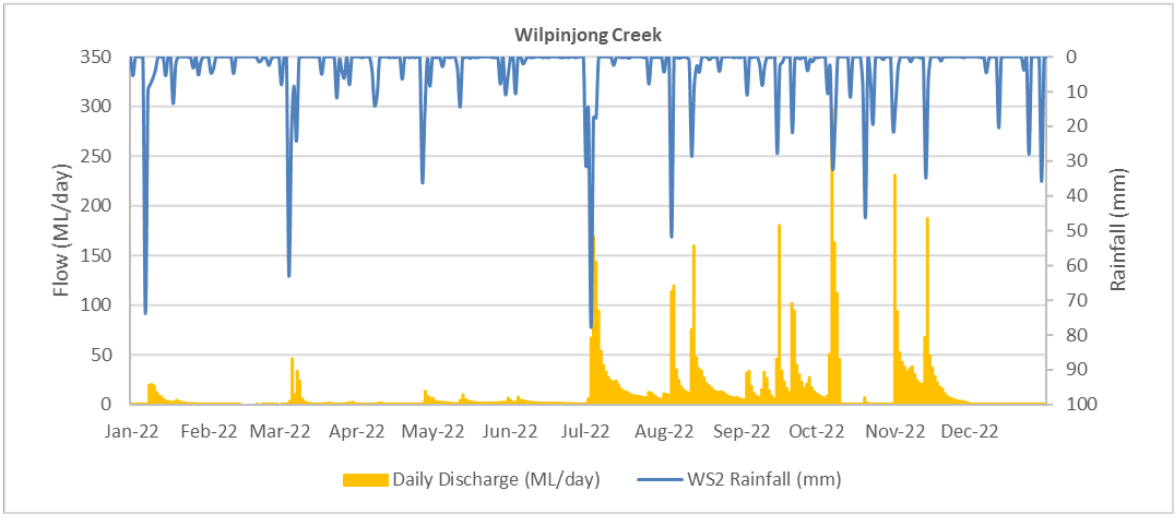
Table 6: Effluent Discharge Quality

Sample Location	Sample Date	Biological Oxygen Demand (mg/L)	Total Nitrogen (mg/L)	Oil & Grease (mg/L)	Total Phosphorus (mg/L)	pH	Total Suspended Solids (mg/L)
OC Effluent Tank	9/02/2022	48	0.02	<5	12.2	7.9	28
OC Effluent Tank	25/05/2022	30	1.11	<5	9.38	7.8	58
OC Effluent Tank	30/08/2022	55	0.05	12	7.18	7.7	62
OC Effluent Tank	30/11/22	59	7	<5	0.54	7.8	36
Admin Effluent	9/02/2022	28	0.12	<5	29.1	7.7	9
Admin Effluent	25/05/2022	14	2.65	<5	14.4	8	45
Admin Effluent	30/08/2022	4	43.1	<5	25.1	6.3	25
Admin Effluent	30/11/2022	13	27.3	<5	27.6	7.4	44
CHPP Effluent	9/02/2022	20	0.1	<5	0.3	7.1	40
CHPP Effluent	25/05/2022	3	0.11	<5	0.47	7.4	47
CHPP Effluent	30/08/2022	16	0.12	9	0.49	7.1	50
CHPP Effluent	30/11/2023	18	51.8	<5	7.3	7.1	22
UG Effluent Tank	9/02/2022	69	0.06	<5	0.36	7	22
UG Effluent Tank	25/05/2022	92	0.06	<5	0.25	7.1	162
UG Effluent Tank	30/08/2022	103	0.77	15	3.32	7.1	63
UG Effluent Tank	09/12/2023	32	22.2	<5	8.4	7.4	62

Figure 3-f 2022 Stream Flow and rainfall







Note: Murragamba Creek flow monitor sensor failure caused data loses during the period August to December 2022. December flows in Murragamaba Creek representative of the EPA54 licensed emergency discharge.

Table 7: LDP01 Discharge Quality

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
1/01/2022	8.8	313	7.5	0.00										
2/01/2022	8.8	319	7.5	0.00										
3/01/2022	7.0	311	7.5	0.00										
4/01/2022	9.0	314	7.5	0.00	<2	<1	0.005	0.0089	0.0022	0.001	<0.0005	<0.0001	<0.0002	<0.0001
5/01/2022	8.5	322	7.5	0.00										
6/01/2022	8.0	324	7.5	0.00										
7/01/2022	7.5	323	7.5	0.01										
8/01/2022	7.5	310	7.4	0.09										
9/01/2022	7.7	300	7.4	0.00										
10/01/2022	7.4	303	7.4	0.00	<2	<1								
11/01/2022	8.5	312	7.4	0.00										
12/01/2022	9.4	313	7.4	0.00										
13/01/2022	9.5	312	7.4	0.00										
14/01/2022	9.1	310	7.4	0.00										
15/01/2022	7.5	315	7.3	0.00										
16/01/2022	6.6	314	7.2	0.03										
17/01/2022	7.5	308	7.3	0.00	<2	<1								
18/01/2022	8.5	305	7.3	0.00										
19/01/2022	7.6	303	7.4	0.00										
20/01/2022	7.9	293	7.4	0.00										
21/01/2022	8.3	304	7.4	0.00										
22/01/2022	8.4	317	7.4	0.00										
23/01/2022	8.5	320	7.4	0.00										
24/01/2022	7.0	328	7.4	0.00	<2	<1								
25/01/2022	7.1	328	7.4	0.00										
26/01/2022	7.5	328	7.4	0.00										
27/01/2022	6.0	319	7.4	0.03										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
28/01/2022	8.2	306	7.3	0.00										
29/01/2022	8.3	308	7.3	0.00										
30/01/2022	8.5	314	7.3	0.00										
31/01/2022	8.5	325	7.3	0.00	<2	<1								
1/02/2022	8.3	325	7.3	0.00										
2/02/2022	8.1	321	7.3	0.00										
3/02/2022	6.9	318	7.3	0.00										
4/02/2022	7.3	314	7.3	0.00										
5/02/2022	7.1	309	7.3	0.00										
6/02/2022	7.3	304	7.3	0.00										
7/02/2022	7.7	307	7.3	0.04	<2	<1	0.005	0.0188	0.0019	0.002	<0.0005	<0.0001	<0.0002	<0.0001
8/02/2022	9.0	313	7.3	0.00										
9/02/2022	8.2	315	7.3	0.00										
10/02/2022	8.0	331	7.3	0.00										
11/02/2022	5.8	316	7.4	0.01										
12/02/2022	6.3	313	7.4	0.00										
13/02/2022	4.5	253	7.3	0.00										
14/02/2022	6.6	288	7.3	0.00	<2	<1								
15/02/2022	7.6	310	7.3	0.00										
16/02/2022	6.0	307	7.3	0.00										
17/02/2022	6.5	300	7.2	0.20										
18/02/2022	6.6	301	7.2	0.06										
19/02/2022	7.0	308	7.2	0.01										
20/02/2022	6.4	307	7.3	0.00										
21/02/2022	6.4	287	7.2	0.00	<2	<1								
22/02/2022	5.4	293	7.3	0.00										
23/02/2022	5.8	277	7.3	0.00										
24/02/2022	5.6	266	7.2	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
25/02/2022	5.8	253	7.2	0.00										
26/02/2022	5.1	284	7.2	0.00										
27/02/2022	4.3	284	7.2	0.00										
28/02/2022	5.0	274	7.2	0.01	<2	<1								
1/03/2022	5.3	287	7.2	0.01										
2/03/2022	4.5	312	7.2	0.01										
3/03/2022	3.9	286	7.2	0.22										
4/03/2022	5.2	296	7.2	0.02										
5/03/2022	4.8	292	7.2	0.02										
6/03/2022	5.4	282	7.2	0.00										
7/03/2022	5.3	273	7.2	0.00										
8/03/2022	7.7	297	7.2	0.00	<2	<1	0.005	0.0108	0.0014	0.002	<0.0005	<0.0001	<0.0002	<0.0001
9/03/2022	6.4	254	7.1	0.00										
10/03/2022	5.0	272	7.3	0.00										
11/03/2022	5.9	273	7.3	0.00										
12/03/2022	6.6	302	7.3	0.00										
13/03/2022	6.2	302	7.2	0.03										
14/03/2022	6.1	298	7.3	0.00	<2	<1								
15/03/2022	5.7	287	7.3	0.00										
16/03/2022	6.3	289	7.3	0.00										
17/03/2022	5.2	300	7.3	0.09										
18/03/2022	4.5	312	7.3	0.03										
19/03/2022	5.9	306	7.3	0.00										
20/03/2022	5.4	303	7.3	0.01										
21/03/2022	3.7	312	7.3	0.01	<2	<1								
22/03/2022	5.2	276	7.3	0.23										
23/03/2022	4.2	300	7.3	0.00										
24/03/2022	4.4	279	7.3	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
25/03/2022	4.4	276	7.3	0.01										
26/03/2022	4.5	273	7.3	0.00										
27/03/2022	4.4	268	7.3	0.03										
28/03/2022	3.7	281	7.2	0.00	<2	<1								
29/03/2022	2.4	274	7.2	0.00										
30/03/2022	1.6	288	7.2	0.00										
31/03/2022	2.8	267	7.3	0.02										
1/04/2022	2.9	246	7.2	0.01										
2/04/2022	3.6	264	7.3	0.00										
3/04/2022	4.0	251	7.2	0.00										
4/04/2022	3.9	282	7.2	0.00	<2	<1	0.005	0.0141	0.0011	0.008	<0.0005	<0.0001	<0.0002	<0.0001
5/04/2022	3.6	269	7.2	0.00										
6/04/2022	4.3	299	7.2	0.00										
7/04/2022	3.6	323	7.3	0.00										
8/04/2022	3.9	293	7.3	0.00										
9/04/2022	3.3	267	7.3	0.00										
10/04/2022	3.0	300	7.3	0.00										
11/04/2022	2.8	297	7.3	0.00	<2	<1								
12/04/2022	3.4	283	7.2	0.00										
13/04/2022	2.1	297	7.4	0.00										
14/04/2022	2.4	269	7.2	0.00										
15/04/2022	2.8	277	7.4	0.00										
16/04/2022	1.9	292	7.1	0.00										
17/04/2022	4.1	278	7.1	0.00										
18/04/2022	3.5	283	7.0	0.00										
19/04/2022	3.6	303	7.1	0.00	<2	<1								
20/04/2022	3.6	264	7.2	0.00										
21/04/2022	3.2	286	7.3	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
22/04/2022	2.7	282	7.4	0.00										
23/04/2022	3.1	259	7.3	0.00										
24/04/2022	3.6	275	7.4	0.00										
25/04/2022	2.4	301	7.4	0.00										
26/04/2022	2.3	262	7.4	0.00	<2	1								
27/04/2022	3.1	280	7.3	0.00										
28/04/2022	2.3	291	7.2	0.00										
29/04/2022	2.4	288	7.2	0.00										
30/04/2022	5.2	274	7.1	0.00										
1/05/2022	5.0	255	7.1	0.00										
2/05/2022	4.0	258	7.2	0.00	<2	<1	0.005	0.0098	0.0006	0.003	<0.0005	<0.0001	<0.0002	<0.0001
3/05/2022	3.0	298	7.2	0.00										
4/05/2022	2.5	280	7.2	0.00										
5/05/2022	3.3	251	7.1	0.00										
6/05/2022	3.1	283	7.2	0.00										
7/05/2022	4.2	291	7.3	0.00										
8/05/2022	3.9	277	7.2	0.00										
9/05/2022	2.3	258	7.2	0.00	<2	<1								
10/05/2022	1.9	306	7.3	0.00										
11/05/2022	2.3	280	7.3	0.00										
12/05/2022	1.7	302	7.3	0.00										
13/05/2022	3.6	269	7.2	0.00										
14/05/2022	4.1	261	7.0	0.00										
15/05/2022	5.3	255	7.0	0.00										
16/05/2022	4.4	277	7.1	0.00	<2	<1								
17/05/2022	3.0	298	7.2	0.00										
18/05/2022	1.9	261	7.2	0.00										
19/05/2022	3.2	291	7.2	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
20/05/2022	2.4	293	7.2	0.00										
21/05/2022	3.4	247	7.2	0.00										
22/05/2022	3.0	240	7.1	0.00										
23/05/2022	3.2	267	7.2	0.00	<2	<1								
24/05/2022	1.8	317	7.2	0.00										
25/05/2022	2.3	296	7.2	0.00										
26/05/2022	2.4	301	7.2	0.00										
27/05/2022	1.9	294	7.2	0.00										
28/05/2022	2.2	218	7.2	0.00										
29/05/2022	3.4	211	7.3	0.00										
30/05/2022	2.4	203	7.3	0.00	<2	<1								
31/05/2022	1.7	225	7.4	0.00										
1/06/2022	3.0	234	7.4	0.00										
2/06/2022	2.3	217	7.2	0.00										
3/06/2022	2.7	208	7.2	0.00										
4/06/2022	3.8	203	7.1	0.00										
5/06/2022	3.5	195	7.1	0.00										
6/06/2022	3.6	223	7.2	0.00	<2	<1	0.005	0.0405	0.0007	0.003	<0.0005	<0.0001	<0.0002	<0.0001
7/06/2022	2.7	252	7.2	0.00										
8/06/2022	2.7	264	7.2	0.00										
9/06/2022	2.3	270	7.3	0.00										
10/06/2022	3.2	254	7.2	0.00										
11/06/2022	3.1	214	7.2	0.00										
12/06/2022	4.7	212	7.0	0.00										
13/06/2022	3.1	222	7.1	0.01										
14/06/2022	1.2	271	7.2	0.03	<2	<1								
15/06/2022	2.9	264	7.2	0.00										
16/06/2022	2.0	283	7.5	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
17/06/2022	3.3	276	7.5	0.00										
18/06/2022	3.2	265	7.5	0.00										
19/06/2022	2.0	213	7.4	0.00										
20/06/2022	3.1	266	7.4	0.00	<2	<1								
21/06/2022	2.2	269	7.2	0.02										
22/06/2022	2.4	258	7.1	0.00										
23/06/2022	4.4	268	7.2	0.00										
24/06/2022	3.7	286	7.2	0.00										
25/06/2022	2.9	281	7.2	0.00										
26/06/2022	3.2	282	7.2	0.00										
27/06/2022	0.5	279	7.1	0.00										
28/06/2022	1.4	264	7.2	0.00										
29/06/2022	1.3	277	7.2	0.00										
30/06/2022	1.5	273	7.3	0.00	<2	<1								
1/07/2022	1.2	262	7.3	0.00										
2/07/2022	2.3	231	7.1	0.00										
3/07/2022	2.5	228	7.1	0.00										
4/07/2022	2.7	216	7.1	0.00										
5/07/2022	3.0	227	7.2	0.00										
6/07/2022	2.4	232	7.2	0.00	<2	<1	0.005	0.0193	<0.0005	0.002	<0.0005	<0.0001	<0.0002	<0.0001
7/07/2022	1.4	209	7.1	0.00										
8/07/2022	1.1	196	7.2	0.00										
9/07/2022	1.7	222	7.2	0.00										
10/07/2022	4.2	219	7.1	0.00										
11/07/2022	2.9	242	7.2	0.00	<2	<1								
12/07/2022	2.0	253	7.2	0.00										
13/07/2022	2.2	298	7.3	0.00										
14/07/2022	0.6	297	7.3	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
15/07/2022	2.4	261	7.2	0.00										
16/07/2022	2.2	251	7.2	0.00										
17/07/2022	3.7	208	7.1	0.00										
18/07/2022	3.9	241	7.1	0.01	<2	<1								
19/07/2022	1.2	277	7.2	0.00										
20/07/2022	2.0	253	7.2	0.00										
21/07/2022	1.3	293	7.2	0.00										
22/07/2022	1.8	258	7.2	0.03										
23/07/2022	3.3	227	7.1	0.02										
24/07/2022	2.5	235	7.1	0.00										
25/07/2022	3.0	240	7.0	0.00	<2	<1								
26/07/2022	2.9	262	7.1	0.03										
27/07/2022	1.9	282	7.2	0.05										
28/07/2022	2.4	269	7.2	0.00										
29/07/2022	2.6	275	7.2	0.00										
30/07/2022	1.6	294	7.2	0.00										
31/07/2022	0.8	295	7.2	0.00										
1/08/2022	1.0	289	7.2	0.05	<2	<1	0.005	0.0349	0.0007	0.006	<0.0005	<0.0001	<0.0002	<0.0001
2/08/2022	0.1	275	7.2	0.00										
3/08/2022	1.1	276	7.3	0.00										
4/08/2022	1.4	265	7.2	0.00										
5/08/2022	1.3	260	7.3	0.00										
6/08/2022	2.7	236	7.2	0.02										
7/08/2022	1.9	246	7.3	0.00										
8/08/2022	1.4	245	7.3	0.03	4	<1								
9/08/2022	1.7	259	7.3	0.03										
10/08/2022	1.1	249	7.3	0.00										
11/08/2022	1.5	221	7.1	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
12/08/2022	4.4	221	6.9	0.00										
13/08/2022	5.3	208	6.8	0.00										
14/08/2022	6.1	202	6.9	0.00										
15/08/2022	6.5	199	6.9	0.07	<2	<1								
16/08/2022	8.7	193	6.9	0.03										
17/08/2022	8.2	226	6.9	0.00										
18/08/2022	7.8	252	6.9	0.00										
19/08/2022	7.4	257	7.0	0.00										
20/08/2022	8.3	256	6.9	0.00										
21/08/2022	8.4	258	6.9	0.00										
22/08/2022	7.8	257	7.0	0.00	<2	<1								
23/08/2022	5.5	261	6.9	0.00										
24/08/2022	8.1	259	7.0	0.00										
25/08/2022	7.4	265	7.0	0.00										
26/08/2022	8.6	265	6.9	0.00										
27/08/2022	8.2	273	6.9	0.00										
28/08/2022	8.3	279	6.9	0.00										
29/08/2022	8.1	270	6.8	0.00	<2	<1								
30/08/2022	7.2	282	6.9	0.02										
31/08/2022	8.5	282	6.7	0.00										
1/09/2022	8.6	286	6.7	0.00										
2/09/2022	8.4	285	6.8	0.00										
3/09/2022	8.5	280	6.8	0.00										
4/09/2022	6.6	284	6.9	0.15										
5/09/2022	6.3	290	6.9	0.46	<2	<1	0.005	0.0634	0.0018	0.006	<0.0005	<0.0001	<0.0002	<0.0001
6/09/2022	9.4	273	6.7	0.00										
7/09/2022	8.9	269	6.7	0.00										
8/09/2022	7.7	263	6.7	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
9/09/2022	6.7	295	6.9	0.00										
10/09/2022	7.8	255	6.9	0.00										
11/09/2022	9.0	254	6.8	0.00										
12/09/2022	7.8	257	6.8	0.00	<2	<1								
13/09/2022	8.3	263	6.8	0.00										
14/09/2022	8.1	265	6.8	0.00										
15/09/2022	8.7	262	6.8	0.00										
16/09/2022	9.4	263	6.8	0.00										
17/09/2022	9.7	267	6.8	0.00										
18/09/2022	9.2	267	6.8	0.00										
19/09/2022	9.4	288	6.9	0.00	<2	<1								
20/09/2022	8.1	277	7.0	0.00										
21/09/2022	8.1	268	7.0	0.00										
22/09/2022	9.7	252	6.9	0.00										
23/09/2022	8.9	256	6.9	0.00										
24/09/2022	9.6	273	7.0	0.00										
25/09/2022	8.9	267	7.0	0.00										
26/09/2022	9.1	273	7.1	0.00	<2	<1								
27/09/2022	9.2	286	7.1	0.00										
28/09/2022	8.6	290	7.1	0.00										
29/09/2022	2.8	289	7.1	0.00										
30/09/2022	5.5	286	7.2	0.00										
1/10/2022	9.9	275	7.1	0.00										
2/10/2022	9.9	281	7.1	0.00										
3/10/2022	9.2	293	7.1	0.00										
4/10/2022	6.6	305	7.1	0.03	<2	<1	0.005	<0.0005	0.0029	0.001	<0.0005	<0.0001	<0.0002	<0.0001
5/10/2022	7.7	304	7.2	0.00										
6/10/2022	9.3	296	7.2	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
7/10/2022	9.3	298	7.2	0.00										
8/10/2022	9.1	297	7.2	0.00										
9/10/2022	8.4	304	7.2	0.00										
10/10/2022	8.6	314	7.3	0.00	3	<1								
11/10/2022	4.0	321	7.3	0.00										
12/10/2022	0.0													
13/10/2022	0.0													
14/10/2022	0.0													
15/10/2022	0.0													
16/10/2022	0.0													
17/10/2022	0.0													
18/10/2022	0.0													
19/10/2022	0.0													
20/10/2022	0.0													
21/10/2022	3.8	257	7.2	0.00										
22/10/2022	8.1	252	7.2	0.00	3	<1								
23/10/2022	8.3	254	7.2	0.00										
24/10/2022	5.1	210	7.2	0.00										
25/10/2022	1.7	145	7.1	0.00										
26/10/2022	0.0													
27/10/2022	0.0													
28/10/2022	0.0													
29/10/2022	0.0													
30/10/2022	0.0													
31/10/2022	0.0													
1/11/2022	0.0													
2/11/2022	0.0													
3/11/2022	0.0													

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
4/11/2022	0.0													
5/11/2022	0.0													
6/11/2022	0.0													
7/11/2022	0.0													
8/11/2022	2.2	280	6.9	0.48										
9/11/2022	7.6	274	7.0	0.00	<5	<1	0.005	0.0746	0.0017	0.004	<0.0005	<0.0001	<0.0002	<0.0001
10/11/2022	8.4	266	7.0	0.00										
11/11/2022	9.7	271	6.9	0.00										
12/11/2022	10.4	251	6.9	0.00										
13/11/2022	9.6	258	6.9	0.00										
14/11/2022	8.2	274	7.1	0.00										
15/11/2022	9.0	284	7.1	0.00	<5	<1								
16/11/2022	7.2	284	7.2	0.00										
17/11/2022	7.8	301	7.2	0.00										
18/11/2022	9.8	312	7.2	0.00										
19/11/2022	10.6	314	7.2	0.00										
20/11/2022	10.2	286	7.3	0.00										
21/11/2022	9.2	288	7.3	0.00	<5	<1								
22/11/2022	8.7	279	7.3	0.00										
23/11/2022	8.5	284	7.3	0.00										
24/11/2022	8.2	282	7.3	0.00										
25/11/2022	8.1	280	7.3	0.00										
26/11/2022	9.6	283	7.2	0.00										
27/11/2022	9.5	275	7.2	0.00										
28/11/2022	7.9	233	7.2	0.00										
29/11/2022	9.3	188	7.2	0.00	<5	<1								
30/11/2022	8.1	185	7.2	0.00										
1/12/2022	10.0	179	7.1	0.00										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
2/12/2022	10.1	179	7.0	0.00										
3/12/2022	10.3	175	6.9	0.00										
4/12/2022	9.8	179	7.0	0.00										
5/12/2022	10.5	186	7.0	0.00	<5	<1	0.005	0.109	0.0021	0.002	<0.0005	<0.0001	<0.0002	<0.0001
6/12/2022	9.0	192	7.1	0.00										
7/12/2022	9.4	187	7.0	0.00										
8/12/2022	8.2	184	7.0	0.00										
9/12/2022	9.2	183	7.0	0.01										
10/12/2022	8.9	186	7.0	0.01										
11/12/2022	9.0	187	7.0	0.00										
12/12/2022	9.2	186	7.0	0.00	<5	<1								
13/12/2022	9.8	192	6.9	0.00										
14/12/2022	10.1	191	6.9	0.00										
15/12/2022	6.8	189	6.8	0.00										
16/12/2022	10.0	224	6.9	0.05										
17/12/2022	12.1	228	7.0	0.00										
18/12/2022	10.5	214	6.9	0.01										
19/12/2022	13.4	205	6.9	0.00	<5	<1								
20/12/2022	12.8	196	6.9	0.02										
21/12/2022	14.1	196	6.9	0.30										
22/12/2022	15.3	190	6.8	0.31										
23/12/2022	15.9	192	6.8	0.05										
24/12/2022	16.0	193	6.8	0.00										
25/12/2022	16.0	200	6.9	0.00										
26/12/2022	15.5	201	6.9	0.02										
27/12/2022	16.4	200	7.0	0.00										
28/12/2022	14.1	201	7.0	0.15	3	<1								
29/12/2022	14.8	203	7.0	0.09										

Date	Flow (ML)	Electrical Conductivity - Field (µS/cm)	pH (Field) (Unit)	Turbidity (NTU)	Oil & Grease	Total Suspended Solids (mg/L)	Aluminium – Dissolved (mg/L)	Manganese – Dissolved (mg/L)	Nickel – Dissolved (mg/L)	Zinc – Dissolved (mg/L)	Copper – Dissolved (mg/L)	Cadmium – Dissolved (mg/L)	Arsenic – Dissolved (mg/L)	Lead – Dissolved (mg/L)
30/12/2022	14.3	202	7.3	0.01										
31/12/2022	16.3	198	7.1	0.00										

Table 8: LDP53 Dam 209 Emergency Discharge Quality

Date	Flow (ML)	pH (Field) (Unit)	Total Suspended Solids (mg/L)	Turbidity (NTU)
16/11/2022	8.59	8.4	0	2.8
17/11/2022	13.97	8.1	0	3.6
18/11/2022	25.73	8.4	0	3.9
19/11/2022	28.03	8.2	0	2.5
20/11/2022	28.1	8.1	0	2.1
21/11/2022	28.23	8.4	0	3.7
22/11/2022	23.11	8.3	0	5.1
23/11/2022	27.66	7.8	0	6.3
24/11/2022	25.57	8.4	0	4.0
25/11/2022	27.25	8.4	0	2.2
26/11/2022	27.12	8.3	0	2.6
27/11/2022	27.1	8.3	0	2.9
28/11/2022	26.7	8.4	0	1.9
29/11/2022	26.96	8.2	0	2.1
30/11/2022	27.17	7.6	0	3.2
1/12/2022	27.45	7.5	8	3.5
2/12/2022	27.67	7.7	5	4.3
3/12/2022	27.73	7.7	0	2.9
4/12/2022	27.61	8.1	0	2.8
5/12/2022	26.43	8.2	0	2.6
6/12/2022	27.33	8.2	0	1.6
7/12/2022	27.11	8.0	0	1.4
8/12/2022	27.15	8.1	0	2.0
9/12/2022	27.15	7.9	0	2.1
10/12/2022	27.08	7.7	0	1.9
11/12/2022	26.68	7.6	0	1.7
12/12/2022	26.53	7.6	0	1.2
13/12/2022	26.36	8.1	6	2.7
14/12/2022	26.74	8.0	0	2.0
15/12/2022	26.74	8.2	0	2.5
16/12/2022	26.87	7.8	0	2.1
17/12/2022	27.26	7.8	0	2.2
18/12/2022	27.19	7.8	0	2.4
19/12/2022	27.27	7.8	0	2.8
20/12/2022	27.51	7.8	6	3.8
21/12/2022	27.76	7.6	0	3.8
22/12/2022	26.25	8.2	0	1.8
23/12/2022	26.19	8.1	0	1.9
24/12/2022	26.56	8.2	0	4.2
25/12/2022	26.82	8.2	0	1.5
26/12/2022	26.95	8.0	0	1.2
27/12/2022	27	8.0	0	1.9
28/12/2022	26.75	8.2	0	1.2
29/12/2022	16.23	8.2	0	2.3
30/12/2022	27.41	8.2	0	6.9
31/12/2022	27.72	8.0	0	2.8

Table 8: LDP53 Dam 302B Emergency Discharge Quality

Date	Flow (ML)	pH (Field) (Unit)	Total Suspended Solids (mg/L)	Turbidity (NTU)
16/11/2022	4.4	7.7	0	1.1
17/11/2022	12.5	7.8	0	0.9
18/11/2022	13.7	8.3	0	1.5
19/11/2022	13.5	8.2	0	1.0
20/11/2022	13.2	7.6	0	1.4
21/11/2022	13.2	8.3	0	1.5
22/11/2022	12.8	8.3	0	1.6
23/11/2022	12.3	7.8	0	3.0
24/11/2022	13.9	8.3	0	2.6
25/11/2022	13.3	8.3	0	2.2
26/11/2022	13.1	8.3	0	2.5
27/11/2022	13.5	8.3	0	2.3
28/11/2022	13.2	8.3	0	3.6
29/11/2022	13.0	8.3	0	2.3
30/11/2022	12.7	7.9	0	2.0
1/12/2022	12.3	7.9	6	2.2
2/12/2022	12.7	7.9	0	3.1
3/12/2022	13.1	7.9	0	2.2
4/12/2022	12.8	7.9	0	2.8
5/12/2022	12.2	8.4	0	2.6
6/12/2022	12.8	8.4	0	2.7
7/12/2022	13.4	8.1	0	2.9
8/12/2022	13.2	8.3	0	2.1
9/12/2022	12.9	8.2	0	5.6
10/12/2022	12.7	8.1	0	9.5
11/12/2022	12.4	8.0	0	8.3
12/12/2022	12.0	8.0	0	7.6
13/12/2022	9.8	8.2	10	7.9
14/12/2022	6.1	8.2	0	5.6
15/12/2022	16.2	8.2	7	6.1
16/12/2022	15.7	8.0	0	9.3
17/12/2022	15.8	8.1	0	9.0
18/12/2022	15.8	8.1	0	10.7
19/12/2022	7.8	8.1	0	13.4
20/12/2022	0.0	8.4	9	12.7
21/12/2022	10.1	8.0	0	10.7
22/12/2022	16.0	8.2	0	6.2
23/12/2022	15.6	8.2	0	6.8
24/12/2022	15.5	8.2	8	18.8
25/12/2022	15.4	8.2	5	10.9
26/12/2022	15.3	8.1	0	11.8
27/12/2022	15.1	8.1	0	7.4
28/12/2022	10.4	8.3	0	8.3
29/12/2022	5.0	8.2	0	13.8
30/12/2022	15.5	8.2	0	24.7
31/12/2022	14.1	8.1	6	14.9

Table 9: LDP54 Dam 401 Emergency Discharge Quality

Date	Flow (ML)	pH (Field) (Unit)	Total Suspended Solids (mg/L)	Turbidity (NTU)
17/11/2022	4.5	8.2	0	12.2
18/11/2022	17.5	8.2	0	7.4
19/11/2022	17.6	8.2	0	5.8
20/11/2022	18.3	7.9	0	13.0
21/11/2022	17.6	8.2	11	24.0
22/11/2022	18.1	8.2	6	17.4
23/11/2022	11.4	7.7	0	9.7
24/11/2022	17.4	8.2	0	8.3
25/11/2022	18.1	8.2	0	6.6
26/11/2022	17.9	8.2	0	6.7
27/11/2022	17.6	8.2	0	3.7
28/11/2022	18.1	8.2	0	3.8
29/11/2022	17.8	8.2	0	6.4
30/11/2022	17.8	8.0	0	5.2
1/12/2022	17.9	7.9	8	6.9
2/12/2022	17.7	8.0	0	4.4
3/12/2022	17.9	8.0	0	6.0
4/12/2022	17.9	6.9	0	8.6
5/12/2022	17.8	8.2	0	7.0
6/12/2022	17.9	8.3	0	4.5
7/12/2022	17.9	8.2	0	3.5
8/12/2022	18.1	8.1	6	12.9
9/12/2022	18.2	8.1	0	8.1
10/12/2022	18.1	8.1	0	5.9
11/12/2022	18.1	8.0	0	4.4
12/12/2022	17.9	8.0	0	3.1
13/12/2022	17.7	8.3	9	4.8
14/12/2022	17.5	8.2	0	3.7
15/12/2022	15.6	8.3	0	3.9
16/12/2022	14.1	8.1	0	4.3
17/12/2022	18.2	8.2	0	3.8
18/12/2022	18.0	8.2	0	2.9
19/12/2022	18.0	8.2	0	3.6
20/12/2022	18.1	8.2	6	3.9
21/12/2022	18.1	8.1	0	3.6
22/12/2022	17.9	8.2	0	2.0
23/12/2022	18.4	8.2	0	1.7
24/12/2022	17.8	8.2	0	1.5
25/12/2022	18.6	8.1	0	2.1
26/12/2022	18.7	8.1	0	1.6
27/12/2022	18.6	8.1	0	1.3
28/12/2022	18.6	8.2	0	1.3
29/12/2022	18.6	8.1	0	2.6
30/12/2022	18.7	8.2	0	4.7
31/12/2022	18.5	8.1	0	2.6

APPENDIX 3G. GROUNDWATER MONITORING DATA

Sample Point	Date	Electrical Conductivity - Field (µS/cm)	Electrical Conductivity - Lab (µS/cm)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	pH (Field) (Unit)	pH Lab (Unit)	Calcium - Dissolved (mg/L)	Magnesium - Dissolved (mg/L)	Sodium - Dissolved (mg/L)	Potassium - Dissolved (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Bicarbonate (mg/L)	Chloride (mg/L)	Sulphate - Turbidimetric (mg/L)	Aluminium - Dissolved (mg/L)	Arsenic - Dissolved (mg/L)	Boron - Dissolved (mg/L)	Cobalt - Dissolved (mg/L)	Cadmium - Dissolved (mg/L)	Chromium - Dissolved (mg/L)	Copper - Dissolved (mg/L)	Iron - Dissolved (mg/L)	Lead - Dissolved (mg/L)	Manganese - Dissolved (mg/L)	Mercury - Dissolved (mg/L)	Nickel - Dissolved (mg/L)	Selenium - Dissolved (mg/L)	Silver - Dissolved (mg/L)	Zinc - Dissolved (mg/L)	Ammonia as N (mg/L)	Nitrate (mg/L)	Phosphorus - Total (mg/L)	Reactive Phosphorus - Total (mg/L)	Fluoride (mg/L)
PZ003	6/04/2022	2319	2280	1250	40	6.4	6.4	11	76	320	12	<1	211	493	161	0.03	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	5.98	<0.001	0.38	<0.0001	<0.001	<0.01	<0.001	0.005	0.13	0.08	0.06	<0.01	0.3
PZ003	11/10/2022	2035	1980	1220	13	6.8	7.5	71	85	202	16	<1	415	392	169	0.07	<0.001	<0.05	0.001	<0.0001	<0.001	<0.001	2.92	<0.001	0.137	<0.0001	0.002	<0.01	<0.001	0.01	0.22	0.01	0.04	<0.01	0.6
PZ040B	7/04/2022	1110	1100	624	77	4.6	4.7	5	26	147	4	<1	4	308	26	0.23	<0.001	<0.05	0.011	<0.0001	<0.001	<0.001	<0.05	<0.001	0.069	<0.0001	0.008	<0.01	<0.001	0.056	<0.01	1.02	0.06	<0.01	0.2
PZ040B	11/10/2022	908	884	517	20	4.9	5.5	4	22	135	3	<1	3	284	24	0.2	<0.001	<0.05	0.009	<0.0001	<0.001	<0.001	<0.05	<0.001	0.052	<0.0001	0.006	<0.01	<0.001	0.042	<0.01	0.91	<0.01	<0.01	0.2
PZ044	7/04/2022	2761	2650	2220	57	6.6	6.5	445	80	97	38	<1	374	239	877	<0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	<0.05	<0.001	0.819	<0.0001	0.006	<0.01	<0.001	0.032	<0.01	0.08	0.1	0.02	0.2
PZ044	14/10/2022	2780	2540	2170	8	6.6	7.4	403	77	95	38	<1	348	268	852	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.488	<0.0001	0.005	<0.01	<0.001	0.036	0.01	0.06	<0.01	<0.01	0.2
PZ055	7/04/2022	2198	1980	1350	55	5.4	5.2	20	75	258	22	<1	41	399	407	0.02	<0.001	<0.05	0.307	<0.0001	<0.001	<0.001	12.7	<0.001	4.84	<0.0001	0.089	<0.01	<0.001	0.09	0.99	<0.01	0.01	<0.01	<0.1
PZ055	13/10/2022	2500	2410	1750	62	5.7	6.0	24	95	299	20	<1	57	564	479	<0.01	<0.001	<0.05	0.36	<0.0001	<0.001	<0.001	25.5	<0.001	8.23	<0.0001	0.099	<0.01	<0.001	0.074	1.17	<0.01	0.03	<0.01	<0.1
PZ058A	6/04/2022	13340	12300	10700	1050	3.3	3.2	120	509	1760	18	<1	<1	2940	3530	168	0.029	<0.05	1.11	0.0005	0.043	0.021	34.6	0.001	1.5	0.0002	1.62	0.24	<0.001	1.06	0.02	0.04	0.64	0.02	0.5
PZ058A	11/10/2022	12950	12500	10700	201	4.0	3.6	111	492	1720	15	<1	<1	3130	3480	196	0.026	<0.05	1.28	0.0002	0.041	<0.001	54	<0.001	1.46	0.0003	1.58	0.19	<0.001	0.79	<0.01	<0.10	0.19	<0.01	0.4
PZ101C	6/04/2022	637	668	354	36	6.8	6.9	38	21	63	12	<1	247	68	2	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.453	<0.0001	0.003	<0.01	<0.001	0.128	0.24	0.85	0.06	<0.01	0.5
PZ101C	13/10/2022	565	620	433	45	6.9	7.7	32	16	59	10	<1	205	69	2	<0.01	0.001	<0.05	0.002	<0.0001	<0.001	<0.001	0.64	<0.001	0.499	<0.0001	0.007	<0.01	<0.001	0.076	0.3	0.46	0.2	<0.01	0.5
PZ101B	6/04/2022	794	817	584	139	7.3	7.5	60	24	76	22	<1	322	54	2	0.03	0.006	<0.05	<0.001	<0.0001	<0.001	<0.001	1.51	<0.001	0.214	<0.0001	0.002	<0.01	<0.001	0.013	0.54	0.02	0.47	<0.01	0.9
PZ101B	13/10/2022	788	784	512	19	7.5	8.0	54	19	75	18	<1	315	56	<1	<0.01	0.004	<0.05	<0.001	<0.0001	<0.001	<0.001	0.91	<0.001	0.155	<0.0001	0.001	<0.01	<0.001	0.01	0.37	0.1	0.21	<0.01	1.2
PZ102A	6/04/2022	1381	1360	793	88	6.6	6.6	77	32	142	27	<1	197	207	158	0.02	<0.001	<0.05	0.078	<0.0001	<0.001	<0.001	1.56	<0.001	0.187	<0.0001	0.186	<0.01	<0.001	0.169	0.31	0.03	0.06	<0.01	1.1
PZ103C	6/04/2022	313	328	206	1720	5.7	5.6	6	11	34	9	<1	35	68	13	<0.01	0.008	<0.05	0.021	<0.0001	<0.001	<0.001	5.56	<0.001	0.539	<0.0001	0.121	<0.01	<0.001	0.102	0.43	0.04	1.63	<0.01	<0.1
PZ103C	19/10/2022	297	297	153	659	5.9	5.8	4	7	30	6	<1	44	50	12	<0.01	0.011	<0.05	0.018	<0.0001	<0.001	<0.001	6.76	<0.001	0.457	<0.0001	0.095	<0.01	<0.001	0.11	0.02	<0.01	0.35	<0.01	<0.1
PZ103A	6/04/2022	599	606	316	82	6.6	6.6	45	22	38	14	<1	167	81	7	0.01	0.006	<0.05	0.002	<0.0001	<0.001	<0.001	3.18	<0.001	0.133	<0.0001	0.011	<0.01	<0.001	0.022	0.48	0.02	0.04	<0.01	0.4
PZ104	7/04/2022	925	943	308	2160	11.7	12.0	76	<1	19	3	32	<1	5	29	0.66	<0.001	<0.05	<0.001	<0.0001	0.064	0.001	<0.05	<0.001	<0.001	<0.0001	<0.001	<0.01	<0.001	<0.005	0.05	0.01	0.47	<0.01	0.2
PZ105C	6/04/2022	229	232	115	66	6.1	6.0	7	6	32	3	<1	46	47	7	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	0.001	<0.05	<0.001	0.021	<0.0001	0.028	<0.01	<0.001	0.028	0.05	0.21	<0.01	<0.01	<0.1
PZ105C	13/10/2022	215.3	219	136	27	6.0	7.1	5	4	27	3	<1	28	52	2	0.01	0.002	<0.05	0.015	<0.0001	<0.001	<0.001	2.54	<0.001	0.782	<0.0001	0.057	<0.01	<0.001	0.016	<0.01	0.02	0.02	<0.01	<0.1
PZ106A	6/04/2022	813	794	415	18	7.9	8.1	33	3	102	23	<1	76	189	12	0.2	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01	0.95	0.02	<0.01	0.1
PZ106A	12/10/2022	782	783	430	<5	8.2	7.9	31	3	111	18	<1	67	221	11	0.24	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.002	<0.0001	<0.001	<0.01	<0.001	<0.005	<0.01	1.07	0.02	0.01	0.2
PZ109	6/04/2022	688	733	382	49	6.7	6.7	38	33	59	3	<1	221	90	15	<0.01	<0.001	<0.05	<0.001	<0.0001	0.001	<0.001	<0.05	<0.001	0.005	<0.0001	0.003	<0.01	<0.001	0.017	<0.01	0.26	0.08	<0.01	0.1
PZ109	13/10/2022	717	721	424	19	6.8	7.5	34	32	56	3	<1	207	97	16	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.012	<0.0001	0.002	<0.01	<0.001	0.015	<0.01	0.29	0.04	<0.01	0.1
PZ111	19/10/2022	1110	1120	646	599	6.8	6.8	82	38	47	21	<1	214	216	25	<0.01	<0.001	<0.05	0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.095	<0.0001	0.008	<0.01	<0.001	<0.005	0.53	0.16	0.21	<0.01	0.3
PZ112B	7/04/2022	2501	2510	1520	14	5.0	5.0	3	30	384	11	<1	10	611	263	0.15	<0.001	<0.05	0.031	0.0003	<0.001	0.002	<0.05	0.002	0.101	<0.0001	0.077	<0.01	<0.001	0.277	0.01	0.89	0.03	<0.01	0.1
PZ112B	27/10/2022	2455	2420	1400	<5	5.2	5.2	2	27	416	9	<1	10	531	353	0.13	<0.001	<0.05	0.027	0.0003	<0.001	<0.001	<0.05	<0.001	0.083	<0.0001	0.066	<0.01	<0.001	0.098	<0.01	1.76	0.03	<0.01	0.1
PZ137	6/04/2022	1287	1100	680	22	6.0	6.1	39	31	96	33	<1	46	287	52	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.018	<0.0001	0.003	<0.01	<0.001	0.018	0.02	0.06	<0.01	<0.01	0.2
PZ137	12/10/2022	1108	1050	778	<5	5.7	6.7	35	30	95	27	<1	28	319	40	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.038	<0.0001	0.004	<0.01	<0.001	0.019	<0.01	0.08	<0.01	<0.01	<0.1
PZ170	7/04/2022	284	2580	1860	23	6.2	6.2	119	113	196	24	<1	183	712	2	<0.01	0.001	<0.05	0.005	<0.0001	<0.001	<0.001	4.31	<0.001	0.286	<0.0001	0.035	<0.01	<0.001	0.01	0.09	<0.01	0.02	<0.01	0.1
PZ170	11/10/2022	1705	1680	1090	11	6.3	7.3	43	73	154	9	<1	192	456	13	<0.01	<0.001	<0.05	0.01	0.0001	<0.001	<0.001	<0.05	<0.001	0.057	<0.0001	0.074	<0.01	<0.001	0.22	<0.01	0.03	0.07	<0.01	0.1
PZ188	7/04/2022	177	188	85	30	5.1	5.2	3	6	31	2	<1	18	48	2	0.02	<0.001	<0.05	0.006	<0.0001	<0.001	0.001	<0.05	<0.001	0.024	<0.0001	0.015	<0.01	<0.001	0.032	0.02	0.04	0.03	<0.01	<0.1
PZ188	13/10/2022	180.7	198	123	6	5.3	6.1	<1	4	32	<1	<1	8	52	1	0.01	<0.001	<0.05	0.007	<0.0001	<0.001	0.001	<0.05	<0.001	0.034	0.0002	0.02	<0.01	<0.001	0.018	<0.01	0.03	0.02	<0.01	<0.1
PZ189	7/04/2022	402	443	294	48	6.0	6.1	15	14	34	7	<1	44	97	11	0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	9.71	<0.001	0.543	<0.0001	0.003	<0.01	<0.001	0.01	0.05	<0.01	0.01	<0.01	<0.1

PZ189	13/10/2022	401	419	332	39	6.1	6.6	15	12	35	6	<1	29	99	12	<0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	7.27	<0.001	0.426	<0.0001	0.005	<0.01	<0.001	0.181	0.05	0.02	0.06	<0.01	0.1
PZ191	4/04/2022	1507	1460	945	3680	6.2	6.8	42	30	198	16	<1	170	106	341	0.02	<0.001	<0.05	0.011	<0.0001	<0.001	<0.001	5.51	<0.001	0.788	<0.0001	0.034	<0.01	<0.001	0.065	0.57	0.06	6.07	<0.01	0.5
PZ191	14/10/2022	1785	1560	1030	908	6.2	7.0	28	106	262	17	<1	120	117	536	0.15	<0.001	<0.05	0.055	0.0058	<0.001	0.009	2.07	<0.001	4.24	<0.0001	0.205	<0.01	<0.001	2.13	0.49	0.05	0.7	<0.01	0.4
PZ203	7/04/2022	381	403	231	26	5.0	5.1	6	10	50	1	<1	11	102	18	0.03	<0.001	<0.05	0.071	<0.0001	<0.001	<0.001	0.12	<0.001	0.36	<0.0001	0.057	<0.01	<0.001	0.053	0.06	0.02	<0.01	<0.01	<0.1
PZ203	19/10/2022	396.7	399	216	18	5.3	5.4	4	7	52	<1	<1	5	100	12	<0.01	<0.001	<0.05	0.037	<0.0001	<0.001	<0.001	<0.05	<0.001	0.112	<0.0001	0.051	<0.01	<0.001	0.037	<0.01	0.06	0.01	<0.01	0.8
PZ213	7/04/2022	414	401	262	1240	5.3	4.7	9	10	39	3	<1	3	108	4	<0.01	<0.001	<0.05	0.028	<0.0001	<0.001	<0.001	6.36	<0.001	0.424	<0.0001	0.03	<0.01	<0.001	0.035	0.04	0.01	0.22	<0.01	<0.1
PZ213	11/10/2022	279	283	213	749	5.4	5.7	6	6	30	2	<1	4	78	3	<0.01	<0.001	<0.05	0.016	<0.0001	<0.001	<0.001	4.85	<0.001	0.28	<0.0001	0.026	<0.01	<0.001	0.059	0.02	0.03	0.04	<0.01	0.2
PZ214	7/04/2022	169.8	194	108	<5	5.7	5.8	6	6	19	2	<1	31	28	2	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.001	<0.0001	0.005	<0.01	<0.001	0.006	<0.01	1.5	<0.01	<0.01	<0.1
PZ214	11/10/2022	170.3	183	123	10	5.9	6.4	5	5	21	1	<1	29	34	2	<0.01	<0.001	<0.05	<0.001	<0.0001	0.001	<0.001	<0.05	<0.001	0.003	<0.0001	0.005	<0.01	<0.001	0.008	<0.01	1.58	<0.01	<0.01	<0.1
PZ217	6/04/2022	579	4700	3410	7	6.9	7.0	168	252	734	22	<1	498	1120	578	0.01	<0.001	<0.05	<0.001	0.0001	<0.001	<0.001	<0.05	<0.001	0.064	<0.0001	0.007	<0.01	<0.001	0.009	<0.01	3.26	0.01	0.01	0.6
PZ217	18/10/2022	4060	4240	2650	<5	7.1	7.2	99	153	534	15	<1	451	889	462	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	<0.001	<0.0001	0.002	<0.01	<0.001	0.008	<0.01	4.2	0.04	<0.01	0.5
PZ221	6/04/2022	1350	1270	666	60	6.5	6.5	38	54	161	11	<1	297	205	75	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	2.05	<0.001	0.216	<0.0001	<0.001	<0.01	<0.001	<0.005	0.06	0.17	0.38	<0.01	0.6
PZ221	18/10/2022	1427	1370	690	52	6.7	6.8	39	50	148	13	<1	311	222	66	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.004	<0.0001	<0.001	<0.01	<0.001	0.015	<0.01	0.14	0.03	<0.01	0.6

BORE	PZ105A – 28m	PZ105A – 80m	PZ105A – 118m	PZ105A – 130m	PZ127 - 43m	PZ127 - 68m	PZ128 - 20m	PZ128 - 36m	PZ128 - 55m	PZ186 – 40m	PZ186 – 65m	PZ186 – 86m	PZ186 – 118m
Jan-22	376.2	364.6	344.8	337.5	449.1	423.9	388.7	374.1	368.6	391.3	365.6	371.4	324.7
Feb-22	376.2	364	344.2	336.7	449	423.9	388.7	374.1	368.4	391.3	365.6	371.4	324.2
Mar-22	376.2	363.6	343.6	335.9	449	423.9	388.7	374.1	368.2	391.4	365.4	371.3	324
Apr-22	376.3	363.2	342.4	335.2	449	424.2	388.8	374.1	368.1	391.5	365	371.3	323.9
May-22	376.3	362.9	342	334.6	449	423.9	388.8	374.1	368	391.5	364.8	371.1	323.8
Jun-22	376.4	362.4	341.9	333.6	449	424.1	388.8	374.1	367.8	390.2	362.4	368.5	323.8
Jul-22	376.5	362	342	333.3	449	423.9	388.8	374.1	367.8	387.1	361.8	366.6	324.1
Aug-22	376.6	361.7	341.4	333			388.7	374.1	367.7	387.1	362.7	366.2	324.2
Sep-22	376.7	361.5	341	332.8			388.7	374.1	367.6	386.9	364.1	366	324.3
Oct-22	376.8	361.2	339.4	332.5			388.7	374	367.6	386.7	365.2	365.8	324.3
Nov-22	376.8	361	339.2	332.3	449.1	424.4	388.7	374	367.6	386.5	366.3	365.6	324.9
Dec-22	376.9	360.7	339	332.2	449	424.3	388.7	374	367.5	386.4	368.5	365.5	325.1
Min	376.2	360.7	339	332.2	449	423.9	388.7	374	367.5	386.4	361.8	365.5	323.8
Max	376.9	364.6	344.8	337.5	449.1	424.4	388.8	374.1	368.6	391.5	368.5	371.4	325.1

BORE	PZ129 - 35m	PZ129 - 53m	PZ129 - 74m	PZ130 - 38.5m	PZ130 - 64m	PZ179 - 28m	PZ179 - 33m	PZ179 - 145m	PZ229 - 84m	PZ229 - 140m	PZ229 - 198m	PZ229 - 253m	PZ229 - 319m
Jan-22	390	383.4	365	494.1	470.8	418.1	417.7	319.8	426.67	388.9	385.86	381.11	373.61
Feb-22	390	383.1	364.9	494	470.8	418.1	417.7	319.8	426.7	388.9	385.87	381.07	373.62
Mar-22	390	383.3	364.8	494	470.7	418.2	417.7	319.8	426.74	388.89	385.87	381.07	373.67
Apr-22	389.9	383.6	364.8	493.9	470.7	418.3	417.7	319.7	426.79	388.84	385.87	381.03	374.03
May-22	389.9	383.6	364.8	494.1	470.8	418.4	417.8	319.7	426.8	388.88	385.82	380.59	373.99
Jun-22	389.9	383.6	364.8	494	470.7	418.3	417.8	319.7	426.86	388.87	385.83	380.25	374.14
Jul-22	390	383.6	364.8	495.8	470.8	418.4	417.9	319.7	426.94	388.85	385.79	379.88	374.04
Aug-22	390	383.6	364.8	495.7	470.7	418.4	417.9	319.7	427.02	388.82	385.73	379.54	373.8

Sep-22	390	383.6	364.9	497.9	470.7	418.4	417.9	319.9	427.1	388.82	385.69	379.31	373.73
Oct-22	390	383.6	364.9	497.1	470.7	418.4	417.9	320.1	427.2	388.77	385.61	379	373.46
Nov-22	390	383.7	364.9	499	471.2	418.4	417.9	320.2	427.44	388.78	385.59	378.86	373.63
Dec-22	390	383.7	364.9	498.1	470.8	418.4	417.9	320.4	427.68	388.76	385.56	378.7	373.57
Min	389.9	383.1	364.8	493.9	470.7	418.1	417.7	319.7	426.67	388.76	385.56	378.7	373.46
Max	390	383.7	365	499	471.2	418.4	417.9	320.4	427.68	388.9	385.87	381.11	374.14

BORE	PZ192-68m	PZ192-166m	PZ192-178m	PZ193 - 80m	PZ193 - 162m	PZ193 - 184m	PZ194 - 78m	PZ194 - 173m	PZ194 - 196m	PZ195 - 72m	PZ195 - 162m	PZ195 - 175m	PZ186a – 13.5m
Jan-22	402	326	318.7	418.3	338	315.7	420.33	334.34	293.77	420.19	337.79	283.33	406.7
Feb-22	402	325.3	318.5	418.4	337.9	314.9	420.27	333.39	293.42	420.06	337.55	284.09	406.7
Mar-22	402	324.7	317.3	418.6	338	314.2	420.24	332.47	293.32	420.01	337.94	283.81	406.8
Apr-22	401.9	324	316.6	418.6	338	313.4	420.24	331.82	292.81	419.99	337.91	283.4	406.9
May-22	401.6	323.2	314.9	418.6	338	312.5	420.19	330.96	292.62	419.93	337.53	283.1	406.9
Jun-22	401.8	323.6	315.2	418.4	340.2	311.6	419.68	330.37	292.92				406.8
Jul-22	401.7	323.4	314.9	418.7	342.1	311.7	419.03	330.54	292.86	415.39	341.31	282.51	406.1
Aug-22	401.7	323.3	315	417.8	340.7	311.7	417.04	329.43	293.06	412.61	340.44	282.61	405.9
Sep-22	401.5	324	315	417.3	339.6	311.2	416.19	328.46	293.15	411.74	339.07	281.89	405.9
Oct-22	400.9	324	314.7	416.9	337.2	310.9	415.68	327.68	292.97	411.16	338.05	281.17	405.9
Nov-22	400.9	323.4	314.8	416.6	336.6	310.8	415.4	327.12	292.93	410.85	337.33	280.44	405.9
Dec-22	400.8	323.1	314.9	416.1	336.3	310.7	415.09	326.7	292.84	410.51	336.84	279.6	405.9
Min	400.8	323.1	314.7	416.1	336.3	310.7	415.09	326.7	292.62	410.51	336.84	279.6	405.9
Max	402	326	318.7	418.7	342.1	315.7	420.33	334.34	293.77	420.19	341.31	284.09	406.9

Gaps in data indicate that no result is available, or data determined to be anomalous

BORE	PZ003	PZ40B	PZ44	PZ55	PZ58A	PZ101C	PZ101B	PZ102B	PZ102A	PZ103C	PZ103B	PZ103A	PZ104
Jan-22	471.7		481.3	423.5	466.5	379.9	359.5		342.1	397.3			375.3
Feb-22	471.7	406.9	481.2	423.5	466.6	379.9	359.2		341.3	397.4		333	373.7
Mar-22	471.6	407.2	480.7	423.6	466.6	379.8	358.8		340.4	397.5		332.3	373.4
Apr-22	471.7	407	481	423.7	466.7	379.9	358.6		341.2	397.5		331.9	373.2
May-22	471.5	406.6	481.2	423.7	466.7	379.8	358.3		339.1	397.1		330.4	372.8
Jun-22	471.5	406.4	481.6	423.8	466.8	379.8	358		341.8	397.2		330.2	372.6
Jul-22	472.5	406.8	482.4	423.6	466.9	379.8	357.7			397.5			364.8
Aug-22	474.4	409.7	483.1	423.8	467	379.9	357.6			397.8			
Sep-22	474.4	407.2	483.2	423.8	467.1	379.8	357.4			397.7			
Oct-22	473.6	407.5	483.7	423.8	467.1	379.8	357.3			397.9			
Nov-22	474.1	407.3	484.1	423.9	467.2	380	357.4			397.7			
Dec-22	474.4	407.2	483.6	424	467.3	379.8	357.1			397.8			
Min	471.5	406.4	480.7	423.5	466.5	379.8	357.1		339.1	397.1		330.2	364.8
Max	474.4	409.7	484.1	424	467.3	380	359.5		342.1	397.9		333	375.3

BORE	PZ105C	PZ106A	PZ194B	PZ194C	PZ109	PZ111	PZ112B	PZ137	PZ170	PZ184	PZ188	PZ189	PZ191
Jan-22	374.7	424.7			382.1	363.8	481.6	461.3	420.6		411.7	392.2	347.7
Feb-22	374.9	424.9			382	363.7	481.9	461.3	420.6		411.7	392.3	347.6
Mar-22	374.9	425.2			382	363.7	482	461.2	420.7		411.7	392.3	346.5
Apr-22	374.8	425.3			382.1		482.1	461.1	421.1		411.6	392.4	347.6
May-22	374.9	424.6			382.1	362.9	482.1	461	419.8		411.6	392.4	347.6
Jun-22	375	424.9			382.2	363	482.3	461.1	420.1		411.5	390.3	347.5
Jul-22	375	425.2		411.5	382.2	362.6		461.4	420.3		411.4	389.3	347.9
Aug-22	375.2	425.5	418.5	413.1	382.1	362.7		461.7	421.1		411.5	389.2	350

Sep-22	375.2		417.2	413	382.1	362.5			421.7		411.5	389.2	349.4
Oct-22	375.3	425.8	416.5	413	382.1	362.3	483.4	462	422.4		411.4	388.8	349.1
Nov-22	375.5		416.2	413	382.1	362.5			423.5		411.2	388.7	349.5
Dec-22	375.5		416	412.9	382.2	362.7			425.3		411.4	388.7	349.4
Min	374.7	424.6	416	411.5	382	362.3	481.6	461	419.8		411.2	388.7	346.5
Max	375.5	425.8	418.5	413.1	382.2	363.8	483.4	462	425.3		411.7	392.4	350

BORE	PZ203	PZ211	PZ213	PZ214	PZ217	PZ221	PZ195B	PZ195C
Jan-22	402.3		410.9	411.3	493.5	470.8		
Feb-22	402.2		410.8	411.3	493.4	470.7		
Mar-22	402.3		410.7	411.3	493.3	470.8		
Apr-22	402.2		410.7	411.1	493.4	470.8		
May-22	402.2		410.6	411.1	493.5	470.6		
Jun-22	402.2		410.6	411	493.7	470.6		
Jul-22	402.5		410.3	410.4	493.9		420.5	416.3
Aug-22	402.8		410.2	410.9	494		415.9	407.6
Sep-22	402.7		410.3	410.9	493.9		414.4	405.1
Oct-22	403.2		410.2	410.8	493.9	472.3	413.7	404.3
Nov-22	403.6		410.3	410.7	493.9		413.5	403.3
Dec-22	403.3		410.4	410.9	493.7		413.3	402.8
Min	402.2		410.2	410.4	493.3	470.6	413.3	402.8
Max	403.6		410.9	411.3	494	472.3	420.5	416.3

Gaps in data indicate that no result is available, or data determined to be anomalous

GROUNDWATER LEVEL GRAPHS

Figure 3-g: Ulan Granite Composite Hydrograph

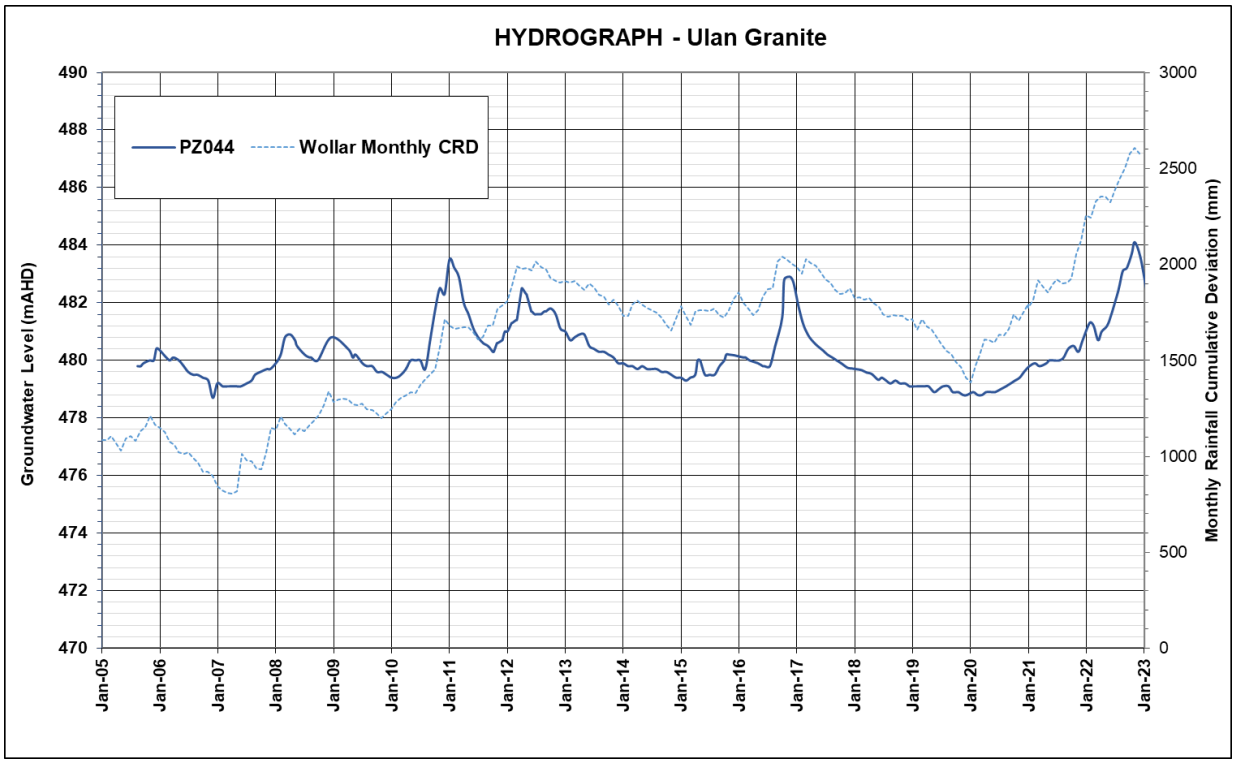


Figure 3-h: Marrangaroo and Ulan Seam Composite Hydrograph

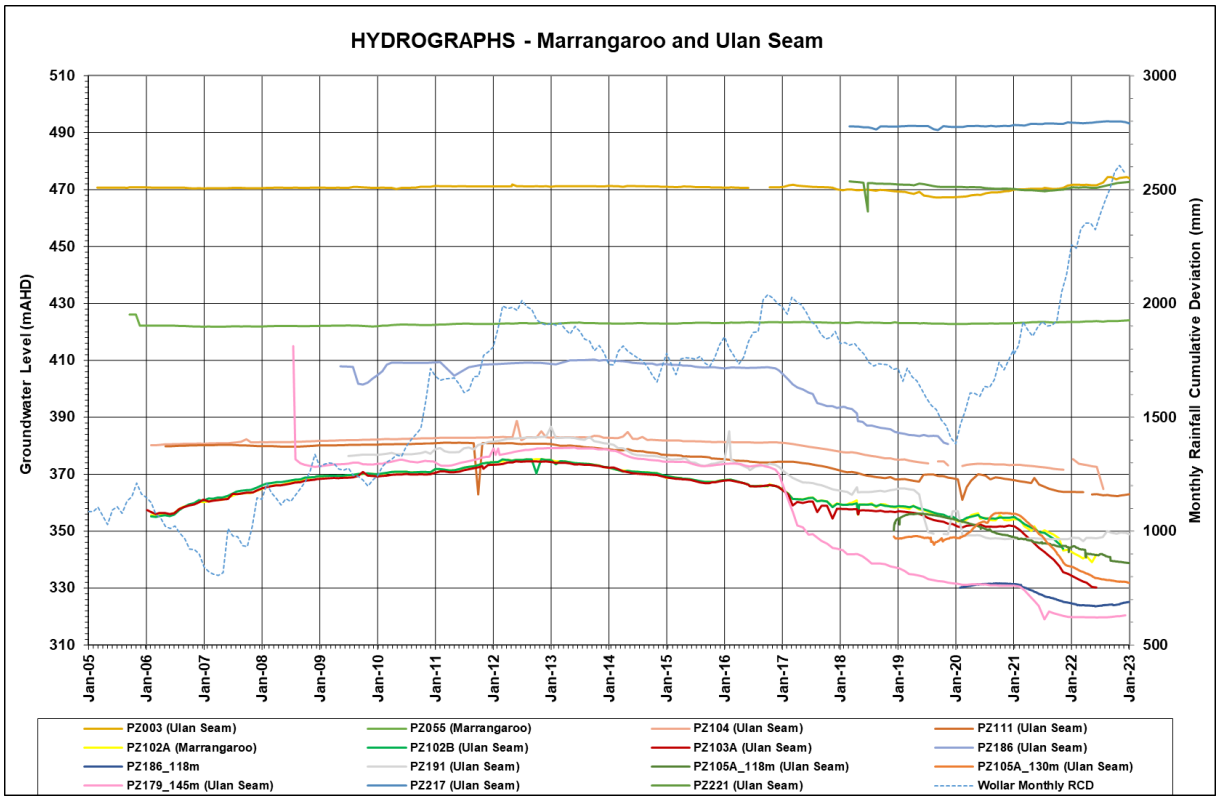


Figure 3-i: Permian Overburden Composite Hydrograph

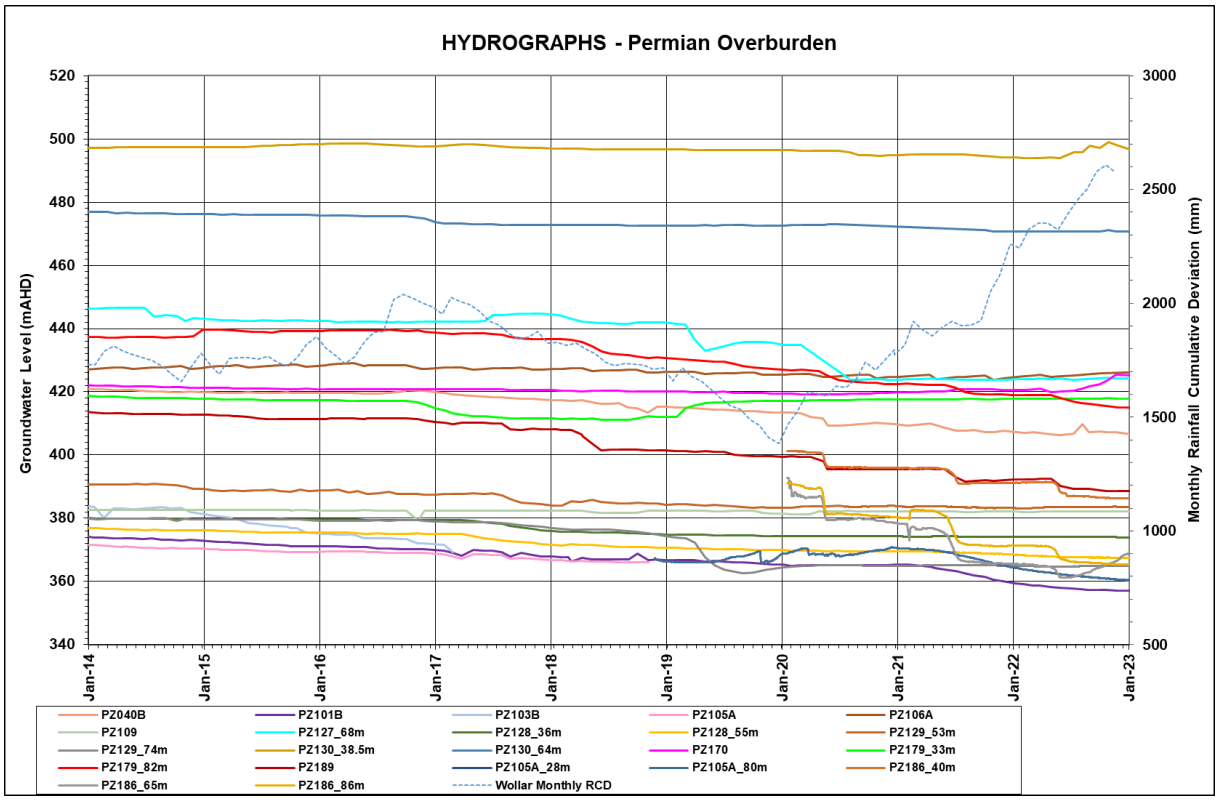


Figure 3-j: Triassic Composite Hydrograph

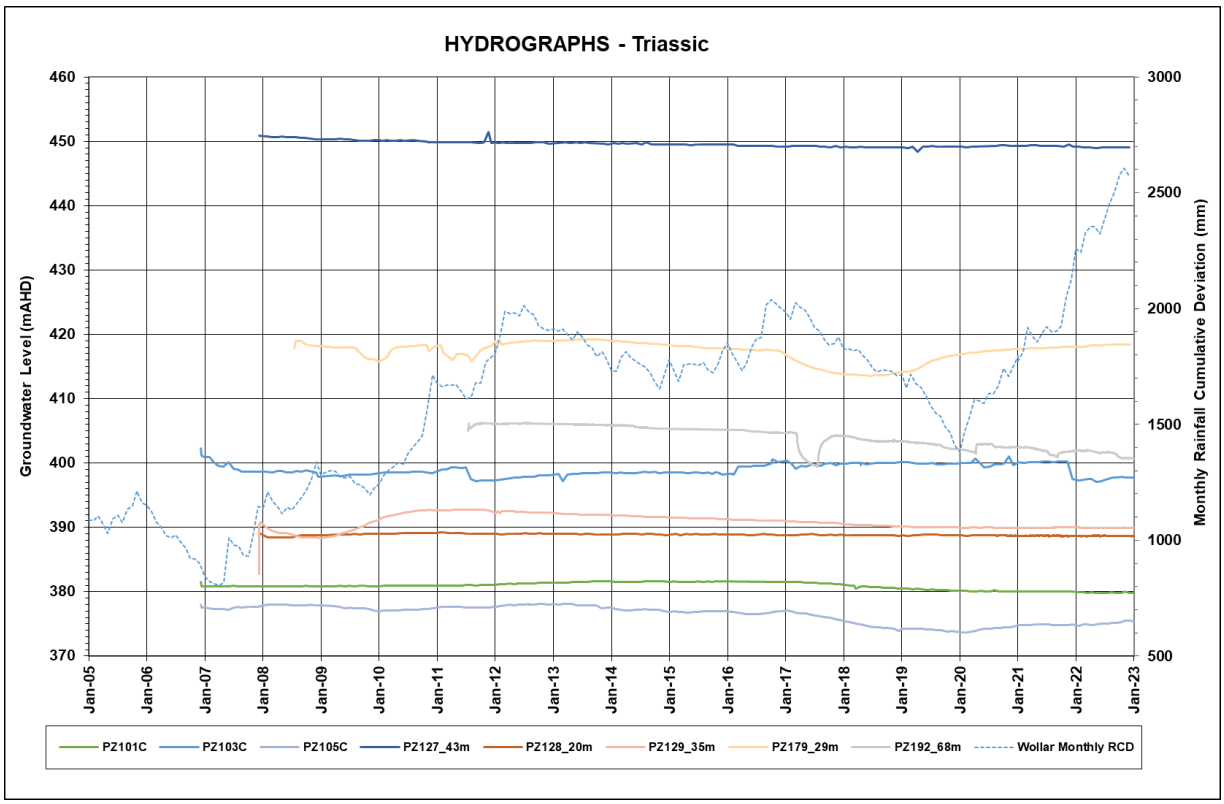
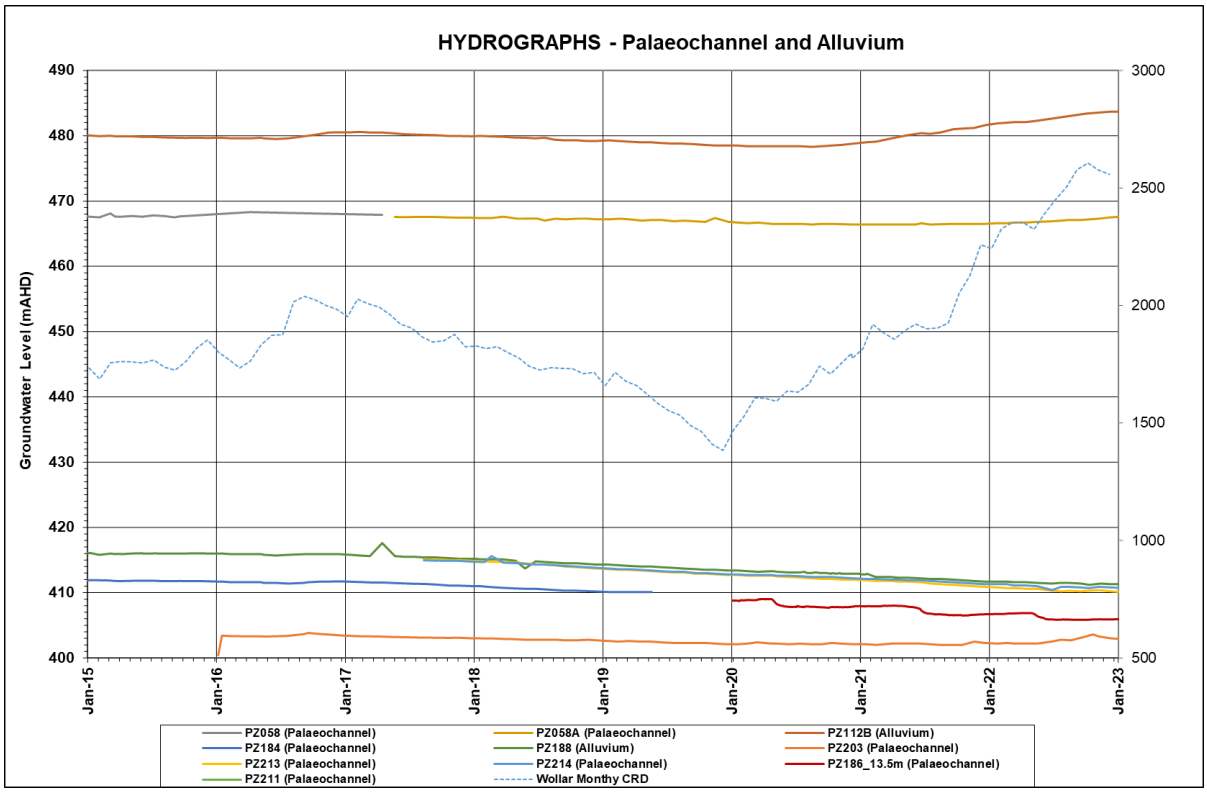


Figure 3-k Alluvium Composite Hydrograph



APPENDIX 4. COMMUNITY COMPLAINTS SUMMARY 2022

Date	Type	Location	Complaint Description
4/01/2022	Air (Dust)	Cooks Cap	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results, and actions.
17/01/2022	Other	Ulan	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
25/01/2022	Air (Dust)	Cooks Cap	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable dust levels. No actions required. Complainant contacted to advise of investigation, results and actions.
26/01/2022	Lighting	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant not contacted upon their request.
28/01/2022	Air (Odour)	Cooks Cap	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant not contacted upon their request.
29/01/2022	Noise	Winchester Crescent	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant contacted to advise of investigation, results and actions.
7/03/2022	Other	Ulan	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results, and actions.
20/03/2022	Noise	Mudgee	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable dust levels. No actions required.
28/04/2022	Blasting (V/O)	Wollar	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
28/04/2022	Blasting (V/O)	Wollar	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
30/04/2022	Noise	Ulan	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant not contacted upon their request.
13/05/2022	Lighting	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant not contacted upon their request.
13/05/2022	Lighting	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant not contacted upon their request.
15/05/2022	Noise	Cooks Cap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
19/06/2022	Noise	Winchester Crescent	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
10/07/2022	Noise	Winchester Crescent	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant not contacted upon their request.
23/07/2022	Blasting (V/O)	Merriwa	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant not contacted upon their request.
29/08/2022	Lighting	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
11/10/2022	Other	Ulan	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
13/10/2022	Air (Dust)	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
22/11/2022	Blasting (V/O)	Wollar	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
26/11/2022	Noise	Winchester Crescent	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.

Date	Type	Location	Complaint Description
11/12/2022	Noise	Winchester Crescent	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable dust levels. No actions required. Complainant contacted to advise of investigation, results and actions.
20/12/2022	Air (Dust)	Ulan Rd	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
22/12/2022	Blasting (V/O)	Moolarben Rd	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
24/12/2022	Other	Ulan	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.

APPENDIX 5. COMMUNITY CONTRIBUTIONS

Community Support Program

Beneficiary	Project/Event
Gulgong Folk Festival	Gulgong Folk Festival
Mudgee Valley Writers	Youth writing competition
The Business Concierge	Survivor Life Skills Program
Mudgee Playgroup	Facility upgrades
Educar	2022 Max Potential Program
Can Assist	2022 Can Cruise
Gowrie NSW	Educational Resources
Gulgong Show Society	2022 Gulgong show
Sculptures in the Garden	Sculptures in the Garden
UA3 Mudgee	Technology and furniture fit out
Mudgee RSL sub Branch	Commemorative Plaques
2022 Seniors Week	Mudgee & District Seniors week committee
Business Mudgee	Working Women's Wellness Breakfast & Lunchoen
Westpac Rescue Helicopter	2022 Annual Mudgee Charity Golf Day
Turill Community & Sports Club	Toilet refurbishment
Gulgong Show Society	NSW Young Woman Competition
Mudgee Rescue Squad	Equipment upgrades
Mudgee Senior League	Auto follow video recorder & Gazebo
Rylstone Show Society	2022 Bull-a-rama
Rylstone Show Society	2022 Rylstone Show
Mudgee Mountain Bike Club	Rider Training
Gulgong Arts Council	2022 Scarecrow Stroll
Mudgee Show Society	2022 Mudgee Show
Cooyal Tennis Club	Heating and cooling for clubhouse
Lions Club	2022 Community Market
Gulgong Hospital Auxiliary	Viva Narrow Cart for MPS
Rotary Sunrise	Mudgee Showground Carols
Country Womens Association	100 years of CWA Mudgee History Book
Cudgegong Valley Antique Machinery Club	Swap Meet
Mudgee Dressage Group Inc.	2022 Dressage Competition
Mudgee Martial Arts	Martial Arts mats
Gulgong Holtermann Museum	Facade upgrade
Mudgee Golf Pro Shop	Moolarben Coal Shootout
Mudgee Library	Henry Lawson Bus Tour (East End Bus Service)
Gulgong Avicultural Society	2022 Gulgong Bird Show
Kanandah Retirement Hostel	Multipurpose Beds
Mudgee Triathlon Club	2022 Mudgee Running Festival
Mudgee Landcare	2022 Green Day
Mudgee Rotary Club	2022 Mathematical Minds Competition
Gulgong Public School	School Presentation
Kandos Public School	School Presentation
Rylstone Steetfeast	2022 Rylstone Streetfeast
Business Mudgee	2022 Magnificent Mudgee Awards
Pink Up Mudgee	2022 Pink Up Mudgee
Westpac Rescue Helicopter	Westpac Rescue Helicopter & Pac National Golf