MOOLARBEN COAL COMPLEX ANNUAL REVIEW 2021

Document	Version	Issue	Author	Approved
MCO_RPT_ANNUAL REVIEW 2021	1	Mar 2022	MCO	SA

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
MOP/RMP start date	1 January 2020
MOP/RMP end date	31 December 2022
Annual Review start date	1 January 2021
Annual Review end date	31 December 2021

I, Steve Archinal, certify that this audit report is a true and accurate record of the compliance status of Moolarben Coal Complex for the period January 1st 2021 to December 31 2021 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	Steve Archinal
Title of authorised reporting officer	General Manager
Signature of authorised reporting officer	
Date	31 March 2022

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1.0 STATEMENT OF COMPLIANCE

A summary of compliance with relevant approval conditions from 01 January 2021 to 31 December 2021 (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
PA05-0117	Sch. 3 C. 33	Surface Water Management Plan	Non-Compliant	Discharge Monitoring, Oil & Grease and TSS sample not collected on two occasion.	7.3 and 12.0
PA 08_0135	Sch. 3 C. 29				
PA 08_0135	Sch. 4 C. 5	Subsidence Monitoring Program	Non-Compliant	Subsidence Monitoring Line G, H, I and Essential Monitoring Line not monitored in required time frame.	8.0 and 12.0
PA05-0117	Sch. 3 C. 31	Water Release as per S120 POEO Act	Non-Compliant	Sediment water release, occurred as a result of heavy rainfall.	7.3 and 12.0
PA 08_0135	Sch. 3 C. 27				

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 Moolarben Coal Complex (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), mining leases ML 1605, ML 1606, ML1628, ML1691 and ML1715, 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 Regional NSW – Resources Regulator (RR) (For Approval);
- NSW Department of Planning and Environment – Biodiversity, Conservation and Science (BCS);
- NSW Department of Planning and Environment – Water (DPE – Water)/Natural Resources Access Regulator (NRAR);
- 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.

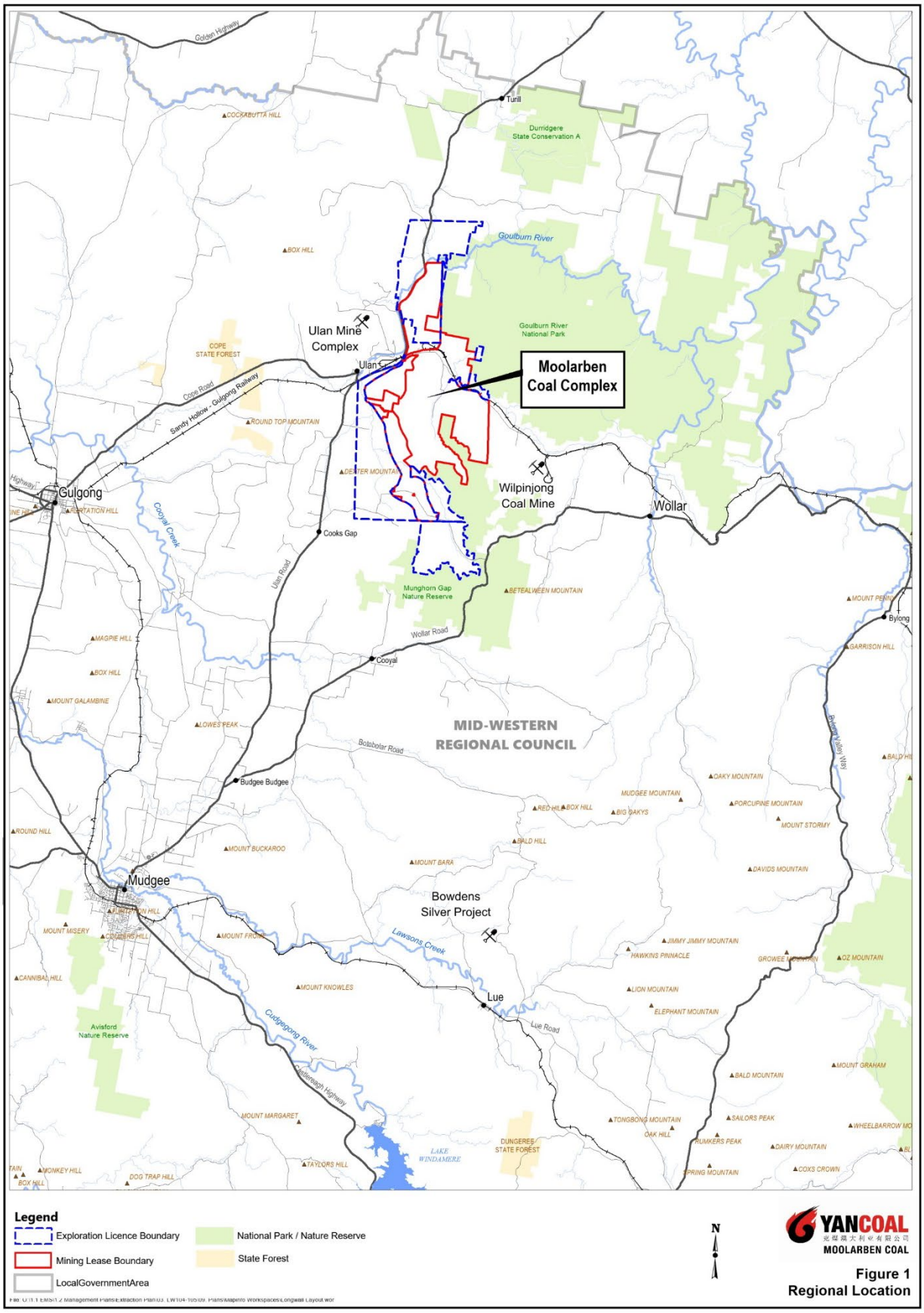
Section 11: Describes independent audit requirements.

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



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.

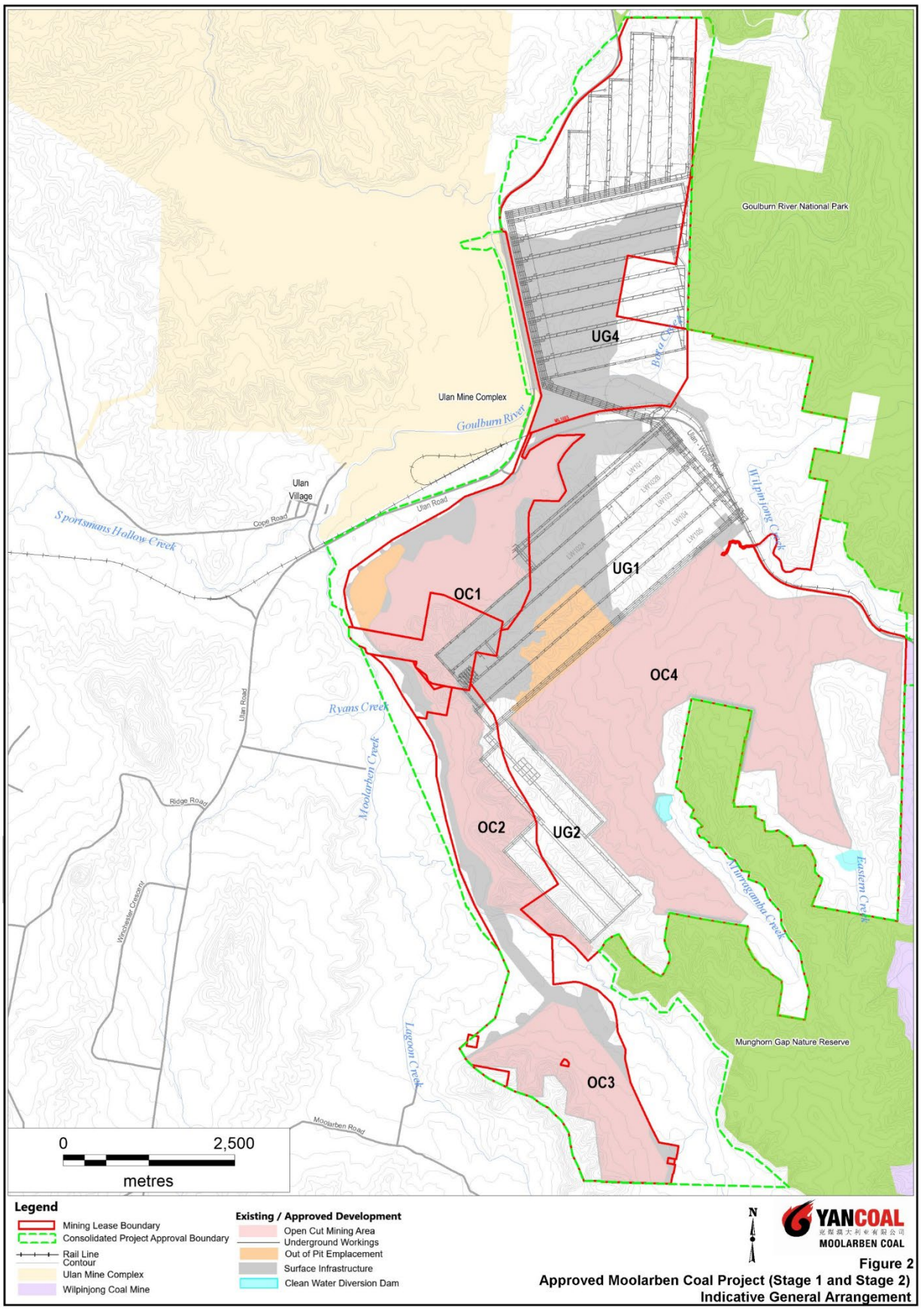
2.4 KEY MINE CONTACT PERSONNEL

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	Steve Archinal	02 6376 1500	steve.archinal@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 to 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
Mining Operation Plan – NSW Department of Regional NSW –Resources Regulator		
MOP	Stage 1 and Stage 2 operations	31 December 2022
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 – Commonwealth Department of Agriculture, Water and the Environment		
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
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 Complex Mining Operations Plan 2020-2022 Amendment C; and
- Environment Protection Licence EPA Revised Discharge Point amendment.

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;* *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* • *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;* *d. identify any trends in the monitoring data over the life of the project;* *e. identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and* *f. describe what measures will be implemented over the next year to improve the environmental performance of the project.*	4.2 & 4.3 6 to 10 1, 6 to 10 & 12 6 to 10 6 to 10 6 to 10 & 13
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;* *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* • *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;* *d. identify any trends in the monitoring data over the life of the project;* *e. identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and* *f. describe what measures will be implemented over the next year to improve the environmental performance of the project.*	4.2 & 4.3 6 to 10 1, 6 to 10 & 12 6 to 10 6 to 10 6 to 10 & 13
Mining Lease 1605, 1606 & 1628 Condition 4 & 5	*The lease holder must lodge Environmental Management Reports (EMR) with The Director-General annually or at dates otherwise directed by the Director-General.* *The EMR must:* *- report against compliance with the MOP;* *- report on progress in respect of rehabilitation completion criteria;* *- report on the extent of compliance with regulatory requirements; and* *- have regard to any relevant guidelines adopted by the Director-General;*	This Report & Section 9

Approval Type & Reference		Annual Review Section
Mining Lease 1691 Condition 4	*(a) The lease holder must lodge Environmental Management Reports (EMR) with the Director-General annually or at dates otherwise directed by the Director-General.* *(b) The EMR must:* *I. Report against compliance with the MOP;* *II. Report on progress in respect of rehabilitation completion criteria;* *III. Report on the extent of compliance with regulatory requirements; and* *IV. Have regard to any relevant guidelines adopted by the Director-General.*	This Report & Section 9
Mining Lease 1715 Condition 3	*f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:* *(i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;* *(ii) be submitted annually on the grant anniversary (or at such other times as agreed by the Minister; and* *(iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.*	This Report & Section 9

4.0 OPERATIONS SUMMARY

4.1 MINING OPERATIONS

Details of production and associated waste generated by the site for the report 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	44,448,108	43,866,072	52,469,190
Open Cut ROM Coal (t) (OC1, 2 & 3)	10,000,000	3,237,139	4,398,171	3,565,523
Open Cut ROM Coal (t) (OC4)	16,000,000	10,873,793	9,710,770	10,098,788
Open Cut ROM Coal (t)	16,000,000	14,110,932	14,108,941	13,664,311
Underground ROM Coal (t)	8,000,000	7,545,551	6,259,630	6,689,351
Coal Washing (t)	16,000,000	13,957,845	14,373,346	13,202,235
Rejects (Co Disposal)	N/A	2,522,377	2,281,064	2,109,082
Product Coal (t)	N/A	19,775,825	18,354,580	18,182,503

4.2 REPORTING PERIOD ACTIVITIES

This section provides further detail on the activities undertaken in the reporting period. Works were carried out in accordance with the relevant Mining Operations Plan (MOP). **Figure 4** presents the areas of activity.

4.2.1 EXPLORATION

Exploration activities were undertaken in EL6288, EL7073, ML1691 and ML1715 during the reporting period. This consisted of a total of 39 exploration holes within EL6288, 35 exploration holes within EL7073, 11 exploration holes focusing on OC3 within ML1691 and a further 7 exploration holes primarily focusing on UG2 within ML1715. An airborne geophysical survey was also conducted across all EL's and ML's.

4.2.2 LAND DISTURBANCE

During the reporting period 124ha were disturbed taking the total mine footprint to 1,816ha 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 the MOP and relevant management plans (Surface Water, Heritage, Biodiversity and Rehabilitation Management Plans).

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 Opencut 4 (OC4). Mine infrastructure works included water management infrastructure and ancillary works. Construction activities commenced or undertaken in the period included:

- Construction of the Underground 4 Remote Services Infrastructure Area
- Construction of the Underground 4 Southern Dewatering Infrastructure
- Construction of water management infrastructure;

4.2.4 MINING OPERATIONS

Mining activities were undertaken in accordance with relevant project approvals and the approved MOP. 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 LW104 and LW105.

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 5.5 per day.

4.2.6 REHABILITATION

Rehabilitation works during the reporting period were undertaken within Open Cut 2, Open Cut 4, 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 2022 is detailed in the currently approved 2020-2022 MOP (as amended) dated October 2021. The status of proposed activities at the end of 2022 are provided in **Figure 5**.

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 2022 will primarily focus on ML1605, ML1715, EL6288 and EL7073, with some exploration required within ML1628. 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 Conduct Exploration Activities.

4.3.2 LAND DISTURBANCE

During the next reporting period, approximately 369ha 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 and Underground 4 surface infrastructure. Construction activities include:

- Completion of the Underground 4 Remote Services Infrastructure Area
- Upgrade of the Water Treatment plant and associated infrastructure
- Upgrade works associated with the CHPP
- Construction of water management infrastructure;

4.3.4 MINING OPERATIONS

Mining operations for the next period are shown in **Figure 5** and include:

- Drilling and blasting select overburden and coal;
- Overburden removal from OC3 and OC4 using dozer, excavator and truck fleets;
- Overburden removal from OC4 using cast and dozer push;
- 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 operations at UG1 in LW105
- Commencement of longwall operations in UG4 LW401 and LW402.

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 Moolarben 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 will include landform establishment, growth medium development, ecosystem and landuse establishment and rehabilitation maintenance if required.

Figure 3: Land preparation areas

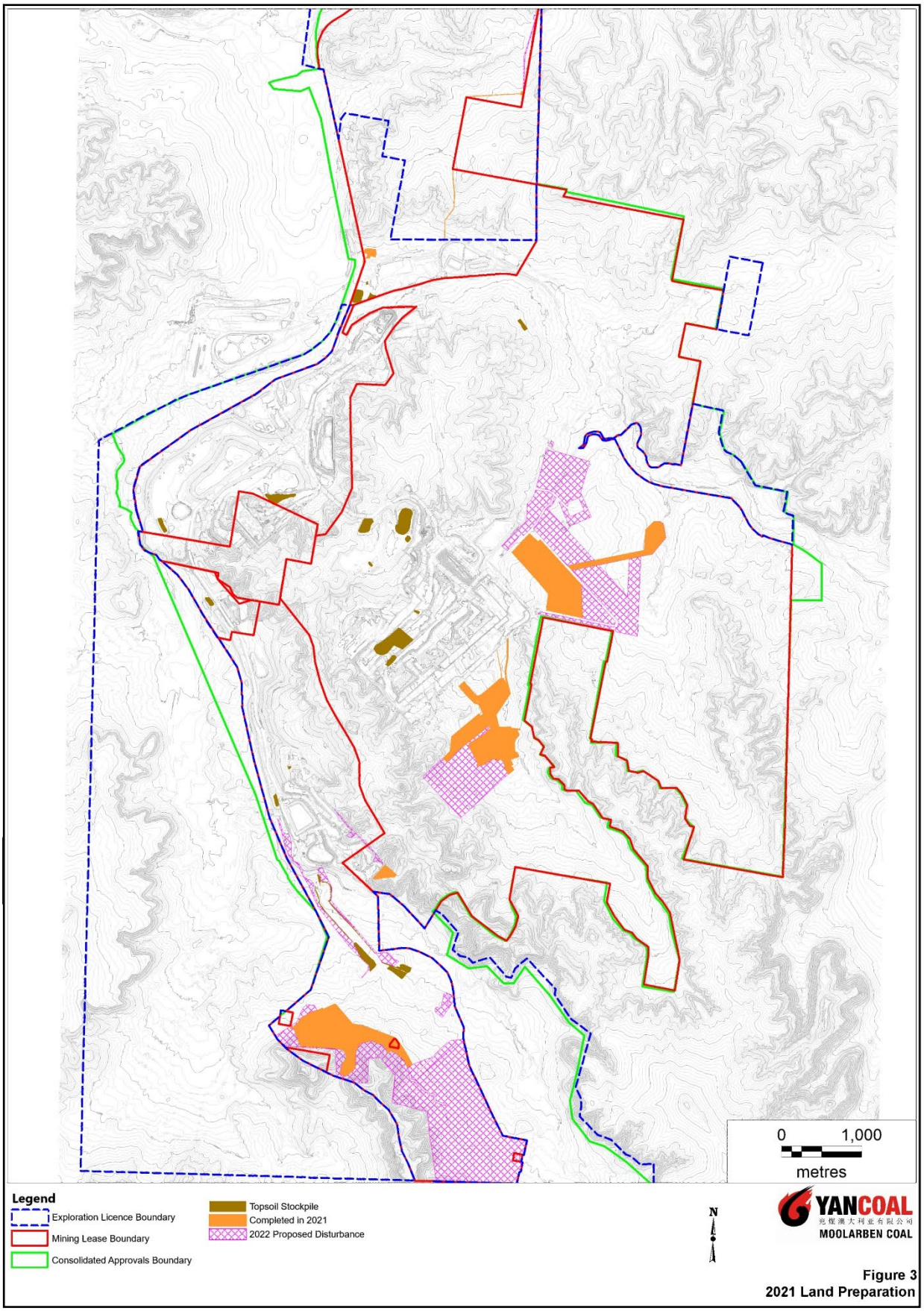


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Figure 4: Mining activity areas during the reporting period

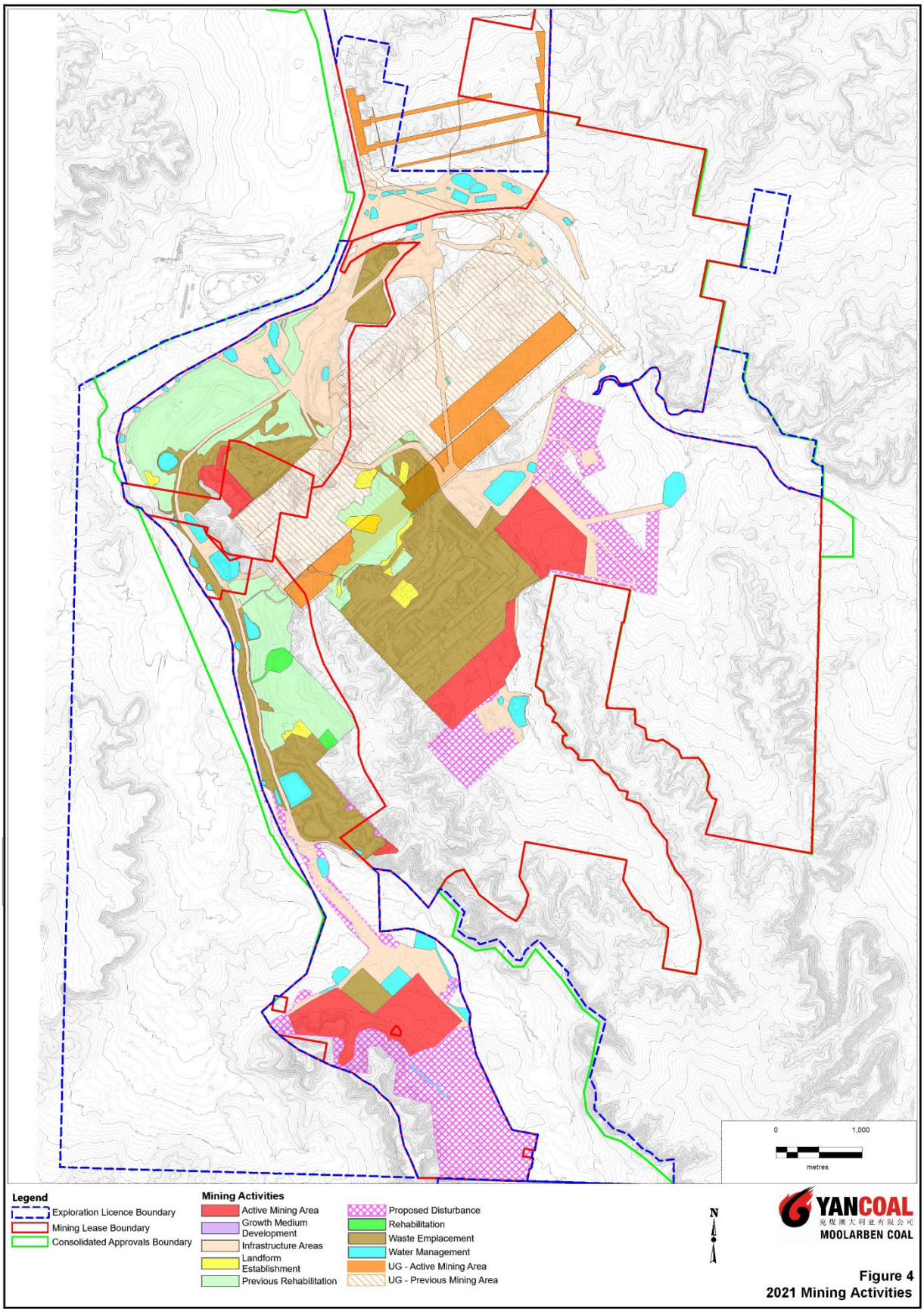
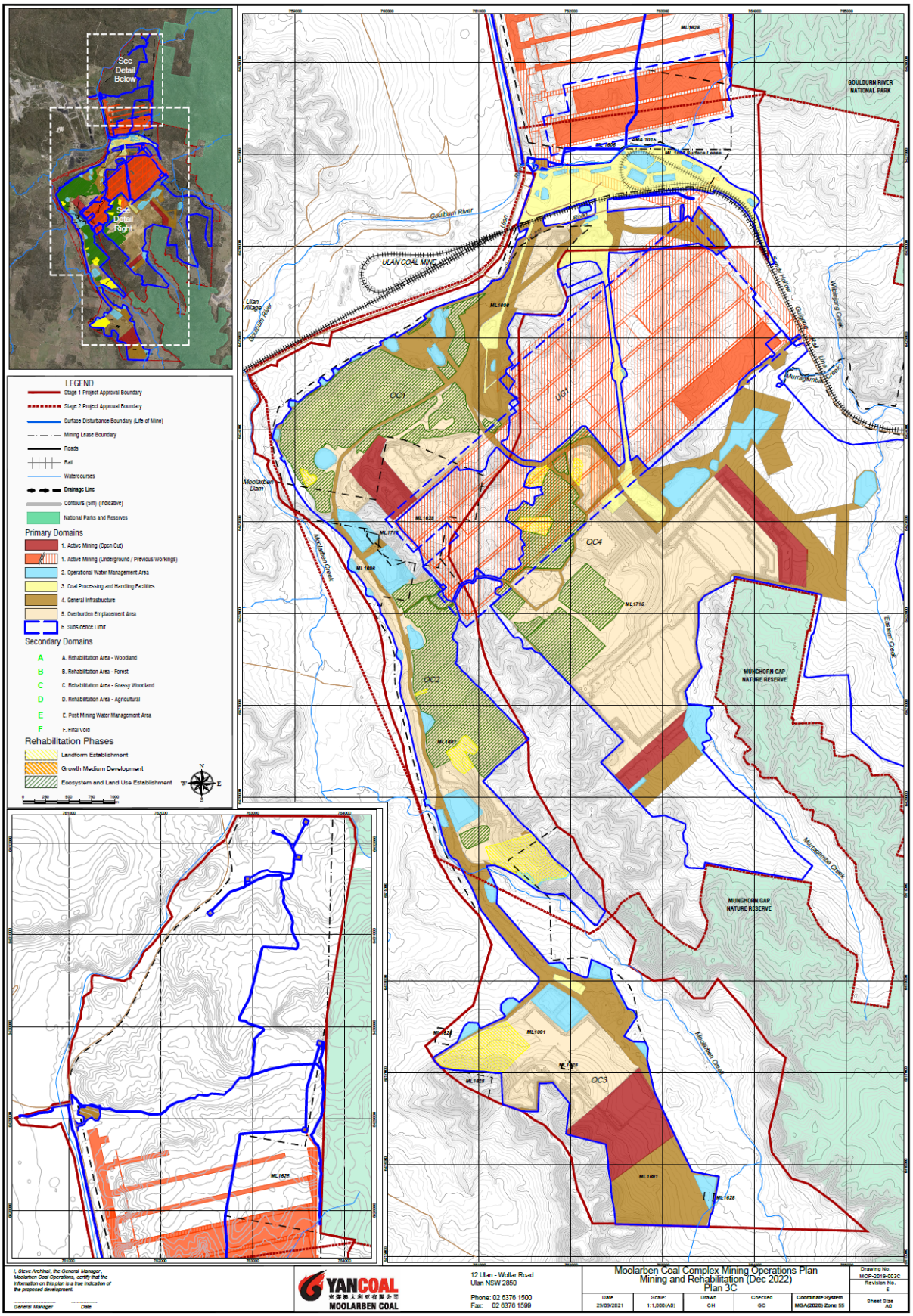


Figure 5: Mining Activities for the next reporting period (MOP Plan 3C)



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5.0 ACTIONS REQUIRED FROM PREVIOUS REPORTING PERIOD

The 2020 AR was submitted to the RR and DPIE on the 31 March 2021 in accordance with Schedule 5 Condition 4 of PA05_0117 and Schedule 6 Condition 4 of PA08_0135. The 2020 AR was accepted and approved by the DPIE on the 19 April 2021. On the 15 July 2021, the RR notified MCO that they will not be conducting a detailed review of the 2020 AR or providing a confirmation of satisfaction. However, the RR noted that they were conducting a series of Targeted Assessment Programs and Proactive Inspection Programs and the 2020 AR may be subject of review as part of these programs.

There were no actions issued to MCO in regards to the 2020 AR, and the 2020 AR was placed on the MCO website within one month of approval.

Actions outlined by MCO in the 2020 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 and revision of Biodiversity Management Plans.	MCO	Biodiversity MP revised. Action Ongoing	Section 6.5
Review PZ58a triggers as part of next Groundwater Management Plan Review.	MCO	Action Ongoing	Section 7.4
Continued progressive rehabilitation.	MCO	Action Ongoing	Section 9
Development of Extraction Plan for Underground 4 LW401-408	MCO	Submitted for approval	Section 8
Establish baseline monitoring sites for LW105 where not already in place.	MCO	Complete	Section 8
Undertake Independent Audit	MCO	Complete	Section 11

6.0 ENVIRONMENTAL PERFORMANCE

In accordance with the MCC Project Approvals, MCO have 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

In order 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 2021 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 (installed December 2020). 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 2021 are summarised in **Table 10**. A total of 899.4mm of rainfall was recorded in 2021, with November the wettest month (207.0mm) and April the driest (3.8mm). The total rainfall at MCO for 2021 was 249.1mm above the annual average rainfall at the Gulgong Post Office of 650.3mm but below the 2020 total of 939.8mm.

Temperature recorded at WS03 ranged from -4.5°C in July to 36.5°C in January. The lowest minimum temperature of -4.5°C was slightly colder than the lowest minimum of -3.9°C recorded in 2020. The highest maximum temperature of 36.5°C was noticeably less than the highest maximum temperature of 43.0°C recorded in 2020.

From January to March and then October to December north east and easterly winds were predominant with south westerly and southerly winds predominant from April to September. 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-21	37	37	70.2	36.5	7
Feb-21	107.4	144.4	61.6	32.1	8.9
Mar-21	146.8	291.2	56.5	32	7.3
Apr-21	3.8	295	43.9	28.6	-0.9
May-21	16	311	44.4	24	-3.8
Jun-21	91.6	402.6	50.6	21.4	-1.6
Jul-21	84	486.6	48.8	21.3	-4.5
Aug-21	38.4	525	45.3	25.2	-1.5
Sep-21	51.2	576.2	47	26.4	-0.9
Oct-21	54.4	630.6	55.2	32.6	1.9
Nov-21	207	837.6	60.3	28.9	3.4
Dec-21	61.8	899.4	67.3	33.5	4.8
Total		**899.4**	**651.2**		

6.2 NOISE

MCO manages noise in accordance with the MCO Noise Management Plan (NMP) (Version 5). The NMP was 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 2021 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 2021, 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 consistently 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, dogs, 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 2021 during the day time period shows that MCO was inaudible during 83% of the samples, with no exceedances of criteria. Monitoring at NA6 Lower Ridge Road between 2012 and 2021 during the night period shows that MCO was inaudible during 21% of the samples, with no exceedances. Attended noise monitoring completed at NA12 Winchester Crescent between 2012 and 2021 during the night period shows that MCO was inaudible during 47% 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 during 35% and 77% of the samples respectively, 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 2021 as required by the NMP. Quarterly monitoring was completed at NA11 during 2021 as required by the NMP. Annual monitoring was undertaken at the two required noise compliance locations (GRNP & MGNR) during 2021 as required by the NMP. There were no recorded noise exceedances during the 2021 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 2021. The 2021 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[4]	NA	NA	NA	NA
February	NA	NA	NA	NA	NA	NA
March	NC[2]	NC[3]	NA	NA	NC[3]	NA
April	NA	NA	-11[2]	NA	NA	-13[2]
May	NA	NA	NC[2]	NA	NA	NC[2]
June	NA	NA	NA	NA	NA	NA
July	NA	NC[4]	NC[3]	NA	NA	NC[3]
August	NA	NA	NC[2]	NA	NA	NC[2]
September	NA	NA	NA	NA	NA	NA
October	NC[2]	NA	NC[2]	NA	NA	NC[2]
November	NA	NA	-20[3]	NA	NA	-22[3]
December	NC[2]	NA	NC[2]	NA	NA	NC[2]

[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.
[2.] Wind conditions assumes winds at speeds between 0.5 and 3 m/s during monitoring and assumes the following possible predicted wind directions: 45°-112.5° or 180°-270° Celsius.
[3.] Strong Inversion of 5.2° Celsius per 100 m altitude or greater.
[4.] Calm conditions assumes winds at speeds between 0.0 and 0.5 m/s.

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**. No exceedances 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	179	Compliant
Days with >2 blasts (PA05 Sch 3 C 10)	0[1]	Compliant
Annual average blasts per week	3.44	Compliant
Blasts outside blasting hours	0	Compliant
Airblast Overpressure >115 dB(Lin Peak) [2]	6[3]	Compliant (3%)
Airblast Overpressure >120 dB(Lin Peak)	0	Compliant
Ground Vibration >5 mm/s [2]	0	Compliant (0%)
Ground Vibration >10 mm/s	0	Compliant
Reportable Fume Events	0	Nil

[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] Six blast events recorded in exceedance of 115dBL during the reporting period – one at BM1 located at Ulan School and five at BM8 (located on MCO owned land) that were wind and/or storm affected.

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 2021 reporting period • **BM1 – Ulan School** ○ Max. Overpressure = 116.8 dBL ○ Max Ground Vibration = 0.34 mm/s ○ Average Ground Vibration = 0.13 mm/s • **BM5 – Ridge Road** ○ Max. Overpressure = 113.6 dBL ○ Max Ground Vibration = 0.73 mm/s ○ Average Ground Vibration = 0.19 mm/s • **BM8 – Moolarben Road** ○ Max. Overpressure = 114.5 dBL ○ Max Ground Vibration = 0.82 mm/s ○ Average Ground Vibration = 0.12 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 2021 blast results to the 2020 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 2020, 2021 and EA

Site	EA Vibration Predictions (mm/s) [2]	2020 vibration range (mm/s)	2021 vibration range (mm/s)	Comment on results
BM1 Ulan School	2.1	0.03 – 0.67	0.03 – 0.34	Generally lower than previous results and predictions.
BM5[3] Ridge Rd	3.0	0.03 – 0.78	0.01 – 0.73	Generally consistent previous results and lower than predictions.
BM8 Moolarben Rd	3.7	0.03 – 0.47	0.01 – 0.82	Generally consistent previous results and lower than predictions.
Site	**EA Overpressure (dBL) [2]**	**2019 Overpressure range (dBL)[1]**	**2020 Overpressure range (dBL)[1]**	**Comment on results**
BM1 Ulan School	112	78.6 – 116.4	81.8 – 116.8	Generally consistent with previous results and predictions.
BM5[3] Ridge Rd	114	77.7 – 109.2	72.8 – 113.6	Generally consistent with previous results and predictions.
BM8 Moolarben Rd	115	70.0 – 113.2	70.9 – 114.5	Generally consistent with previous results and 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 6** and **Figure 7**. 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.

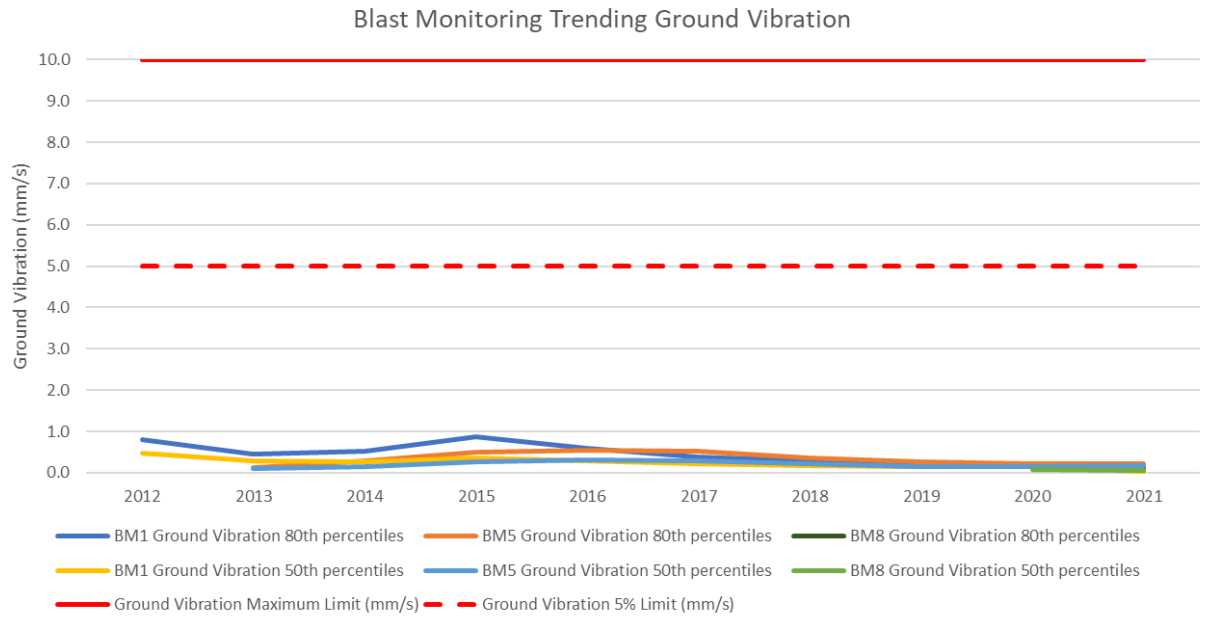


Figure 6 Blast Monitoring Trending Ground Vibration

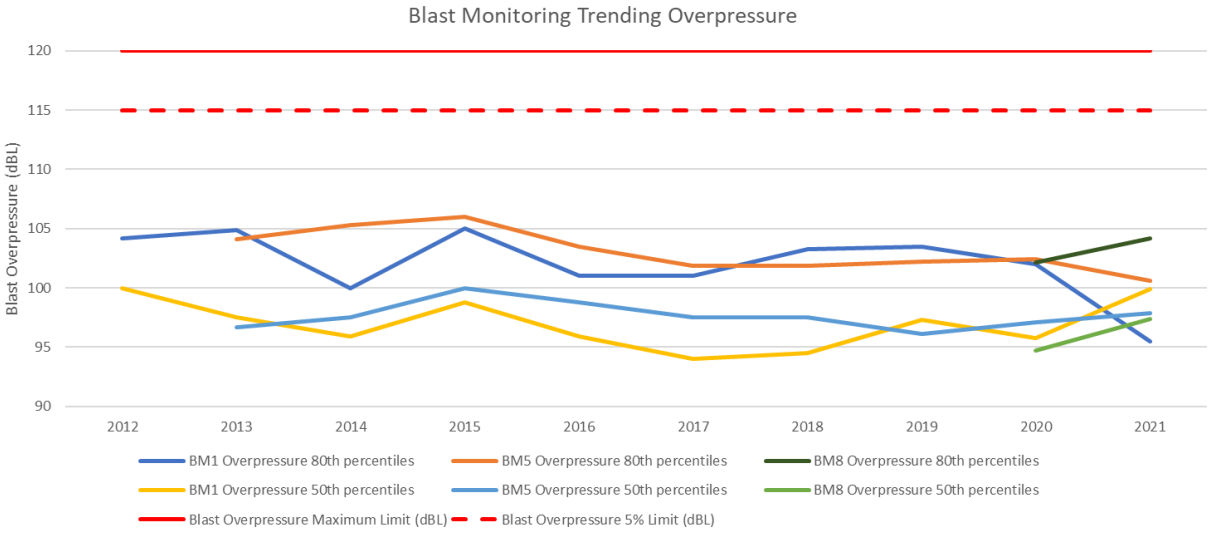


Figure 7 Blast Monitoring Trending Overpressure

6.4 AIR QUALITY

MCO manages air quality in accordance with Air Quality Management Plan (AQMP). The AQMP was 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;
- 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 2021 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 slight decreasing 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 2021 reporting period indicate a continued steady trend at all locations when compared to 2020.	
	$PM_{2.5}$	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 2021 reporting period indicate a stable trend when compared to 2020.	
	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 where calculated as being below the 90µg/m^3 criterion.	Annual average TSP results for the 2021 reporting period indicate similar results when compared to 2020 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	2021 Data Capture Rate
TEOM 01 (Ulan School)	99%
TEOM 04 (Ulan Road)	99%
TEOM 06 (Ulan-Wollar Road)	97%
TEOM 07 (Ulan Road)[1]	94%
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 2021 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/m^2/month)											
	Back-ground	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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	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
DG05^	1.8	0.8	1.0	2.0	0.8	1.3	1.5	1.8	1.5	1.3	0.9	1
DG09^	-	0.4	0.7	2.0	0.6	0.6	0.9	1.9	1.5	1.3	0.4	1

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

PM_{10}

A comparison of the 2021 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	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	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	17
Ulan-Wollar Road (TEOM06)	-[1]	-[2]	-[2]	-[2]	9.0	11.5	12.5	15.7	19.7	16.6	12.0	*
Ulan Road (TEOM07)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	11.2[3]	16.5	15.6	11.4	8.0	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	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	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
*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 2021 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 (**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	EA Prediction[5]
Ulan Road (TEOM07)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]	-[2]	5.8[3]	5.6	4.4	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	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	35
TEOM04 (Ulan Road)	0	22.25	27	31.75	22.5	29.0	37.9	46.8	50.1	35.3	28.5	37
TEOM06 (Ulan-Wollar Rd)	-[1]	-[2]	-[2]	-[2]	22.5	28.8	31.4	39.3	49.3	41.5	30.0	*
TEOM07 (Ulan Road)	-[1]	-[2]	-[2]	-[2]	-[2]	-[2]	27.9[3]	41.3	39.0	28.5	20.0	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	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	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 2020-21 financial year. MCC Scope 1 and Scope 2 emissions calculated for the 2020-21 financial year was 278,320t CO_2-e. MCC Scope 1 and Scope 2 emissions calculated for the 2019-20 financial year was 272,971t CO_2-e. The approximate 2% increase in emissions can be attributable to an increase in production. Scope 1 and Scope 2 emissions attributable to MCO are generally consistent with Environmental Assessment predictions.

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;
- 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 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.

During the reporting period over eight (8) kilometres of redundant fencing was removed from MCO offsets. Track maintenance and upgrades were completed on over nine (9) kilometres of required access and bushfire management trails. Revegetation works were continued within the offsets with over 68,000 stems planted to supplement natural regeneration within the Ulan 18, Bobadeen and Redhills Biodiversity Offset clusters.

6.5.2 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.

6.5.2.1 Offset Monitoring Results

Stage 1 offset areas monitoring
Floristic monitoring undertaken within the Stage 1 BOAs during Autumn and Spring 2021 recorded:

244 species were recorded across Area 1 BOA. This consisted of 190 native species, 44 exotic species and 10 species that could not be identified to species level nor confidently be determined as native or exotic species.

170 species were recorded across Area 2 BOA. This consisted of 140 native species, 20 exotic species and 10 species that could not be identified to species level nor confidently be determined as native or exotic species.

220 species were recorded across Area 3 BOA. This consisted of 183 native species, 23 exotic species and 14 species that could not be identified to species level nor confidently be determined as native or exotic species.

Overall, the condition of Stage 1 MZ1 sites compare favourably with analogue sites. The majority of areas had an overall ranking of high or moderate; with overall condition being similar to analogue

sites. An assessment of Site Value Scores (SVS) over the monitoring period demonstrated an overall improvement in biodiversity values within MZ1 areas within Area 1 BOA. Generally, biodiversity values have also been maintained within MZ1 areas within the Area 2 and Area 3 BOA.

The Blakely's Red Gum Grassy Woodland in MZ2 of the Area 1 and Area 3 BOAs is showing good progress towards benchmark conditions with low exotic cover and Native Groundcover (NGC) and NMC attributes meeting benchmark values. NSD and NTC were also approaching benchmarks in Area 1 BOA, in part due to maturing revegetation plantings. Canopy cover was improving at one site in Area 3 BOA and absent at the other site in MZ2, but all other conditions are good and there is no apparent hindrance to natural regeneration at this site.

The fauna monitoring undertaken within the Stage 1 BOAs during spring 2021 identified a total of 95 fauna species were recorded at Area 1 BOA, made up of 71 birds, eight positively identified microbats, five other mammals (two of which were introduced species), five amphibians and six reptiles. Four threatened bird species and two threatened microbats were recorded within this BOA.
A total of 55 fauna species were recorded at Area 2 BOA, made up of 39 birds, nine positively identified microbats, five other mammals, one amphibian and one reptile. Two definitely recorded threatened microbat species were recorded within this BOA.
A total of 56 fauna species were recorded at Area 3 BOA, made up of 39 birds, seven positively identified microbats, seven other mammals, two amphibians and reptile. One threatened bird species and two definitely recorded threatened microbat species were recorded within this BOA.

Stage 1 Mod 9 offset areas monitoring.

Floristic monitoring undertaken within the MOD 9 BOAs during Autumn and Spring 2021 recorded:

- 190 species were recorded across Bobadeen BOA. This consisted of 115 native species, 58 exotic species and 17 species that could not be identified to species level nor confidently be determined as native or exotic species.
- 163 species were recorded across Clarke BOA. This consisted of 135 native species, 19 exotic species and 9 species that could not be identified to species level nor confidently be determined as native or exotic species.
- 119 species were recorded across Clifford BOA. This consisted of 95 native species, 16 exotic species and 8 species that could not be identified to species level nor confidently be determined as native or exotic species.
- 150 species were recorded across Elward BOA. This consisted of 120 native species, 23 exotic species and 7 species that could not be identified to species level nor confidently be determined as native or exotic species.
- 144 species were recorded across Moolarmoo BOA. This consisted of 95 native species, 33 exotic species and 16 species that could not be identified to species level nor confidently be determined as native or exotic species.
- 84 species were recorded across Property 5 BOA. This consisted of 53 native species, 27 exotic species and four species that could not be identified to species level nor confidently be determined as native or exotic species
- 97 species were recorded across Property 24 & 25 BOA. This consisted of 68 native species, 25 exotic species and four species that could not be identified to species level nor confidently be determined as native or exotic species.

In general, the overall objective of maintaining vegetation structure has been achieved. Most MOD 9 MZ1 sites ranked well for Native Species Diversity (NSD), NGC and exotic cover. Key feed species for Koala were recorded naturally regenerating at all MOD 9 BOAs with key feed species for Regent Honeyeater and Swift Parrot also recorded as naturally regenerating at Bobadeen, Clarke and Property 5 BOAs.

The lack of NTC and NMC is the main reason why most MZ2 areas have not met all completion criteria in 2021. Although some NTC was recorded at two sites at Bobadeen, one site at Clarke and the site at Elward, the remaining 13 sites recorded no NTC or NMC. However, natural regeneration of canopy species is occurring across MZ2 areas of all BOAs. These trees are not yet large enough to contribute to NMC or NTC. However, it is noted that revegetation works have commenced at Bobadeen, Property 5, and Property 24 & 25 BOA's.

The total bird and microbat species assemblages recorded across both MZ1 and MZ2 sites indicated that the majority of BOAs contain overall similar bird and microbat species assemblages between MZ1 and MZ2 sites, with MZ2 sites recording a range of typically woodland species, as well as multiple threatened species. The BOAs on the whole are providing habitat for a wide range of woodland/forest indicator birds and that in some BOAs at least, there is still connectivity between remnant patches within and surrounding BOAs.

Stage 2 offset areas monitoring.

Floristic monitoring has continued to be undertaken within the Stage 2 BOAs during Autumn and Spring 2021. Monitoring has been undertaken general in accordance with the 2008/4444 EPBC BioMP.

- All Consolidated Offset Outcome 1(a) woodland/forest areas recorded natural regeneration of dominant mature trees and less than 15% cover of high threat exotic species.
- All Consolidated Offset Outcome 1(a) DNG areas at Libertus and Ulan 18 BOA recorded natural regeneration of overstorey species and less than 15% cover of high threat exotic species.
- All Consolidated Offset Outcome 1(a) DNG areas at Dun Dun East, Dun Dun West and Onsite Offset BOAs recorded less than 15% cover of high threat exotic species. However, only some areas recorded natural regeneration of overstorey species.
- All Consolidated Offset Outcome 1(b) woodland areas within Dun Dun East, Libertus, Old Bobadeen, Onsite Offset and Ulan 18 BOAs recorded evidence of natural regeneration of overstorey species representative of Box Gum Woodland EEC, evidence of flowering and seeding of shrub and groundcover species that are representative of Box Gum Woodland EEC, shrub cover not exceeding 30%, and less than 15% cover of high threat exotic species.
- Consolidated Offset Outcome 1(b) woodland areas at Dun Dun West recorded a large population of *Nassella trichotoma*, within one site and in the surrounding area.
- Consolidated Offset Outcome 1(b) DNG areas at Dun Dun East BOA recorded evidence of flowering and seeding of shrub and groundcover species that are representative of Box Gum Woodland EEC, shrub cover not exceeding 30%, and less than 15% cover of high threat exotic species.
- Consolidated Offset Outcome 1(b) DNG areas monitored in autumn at Old Bobadeen BOA recorded evidence of flowering and seeding of shrub and groundcover species that are representative of Box Gum Woodland EEC, and shrub cover not exceeding 30%.
- Consolidated Offset Outcome 2(c) areas at Old Bobadeen and Onsite Offset BOA recorded high threat exotic species less than 15% cover at all monitoring sites.

6.5.3 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 2021, 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

During the reporting period the MCO Bushfire Management Plan was reviewed and updated. 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 22**. During the reporting period 74% 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 22: Waste Removal Volumes removed during the reporting period

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

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 5) and Groundwater Management Plan (GWMP) (Version 4) were approved in October 2020.

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 completed construction of 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 2021), as well as a prediction for the next reporting period (1 January to 31 December 2022) is provided in **Table 23**. Water take is provided in six monthly periods to coincide with the water year (i.e. 1 July 2020 to 30 June 2021).

Table 23: Water Licences and Take

Water Access Licence	Description	Available Water (Units) [1]	2021 Estimated Water take (ML)[2]			2022 Forecast Water Take (ML)
			Jan - Jun	Jul - Dec	Total	
36340 37583	Wollar Creek Water Source	436	15	121	136	150
37582 & 41888	Upper Goulburn River Water Source	389	5	7	11	24
39799	Sydney Basin - North Coast Groundwater Sources	5,900	1,563[3]	1,702[3]	3,285[3]	3,486

[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 UG4 extraction plan. The estimated water take during the 2021 calendar year has been summarised in **Table 23**.

The available water for 2020/21 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 24**) for the reporting period was prepared with input from suitably qualified and experienced consultants WRM and AGE. Site water storage increased by 601ML 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 174ML (2.8%).

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

Table 24: Site Water Balance

Water Sources (Inflows)	Volume (ML)
UCML Water	0
Groundwater Extraction (bores)	0
Rainfall / runoff	2,926
Groundwater inflows	3,285
Total	6,211
Water Loss (Outflows)	
Evaporation	651
Seepage	0
Construction & dust suppression	900
Licensed Discharge	3,097
CHPP Demand	889
Underground demand	246
Total	5,783
Water Balance	
Inflows minus outflows	428
Change in inventory	601
Balance	-174 (2.8%)

7.3 SURFACE WATER

7.3.1 SURFACE WATER QUALITY AND FLOWS

7.3.1.1 Surface Water Flows

The Moolarben Coal Complex 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 through 2021. The findings are described in **Section 7.3.1.3** below. Water quality data for the period is presented in **Figure 8, Figure 9** and **Figure 10**. Monitoring data is provided in **Appendix 3F**.

Figure 8: Goulburn River Water Quality

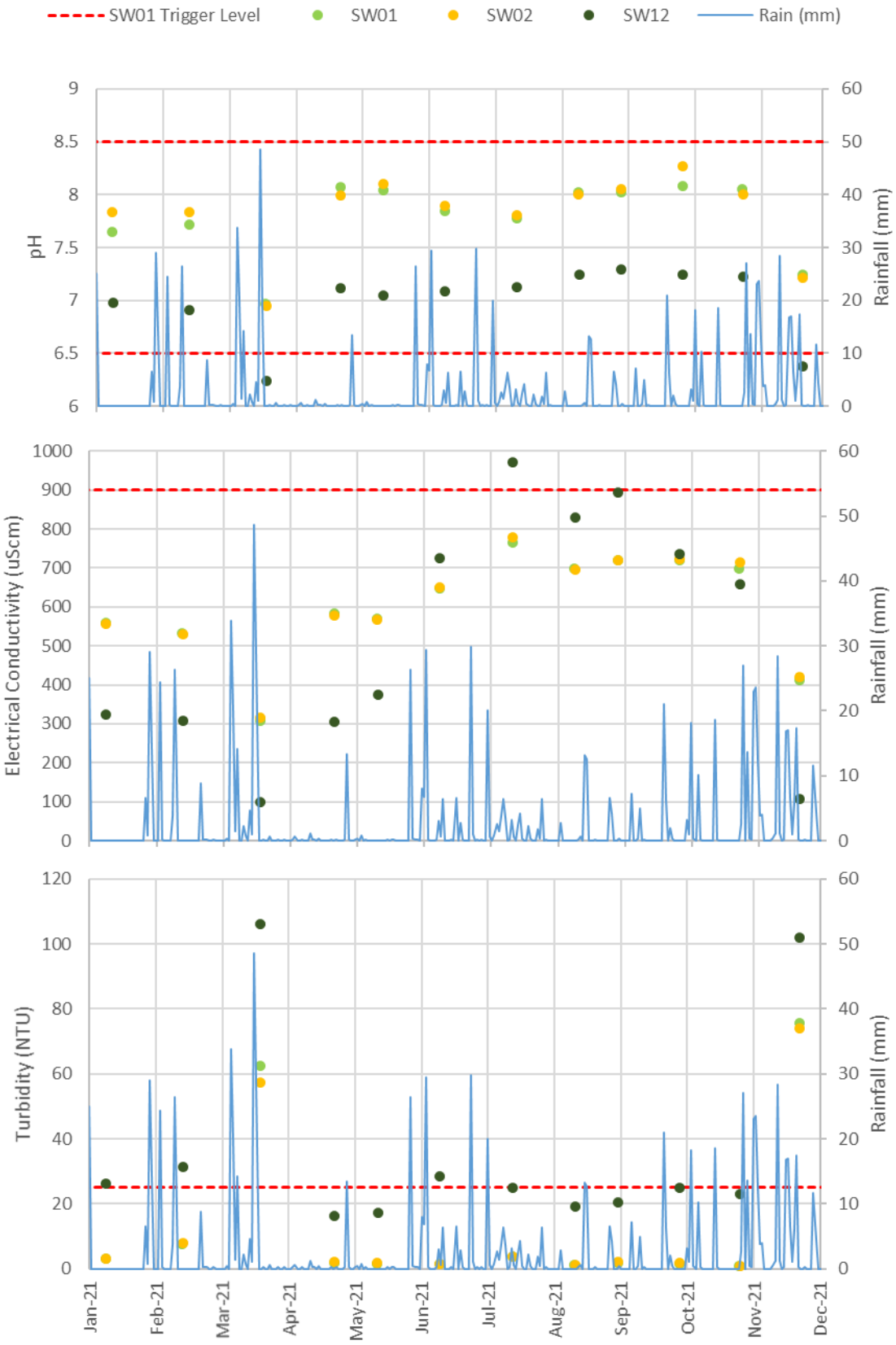


Figure 9: Moolarben and Lagoon Creek Water Quality

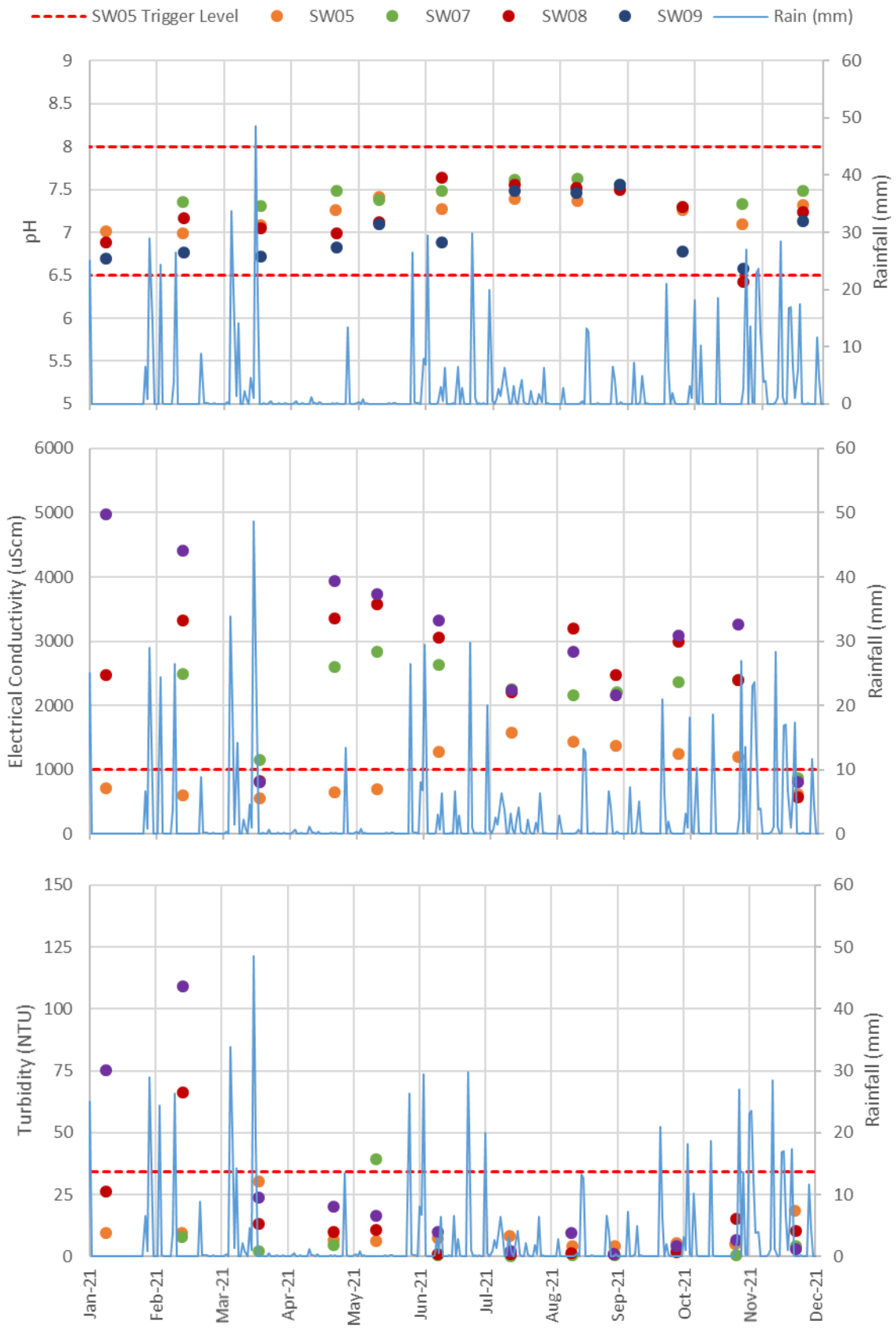
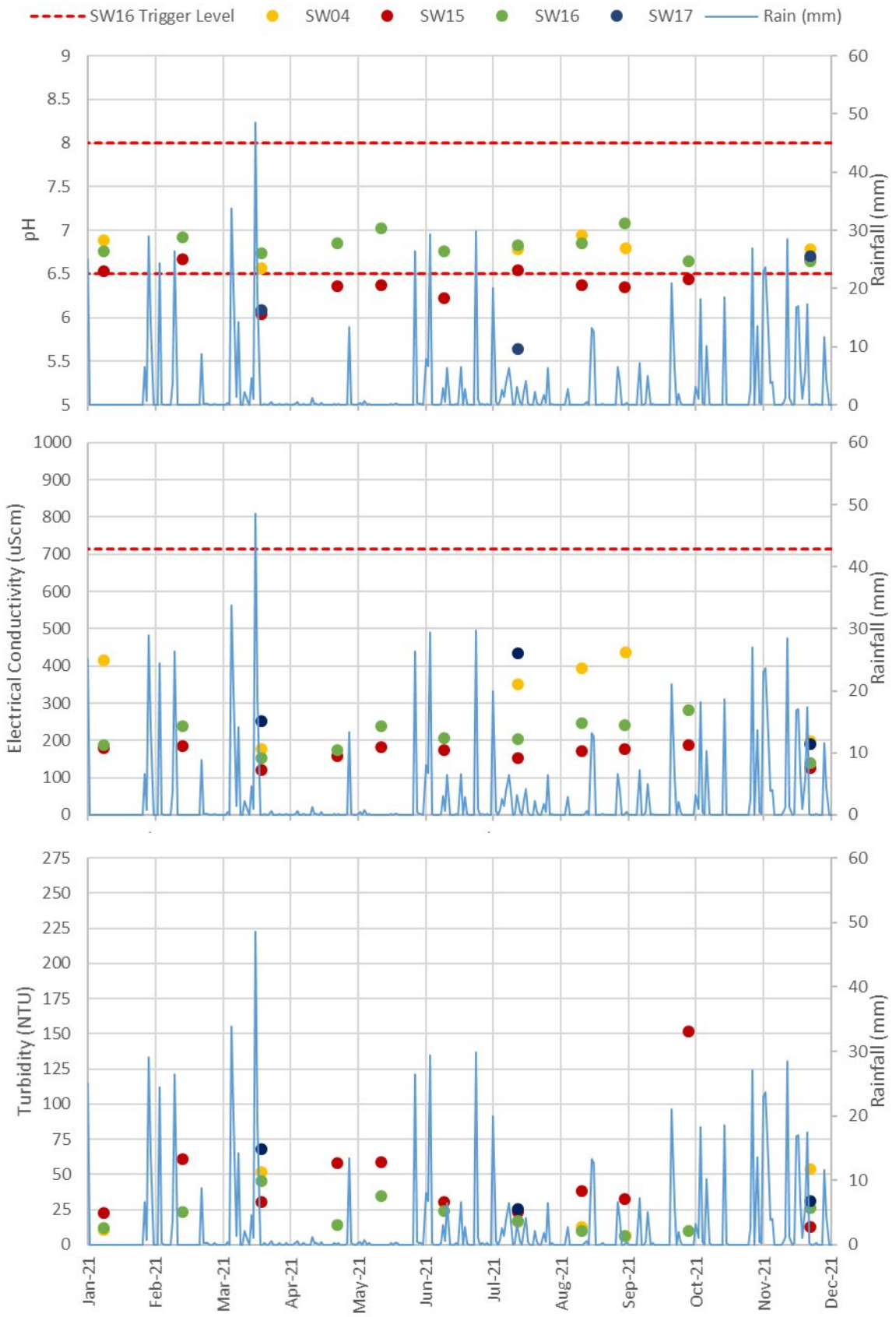


Figure 10: Murragamba, Eastern and Wilpinjong Creek Water Quality



7.3.1.3 Comparison to baseline and trends

Location	Trigger Investigation Values (20th / 80th %ile)		Performance during the Monitoring Period (01/01/2021 - 31/12/2021)	Trend/ Key Management Implications (Monitoring Period 01/01/2017 - 31/12/2021)	Implemented / proposed Management Action
Surface Water Quality					
Goulburn River Sites; SW01* SW02 SW12	PH	*6.5 - 8.5*	Surface water pH in the Goulburn River ranged from 6.9 to 8.0 (20%ile and 80%ile) during 2021. Readings were similar to historical data. All SW01 results were within the current trigger levels during the period. Slightly lower than historic pH levels at SW12 were observed during March and December.	pH readings range between 7.2 and 8.0 (20%ile and 80%ile) for SW01 and SW02 and between 6.8 and 7.4 (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 305 to 811 (20%ile and 80%ile) during the reporting period. EC readings at SW12 in July (971 µS/cm), August (830 µS/cm) and September (893 µS/cm) exceed the 80th percentile for 2021. All SW01 results were below the current applicable trigger levels.	EC readings range between 509 and 814 µS/cm (20%ile and 80%ile) for SW01 and SW02 and between 323 and 623 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 2021 in the Goulburn River were generally consistent with historical data, however there were some elevated readings at all three locations in March, and December. In each case, the Turbidity at the downstream sites (SW01 and SW02) was less than the upstream (SW12).	Turbidity readings range between 0.5 and 7.3 NTU (20%ile and 80%ile) for SW01 and SW02 and between 5.9 and 26.5 NTU (20%ile and 80%ile) for SW12. The turbidity readings for all three monitoring locations are generally below the SW01 trigger level (25 NTU), except for a number of readings in 2017, 2020 and 2021. The exceedances at SW01 coincide with elevated turbidity upstream at SW12 and are likely due to natural flow conditions.	
	PH	*6.5 – 7.7*	Surface water pH in the Moolarben and Lagoon creeks ranged from 6.7 to 7.6 (20%ile and	pH for all four monitoring locations was neutral to slightly alkaline ranging from 6.4 to 7.8 (20%ile and 80%ile). The majority of the SW07 samples in	

Location	Trigger Investigation Values (20th / 80th %ile)		Performance during the Monitoring Period (01/01/2021 - 31/12/2021)	Trend/ Key Management Implications (Monitoring Period 01/01/2017 - 31/12/2021)	Implemented / proposed Management Action
Moolarben and Lagoons Creek Sites; SW05* SW07 SW08 SW09			80%ile). Readings were generally within the historical range.	early 2017 were above the SW05 high trigger level for Moolarben Creek, but within the SW05 trigger levels in 2020 and 2021. 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.	
	EC	*1,000*	The EC readings at SW05 between June and November were above the SW05 trigger level (between 1,207 and 1,608 µs/cm), coinciding with a period of lower flow. This was caused by spillway overflows, releases and seepage from Moolarben Creek Dam, which contained higher EC water from the upstream catchment. Surface water EC in the upstream sites ranged from 2,160 to 3,892 µs/cm (20%ile and 80%ile) during 2021.	EC readings at SW05 range between 477 and 839 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 1,878 and 4,562 µS/cm (20%ile and 80%ile).	
	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 5.5 NTU, while the 80th percentile ranges between 13.1 and 32.1 NTU. There are several recordings that exceed the trigger level during 2019, 2020 and early 2021, however they are generally associated with rainfall events or low flow conditions. There is no discernible trend in turbidity at these locations over the last five years.	
Murragamba, Eastern and	PH	*6.5-8.0*	Surface water pH in the Murragamba, Eastern and Wilpinjong Creek ranged from 5.8 to 6.9 (20%ile and 80%ile). Readings were generally within the historical range. There were a	pH readings range between 6.7 and 7.7 (20%ile and 80%ile) for Murragamba Creek (SW04). Wilpinjong Creek (SW15, SW16 & SW18) has pH ranging between 6.2 and 7.1 (20%ile and 80%ile).	

Location	Trigger Investigation Values (20th / 80th %ile)		Performance during the Monitoring Period (01/01/2021 - 31/12/2021)	Trend/ Key Management Implications (Monitoring Period 01/01/2017 - 31/12/2021)	Implemented / proposed Management Action
Wilpinjong Creek Sites; SW04 SW15 SW16* SW17 SW18			number of pH readings at SW15, SW17 and SW18 which were just below the lower pH limit for SW16, including a single low reading at SW17 in July (5.6). SW17 has historically had slightly lower pH than Murragamba and Wilpinjong Creeks.	Eastern Creek (SW17) has a pH ranging between 5.7 and 6.8 (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 174 to 241 (20%ile and 80%ile) for SW16. All SW16 EC readings were within the trigger level and consistent with historical records.	The EC in Murragamba Creek ranges between 315 and 729 µS/cm (20%ile and 80%ile) for SW04. Wilpinjong Creek has EC ranging between 159 and 431 µS/cm (20%ile and 80%ile). Eastern Creek has EC ranging between 70 and 546 µS/cm (20%ile and 80%ile). There is no discernible trend in EC at these locations over the last five years.	
	Turbidity	*ND*	Turbidity readings were all consistent with the historical data.	Murragamba Creek has turbidity readings between 10 and 53 NTU (20%ile and 80%ile). Wilpinjong Creek has a turbidity ranging between 9 and 67.4 NTU (20%ile and 80%ile). Eastern Creek has a turbidity ranging between 41 and 148 NTU (20%ile and 80%ile). There is no discernible trend in turbidity at these locations over the last five years.	

* Monitoring site associated with trigger investigation levels
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 seven 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 treated water from EPA Licenced Discharge Point 1. A total of 3,097 megalitres of treated water were released from MCO during 2021. All compliance limits were met during releases. Two Oil and Grease and Total Suspended Solids samples were not collected in accordance with EPL 12932. Discharge results are presented in
Figure 11, **Figure 12**, **Figure 13**, **Figure 14** and **Figure 15**. A summary of discharge results is provided in **Appendix 3F**.

During the reporting period one incident occurred that resulted in the release of sediment laden water at the MCC.

- During construction of Sediment Dam 413 (EPL Identification Point 33) a rainfall event resulted in the release of sediment water into Eastern Creek. The PIRMP was activated including notification to the EPA and other agencies and provision of a report. Water quality sampling was undertaken at the time of the event, with results showing water quality lower in electrical conductivity and higher in suspended solids than the Eastern Creek upstream and similar or lower than downstream. The dam was constructed to design specifications following the wet weather.

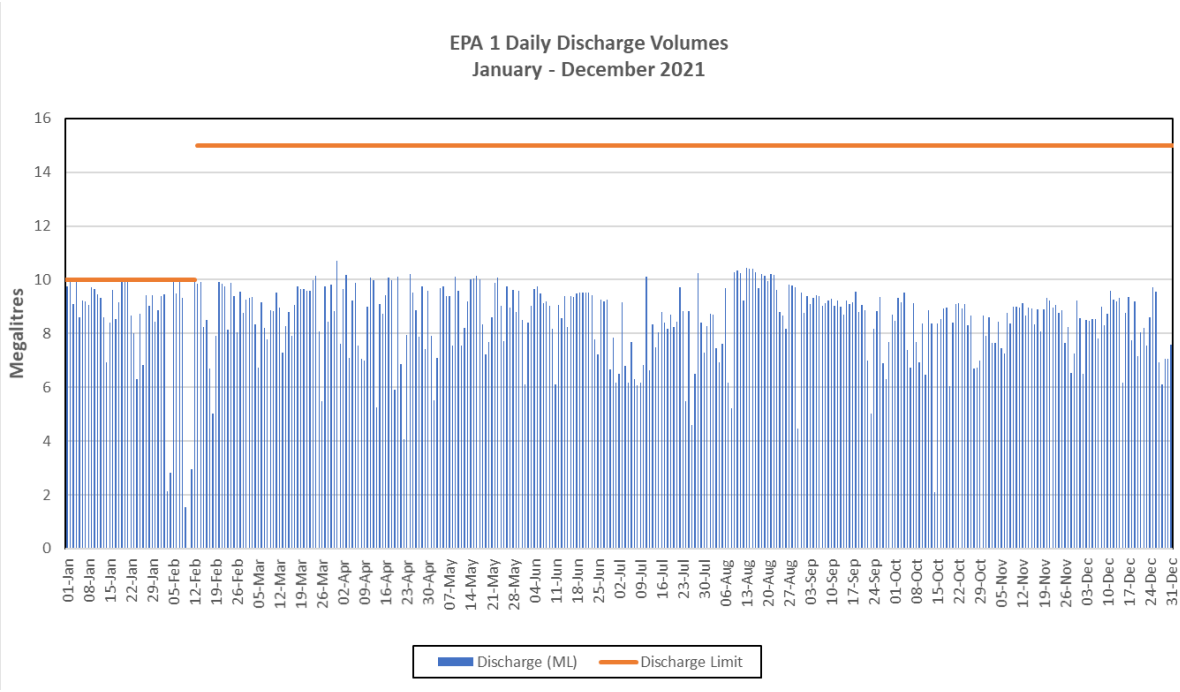


Figure 11 Daily Discharge Volumes[1] EPL Pt 1

1 As per the SWMP V5 October 2020 as operations commenced in UG4 the daily discharge volume limit increased to 15 ML/d.

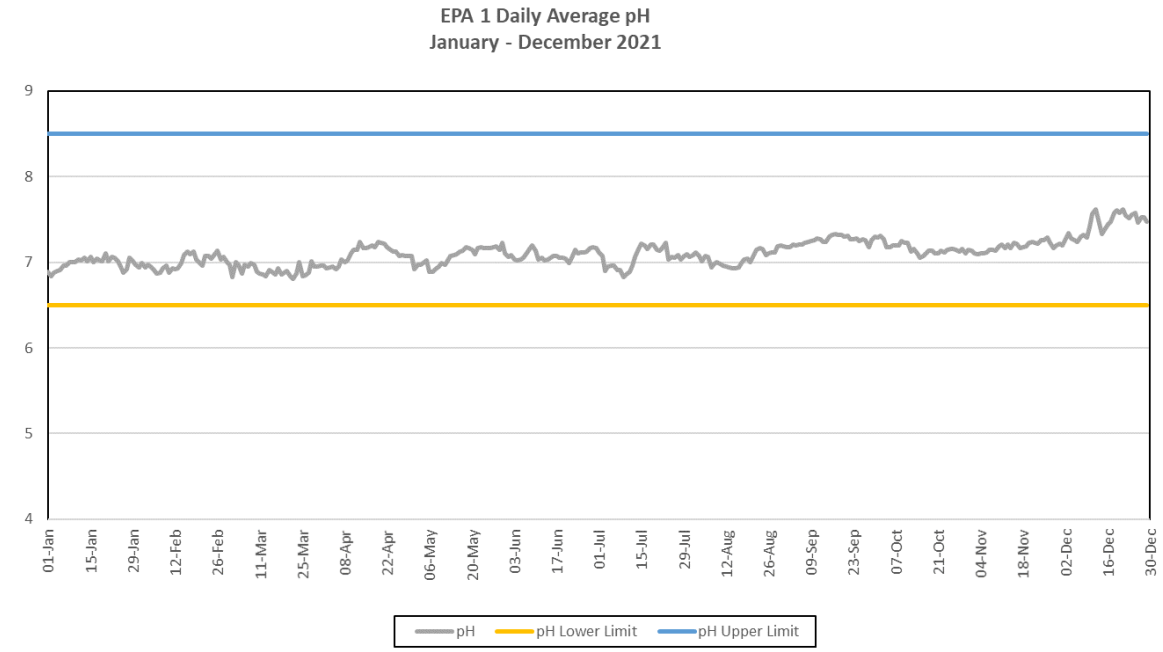


Figure 12: Daily Discharge pH

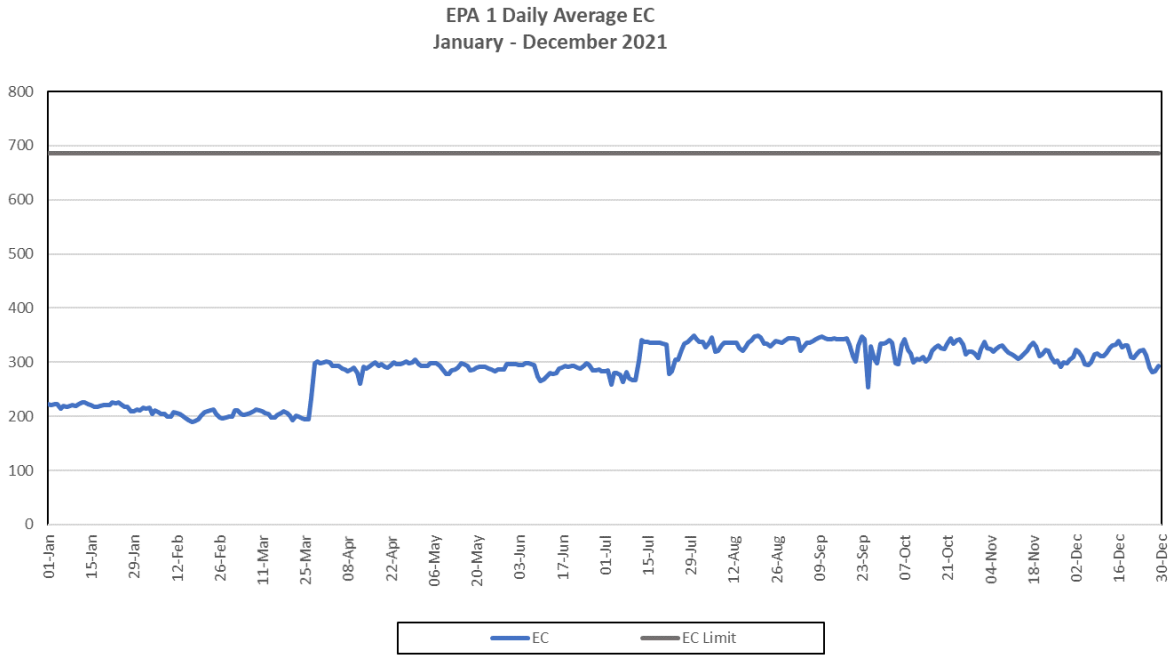


Figure 13: Daily Discharge EC (µs/cm)

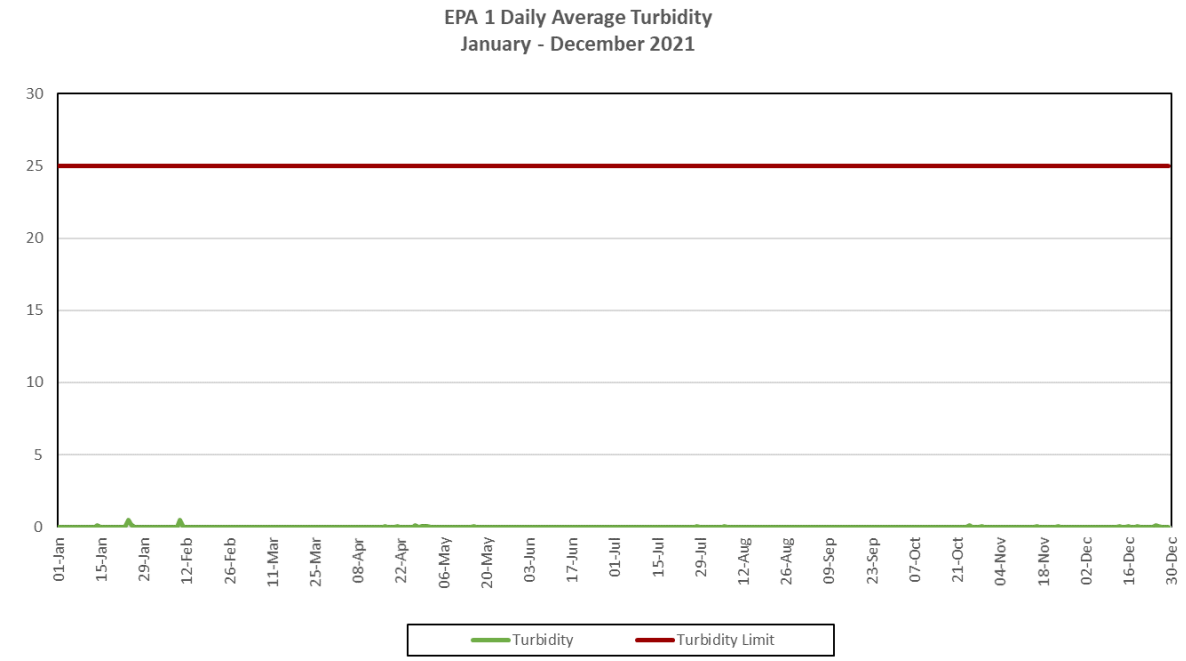


Figure 14: Daily Discharge Turbidity (NTU)

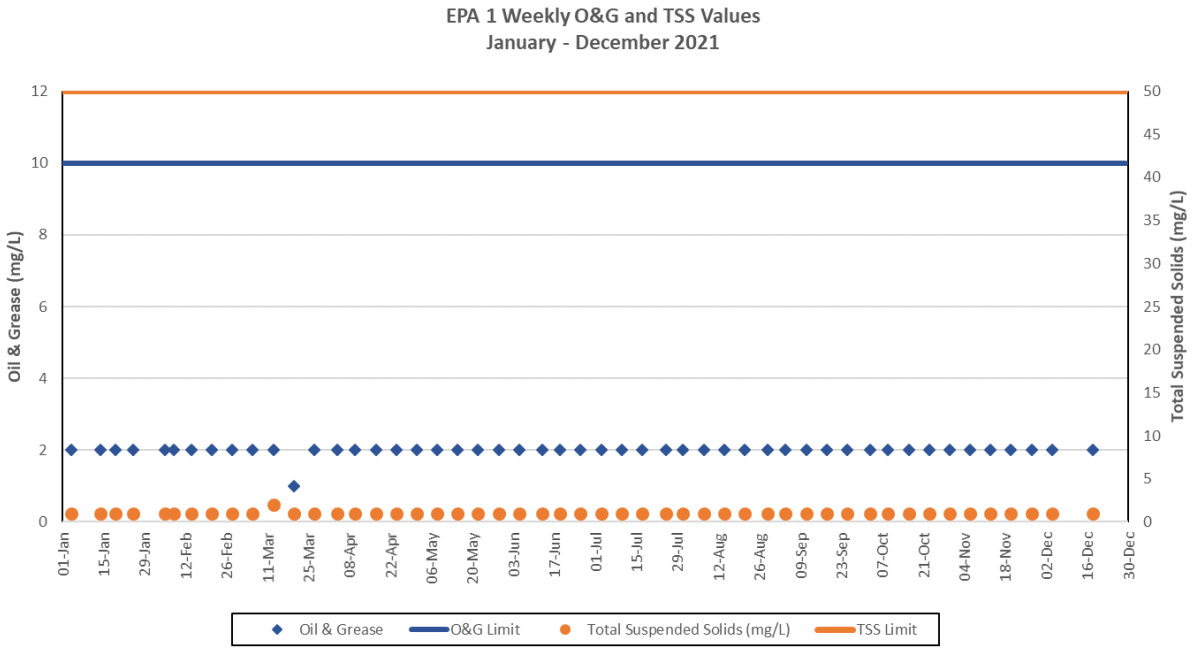


Figure 15: Weekly Discharge Oil & Grease and Total Suspended Solids (mg/L)

7.3.3 STREAM HEALTH MONITORING

Stream health monitoring was undertaken in Autumn and Spring 2021 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 2021

Rainfall activity over the period leading into the autumn 2021 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 2021 survey saw consistent light showers the overall quantity of rainfall was low. Sampling for the autumn 2021 stream health monitoring was undertaken between 20th and 22nd 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 2021 RCE values ranged between 46% and 80% over all monitoring sites (**Figure 3-e**). Compared to the previous spring 2020 survey, there were changes to RCE category scores at nine of the 15 monitoring sites, with most changes being attributable to changes in the composition of aquatic vegetation between surveys (at seven sites) or stream detritus (five sites). Wilpinjong Creek site SH17 recorded a reduction in category score for 'stream bank structure' due to increased bank instability in the downstream section of the site, most likely caused by scouring high flow events along a section of stream bank devoid of stabilising vegetation (shrubs and trees). Furthermore, there were increased sandy sediments noted in Bobadeen Creek site SH01B which resulted in a reduction in category score for 'channel sediment accumulations'.

- Aquatic Macroinvertebrate Diversity – The autumn 2021 site macroinvertebrate diversity ranged between 14 taxa SH08 and 31 taxa at SH05 (**Figure 3-e**), and were above the established trigger values at SH02, SH06 and SH17. Of the nine sites for which pre-mining mean values exist, SH02, SH06 and SH12 were the only sites to record macroinvertebrate diversities value below their pre-mining average values. For the most part, the Goulburn River, Moolarben and Wilpinjong Creek catchment sites continue to maintain improved macroinvertebrate diversity values compared to values recorded over the drought period between 2017 and 2019, with SH05 (Goulburn River), SH10 (Moolarben Creek), SH14 and SH15 (Wilpinjong Creek) each recording their respective highest diversity values to date.

- Pollution Tolerance SIGNAL-2 Scores – The autumn 2021 SIGNAL-2 values ranged between 3.20 at SH08 and 4.28 at Goulburn River site SH13 (**Figure 3-e**). The SIGNAL-2 values at SH02, SH06 and SH17 were above established trigger levels, and all sites for which pre-mining average values exist recorded higher SIGNAL-2 scores compared to pre-mining average values. For most sites the SIGNAL-2 values were within the range of values recorded over recent monitoring surveys, however Goulburn River site SH20 recorded its highest value to date (4.22), which was consistent with the range of values recorded at other downstream Goulburn River sites.

7.3.3.2 Spring 2021

Following on from the 2021 autumn stream health survey, weather patterns fluctuated from an initial dry period in April to May to consistent wet weather conditions over June to July. Rainfall activity leading into the spring 2021 survey period in mid-October was characterised by consistent light showers, which would have maintained creek and river water levels and flow rates. The 2021 spring stream health monitoring was undertaken between the 19th and 21st October. 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 2021 site RCE scores ranged from 46% at SH20 and 79% at SH13 (**Figure 3-e**). There were minor changes in site RCE scores at around half of the monitoring sites in spring 2021. Changes were owing mostly to fluctuations in the levels of filamentous green algae and macrophytes (seven sites), and there were higher quantities of detritus noted at Goulburn River catchment sites SH01G, SH02 and SH01B which resulted in increased category scores for 'stream detritus'. Both of the downstream Goulburn River sites SH01G and SH02 recorded increases in the 'channel sediment accumulations' category due to a reduction in the proportion of sandy sediments to gravels and cobbles.

- Aquatic Macroinvertebrate Diversity – The spring 2021 site macroinvertebrate diversity ranged from 16 taxa at SH16 to 32 taxa at SH02 (**Figure 3-e**) and were above the established trigger values at sites SH02, SH06 and SH17. All of the nine sites for which pre-mining values exist recorded macroinvertebrate diversity values above their respective pre-mining mean values. Most of the sites recorded increases in diversity compared to the previous autumn 2021 survey, and were within the range of values recorded over the previous post-drought (recovery) survey year in 2020. Goulburn River site SH20 maintained its relatively high diversity record in spring 2021 (29 taxa) which was also its highest to date, as did Bora Creek site SH04, and the up and downstream sites in Wilpinjong Creek (SH15 and SH17 respectively).

- Pollution Tolerance SIGNAL-2 Scores – The spring 2021 SIGNAL-2 values ranged between 2.78 at SH14 and 4.62 at SH12 (**Figure 3-e**), and were above the established trigger values at sites SH02, SH06 and SH17. Of the nine sites for which pre-mining average values exist, Bobadeen Creek site SH01B was the only site to record a SIGNAL-2 value below its pre-mining average value. Ryans Creek site SH12 and downstream Goulburn River site SH01G recorded their highest SIGNAL-2 values to date, and all sites except SH02, SH14 and SH16 were within or above the range of values recorded during the post-drought recovery survey period in 2020.

7.3.3.3 Trends

The 2021 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 documented the post-drought recovery of aquatic habitats through improved stream health riparian, channel and macroinvertebrate indices, and the 2021 stream health results saw a continuation in the pattern of post-drought recovery.

Wilpinjong Creek downstream site SH17 showed evidence of high flow impacts in autumn 2021, with bank undercutting and bank slumping throughout the incised channel area at the downstream limits of the site, which returned reduced RCE scores in 2021. While Goulburn River sites SH01G, SH02 and Bobadeen Creek site SH01B showed continued signs of recovery from flood impacts experienced in April 2020 (through improved channel sediment criteria scores and increased detrital accumulations), the sand accumulation that was noted at Eastern Creek site SH16 during the same event remains for the most part, unchanged. The other main source of inter-seasonal variation in RCE scores was owing to seasonal fluctuations in aquatic vegetation (filamentous algae and macrophytes).

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 2021 surveys. For sites in each of the study area creek and river catchments, the

2021 macroinvertebrate diversity results were relatively high compared to those recorded in 2018 and 2019, and consistent with the post-drought values from 2020. Whilst SH13, SH12 and SH16 recorded their highest macroinvertebrate diversities over the past five years in 2020, the remainder of sites recorded their highest five-year macroinvertebrate diversities in 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 2021 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 12th and 14th 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. There were no obvious signs flow events since September 2020 had been as damaging as events noted in the previous monitoring period. As noted in 2020, flood debris had accumulated within the channel downstream BC-pt09. The average CSIRO classification for Bora Creek in 2021 was 'Potentially Stabilising'.

Moolarben Creek channel stability monitoring trend is considered comparable to the results previously recorded. Ten sites improved their stability scores when compared to 2020 due to increased ground vegetation observed in 2021, and additional 13 monitoring sites were also added in the upper reaches of Moolarben Creek in 2021. The average CSIRO classification for Moolarben Creek in 2021 was 'Potentially Stabilising'.

Murragamba Creek channel stability monitoring trend is considered comparable to the results previously recorded. All sites except for MuC-pt01 improved their stability scores when compared to 2020, due to increased ground vegetation. The average classification for Murragamba Creek in 2021 was 'Stable'.

Wilpinjong Creek channel stability monitoring results trend is considered comparable to the results previously recorded. Fourteen sites improved their stability scores when compared to 2020 due to increased ground vegetation. The average CSIRO classification for Wilpinjong Creek in 2021 was 'Potentially Stabilising'.

Eastern Creek channel stability monitoring results identified continuation of morphological processes identified in previous monitoring. The 2020 scores are considered comparable to the results previously recorded. EC-pt01 improved the stability scores when compared to 2020 due to increased ground vegetation observed in 2021. The average CSIRO classification for Eastern Creek in 2021 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. Although a number of sites were visibly impacted by possibly one of more flow events during the previous monitoring period, the 2021 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 pressures for vibrating wire piezometers (VWPs). 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 observed above average annual rainfall, continued mining impacts for approved MCO open cut and underground operations and regional depressurisation due to neighbouring operations. Monthly rainfall to May was variable with 2 months well above and three months well below average. The remainder of the year consisted of average to above average rainfall as represented by the increasing Rainfall Cumulative Deviation (RCD) trend (**Figure 16**). MCOs mining operations during the period included mining in open-cuts OC2, OC3 and OC4 and secondary extraction in UG1 LW104 and LW105 and development of first workings in UG4 (**Figure 4**). 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 triggers, along with monitored groundwater levels are presented in **Table 25**.

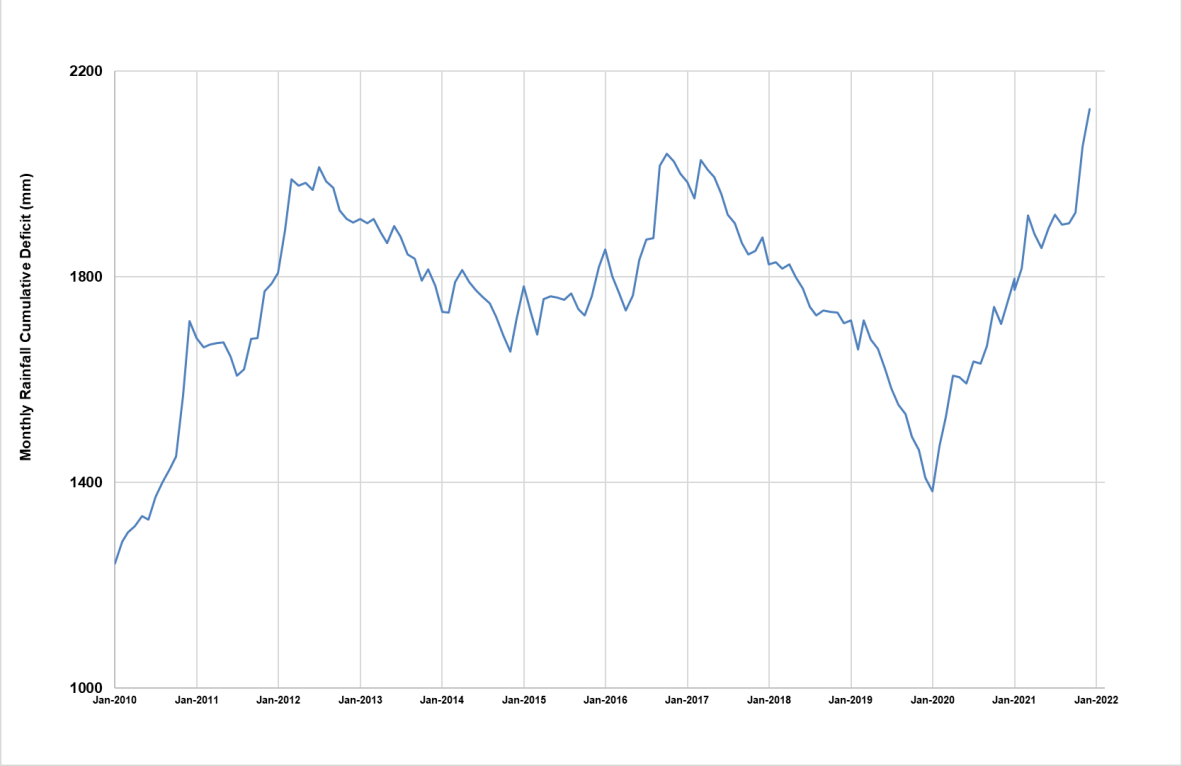


Figure 16: Rainfall Residual Mass - Wollar

Groundwater levels in the Ulan coal seam and Permian coal measures are extensively affected by past mining and are predicted to undergo further impact from mining at Moolarben and neighbouring operations. During the period, the Ulan Seam levels were influenced by open cut and underground mining, neighbouring operations and in some cases rainfall recharge. The influence of UG1 secondary extraction, progressive UG4 development and open cut operations continued over the period. The largest groundwater drawdowns in the Ulan seam during the period are observed at close proximity to the underground operations as they progress down dip (north east), including development of the UG4 mains on the western side of UG4 and backroads on the eastern side. This can be seen in PZ102B, PZ103A, PZ192 and PZ193 where drawdowns of 11 to 29m were observed over the period. The rate of drawdown has generally increased with the approach of mining operations. Groundwater drawdown is expected to continue to propagate in an east to north easterly direction over time. Climatic influences were observed in Ulan Seam piezometers in areas in the vicinity of subcrop such as PZ003 and PZ217 located to the east of OC3 with level increases of 1.3 m to 2 m. PZ111 located between MCO and Wilpinjong continues to decline and PZ191 remained close the bottom of the piezometer, being located adjacent to the UG4 access headings.

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 period associated with proximity to mining, strata interval monitored and location. Permian overburden VWP above UG1 remained dry throughout the period. To the south east of OC4 groundwater levels were observed to increase at PZ137 and PZ112B, with a slight decline at PZ106A. Drawdown of the Permian generally continued during the period in the vicinity of UG1 due to the extraction of LW104, underground development and OC4 progression, as observed in PZ040B, PZ189 and PZ186 Permian VWPs. Drawdown generally decreases with distance, with exceptions such as PZ170 located above and immediately adjacent to UG1 which was observed to increase, and exhibiting strong correlation to climatic data. PZ179_33m and PZ105A_28m VWPs in the upper Permian exhibited pressure increases over approximately 1 m whilst PZ193_80m VWP was stable over the period.

Groundwater draw-down was also observed at the northern end of UG4 including PZ101B and PZ105_80m VWP although the response was not consistent with Permian piezometers closer to MCOs mining operations in the period. The responses in the piezometers will continue to be monitored. PZ103B remained blocked and was decommissioned with a replacement VWP to be installed in 2022.

The Triassic aged sandstones overly the Permian coal measures. Saturation of the Triassic strata is predominantly limited to the north eastern extent of the Moolarben Coal Complex. Groundwater levels in Triassic bores remained relatively stable over the period with changes less than 0.6m during the reporting period with the exception of PZ103C. PZ105C and PZ179 (29m) increased from 2021 by 0.3 and 0.4m respectively. PZ192_68m VWP pressure declined slightly to July followed by increases to December with an overall reduction of 0.6m from 2020. PZ101C and PZ129_35m VWP remained stable over the period. PZ103C was stable through the period until December when the groundwater level reduced due to PZ103B decommissioning works. PZ128 (20m) and PZ127 (43m) remained dry during the period. No Triassic water level investigations were triggered during the 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 the defined palaeochannels consisting of poorly-sorted semi-consolidated quartzose sands and gravels in a clayey matrix and are unsaturated across a portion of the area. Groundwater levels in the alluvium and Tertiary palaeochannel were stable or declined by up to 1.2m during the period. Groundwater level reductions continued at PZ213, PZ214, PZ188 and PZ186A with 0.9 to 1.2m were observed in likely in response to MCO operations. PZ203 remained stable and PZ184 and PZ211 remained dry during the period. PZ058A fell to 466.4mAHD during the period and further reductions will exceed the investigation trigger. PZ058A is poorly connected to the palaeochannel as evidenced by the 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 period consistent with climate data. Groundwater levels in the Marrangaroo at PZ102A declined during the period, which is generally consistent with the long-term trend (since 2013), with additional influence of UG4 as development progressed towards the piezometer.

During the period, the groundwater model was updated with additional vertical discretisation included, now consisting of 21 model layers and updated with contemporary monitoring data for calibration. The Scaled Root Mean Squared Error of the updated model is now 6.7%, which is better than the 10% suggested target defined within the Australian Groundwater Modelling Guidelines (Barnett Et al, 2012). The updated calibration indicates the model can generally be considered calibrated. Comparison between the site data and model results suggests that the long-term trend is matched adequately. The model produces both a radius of influence and levels of groundwater drawdown which are commensurate with those being observed at MCC. Groundwater levels in the Permian and Ulan seam in close proximity to the operations have generally been observed to respond earlier than model predictions. Further afield and in the Triassic strata groundwater monitoring generally aligns to modelled trends. Palaeochanel trends are generally consistent with the model, with drawdown occurring earlier and variability in response which is indicative of the variability of the strata properties. Groundwater take during the period was approximately 28% greater than predictions, which is likely due to contributions of above average rainfall, progression of UG4 development and unaccounted recirculation.

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 26**. Water quality results from all piezometers are provided in **Appendix 3G**.

The Ulan Seam and Permian Coal measures water quality for the period is generally consistent with previous monitoring results with no clear trends. East of the site, PZ104 EC continued to reduce during the period to approximately 2,000µs/cm from recent records closer to 8,000µs/cm, and also recorded a slight reduction in pH. PZ191, located adjacent UG4 development, recorded a reduction in EC from 2019 and 2020 with the water level near the base of the bore. PZ170 EC remained lower than historical data. PZ101B EC also reduced to 614µs/cm.

Triassic water quality was consistent with historical results. PZ101C recorded an increased EC in October to 792µs/cm which is within the range of quality recorded and higher than recent years. PZ103C recorded a slight decline in pH to 5.04 before increasing to 5.2 in October with both readings consistent with the historical range. Alluvium and Tertiary palaeochannel water quality were generally consistent with historical results. PZ058A recorded an EC of 13,200 µs/cm which is below the historical range of approximately 15,000-16,000 µs/cm before the groundwater level became too low to sample. The groundwater EC at PZ058A is significantly higher than surrounding locations (including deeper stratigraphic units), which indicates the location receives less relatively recharge which would effectively freshen the unit. It also indicates a poor connection to the broader palaeochannel.
Marrangaroo water quality at PZ102A and PZ055 was consistent with recent years with PZ102A EC being slightly lower. Granite water quality recorded at PZ044 showed a reduction in EC likely due to the climatic conditions and stable pH

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:

- Review PZ058A monitoring as part of next Groundwater Management Plan Review.
- Install VWP to replace PZ103B.
- WAMP to be reviewed and revised as necessary.

Table 25: Water Levels – Triassic, Alluvium and Palaeochannel Bore Performance

Location	Investigation Trigger Level (mAHD)	Minimum 2021 Groundwater Level/Pressure (mAHD)	Trend/ Key Management Implications	Implemented/proposed Management Action
Alluvium, Palaeochannel and Marrangaroo Bores				
PZ55	418.1	423.1	Above average annual rainfall resulted in an increasing RCD. Monthly rainfall to May was variable with 2 months well above average and three months well below average. Monthly rainfall for the remainder of the year was average to above average. Piezometers in the vicinity of mining operations exhibited groundwater level reductions during the period. Groundwater level reductions continued at PZ213, PZ214, PZ188 and PZ186a with 0.9 to 1.2m observed likely in response to MCO operations. PZ203 level remained stable. PZ058A reduce to the trigger level of 466.4mAHD during the period and will continue to be monitored. PZ058a is poorly connected to the palaeochannel as evidence by unproportionate salinity groundwater at this location (approximately 15, 000 to 16, 000µs/cm). Overall groundwater level trend directions were generally consistent with groundwater model predictions, with actual drawdown occurring earlier than modelled and observed drawdown above model predictions in close 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	466.4		
PZ188	409.4	411.8		
PZ203	394.4	402.0		
PZ213	409.7	411.0		
PZ214	409.8	411.4		

Location	Investigation Trigger Level (mAHD)	Minimum 2021 Groundwater Level/Pressure (mAHD)	Trend/ Key Management Implications	Implemented/proposed Management Action
Triassic Bores				
PZ101C	376.8	380.0	Above average annual rainfall resulted in an increasing RCD. Monthly rainfall to May was variable with 2 months well above average and three months well below average. Monthly rainfall for the remainder of the year was average to above average. Groundwater levels in PZ101C and PZ129 (35m) remained stable and PZ105C increased by 0.3m during the period with overall trends consistent with model 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	374.8		
PZ129 (VWP-35m)	385.7 (dry)	389.0		

Table 26: Water Quality Performance

Location	Lithology	Investigation Trigger Level(s)		2021 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. Review PZ058A monitoring 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 recorded a reduction in EC to 13,200 µs/cm below the historical range of 15-16,000µs/cm before the groundwater level became too low to sample. No investigations were triggered.		
PZ188	Tertiary paleochannel	4.7 – 6.9	394			
PZ101C	Lower Triassic	6.1 – 7.7	810	Triassic water quality was consistent with recent monitoring results. PZ103C recorded a slight decline in pH to 5.04 before increasing to 5.2 on October with both readings consistent with the historical range. No investigations were triggered.		
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 Extraction Plan). The 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.

During the reporting period, secondary extraction was undertaken in Longwall LW104 and LW105. Mining of longwall panel 104 was completed on July 2021. A longwall move was carried out in with LW105 commencing on August 2021. As of the 31 December 2021 Longwall LW105 had retreated 2,682m. The combined total extracted length during the 2021 reporting period was 4,055m.

During the reporting period MCO continued to conduct monitoring of subsidence lines, flora and fauna habitats, cliffs, landscape features, and built features for LW102, LW103, LW104 and LW105. 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, LW103 and LW104.

Subsidence monitoring included the 3D ground monitoring G, H, and I lines. Surveys of the A, C and E 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. LW104 mined directly beneath this monitoring line during 2021. Line H is a monitoring line that is orientated transverse to the longwalls approximately 290 m from the finishing end of LW104. Line I is a 3D ground monitoring line located along the centreline of LW104 at the longwall finishing end. The base survey was carried out in July 2020 prior to LW104.

During the reporting period, monitoring Lines G, H, I, and the Essential Energy Monitoring Line were not monitored during October 2021, as required by the Subsidence Monitoring Program. The Subsidence Monitoring Program requires each Monitoring Line to be monitored within 3 months following completion of longwall recovery from each longwall. Monitoring line G, H, and the Essential Energy Monitoring line were monitored in January 2022 and Monitoring Line I was monitored during December 2021.

Subsidence impacts during the period were below predictions as shown in **Table 27.**

Table 27 Comparison of maximum observed and predicted vertical subsidence, tilt & strain for the G, H & I Line.

Survey Line	Type	Maximum vertical subsidence (mm)	Maximum tilt (mm/m)	Maximum tensile strain (mm/m)	Maximum compressive strain (mm/m)
G	Measured	2232	43	13	6
	Predicted	2300	45	18*	14*
H	Measured	1808	50	25	17
	Predicted	2100	60	39*	28*
I	Measured	1919	41	13	17
	Predicted	2100	95	65*	46*

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

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 and Condition 1, Condition 3, Schedule 4 of Project Approval (08_0135) is provided in **Table 28** and **Table 29.**

Table 28: Assessment of Subsidence Performance Indicators Measures for UG1 – Natural and Heritage 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 LW104 and was mined beneath during 2021 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 LW104 and 105 at the end of 2021, 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 LW104 and 105. Ground movements measured during 2021 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 features within any longwall mining domain)*	• 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 LW104 and 105. Ground movements measured during 2021 were similar to or less than those predicted Rockfalls and cracking observed. No impacts greater than predicted recorded. Post-mining surveys to be undertaken at the completion of longwall mining.	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
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 LW104 and 105 completed. Eleven baseline floristic sites have been established along ten transects above LW101 to 105 Post-mining surveys were undertaken at LW102, 103 and 104 for biodiversity. 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 2021 were similar to or less than those predicted	**No**
Mine Workings:					
First workings	*First working under an approved Extraction Plan beneath any feature where performance measures require negligible subsidence impacts or negligible environmental*	• 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	**No**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
	consequences to remain long-term stable and non-subsiding			accordance with the requirements under Condition 7, Schedule 4 of PA08_0135 and Condition 79 Schedule 3 of PA05_0117.	
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 LW104 and 105 in accordance with the approved *Longwalls 101-105 Extraction Plan* during the assessment period.	**No**

Table 29: Assessment of Subsidence Performance Indicators Measures for UG1 – Built Features

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
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. • Serviceability of guard rails, marker posts and signage are maintained.	**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?
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 LW104 and 105.	**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 LW104 and 105.	**No**
Telecommunication cable *Fibre-optic cable*	*Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated.* *Damage must be fully repairable, and must be fully*	• 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, 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**

Subsidence Impact Performance Measure		Subsidence Impact Performance Indicator	Indicators Exceeded?	Assessment of Subsidence Impact Performance Measures	Performance Measures Exceeded?
	repaired or else replaced or fully compensated.			No observed/recorded impacts to either the telecommunications line and/or the fibre optic cable occurred during the assessment period, as a result of LW104 and 105.	
Murragamba Trig Station		Subsidence related impacts to Muragamba 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 of LW104 and 105, 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 LW104 and 105 during the assessment period.	**No**

8.1.1 ACTIONS FOR NEXT REPORTING PERIOD

Activities in the 2022 reporting period include:

- Routine environmental and subsidence line monitoring.
- Establishment and baseline monitoring of locations associated with UG4 where not completed.
- Remediation works, (Eg. tracks) as required.

8.1.2 SUBSIDENCE REMEDIATION

Minor subsidence management actions were required to be undertaken as a result of LW104 and LW105 extraction during the reporting period. These included maintenance of MCO managed access tracks and haul roads as well as minor adjustments to the OC4 conveyor to re-level the infrastructure after subsidence.

9.0 REHABILITATION

MCO manages rehabilitation in accordance with Rehabilitation Management Plan (RMP) and Mining Operations Plan (MOP). The RMP was developed by MCO with advice from experienced and qualified experts to satisfy Condition 68, Schedule 3 of PA 05_0117 and Condition 56, Schedule 3 of PA 08-0135. The MCO Rehabilitation Management Plan (RMP) describes the management of rehabilitation at the Moolarben Coal Complex for Stage 1 and Stage 2.

The MOP was developed to meet the requirements of Mining Lease conditions. The MCO Mining Operations Plan (MOP) was revised during the reporting period to capture amendments to mining progression. The MOP describes the proposed Stage 1 and Stage 2 mining and rehabilitation activities for the period 1 January 2020 to 31 December 2022 (the MOP term). A description of the proposed rehabilitation activities during the MOP term is provided in Section 7.2 of the MOP. Mining and rehabilitation progression are shown on MOP Plans 3A, 3B and 3C. The MOP and RMP are available on the Moolarben Coal website (www.moolarbencoal.com.au).

This section addressed the annual rehabilitation reporting requirements for Project Approvals PA05_0117 and PA08_0135, the MOP and Moolarben Coal Complex MLs.

9.1 MINING AND REHABILITATION STATUS

At the end of December 2021 MCO had a Total Mine Footprint of 1,817ha, approximately 180ha less than described in MOP C. The reduction in disturbance resulted from the delayed progression of mining operations associated with impacts from COVID and above average rainfall. The area under rehabilitation preparation and active rehabilitation activities increased to approximately 390ha, 16ha less than predicted. The area under active rehabilitation increased by 10ha to 360ha. The area classified as being prepared for rehabilitation was 30 ha.

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**. The status of mining and rehabilitation is presented in **Figure 4**. The status of mining and rehabilitation, and the agreed post rehabilitation land-use is presented in **Figure 5**.

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 30: Mining and Rehabilitation Status

Mine Area Type	Previous Reporting Period (2020)	This Reporting Period (2021)	Next Reporting Period (2022)
Total Mine Footprint	1,687	1,816	2,185
Total Active Disturbance	1,302	1,426	1,688
Land being Prepared for Rehabilitation	35	30	80
Land under active Rehabilitation	350	360	432
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**) as described in **Section 6.5.1**. 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 2021 MCO's seed bank contained 272,115 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 24 EFA sites within the MCO open cut rehabilitation areas, as well as at seven (7) 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 LOIimplies a more stable transect that is less prone to erosion and resource loss.

During 2021, LOI ranged from 60 (R2) to 100 (R7 and R10) within Box Gum Shrubby Woodland sites, with an average of 88. An LOI of 100 was recorded at one analogue site (A1c). LOI ranged from 50 (R20) to 100 (R12, R13, R14, R16, R17, R18, R25 and R26) at Sedimentary Ironbark Forest sites, with an average of 93 compared to an LOI of 89 recorded at the analogue site (A5B). LOI Ranged from 47 (R24) to 100 (R22 and R23) within the OC2/OC3 Ecosystem and species credit sites. LOI comparison to analogue sites is shown in **Figure 17**.

Variation in the patch assemblages has been recorded throughout the duration of monitoring for each site which can be attributed to variation in climatic conditions across years and seasons, as well as monitoring timing and rehabilitation development.

Bare soil patches averaged less than 10% during 2021 monitoring. There is an increasing tree and shrub canopy associated with maturing rehabilitation campaigns and seasonal changes in ground herbage year to year. Monitoring sites are presented in **Appendix 2**.

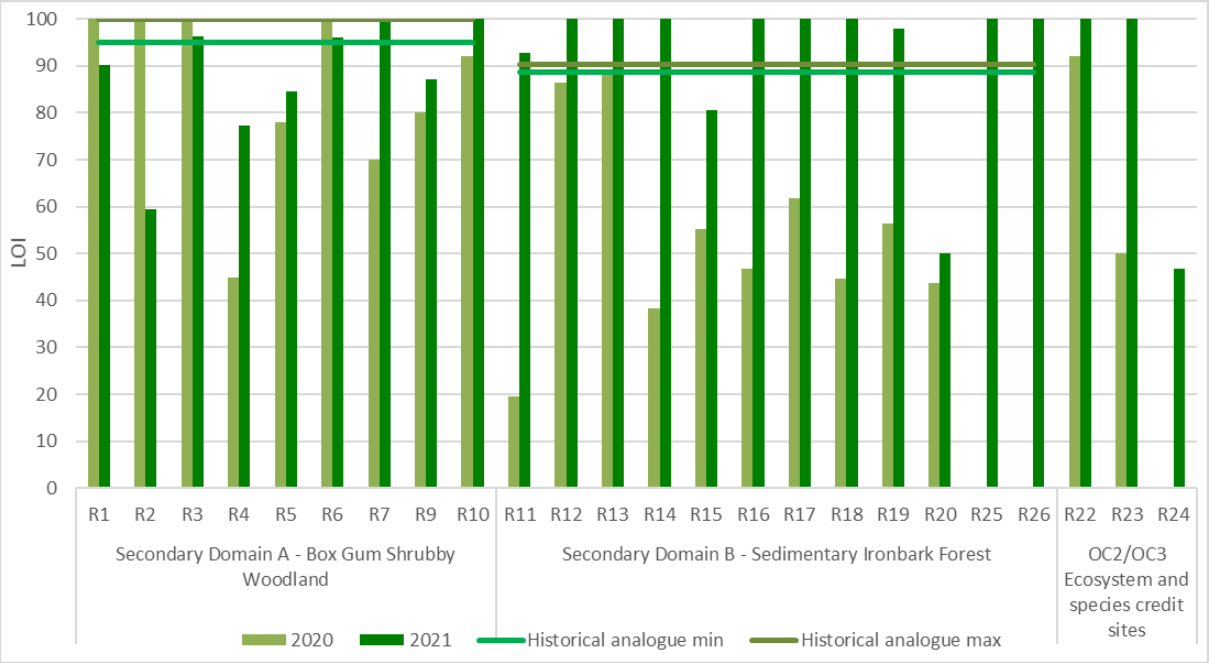


Figure 17: Landscape organisation indices (LOIs) for 2020 and 2021 compared to analogue LOI values

Floristic Monitoring

During the 2021 monitoring of Box Gum Shrubby Woodland, a total of 196 species were recorded including 13 native canopy species, 35 native mid-storey species, one (1) exotic mid-storey species, 96 native and 44 exotic groundcover species. Five (5) species were recorded which could not be identified to species level due to absence of material required for identification. All sites show an increasing trend in native species richness with time. All sites except R7 recorded the highest native species richness for the respective monitoring season since monitoring began.

During the 2021 monitoring of Sedimentary Ironbark Forest, a total of 199 species were recorded including 14 native canopy species, 31 native mid-storey species, one (1) exotic midstorey species, and 86 native and 62 exotic groundcover species. Four (4) species were recorded which could not be identified to species level due to the absence of material required for identification. Native species richness in 2021 was comparable to analogue sites.

The trend in native species diversity at Box Gum Shrubby Woodland rehabilitation sites, shows a similar pattern in recent years to that at the equivalent analogue sites (**Figure 18**). At most sites, there was an increase in native species diversity from 2019 to 2021, likely in response to the recent improved rainfall in the region. The same pattern was observed for Sedimentary Ironbark sites (**Figure 19**). This indicates that the vegetation at rehabilitation sites is responding in a similar way to that at analogue sites which suggests that it may be developing resilience to environmental stress. If the rehabilitated

vegetation continues to respond in a similar way to analogue sites this will be a clear demonstration of resilience which is a critical element for long-term sustainability.

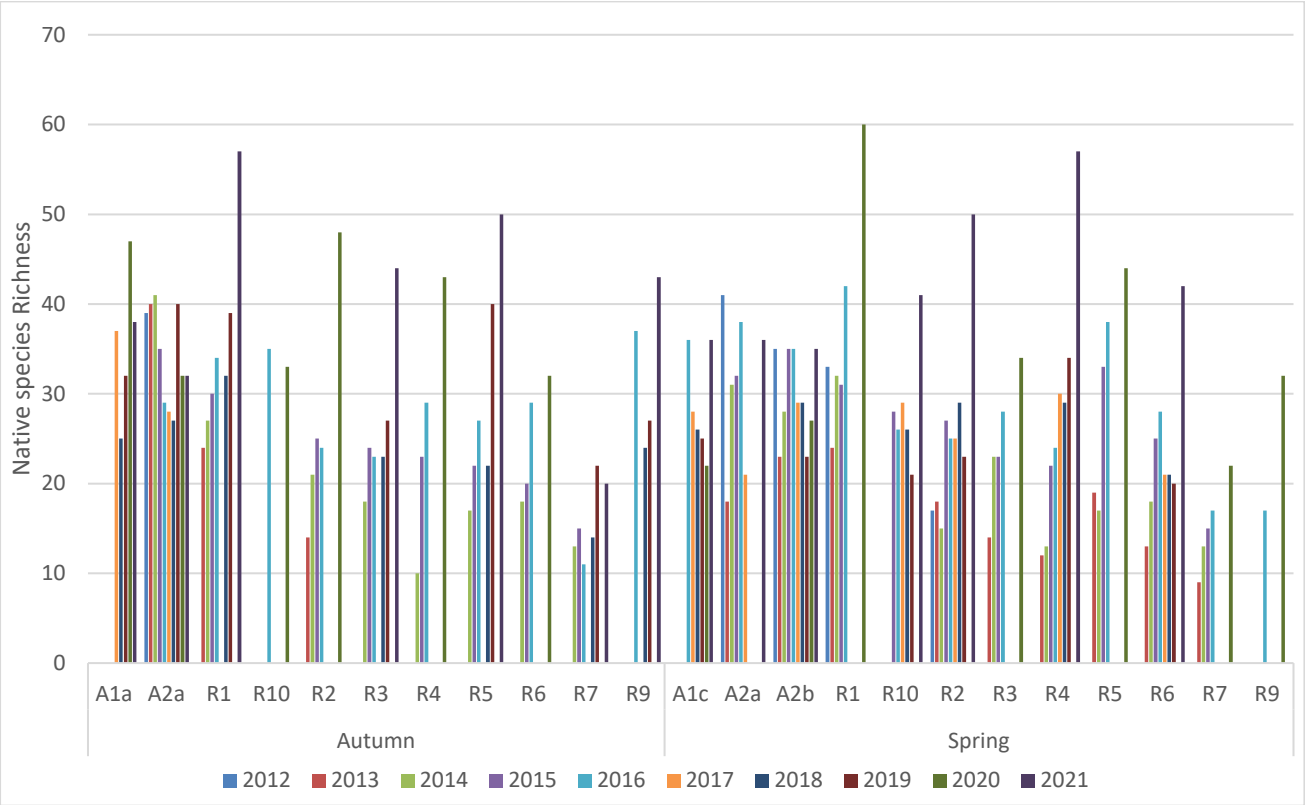


Figure 18: **Native species Richness 2012 – 2021 for Box Gum Shrubby Woodland open cut rehabilitation monitoring sites and Box Gum Grassy Woodland analogue sites.**

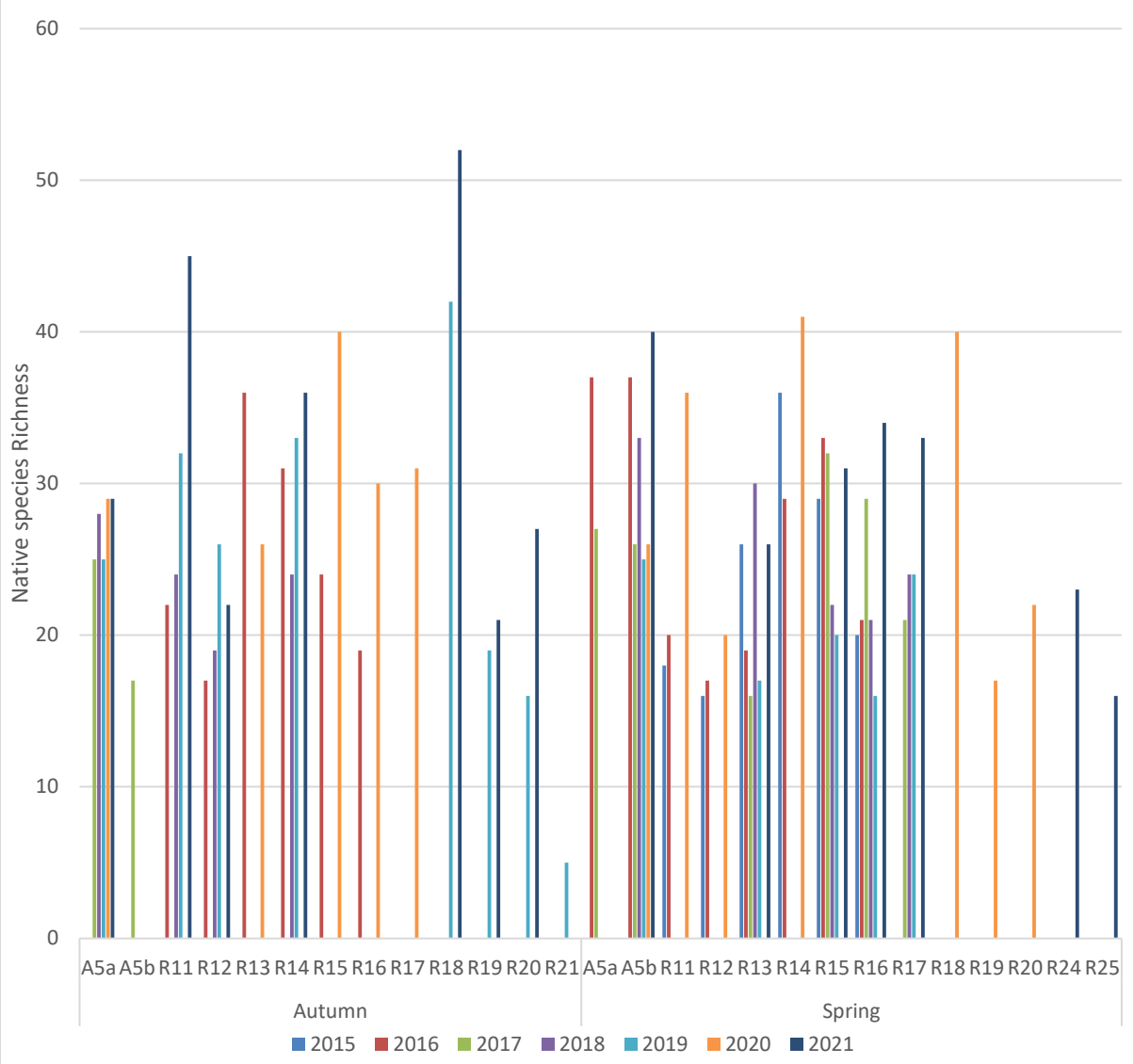


Figure 19: Native species Richness 2015 – 2021 for open cut rehabilitation and analogue Sedimentary Ironbark Forest sites

Vegetation Structure and Growth

Canopy cover for Box Gum Shrubby Woodlands averaged 9%, which is consistent with 2020 (10%), and continues to be less than that seen at the analogue sites which during 2021 averaged 16.7%. Canopy cover for Sedimentary Ironbark Forest sites averaged 5%, which is consistent with the average canopy cover recorded in 2020 (5.5%). Average canopy cover remains slightly less than that recorded at analogue sites which averaged 8%. No canopy cover was recorded within the OC2/OC3 Ecosystem and species credit sites, this is consistent for the age of the rehab.

The average mid-storey cover for both Box Gum Shrubby Woodlands averaged 11% which is consistent with 2020 results (10%) which is higher than the average midstorey cover recorded at analogue sites (0.6%). Sedimentary Ironbark Forest averaged 11%, which is slightly higher than 2020 results (9%). Midstorey species were recorded at all Native Vegetation Sites with between two (2) and four (4) species present.

Total native groundcover (grasses, herbs/forbs and shrubs <1 m in height) for Box Gum Shrubby Woodlands and Sedimentary Ironbark Forest sites in 2020 averaged 18% and 27% respectively, which is slightly higher than 2020 results for Box Gum Shrubby Woodlands and consistent with 2020 results for Sedimentary Ironbark Forest sites. Total native groundcover (grasses, herbs, forbs and shrubs <1 m in height) for the OC2/OC3 Ecosystem and species credit sites ranged from 10% (R24 and R25) to 52% (R26), with an average of 29%.

Fauna Monitoring

Two (2) amphibian species, 45 bird species and eight (8) microbat species were recorded during monitoring in 2021 including four (4) threatened species being Speckled Warbler (Chthonicola sagittata), 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 2021 monitoring, including insectivores, nectivores and herbivores which forage at different stratum levels within vegetation. Bird species richness was consistent with 2020.

Visual Monitoring

Visual transect monitoring results from 2021 were largely consistent with previous years. Eight (8) out of 13 transects scored between 'moderate' and 'good' in all attributes. All transects achieved a score of 'good' for groundcover, soil compaction and disturbance factors.

Transect 13 (OC2) continued to achieve a score of 'poor' for overstorey components, with no overstorey species recorded along the transect, however this is expected in immature rehabilitation.

Assessment of Rehabilitation Performance Indicators

Analysis of the Box Gum Woodland, Sedimentary Ironbark Forest rehabilitation, and OC2/OC3 Ecosystem and species credit sites against the RMP Performance Indicators (and vegetation structure indicators) for Ecosystem and Land Use Establishment is presented in **Table 31**, **Table 32** and **Table 33**

Table 31: Box Gum Shrubby Woodland rehabilitation assessment (Secondary Domain A)

Completion Criteria (by years 5-7)	**Objective:** Establish native vegetation comparable to Box Gum Shrubby Woodland communities (including stands of Allocasuarina spp. in OC1)
	Rehabilitation Monitoring Outcome
No evidence of significant noxious weed infestation	Three priority weed species, *X. spinosum, H. perforatum and H. amplexicaule* were recorded and contributed less than 1% cover for this secondary domain. **Outcome:** Priority weeds are present; however, the level of infestation is not significant (i.e <1% total pfc)
Pest animal populations are not causing significant damage to rehabilitation areas.	European Hare and Common Starling were observed in very low abundances during both autumn and spring monitoring periods. **Outcome**: No damage from feral animals was recorded. This Secondary Domain meets the completion criteria related to feral animals.
There are one to three overstorey species from the Box Gum Shrubby Woodland EEC present by Years 5 to 7.	All individual rehabilitation campaigns had at least two (2) overstorey species from the Box Gum Shrubby Woodland community.

Completion Criteria (by years 5-7)	**Objective:** Establish native vegetation comparable to Box Gum Shrubby Woodland communities (including stands of Allocasuarina spp. in OC1)
	Rehabilitation Monitoring Outcome
	Outcome: Based on data from autumn and spring 2021; the area covered by all four rehabilitation campaigns within this secondary domain meet the completion criteria related to Box Gum Woodland overstorey species richness.
Indicator species plant densities are trending towards plant densities of analogue sites at Years 5 to 7.	This has been assessed on a rehabilitation campaign level. February 2012 rehabilitation campaign indicator species plant densities are trending towards analogue site densities. Indicator species densities at November 2010, March 2012 and February 2013 are not yet trending towards analogue densities, however, it is expected that these sites will trend towards analogue densities as the rehabilitation continues to mature. **Outcome**: Based on data from autumn and spring 2021; All Secondary Domain A – Box Gum Shrubby Woodland rehabilitation campaigns meet the completion criteria related to indicator species plant density trends.
A minimum of four native ground cover species that are present in analogue sites are present by Years 5 to 7.	During 2021, All individual sites recorded greater than the minimum of four (4) (and recorded up to 31) native ground cover species that are present in analogue sites. **Outcome**: Based on data from plots monitored in 2021, Secondary Domain A meets the completion criteria related to native ground cover species.
Stands of Allocasuarina spp. are present in Box Gum Shrubby Woodland rehabilitation areas by Years 5 to 7.	Stands of Allocasuarina spp. were recorded within the OC1 rehabilitation in R1 ten (10) individuals) and R5 (10 individuals). An *Allocasuarina spp*. stand was also recorded in an area downslope (west) of R1. **Outcome**: Based on data from plots and visual transects in 2021 this secondary domain meets the completion criteria related to the presence of stands of *Allocasuarina spp.*

Table 32: Sedimentary Ironbark Forest rehabilitation assessment (Secondary Domain B)

Completion Criteria (by years 5-7)	**Objective**: Establish native vegetation comparable to Sedimentary Ironbark Forest communities (including stands of Allocasuarina spp. in OC1)
	Rehabilitation Monitoring Outcome
No evidence of significant noxious weed infestation	Two priority weed species, (*H. perforatum* and *O. stricta*) were recorded at less than 1% cover. **Outcome:** Priority weeds are present; however, the level of infestation is not significant (i.e <1% total pfc)
Pest animal populations are not causing significant damage to rehabilitation areas.	European Hare and Common Starling were observed in very low abundances within this Secondary Domain in OC1 during both autumn and spring monitoring periods. No feral animals were recorded within this Secondary Domain within OC4. **Outcome**: No damage from feral animals was recorded. This Secondary Domain meets the completion criteria related to feral animals.
There are two to three overstorey species from the Sedimentary Ironbark Forest community present by Years 5 to 7	Between 1 and 4 indicator species were recorded Secondary Domain B – Sedimentary Ironbark Forest rehabilitation campaign areas during 2021. **Outcome**: The rehabilitation campaigns March 2012, November 2012, November 2016 and March 2018 have met this completion criteria. The rehabilitation campaigns December 2014, April 2017 (OC1), April 2017 (OC4) and December 2019 have not yet met the completion criteria.

Completion Criteria (by years 5-7)	**Objective**: Establish native vegetation comparable to Sedimentary Ironbark Forest communities (including stands of Allocasuarina spp. in OC1) Rehabilitation Monitoring Outcome
Indicator species plant densities are trending towards plant densities of analogue sites at Years 5 to 7.	November 2012 and November 2016 rehabilitation campaigns are meeting this criteria. The OC1 April 2017, OC4 April 2017, March 2018 and December 2019 rehabilitation campaigns have not yet reached Year 5. Densities within the OC1 April 2017 and OC4 April 2017 rehabilitation campaigns have remained low between the 2020 and 2021 monitoring campaigns. OC4 March and December 2019 rehabilitation campaigns were first monitored in 2021 and as such no trends can be determined. Density at the March 2012 rehabilitation campaign have fluctuated since 2017 and is not trending towards analogue densities. There were no indicator plant species recorded during 2021 within the OC1 December 2014 rehabilitation campaign. **Outcome**: Secondary Domain B – Sedimentary Ironbark Forest has not yet met the completion criteria on a landscape level. It is expected that densities across all rehabilitation campaigns will decrease (trend towards analogue values) as the rehabilitation matures.
A minimum of four native ground cover species that are present in analogue sites are present by Years 5 to 7.	All Rehabilitation campaigns recorded a minimum of four native groundcover species that are present in analogue sites. **Outcome**: Secondary Domain B meets the completion criteria related to native ground cover species
Stands of Allocasuarina spp. are present in Sedimentary Ironbark Forest rehabilitation areas by Years 5 to 7.	Two stands of Allocasuarina spp. were observed within the OC1 rehabilitation areas. R18 has over 50 individuals of Allocasuarina spp present and a less extensive stand is present at R14 (five (5) individuals). **Outcome**: Based 2021 results, the OC1 area of Secondary Domain B meets the completion criteria related to the presence of stands of *Allocasuarina*.

Table 33: OC2/OC3 Ecosystem and species credit sites

Completion Criteria (year 10 post landform establishment	**Objective**: Establish vegetation communities in the rehabilitated OC2 and/or OC3 landforms to generate the residual ecosystem credits for HU730 (PCT618) and HU910 (PCT1696) and species credits for the Koala. Rehabilitation Monitoring Outcome
Native Plant Species Richness is ≥ 10.25 at year 10 post landform establishment.	November 2015 and May 2019 sites are meeting criteria with the March 2018 rehabilitation campaign measuring ten (10). **Outcome:** Based on 2021 results, two (2) sites are meeting criteria with the March 2018 rehabilitation campaign trending towards the completion criteria it expected to achieve criteria as the rehabilitation matures.
Native Over Storey Cover between 1.88 and 40% at year 10 post landform establishment	No sites have reached Year 10. All sites recorded 0% canopy cover along the 50m transects, however canopy species are present in the May 2019 rehabilitation campaign. **Outcome:** The completion criteria has not been met. It is expected that Over Storey Species will develop as the rehabilitation matures.

Completion Criteria (year 10 post landform establishment	**Objective**: Establish vegetation communities in the rehabilitated OC2 and/or OC3 landforms to generate the residual ecosystem credits for HU730 (PCT618) and HU910 (PCT1696) and species credits for the Koala. Rehabilitation Monitoring Outcome
Native Mid-Storey Cover between 1 and 20% at year 10 post landform establishment.	No sites have reached Year 10. All sites recorded 0% mid-storey cover along the 50 m transect; however, 20 x 20 m plot data indicates that mid-storey species are present at all sites except the March 2018 rehabilitation campaign. **Outcome:** It is anticipated that, once these individuals have matured over the coming years, the criteria relating to native mid-storey cover will be met.
Native Ground Cover, Grass between 1.5 and 50% at year 10 post landform establishment.	All Rehabilitation campaigns recorded between 1.5% and 50% for Native Ground Cover Grass. **Outcome:** Native Vegetation Sites meets the completion criteria for Native Ground Cover Grass.
Native Ground Cover, Shrubs between 0.25 and 10% at year 10 post landform establishment.	No sites have reached Year 10. All sites recorded 0% Native Ground Cover Shrubs. **Outcome:** The completion criteria has not been met. It is expected that Over Storey Species will develop as the rehabilitation matures.
Native Ground Cover, Other between 1 and 40% at year 10 post landform establishment.	All Rehabilitation campaigns recorded between 1% and 40% for Native Ground Cover Other. **Outcome:** Native Vegetation Sites meets the completion criteria for Native Ground Cover Other
Total Length Fallen Logs (m) is 1 at year 10 post landform establishment.	November 2015 and May 2019 rehabilitation campaigns are meeting criteria with the March 2018 rehabilitation campaign not yet meeting the criteria, measuring zero (0). **Outcome:** The completion criteria has not been met for the March 2018 rehabilitation campaign. It is expected that the criteria will be met as the rehabilitation matures.
Exotic Plant Cover (% of total cover) is <50% at year 10 post landform establishment.	All Rehabilitation campaigns recorded <50% for Exotic Plant Cover. **Outcome:** Native Vegetation Sites meets the completion criteria for Exotic Plant Cover.
Overall Site Value Score (OEH, 2015) (average of plots in vegetation zone) is ≥6.9 at 10 years post landform establishment.	All Rehabilitation campaigns achieved an Overall Site Value Score of ≥ 6.9 **Outcome:** Native Vegetation Sites meets the completion criteria for Overall Site Value Score.

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 Moolarben Coal Complex are provided in the MOP. A summary of rehabilitation phases completed during the reporting period included:

Decommissioning
There were no decommissioning activities undertaken at MCO.

Landform Establishment
6ha of landform establishment in OC4 was completed during 2021. Final landforms were established to the relevant completion criteria including:

- Constructed landforms consist with surrounding topography;
- Slopes were generally less than 10^0 to 18^0;
- Constructed landforms were free draining; and
- No hostile overburden material in the final surface layers.

Growth Medium Development
10ha in OC2 underwent growth medium development during 2021. Growth medium was managed and applied to the relevant completion criteria including:

- Topsoil depths achieved a minimum of 100mm;
- Appropriate soil ameliorants have been applied in accordance with specification and recommendations from subsoil and topsoil material characterisation testing; and
- Topsoil areas ripped along the contour.

Ecosystem and Landuse Establishment
360ha of rehabilitation in the ecosystem and landuse establishment phase located in OC1, OC2 and OC4 were maintained and further enhanced during 2021.

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 2021, 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 – Lue Public School, Mudgee and Gulgong Chamber of Commerce, Mudgee Rotary, Mudgee Lions Club, Mudgee Men's Shed, Survivor Life skills program, Mudgee Junior League, North-west Legacy Branch and Sculptures in the Garden. MCO also supported the Gulgong Public School, Western Area Health Service, Dunedoo Sports Club, Lifeskills Plus. In total, MCO provided $138,000 in community donations during 2021 to 37 community groups and events through its Community Support Program and other programs (**Appendix 5).**

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

- Yancoal cadet student placements
- Max Potential Program at Club Mudgee
- Spirit Awards for 2020 overall winner (held in March);
- Active participation in Wild Dog Groups and the LLS; and
- Direct engagement with nearby landholders.
- Coordinated COVID-19 support of local health services.

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 in order 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 2021, a total of 39 complaints were received in relation to MCO Operations by 10 complainants. All complaints are investigated and included in the complaints register on the Moolarben Coal website (www.moolarbencoal.com.au). 52% of complaints were received by two complainants. Noise remained the primary issue of concern (56% of complaints), followed by Other (33%) (**Figure 20**).

A comparison of complaints to previous years is presented in **Table 34**. There has been a general decrease in noise 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.

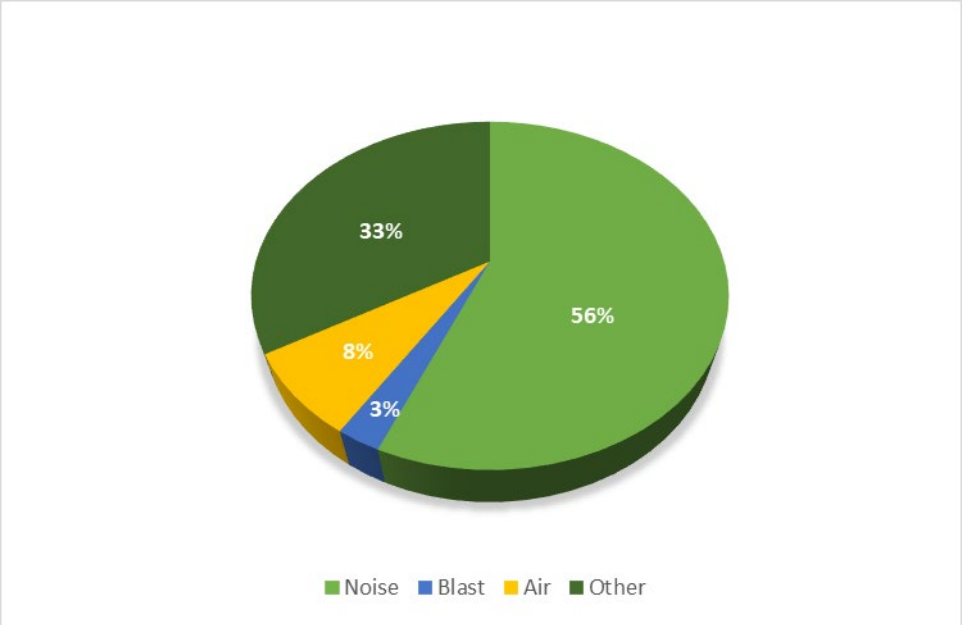


Figure 20: Community Complaints 2021 – Breakdown by Type

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**

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 2020 reporting period. The purpose of a Community Consultative Committee 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 2021 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 2021

Name	Representing	Name	Representing
Aleshia Lonsdale	Mudgee Local Aboriginal Land Council	Helen Ungaro	Ulan Public School and Local Landholder.
Chris Pilley[1]	Mudgee Chamber of Commerce	David Stokes	Local resident
Julia Imrie	Local Landholder and Business Owner	John O'Neil	Councillor, Mid-Western Regional Council
Bev Smiles	Mudgee District Environment Group	Ms Lisa Andrews	DPIE endorsed Independent Chair.
Des Kennedy	Councillor, Mid-Western Regional Council	Stephen Alcorn	Mudgee Chamber of Commerce
David Lowe[2]	Mudgee Chamber of Commerce		

[1]Chris Pilley replaced Stephen Alcorn as a CCC member at the CCC No. 57 meeting.
[2]David Lowe replaced Chris Pilley as a CCC member at the CCC No. 59 meeting.

Table 36: CCC Meeting Summary

Date	Meeting Summary
9th March	General update on community interaction, operations and exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management, and employment and COVID-19 controls at MCO. Update on the Underground 2 Modification. Information on the Open Cut Progression Feasibility Study.
8th June	General update on community interaction, operations and exploration, environmental monitoring, community complaints, rehabilitation, biodiversity offset management and employment and COVID-19 controls at MCO. Update on the Underground 2 Modification Update on the Open Cut Extension Projects and overview of the 2020 Annual Review.
7th 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 Extension Projects
30th 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

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 have also been identified for noise attenuation works. Works required at each of the properties was determined generally in accordance with the RMS guidelines. The current status is:

- 13 properties with works completed (works remaining to be finalised on 1 property);
- 2 properties with agreements in place;
- 1 property where owners have declined mitigation works;
- 2 properties on review are outside the mitigation zone;

11.0 INDEPENDENT AUDIT

During the reporting period 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 Barnet and May during December 2021. The Audit found 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.

Non-compliances identified included:

- Sediment water release as a result of heavy rainfall.
- Non-continuous environmental monitoring (power and communications).
- EPL Licence Point 1 and 22 not sampled on one occasion.
- Area 2 (Extract) offset secured on the 25 August 2020, post the required due date.
- Bore notifications not issued within 2 months timeframe.

Table 34: IEA Recommendations and Observations

Condition Reference No #	Summary of Audit Observation and Recommendations	MCO Response	Estimated Completion Date
PROJECT APPROVAL 05_0177			
Schedule 3 condition 31	During the construction of the Moolarben Creek crossing, a storm event (19/2/2020) resulted in Moolarben Creek entering the downstream culvert construction works then flowing back into Moolarben Creek. The PIRMP was activated including notification of EPA and other agencies and provision of report. On 21 December 2020 a sediment water release occurred from a sediment drain associated with Sediment Dam 304 (EPL Identification Point 51) in the vicinity of the Open Cut 3 pre-strip area (this being an area where topsoil had been removed in preparation for mining operations). The PIRMP was activated including notification of EPA and other agencies and provision of report.	MCO completed investigations into the cause of the incidents and implemented corrective and preventative actions	Complete
PROJECT APPROVAL 08_0135			
Schedule 3 condition 27	On 22 March 2021 a sediment water release, occurred as a result of heavy rainfall, downstream from Dam 413.	MCO completed investigations into the cause of the incidents and implemented corrective and preventative actions	Complete
ENVIRONMENTAL PROTECTION LICENCE 12932			
Condition L1.1	During the construction of the Moolarben Creek crossing, a storm event (19/2/2020) resulted in Moolarben Creek entering the downstream culvert construction works then flowing back into Moolarben Creek. The PIRMP was activated including notification of EPA and other agencies and provision of report. On 21 December 2020 a sediment water release occurred from a sediment drain associated with	MCO completed investigations into the cause of the incidents and implemented corrective and preventative actions	Complete

Condition Reference No #	Summary of Audit Observation and Recommendations	MCO Response	Estimated Completion Date
	Sediment Dam 304 (EPL Identification Point 51) in the vicinity of the Open Cut 3 pre-strip area (this being an area where topsoil had been removed in preparation for mining operations). The PIRMP was activated including notification of EPA and other agencies and provision of report. On 22 March 2021 a sediment water release, occurred as a result of heavy rainfall, downstream from Dam 413.		
Condition M2.1	The following non-compliances were noted in the MCO Annual Returns to the EPA: • 2019: Failure to monitor continuously for PM10 and PM2.5 at EPA identification number 15, 17 and 27, due to equipment breakdown. power outage and scheduled maintenance. • 2019: Non continuous monitoring at EPL point 50, due to equipment breakdown, power outage and scheduled maintenance.	MCO varied the EPL in October 2019. No further action is required.	Complete
Condition M2.4	The following non-compliances were noted in the MCO Annual Returns to the EPA: • 2020 Licence point 1 was not sampled on 28 September 2020 for oil and grease analysis. • Licence point 22 was not sampled on 11 February 2020 due to unscheduled maintenance.	MCO have reviewed and updated the environmental sampling program.	Complete
Condition M4.2	During the audit period (June 2019) there were two occasions were non-continuous monitoring occurred, however an investigation found this to be the result of equipment breakdown. In accordance with the note associated with condition M4.1 and M4.2 data capture rates do not apply under these situations.	MCO varied the EPL in October 2019. No further action is required.	Complete
EPBC Approval (2017/7974)			
Part A Condition 4	Area 2 (Extract) offset was secured on 25 August 2020, post the required due date. MCO advised the DAWE on 24 June 2020 that the offsets security mechanism was in the final stages of execution and requested an Extension of time to 31 August 2020 to align with the offset security timing as approved by the NSW DPIE for the same offset area.	No further action is required.	Complete
Water Licence			
20BL173935 Condition 1	During the audit documentation from construction of bores was viewed. This included Form A (Particulars of completed works) Examples dated 07/11/2020 (PZ227) and 14/11/2020 (PZ228). The Form A for PZ227 was submitted late (7 days).	MCO will provide notifications to the DPI within the 2 months of construction of new production bores.	As required

Condition Reference No #	Summary of Audit Observation and Recommendations	MCO Response	Estimated Completion Date
WAL39799 Condition 09	M1 was completed in 2018 but notice was not issued to Department of Primary Industries - Water until 31/01/2019 (i) The details were submitted on a Form A (the prescribed form).	MCO will provide notifications to the DPI within the 2 months of construction of new production bores.	As required
Recommendations for Improvement			
Project Approval 05_0117 Schedule 3 condition 33 and Project Approval 08_0135 Schedule 3 condition 29	Some additional investigation be completed in order to assess the potential impact of a potential reversal in gradient: 1. Review potential impacts from a reversal of the gradient in this area on hydrologic and ecologic systems including at a conceptual basis prior to the commencement of LW409. 2. Trigger levels should be reviewed, and were necessary revised, based on developments in understanding of potential impacts so triggers are fit for purpose. Installation of the proposed additional monitoring bore between the Goulburn River and UG4 LW408/LW409 should proceed as planned.	MCO will review the potential impacts from a reversal of the gradient in this area on hydrologic and ecologic systems including at a conceptual basis prior to the commencement of LW409. Triger levels will continue to be reviewed and where necessary revised, based on developments in understanding of potential impacts. MCO will install an additional monitoring bore between the Goulburn River and UG4 LW408/LW409.	Prior to the commencement of LW409 As required Prior to the commencement of LW405
Project Approval 05_0117 Schedule 3 condition 33 and Project Approval 08_0135 Schedule 3 condition 29	Groundwater levels for the paleo-channel /upper Permian groundwater system should be compiled, and trend analyses completed once sufficient data is available (typically 2 full seasonal cycles).	MCO will include groundwater levels for the paleo-channel /upper Permian groundwater system in the 2022 Annual Review.	31 March 2023

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 2 non-compliance during the reporting period:

- On two occasions in December 2021 EPL Identification Number 1 was not sampled for Oil & Grease and Total Suspended Solids during discharge. Minor Administrative
- During the reporting period, monitoring Lines G, H, I, and the Essential Energy Monitoring Line were not monitored during October 2021, as required by the Subsidence Monitoring Program. Monitoring line G, H, and the Essential Energy Monitoring line were monitored in January 2022 and Monitoring Line I was monitored during December 2021.
- On 22 March 2021 a sediment water release, occurred as a result of heavy rainfall, downstream from Dam 413. Sediment Dam 413 was 'in construction' at the time of the event.

13.0 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

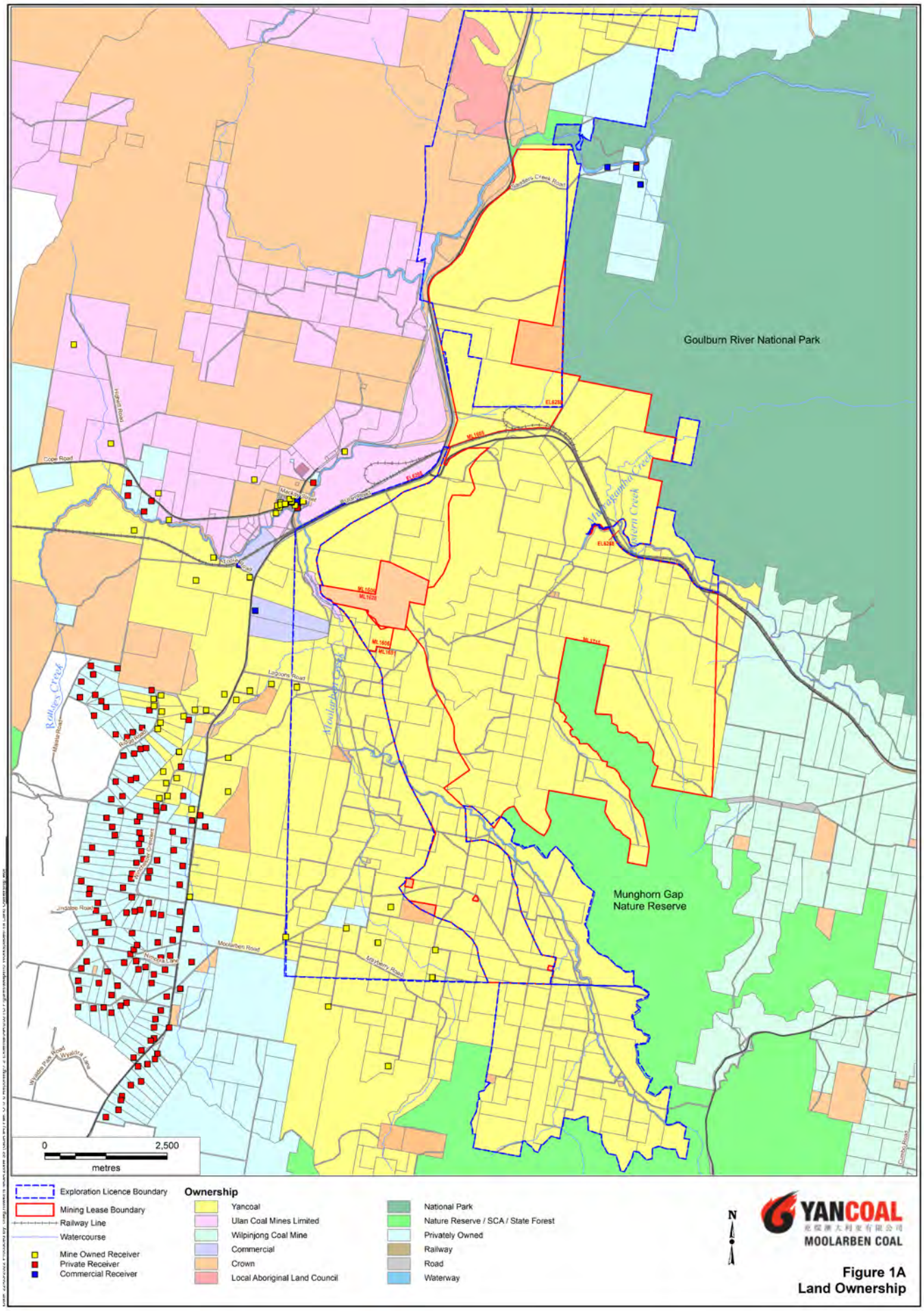
The following is a summary of measures to be implemented in the next reporting period.

- Review and revise environmental management plans as necessary.
- Review PZ058a monitoring as part of next Groundwater Management Plan Review.
- Install VWP to replace PZ103B.
- Continued progressive rehabilitation.
- Establishment and baseline monitoring associated with UG4 where not completed.

LIST OF APPENDICES

LIST OF FIGURES

APPENDIX 1. LAND OWNERSHIP



APPENDIX 2. MONITORING LOCATIONS

Figure 2-a Noise Monitoring Locations

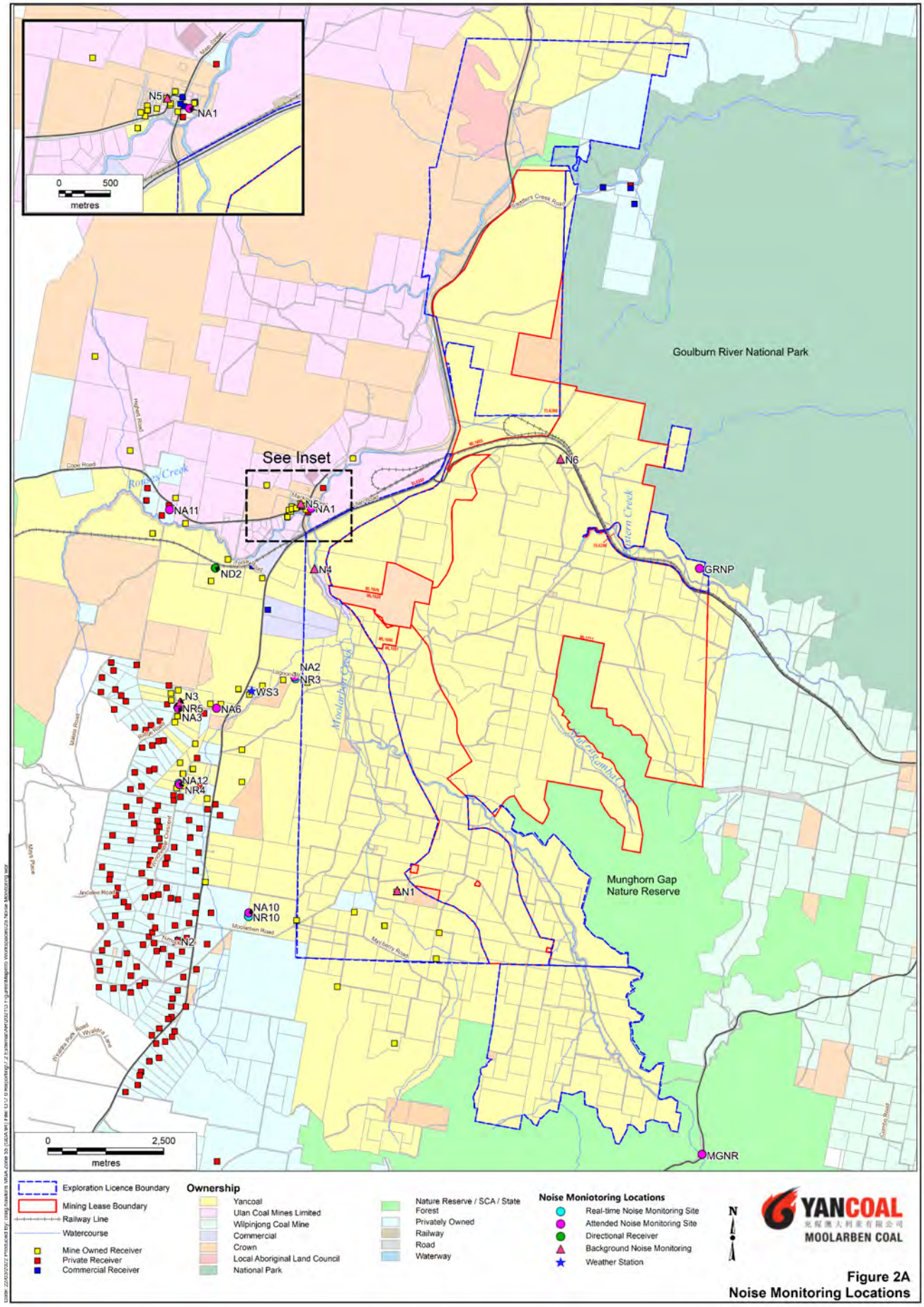


Figure 2-b Blast Monitoring Locations

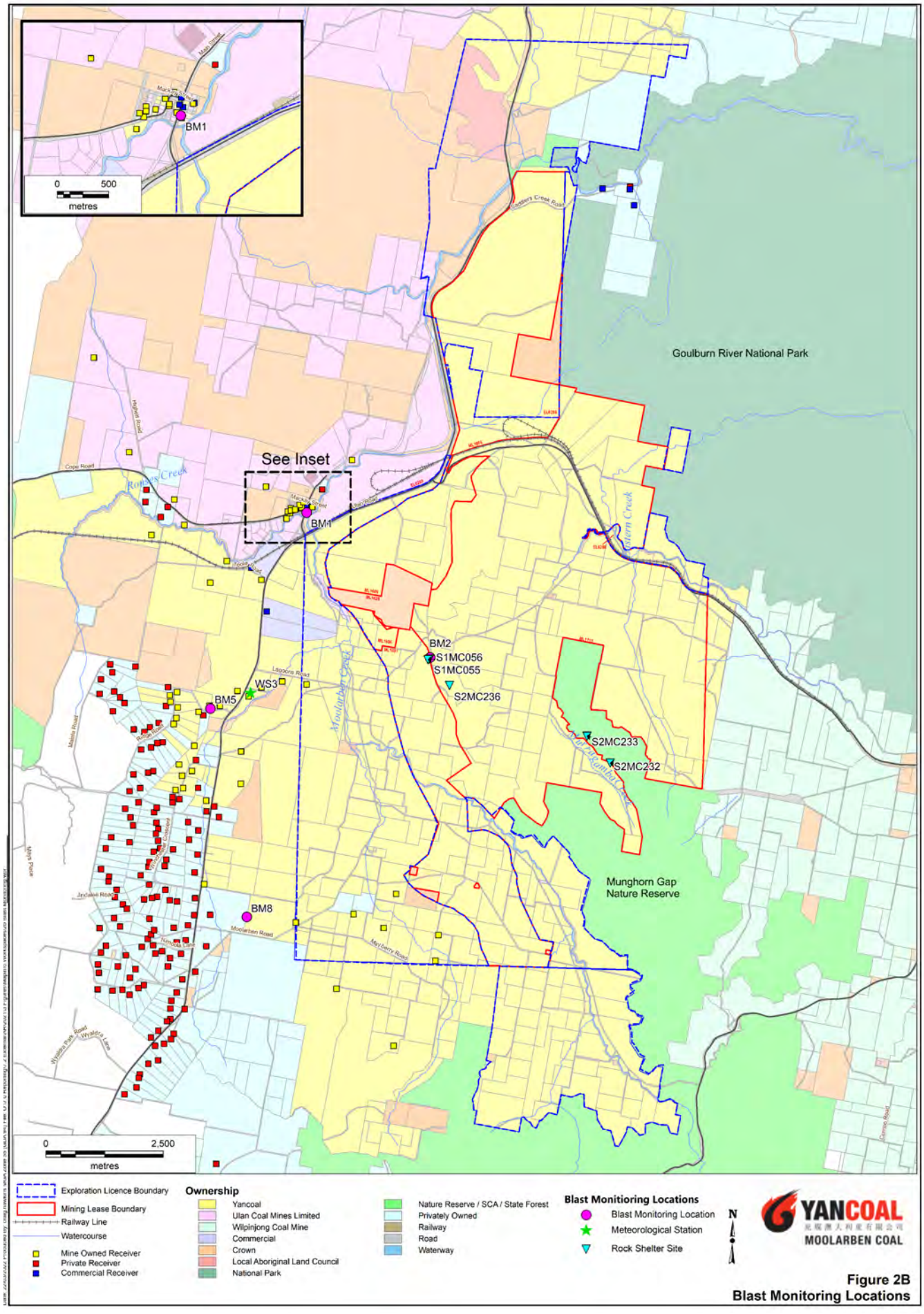


Figure 2-c Air quality Monitoring Locations

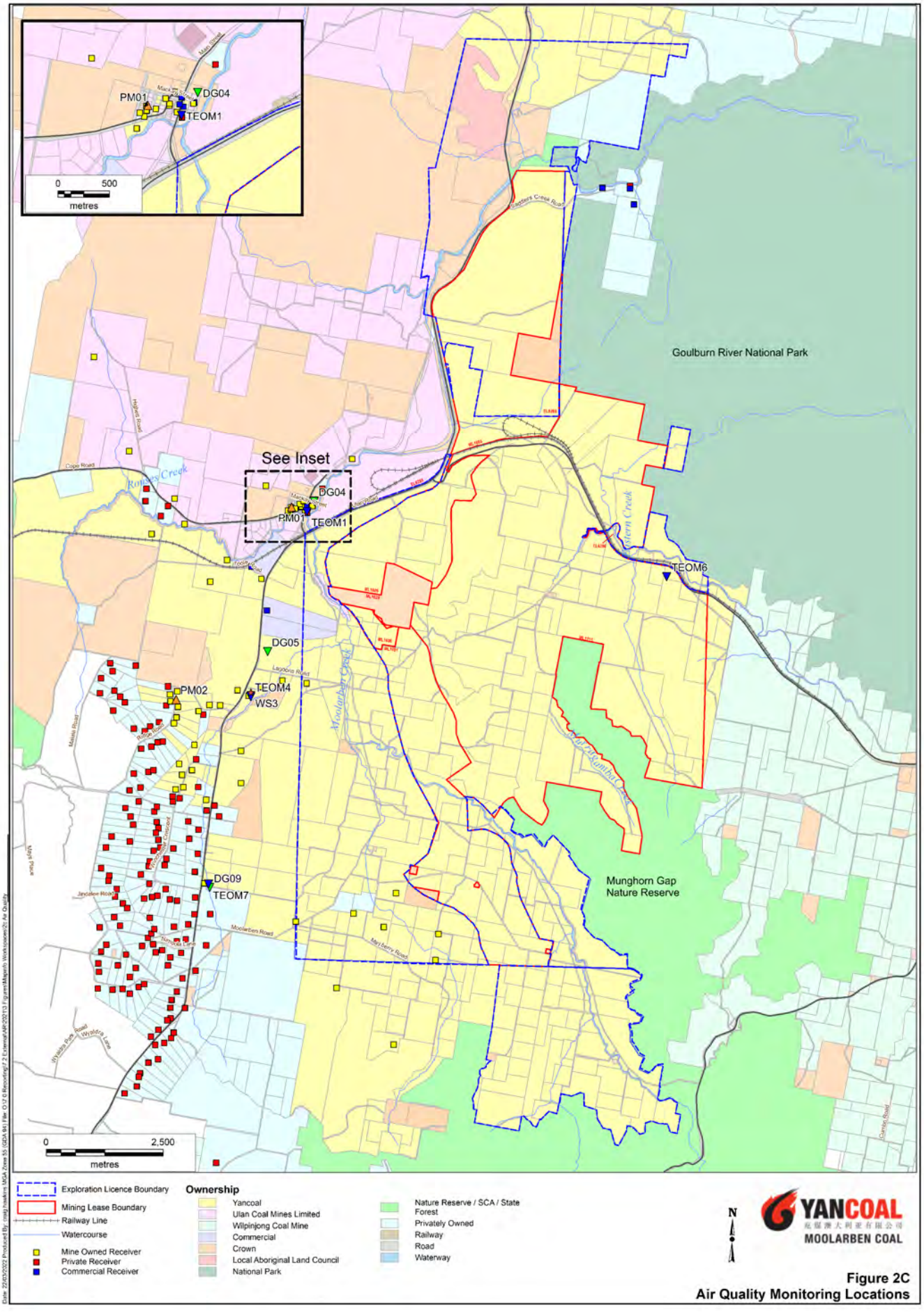


Figure 2-d MCO Northern Biodiversity Offset Area monitoring site locations

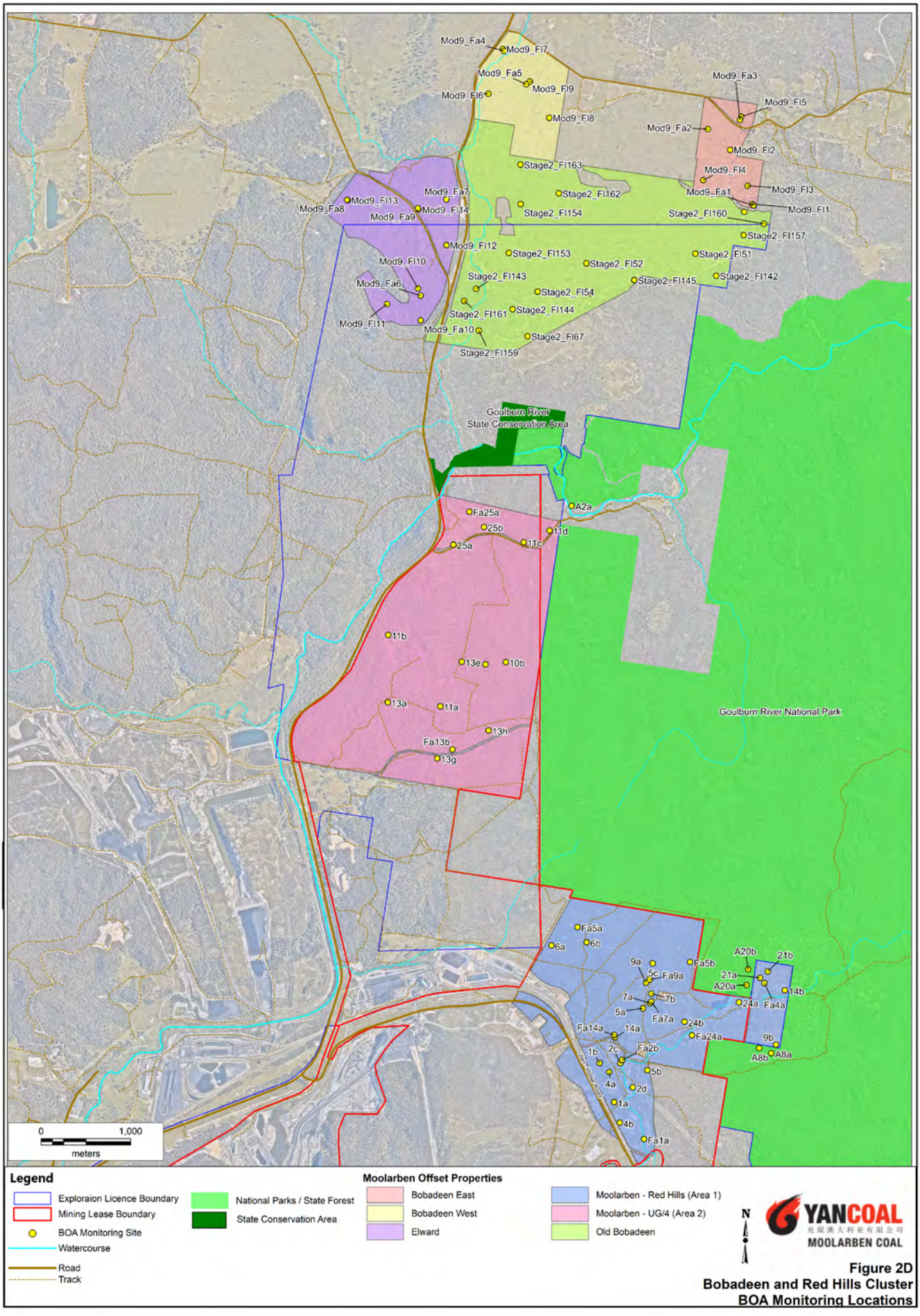


Figure 2-e MCO Western Biodiversity Offset Area monitoring site locations

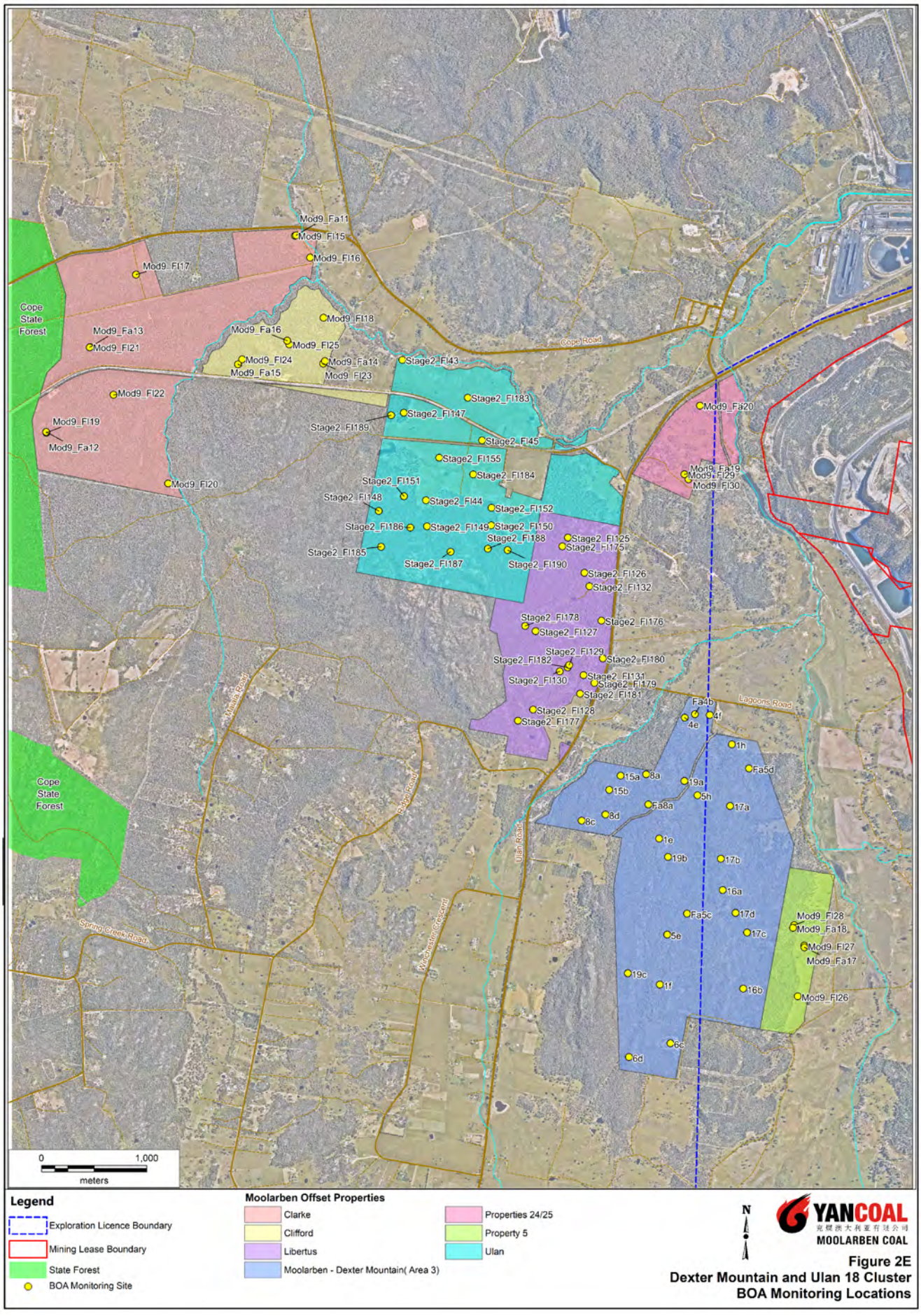


Figure 2-f MCO Southern Biodiversity Offset Area monitoring site locations

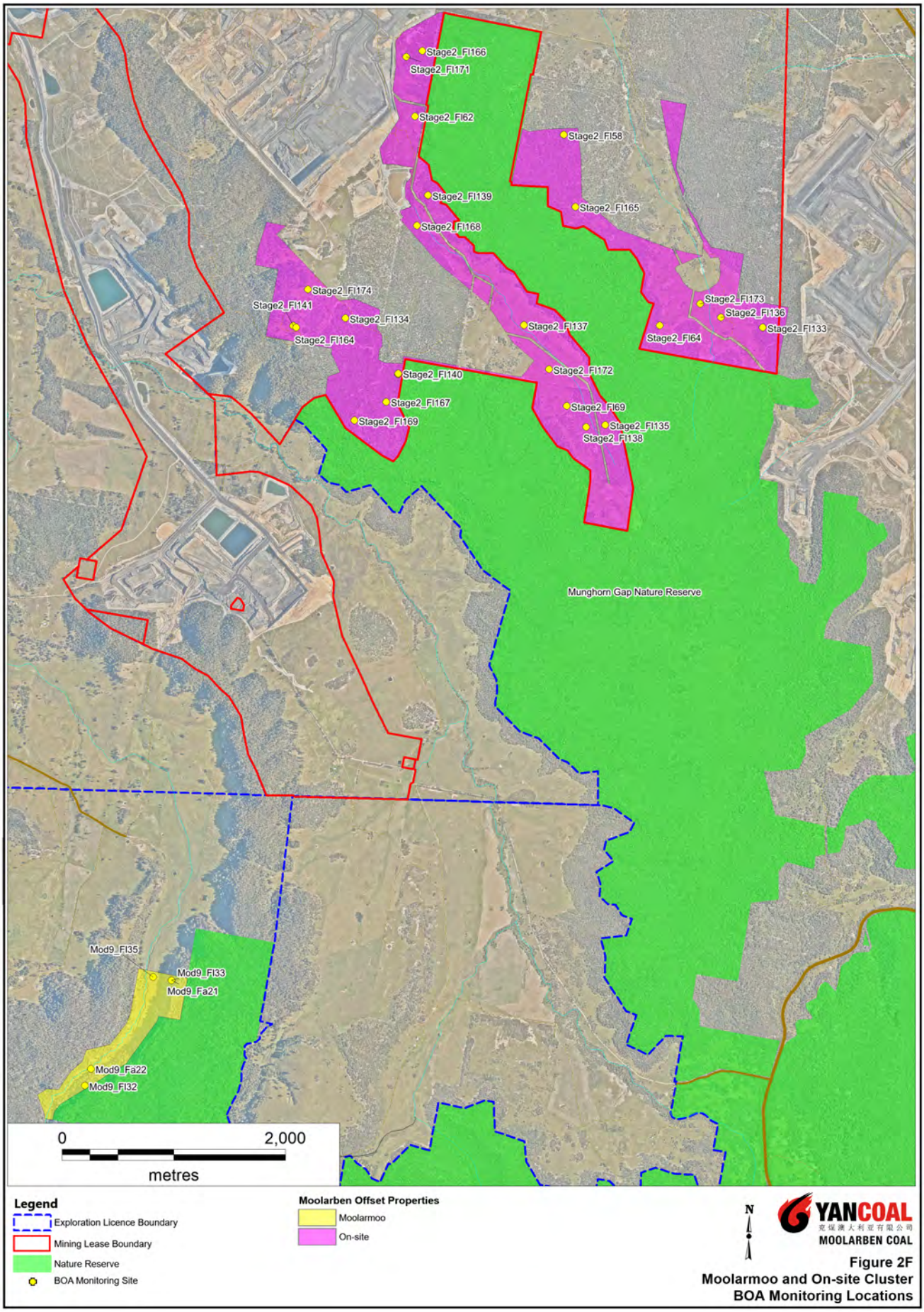


Figure 2-g MCO Remote Biodiversity Offset monitoring site locations

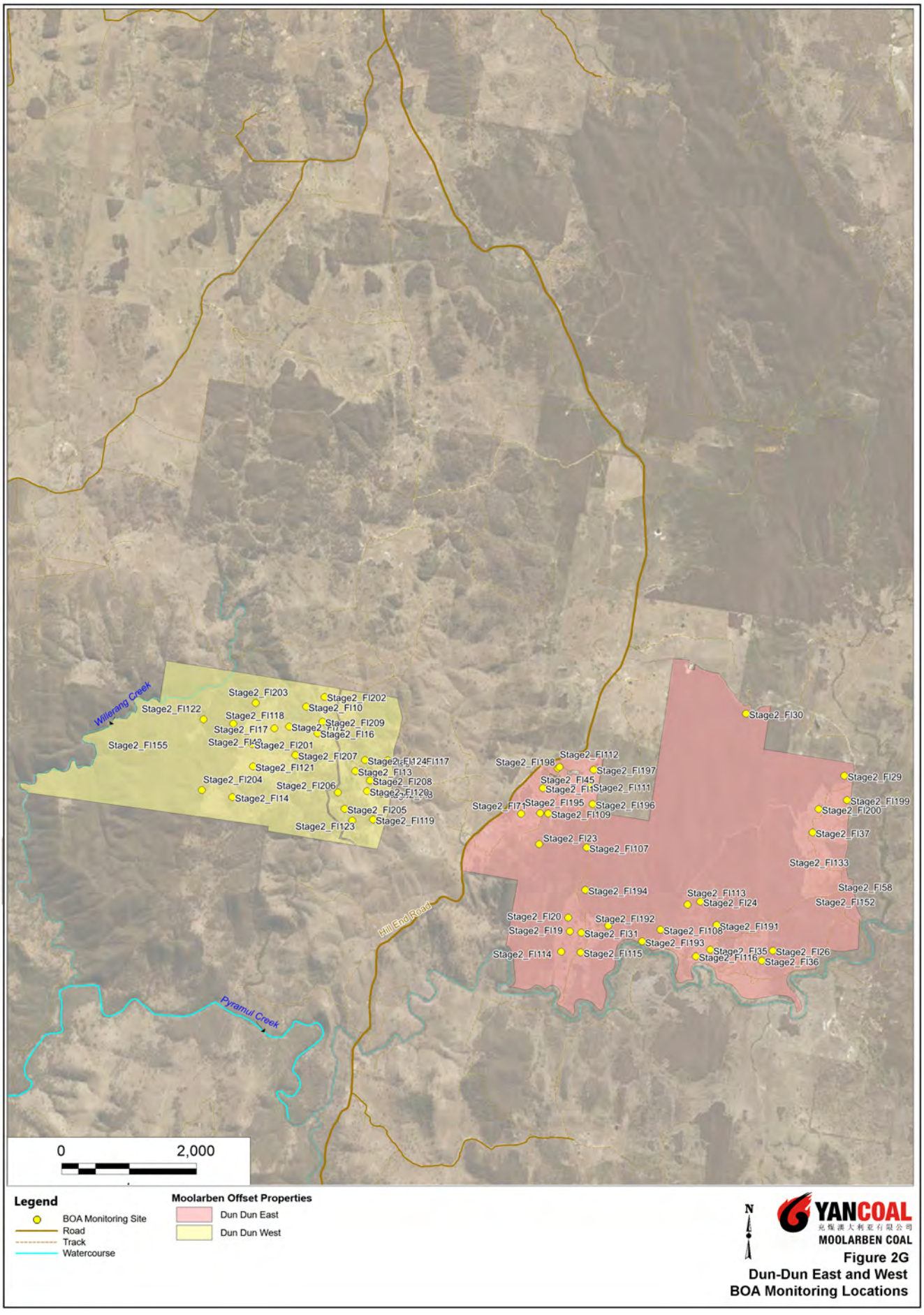


Figure 2-h MCO analogue monitoring site locations

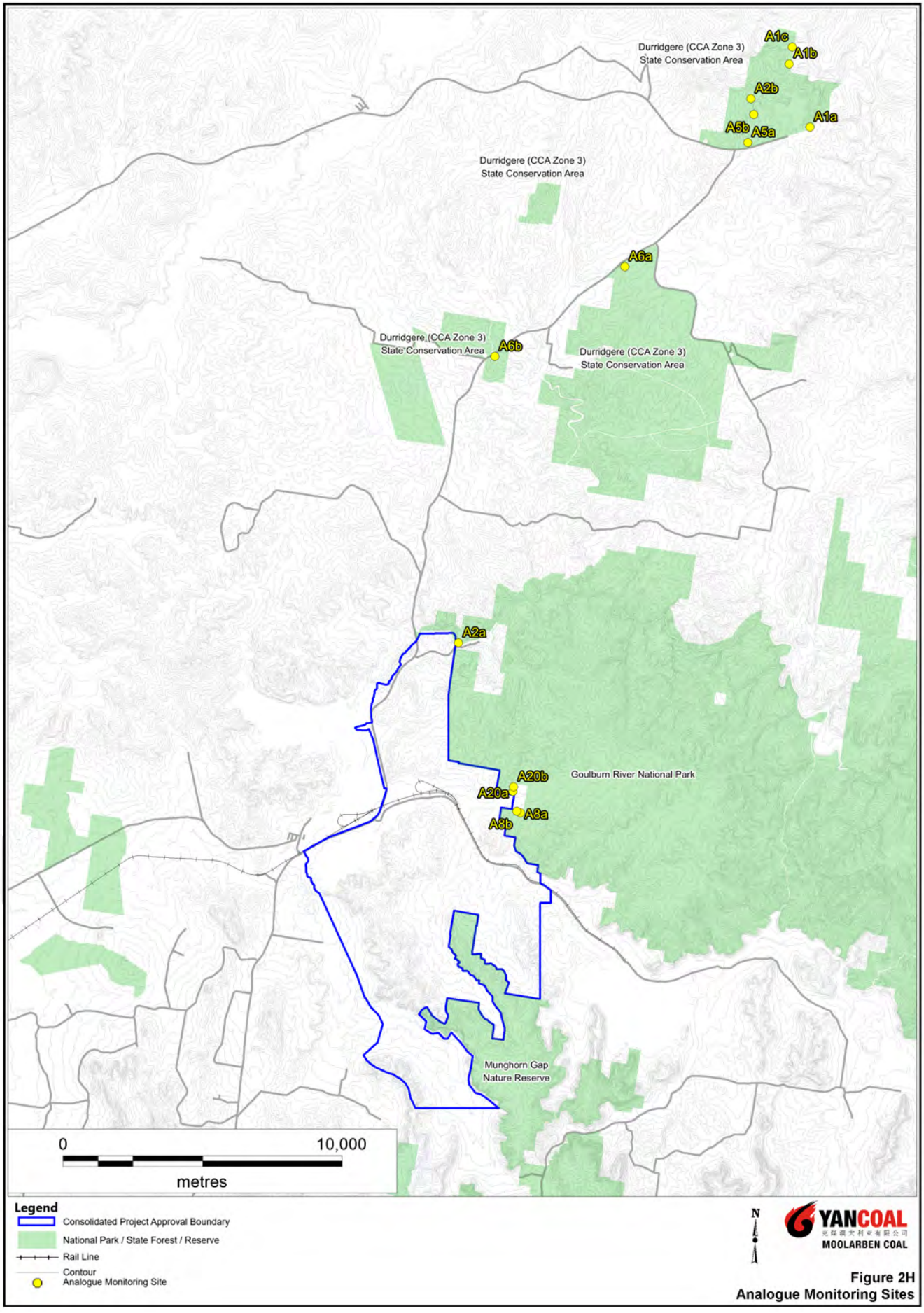


Figure 2-i Surface Water Monitoring Locations

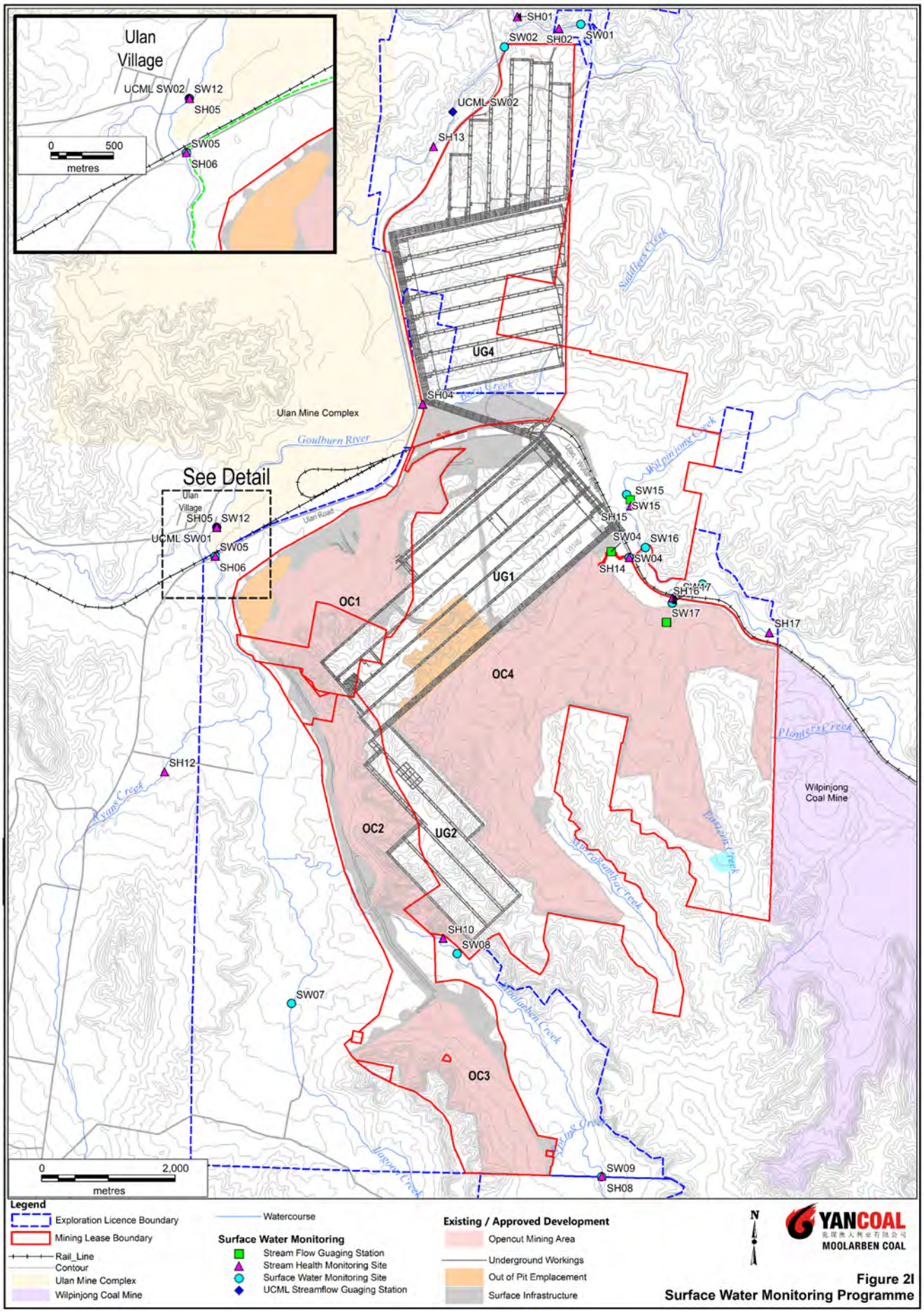


Figure 2-j Channel Stability Monitoring Locations

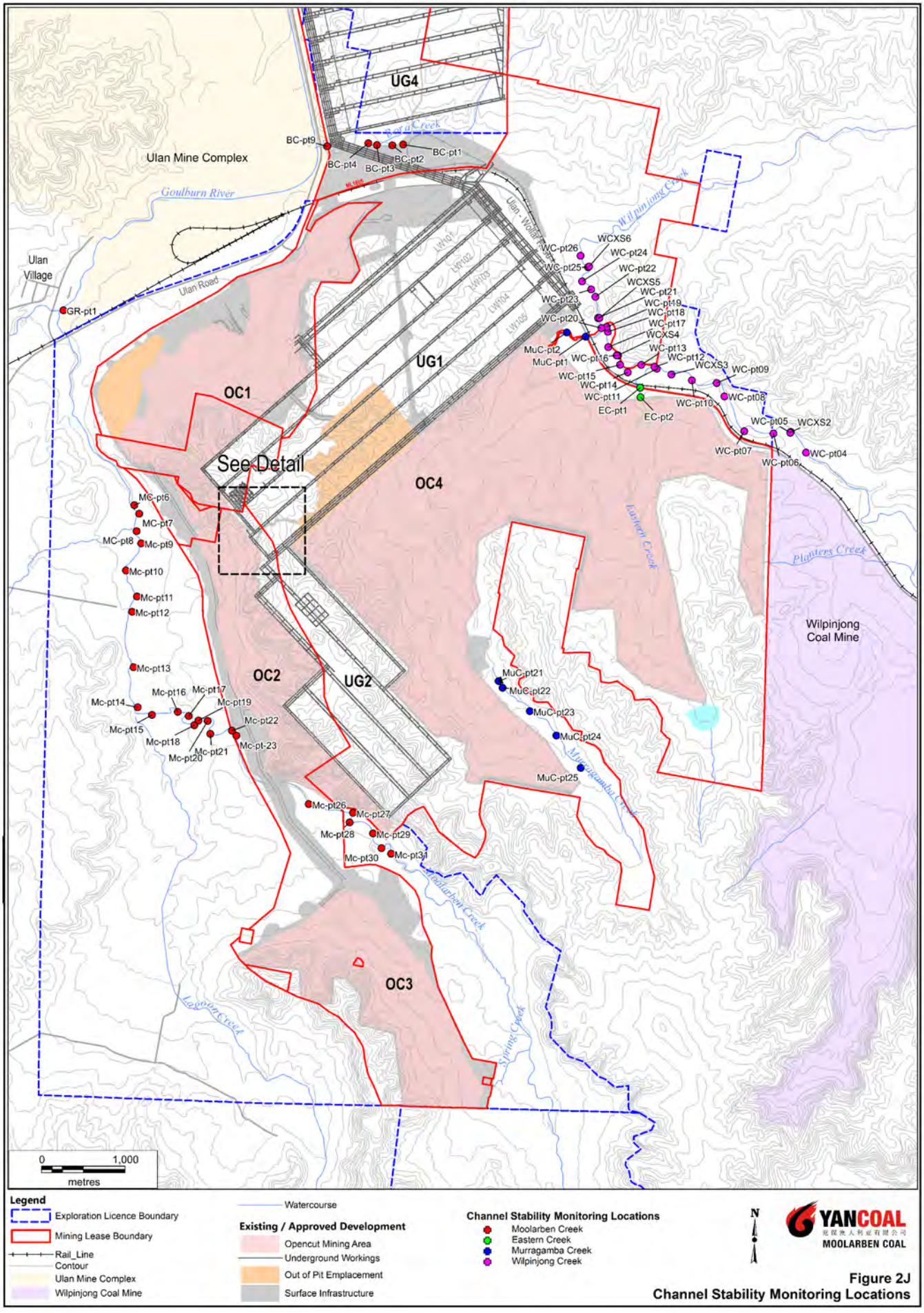


Figure 2-k Groundwater Monitoring Locations

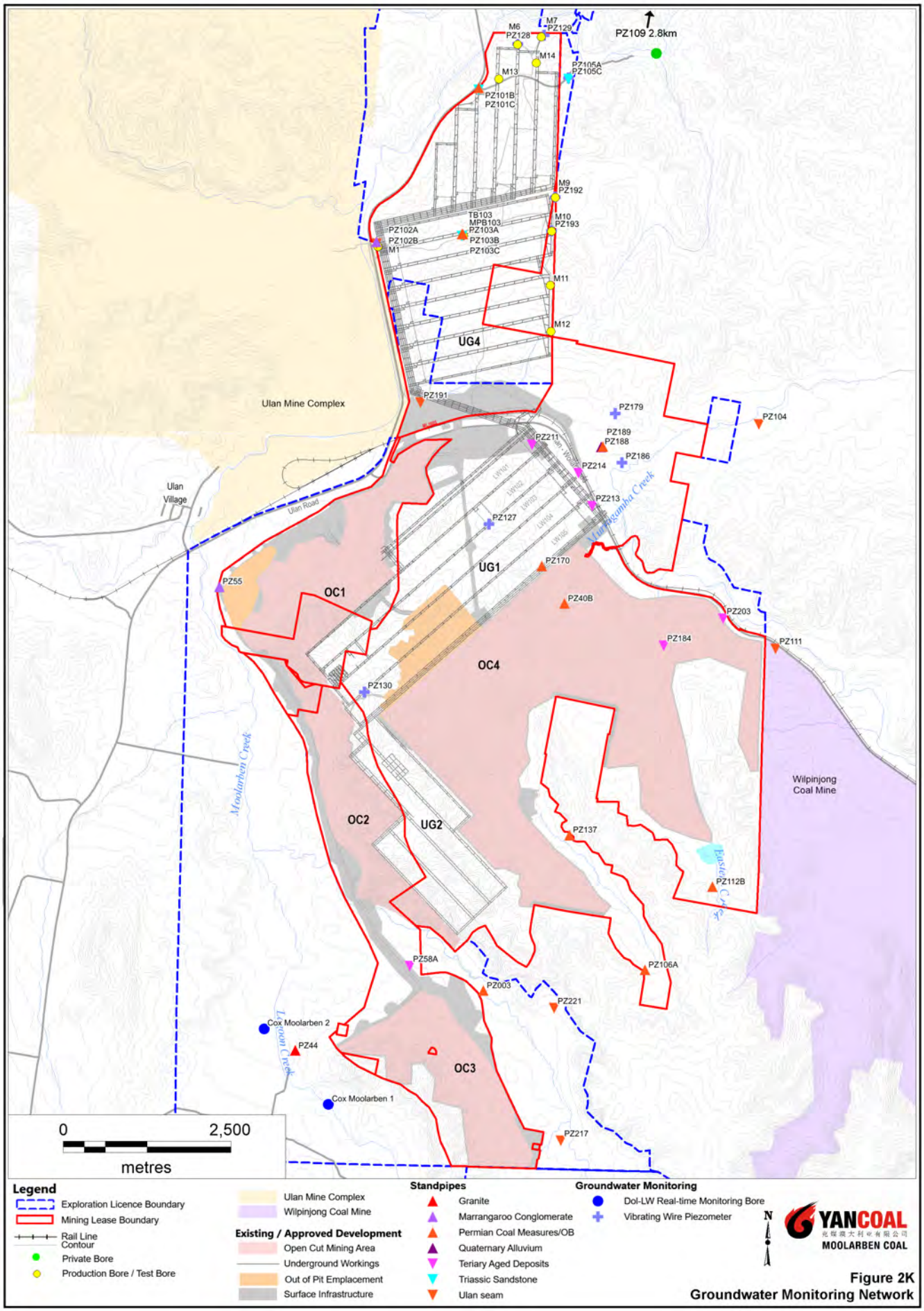
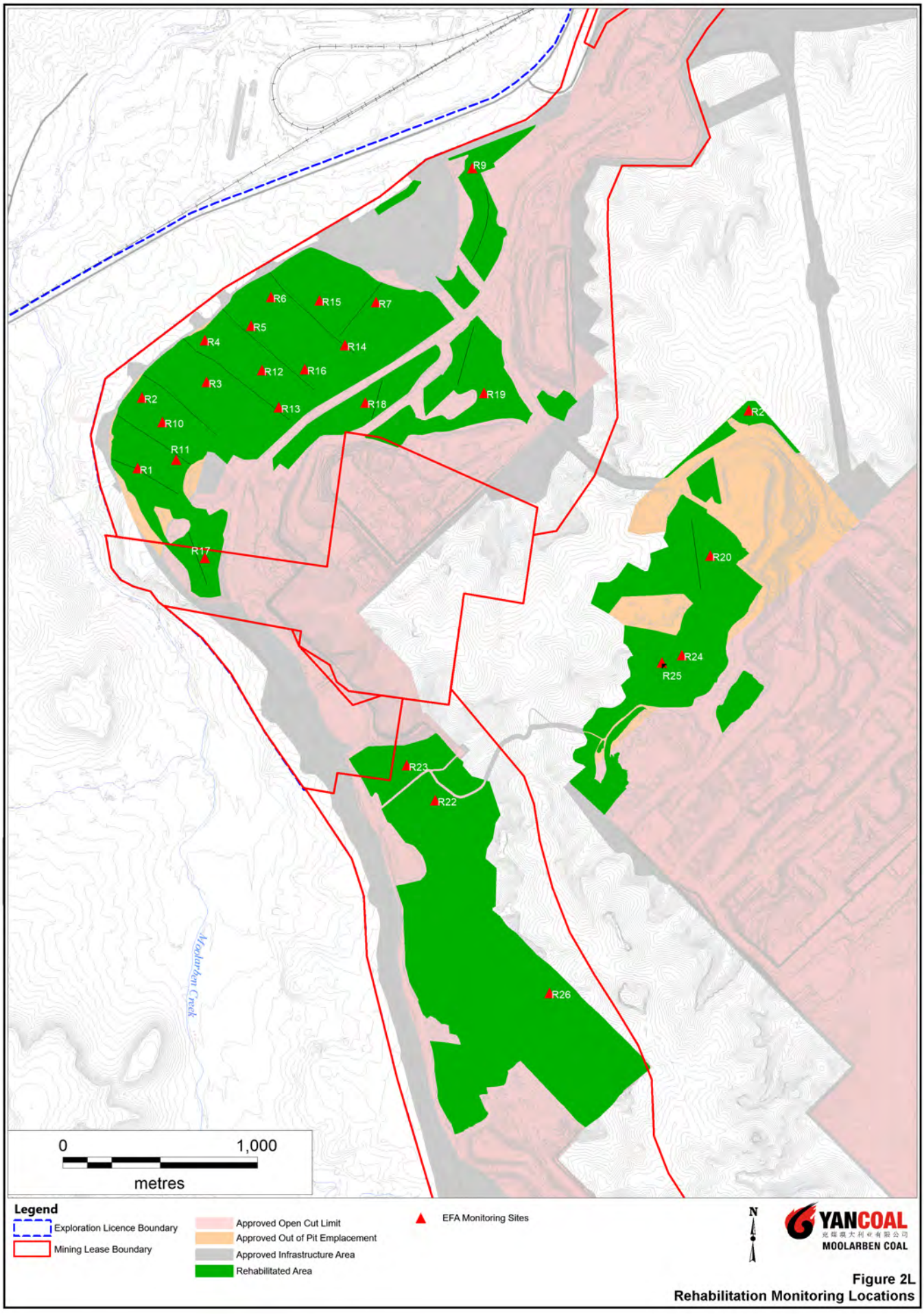


Figure 2-l Rehabilitation Monitoring Locations



APPENDIX 3. MONITORING DATA

APPENDIX 3A. DAILY METEOROLOGICAL DATA (WS03)

Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
1/01/2021	14.4	20.1	14.7	20.0	79.0	0
2/01/2021	14.4	23.7	14.7	22.9	79.9	0
3/01/2021	17.1	27.9	17.4	25.6	85.1	4.6
4/01/2021	16.0	28.0	16.7	26.5	93.4	25.0
5/01/2021	14.9	29.3	15.8	28.0	73.6	0
6/01/2021	13.2	23.9	14.1	23.3	81.1	0
7/01/2021	14.1	22.3	14.9	21.7	69.2	0
8/01/2021	12.9	22.0	13.7	21.5	63.4	0
9/01/2021	13.6	23.5	14.2	22.9	72.7	0
10/01/2021	11.1	26.5	12.5	26.0	68.4	0
11/01/2021	12.0	29.2	13.5	27.7	61.5	0
12/01/2021	11.9	32.3	12.9	31.0	62.2	0
13/01/2021	13.3	31.0	14.2	29.3	64.0	0
14/01/2021	15.0	34.9	16.2	33.9	58.4	0
15/01/2021	13.8	31.2	15.4	30.6	45.7	0
16/01/2021	11.5	24.7	13.0	24.1	34.5	0
17/01/2021	7.0	28.3	8.9	27.3	51.0	0
18/01/2021	12.9	31.3	13.9	29.8	52.5	0
19/01/2021	9.6	31.1	11.0	29.4	50.5	0
20/01/2021	15.4	23.1	16.0	22.3	69.3	0
21/01/2021	13.2	30.9	13.9	29.2	59.5	0
22/01/2021	14.0	33.5	15.1	32.1	55.4	0
23/01/2021	14.4	35.4	15.9	34.0	53.9	0
24/01/2021	17.1	36.5	19.1	35.0	50.2	0
25/01/2021	15.4	35.6	16.7	33.8	50.2	0
26/01/2021	16.4	35.8	18.7	34.1	48.7	0
27/01/2021	19.1	31.5	19.6	30.4	63.2	0
28/01/2021	18.8	24.6	19.2	24.1	68.7	0
29/01/2021	18.0	26.0	18.3	25.2	74.2	0
30/01/2021	19.7	31.7	20.1	29.7	74.8	6.6
31/01/2021	16.8	29.9	17.5	28.8	77.2	0.8
1/02/2021	15.7	31.4	16.6	29.8	70.7	29.0
2/02/2021	14.8	28.0	15.4	27.1	72.2	14.2
3/02/2021	13.8	25.8	14.7	25.1	68.8	0
4/02/2021	15.5	30.9	16.4	29.4	67.1	0
5/02/2021	19.6	31.9	20.2	30.9	59.6	0
6/02/2021	18.1	24.1	18.8	24.7	88.0	24.4
7/02/2021	16.7	27.7	17.3	26.9	72.7	0.2
8/02/2021	14.6	25.7	16.1	24.9	69.9	0
9/02/2021	15.5	24.8	16.1	24.2	66.3	0
10/02/2021	10.1	24.6	11.0	24.0	69.3	0
11/02/2021	10.9	29.0	12.0	28.0	66.8	0
12/02/2021	12.9	29.9	14.1	28.6	74.6	3.8
13/02/2021	17.7	28.9	18.2	28.1	89.7	26.4
14/02/2021	13.2	24.3	14.0	23.7	65.8	0
15/02/2021	8.9	23.8	9.9	23.4	67.8	0
16/02/2021	14.7	25.4	16.1	25.2	67.3	0
17/02/2021	15.3	25.1	16.3	24.5	65.9	0
18/02/2021	15.2	24.3	15.9	23.9	67.5	0
19/02/2021	13.7	27.1	15.3	26.8	73.4	0
20/02/2021	15.7	28.9	17.0	28.5	73.4	0
21/02/2021	14.9	31.6	15.9	31.1	67.4	0

Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
22/02/2021	16.3	32.1	18.6	31.7	63.1	0
23/02/2021	16.1	24.0	16.6	23.2	75.9	0
24/02/2021	13.8	23.2	14.4	22.5	75.1	0
25/02/2021	14.7	28.1	15.6	26.8	81.9	8.8
26/02/2021	11.8	30.4	12.9	29.4	73.6	0.2
27/02/2021	18.4	25.0	18.8	23.9	84.1	0.2
28/02/2021	15.9	31.5	16.8	30.5	71.2	0.2
1/03/2021	15.0	32.0	16.3	31.3	62.4	0
2/03/2021	9.2	28.5	11.1	27.8	45.2	0
3/03/2021	15.3	24.6	15.9	23.5	63.5	0.2
4/03/2021	11.1	27.2	12.3	26.4	61.9	0
5/03/2021	9.3	28.9	11.7	28.1	48.3	0
6/03/2021	15.0	25.1	15.7	24.2	64.4	0
7/03/2021	13.7	28.5	14.6	27.8	65.5	0
8/03/2021	14.4	27.7	15.7	26.1	77.9	0
9/03/2021	12.5	30.9	13.6	30.2	68.2	0.4
10/03/2021	18.0	28.1	18.5	27.4	73.7	0
11/03/2021	16.6	25.8	17.1	25.2	83.1	33.8
12/03/2021	16.9	24.8	17.4	24.0	92.3	20.0
13/03/2021	14.6	30.8	15.3	28.9	83.8	1.4
14/03/2021	13.0	21.9	13.3	21.3	93.0	14.2
15/03/2021	9.2	21.9	9.9	21.4	78.2	0
16/03/2021	12.7	22.5	13.6	21.6	72.9	0
17/03/2021	15.2	18.3	15.6	18.4	81.7	2.2
18/03/2021	15.2	22.1	15.5	21.7	79.0	0.8
19/03/2021	17.3	22.2	17.9	21.8	73.6	0
20/03/2021	15.8	23.6	16.2	22.9	83.9	4.6
21/03/2021	17.3	20.5	17.8	20.6	86.7	1.0
22/03/2021	14.9	17.6	15.4	18.1	96.0	48.6
23/03/2021	15.0	23.2	15.5	23.0	96.6	18.8
24/03/2021	13.7	24.1	14.8	23.4	73.7	0
25/03/2021	12.1	23.8	13.1	23.2	74.5	0
26/03/2021	8.4	23.7	9.4	22.8	68.4	0.2
27/03/2021	9.6	24.9	10.4	24.0	64.4	0
28/03/2021	8.5	24.7	9.7	24.0	68.5	0
29/03/2021	7.7	24.4	8.6	24.0	69.4	0.6
30/03/2021	8.2	23.9	9.3	22.3	76.2	0
31/03/2021	7.3	22.3	8.3	21.7	75.9	0
1/04/2021	8.8	23.0	9.7	22.6	71.0	0
2/04/2021	9.6	23.8	10.9	23.4	77.7	0.2
3/04/2021	9.4	24.3	11.5	23.7	79.5	0
4/04/2021	9.4	28.6	10.7	26.9	76.6	0
5/04/2021	10.2	25.6	11.4	25.1	75.6	0.2
6/04/2021	11.9	23.8	13.7	23.7	76.1	0
7/04/2021	12.8	25.3	14.1	24.7	77.8	0
8/04/2021	10.6	25.2	11.6	24.1	81.2	0
9/04/2021	9.6	26.7	10.7	26.3	69.5	0.2
10/04/2021	7.2	19.8	10.1	19.4	67.6	0.6
11/04/2021	2.0	14.8	3.6	14.4	65.1	0
12/04/2021	0.5	18.6	1.5	18.0	63.6	0
13/04/2021	0.4	23.0	1.8	21.6	66.3	0.2
14/04/2021	3.0	24.1	4.4	23.5	57.5	0
15/04/2021	4.5	23.3	6.1	22.8	57.7	0
16/04/2021	9.9	19.7	10.9	18.7	60.9	0
17/04/2021	5.9	16.7	6.9	15.8	85.0	1.2
18/04/2021	5.0	20.5	6.0	19.7	82.0	0.2
19/04/2021	1.6	21.2	2.8	20.7	69.5	0.2
20/04/2021	1.0	20.6	2.3	20.0	62.8	0
21/04/2021	4.1	17.5	6.6	16.9	62.3	0.4

Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
22/04/2021	-0.8	15.8	0.6	15.4	66.7	0
23/04/2021	-0.9	18.2	0.3	17.9	69.5	0
24/04/2021	0.9	19.5	1.8	19.1	71.1	0
25/04/2021	0.7	20.6	2.0	20.1	70.6	0
26/04/2021	3.1	21.2	4.1	20.2	77.7	0
27/04/2021	2.7	21.3	4.2	20.8	76.6	0.2
28/04/2021	4.8	20.2	6.4	20.0	82.6	0
29/04/2021	3.9	22.7	5.5	21.3	77.2	0.2
30/04/2021	4.1	21.1	5.7	20.7	79.0	0
1/05/2021	6.3	21.6	8.1	21.3	81.7	0
2/05/2021	7.4	23.1	9.0	22.0	80.8	0
3/05/2021	5.4	23.0	6.6	22.6	78.0	0.2
4/05/2021	10.1	15.1	11.1	14.8	91.6	13.4
5/05/2021	9.2	18.3	10.1	17.8	85.5	0.2
6/05/2021	9.6	20.9	11.1	20.8	81.9	0
7/05/2021	10.7	24.0	12.0	22.7	84.5	0
8/05/2021	10.9	22.3	11.8	22.1	84.0	0.2
9/05/2021	11.8	18.1	12.3	17.7	82.0	0.4
10/05/2021	6.1	20.7	7.3	19.8	81.9	0
11/05/2021	6.0	17.5	6.9	17.1	81.9	0.8
12/05/2021	1.3	18.0	2.5	17.7	86.4	0
13/05/2021	4.2	19.0	5.0	18.5	80.3	0.2
14/05/2021	3.1	15.1	5.4	14.7	69.2	0
15/05/2021	3.2	14.0	5.2	13.5	63.8	0
16/05/2021	-3.8	14.8	-2.6	14.3	64.4	0
17/05/2021	-0.2	16.8	1.1	16.4	68.7	0
18/05/2021	-1.5	17.1	-0.5	16.5	75.6	0
19/05/2021	-1.7	19.2	-0.4	18.7	74.6	0
20/05/2021	-0.8	19.2	0.4	18.9	72.6	0
21/05/2021	2.2	18.5	3.6	18.0	75.7	0
22/05/2021	2.7	18.8	4.2	18.1	83.3	0
23/05/2021	1.8	19.5	2.9	18.5	85.1	0.2
24/05/2021	2.6	17.7	4.1	17.5	84.2	0
25/05/2021	4.3	20.9	5.6	19.6	83.7	0.2
26/05/2021	2.6	17.9	5.2	17.3	68.7	0.2
27/05/2021	-0.9	15.9	0.1	15.7	71.2	0
28/05/2021	1.4	16.2	3.3	16.0	62.9	0
29/05/2021	-3.0	17.0	-1.8	16.3	64.6	0
30/05/2021	-1.6	16.9	-0.5	16.1	80.1	0
31/05/2021	-1.1	18.0	0.6	17.6	78.7	0
1/06/2021	-0.1	17.8	1.0	17.5	78.4	0
2/06/2021	4.1	21.4	5.3	20.4	74.1	0
3/06/2021	6.4	12.1	7.9	12.3	97.6	26.4
4/06/2021	8.1	14.3	8.7	14.1	84.0	0.4
5/06/2021	0.4	14.9	1.5	13.9	80.6	0.2
6/06/2021	-1.1	17.4	0.6	16.6	79.7	0.2
7/06/2021	-1.2	18.3	-0.1	17.6	78.7	0
8/06/2021	0.7	16.2	2.3	15.3	89.9	8
9/06/2021	3.1	7.3	3.6	8.0	93.5	6.8
10/06/2021	2.7	5.6	2.9	5.7	95.5	29.4
11/06/2021	2.6	10.2	2.9	10.1	91.1	0.2
12/06/2021	2.6	13.0	4.0	12.6	83.6	0
13/06/2021	2.2	14.4	2.9	13.6	73.2	0
14/06/2021	-1.6	14.2	-0.7	13.8	82.1	0
15/06/2021	-0.3	15.7	0.6	15.5	83.6	0.2
16/06/2021	-0.6	18.0	0.5	17.6	83.2	3
17/06/2021	4.8	12.3	5.5	12.3	77.2	0.6
18/06/2021	7.3	12.5	7.8	12.2	90.3	6.4
19/06/2021	3.8	15.3	5.1	14.9	74.4	0

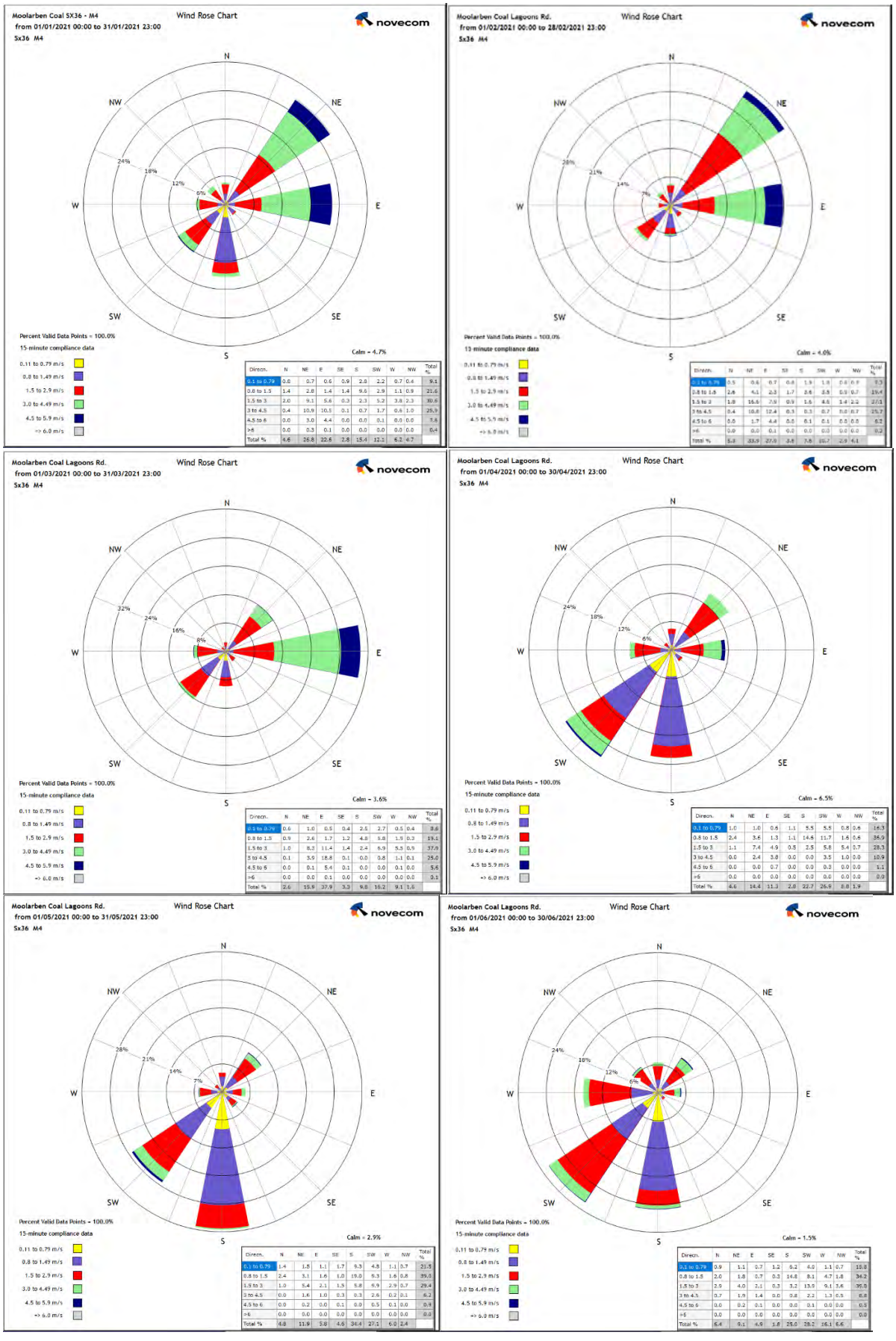
Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
20/06/2021	3.3	15.6	4.6	15.2	75.9	0
21/06/2021	0.5	15.5	1.6	15.0	84.3	0
22/06/2021	1.1	14.9	2.8	14.8	86.5	0.2
23/06/2021	3.3	16.3	4.5	15.8	86.8	0
24/06/2021	9.4	16.5	10.6	16.3	86.3	6.6
25/06/2021	6.1	15.2	7.8	14.4	81.0	0
26/06/2021	2.3	13.2	4.6	12.7	85.9	2.8
27/06/2021	0.9	14.0	2.3	13.7	80.7	0.2
28/06/2021	-1.4	14.4	-0.4	14.2	87.0	0
29/06/2021	2.2	15.6	3.4	15.2	87.7	0
30/06/2021	8.4	15.9	10.3	15.6	82.8	0
1/07/2021	9.6	11.2	10.0	11.3	96.2	29.8
2/07/2021	2.0	14.0	3.2	13.5	92.8	1
3/07/2021	0.2	15.7	0.9	14.9	87.6	0
4/07/2021	-2.0	12.0	-1.0	10.9	84.0	0.2
5/07/2021	-1.9	12.6	0.0	12.3	80.5	0
6/07/2021	-2.6	13.2	-1.6	12.5	82.8	0.2
7/07/2021	-4.5	13.8	-3.4	13.5	82.3	0
8/07/2021	-1.9	14.2	-0.4	13.9	84.1	0
9/07/2021	5.5	11.4	6.4	11.4	95.2	20.0
10/07/2021	2.6	15.8	4.1	15.5	80.6	0.6
11/07/2021	0.4	15.3	1.4	14.5	85.4	0
12/07/2021	1.0	16.2	2.1	15.4	86.8	0.8
13/07/2021	2.3	16.4	3.4	15.8	79.1	2.6
14/07/2021	1.6	15.5	3.0	15.4	86.4	1.4
15/07/2021	7.7	18.4	10.9	17.8	82.0	3.8
16/07/2021	5.6	14.5	7.1	14.0	74.1	6.4
17/07/2021	5.8	10.6	6.2	10.4	68.1	3.6
18/07/2021	2.6	11.4	3.9	11.4	78.0	0
19/07/2021	-0.6	10.0	0.2	9.8	83.0	0.2
20/07/2021	5.1	10.2	5.4	10.1	83.8	3.2
21/07/2021	-0.7	12.1	0.9	11.9	72.6	0.6
22/07/2021	-3.9	15.0	-3.0	14.2	75.4	0
23/07/2021	4.2	15.0	5.0	14.2	81.7	2.4
24/07/2021	7.0	12.7	7.5	11.9	81.5	4.2
25/07/2021	4.0	9.9	4.7	9.8	70.8	0.4
26/07/2021	3.8	13.2	4.9	12.8	77.3	0
27/07/2021	0.9	17.7	2.2	17.0	77.4	0
28/07/2021	1.0	19.1	3.0	18.6	76.6	2.2
29/07/2021	-0.9	13.0	0.7	12.6	74.4	0.4
30/07/2021	-4.2	16.8	-3.0	16.1	72.1	0
31/07/2021	-0.5	21.3	0.8	20.4	68.6	0
1/08/2021	4.7	21.8	6.3	21.0	75.9	1.8
2/08/2021	1.1	17.4	2.3	16.9	84.2	0.4
3/08/2021	6.2	14.7	6.7	14.0	78.4	6.4
4/08/2021	5.3	9.6	5.7	9.4	78.9	0
5/08/2021	5.5	14.1	5.9	13.7	75.1	0.2
6/08/2021	2.3	14.4	4.6	14.1	68.7	0
7/08/2021	0.0	13.4	2.5	12.9	74.3	0
8/08/2021	-1.1	16.2	0.1	15.9	79.1	0
9/08/2021	4.2	17.8	6.0	16.8	79.7	0
10/08/2021	2.3	19.2	3.4	18.4	78.2	0
11/08/2021	3.9	20.4	5.4	19.9	70.3	0
12/08/2021	1.6	17.8	2.8	17.4	72.3	2.8
13/08/2021	-1.3	17.5	-0.3	16.7	70.2	0
14/08/2021	-1.2	19.5	-0.2	18.8	73.2	0
15/08/2021	-0.4	18.3	0.5	18.0	64.1	0
16/08/2021	-0.8	16.0	0.9	16.0	66.1	0
17/08/2021	0.5	15.9	1.6	15.2	69.8	0

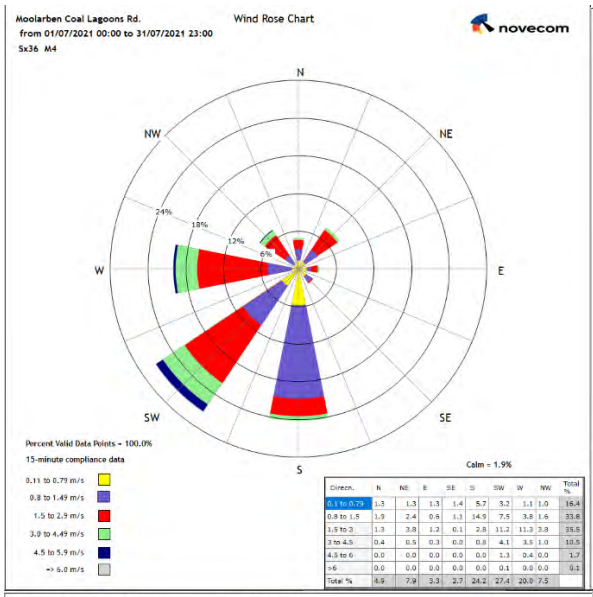
Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
18/08/2021	-1.5	17.2	-0.7	17.2	74.7	0
19/08/2021	0.5	19.5	1.6	18.5	77.1	0
20/08/2021	0.9	20.5	2.1	20.2	70.4	0.2
21/08/2021	4.2	20.6	5.7	20.0	70.6	0.6
22/08/2021	2.0	25.2	3.3	24.2	61.0	0
23/08/2021	8.4	18.8	10.2	18.5	83.4	13.2
24/08/2021	5.9	11.6	6.3	11.9	92.6	12.6
25/08/2021	1.8	12.9	2.6	12.5	74.2	0
26/08/2021	-0.8	16.5	0.0	15.6	70.7	0
27/08/2021	1.3	14.3	4.2	13.6	73.8	0
28/08/2021	-0.5	14.9	0.6	14.3	70.6	0.2
29/08/2021	-1.2	19.3	-0.3	18.7	70.0	0
30/08/2021	-1.1	16.6	-0.1	16.2	72.7	0
31/08/2021	-0.3	22.2	1.0	21.3	65.5	0
1/09/2021	1.1	23.9	2.4	23.5	61.5	0
2/09/2021	3.7	24.6	5.7	23.7	71.3	0
3/09/2021	8.4	23.1	9.6	21.8	70.7	0
4/09/2021	7.1	17.2	8.5	17.2	88.0	6.6
5/09/2021	5.5	13.3	6.2	13.7	80.9	4.2
6/09/2021	2.8	15.4	4.5	14.9	68.5	0
7/09/2021	-0.9	18.4	0.4	18.2	65.4	0
8/09/2021	0.8	21.0	1.7	20.3	73.8	0.4
9/09/2021	0.6	21.7	2.1	21.1	65.9	0
10/09/2021	2.7	23.7	4.9	23.4	60.6	0
11/09/2021	0.9	26.2	2.0	25.6	55.4	0
12/09/2021	6.3	26.4	8.8	25.9	44.8	0
13/09/2021	3.4	16.0	4.4	14.9	61.9	0
14/09/2021	3.2	16.7	4.5	16.2	71.2	7.2
15/09/2021	-0.1	17.8	0.9	16.7	71.6	0
16/09/2021	1.1	17.7	2.4	16.9	74.6	0
17/09/2021	1.3	22.6	2.5	21.5	71.2	0.4
18/09/2021	7.4	22.2	8.9	21.5	81.2	5
19/09/2021	2.2	18.8	3.1	18.4	70.8	0
20/09/2021	1.3	21.4	2.5	21.1	57.5	0.2
21/09/2021	2.9	11.9	4.7	11.7	63.4	0
22/09/2021	-0.6	18.1	0.7	17.6	64.5	0
23/09/2021	1.3	20.9	2.3	20.3	70.9	0
24/09/2021	3.8	22.9	4.7	22.4	65.0	0
25/09/2021	5.1	20.5	7.2	20.2	55.2	0
26/09/2021	7.5	14.4	8.2	14.0	70.4	0
27/09/2021	7.6	19.8	8.3	19.2	61.3	0
28/09/2021	5.1	22.0	6.4	21.2	74.2	0
29/09/2021	9.3	16.9	11.1	16.6	85.7	21
30/09/2021	9.5	22.6	9.9	21.5	86.5	6.2
1/10/2021	7.9	23.2	9.3	22.1	75.0	0
2/10/2021	7.6	17.5	8.9	17.1	84.4	2
3/10/2021	9.1	22.4	10.7	21.4	73.4	0.4
4/10/2021	7.5	19.8	9.0	19.4	69.9	0
5/10/2021	4.1	16.3	5.9	15.9	63.2	0
6/10/2021	1.9	22.2	4.4	21.3	60.3	0
7/10/2021	4.8	25.2	5.8	24.4	55.7	0
8/10/2021	7.4	24.9	9.3	23.7	66.9	0
9/10/2021	4.8	27.7	5.8	26.9	64.4	0
10/10/2021	10.2	28.0	11.8	27.5	74.8	3.2
11/10/2021	10.3	19.0	10.6	17.5	88.9	1
12/10/2021	9.0	11.0	9.1	11.0	89.6	18.2
13/10/2021	9.9	17.6	10.3	17.6	86.2	0.4
14/10/2021	10.5	25.6	11.7	25.0	67.4	0
15/10/2021	5.9	16.3	7.5	15.3	77.2	10.2

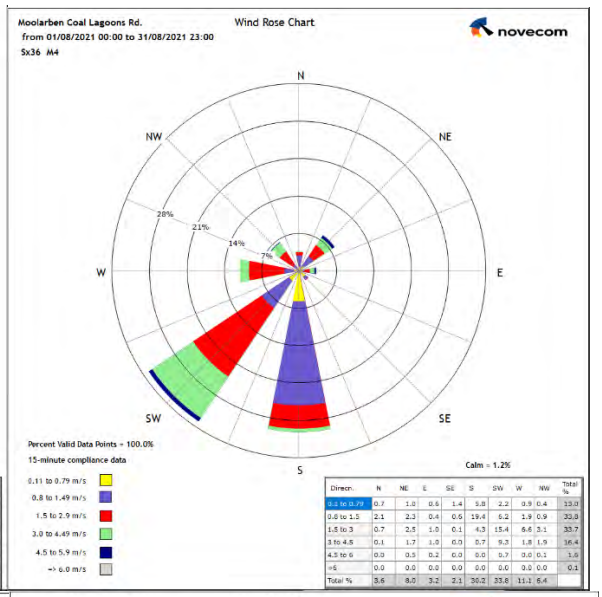
Date	Temperature (2m) (°C)		Temperature (10m) (°C)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
16/10/2021	6.5	15.6	7.1	15.3	76.9	0.2
17/10/2021	3.1	20.9	4.9	20.3	67.6	0
18/10/2021	3.8	23.4	4.9	22.5	64.1	0
19/10/2021	4.4	24.4	5.8	24.0	58.0	0
20/10/2021	5.8	19.6	6.8	19.5	66.1	0
21/10/2021	5.5	21.5	6.5	21.1	70.3	0
22/10/2021	7.6	25.3	8.6	24.4	73.1	0
23/10/2021	8.3	32.6	9.7	31.6	80.8	18.6
24/10/2021	7.2	20.7	10.3	20.1	61.3	0.2
25/10/2021	2.8	20.1	3.7	19.5	61.0	0
26/10/2021	2.9	23.8	4.2	22.9	63.1	0
27/10/2021	5.3	27.6	7.0	26.6	65.9	0
28/10/2021	7.1	29.3	8.8	29.0	58.2	0
29/10/2021	10.5	26.8	13.5	25.9	59.7	0
30/10/2021	5.8	20.6	6.9	19.9	52.9	0
31/10/2021	3.7	21.3	4.8	21.1	59.6	0
1/11/2021	7.0	24.3	8.6	23.5	67.8	0
2/11/2021	6.6	25.6	8.2	24.7	60.0	0
3/11/2021	9.7	27.3	11.4	25.9	58.5	0
4/11/2021	15.8	19.5	16.2	20.0	78.0	2.6
5/11/2021	13.5	17.0	14.3	17.0	93.4	27
6/11/2021	13.0	26.0	14.0	24.9	78.2	0
7/11/2021	12.0	25.1	12.8	24.2	89.7	13.6
8/11/2021	12.3	26.1	14.2	25.8	71.3	0.4
9/11/2021	12.4	27.7	14.1	26.8	71.8	0.2
10/11/2021	14.7	28.9	16.2	28.1	81.9	23.0
11/11/2021	15.0	24.1	15.3	23.1	92.4	23.6
12/11/2021	10.9	23.3	11.4	22.4	79.2	12.6
13/11/2021	8.9	13.4	9.1	12.7	79.1	3.8
14/11/2021	5.3	18.8	6.3	18.0	66.1	4.0
15/11/2021	6.6	18.5	8.0	17.9	58.2	0
16/11/2021	3.4	20.7	4.3	19.6	66.5	0
17/11/2021	5.3	22.2	6.4	21.7	68.0	0
18/11/2021	8.4	26.9	9.6	25.9	66.9	0
19/11/2021	11.7	27.3	12.9	26.1	74.3	0.4
20/11/2021	15.5	27.0	16.3	26.1	74.3	1.2
21/11/2021	12.9	17.2	13.3	17.3	95.6	28.4
22/11/2021	12.9	20.1	13.4	19.8	73.7	1.2
23/11/2021	14.4	23.8	14.8	23.4	72.8	0
24/11/2021	16.4	23.7	16.7	23.4	81.6	0.2
25/11/2021	18.0	24.3	18.2	23.6	91.9	16.8
26/11/2021	15.1	19.4	15.6	19.7	90.8	17.0
27/11/2021	12.1	16.7	12.4	16.7	82.2	6.6
28/11/2021	12.2	18.3	12.6	17.7	78.1	1
29/11/2021	12.0	19.5	12.5	19.0	85.4	6
30/11/2021	12.7	17.1	13.6	17.2	96.8	17.4
1/12/2021	16.7	26.0	17.1	25.7	80.2	0.2
2/12/2021	13.1	28.9	14.2	27.5	75.7	0
3/12/2021	13.5	32.0	14.4	31.4	66.2	0
4/12/2021	16.9	27.5	17.4	26.9	61.0	0.2
5/12/2021	13.0	22.1	13.6	21.6	68.6	0
6/12/2021	12.4	19.5	13.0	19.6	79.4	6.8
7/12/2021	14.2	24.5	14.4	23.7	89.7	26.6
8/12/2021	13.3	26.6	13.6	25.2	87.0	11.6
9/12/2021	11.4	24.0	12.5	23.3	70.7	4.4
10/12/2021	4.8	21.0	5.5	20.5	65.5	0
11/12/2021	8.3	22.9	9.2	22.2	67.9	0
12/12/2021	10.0	24.7	11.0	23.4	66.4	0
13/12/2021	10.4	27.1	11.5	26.3	66.0	0

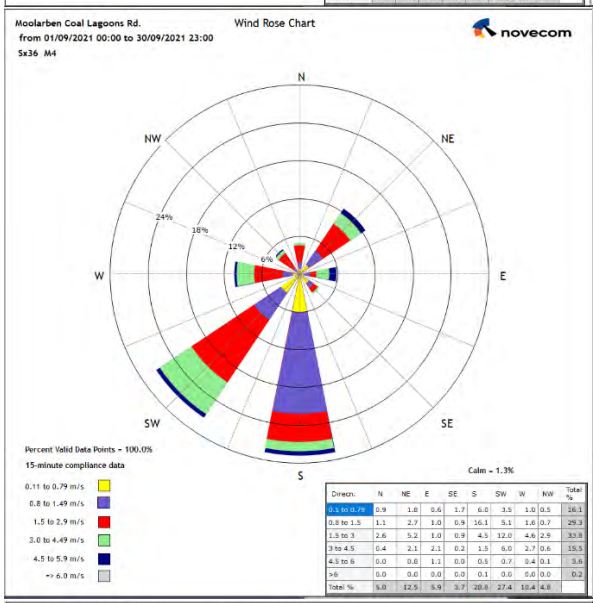
Date	Temperature (2m) (ºC)		Temperature (10m) (ºC)		Relative Humidity (%)	Rain (mm)
	Min	Max	Min	Max	Average	
14/12/2021	13.3	29.9	14.1	29.2	63.6	0
15/12/2021	11.7	32.7	13.5	31.4	56.9	0
16/12/2021	17.4	30.0	18.4	29.0	61.6	0.2
17/12/2021	16.6	29.1	16.9	28.5	69.7	0
18/12/2021	15.5	32.8	16.6	31.6	67.9	0
19/12/2021	15.8	29.9	16.3	29.0	72.2	5.2
20/12/2021	15.0	32.1	15.8	30.9	70.6	0.6
21/12/2021	15.0	33.5	16.0	32.8	61.6	0
22/12/2021	18.3	32.8	19.4	31.7	64.5	0
23/12/2021	15.8	29.4	16.9	28.5	78.0	2.4
24/12/2021	13.3	30.2	14.2	29.1	70.8	0.4
25/12/2021	16.4	32.1	17.4	30.7	73.2	0
26/12/2021	13.6	31.2	14.7	30.4	71.5	3.0
27/12/2021	15.6	21.9	16.0	21.5	75.3	0.2
28/12/2021	13.7	22.2	14.2	21.6	71.1	0
29/12/2021	9.1	24.0	10.4	23.2	67.1	0
30/12/2021	9.8	25.8	11.9	25.1	63.2	0
31/12/2021	10.7	29.4	12.1	28.4	61.8	0

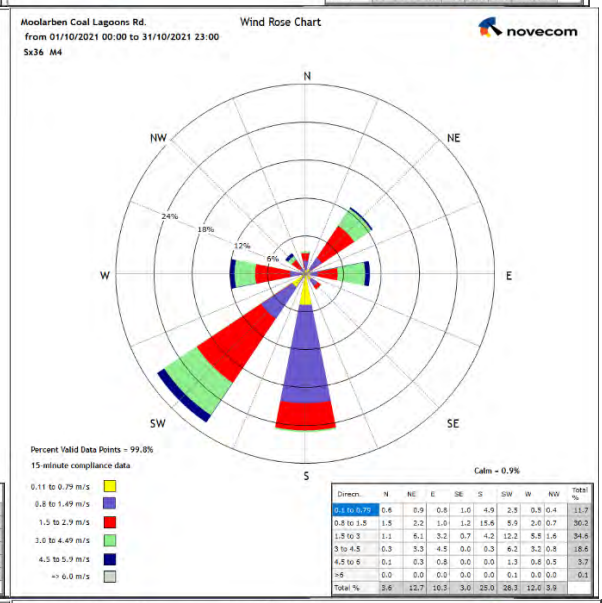
Figure 3-a Monthly Wind Rose (WS03)

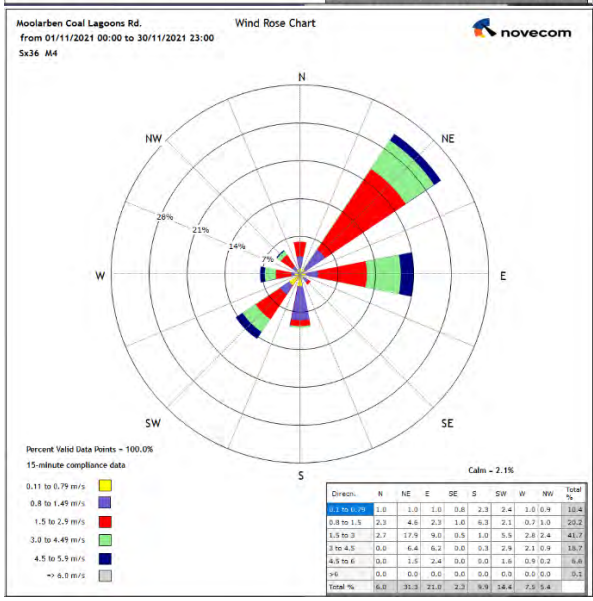


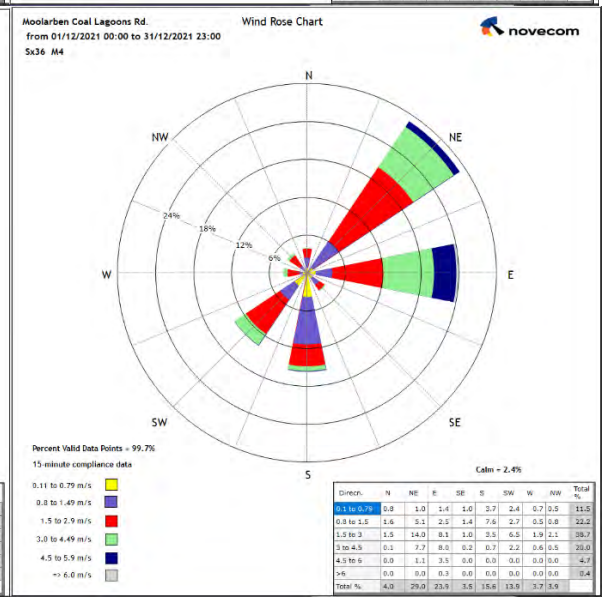

Moolarben Coal Lagoons Rd.
from 01/07/2021 00:00 to 31/07/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
6%
12%
18%
24%
Percent Valid Data Points = 100.0%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 1.9%


Moolarben Coal Lagoons Rd.
from 01/08/2021 00:00 to 31/08/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
7%
14%
21%
28%
Percent Valid Data Points = 100.0%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 1.2%


Moolarben Coal Lagoons Rd.
from 01/09/2021 00:00 to 30/09/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
6%
12%
18%
24%
Percent Valid Data Points = 100.0%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 1.3%


Moolarben Coal Lagoons Rd.
from 01/10/2021 00:00 to 31/10/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
6%
12%
18%
24%
Percent Valid Data Points = 99.8%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 0.9%


Moolarben Coal Lagoons Rd.
from 01/11/2021 00:00 to 30/11/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
7%
14%
21%
28%
Percent Valid Data Points = 100.0%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 2.1%


Moolarben Coal Lagoons Rd.
from 01/12/2021 00:00 to 31/12/2021 23:00
Sx36 M4
Wind Rose Chart
novecom
N
NE
E
SE
S
SW
W
NW
6%
12%
18%
24%
Percent Valid Data Points = 99.7%
15-minute compliance data
0.11 to 0.79 m/s
0.8 to 1.49 m/s
1.5 to 2.9 m/s
3.0 to 4.49 m/s
4.5 to 5.9 m/s
=> 6.0 m/s
Calm = 2.4%

Appendix 3B. NOISE MONITORING RESULTS

Environmental Noise Monitoring – January 2021

4.3 Attended Noise Monitoring

Noise levels from MCO in the absence of other noise sources are shown in Table 4.2 and Table 4.3, and are reproduced in Appendix B in a format generally specified in the EPA guidelines *'Requirements for Publishing Pollution Monitoring Data'* (March 2012). Discussion as to the noise sources responsible for these measured levels is provided in Section 5 of this report.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY MCO AGAINST IMPACT ASSESSMENT CRITERIA – JANUARY 2021

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies [1]	MCO L_{Aeq} dB [2]	Exceedance dB [3]
NA1	27/01/2021 10:43	3.6	A	43[4]	No	IA	NA
NA6	26/01/2021 23:55	0.5	F	37	Yes	NM	Nil
NA12	26/01/2021 23:31	1.2	F	35	Yes	IA	Nil

Notes:

1. *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;*
2. *Site-only $L_{Aeq,15minute}$ attributed to MCO, including modifying factors if applicable;*
3. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL; and*
4. *External criterion. A difference of 8 dB between the internal and external criterion has been adopted at NA1 for consistency with previous versions of the NMP.*

As impact assessment criteria are more stringent than land acquisition or noise mitigation criteria and MCO levels complied with impact assessment criteria in all measurements as shown in Table 4.2, no comparison against mitigation or land acquisition criteria is required.

Table 4.3: $L_{A1,1minute}$ GENERATED BY MCO AGAINST IMPACT ASSESSMENT CRITERIA – JANUARY 2021

Location	Start Date and Time	Wind Speed m/s	Stability Class	Criterion dB	Criterion Applies [1]	MCO $L_{A1,1min}$ dB [2]	Exceedance dB [3]
NA6	26/01/2021 23:55	0.5	F	45	Yes	NM	Nil
NA12	26/01/2021 23:31	1.2	F	45	Yes	IA	Nil

Notes:

1. *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;*
2. *Site-only $L_{A1,1minute}$ attributed to MCO; and*
3. *NA in exceedance column means criterion was not applicable due to atmospheric conditions outside those specified in EPL.*

4.4 Attended Validation Noise Monitoring

Table 4.4 presents data recorded concurrently at the real-time noise monitor and attended monitoring locations.

Table 4.4: REAL-TIME VERSUS ATTENDED DATA COMPARISON – JANUARY 2021

Location	Start Date and Time	Real-time Noise Monitor Levels – dB						Attended Noise Monitoring Levels – dB					
		L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	$L_{Aeq,LF}$ [1]	L_{A1}	L_{A10}	L_{Aeq}	L_{A50}	L_{A90}	MCO L_{Aeq} [2]
NA12/SX39	26/01/2021 23:31	48	39	38	37	34	34	39	37	35	35	32	35

Notes:

1. *$L_{Aeq,LF}$ refers to $L_{Aeq,15minute}$ in the frequency range 20 to 630 Hz as measured by the real-time noise monitors; and*
2. *MCO L_{Aeq} refers to the site-only $L_{Aeq,15minute}$ attributed to MCO during attended monitoring.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 4.5. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain hail, or wind speeds above 5 m/s at microphone height.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – JANUARY 2021

Location	Start Date and Time	Temperature °C	Wind Speed m/s	Wind Direction ° Magnetic North [1]	Cloud Cover 1/8s
NA1	27/01/2021 10:43	30	1.5	340	6
NA6	26/01/2021 23:55	27	0.0	-	7
NA12	26/01/2021 23:31	27	0.0	-	7

Notes:

1. *"-" indicates calm conditions at monitoring location.*

Meteorological data used for compliance assessment is sourced from the MCO AWS.

6 SUMMARY

Global Acoustics was engaged by MCO to conduct a monthly noise survey of operations at Moolarben Coal Mine. The purpose of the survey was to quantify and describe the acoustic environment around the site and compare results with specified limits.

Monthly attended environmental noise monitoring described in this report was undertaken during the day period of 27 January and night period of 26 January 2021.

MCO complied with project specific criteria at all monitoring sites during the January 2021 survey. In accordance with Condition R4.2(b) of the EPL, no management actions have taken place at MCO as a result of attended monitoring as there were no exceedances recorded during the monitoring period.

Global Acoustics Pty Ltd

Environmental Noise Monitoring – February 2021

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 – 22nd & 23rd February 2021

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	10:08am	51	<20	35	IA	45	B / 3.7 / 036	Traffic (49), birds (46), **MCO (IA)**
Cope Rd/Toole Rd	10:17pm	36	<20	35	IA	45	F / 0.7 / 181	Insects (34), frogs (31), **MCO (IA)**
Lower Ridge Rd	10:45pm	47	<20	37	IA	45	F / 0.8 / 193	Traffic (47), frogs (36), dogs (30), insects (24), aeroplane (21), **MCO (IA)**
Winchester Cr	11:08pm	37	<20	35	IA	45	F / 0.6 / 249	Traffic (35), frogs (32), insects (23), **MCO (IA)**

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

4.1.2 Cumulative Mine Noise

The cumulative measured noise levels for all mining activity in the area for the monitoring location are summarised in Table 4.

Table 4
Cumulative Mining Noise Monitoring Results – 22nd February 2021

Location	Time	dB(A), Leq	All Mines dB(A), Leq	MCO Contribution dB(A), Leq	Criterion dB(A) Leq	Stability Class, Wind speed (m/s),dir	Identified Noise Sources
Cope Rd/Toole Rd	10:47pm	36	IA	IA	40	F / 0.7 / 181	Insects (34), frogs (31), **MCO (IA)**

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 majority of noise measurements were made under compliant meteorological conditions. During monitoring at NA1 the wind speed at the weather station was marginally higher that 3m/s.

The results in Tables 4 show that the cumulative mine noise levels were inaudible.

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] LA1,1minutedB (15min)	Measured Level[1,2,3] LAeq 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	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

NA in last column means atmospheric conditions outside those specified in EPL, therefore criterion was not applicable

Environmental Noise Monitoring – March 2021

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 March 2021

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	9:24am	44	<20	35	IA	45	A / 2.8 / 249	Birds (42), traffic (40), **MCO (IA)**
Lower Ridge Rd	10:05pm	42	<20	37	IA	45	E / 1.5 / 244	Frogs (40), insects (37), traffic (24), dog (21), **MCO (IA)**
Winchester Cr	10:28pm	42	<20	35	IA	45	F / 1.2 / 257	Frogs (40), insects (38), dog (23), traffic (21), **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. All of noise measurements were made under compliant meteorological conditions.

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] LA1,1minutedB (15min)	Measured Level[1,2,3] LAeq 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 – April 2021

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 2021

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	42	IA	35	IA	45	A / 1.4 / 009	Traffic (39), birds (38), Ulan mine (34), **MCO (IA)**
Lower Ridge Rd	10:04pm	43	25	37	29	45	E / 1.1 / 198	Traffic (42), frogs (33), **MCO (25)**
Winchester Cr	10:27pm	36	23	35	26	45	D / 1.3 / 198	Traffic (35), birds (26), **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 Ulan Public School, and compliant at all monitoring locations. All of the noise measurements were made under compliant meteorological conditions.

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 (15min) dB	Measured Level[1,2,3] LA1 (1min) dB	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	23	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	25	29	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 2021

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 – 27th & 28th May 2021

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	9:25am	67	IA	35	IA	45	A / 2.4 / 224	Rooster (67), traffic (43), birds (42), industrial (37), **MCO (IA)**
Cope Road/Toole Road	12:17am	58	IA	35	IA	45	E / 2.5 / 205	Traffic (58), frogs (41), mine (23), **MCO (IA)**
Lagoons Road	11:50pm	41	18	35	21	45	E / 2.8 / 192	Insects (40), frogs (33), wind (27), **MCO (18)**
Winchester Crescent	10:35pm	51	IA	35	IA	45	E / 2.9 / 213	Aeroplanes (48), traffic (48), birds (38), dogs (28), **MCO (IA)**
Upper Ridge Road	11:22pm	36	IA	35	IA	45	D / 3.6 / 208	Wind (34), traffic (32), **MCO (IA)**
Lower Ridge Road	11:00pm	42	IA	37	IA	45	D / 3.1 / 205	Traffic (40), dog (35), frogs (34), **MCO (IA)**
Moolarben Road	10:02pm	46	IA	35	IA	45	D / 3.5 / 212	Aeroplane (46), traffic (22), cow (21), **MCO (IA)**
Goulburn River National Park	10:47am	47	23	50	25	NA	A / 2.8 / 180	Traffic (45), birds (43), mine (30), **MCO (23)**
Munghorn Gap Nature Reserve	10:11am	36	IA	50	IA	NA	A / 2.5 / 199	Birds (35), traffic (27), kids in picnic area (25), **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 of noise measurements were made under compliant meteorological conditions.

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	18	21	-	Yes	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	IA	IA	-	Yes	No
40, 41	Lower Ridge Road	NA8	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	IA	IA	-	Yes	No
46	Goulburn River National Park	GRNP	Compliance -Attended	Annually	23	25	All periods LAeq,15minute: 50 dB	Yes	No
46	Munghorn Gap Nature Reserve	MGNR	Compliance -Attended	Annually	IA	IA	All periods LAeq,15minute: 50 dB	Yes	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 – June 2021

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 June 2021

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	9:09am	48	IA	35	IA	45	B / 1.8 / 031	Traffic (47), birds (40), aeroplane (36), mine (29), **MCO (<20)**
Winchester Crescent	10:23pm	49	21	35	26	45	E / 1.7 / 144	Dogs (49), traffic (36), frogs (27), cows (23), **MCO (21)**
Lower Ridge Road	10:00pm	48	23	37	27	45	D / 2.7 / 156	Traffic (48), frogs (32), **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 compliant at all monitoring locations. All of the noise measurements were made under compliant meteorological conditions. During monitoring periods, no wind speeds at the weather station were higher than 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	-	-	-	No	-
N/A	Lagoons Road	NA2	Validation - Attended	Annually	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	21	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	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 2021

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 July 2021

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	47	IA	35	IA	45	A / 0.8 / 048	Traffic (46), birds (36), mine (32), frogs (31), nearby stream (26), **MCO (IA)**
Winchester Crescent	10:28pm	31	IA	35	IA	45	F / 0.7 / 082	Traffic (31), dogs (19), frogs (17), mine (11), **MCO (IA)**
Lower Ridge Road	10:05pm	41	IA	37	IA	45	F / 0.2 / 014	Traffic (41), frogs (29), mine (27), **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. All of the noise measurements were made under compliant meteorological conditions. During monitoring periods, no wind speeds at the weather station were higher than 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	-	-	-	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 2021

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 – 31st August 2021

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	2:39pm	37	IA	35	IA	45	A / 1.9 / 312	Birds (34), traffic (32), insects (26), mine (25), **MCO (IA)**
Winchester Crescent	10:00pm	36	IA	35	IA	45	D / 1.1 / 186	Traffic (33), dogs (32), sheep (26), frogs (22), **MCO (IA)**
Lower Ridge Road	10:23pm	57	IA	37	IA	45	E / 1.5 / 195	Traffic (57), frogs (44), mine (20), **MCO (IA)**
Cope Road / Toole Road	10:50pm	54	IA	35	IA	45	E / 1.2 / 180	Traffic (54), frogs (43), insects (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. All of the noise measurements were made under compliant meteorological conditions. During monitoring periods, no wind speeds at the weather station were higher than 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	-	-	-	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 2021

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 – 27th September 2021

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	2:45pm	46	IA	35	IA	45	C / 4.1 / 080	Traffic (45), industrial (37), birds (36), mine (29), **MCO (IA)**
Winchester Crescent	10:24pm	40	33	35	39	45	D / 4.6 / 074	Traffic (30), **MCO (33)**, frogs (26)
Lower Ridge Road	10:02pm	50	30	37	38	45	D / 5.1 / 071	Traffic (50), frogs (37), **MCO (30)**

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. Wind speeds from the MCO weather station were in the range 4-5 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.

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	N/A
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	33	39	Night time (22:00 – 07:00) LAeq,15minute: 35 dB LA1,1minute: 45 dB	Yes	N/A
N/A	Upper Ridge Road (Receiver 176)	NA3	Validation - Attended	Annually	-	-	-	No	-
40, 41	Lower Ridge Road	NA6	Compliance -Attended	Monthly	30	38	Night time (22:00 – 07:00) LAeq,15minute: 37 dB LA1,1minute: 45 dB	Yes	N/A
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 2021

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 October 2021

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	2:32pm	42	IA	35	IA	45	A / 2.4 / 238	Traffic (41), birds (33), mine (27), industrial (25), **MCO (IA)**
Winchester Crescent	10:21pm	46	IA	35	IA	45	D / 1.4 / 190	Traffic (46), frogs (36), **MCO (IA)**
Lower Ridge Road	10:00pm	32	IA	37	IA	45	F / 0.9 / 172	Frogs (31), traffic (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 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 178)	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 2021

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 – 29th November 2021

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	2:29pm	49	IA	35	IA	45	B / 2.6 / 092	Birds (47), traffic (45), nearby workshop (24), **MCO (IA)**
Winchester Crescent	10:22pm	47	14	35	17	45	F / 1.6 / 066	Frogs (47), traffic (36), crickets (31), **MCO (14)**
Lower Ridge Road	10:00pm	49	17	37	23	45	F / 2.2 / 058	Traffic (46), frogs (45), crickets (39), **MCO (17)**
Cope Road / Toole Road	10:53pm	56	IA	35	IA	45	D / 2.4 / 079	Traffic (56), frogs (40), 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 compliant at all monitoring locations, when it was audible. All of the noise measurements were made under compliant meteorological conditions, except for Lower Ridge Road where wind speed was marginally above 2m/s with the F class stability. During monitoring periods, no wind speeds at the weather station were higher than 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	-	-	-	No	-
42	Winchester Crescent	NA12	Compliance/Validation - Attended	Monthly	14	17	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	23	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 2021

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 December 2021

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	2:29pm	45	IA	35	IA	45	A / 2.9 / 257	Traffic (44), birds (39), aeroplane (24), **MCO (IA)**
Winchester Crescent	10:00pm	40	IA	35	IA	45	D / 2.0 / 194	Frogs (40), traffic (27), insects (24), **MCO (IA)**
Lower Ridge Road	10:22pm	52	IA	37	IA	45	D / 1.8 / 198	Traffic (49), insects (48), frogs (42), aeroplanes (25), **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)
18/01/2021	16:10	94.8	0.10	98.1	0.09	87.6	0.04
20/01/2021	16:15	100.3	0.16	104.8	0.23	104.5	0.05
21/01/2021	16:28	99.8	0.15	99.6	0.22	77.2	0.14
22/01/2021	12:03	95.3	0.11	102.0	0.09	97.7	0.13
25/01/2021	12:07	90.5	0.19	83.2	0.23	89.2	0.16
30/01/2021	12:07	96.7	0.09	92.8	0.13	81.9	0.07
30/01/2021	12:13	95.6	0.18	96.2	0.20	72.2	0.20
2/02/2021	12:19	91.9	0.11	94.2	0.31	98.2	0.25
3/02/2021	12:04	96.4	0.16	94.6	0.18	98.3	0.12
6/02/2021	12:15	81.8	0.10	89.5	0.19	74.7	0.07
12/02/2021	12:05	96.7	0.32	99.7	0.73	93.3	0.18
12/02/2021	12:10	97.6	0.24	96.3	0.17	99.6	0.10
19/02/2021	12:03	95.5	0.07	99.2	0.11	104.8	0.05
20/02/2021	11:58	94.3	0.12	96.5	0.15	94.9	0.08
24/02/2021	12:11	100.0	0.12	98.0	0.08	106.3	0.07
25/02/2021	12:05	84.7	0.04	83.9	0.07	91.1	0.07
26/02/2021	16:05	86.0	0.04	97.9	0.07	94.1	0.06
27/02/2021	12:00	93.2	0.04	95.5	0.09	97.4	0.06
27/02/2021	16:13	103.8	0.17	100.1	0.47	93.9	0.16
2/03/2021	16:51	98.0	0.07	95.7	0.11	82.0	0.03
6/03/2021	16:02	92.4	0.11	98.4	0.21	95.8	0.07
8/03/2021	13:39	89.7	0.12	88.5	0.17	100.7	0.04
10/03/2021	12:03	94.5	0.04	96.4	0.06	101.3	0.03
13/03/2021	16:01	100.1	0.15	102.3	0.17	101.3	0.13
17/03/2021	15:59	96.5	0.18	101.1	0.20	107.7	0.09
18/03/2021	12:27	96.4	0.05	99.1	0.01	107.0	0.02
20/03/2021	12:03	97.9	0.08	106.8	0.06	104.0	0.04
23/03/2021	15:05	83.2	0.04	95.5	0.11	107.4	0.07
24/03/2021	16:48	96.8	0.09	93.3	0.11	102.7	0.09
27/03/2021	16:16	89.3	0.15	93.0	0.55	97.2	0.39
31/03/2021	16:11	94.0	0.22	99.9	0.46	88.6	0.32
31/03/2021	16:15	100.1	0.25	100.3	0.20	89.7	0.13
1/04/2021	16:24	95.5	0.18	89.7	0.18	88.5	0.11
6/04/2021	12:05	107.4	0.22	110.2	0.25	108.7	0.08
6/04/2021	12:27	105.4	0.11	110.6	0.10	110.4	0.06
9/04/2021	12:00	98.0	0.13	95.8	0.15	101.8	0.11
9/04/2021	12:33	91.9	0.17	100.8	0.18	106.6	0.15
10/04/2021	11:58	94.4	0.11	99.3	0.32	95.9	0.25
12/04/2021	12:13	89.3	0.10	85.6	0.15	90.8	0.06
15/04/2021	16:08	97.5	0.04	104.8	0.08	104.1	0.06
15/04/2021	16:12	88.7	0.08	98.1	0.25	97.5	0.12
16/04/2021	16:37	94.2	0.12	94.7	0.06	87.1	0.03
19/04/2021	12:00	87.3	0.04	86.3	0.02	99.2	0.02
20/04/2021	16:03	87.6	0.16	93.8	0.10	90.4	0.06
23/04/2021	12:07	95.8	0.09	96.7	0.24	95.3	0.10
24/04/2021	12:01	98.6	0.14	94.5	0.13	84.0	0.06

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)
26/04/2021	16:46	91.1	0.05	97.2	0.14	106.4	0.15
30/04/2021	12:06	104.5	0.34	100.1	0.37	91.9	0.14
4/05/2021	13:27	91.4	0.08	95.8	0.11	92.3	0.04
6/05/2021	12:28	95.3	0.07	96.4	0.08	102.8	0.05
7/05/2021	12:06	86.5	0.13	84.8	0.20	85.7	0.08
11/05/2021	12:16	98.9	0.24	95.9	0.16	97.8	0.10
13/05/2021	15:56	86.4	0.09	98.8	0.10	89.1	0.06
14/05/2021	12:03	97.7	0.12	92.2	0.12	86.9	0.06
18/05/2021	12:09	91.9	0.12	92.6	0.06	97.2	0.03
20/05/2021	12:05	94.4	0.12	91.1	0.22	96.1	0.18
21/05/2021	13:34	99.4	0.10	113.6	0.06	113.2	0.07
24/05/2021	16:19	97.7	0.10	102.1	0.07	94.0	0.05
24/05/2021	16:23	87.7	0.09	91.4	0.04	92.1	0.05
25/05/2021	12:05	87.5	0.09	84.1	0.16	88.8	0.04
27/05/2021	16:11	91.1	0.20	101.7	0.25	103.7	0.15
27/05/2021	16:28	93.2	0.14	92.5	0.12	93.8	0.10
29/05/2021	12:10	88.0	0.09	91.5	0.11	85.8	0.06
31/05/2021	16:03	90.6	0.11	89.0	0.14	85.2	0.07
3/06/2021	9:56	92.6	0.05	105.5	0.06	114.5	0.08
9/06/2021	16:54	89.4	0.12	91.4	0.29	80.1	0.36
9/06/2021	16:59	91.7	0.13	93.9	0.08	78.6	0.04
12/06/2021	16:10	99.0	0.24	92.4	0.36	79.1	0.11
12/06/2021	16:14	86.2	0.07	89.1	0.10	73.9	0.06
15/06/2021	16:17	84.3	0.16	82.3	0.18	80.7	0.09
15/06/2021	16:23	89.7	0.08	89.9	0.10	79.5	0.06
17/06/2021	16:11	95.3	0.07	95.5	0.08	*	0.06
19/06/2021	15:59	96.4	0.11	93.2	0.22	79.3	0.08
19/06/2021	16:32	96.1	0.11	101.5	0.12	82.0	0.07
22/06/2021	12:14	108.4	0.20	99.7	0.14	74.9	0.06
23/06/2021	16:04	83.6	0.07	85.8	0.23	78.2	0.15
25/06/2021	16:19	94.9	0.33	92.9	0.18	75.7	0.08
26/06/2021	16:07	89.8	0.10	90.7	0.11	72.2	0.08
28/06/2021	12:15	94.7	0.11	101.5	0.09	96.8	0.04
30/06/2021	16:11	95.4	0.17	100.1	0.15	80.9	0.08
3/07/2021	16:10	89.7	0.05	94.9	0.15	98.4	0.08
5/07/2021	12:23	102.1	0.18	95.5	0.23	90.7	0.11
6/07/2021	13:17	92.3	0.06	99.3	0.13	103.9	0.22
7/07/2021	16:04	99.3	0.18	98.8	0.35	74.4	0.22
8/07/2021	12:57	97.8	0.08	91.9	0.09	84.7	0.06
10/07/2021	12:16	92.2	0.15	96.8	0.35	93.3	0.25
13/07/2021	12:17	93.2	0.15	91.3	0.11	98.6	0.06
15/07/2021	16:06	96.0	0.14	95.2	0.42	100	0.43
17/07/2021	16:07	95.8	0.11	93.2	0.25	80.2	0.07
19/07/2021	16:06	86.0	0.14	84.6	0.20	94.0	0.14
20/07/2021	12:14	95.8	0.15	87.3	0.17	104.3	0.07
23/07/2021	16:27	87.1	0.13	90.9	0.07	92.0	0.04
24/07/2021	12:07	96.5	0.24	94.9	0.36	78.8	0.14
28/07/2021	12:17	101.1	0.20	96.3	0.16	104.6	0.07
29/07/2021	12:06	106.9	0.16	99.5	0.27	100.3	0.41

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)
31/07/2021	12:13	98.2	0.21	101.0	0.61	95.6	0.14
2/08/2021	16:15	94.4	0.11	101.4	0.17	90.9	0.08
2/08/2021	16:28	92.7	0.12	92.8	0.13	87.9	0.06
4/08/2021	12:02	104.3	0.21	89.6	0.25	110.1	0.29
5/08/2021	12:10	93.8	0.04	105.8	0.01	106.5	0.02
6/08/2021	12:09	99.9	0.05	101.7	0.06	98.6	0.12
9/08/2021	12:08	95.3	0.10	95.8	0.18	82.7	0.07
10/08/2021	12:07	93.8	0.04	86.9	0.12	94.5	0.16
10/08/2021	16:04	88.7	0.27	92.4	0.47	83.1	0.24
14/08/2021	12:07	102.8	0.13	97.1	0.18	92.8	0.07
18/08/2021	13:17	93.3	0.08	95.9	0.08	89.4	0.07
19/08/2021	16:08	88.5	0.08	86.9	0.18	92.1	0.44
20/08/2021	13:16	94.9	0.18	94.9	0.23	99.5	0.08
23/08/2021	12:14	86.7	0.20	85.0	0.58	71.6	0.16
23/08/2021	12:20	92.1	0.08	89.4	0.06	77.9	0.06
24/08/2021	12:00	100	0.13	93.0	0.15	87.3	0.07
25/08/2021	13:58	110.9	0.14	96.1	0.35	101.7	0.10
28/08/2021	12:07	99.3	0.12	97.7	0.25	95.4	0.33
31/08/2021	16:04	90.7	0.24	95.9	0.39	99.2	0.82
1/09/2021	16:04	99.2	0.11	93.2	0.13	90.5	0.09
4/09/2021	12:00	94.0	0.10	92.0	0.18	88.7	0.08
6/09/2021	16:10	104.7	0.07	112.4	0.18	110.2	0.16
8/09/2021	16:23	83.6	0.06	72.8	0.01	77.2	0.01
9/09/2021	12:08	97.0	0.11	103.0	0.21	94.8	0.06
9/09/2021	12:22	97.7	0.32	98.9	0.45	101.4	0.12
10/09/2021	12:11	95.4	0.05	95.9	0.10	99.5	0.20
13/09/2021	12:11	90.7	0.11	89.9	0.16	95.9	0.06
14/09/2021	12:04	93.4	0.09	101.7	0.13	97.6	0.07
14/09/2021	16:07	87.3	0.07	86.0	0.05	70.9	0.14
16/09/2021	12:05	96.0	0.18	99.4	0.17	83.6	0.06
20/09/2021	12:04	96.6	0.10	104.8	0.16	106.2	0.04
22/09/2021	16:11	89.1	0.12	84.3	0.06	96.5	0.05
22/09/2021	16:17	95.0	0.12	99.1	0.15	103.4	0.05
25/09/2021	16:46	96.4	0.16	93.3	0.24	98.4	0.10
28/09/2021	16:06	93.9	0.05	97.1	0.11	105.5	0.10
28/09/2021	16:23	87.8	0.06	94.7	0.09	101.7	0.13
30/09/2021	16:02	97.8	0.14	95.8	0.17	103.8	0.06
1/10/2021	16:01	88.1	0.07	108.6	0.09	105.7	0.03
2/10/2021	16:02	98.8	0.19	95.1	0.29	96.9	0.09
5/10/2021	11:25	99.4	0.05	102.4	0.05	109.5	0.06
5/10/2021	11:29	105.1	0.09	92.3	0.09	110.7	0.17
6/10/2021	12:09	103.0	0.13	95.4	0.33	102.1	0.07
7/10/2021	16:15	94.3	0.14	95.4	0.18	102.0	0.08
13/10/2021	16:02	103.9	0.16	99.4	0.33	102.2	0.08
14/10/2021	16:55	105.7	0.16	111.0	0.28	117.8**	0.10
16/10/2021	15:56	95.6	0.07	93.8	0.09	117.8**	0.12
18/10/2021	16:02	97.9	0.22	101.6	0.47	104.5	0.51
19/10/2021	16:01	88.5	0.26	92.4	0.27	112.4	0.10
21/10/2021	16:05	106.7	0.10	95.9	0.15	106.0	0.06

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)
22/10/2021	12:02	95.1	0.08	96.9	0.10	107.5	0.03
23/10/2021	12:14	85.0	0.11	86.9	0.14	90.0	0.08
27/10/2021	16:15	101.9	0.22	96.4	0.39	91.5	0.11
30/10/2021	12:00	94.9	0.20	93.8	0.39	97.6	0.14
1/11/2021	12:02	98.0	0.18	110.3	0.35	99.8	0.26
2/11/2021	12:07	96.1	0.19	100.8	0.25	99.6	0.37
5/11/2021	12:11	86.0	0.12	94.0	0.14	100.8	0.06
9/11/2021	16:11	90.1	0.20	89.0	0.22	91.3	0.33
12/11/2021	15:01	99.9	0.03	89.5	0.13	113.0	0.03
13/11/2021	15:58	110.8	0.13	106.4	0.14	118.8**	0.13
15/11/2021	12:00	99.3	0.09	107.2	0.25	116.3**	0.16
16/11/2021	12:06	96.8	0.19	92.0	0.26	108.3	0.06
18/11/2021	11:06	98.1	0.13	95.4	0.13	91.4	0.04
18/11/2021	16:07	91.7	0.21	93.3	0.29	95.4	0.10
19/11/2021	16:02	89.9	0.10	83.2	0.16	94.6	0.05
20/11/2021	12:19	98.8	0.23	91.4	0.51	96.6	0.08
24/11/2021	15:59	96.6	0.34	96.6	0.29	94.5	0.64
26/11/2021	15:03	100.1	0.07	104.8	0.17	101.2	0.09
26/11/2021	15:29	100.5	0.10	98.5	0.09	95.4	0.08
27/11/2021	12:05	92.0	0.15	101.7	0.11	96.1	0.09
30/11/2021	12:03	116.8	0.24	110.1	0.15	104.4	0.06
1/12/2021	12:06	86.0	0.05	86.2	0.05	81.3	0.02
6/12/2021	12:06	94.3	0.18	97.5	0.19	100.5	0.15
6/12/2021	16:12	97.5	0.09	96.5	0.07	93.5	0.07
8/12/2021	13:40	109.3	0.17	111.2	0.60	119.0**	2.13**
9/12/2021	16:01	92.5	0.18	97.1	0.15	93.9	0.07
10/12/2021	15:59	107.3	0.18	103.5	0.28	105.6	0.17
13/12/2021	12:03	92.2	0.12	88.4	0.09	84.1	0.05
15/12/2021	16:07	91.0	0.13	89.1	0.13	82.7	0.04
17/12/2021	12:17	103.7	0.23	103.1	0.17	92.7	0.08
24/12/2021	11:15	94.0	0.12	95.6	0.14	93.4	0.04
29/12/2021	12:06	91.2	0.07	95.2	0.04	86.1	0.03
30/12/2021	16:16	102.3	0.06	107.9	0.10	111.1	0.06
31/12/2021	12:01	95.6	0.05	101.9	0.04	101.6	0.06
31/12/2021	16:09	91.4	0.13	94.8	0.09	90.9	0.10

*Result not an actual measurement of the airblast overpressure due to equipment malfunction
**Results influenced by meteorological conditions

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-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
DG1	0.3	1.4	0.7	0.4	0.5	0.2	0.3	0.2	0.1	0.3	1.2	0.5
DG4	0.5	0.7	1.1	0.4	0.4	0.3	0.3	0.3	0.2	0.6	0.5	0.3
DG5	0.4	1.2	1.4	1.8	2.5	0.2	0.5	0.6	0.6	0.6	0.5	0.8
DG9	0.6	0.7	1.1	0.4	0.3	0.2	0.2	0.3	0.2	14.7c	0.4	0.2

C – Dust gauge deemed contaminated after analysis of influencing factors. These factors include an ash residue result of <50%, the presence of bird droppings or other contaminants such as insects in the dust gauge and analysis of historical results from the dust gauge.

Figure 3-b 2017 to 2021 Dust Depositional Results

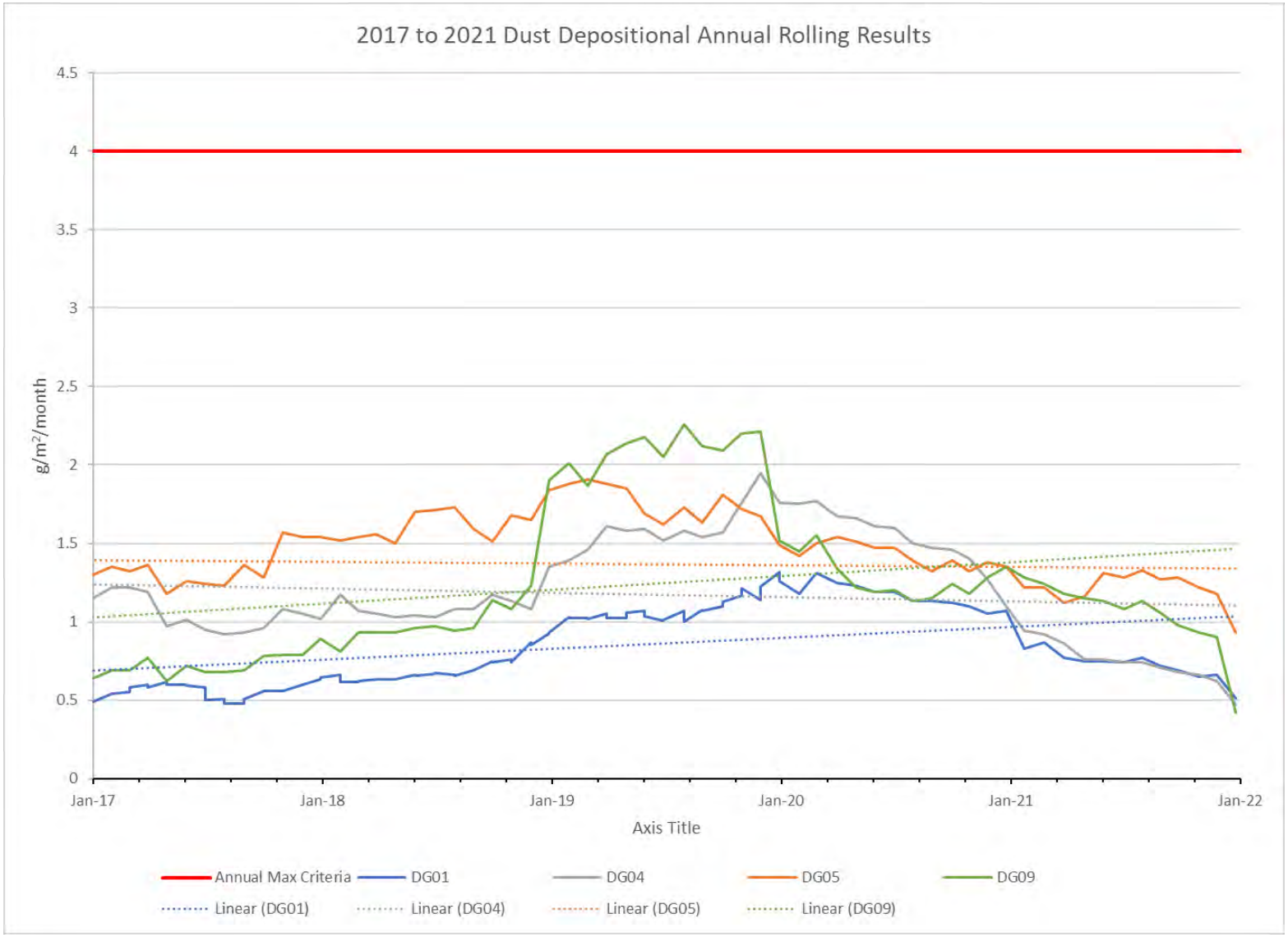


Table 3: TEOM Monitoring Data (Cumulative)

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)	
1/01/2021	7.5	6.8	2.4	1.9	4.9	
2/01/2021	8.2	8.4	3.6	2.9	5.6	
3/01/2021	9.8	9.9	5.7	4.9	7.2	
4/01/2021	14.0	9.5	5.9	4.8	10.6	
5/01/2021	9.1	8.6	4.3	3.0	9.3	
6/01/2021	14.7	13.9	7.4	6.2	13.8	
7/01/2021	11.2	10.8	4.1	3.0	7.8	
8/01/2021	15.9	11.7	4.4	3.4	9.8	
9/01/2021	13.7	11.6	4.8	3.9	8.1	
10/01/2021	12.0	13.1	6.0	4.6	7.8	
11/01/2021	12.9	13.8	8.8	6.2	8.9	
12/01/2021	18.5	16.1	8.3	5.7	18.5	
13/01/2021	27.9	27.2	16.0	12.8	23.9	
14/01/2021	23.0	19.5	10.8	6.6	22.7	
15/01/2021	23.2	22.5	9.0	3.8	27.2	
16/01/2021	22.4	17.9	6.9	4.4	26.9	
17/01/2021	14.1	11.7	4.4	2.3	19.7	
18/01/2021	17.9	19.1	11.3	7.3	18.5	
19/01/2021	25.2	23.9	10.9	6.6	21.8	
20/01/2021	13.3	14.4	6.4	4.9	8.7	
21/01/2021	23.3	24.1	9.2	6.4	14.9	
22/01/2021	18	17.1	7.7	5.2	17.0	
23/01/2021	16.5	15.5	9.6	6.1	16.4	
24/01/2021	18.7	19.5	10.3	6.8	23.6	
25/01/2021	15.2	14.8	8.5	5.7	18.0	
26/01/2021	18.7	15.9	8.1	5.0	16.9	
27/01/2021	21.6	23.5	11.9	7.4	18	
28/01/2021	10.8	11.2	3.1	2.3	3.7	
29/01/2021	7.7	9.4	3.7	2.7	5.0	
30/01/2021	10.7	13.9	6.0	4.9	8.1	
31/01/2021	12.8	13.1	9.3	7.7	10.1	
1/02/2021	12.4	9.5	10.8	8.7	13.5	
2/02/2021	9.0	7.1	5.5	4.5	7.7	
3/02/2021	17.3	12.7	9.5	7.1	18.8	
4/02/2021	18.5	11.8	8.7	6.6	18.3	
5/02/2021	19.3	12.9	9.7	7.5	19.8	
6/02/2021	9.1	7.6	5.1	4.1	8.0	
7/02/2021	12.3	10.9	6.1	3.8	12.1	
8/02/2021	16.0	11.5	7.7	5.9	16.5	
9/02/2021	11.0	8.2	6.2	4.5	12.8	
10/02/2021	12.5	9.4	7.2	5.6	14.5	
11/02/2021	13.9	10.9	7.9	5.7	14.9	
12/02/2021	22.1	19.8	7.7	5.5	17.7	

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)	
13/02/2021	4.1	4.7	-	-	3.8	PM2.5 > PM10 results excluded
14/02/2021	13.8	9.1	6.5	5.2	10.8	
15/02/2021	13.1	9.7	4.9	3.9	10.0	
16/02/2021	10.6	7.9	3.3	2.5	8.8	
17/02/2021	13.2	8.5	4.7	3.5	12.0	
18/02/2021	17.2	11.3	5.4	3.8	16.2	
19/02/2021	12.9	9.1	4.8	3.9	12.2	
20/02/2021	10.8	7.4	5.3	4.2	10.6	
21/02/2021	13.4	9.2	6.9	5.4	11.2	
22/02/2021	12.9	15.6	8.3	5.7	13.2	
23/02/2021	12.8	9.5	7.4	5.8	14.3	
24/02/2021	10.6	7.4	4.6	3.7	12.6	
25/02/2021	9.4	7.7	-	-	9.3	PM2.5 > PM10 results excluded
26/02/2021	11.7	11.4	5.2	3.9	11.4	
27/02/2021	18.6	15.7	13.0	11.5	21.8	
28/02/2021	16.6	15.9	11.9	10.3	16.7	
1/03/2021	22.3	22.7	14.5	11.1	24.1	
2/03/2021	21.5	-	10.4	5.4	-	Maintenance
3/03/2021	22.5	-	16.7	9.3	-	Maintenance
4/03/2021	16.0	14.0	11.3	5.3	16.0	
5/03/2021	20.3	19.4	14.2	5.8	24	
6/03/2021	22.7	25.3	15.1	7.7	17.7	
7/03/2021	18.6	21.5	14.5	7.0	14.7	
8/03/2021	18.9	18.7	12.5	5.2	16.1	
9/03/2021	16.2	15.1	12.2	4.3	26	
10/03/2021	28	28.3	20.2	11.5	22.5	
11/03/2021	18.3	17.3	10.0	5.3	13	
12/03/2021	9.4	8.7	4.8	3.4	6.7	
13/03/2021	11.1	10.7	8.5	6.0	8.6	
14/03/2021	9.9	7.9	5.4	3.9	11.1	
15/03/2021	13.0	13.0	7.0	3.0	9.8	
16/03/2021	12.5	12.1	5.8	2.3	9.1	
17/03/2021	9.2	8.1	4.3	2.6	7.5	
18/03/2021	6.3	5.6	3.3	2.3	4.9	
19/03/2021	10.5	7.1	4.5	3.1	7.4	
20/03/2021	6.9	5.8	3.8	2.9	5.9	
21/03/2021	5.4	5.7	2.9	1.9	4.9	
22/03/2021	3.7	3.1	1.9	1.4	3.1	
23/03/2021	3.6	6.1	2.4	1.8	3.8	
24/03/2021	10.2	8.5	5.6	2.7	8.6	
25/03/2021	10.3	8.5	4.3	1.8	10.1	
26/03/2021	9.0	8.1	5.3	2.2	11.2	
27/03/2021	9.3	9.7	8.6	4.1	13.1	
28/03/2021	9.9	13.9	7.5	4.2	14.5	
29/03/2021	10.7	11.6	9.2	4.4	14.5	

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)	
30/03/2021	16.7	16.0	11.8	6.9	15.1	
31/03/2021	14.0	15.6	9.9	4.7	12.0	
1/04/2021	13.4	12.9	9.4	3.6	12.8	
2/04/2021	11.1	12.8	6.4	3.6	10.2	
3/04/2021	11.7	11.8	8.2	3.9	9.8	
4/04/2021	11.2	12	11.8	6.7	14.9	
5/04/2021	16.2	15.7	11.5	6.2	18	
6/04/2021	15.1	13.0	8.9	5.9	12.9	
7/04/2021	9.1	7.5	3.8	2.1	7.8	
8/04/2021	11.8	13.7	7.7	4.9	12.2	
9/04/2021	15.5	17.3	17.6	8.9	20.8	
10/04/2021	15.1	15.9	14.8	7.9	23.4	
11/04/2021	12.4	11.3	9.4	4.1	19.9	
12/04/2021	9.4	9.1	7.4	2.9	13.5	
13/04/2021	12.4	16.3	11.5	5.5	18.5	
14/04/2021	15.5	12.9	14.9	5.9	19.1	
15/04/2021	19.8	18.2	15.7	6.3	27.9	
16/04/2021	25.7	27.9	25.5	18.1	27.5	
17/04/2021	11.7	11.7	10.9	7.5	10.8	
18/04/2021	10.5	10	11.0	7.7	10.2	
19/04/2021	14.1	14.1	13.5	8.1	20.8	
20/04/2021	17.5	17.7	17.8	9.3	26.9	
21/04/2021	11.7	11.9	10.9	3.3	15.7	
22/04/2021	14.9	13.2	11.3	4.2	21.4	
23/04/2021	14.6	14.0	13.5	5.5	21.4	
24/04/2021	13.9	14.1	13.8	8.3	22.0	
25/04/2021	13.8	14.9	12.2	7.0	20.0	
26/04/2021	17.1	22.2	18.2	12.2	21.4	
27/04/2021	22.1	20.4	18.3	11.5	25.3	
28/04/2021	23.6c	31.2c	32c	25.9c	33.6c	Extraordinary Event - Hazard Reduction Burns
29/04/2021	28.4c	36.1c	36.6c	30.6c	35c	Extraordinary Event - Hazard Reduction Burns
30/04/2021	17.8	19.1	17.8	12.9	26.3	
1/05/2021	13.7	11.8	11.0	7.6	19.3	
2/05/2021	13.0	14.1	9.7	4.5	15.6	
3/05/2021	12.1	11.5	10.9	5.1	15.3	
4/05/2021	7.7	6.7	6.3	4.5	10.3	
5/05/2021	7.8	5.0	4.1	3.2	7.1	
6/05/2021	11.7	5.1	2.8	2.0	9.8	
7/05/2021	8.0	5.4	3.3	2.6	10.8	
8/05/2021	8.5	7.7	7.2	5.2	10.1	
9/05/2021	13.6	12.1	9.9	6.2	15.4	
10/05/2021	9.5	8.9	10.4	7.6	13.8	
11/05/2021	10.3	7.8	6.4	3.2	14.6	
12/05/2021	11.5	10.9	8.5	5.6	12.3	
13/05/2021	10.3	6.9	11.5	5.9	12.5	

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)	
14/05/2021	9.2	5.8	8.2	3.6	12.1	
15/05/2021	9.8	9.3	8.0	1.9	18.8	
16/05/2021	9.7	7.5	7.4	3.8	19.7	
17/05/2021	10.1	8.3	6.4	3.0	12.6	
18/05/2021	9.1	13.4	8.5	3.8	13.9	
19/05/2021	12.2	14.3	11.7	4.5	25.0	
20/05/2021	23.3	14.2	11.4	4.8	21.8	
21/05/2021	13.9	14.2	-	-	20.5	Power Outage
22/05/2021	13	14.7	-	-	12.9	Power Outage
23/05/2021	14.4	12.4	-	-	16.9	Power Outage
24/05/2021	13.1	13.0	-	-	25.0	Power Outage
25/05/2021	10	8.0.0	7.3	4.2	9.4	
26/05/2021	10.1	7.6	4.7	1.7	17.1	
27/05/2021	8.6	8.2	5.6	2.7	14.7	
28/05/2021	9.8	7.2	5.2	2.5	9.2	
29/05/2021	11.6	14.1	7.2	3.3	10.5	
30/05/2021	11.6	10.3	5.5	2.8	14.8	
31/05/2021	12.0	14.5	10.9	6.7	13.3	
1/06/2021	12.6	17.3	11.6	4.6	21.6	
2/06/2021	17.2	18.2	10.7	4.2	21.6	
3/06/2021	11.2	8.6	5.4	3.0	16.3	
4/06/2021	7.6	6.7	4.0	2.5	7.6	
5/06/2021	7.4	6.5	5.0	3.6	8.95	
6/06/2021	8.2	7.6	5.1	3.1	10.5	
7/06/2021	9.1	6.4	3.1	1.7	12.9	
8/06/2021	9.0	6.2	5.4	3.9	11.9	
9/06/2021	2.7	2.2	1.5	1.3	3.0	
10/06/2021	3.8	3.2	-	-	3.3	PM2.5 > PM10 results excluded
11/06/2021	6.3	5.6	-	-	6.2	PM2.5 > PM10 results excluded
12/06/2021	6.9	6.2	4.0	3.5	6.9	
13/06/2021	6.5	5.6	2.7	1.8	7.2	
14/06/2021	7.3	6.6	5.3	4.6	8.5	
15/06/2021	10.2	7.1	5.2	3.1	10.7	
16/06/2021	9.6	7.9	4.6	2.8	10.5	
17/06/2021	6.5	4.5	2.6	1.4	5.4	
18/06/2021	4.5	4.0	1.9	1.2	4.5	
19/06/2021	6.2	5.6	3.1	2.3	7.8	
20/06/2021	8.0	5.6	3.3	2.1	9.0	
21/06/2021	13.1	9.0	4.6	2.1	10.0	
22/06/2021	12.6	9.7	5.2	2.3	15.0	
23/06/2021	9.9	8.1	5.4	3.2	8.1	
24/06/2021	7.2	6.2	4.2	2.5	7.2	
25/06/2021	7.2	5.3	3.8	2.9	5.6	
26/06/2021	7.3	5.4	3.7	2.7	7.0	
27/06/2021	7.2	5.2	3.0	2.0	8.6	

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)	
28/06/2021	12.6	10.0	3.7	1.8	16.9	
29/06/2021	14.3	10.3	-	-	14	Equipment Failure
30/06/2021	12.0	12.4	-	-	8.2	Equipment Failure
1/07/2021	7.7	9.1	5.5	4.6	7.0	
2/07/2021	7.5	4.6	2.4	2.1	3.7	
3/07/2021	6.5	5.2	2.9	2.2	7.2	
4/07/2021	6.8	5.4	3.1	2.0	6.19	
5/07/2021	7.6	4.4	3.3	2.5	5.83	
6/07/2021	8.4	6.9	6.2	5.0	7.61	
7/07/2021	12.2	9.4	8.2	5.7	9.7	
8/07/2021	19.5	15.6	7.4	3.8	11.8	
9/07/2021	8.5	6.5	4.7	3.9	8.0	
10/07/2021	7.6	6.7	4.6	3.8	6.5	
11/07/2021	10.2	9.2	4.3	2.1	11.3	
12/07/2021	9.2	8.1	6.0	3.2	8.3	
13/07/2021	11.2	7.2	4.3	2.6	8.3	
14/07/2021	13.3	8.3	5.9	4.3	12.4	
15/07/2021	8.7	5.8	4.1	2.8	6.0	
16/07/2021	10.2	8.9	5.5	2.3	7.0	
17/07/2021	13.8	13.6	7.3	2.5	9.3	
18/07/2021	8.3	7.4	3.5	2.1	7.1	
19/07/2021	8.0	4.8	3.0	2.2	5.3	
20/07/2021	5.4	4.1	-	-	3.7	Equipment Failure
21/07/2021	8.2	5.9	-	-	6.3	Equipment Failure
22/07/2021	11.3	5.8	4.9	3.1	7.2	
23/07/2021	5.8	2.57	4.1	2.3	-	Maintenance
24/07/2021	1.3	2.0	2.4	1.4	0	
25/07/2021	6.3	6.2	5.0	3.0	4.3	
26/07/2021	10.3	7.3	6.2	3.4	4.7	
27/07/2021	10.4	5.7	6.0	3.3	5.1	
28/07/2021	11.2	7.4	6.4	3.6	8.8	
29/07/2021	10.6	8.6	7.1	2.9	8.4	
30/07/2021	-	8.5	7.8	5.2	9.4	Equipment Failure
31/07/2021	-	10.3	7.0	3.7	14.6	Equipment Failure
1/08/2021	10.3	9.7	6.9	3.8	8.8	
2/08/2021	12.2	12.4	9.9	5.0	8.6	
3/08/2021	8.0	7.0	6.1	3.6	8.2	
4/08/2021	5.4	4.5	3.3	2.3	4.7	
5/08/2021	4.8	4.9	2.7	2.3	8.0	
6/08/2021	6.4	4.8	3.9	2.7	7.0	
7/08/2021	6.4	5.4	3.7	2.0	6.7	
8/08/2021	11.4	9.7	5.2	2.7	8.8	
9/08/2021	15.1	19.5	13.3	4.7	10.3	
10/08/2021	15.3	11.3	9.0	4.0	13.8	
11/08/2021	13.1	9.0	7.5	4.3	8.6	

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)	
12/08/2021	9.5	6.7	4.2	1.9	6.8	
13/08/2021	9.1	7.4	5.6	3.4	7.9	
14/08/2021	13.7	13.6	10.1	6.0	12.1	
15/08/2021	11.9	13.2	15.2	11.9	13.2	
16/08/2021	9.3	7.4	6.4	3.2	14.0	
17/08/2021	6.8	5.8	3.5	1.5	6.4	
18/08/2021	12.9	15.8	10.6	4.7	9.9	
19/08/2021	17.9	16.5	13.1	7.4	14.9	
20/08/2021	12.7	12	9.4	5.3	12.6	
21/08/2021	7.9	8.0	6.4	4.0	10.0	
22/08/2021	14.8	10.9	7.8	4.0	14.9	
23/08/2021	13.5	10.7	8.0	4.8	13.6	
24/08/2021	3.3	3.3	-	-	3.4	PM2.5 > PM10 results excluded
25/08/2021	7.8	6.4	4.7	3.2	6.0	
26/08/2021	7.0	5.6	3.4	2.0	5.9	
27/08/2021	9.2	7.3	5.4	3.4	6.9	
28/08/2021	8.4	8.8	7.0	4.2	9.0	
29/08/2021	13.0	12.9	8.9	4.5	13.3	
30/08/2021	9.9	8.7	6.2	2.0	9.6	
31/08/2021	11.5	12.5	11.4	4.7	12.1	
1/09/2021	16.5	18.8	9.6	2.7	15.9	
2/09/2021	29.2	28.6	18.6	10.7	22.1	
3/09/2021	15.9	14	9.6	5.0	12.4	
4/09/2021	10.4	8.5	6.4	3.3	11.6	
5/09/2021	4.6	4.6	3.8	2.8	4.5	
6/09/2021	6.1	5.2	3.9	2.9	5.8	
7/09/2021	9.2	7.7	6.1	2.9	9.0	
8/09/2021	13.0	13.2	11.0	6.1	11.5	
9/09/2021	10.8	8.4	10.4	4.5	12.2	
10/09/2021	9.4	11.6	6.7	3.0	10.8	
11/09/2021	10.8	8.4	5.9	2.3	13.1	
12/09/2021	17.1	14.1	12.6	6.3	18.3	
13/09/2021	9.5	8.7	6.5	2.7	9.8	
14/09/2021	7.4	6.5	2.5	1.3	5.1	
15/09/2021	9.3	8.5	4.8	2.8	6.4	
16/09/2021	12.9	11.1	7.2	3.1	6.8	
17/09/2021	13.8	17	13.1	5.8	10.3	
18/09/2021	15.2	12.8	8.2	4.2	15.4	
19/09/2021	7.0	7.6	6.7	3.5	7.6	
20/09/2021	10.2	8.5	6.9	2.9	9.9	
21/09/2021	8.3	7	4.0	2.3	7.3	
22/09/2021	8.3	7.3	5.1	3.2	9.5	
23/09/2021	10.7	8.4	8.2	3.2	8.8	
24/09/2021	9.9	11.9	12.1	4.3	11.3	
25/09/2021	12.7	13.0	10.2	3.9	15.7	

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)	
26/09/2021	11.2	14.8	5.8	2.9	7.9	
27/09/2021	14.8	16.5	10.3	2.9	8.2	
28/09/2021	17.3	17.5	10.0	3.9	9.4	
29/09/2021	11.8	10.2	6.2	3.5	8.3	
30/09/2021	10.1	9.8	7.1	4.6	8.5	
1/10/2021	9.9	9.1	7.2	4.2	8.4	
2/10/2021	6.4	5.4	2.4	1.3	5.7	
3/10/2021	-	-	5.1	3.4	-	Maintenance
4/10/2021	10.8	9.7	12.6	5.6	11.6	
5/10/2021	11.7	11.6	11.4	3.7	13.1	
6/10/2021	12.2	14.3	10.9	4.5	11.9	
7/10/2021	20.3	18.8	17.6	5.3	20.7	
8/10/2021	20.4	22.6	19.6	5.9	17.0	
9/10/2021	-	21.6	17.4	7.6	19.4	Equipment Failure
10/10/2021	24.3	17.6	14.9	8.9	21.4	
11/10/2021	6.0	5.8	4.5	2.8	4.5	
12/10/2021	5.9	6.4	3.8	2.4	4.8	
13/10/2021	6.3	7.1	4.4	3.5	4.9	
14/10/2021	10.8	9.3	8.9	2.5	6.5	
15/10/2021	15.7	14.2	10.4	3.2	12.3	
16/10/2021	6.5	6.4	4.9	3.2	5.7	
17/10/2021	7.9	6.6	5.3	3.1	7.1	
18/10/2021	9.9	8.5	6.5	3.2	9.5	
19/10/2021	9.6	8.6	7.1	2.8	12.7	
20/10/2021	14.1	13.1	-	-	9.9	Maintenance
21/10/2021	13.1	14.5	9.0	4.4	12.4	
22/10/2021	16.7	16.7	14.3	6.4	13.2	
23/10/2021	14.2	16.2	13.5	5.6	13.8	
24/10/2021	8.4	6.8	5.7	2.5	12.3	
25/10/2021	9.5	9.0	8.6	4.3	16.3	
26/10/2021	13.6	15.2	9.6	3.9	16.6	
27/10/2021	18.0	17.7	13.3	5.8	17.9	
28/10/2021	19.2	21.7	15.2	6.2	20.9	
29/10/2021	29.0	24.5	19.7	5.2	36.3	
30/10/2021	10.1	10.4	8.4	3.1	14.2	
31/10/2021	17.1	21.1	12.5	3.3	15.4	
1/11/2021	16.9	20.1	13.6	4.8	12.7	
2/11/2021	19.0	24.1	12.7	4.5	16	
3/11/2021	17.6	18.3	11.4	4.4	10.8	
4/11/2021	16.8	15.5	10.9	5.3	11.1	
5/11/2021	8.4	8.5	6.2	4.2	6.3	
6/11/2021	10.7	10.4	8.1	5.4	8.7	
7/11/2021	12.4	10.4	-	-	-	Power Outage
8/11/2021	10.3	8.5	6.9	3.9	11.2	
9/11/2021	16.5	15.8	12.5	8.3	15.6	

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)	
10/11/2021	15.1	14.5	10.6	6.9	13.5	
11/11/2021	7.1	6.5	5.9	4.4	6.0	
12/11/2021	27.6	25.9	25.0	5.8	22.4	
13/11/2021	5.5	5.5	2.8	1.6	5.3	
14/11/2021	7.5	7.1	4.5	2.0	6.7	
15/11/2021	11.1	10.3	6.8	2.1	10.3	
16/11/2021	8.5	7.6	3.6	1.0	9.6	
17/11/2021	18.3	19.1	11.4	4.9	12.8	
18/11/2021	15.1	15.5	9.5	4.1	12.1	
19/11/2021	16.8	15.4	10.8	5.4	16.1	
20/11/2021	13.8	12.6	7.9	3.7	15.6	
21/11/2021	5.2	5.1	3.8	2.9	4.0	
22/11/2021	8.6	7.1	3.8	2.2	5.9	
23/11/2021	9.3	9.9	4.8	2.9	6.2	
24/11/2021	12.1	13	6.4	4.0	9.2	
25/11/2021	7.8	7.8	5.7	4.1	5.8	
26/11/2021	4.6	4.3	3.8	2.8	2.9	
27/11/2021	5.3	5.9	2.2	1.1	4.1	
28/11/2021	10.1	10.1	6.0	3.0	7.4	
29/11/2021	11.9	12.1	7.0	4.3	9.1	
30/11/2021	11.8	11.4	8.6	6.7	9.3	
1/12/2021	10.9	10.3	6.5	4.8	7.9	
2/12/2021	12.6	13.5	7.2	4.3	8.2	
3/12/2021	16.8	14.0	-	-	11.9	Power Outage
4/12/2021	17.5	18.2	-	-	15.5	Power Outage
5/12/2021	14.5	13.2	-	-	7.8	Power Outage
6/12/2021	17.2	17.1	-	-	11.5	Power Outage
7/12/2021	10.5	10.9	8.1	5.7	8.0	
8/12/2021	10.2	8.5	4.5	2.6	7.3	
9/12/2021	8.0	6.6	5.3	2.9	8.9	
10/12/2021	11.2	10.4	6.5	2.7	11.7	
11/12/2021	8.2	8.5	2.2	1.1	7.1	
12/12/2021	13.4	15.2	6.1	2.7	7.7	
13/12/2021	14.2	14.9	9.2	4.5	11	
14/12/2021	20.0	23.1	14.5	8.3	15.5	
15/12/2021	20.9	19.8	16.1	7.6	17.7	
16/12/2021	17.9	16.3	11.5	6.3	15.7	
17/12/2021	22.3	21.2	15.7	9.4	15.6	
18/12/2021	17.7	19.2	12.6	6.5	13.4	
19/12/2021	11.0	10.2	7.5	3.8	9.7	
20/12/2021	17.3	16.6	10.0	4.3	15.7	
21/12/2021	18.9	19.4	-	-	25.6	Maintenance
22/12/2021	13.2	15.0	-	-	12.8	Maintenance
23/12/2021	20.9	21.3	18.0	11.3	16.9	
24/12/2021	12.7	15.0	12.5	5.5	10.9	

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)	
25/12/2021	10.5	10.1	9.0	5.0	9.7	
26/12/2021	10.5	9.6	8.9	5.1	9.0	
27/12/2021	8.9	8.8	6.3	3.3	6.8	
28/12/2021	7.8	7.4	3.6	1.7	4.8	
29/12/2021	9.8	12.6	6.3	3.0	6.3	
30/12/2021	13.5	13.7	8.6	3.7	8.2	
31/12/2021	16.4	16.7	13.6	6.9	11.7	

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 2017 to 2021 TEOM Rolling Average

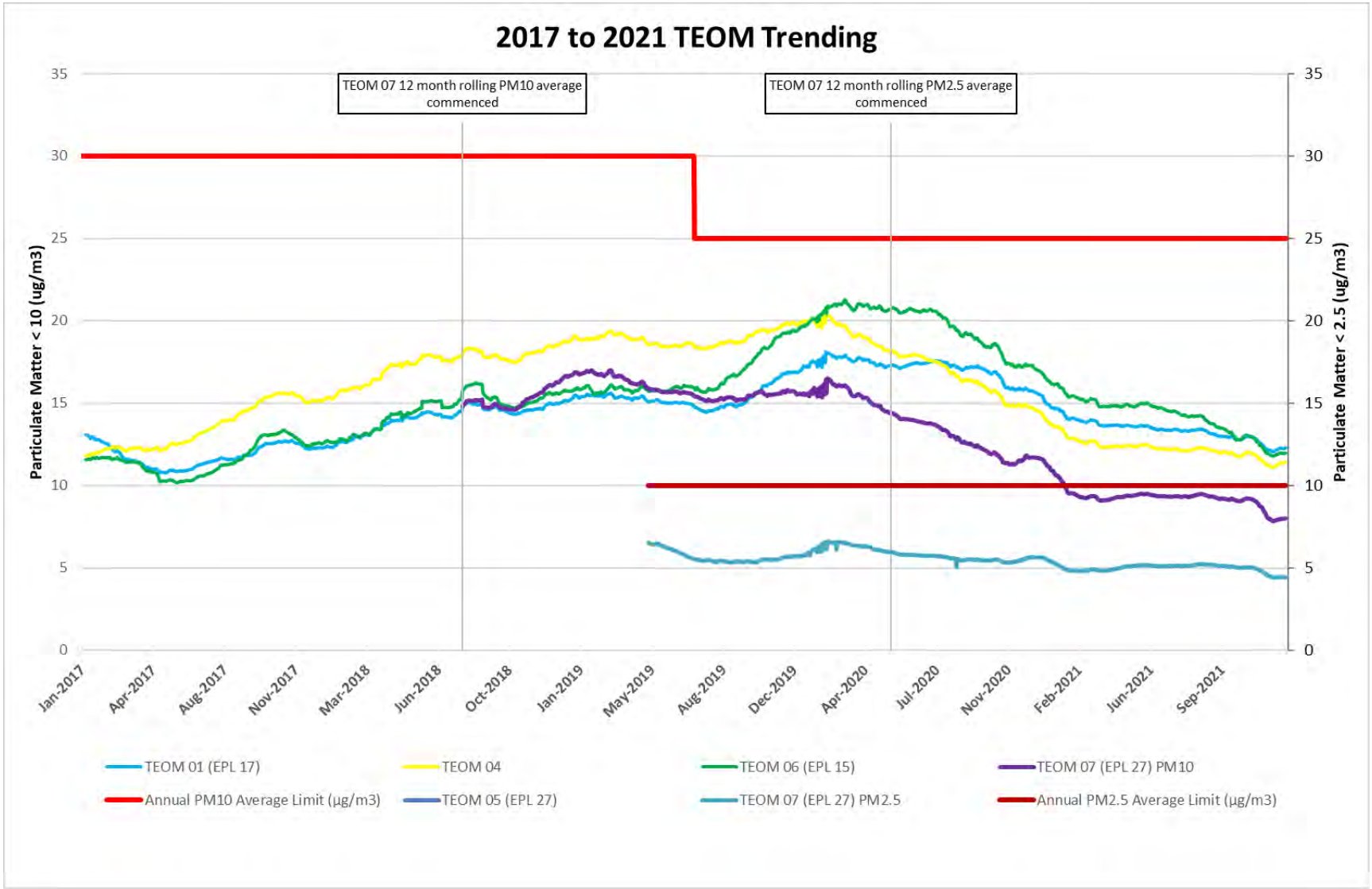


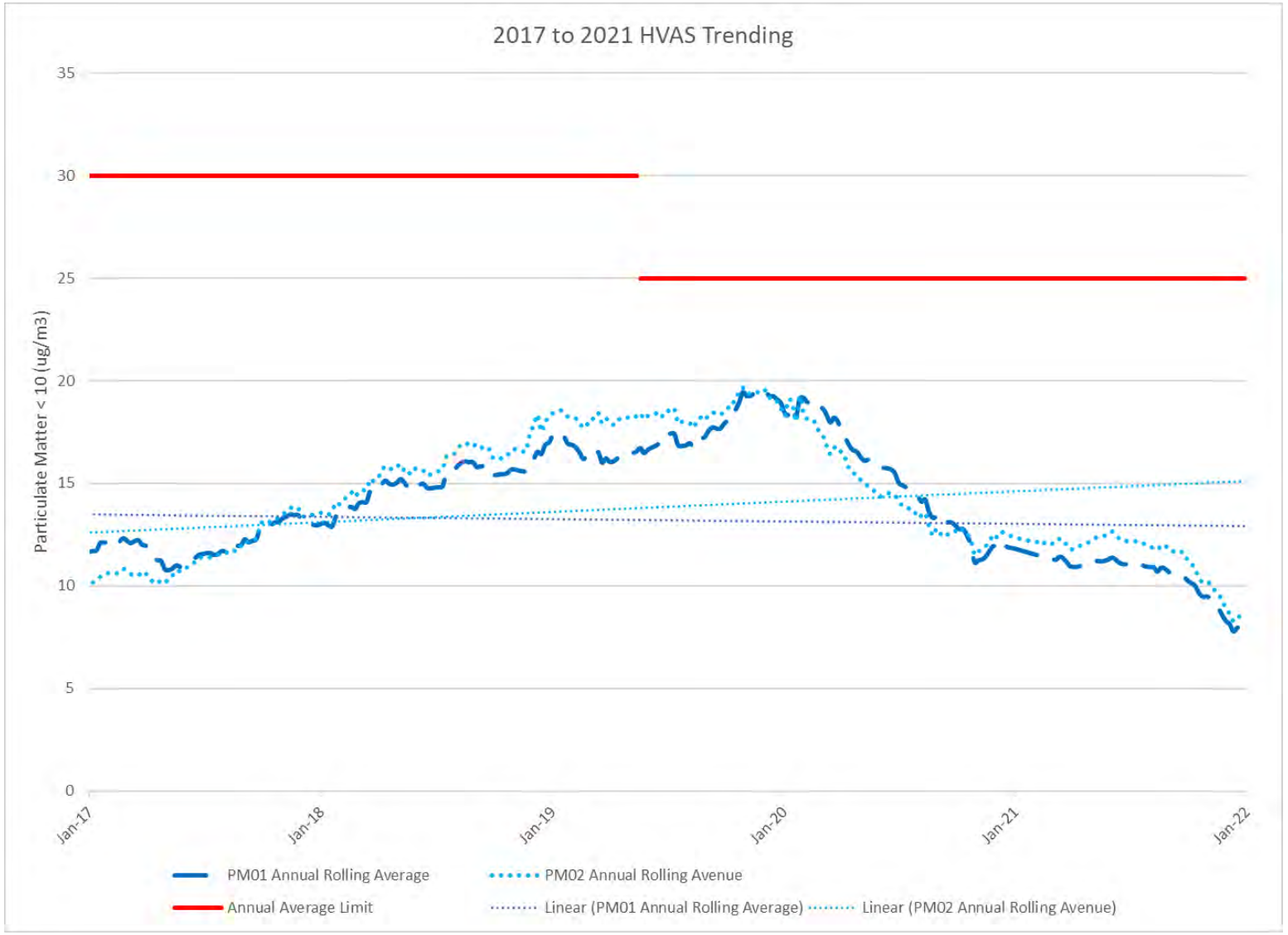
Table 4: HVAS monitoring results

Sampling Date	PM01	PM02
	Particulate Matter <10 µm (µg/m³)	Particulate Matter <10 µm (µg/m³)
3/01/2021	7	6
9/01/2021	13	10
15/01/2021	24	25
21/01/2021	22	26
27/01/2021	24	28
2/02/2021	6.1	6.3
8/02/2021	13.5	14.7
14/02/2021	11.8	6.0
20/02/2021	9.3	9.1
26/02/2021	8.0	8.5
4/03/2021	10.9	15.6
10/03/2021	21.6	22.6
16/03/2021	5.2	5.4
26/03/2021	5.2	5.5
28/03/2021	6.4	6.8
3/04/2021	7.4	10.4
9/04/2021	10.4	14.8
15/04/2021	13.9	16.7
21/04/2021	10.4	13.6
27/04/2021	18.6	23.5
3/05/2021	8.6	9.2
9/05/2021	11.1	13.2
15/05/2021	8.3	8.2
21/05/2021	11.5	10.4
27/05/2021	8.1	8.3
2/06/2021	9.0	7.9
8/06/2021	2.8	1.8
14/06/2021	0.4	2.0
20/06/2021	1.4	<0.1
26/06/2021	<0.1	<0.1
2/07/2021	<0.1	<0.1
8/07/2021	10.1	9.6
14/07/2021	4.4	3.6
20/07/2021	<0.1	<0.1
26/07/2021	2.9	2.4
1/08/2021	5.8	4.4
7/08/2021	<0.1	<0.1
13/08/2021	3.4	4.7
19/08/2021	12.2	14.0
25/08/2021	1.6	1.5
31/08/2021	4.2	5.5
6/09/2021	<0.1	0.8
12/09/2021	9.6	11.4

Sampling Date	PM01	PM02
	Particulate Matter <10 µm (µg/m³)	Particulate Matter <10 µm (µg/m³)
18/09/2021	7.9	6.4
24/09/2021	4.9	4.9
30/09/2021	4.4	3.4
6/10/2021	5.2	7.0
12/10/2021	0.5	0.4
18/10/2021	3.2	3.4
24/10/2021	4.0	5.1
30/10/2021	6.9	7.6
5/11/2021	5.5	5.9
11/11/2021	2.9	2.7
17/11/2021	13.4	15.9
23/11/2021	3.8	4.6
29/11/2021	5.6	5.5
5/12/2021	9.9	8.4
11/12/2021	4.8	4.7
17/12/2021	20.2	23.6
23/12/2021	6.4	7.2
29/12/2021	6.4	7.2

Note: Data includes resamples due to equipment malfunction.

Figure 3-d 2017 to 2021 HVAS Trending



APPENDIX 3E. BIODIVERSITY MONITORING DATA

2021 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	20	5	18	2	14	0	56	6	4
BOA 1	1b	29.3	0	20	8	16	6	42	8	0
BOA 1	2c	24.5	0.5	10	4	10	0	66	10	0
BOA 1	4a	3.8	0	42	4	10	20	18	6	0
BOA 1	5a	21.5	14.1	30	20	16	0	34	0	0
BOA 1	5c	42	0.5	12	10	64	0	10	4	0
BOA 1	6a	9	4	2	0	50	0	36	12	0
BOA 1	6b	14.5	0.1	2	6	50	0	34	12	0
BOA 1	14a	12.5	0	38	0	20	2	32	8	0
BOA 1	24a	0	0	26	0	12	26	14	22	0
BOA 1	1a	20	5	18	2	14	0	56	6	4
BOA 1	1b	29.3	0	20	8	16	6	42	8	0
BOA 2	13e	11.8	3.6	0	38	20	0	22	20	0
BOA 2	11a	12.5	2	36	0	18	0	24	22	0
BOA 2	11c	11.5	1.5	6	22	12	0	50	0	10
BOA 2	11d	15.5	0.4	12	14	8	0	46	0	20
BOA 2	13a	7	1.5	0	0	20	0	36	6	38
BOA 2	10a2	19.5	1	8	2	46	0	38	4	2
BOA 2	12a	8.2	2.5	14	2	22	0	30	20	14
BOA 3	1e	20.5	0	12	4	42	0	40	0	4
BOA 3	5e	16	5.2	20	4	54	0	22	0	0
BOA 3	1f	17	0.9	30	10	24	14	22	0	0
BOA 3	1h	12	0	72	4	12	0	2	0	0
BOA 3	4f	0	2	62	2	16	0	12	4	4
BOA 3	8d	17.7	2.5	26	10	28	0	34	2	0
BOA 3	15a	3.5	17.5	10	0	54	0	30	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
BOA 3	16a	0.3	0.6	12	6	24	0	8	6	38
BOA 3	17a	11.5	4.5	0	6	62	0	20	2	10
BOA 3	17b	5	0	2	0	62	0	14	10	12
BOA 3	17c	1.6	3.5	2	2	40	0	22	14	22
BOA 3	19b	5	1	6	2	46	0	16	6	4
BOA 3	19c	6.5	1	6	2	54	0	24	2	2
Bobadeen	Mod9_Fl1	12	0	48	0	32	0	18	0	0
Bobadeen	Mod9_Fl3	2.5	0	70	0	26	0	2	2	0
Bobadeen	Mod9_Fl5	0	0	62	0	12	20	4	2	0
Bobadeen	Mod9_Fl9	0	0	24	0	10	32	34	0	0
Bobadeen	Mod9_Fl2	0	0	56	0	6	34	4	0	0
Bobadeen	Mod9_Fl4	0	0	68	0	16	10	4	0	0
Bobadeen	Mod9_Fl6	0	0	16	0	34	40	12	0	0
Bobadeen	Mod9_Fl7	5.5	0	32	0	4	62	2	0	0
Bobadeen	Mod9_Fl8	0	0	22	0	6	38	34	0	0
Clarkes	Mod9_Fl19	3.3	0	4	0	38	0	38	0	2
Clarkes	Mod9_Fl17	18	2.6	42	2	14	2	38	2	0
Clarkes	Mod9_Fl21	16	11	16	34	6	0	42	2	0
Clarkes	Mod9_Fl22	18	0.9	10	14	4	0	58	14	0
Clarkes	Mod9_Fl15	0	0	36	0	38	0	20	4	0
Clarkes	Mod9_Fl16	5.6	0	44	0	32	0	22	2	0
Clarkes	Mod9_Fl20	18	0.4	6	12	20	0	60	2	0
Clifford	Mod9_Fl24	16.5	0	24	10	14	0	52	0	0
Clifford	Mod9_Fl18	11.5	6	40	4	4	0	50	0	4
Clifford	Mod9_Fl25	22.5	11.5	14	10	12	0	66	2	0
Clifford	Mod9_Fl23	15	4.5	30	0	30	0	40	0	0
Elward	Mod9_Fl12	9.7	0.3	28	6	60	0	6	0	0
Elward	Mod9_Fl10	9	1	8	0	48	0	22	22	0
Elward	Mod9_Fl13	23	0	0	0	30	0	58	10	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_Fl11	1	3	26	10	60	0	0	4	0
Elward	Mod9_Fl14	4.2	11	48	4	26	4	12	4	2
Moolarmoo	Mod9_Fl32	10.2	1.5	4	0	18	0	46	8	0
Moolarmoo	Mod9_Fl33	7.5	6	44	0	16	0	0	16	0
Moolarmoo	Mod9_Fl34	0	0	68	0	12	2	14	4	0
Moolarmoo	Mod9_Fl35	0	0	62	0	8	2	24	4	0
Property 24 & 25	Mod9_Fl29	17	5	34	0	24	0	40	2	0
Property 24 & 25	Mod9_Fl31	0	0	54	0	38	8	0	0	0
Property 24 & 25	Mod9_Fl30	0	0	22	0	50	0	8	14	6
Property 5	Mod9_Fl28	18.5	0	62	0	20	0	16	2	0
Property 5	Mod9_Fl27	0	0	10	0	12	14	64	0	0
Property 5	Mod9_Fl26	0	0	28	0	0	8	64	0	0

2021 Stage2 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	12.7	0	14	4	14	0	52	10	0
Dun Dun East	Stage2_Fl26	22.5	0	4	0	6	0	78	8	2
Dun Dun East	Stage2_Fl107	29	0	22	6	4	2	54	8	0
Dun Dun East	Stage2_Fl108	24.5	0	0	0	0	0	84	16	0
Dun Dun East	Stage2_Fl109	0	4.8	72	10	0	2	8	0	0
Dun Dun East	Stage2_Fl110	0	0	56	2	2	20	20	0	0
Dun Dun East	Stage2_Fl111	0	0	46	0	2	50	2	0	0
Dun Dun East	Stage2_Fl112	0	0	48	6	6	2	16	10	4
Dun Dun East	Stage2_Fl20	10.1	0	52	2	14	2	18	2	0
Dun Dun East	Stage2_Fl36	8.2	0	36	12	18	2	32	0	0
Dun Dun East	Stage2_Fl113	14.2	2.1	18	6	14	6	38	18	0
Dun Dun East	Stage2_Fl114	22.9	0	48	0	20	4	28	0	0
Dun Dun East	Stage2_Fl71	0	0	52	0	18	24	6	0	0

Dun Dun East	Stage2_Fl37	0.5	0	44	0	6	20	30	0	0
Dun Dun East	Stage2_Fl115	0	0	36	2	28	4	24	6	0
Dun Dun East	Stage2_Fl116	0	0	52	0	8	22	6	10	2
Dun Dun West	Stage2_Fl117	19	0	4	0	4	0	74	6	0
Dun Dun West	Stage2_Fl14	0	0	42	8	30	12	2	0	2
Dun Dun West	Stage2_Fl118	23.5	9.5	16	2	4	0	62	2	0
Dun Dun West	Stage2_Fl119	22.5	4.5	34	8	0	0	54	0	0
Dun Dun West	Stage2_Fl17	0	0	70	0	14	6	8	0	0
Dun Dun West	Stage2_Fl16	0	0	64	4	14	12	0	0	0
Dun Dun West	Stage2_Fl120	0	0	50	10	10	30	0	0	0
Dun Dun West	Stage2_Fl121	0	0	60	0	16	16	2	0	0
Dun Dun West	Stage2_Fl10	16	0	2	0	6	0	68	8	2
Dun Dun West	Stage2_Fl122	17	0.2	32	6	20	8	22	8	4
Dun Dun West	Stage2_Fl123	24.5	0.5	14	2	12	2	60	6	0
Dun Dun West	Stage2_Fl124	7.5	3	22	2	14	0	38	8	6
Libertus	Stage2_Fl125	10	0	0	0	46	0	50	2	0
Libertus	Stage2_Fl126	22.5	7.2	0	8	40	0	46	6	0
Libertus	Stage2_Fl127	9.5	4	10	0	36	0	46	16	2
Libertus	Stage2_Fl128	10.5	0	20	2	60	0	18	0	0
Libertus	Stage2_Fl129	0	0	62	0	16	22	0	0	0
Libertus	Stage2_Fl130	0	0	20	0	16	10	38	8	8
Libertus	Stage2_Fl131	18	0	18	6	54	0	12	0	0
Libertus	Stage2_Fl132	13.6	0	28	0	64	0	6	2	0
Old Bobadeen	Stage2_Fl142	11.5	0	62	12	12	0	14	0	0
Old Bobadeen	Stage2_Fl143	10	4	58	10	12	0	16	2	0
Old Bobadeen	Stage2_Fl144	7	0	24	44	12	0	18	2	0
Old Bobadeen	Stage2_Fl145	18.5	0	10	0	10	0	74	6	0
Old Bobadeen	Stage2_Fl146	23.5	0	80	0	8	2	12	0	0
Old Bobadeen	Stage2_Fl52	0	0	42	0	4	6	46	2	0
Old Bobadeen	Stage2_Fl67	0	0	36	0	0	2	54	4	0
Old Bobadeen	Stage2_Fl153	0	0	36	0	34	26	0	4	0

Old Bobadeen	Stage2_Fl154	0	0	20	0	0	8	64	4	0
Onsite Offset	Stage2_Fl58	30.5	0	2	0	34	0	52	8	0
Onsite Offset	Stage2_Fl133	26	0.2	2	0	12	0	80	2	2
Onsite Offset	Stage2_Fl134	15.5	0.2	2	0	4	0	62	22	0
Onsite Offset	Stage2_Fl135	11.5	1.2	70	10	16	0	4	0	0
Onsite Offset	Stage2_Fl69	0	0	40	0	20	4	34	0	2
Onsite Offset	Stage2_Fl64	0	0	50	0	14	2	34	0	0
Onsite Offset	Stage2_Fl136	0	0	32	0	18	2	44	4	0
Onsite Offset	Stage2_Fl137	0	0	20	0	52	20	8	0	0
Onsite Offset	Stage2_Fl138	16.2	0	38	4	30	2	16	0	10
Onsite Offset	Stage2_Fl139	35	0.5	26	4	12	0	58	0	0
Onsite Offset	Stage2_Fl140	20	0	32	0	40	0	24	4	0
Onsite Offset	Stage2_Fl141	0	0	14	0	58	0	16	4	0

2021 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	19	1	16	0	10	2	66	6	0
BOA1	4b	0	8	18	0	4	4	38	36	0
BOA1	5b	28	3	2	10	14	0	68	4	2
BOA1	7b	0	2.5	38	6	12	4	6	18	10
BOA1	9a	0	4	54	0	34	6	2	4	0
BOA1	9b	8	1.5	16	0	10	0	24	28	0
BOA1	14b	9	24.2	46	6	20	0	22	6	0
BOA1	21a	0	0.5	46	4	46	0	0	4	0
BOA1	21b	0	0	56	4	36	0	2	2	0
BOA1	24b	0	4.5	56	0	2	0	4	40	0
BOA2	10b	5	1	4	30	18	0	20	14	0
BOA2	11b	10.5	2.5	34	4	4	0	16	20	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
BOA2	12b	2	13	4	0	34	0	18	8	16
BOA2	13g	18.5	12	4	2	34	0	58	2	0
BOA2	13h	18.5	8.7	6	2	34	0	56	2	0
BOA2	25a	0	1.5	30	6	42	4	8	0	0
BOA3	4e	8	0	56	0	8	4	22	6	4
BOA3	5h	15	2	6	2	22	0	46	4	0
BOA3	6c	12	2	10	0	20	0	42	20	0
BOA3	8c	16	1.5	2	2	2	0	94	0	0
BOA3	15b	2	5	0	0	80	0	12	8	0
BOA3	16b	3	1	2	16	62	4	6	4	6
BOA3	17d	1	0	2	2	32	8	12	6	38
BOA3	19a	4	8	10	0	28	4	34	14	8
Bobadeen	Mod9_Fl1	18.9	0.1	48	0	14	0	36	2	0
Bobadeen	Mod9_Fl3	17	0.5	30	2	20	4	42	2	0
Bobadeen	Mod9_Fl5	0	0	22	0	4	36	38	0	0
Bobadeen	Mod9_Fl9	0	0.5	42	0	8	26	22	2	0
Bobadeen	Mod9_Fl2	0	0	52	0	6	8	34	0	0
Bobadeen	Mod9_Fl4	0	0	58	2	6	14	18	0	0
Bobadeen	Mod9_Fl6	0	0	54	0	32	2	12	0	0
Bobadeen	Mod9_Fl7	5	0	34	0	2	38	26	0	0
Bobadeen	Mod9_Fl8	0	0	30	0	0	36	34	0	0
Clarkes	Mod9_Fl15	0	0	26	0	34	4	12	4	0
Clarkes	Mod9_Fl16	5	0	22	0	42	4	26	6	2
Clarkes	Mod9_Fl19	4.5	0	2	2	48	0	30	0	0
Clarkes	Mod9_Fl17	18	2	24	6	20	2	38	10	0
Clarkes	Mod9_Fl21	15	13.5	16	10	16	2	54	2	0
Clarkes	Mod9_Fl22	18.5	0.7	4	6	8	0	70	12	0
Clarkes	Mod9_Fl20	15.7	1	6	8	28	0	56	2	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
Clifford	Mod9_FI18	21.5	2.9	40	4	8	2	38	6	2
Clifford	Mod9_FI23	15	1	44	2	20	4	28	2	0
Clifford	Mod9_FI24	14	0	28	8	18	0	46	0	0
Clifford	Mod9_FI25	20	9.3	6	20	22	0	48	4	0
Elward	Mod9_FI10	20	3.7	6	6	50	0	26	2	0
Elward	Mod9_FI11	1.8	0.6	8	20	62	0	10	0	0
Elward	Mod9_FI12	9.2	1.1	56	8	24	0	12	0	0
Elward	Mod9_FI13	21	0	0	8	28	0	34	4	0
Elward	Mod9_FI14	0.1	8.5	32	10	24	6	14	14	0
Moolarmoo	Mod9_FI32	24.5	6	20	0	12	0	50	2	0
Moolarmoo	Mod9_FI33	19	14.5	32	0	22	2	10	12	0
Moolarmoo	Mod9_FI34	0	0	64	0	10	26	0	0	0
Moolarmoo	Mod9_FI35	0	0	18	0	0	82	0	0	0
Property 24 & 25	Mod9_FI29	10.5	0.7	26	4	22	4	42	0	0
Property 24 & 25	Mod9_FI30	0	0	8	0	34	2	24	8	2
Property 24 & 25	Mod9_FI31	0	0	48	0	6	6	40	0	0
Property 5	Mod9_FI26	0	0	6	0	8	40	46	0	0
Property 5	Mod9_FI27	0	0	0	0	6	26	68	0	0
Property 5	Mod9_FI28	15	0	68	0	22	0	10	0	0

2021 Stage2 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)	Litter	Bare soil	Rock	Crypto
Dun Dun	Stage2_Fl19	0.4	0	38	0	4	10	6	0	2
Dun Dun	Stage2_Fl191	13	0	2	0	4	78	2	10	0
Dun Dun	Stage2_Fl192	14.5	0	8	0	2	88	0	0	2
Dun Dun	Stage2_Fl193	1	0.2	14	0	14	48	8	0	0
Dun Dun	Stage2_Fl194	0.5	0	8	0	12	48	8	22	2
Dun Dun	Stage2_Fl195	1	0	36	0	0	4	0	0	0
Dun Dun	Stage2_Fl196	0	0	44	0	0	8	8	0	0
Dun Dun	Stage2_Fl197	0	1.5	32	2	0	2	0	0	0
Dun Dun	Stage2_Fl198	0	0.2	20	0	4	2	0	2	0
Dun Dun	Stage2_Fl199	0	0	4	0	4	0	2	0	0
Dun Dun	Stage2_Fl200	0	0	24	0	6	6	10	2	2
Dun Dun	Stage2_Fl23	12.7	0.5	36	0	0	56	4	2	0
Dun Dun	Stage2_Fl24	12.5	1	10	0	30	38	6	0	0
Dun Dun	Stage2_Fl30	0.8	0	20	0	12	34	0	10	8
Dun Dun	Stage2_Fl31	0	0	20	0	4	0	0	0	0
Dun Dun	Stage2_Fl35	0	0	18	2	12	4	2	0	4
Nori	Stage2_Fl201	0	0	28	0	2	4	2	12	0
Nori	Stage2_Fl202	0	0	28	0	8	6	0	4	0
Nori	Stage2_Fl203	15	4.5	14	0	8	58	8	10	0
Nori	Stage2_Fl204	17	0	26	0	0	68	6	0	0
Nori	Stage2_Fl205	0.3	0.1	14	2	22	12	14	16	12
Nori	Stage2_Fl206	0	0	24	6	22	4	4	2	0
Nori	Stage2_Fl207	16.5	0.5	8	4	6	38	4	8	0
Nori	Stage2_Fl208	15	0	4	0	6	46	32	4	0
Nori	Stage2_Fl209	6.5	0	12	0	10	22	16	8	2
Nori	Stage2_Fl201	0	0	28	0	2	4	2	12	0
Nori	Stage2_Fl202	0	0	28	0	8	6	0	4	0

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Litter	Bare soil	Rock	Crypto
Nori	Stage2_FI203	15	4.5	14	0	8	58	8	10	0
Old Bobadeen	Stage2_FI157	10.2	0	56	0	16	24	0	0	0
Old Bobadeen	Stage2_FI158	18.5	0	34	0	14	38	0	0	0
Old Bobadeen	Stage2_FI159	12.8	0	30	2	28	24	10	0	2
Old Bobadeen	Stage2_FI160	12	0.1	16	26	26	32	0	0	0
Old Bobadeen	Stage2_FI161	24.2	0	20	2	12	52	14	0	0
Old Bobadeen	Stage2_FI162	0	0	18	0	0	4	2	0	0
Old Bobadeen	Stage2_FI163	0	0	12	0	0	12	0	0	0
Old Bobadeen	Stage2_FI51	0	0	28	0	8	12	0	0	0
Old Bobadeen	Stage2_FI54	0	0	2	0	0	18	12	0	0
Onsite Offset	Stage2_FI164	0	0	20	0	46	14	0	6	2
Onsite Offset	Stage2_FI165	17.5	4.7	2	6	16	72	2	2	0
Onsite Offset	Stage2_FI166	6.7	3.5	12	8	12	66	0	2	0
Onsite Offset	Stage2_FI167	10.5	0.5	6	12	30	38	12	2	0
Onsite Offset	Stage2_FI168	7.9	1.6	26	18	24	26	2	0	0
Onsite Offset	Stage2_FI169	14.3	0	36	2	28	16	0	14	4
Onsite Offset	Stage2_FI170	13.4	2.9	36	30	12	22	0	0	0
Onsite Offset	Stage2_FI171	13.3	1.2	12	30	8	50	0	0	0
Onsite Offset	Stage2_FI172	0	0	26	2	58	2	0	0	0
Onsite Offset	Stage2_FI173	0	0	30	0	10	0	0	0	0
Onsite Offset	Stage2_FI174	0	0	42	0	8	2	0	0	0
Onsite Offset	Stage2_FI62	0	0	36	0	38	2	0	0	0
Ulan 18	Stage2_FI183	0	0	28	0	0	12	0	0	0
Ulan 18	Stage2_FI184	0	0	12	0	22	18	2	0	0
Ulan 18	Stage2_FI185	4	4.7	10	2	32	18	10	20	8
Ulan 18	Stage2_FI186	7	10.5	4	0	52	24	2	18	0
Ulan 18	Stage2_FI187	1.5	14	2	4	40	44	6	4	0
Ulan 18	Stage2_FI188	24.2	5.5	12	2	50	24	2	8	2

BOA	Plot Number	Native Overstorey Species	Native Mid Storey Species	Native ground cover (Grasses)	Native Ground Cover (Shrubs)	Native Ground Cover (Other)	Litter	Bare soil	Rock	Crypto
Ulan 18	Stage2_Fl189	35	2	10	12	12	58	8	0	0
Ulan 18	Stage2_Fl190	9.8	3.3	36	16	20	26	2	0	0
Ulan 18	Stage2_Fl44	0	0	12	0	40	4	0	0	0

Appendix 3F. SURFACE WATER MONITORING DATA

Table 5: 2021 Surface water quality data

Sample Point	Sample Date	pH (Field) (Unit)	pH (Lab) (Unit)	EC (Lab) (µS/cm)	EC (Field) (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)	P - T (mg/L)	N - T (mg/L)
SW01	11/01/21	7.7	7.8	530	558	7	334	24.6	3	0.07	0.001	0.001	0.005	0.005	0.45	0.044	0.001	0.01	0.0001	0.001	0.076	0.02	0.135	8.0	0.01	0.2
SW01	2/02/21(	7.8	7.9	461	484	5	312	25	4.9				0.005		0.66											
SW01	14/02/21*	7.5	7.5	368	376	17	258	21.9	50.3				0.005		2.71											
SW01	16/02/21	7.7	7.9	513	532	5	324	22.9	7.5																	
SW01	12/03/21*	7.8	7.9	616	609	1	374	22.6	2.1				0.005		0.33											
SW01	23/03/21*	7.0	7.0	265	272	37	273	18	121				0.008		3.91											
SW01	24/03/21	7.0	7.0	317	308	16	268	20.8	62.4																	
SW01	28/04/21	8.1	8.0	619	582	6	345	14.9	1.9																	
SW01	18/05/21	8.0	7.9	581	571	5	364	13.2	1.6																	
SW01	16/06/21	7.8	7.8	619	647	5	354	9.0	1.4	0.04	0.001	0.001	0.005	0.003	0.19	0.024	0.001	0.01	0.0001	0.001	0.077	0.021	0.146	11.8	0.01	0.1
SW01	2/07/21*	7.3	7.3	400	411	109	314	13.2	185				0.017		5.12											
SW01	20/07/21	7.8	7.8	718	764	5	430	13.9	3.6																	
SW01	18/08/21	8.0	7.9	715	698	5	436	15.7	1.1																	
SW01	7/09/21	8.0	8.0	761	720	5	400	16.1	1.8																	
SW01	6/10/21	8.1	8.0	723	720	5	405	15.8	1.6																	
SW01	3/11/21	8.1	8.1	713	697	5	402	22.7	1																	
SW01	12/11/21*	7.7	7.5	536	496	57	369	21.5	150				0.009		3.71											
SW01	26/11/21*	7.0	7.1	329	375	25	269	20.0	57.2				0.012		1.76											
SW01	1/12/21	7.2	7.2	360	412	31	343	20.7	75.6																	
SW02	11/01/21	7.8	7.8	515	556	5	326	22.6	3.2	0.06	0.001	0.001	0.005	0.005	0.49	0.055	0.001	0.01	0.0001	0.001	0.077	0.019	0.135	8.0	0.01	0.5
SW02	2/02/21*	7.9	7.8	474	488	5	334	23.8	4.8				0.005		0.68											
SW02	14/02/21*	7.3	7.4	378	379	9	268	20.7	47.3				0.005		2.43											

SW02	16/02/21	7.8	7.9	513	530	5	300	22.0	8																
SW02	12/03/21*	7.9	7.9	603	598	1	392	22.4	2.6				0.005		0.35										
SW02	23/03/21*	7.0	7.0	266	272	48	271	18.2	115				0.033		6.29										
SW02	24/03/21	7.0	7.1	318	317	10	278	21.3	57.2																
SW02	28/04/21	8.0	7.9	601	577	6	326	13.9	2.1																
SW02	18/05/21	8.1	7.9	557	568	5	365	12.4	1.7																
SW02	16/06/21	7.9	7.8	607	650	5	368	9.0	1.4	0.04	0.001	0.001	0.005	0.003	0.19	0.027	0.001	0.01	0.0001	0.001	0.079	0.02	0.148	11.9	0.01	0.1
SW02	2/07/21*	7.3	7.4	443	454	51	333	13.2	145				0.009		1.22										
SW02	20/07/21	7.8	7.8	785	779	5	430	13.4	3.9																
SW02	18/08/21	8.0	7.9	684	696	5	400	14.3	1.3																
SW02	7/09/21	8.1	8.0	755	721	5	404	15.5	2																
SW02	6/10/21	8.3	8.2	707	722	5	410	14.0	1.7																
SW02	3/11/21	8.0	8.0	706	714	5	418	22.3	0.9																
SW02	12/11/21*	7.7	7.4	533	509	22	372	20.5	71.3				0.008		2.43										
SW02	26/11/21*	7.4	7.4	353	397	20	274	20.2	44.1				0.009		1.75										
SW02	1/12/21	7.2	7.2	361	420	22	348	20.6	73.9																
SW04	11/01/21	6.9	6.9	394	414	5	253	25.2	10.5	0.14	0.001	0.001	0.005	0.009	2.97	2.64	0.002	0.01	0.0001	0.001	0.001	0.05	0.133	4.9	0.01	0.6
SW04	2/02/21*	6.5	6.6	283	290	104	277	24.4	321				0.026		4.75										
SW04	14/02/21*	6.6	6.6	300	306	13	238	22.0	52.9				0.006		3.82										
SW04	23/03/21*	6.6	6.7	110	123	24	164	17.5	82.9				0.009		1.58										
SW04	24/03/21	6.6	6.7	166	177	8	185	22.2	51.5																
SW04	2/07/21*	6.7	6.9	148	166	37	203	13.6	120				0.011		2.02										
SW04	20/07/21	6.8	7.0	331	350	5	215	11.0	16.4																
SW04	18/08/21	6.9	7.0	372	394	5	258	13.2	12.9																
SW04	7/09/21	6.8	6.9	442	437	5	242	17.0	6.1																
SW04	12/11/21*	7.2	7.0	224	231	20	257	22.9	107				0.011		2.26										
SW04	26/11/21*	6.7	6.9	130	157	24	147	19.4	75.7				0.009		1.46										
SW04	1/12/21	6.8	6.8	158	197	5	218	22.6	53.8																
SW05	11/01/21	7.0	7.0	623	707	8	474	25.9	9.7	0.24	0.001	0.001	0.005	0.002	2	0.448	0.002	0.01	0.0001	0.001	0.002	0.033	0.221	4.1	0.01	1
SW05	2/02/21*	7.2	7.2	597	625	5	424	26.2	8.2				0.005		1.34										

SW05	14/02/21*	7.0	7.2	555	575	6	358	23.3	10.4				0.005		1.72										
SW05	16/02/21	7.0	7.1	563	597	5	385	26.1	9.5																
SW05	12/03/21*	7.2	7.2	580	574	1	398	22.7	5				0.005		0.96										
SW05	23/03/21*	6.6	6.7	26	37	22	118	18.8	90.8				0.014		1.26										
SW05	24/03/21	7.1	7.0	564	556	8	372	20.6	30.2																
SW05	28/04/21	7.3	7.3	660	649	6	404	15.6	6.6																
SW05	18/05/21	7.4	7.4	687	702	5	446	13.9	6.2																
SW05	16/06/21	7.3	7.4	1207	1280	5	710	14.7	7.3	0.29	0.001	0.001	0.005	0.001	0.8	0.074	0.001	0.01	0.0001	0.001	0.004	0.035	0.395	10.1	0.01	0.9
SW05	2/07/21*	7.2	7.4	1226	1220	11	676	12.5	17.7				0.005		1.03										
SW05	20/07/21	7.4	7.5	1608	1570	5	912	11.0	8.1																
SW05	18/08/21	7.4	7.5	1463	1440	5	965	14.5	4.2																
SW05	7/09/21	7.5	7.6	1429	1380	5	792	16.7	4.2																
SW05	6/10/21	7.3	7.4	1247	1250	5	688	20.3	5.3																
SW05	3/11/21	7.1	7.2	1217	1200	5	678	21.9	5.1																
SW05	12/11/21*	7.6	7.4	895	885	18	588	22.6	50.2				0.006		1.89										
SW05	26/11/21*	7.4	7.4	866	920	20	572	19.6	25.1				0.005		1.47										
SW05	1/12/21	7.3	7.4	535	617	5	397	21.9	18.6																
SW07	2/02/21*	7.1	7.2	2570	2710	5	1780	26.3	3.2				0.005		0.16										
SW07	14/02/21*	7.2	7.3	1940	2030	5	1250	25.3	0.7				0.005		0.1										
SW07	16/02/21	7.4	7.3	2330	2490	15	1740	26.7	7.8																
SW07	12/03/21*	7.2	7.3	2127	2140	5	1360	21.3	7				0.005		0.12										
SW07	23/03/21*	7.2	7.1	1147	1090	5	706	17.3	4.8				0.005		0.37										
SW07	24/03/21	7.3	7.4	1153	1150	5	715	21.9	2.2																
SW07	28/04/21	7.5	7.5	2770	2600	28	1860	17.2	4.4																
SW07	18/05/21	7.4	7.3	2840	2840	276	1820	15.7	39.5																
SW07	16/06/21	7.5	7.6	2560	2630	5	1790	12.3	0.6	0.02	0.001	0.001	0.005	0.002	0.11	0.201	0.001	0.01	0.0001	0.001	0.002	0.049	1.12	0.2	0.01	0.5
SW07	2/07/21*	7.3	7.4	1788	1790	5	1010	12.5	3.5				0.005		0.2										
SW07	20/07/21	7.6	7.6	2370	2250	5	1410	9.9	0.2																
SW07	18/08/21	7.6	7.6	2192	2160	5	1340	14.4	0.7																
SW07	7/09/21	7.6	7.4	2346	2200	5	1360	16.3	0.4																

SW07	6/10/21	7.3	7.4	2403	2360	5	1500	20.5	2																
SW07	3/11/21	7.3	7.4	2667	2390	5	1610	25.5	0.4																
SW07	12/11/21*	7.4	7.2	779	730	5	490	24.2	10.7				0.015		0.48										
SW07	26/11/21*	7.3	7.5	984	1100	5	684	20.6	5.6				0.012		0.54										
SW07	1/12/21	7.5	7.6	739	861	5	484	25.5	4.1																
SW08	11/01/21	6.9	6.8	2380	2480	14	1540	24.1	26.1	0.13	0.001	0.001	0.005	0.007	3.4	1.27	0.001	0.01	0.0001	0.001	0.005	0.04	0.548	6.7	0.01	0.9
SW08	2/02/21*	6.6	6.6	2730	2900	27	1740	23.8	46.6				0.005		4.94										
SW08	14/02/21*	6.8	6.8	3330	3460	11	1830	21.4	52.9				0.005		6.88										
SW08	16/02/21	7.2	6.7	3170	3320	12	2050	22.1	66.2																
SW08	12/03/21*	6.5	6.5	2960	2940	25	1890	21.3	42.7				0.005		5.44										
SW08	23/03/21*	7.0	7.1	483	480	9	344	18.6	30.8				0.008		1.39										
SW08	24/03/21	7.1	7.0	842	821	5	538	18.7	13																
SW08	28/04/21	7.0	7.0	3510	3350	30	2340	13.8	9.9																
SW08	18/05/21	7.1	7.0	3640	3580	8	2160	9.7	10.7																
SW08	16/06/21	7.6	7.6	2175	3050	5	1950	9.3	1.1	0.01	0.001	0.001	0.005	0.004	0.42	0.061	0.001	0.01	0.0001	0.001	0.001	0.031	0.727	11.3	0.01	0.7
SW08	2/07/21*	7.3	7.4	927	907	5	539	11.7	14.4				0.005		0.89										
SW08	20/07/21	7.6	7.6	2311	2210	5	1290	9.3	1																
SW08	18/08/21	7.5	7.4	3190	3200	5	1910	11.8	1.5																
SW08	7/09/21	7.5	7.5	2587	2480	5	1460	14.3	0.8																
SW08	6/10/21	7.3	7.6	3000	3000	5	1780	18.5	1.7																
SW08	3/11/21	6.4	6.8	2450	2400	5	1400	20.6	15.4																
SW08	12/11/21*	7.3	7.3	451	442	8	328	22.2	21.7				0.005		1.55										
SW08	26/11/21*	7.3	7.2	384	446	6	338	19.9	15.4				0.007		1.49										
SW08	1/12/21	7.2	7.3	474	571	5	390	24.6	10.2																
SW09	11/01/21	6.7	6.6	4530	4970	46	3120	24.3	75.4	0.19	0.001	0.001	0.005	0.004	6.84	5	0.001	0.01	0.0001	0.002	0.001	0.139	1.14	2.2	0.01	0.7
SW09	2/02/21*	6.8	6.7	4390	4840	180	2880	25.3	93				0.011		8.04										
SW09	14/02/21*	6.7	6.8	4220	4490	57	2660	22.3	60.5				0.005		7.16										
SW09	16/02/21	6.8	6.8	4150	4410	105	2600	22.7	109																
SW09	12/03/21*	6.7	6.7	4280	4280	63	2640	20.9	45.7				0.005		7.27										
SW09	23/03/21*	6.7	6.8	950	958	8	593	18.8	36.2				0.007		2.06										

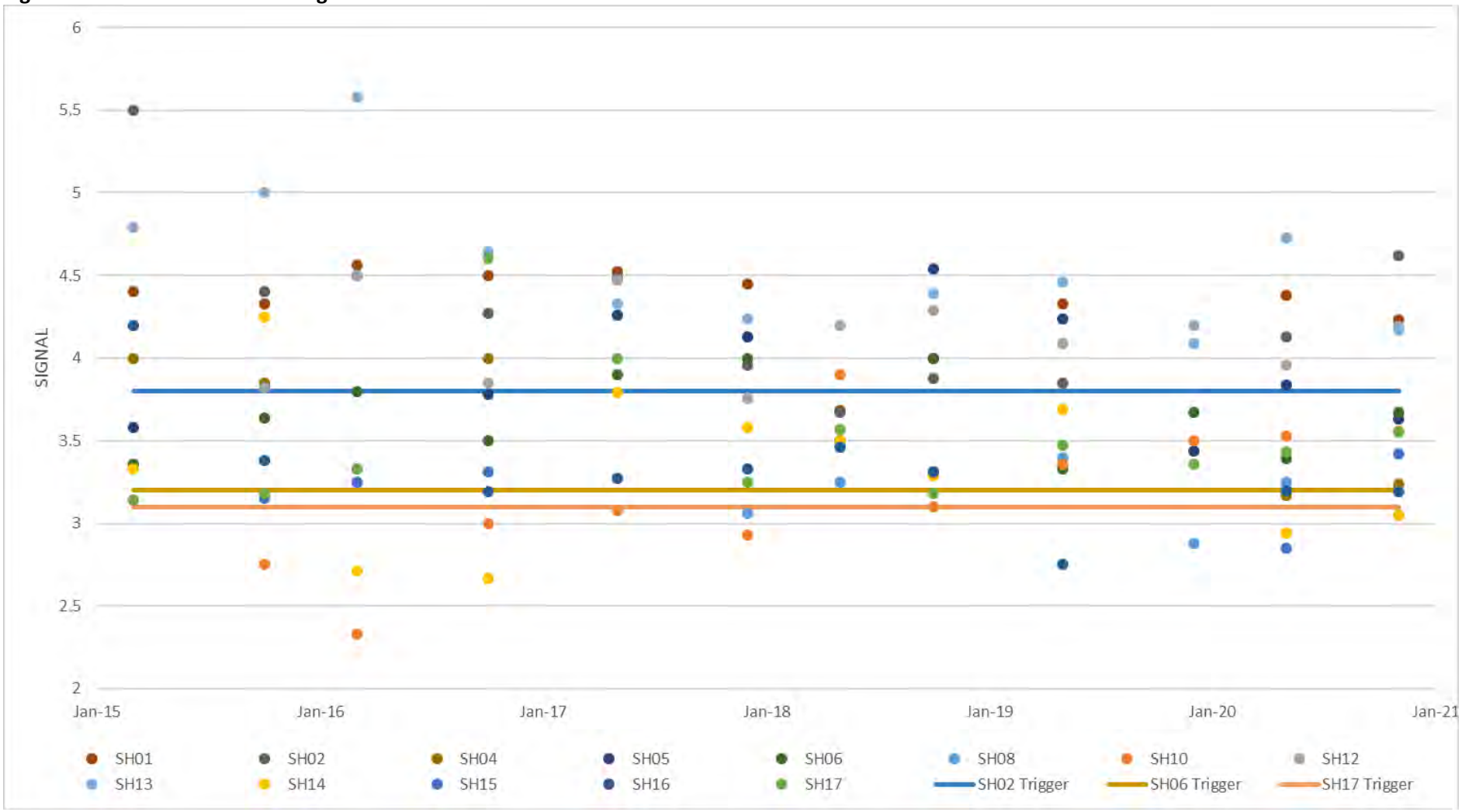
SW09	24/03/21	6.7	6.8	823	801	5	538	18.7	23.7																	
SW09	28/04/21	6.8	6.9	4190	3930	16	2690	16.0	20.1																	
SW09	18/05/21	7.1	7.0	3760	3740	22	2250	12.3	16.3																	
SW09	16/06/21	6.9	7.0	3510	3320	30	2060	11.7	9.8	0.02	0.001	0.001	0.005	0.003	2.17	1.48	0.001	0.01	0.0001	0.001	0.001	0.089	0.846	7.9	0.01	0.6
SW09	2/07/21*	7.3	7.4	1421	1440	5	824	12.6	16.8				0.005		1.74											
SW09	20/07/21	7.5	7.5	2355	2230	5	1310	9.9	2.2																	
SW09	18/08/21	7.5	7.4	2790	2830	16	1670	13.5	9.7																	
SW09	7/09/21	7.6	7.6	2257	2160	5	1260	14.5	1.1																	
SW09	6/10/21	6.8	7.0	3060	3080	5	1840	21.6	4.1																	
SW09	3/11/21	6.6	6.9	3360	3260	5	2030	20.2	6.8																	
SW09	12/11/21*	7.4	7.3	421	402	10	318	22.5	35.3				0.005		2.56											
SW09	26/11/21*	7.0	7.0	240	259	5	276	19.6	8.4				0.01		1.82											
SW09	1/12/21	7.1	7.2	657	805	5	514	23.9	2.9																	
SW12	11/01/21	7.0	6.8	289	324	9	217	24.2	26.1	1.08	0.001	0.001	0.005	0.001	2.37	0.192	0.001	0.01	0.0001	0.001	0.002	0.022	0.089	4.8	0.01	0.8
SW12	2/02/21*	6.8	6.6	131	136	84	274	23.8	273				0.012		7											
SW12	14/02/21*	7.1	6.7	164	171	28	235	22.9	107				0.007		5.4											
SW12	16/02/21	6.9	6.9	301	309	5	272	23.7	31.5																	
SW12	12/03/21*	7.1	6.9	289	279	82	336	22.2	168				0.006		5.22											
SW12	23/03/21*	6.4	6.6	69	79	148	167	17.3	288				0.067		3.42											
SW12	24/03/21	6.2	6.4	88	99	44	216	22.1	106																	
SW12	28/04/21	7.1	7.2	294	304	9	222	16.6	16.4																	
SW12	18/05/21	7.1	7.0	346	375	5	280	13.1	17.1																	
SW12	16/06/21	7.1	7.1	677	725	10	508	14.0	28.5	0.47	0.001	0.001	0.005	0.001	0.86	0.066	0.001	0.01	0.0001	0.001	0.003	0.026	0.203	9.7	0.04	0.8
SW12	2/07/21*	6.5	6.6	144	159	67	263	12.7	170				0.005		1.41											
SW12	20/07/21	7.1	7.3	993	971	5	621	10.9	24.8																	
SW12	18/08/21	7.2	7.3	839	830	9	556	13.7	19.1																	
SW12	7/09/21	7.3	7.4	916	893	8	598	17.4	20.4																	
SW12	6/10/21	7.2	7.2	711	736	6	449	16.4	25																	
SW12	3/11/21	7.2	7.2	668	658	5	404	20.2	23																	
SW12	12/11/21*	6.8	6.5	94	103	76	324	23.3	246				0.018		7.23											

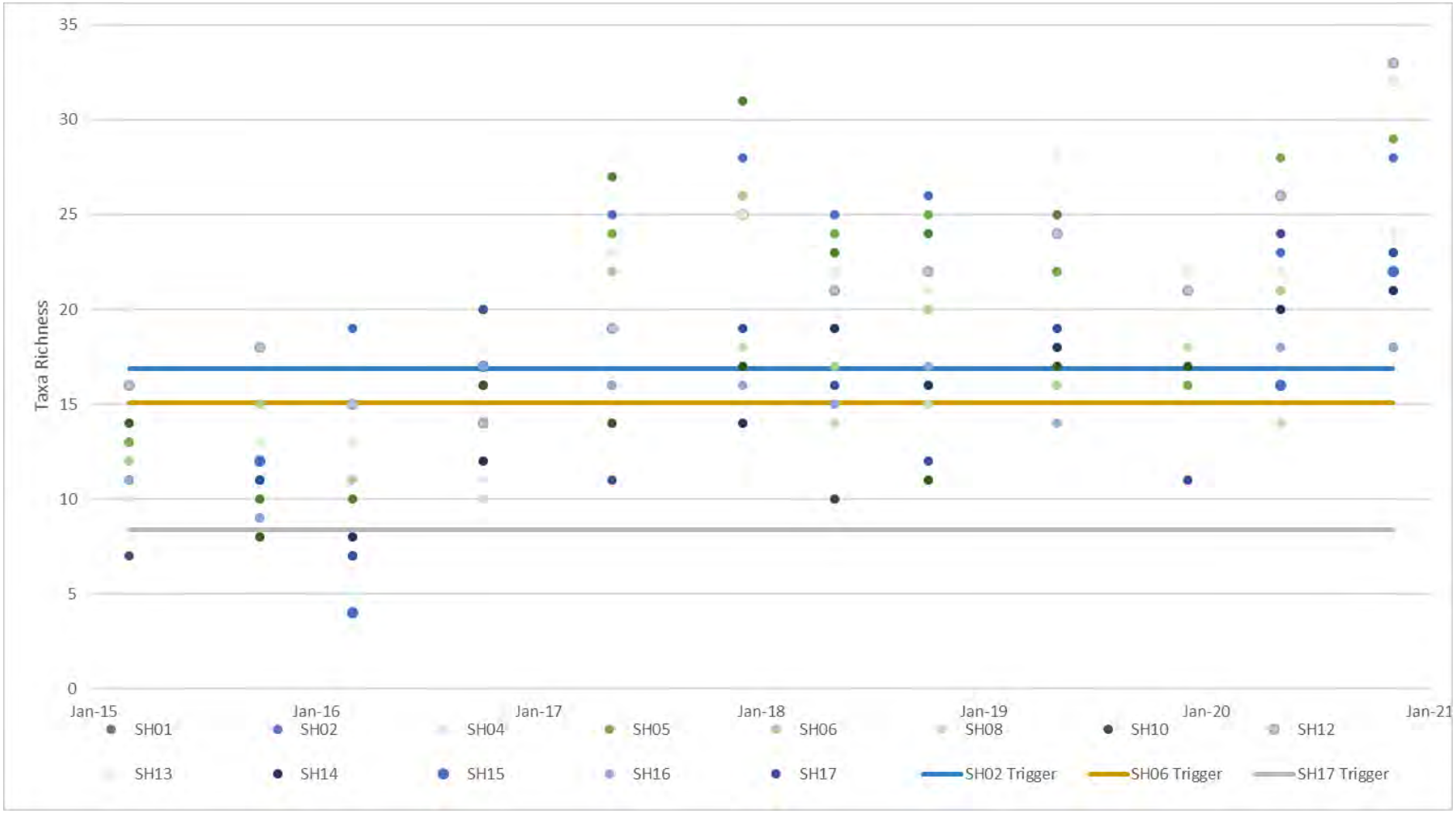
SW12	26/11/21*	6.7	6.5	77	94	112	272	18.8	220				0.013		5.04										
SW12	1/12/21	6.4	6.4	81	107	33	256	22.3	102																
SW15	11/01/21	6.5	6.3	170	180	23	171	21.8	22.8	0.21	0.001	0.001	0.005	0.006	8.12	0.445	0.002	0.01	0.0001	0.002	0.001	0.041	0.053	1.6	0.03	0.9
SW15	2/02/21*	6.9	6.5	176	178	28	140	22.3	81.3				0.005		8.4										
SW15	14/02/21*	6.6	6.4	179	179	35	164	20.1	71.9				0.005		19.4										
SW15	16/02/21	6.7	6.4	182	185	24	158	21.1	60.5																
SW15	12/03/21*	6.7	6.5	193	190	29	145	21.3	60				0.005		10.6										
SW15	23/03/21*	6.2	6.3	69	83	10	146	17.8	70.1				0.005		2.86										
SW15	24/03/21	6.0	6.2	107	119	5	146	20.4	30.6																
SW15	28/04/21	6.4	6.3	145	159	40	127	12.4	58.2																
SW15	18/05/21	6.4	6.2	174	183	36	98	9.5	58.6																
SW15	16/06/21	6.2	6.3	153	174	8	124	8.4	30.2	0.16	0.001	0.001	0.005	0.002	4.94	0.081	0.001	0.01	0.0001	0.001	0.001	0.028	0.032	6.2	0.03	0.4
SW15	2/07/21*	6.4	6.4	90	107	8	115	12.6	75.8				0.005		1.99										
SW15	20/07/21	6.5	6.5	137	153	5	94	11.4	22.9																
SW15	18/08/21	6.4	6.4	147	170	19	124	12.7	38.2																
SW15	7/09/21	6.4	6.4	169	176	21	122	13.0	32.2																
SW15	6/10/21	6.4	6.4	184	188	43	138	12.2	152																
SW15	12/11/21*	6.8	6.4	106	113	30	190	19.8	103				0.006		6.2										
SW15	26/11/21*	6.9	6.4	52	70	8	124	20.4	43.5				0.007		2.03										
SW15	1/12/21	6.7	6.5	98	126	5	132	21.5	12.4																
SW16	11/01/21	6.8	6.6	176	187	5	114	22.9	12.2	0.3	0.001	0.001	0.005	0.009	5.92	0.232	0.002	0.01	0.0001	0.002	0.001	0.038	0.054	7.0	0.02	0.9
SW16	2/02/21*	7.0	6.9	291	301	44	222	25.9	149				0.014		4.71										
SW16	14/02/21*	7.0	6.9	255	256	10	218	21.5	44.8				0.006		4.17										
SW16	16/02/21	6.9	6.9	220	237	6	153	21.7	23.6																
SW16	12/03/21*	7.2	7.2	325	319	8	238	21.7	11				0.005		3.46										
SW16	23/03/21*	6.5	6.6	81	96	17	142	18.0	84.5				0.009		2.46										
SW16	24/03/21	6.7	6.7	140	153	5	160	21.9	45																
SW16	28/04/21	6.9	6.9	159	174	11	138	12.1	14.1																
SW16	18/05/21	7.0	6.7	225	237	14	119	10.1	34.3																
SW16	16/06/21	6.8	6.8	185	207	8	123	9.6	24.3	0.11	0.001	0.001	0.005	0.003	2.26	0.255	0.001	0.01	0.0001	0.001	0.001	0.023	0.048	9.2	0.01	0.4

SW16	2/07/21*	6.5	6.6	109	127	14	88	13.1	60.9				0.005		3.33										
SW16	20/07/21	6.8	7.0	186	203	5	113	11.4	16.8																
SW16	18/08/21	6.9	6.8	230	245	5	163	12.8	10																
SW16	7/09/21	7.1	7.0	242	241	5	128	14.8	6.1																
SW16	6/10/21	6.7	6.8	275	282	5	174	18.0	9.5																
SW16	12/11/21*	7.0	7.0	208	216	21	185	22.8	80.9				0.008		3.73										
SW16	26/11/21*	6.7	6.8	82	104	22	190	20.3	70.1				0.01		2.33										
SW16	1/12/21	6.7	6.8	104	138	8	150	22.9	26.3																
SW17	2/02/21*	6.1	5.8	278	285	72	309	25.8	203				0.048		4.93										
SW17	14/02/21*	6.5	6.2	263	265	32	276	20.9	91.8				0.037		7.65										
SW17	23/03/21*	6.2	6.2	117	129	166	198	17.3	130				0.031		3.82										
SW17	24/03/21	6.1	6.2	249	252	26	247	23.6	68.3																
SW17	2/07/21*	6.3	6.3	205	220	16	143	13.3	42.1				0.023		0.98										
SW17	20/07/21	5.6	5.6	427	435	5	268	11.4	25.2																
SW17	12/11/21*	6.8	6.5	246	245	30	239	23.6	43.5				0.028		1.55										
SW17	26/11/21*	6.7	6.7	103	123	50	139	20.2	119				0.026		2.71										
SW17	1/12/21	6.7	6.8	159	191	14	198	22.5	30.9																
SW18	11/01/21	6.6	6.4	428	414	22	314	24.8	37.1	0.05	0.001	0.001	0.005	0.024	18	3.56	0.001	0.01	0.0001	0.001	0.001	0.048	0.147	2.5	0.02	1.2
SW18	2/02/21*	6.6	6.5	205	215	17	149	24.2	48.7				0.02		3.67										
SW18	14/02/21*	6.8	6.7	214	223	8	209	22.1	44.4				0.011		5.26										
SW18	16/02/21	6.3	6.3	383	348	12	274	23.8	55.6																
SW18	23/03/21*	6.5	6.4	112	118	33	185	16.7	95.2				0.018		2.71										
SW18	24/03/21	6.4	6.5	173	185	6	163	21.6	52.9																
SW18	28/04/21	6.4	6.5	530	519	29	329	14.2	46.3																
SW18	2/07/21*	6.5	6.6	178	199	21	183	13.8	68.6				0.018		1.96										
SW18	20/07/21	6.6	6.7	293	311	5	191	11.2	13.1																
SW18	12/11/21*	6.8	6.7	249	253	13	225	25.1	54.7				0.017		1.93										
SW18	26/11/21*	6.6	6.6	90	112	22	220	20.2	87.8				0.02		2.38										
SW18	1/12/21*	6.5	6.6	111	140	9	155	22.7	35.6																

Notes:
Sampling events where location was 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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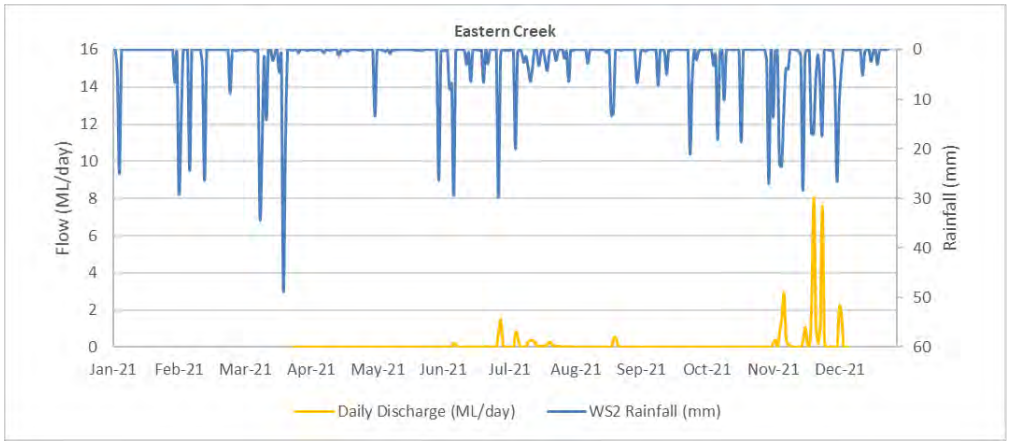
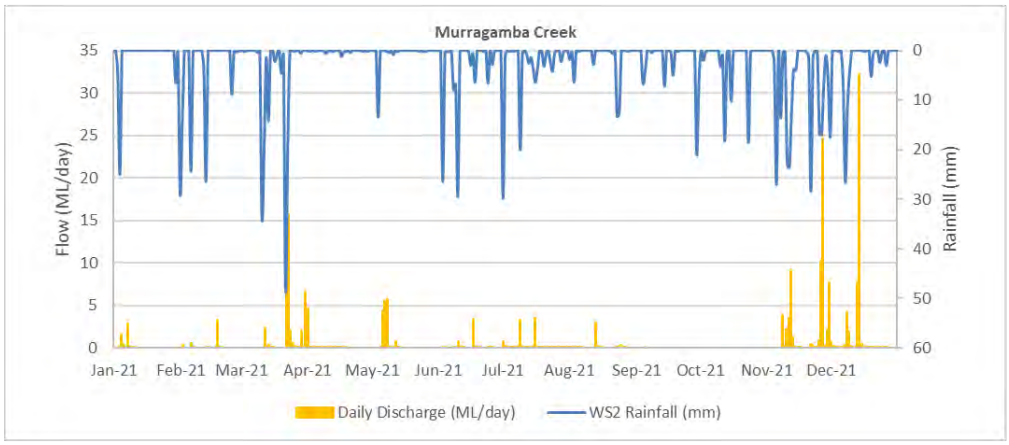
SH05
SH06
SH08
SH10
SH12
SH13
SH14
SH15
SH16
SH17
SH02 Trigger
SH06 Trigger
SH17 Trigger

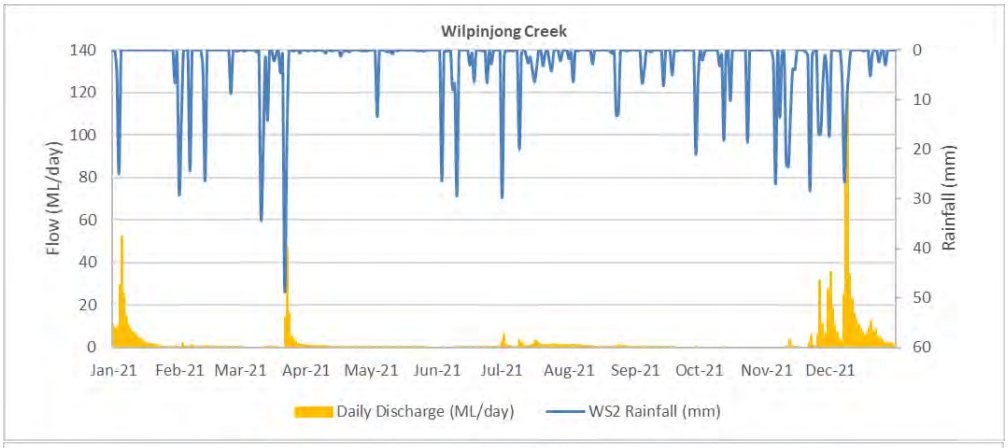
Table 6: Effluent Discharge Quality

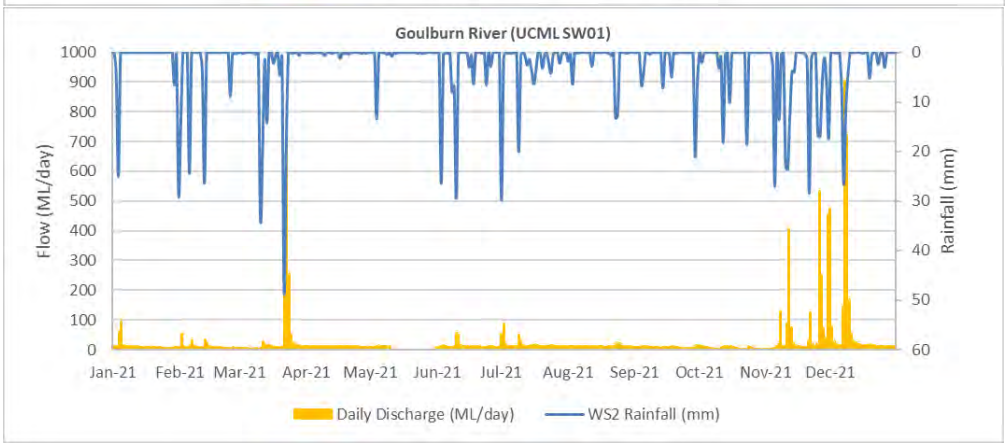
Sample Location	Sample Date	Biological Oxygen Demand (mg/L)	Total Nitrogen (mg/L)	Oil & Grease (mg/L)	Total Phosphorus (mg/L)	pH	Total Suspended Solids (mg/L)
OC Effluent Tank	3/02/2021	2	25.2	<5	3.33	7.6	22
OC Effluent Tank	25/05/2021	46	21.8	5	3.23	7.2	123
OC Effluent Tank	3/08/2021	2	11.7	<5	1.29	7.0	26
OC Effluent Tank	4/11/2021	50	67.3	<5	9.68	7.8	21
Admin Effluent	3/02/2021	28	152	<5	21.1	7.3	17
Admin Effluent	25/05/2021	3	243	<5	23.3	7.5	7
Admin Effluent	3/08/2021	32	329	<5	34.2	7.3	8
Admin Effluent	4/11/2021	27	259	<5	31.3	7.4	14
CHPP Effluent	3/02/2021	2	7.2	<5	0.3	7.5	37
CHPP Effluent	25/05/2021	29	5.4	5	0.41	7.2	32
CHPP Effluent	3/08/2021	4	5.6	<5	0.59	7.1	48
CHPP Effluent	4/11/2021	6	4.9	<5	0.21	7.0	35
UG Effluent Tank	3/02/2021	14	7.6	<5	6.96	7.2	24
UG Effluent Tank	22/06/2021	24	6.7	3	1.4	7.2	20
UG Effluent Tank	3/08/2021	37	11.5	<5	1.39	7.4	19
UG Effluent Tank	4/11/2021	56	4.6	6	0.25	7.1	20

Figure 3-f 2021 Stream Flow and rainfall









Note: Eastern Creek flow monitor damage caused data losses during January, February, March and December 2021

Table 7: 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)
1/01/2021	9.8	223	6.9	0										
2/01/2021	9.9	221	6.8	0										
3/01/2021	9.1	222	6.9	0										
4/01/2021	9.9	223	6.9	0	<2	<1	<0.005	0.086	0.003	0.002	<0.0005	<0.0001	<0.0002	0.0001
5/01/2021	8.6	215	6.9	0										
6/01/2021	9.2	219	7.0	0										
7/01/2021	9.2	218	7.0	0										
8/01/2021	9.1	220	7.0	0										
9/01/2021	9.7	220	7.0	0										
10/01/2021	9.7	220	7.0	0										
11/01/2021	9.5	223	7.0	0										
12/01/2021	9.3	226	7.0	0										
13/01/2021	8.6	225	7.1	0										
14/01/2021	6.9	223	7.0	0.10	<2	<1								
15/01/2021	8.4	221	7.1	0										
16/01/2021	9.6	218	7.0	0										
17/01/2021	8.5	218	7.0	0										
18/01/2021	9.1	219	7.0	0										
19/01/2021	9.9	221	7.0	0	<2	<1								
20/01/2021	9.9	221	7.1	0										
21/01/2021	9.9	221	7.0	0										
22/01/2021	8.7	225	7.1	0										
23/01/2021	8.0	225	7.1	0										
24/01/2021	6.3	226	7.0	0.47										
25/01/2021	8.7	221	7.0	0.16	<2	<1								
26/01/2021	6.8	218	6.9	0										
27/01/2021	9.4	217	6.9	0										
28/01/2021	9.0	209	7.0	0										
29/01/2021	9.4	209	7.0	0										
30/01/2021	8.4	213	7.0	0										
31/01/2021	8.9	211	6.9	0										
1/02/2021	9.4	215	7.0	0										
2/02/2021	9.5	214	6.9	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)
3/02/2021	2.1	216	7.0	0										
4/02/2021	2.8	204	6.9	0										
5/02/2021	9.9	212	6.9	0	<2	<1								
6/02/2021	9.5	208	6.9	0										
7/02/2021	9.9	205	6.9	0										
8/02/2021	9.3	205	6.9	0	<2	<1	<0.005	0.034	0.002	0.002	<0.0005	<0.0001	<0.0002	0.0001
9/02/2021	1.5	200	7.0	0										
10/02/2021	0.0													
11/02/2021	3.0	200	6.9	0.48										
12/02/2021	9.9	207	6.9	0										
13/02/2021	9.8	206	6.9	0										
14/02/2021	9.9	204	6.9	0										
15/02/2021	8.2	202	7.0	0	<2	<1								
16/02/2021	8.5	196	7.1	0										
17/02/2021	6.7	193	7.1	0										
18/02/2021	5.0	189	7.1	0										
19/02/2021	7.9	192	7.1	0										
20/02/2021	9.9	194	7.0	0										
21/02/2021	9.9	200	7.0	0										
22/02/2021	9.8	208	7.0	0	<2	1								
23/02/2021	8.1	210	7.1	0										
24/02/2021	9.9	211	7.1	0										
25/02/2021	9.4	213	7.0	0										
26/02/2021	8.0	205	7.1	0										
27/02/2021	9.6	198	7.1	0										
28/02/2021	8.8	196	7.0	0										
1/03/2021	9.3	198	7.1	0	<2	<1	<0.005	0.055	0.003	0.002	<0.0005	<0.0001	<0.0002	<0.0001
2/03/2021	9.3	200	7.0	0										
3/03/2021	9.4	199	7.0	0										
4/03/2021	8.3	211	6.8	0										
5/03/2021	6.7	211	7.0	0										
6/03/2021	9.2	204	7.0	0										
7/03/2021	8.2	203	6.9	0										
8/03/2021	7.8	205	7.0	0	<2	<1								
9/03/2021	8.9	206	7.0	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)
10/03/2021	8.8	209	7.0	0										
11/03/2021	9.5	213	7.0	0										
12/03/2021	9.0	212	6.9	0										
13/03/2021	7.3	209	6.9	0										
14/03/2021	8.3	205	6.9	0										
15/03/2021	8.8	204	6.8	0	<2	2								
16/03/2021	7.9	198	6.9	0										
17/03/2021	9.1	199	6.9	0										
18/03/2021	9.8	203	6.9	0										
19/03/2021	9.6	207	6.9	0										
20/03/2021	9.7	210	6.9	0										
21/03/2021	9.6	205	6.9	0										
22/03/2021	9.6	202	6.9	0	<1	<1								
23/03/2021	10.0	193	6.8	0										
24/03/2021	10.1	202	6.8	0										
25/03/2021	8.1	199	6.9	0										
26/03/2021	5.5	196	7.0	0										
27/03/2021	9.7	194	6.8	0										
28/03/2021	8.4	194	6.8	0										
29/03/2021	9.8	233	6.9	0	<2	<1								
30/03/2021	8.8	298	7.0	0										
31/03/2021	10.7	301	7.0	0										
1/04/2021	7.6	299	7.0	0										
2/04/2021	9.7	299	7.0	0										
3/04/2021	10.2	301	7.0	0										
4/04/2021	7.1	300	6.9	0.01										
5/04/2021	9.2	294	6.9	0										
6/04/2021	9.9	294	6.9	0	<2	<1	<0.005	0.107	0.006	0.005	<0.0005	<0.0001	<0.0002	<0.0001
7/04/2021	7.5	293	6.9	0										
8/04/2021	7.1	288	7.0	0										
9/04/2021	7.0	286	7.0	0										
10/04/2021	9.0	283	7.0	0										
11/04/2021	10.1	287	7.0	0										
12/04/2021	10.0	290	7.1	0	<2	<1								
13/04/2021	5.2	279	7.1	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)
14/04/2021	9.1	261	7.1	0										
15/04/2021	8.7	291	7.2	0										
16/04/2021	9.4	289	7.2	0										
17/04/2021	10.1	292	7.2	0										
18/04/2021	10.0	296	7.2	0										
19/04/2021	5.9	300	7.2	0.02	<2	<1								
20/04/2021	10.1	293	7.2	0										
21/04/2021	6.9	296	7.2	0										
22/04/2021	4.1	291	7.2	0										
23/04/2021	8.0	290	7.2	0.06										
24/04/2021	10.2	295	7.2	0										
25/04/2021	9.5	300	7.1	0										
26/04/2021	8.9	296	7.1	0	<2	<1								
27/04/2021	7.9	297	7.1	0										
28/04/2021	9.8	298	7.1	0										
29/04/2021	7.4	301	7.1	0.08										
30/04/2021	9.6	298	7.1	0										
1/05/2021	7.9	299	7.1	0.02										
2/05/2021	5.5	305	7.1	0.01										
3/05/2021	7.1	297	6.9	0.03	<2	<1								
4/05/2021	9.7	293	7.0	0										
5/05/2021	9.7	293	7.0	0										
6/05/2021	9.4	293	7.0	0										
7/05/2021	9.4	298	7.0	0										
8/05/2021	7.6	298	6.9	0										
9/05/2021	10.1	298	6.9	0										
10/05/2021	9.6	293	6.9	0	<2	<1	<0.005	0.104	0.005	0.004	<0.0005	<0.0001	<0.0002	<0.0001
11/05/2021	7.6	286	6.9	0										
12/05/2021	8.2	278	7.0	0										
13/05/2021	9.2	278	7.0	0										
14/05/2021	10.0	284	7.0	0										
15/05/2021	10.0	286	7.1	0										
16/05/2021	10.1	290	7.1	0										
17/05/2021	10.0	298	7.1	0	<2	<1								
18/05/2021	8.3	296	7.1	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)
19/05/2021	7.2	293	7.1	0										
20/05/2021	7.7	285	7.2	0										
21/05/2021	8.6	287	7.2	0										
22/05/2021	9.9	290	7.1	0										
23/05/2021	10.1	291	7.1	0										
24/05/2021	9.0	291	7.2	0	<2	<1								
25/05/2021	7.7	292	7.2	0.01										
26/05/2021	9.8	288	7.2	0										
27/05/2021	9.0	286	7.2	0										
28/05/2021	9.6	283	7.2	0										
29/05/2021	8.8	286	7.2	0										
30/05/2021	9.6	287	7.2	0										
31/05/2021	8.5	287	7.1	0	<2	<1								
1/06/2021	6.1	297	7.2	0										
2/06/2021	8.4	296	7.1	0										
3/06/2021	9.0	297	7.1	0										
4/06/2021	9.6	296	7.1	0										
5/06/2021	9.7	295	7.0	0										
6/06/2021	9.5	296	7.0	0										
7/06/2021	9.1	299	7.0	0	<2	<1								
8/06/2021	9.2	298	7.0	0										
9/06/2021	9.0	297	7.1	0										
10/06/2021	8.2	295	7.2	0										
11/06/2021	6.1	273	7.2	0										
12/06/2021	9.1	265	7.1	0										
13/06/2021	8.6	268	7.0	0.01										
14/06/2021	9.4	274	7.1	0										
15/06/2021	8.2	280	7.0	0	<2	<1	<0.005	0.101	0.005	0.005	<0.0005	<0.0001	<0.0002	<0.0001
16/06/2021	9.4	278	7.0	0										
17/06/2021	9.4	279	7.1	0										
18/06/2021	9.5	288	7.1	0										
19/06/2021	9.5	290	7.1	0										
20/06/2021	9.5	293	7.1	0										
21/06/2021	9.5	292	7.1	0	<2	<1								
22/06/2021	9.5	293	7.0	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)
23/06/2021	9.4	292	7.0	0										
24/06/2021	7.8	290	7.1	0.01										
25/06/2021	7.2	289	7.1	0										
26/06/2021	9.3	293	7.1	0										
27/06/2021	9.2	297	7.1	0										
28/06/2021	9.2	296	7.1	0	<2	<1								
29/06/2021	6.7	285	7.1	0										
30/06/2021	7.9	285	7.2	0										
1/07/2021	6.2	286	7.2	0										
2/07/2021	6.5	283	7.2	0										
3/07/2021	9.2	284	7.1	0										
4/07/2021	6.8	284	7.1	0										
5/07/2021	6.2	259	6.9	0	<2	<1								
6/07/2021	7.7	281	6.9	0										
7/07/2021	6.3	280	7.0	0										
8/07/2021	6.1	277	7.0	0										
9/07/2021	6.2	263	6.9	0										
10/07/2021	6.8	281	6.9	0										
11/07/2021	10.1	270	6.8	0										
12/07/2021	6.6	267	6.9	0	<2	<1	<0.005	0.069	0.004	0.006	<0.0005	<0.0001	<0.0002	<0.0001
13/07/2021	8.3	266	6.9	0										
14/07/2021	7.5	303	7.0	0										
15/07/2021	8.0	341	7.1	0										
16/07/2021	8.8	338	7.2	0										
17/07/2021	8.4	337	7.2	0										
18/07/2021	8.2	335	7.2	0										
19/07/2021	8.7	336	7.2	0	<2	<1								
20/07/2021	8.3	336	7.2	0										
21/07/2021	8.4	335	7.2	0										
22/07/2021	9.7	333	7.1	0										
23/07/2021	8.8	332	7.1	0										
24/07/2021	5.5	278	7.2	0										
25/07/2021	8.8	283	7.2	0										
26/07/2021	4.6	304	7.0	0										
27/07/2021	6.5	305	7.1	0	<2	<1								

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)
28/07/2021	10.2	322	7.1	0										
29/07/2021	8.4	334	7.1	0										
30/07/2021	7.3	338	7.0	0.05										
31/07/2021	8.3	342	7.1	0										
1/08/2021	8.7	349	7.1	0										
2/08/2021	8.7	343	7.1	0	<2	<1								
3/08/2021	7.4	338	7.1	0										
4/08/2021	6.9	337	7.1	0.01										
5/08/2021	7.6	328	7.1	0										
6/08/2021	9.7	335	7.0	0										
7/08/2021	6.2	346	7.1	0.01										
8/08/2021	5.2	320	7.1	0.01										
9/08/2021	10.3	321	6.9	0	<2	<1	<0.005	0.088	0.004	0.002	<0.0005	<0.0001	<0.0002	<0.0001
10/08/2021	10.4	332	7.0	0										
11/08/2021	10.3	336	7.0	0										
12/08/2021	9.2	335	7.0	0										
13/08/2021	10.4	335	7.0	0										
14/08/2021	10.4	336	6.9	0										
15/08/2021	10.4	336	6.9	0										
16/08/2021	10.3	326	6.9	0	<2	<1								
17/08/2021	9.7	321	6.9	0										
18/08/2021	10.2	328	6.9	0										
19/08/2021	10.2	336	7.0	0										
20/08/2021	10.0	342	7.0	0										
21/08/2021	10.2	347	7.0	0										
22/08/2021	10.2	348	7.0	0										
23/08/2021	9.6	346	7.1	0	<2	<1								
24/08/2021	8.8	334	7.1	0										
25/08/2021	8.7	334	7.2	0										
26/08/2021	8.2	329	7.2	0										
27/08/2021	9.8	335	7.1	0										
28/08/2021	9.8	339	7.1	0										
29/08/2021	9.7	337	7.1	0										
30/08/2021	4.5	336	7.1	0										
31/08/2021	9.5	340	7.2	0	<2	<1								

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)
1/09/2021	8.8	344	7.2	0										
2/09/2021	9.4	344	7.2	0										
3/09/2021	9.1	343	7.2	0										
4/09/2021	9.3	343	7.2	0										
5/09/2021	9.4	321	7.2	0										
6/09/2021	9.4	327	7.2	0	<2	<1								
7/09/2021	9.0	335	7.2	0										
8/09/2021	9.1	335	7.2	0										
9/09/2021	9.2	339	7.2	0										
10/09/2021	9.3	343	7.2	0										
11/09/2021	9.0	346	7.2	0										
12/09/2021	9.2	347	7.3	0										
13/09/2021	9.0	344	7.3	0	<2	<1	<0.005	0.052	0.004	0.003	<0.0005	<0.0001	<0.0002	<0.0001
14/09/2021	8.7	342	7.3	0										
15/09/2021	9.2	342	7.2	0										
16/09/2021	9.1	344	7.2	0										
17/09/2021	9.2	342	7.3	0										
18/09/2021	9.5	342	7.3	0										
19/09/2021	8.8	343	7.3	0										
20/09/2021	9.1	343	7.3	0	<2	<1								
21/09/2021	8.9	333	7.3	0										
22/09/2021	7.0	312	7.3	0										
23/09/2021	5.0	302	7.3	0										
24/09/2021	8.2	331	7.3	0										
25/09/2021	8.8	347	7.3	0										
26/09/2021	9.4	342	7.3	0										
27/09/2021	6.9	254	7.2	0	<2	<1								
28/09/2021	6.3	329	7.3	0										
29/09/2021	7.7	306	7.3	0										
30/09/2021	8.7	297	7.2	0										
1/10/2021	8.5	334	7.3	0										
2/10/2021	9.3	335	7.3	0										
3/10/2021	9.2	335	7.3	0										
4/10/2021	9.5	341	7.3	0										
5/10/2021	7.4	335	7.3	0	<2	<1								

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)
6/10/2021	6.7	298	7.2	0										
7/10/2021	9.1	297	7.2	0										
8/10/2021	7.7	333	7.2	0										
9/10/2021	6.9	342	7.2	0										
10/10/2021	8.4	323	7.2	0										
11/10/2021	6.5	316	7.2	0	<2	<1	<0.005	0.054	0.002	0.002	<0.0005	<0.0001	<0.0002	<0.0001
12/10/2021	8.9	300	7.2	0										
13/10/2021	8.4	306	7.2	0										
14/10/2021	2.1	305	7.1	0										
15/10/2021	8.4	310	7.2	0										
16/10/2021	8.5	301	7.1	0										
17/10/2021	8.9	308	7.1	0										
18/10/2021	9.0	321	7.1	0	<2	<1								
19/10/2021	6.0	327	7.1	0										
20/10/2021	8.4	331	7.1	0										
21/10/2021	9.1	325	7.1	0										
22/10/2021	9.1	325	7.1	0										
23/10/2021	8.9	335	7.1	0										
24/10/2021	9.1	344	7.1	0										
25/10/2021	8.3	335	7.1	0	<2	<1								
26/10/2021	8.7	341	7.1	0										
27/10/2021	6.7	342	7.2	0.13										
28/10/2021	6.7	332	7.2	0.01										
29/10/2021	7.0	315	7.1	0										
30/10/2021	8.7	320	7.1	0										
31/10/2021	7.9	320	7.2	0.04										
1/11/2021	8.6	316	7.1	0	<2	<1								
2/11/2021	7.6	309	7.1	0										
3/11/2021	7.7	325	7.1	0										
4/11/2021	8.4	337	7.1	0										
5/11/2021	7.5	326	7.1	0										
6/11/2021	7.2	324	7.1	0										
7/11/2021	8.8	319	7.1	0										
8/11/2021	8.4	325	7.1	0	<2	<1	<0.005	0.056	0.003	0.002	<0.0005	<0.0001	<0.0002	<0.0001
9/11/2021	9.0	329	7.1	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)
10/11/2021	9.0	330	7.1	0										
11/11/2021	9.0	322	7.1	0										
12/11/2021	9.1	317	7.2	0										
13/11/2021	8.7	314	7.2	0										
14/11/2021	9.0	311	7.2	0										
15/11/2021	8.9	306	7.2	0	2	<1								
16/11/2021	8.3	309	7.2	0										
17/11/2021	8.9	315	7.2	0										
18/11/2021	8.1	321	7.2	0.04										
19/11/2021	8.9	330	7.2	0										
20/11/2021	9.3	335	7.2	0										
21/11/2021	9.2	329	7.2	0										
22/11/2021	9.0	312	7.2	0	<2	<1								
23/11/2021	9.1	314	7.2	0.01										
24/11/2021	8.8	323	7.2	0										
25/11/2021	8.9	321	7.2	0.02										
26/11/2021	7.7	310	7.3	0										
27/11/2021	8.2	300	7.3	0										
28/11/2021	6.5	303	7.3	0										
29/11/2021	7.2	291	7.2	0	<2	<1								
30/11/2021	9.2	300	7.2	0										
1/12/2021	8.6	298	7.2	0										
2/12/2021	6.5	304	7.2	0										
3/12/2021	8.5	310	7.2	0										
4/12/2021	8.5	322	7.3	0										
5/12/2021	8.5	320	7.3	0										
6/12/2021	8.5	310	7.3	0	<2	<1	<0.005	0.046	0.002	0.002	<0.0005	<0.0001	<0.0002	<0.0001
7/12/2021	7.8	297	7.3	0										
8/12/2021	9.0	294	7.2	0										
9/12/2021	8.3	300	7.3	0										
10/12/2021	8.7	314	7.3	0										
11/12/2021	9.6	317	7.3	0										
12/12/2021	9.2	311	7.4	0										
13/12/2021	9.2	312	7.6	0										
14/12/2021	9.3	316	7.6	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)
15/12/2021	6.2	326	7.5	0.03										
16/12/2021	8.8	331	7.3	0										
17/12/2021	9.4	332	7.4	0										
18/12/2021	7.7	339	7.4	0.07										
19/12/2021	9.2	328	7.5	0										
20/12/2021	7.1	331	7.6	0	<2	<1								
21/12/2021	8.1	331	7.6	0.03										
22/12/2021	8.2	310	7.6	0										
23/12/2021	7.6	308	7.6	0.01										
24/12/2021	8.6	315	7.5	0										
25/12/2021	9.7	321	7.5	0										
26/12/2021	9.5	323	7.6	0										
27/12/2021	6.9	312	7.6	0.13										
28/12/2021	6.1	291	7.5	0.05										
29/12/2021	7.1	281	7.5	0										
30/12/2021	7.1	283	7.5	0										
31/12/2021	7.6	293	7.5	0										

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	20/04/2021	820	771	432	25	6.2	6.3	4	19	117	7	<1	105	171	28	0.12	<0.001	<0.05	0.004	<0.0001	<0.001	<0.001	0.32	<0.001	0.025	<0.0001	0.006	<0.01	<0.001	0.04	0.17	0.29	0.09	<0.01	0.2
PZ003	12/10/2021	843	814	431	16	6.8	6.8	4	22	126	7	<1	116	185	26	0.01	<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	0.34	0.02	<0.01	0.2
PZ040B	21/04/2021	1571	1430	910	74	4.4	4.5	9	36	187	5	<1	2	433	32	0.24	<0.001	<0.05	0.019	<0.0001	<0.001	<0.001	0.14	<0.001	0.133	<0.0001	0.012	<0.01	<0.001	0.268	0.22	0.43	0.15	<0.01	0.2
PZ040B	15/10/2021	1299	1240	696	110	4.9	4.6	5	33	172	4	<1	7	382	24	0.23	<0.001	<0.05	0.012	<0.0001	<0.001	<0.001	<0.05	<0.001	0.077	<0.0001	0.007	<0.01	<0.001	0.061	<0.01	1.06	0.16	<0.01	0.2
PZ044	23/04/2021	3120	2760	2230	30	6.5	6.6	409	68	88	36	<1	423	241	759	<0.01	0.004	<0.05	<0.001	<0.0001	<0.001	<0.001	4.18	<0.001	0.621	<0.0001	0.002	<0.01	<0.001	0.012	0.24	0.05	0.1	<0.01	0.3
PZ044	12/10/2021	2640	2410	2170	26	6.5	6.6	376	68	88	35	<1	448	252	878	<0.01	0.006	<0.05	0.001	<0.0001	<0.001	<0.001	4.93	<0.001	0.943	<0.0001	0.005	<0.01	<0.001	0.026	0.22	0.13	0.12	<0.01	0.2
PZ055	23/04/2021	2551	2160	1530	41	5.4	5.4	21	80	254	18	<1	49	423	448	0.04	<0.001	<0.05	0.308	<0.0001	<0.001	<0.001	13.2	<0.001	6.01	<0.0001	0.078	<0.01	<0.001	0.086	1.01	<0.01	<0.01	<0.01	0.1
PZ055	13/10/2021	2112	2030	1280	98	5.4	5.1	18	76	263	17	<1	39	403	423	0.02	<0.001	<0.05	0.271	<0.0001	<0.001	<0.001	16.2	<0.001	5.35	<0.0001	0.07	<0.01	<0.001	0.054	1.02	<0.01	<0.01	<0.01	<0.1
PZ058A	20/04/2021	13710	13200	11400	2810	3.3	3.5	122	537	1790	8	<1	<1	3100	3700	252	0.028	<0.05	1.23	0.0036	0.062	0.002	4.42	0.002	1.31	0.0002	1.64	0.16	<0.001	7.19	0.05	0.01	0.61	0.1	0.2
PZ101C	23/04/2021	730	624	370	54	6.8	6.8	35	17	60	10	<1	225	70	1	0.01	0.002	<0.05	0.001	<0.0001	<0.001	<0.001	1.03	<0.001	0.492	<0.0001	0.025	<0.01	<0.001	0.009	0.42	<0.01	0.12	<0.01	0.6
PZ101C	14/10/2021	626	792	471	46	6.4	7.6	57	21	78	18	<1	369	51	<1	<0.01	0.002	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.141	<0.0001	0.002	<0.01	<0.001	0.005	0.2	0.05	0.14	0.01	1.1
PZ101B	23/04/2021	975	797	482	58	7.6	7.4	58	22	79	18	<1	353	62	3	0.04	0.006	<0.05	<0.001	<0.0001	<0.001	<0.001	1.3	<0.001	0.214	<0.0001	0.002	<0.01	<0.001	0.005	0.63	0.04	0.32	<0.01	1.2
PZ101B	14/10/2021	772	614	366	56	7.2	6.8	34	18	63	10	<1	238	66	<10	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.425	<0.0001	0.001	<0.01	<0.001	0.02	0.48	0.02	0.22	<0.01	0.4
PZ102B	23/04/2021	2851	2470	1880	124	6.7	6.6	198	79	226	32	<1	206	151	833	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.006	<0.0001	0.007	<0.01	<0.001	0.19	0.04	0.76	0.13	<0.01	1.3
PZ102B	14/10/2021	2416	2450	1800	144	6.2	6.7	180	79	261	32	<1	272	234	812	<0.01	<0.001	<0.05	0.004	<0.0001	<0.001	<0.001	1.54	<0.001	1.02	<0.0001	0.014	<0.01	<0.001	0.039	0.5	0.06	0.14	<0.01	1.3
PZ102A	23/04/2021	1627	1440	850	66	7.0	7.1	68	28	172	22	<1	354	193	125	<0.01	<0.001	<0.05	0.003	<0.0001	<0.001	<0.001	0.16	<0.001	0.211	<0.0001	0.009	<0.01	<0.001	<0.005	0.43	0.01	0.02	<0.01	2.1
PZ102A	14/10/2021	1404	1420	888	106	6.7	7	70	29	185	22	<1	360	193	98	0.02	<0.001	<0.05	0.069	<0.0001	<0.001	<0.001	0.33	<0.001	0.221	<0.0001	0.175	<0.01	<0.001	0.258	0.4	0.04	0.08	<0.01	2.1
PZ103C	22/04/2021	316	330	218	3340	5.0	5.4	6	9	34	7	<1	17	78	17	<0.01	0.002	<0.05	0.014	<0.0001	<0.001	<0.001	1.18	<0.001	0.35	<0.0001	0.146	<0.01	<0.001	0.108	0.55	0.04	0.65	<0.01	<0.1
PZ103C	14/10/2021	340	331	200	795	5.2	5.4	5	9	36	7	<1	37	74	14	<0.01	0.001	<0.05	0.036	<0.0001	<0.001	<0.001	1.03	<0.001	1.07	<0.0001	0.171	<0.01	<0.001	0.038	0.02	0.02	0.72	<0.01	<0.1
PZ103A	22/04/2021	611	589	369	147	6.4	6.7	45	19	34	11	<1	172	82	8	<0.01	0.002	<0.05	0.001	<0.0001	<0.001	<0.001	4.84	<0.001	0.094	<0.0001	0.006	<0.01	<0.001	0.009	0.19	0.05	0.11	<0.01	0.4
PZ103A	14/10/2021	641	589	355	164	6.4	6.6	44	20	40	12	<1	184	81	10	<0.01	0.004	<0.05	0.002	<0.0001	<0.001	<0.001	4.71	<0.001	0.117	<0.0001	0.006	<0.01	<0.001	0.013	0.29	<0.01	0.12	<0.01	0.4
PZ104	21/04/2021	2544	2460	704	600	12.0	11.8	217	<1	32	5	35	<1	23	43	0.65	<0.001	<0.05	<0.001	<0.0001	0.144	<0.001	<0.05	<0.001	<0.001	<0.0001	<0.001	<0.01	<0.001	<0.005	0.17	0.1	0.16	<0.01	0.2
PZ104	15/10/2021	1965	2080	549	540	11.8	12	185	<1	42	5	28	<1	28	59	0.43	0.002	<0.05	<0.001	<0.0001	0.116	<0.001	<0.05	<0.001	<0.001	<0.0001	<0.001	<0.01	<0.001	<0.005	0.39	0.02	0.2	<0.01	0.2
PZ105C	20/04/2021	230	221	150	38	5.9	6	6	4	30	3	<1	26	56	2	<0.01	0.001	<0.05	0.015	<0.0001	<0.001	<0.001	1.89	<0.001	0.818	<0.0001	0.053	<0.01	<0.001	0.012	0.04	<0.01	0.04	<0.01	<0.1
PZ105C	14/10/2021	207	220	111	52	5.7	5.9	5	4	27	2	<1	37	45	<1	<0.01	0.001	<0.05	0.015	<0.0001	<0.001	<0.001	2.83	<0.001	0.805	<0.0001	0.051	<0.01	<0.001	<0.005	0.06	<0.01	0.04	<0.01	<0.1
PZ106A	22/04/2021	775	760	426	98	8.1	8.2	28	3	98	19	<1	68	192	14	0.22	<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	0.12	1.06	0.1	<0.01	0.1
PZ106A	13/10/2021	801	762	421	58	8.3	8.3	30	3	105	18	2	76	196	6	0.23	<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	1.12	0.08	0.01	0.1
PZ109	20/04/2021	756	703	412	65	6.5	6.7	36	32	56	3	<1	226	94	16	<0.01	<0.001	<0.05	<0.001	<0.0001	0.001	<0.001	<0.05	<0.001	0.001	<0.0001	0.003	<0.01	<0.001	0.014	0.04	0.28	0.07	0.02	0.2
PZ109	14/10/2021	715	700	401	48	6.4	6.7	36	35	61	3	<1	242	94	13	<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	0.01	<0.01	0.27	0.05	<0.01	0.1
PZ111	21/04/2021	1041	1040	742	794	6.4	6.5	74	34	53	19	<1	150	240	22	<0.01	<0.001	<0.05	0.01	<0.0001	<0.001	<0.001	0.48	<0.001	0.47	<0.0001	0.028	<0.01	<0.001	0.016	0.31	0.15	<0.05	<0.01	0.4
PZ111	13/10/2021	1092	1030	648	896	6.4	6.6	77	39	56	20	<1	185	237	16	<0.01	<0.001	<0.05	0.009	<0.0001	<0.001	<0.001	0.34	<0.001	0.345	<0.0001	0.021	<0.01	<0.001	0.006	0.39	0.2	0.11	<0.01	0.2
PZ112B	23/04/2021	3630	3310	2120	485	5.9	4.9	4	39	519	12	<1	4	776	407	0.18	<0.001	<0.05	0.035	0.0005	<0.001	<0.001	<0.05	<0.001	0.096	<0.0001	0.09	<0.01	<0.001	0.144	0.07	2.51	0.11	<0.01	0.2
PZ112B	15/10/2021	3970	4860	2820	65	5.0	4.8	6	61	688	13	<1	14	1230	355	0.15	<0.001	<0.05	0.035	0.0006	<0.001	0.001	<0.05	<0.001	0.096	<0.0001	0.113	<0.01	<0.001	0.157	<0.01	1.31	0.08	<0.01	0.2
PZ137	22/04/2021	1728	1480	1040	128	6.0	5.9	67	53	123	33	<1	91	359	139	<0.01	0.003	<0.05	0.002	<0.0001	<0.001	<0.001	12.6	<0.001	0.784	<0.0001	0.006	<0.01	<0.001	0.015	0.32	<0.01	<0.01	<0.01	<0.1
PZ137	13/10/2021	1288	1200	2670	110	5.8	6	44	38	107	27	<1	65	318	53	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	2.92	<0.001	0.301	<0.0001	0.003	<0.01	<0.001	0.016	0.1	0.05	0.02	<0.01	<0.1

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)
PZ170	21/04/2021	2252	2160	1580	73	6.3	6.3	109	78	175	18	<1	272	560	4	<0.01	0.005	<0.05	0.002	<0.0001	<0.001	<0.001	6.96	<0.001	0.186	<0.0001	0.011	<0.01	<0.001	0.02	0.29	0.13	0.08	<0.01	0.2
PZ170	15/10/2021	2303	2170	1360	59	6.2	6.4	116	88	199	19	<1	247	578	2	<0.01	0.007	<0.05	0.003	<0.0001	<0.001	<0.001	9.58	<0.001	0.202	<0.0001	0.012	<0.01	<0.001	0.009	0.2	0.03	0.08	<0.01	0.1
PZ188	21/04/2021	214	223	145	42	5.5	5.7	2	4	30	1	<1	14	53	6	<0.01	0.001	<0.05	0.006	<0.0001	<0.001	<0.001	6.31	<0.001	0.106	<0.0001	0.011	<0.01	<0.001	0.015	0.03	<0.01	<0.01	<0.01	<0.1
PZ188	15/10/2021	202	203	125	27	4.8	5.1	<1	4	34	<1	<1	14	53	<1	0.02	<0.001	<0.05	0.008	<0.0001	<0.001	<0.001	0.17	<0.001	0.039	<0.0001	0.018	<0.01	<0.001	0.019	<0.01	0.03	0.01	<0.01	<0.1
PZ189	21/04/2021	406	395	276	233	5.9	5.9	14	12	35	5	<1	39	98	6	0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	12.1	<0.001	0.508	<0.0001	0.003	<0.01	<0.001	0.098	0.13	0.05	0.19	<0.01	0.2
PZ189	15/10/2021	410	412	253	86	5.6	6	15	13	38	6	<1	54	96	6	<0.01	<0.001	<0.05	0.001	<0.0001	<0.001	<0.001	12.4	<0.001	0.511	<0.0001	0.002	<0.01	<0.001	0.022	0.04	0.02	0.08	<0.01	0.1
PZ191	21/04/2021	1045	1090	940	11100	6.5	6.7	32	16	165	11	<1	241	109	149	<0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	5	<0.001	0.119	<0.0001	0.004	<0.01	<0.001	0.005	0.92	0.11	47.2	<0.01	0.8
PZ203	23/04/2021	417	324	212	12	5.0	5.1	4	6	44	<1	<1	6	87	15	0.01	<0.001	<0.05	0.053	<0.0001	<0.001	<0.001	<0.05	<0.001	0.27	<0.0001	0.044	<0.01	<0.001	0.038	0.02	0.01	<0.01	<0.01	<0.1
PZ203	15/10/2021	428	329	201	21	5.4	5.5	4	7	52	1	<1	14	85	14	<0.01	<0.001	<0.05	0.052	<0.0001	<0.001	<0.001	<0.05	<0.001	0.265	<0.0001	0.045	<0.01	<0.001	0.037	0.23	0.08	0.04	0.01	<0.1
PZ213	21/04/2021	505	520	368	69	5.0	5.2	15	15	51	4	<1	15	148	8	0.01	<0.001	<0.05	0.05	<0.0001	<0.001	<0.001	6.17	<0.001	0.559	<0.0001	0.063	<0.01	<0.001	0.083	0.12	<0.01	0.08	<0.01	<0.1
PZ213	15/10/2021	495	475	278	25	5.0	5.2	12	12	56	3	<1	17	138	4	0.01	<0.001	<0.05	0.034	<0.0001	<0.001	<0.001	8.17	<0.001	0.524	<0.0001	0.039	<0.01	<0.001	0.071	0.08	0.03	0.04	<0.01	<0.1
PZ214	21/04/2021	195	191	124	12	5.5	5.7	6	6	22	2	<1	38	33	3	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.007	<0.0001	0.005	<0.01	<0.001	0.019	0.12	1.84	0.02	<0.01	<0.1
PZ214	15/10/2021	173	181	110	23	5.6	5.7	6	6	23	2	<1	38	30	1	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	<0.05	<0.001	0.005	<0.0001	0.005	<0.01	<0.001	0.009	<0.01	1.54	0.02	<0.01	<0.1
PZ217	20/04/2021	4940	5200	3230	15	6.6	7	143	191	568	21	<1	486	1140	550	<0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	<0.05	<0.001	0.246	<0.0001	0.006	<0.01	<0.001	0.014	0.15	3.94	0.01	<0.01	0.6
PZ217	12/10/2021	4630	4570	2870	7	7.0	7.3	127	202	657	18	<1	442	977	556	<0.01	<0.001	<0.05	0.002	<0.0001	<0.001	<0.001	<0.05	<0.001	0.188	<0.0001	0.004	<0.01	<0.001	0.009	<0.01	1.13	<0.01	0.01	0.7
PZ221	20/04/2021	1348	1290	728	37	6.4	6.4	38	51	163	12	<1	318	218	70	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	1.31	<0.001	0.16	<0.0001	<0.001	<0.01	<0.001	0.017	0.12	0.17	0.1	<0.01	0.7
PZ221	12/10/2021	1358	1260	708	45	6.4	6.4	34	49	149	11	<1	319	215	63	<0.01	<0.001	<0.05	<0.001	<0.0001	<0.001	<0.001	1.98	<0.001	0.218	<0.0001	<0.001	<0.01	<0.001	<0.005	0.08	<0.01	0.19	<0.01	0.6
PZ003	20/04/2021	820	771	432	25	6.2	6.3	4	19	117	7	<1	105	171	28	0.12	<0.001	<0.05	0.004	<0.0001	<0.001	<0.001	0.32	<0.001	0.025	<0.0001	0.006	<0.01	<0.001	0.04	0.17	0.29	0.09	<0.01	0.2
PZ003	12/10/2021	843	814	431	16	6.8	6.8	4	22	126	7	<1	116	185	26	0.01	<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	0.34	0.02	<0.01	0.2

BORE	PZ105A – 28m	PZ105A – 80m	PZ105A – 118m	PZ105A – 130m	PZ127 - 43m	PZ127 - 68m	PZ128 - 20m	PZ128 - 36m	PZ128 - 55m
Jan-21	375.21	370.71	347.91	356.12				374.2	369.6
Feb-21	375.36	370.39	347.23	355.69				374.2	369.5
Mar-21	375.45	370.26	347.24	354.6				374.2	369.5
Apr-21	375.65	370.24	346.85	353.03				374.2	369.6
May-21	375.77	369.94	346.52	351.55				374.2	369.5
Jun-21	375.81	369.5	346	349.65				374.3	369.4
Jul-21	375.86	369.03	345.69	348.2				374.2	369.3
Aug-21	375.87	368.08	345.63	345.89				374.2	369.1
Sep-21	375.95	367.52	345.1	344.29				374.2	369.1
Oct-21	375.97	366.76	344.74	342.28				374.2	368.9
Nov-21	376.01	366.05	344.82	339.95				374.2	368.9
Dec-21	376.05	365.34	344.53	337.98				374.1	368.7
min	375.2	365.3	344.5	338.0				374.1	368.7
max	376.1	370.7	347.9	356.1				374.3	369.6

BORE	PZ129 - 35m	PZ129 - 53m	PZ129 - 74m	PZ130 - 38.5m	PZ130 - 64m	PZ179 - 28m	PZ179 - 33m	PZ179 - 145m	PZ186a – 13.5m
Jan-21	390.0	383.9	365.0			417.7	417.5	330.8	407.9
Feb-21	390.0	383.7	365.0			417.8	417.6	330.5	407.9
Mar-21	389.9	383.7	365.0			417.8	417.6	329.3	407.9
Apr-21	389.9	383.8	365.0			417.8	417.6	326.7	408.0
May-21	389.9	383.8	365.1			417.9	417.6	325.5	408.0
Jun-21	390.0	383.8	365.1			417.9	417.7	323.7	407.9
Jul-21	390.0	383.7	365.1			417.9	417.7	319.0	407.7
Aug-21	390.0	383.5	365.2			418.0	417.7	321.8	406.8
Sep-21	390.0	383.4	365.2			418.0	417.7	321.2	406.7
Oct-21	390.0	383.4	365.2		471.3	418.0	417.7	320.6	406.6
Nov-21	390.0	383.3	365.1			418.1	417.7	320.2	406.6
Dec-21	390.0	383.3	365.0			418.1	417.7	319.9	406.6
min	389.9	383.3	365.0		470.7	417.7	417.5	319.0	406.6
max	390.0	383.9	365.2		471.3	418.1	417.7	330.8	408.0

BORE	PZ186 – 40m	PZ186 – 65m	PZ186 – 86m	PZ186 – 118m	PZ192-68m	PZ192-166m	PZ192-178m	PZ193 - 80m	PZ193 - 162m	PZ193 - 184m
Jan-21	395.9	378.6	380.4	331.5	402.5	348.9	345.3	418.1	358.9	344.5
Feb-21	395.9	378.2	380.1	331.2	402.4	348.4	345.0	418.1	358.7	344.0
Mar-21	395.8	377.3	382.7	330.3	402.5	347.1	343.4	418.1	358.0	342.6
Apr-21	395.9	376.9	382.5	329.8	402.4	345.1	341.1	418.2	356.7	340.4
May-21	396.0	376.8	382.4	329.1	402.2	343.2	338.9	418.0	355.4	338.1
Jun-21	395.6	375.7	381.1	328.3	402.0	340.9	336.1	418.0	354.1	335.3
Jul-21	394.4	371.7	377.1	327.6	401.9	338.7	333.9	418.0	352.3	332.6
Aug-21	390.9	366.6	372.1	326.9	401.2	335.7	330.1	417.9	348.4	329.7
Sep-21	391.1	366.2	371.6	326.5	401.1	333.8	328.2	417.6	346.4	327.4
Oct-21	391.1	366.0	371.4	325.9	401.6	330.8	324.8	418.2	341.8	323.1
Nov-21	391.2	365.7	371.3	325.4	401.8	327.8	321.5	418.1	339.3	318.9
Dec-21	391.2	365.8	371.2	325.0	401.9	326.3	319.0	418.1	338.1	316.4
min	390.9	365.7	371.2	325.0	401.1	326.3	319.0	417.6	338.1	316.4
max	396.0	378.6	382.7	331.5	402.5	348.9	345.3	418.2	358.9	344.5

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	PZ105C	PZ106A
Jan-21	470.0	409.7	479.8	423.1	466.4	380.1	365.3	355.0	354.2	400.1		351.7	373.3	374.8	424.8
Feb-21	470.1	409.4	479.9	423.2	466.4	380.0	365.3	353.7	354.1	400.0		350.4	373.3	374.8	425.0
Mar-21	470.1	409.5	479.8	423.2	466.4	380.1	365.2	352.5	351.7	400.1		348.9	373.1	374.8	425.2
Apr-21	470.3	409.9	479.9	423.4	466.4	380.0	364.6	351.2	350.1	400.1		346.7	372.9	374.9	425.3
May-21	470.3	409.5	480.0	423.4	466.4	380.1	364.3	350.9	351.7	400.1		345.7	372.8	374.9	424.1
Jun-21	470.3	408.6	480.0	423.5	466.4	380.1	363.8	349.7	349.1	400.2		344.2	372.6	374.9	424.3
Jul-21	470.6	407.7	480.0	423.5	466.6	380.0	363.2	349.4	350.3	400.3		342.7	372.4	374.9	424.6
Aug-21	470.4	407.8	480.1	423.4	466.4	380.0	362.6	348.4	349.6	400.1		341.4	372.2	374.8	424.8
Sep-21	470.2	408.0	480.4	423.3		380.0	362.0	347.3	348.8	400.2		340.0	371.9	374.8	425.0
Oct-21	470.3	407.3	480.5	423.4	466.5	380.0	361.4	345.6	347.5	400.3		337.9	371.7	374.8	425.2
Nov-21	470.6	407.3	480.3	423.4	466.5	380.0	360.6	343.8	343.2	400.3		335.6	371.6	374.8	423.9
Dec-21	471.4	407.7	480.7	423.5	466.5	380.0	360.2		343.5	397.5		335.0		374.9	424.2
min	470.2	407.3	479.9	423.3	466.4	380.0	360.2	343.8	343.2	397.5		335.0	371.6	374.8	423.9
max	471.7	409.9	481.3	423.6	466.6	380.1	365.3	355.0	354.2	400.3		351.7	375.3	374.9	425.3
BORE	**PZ109**	**PZ111**	**PZ112B**	**PZ137**	**PZ170**	**PZ184**	**PZ188**	**PZ189**	**PZ191**	**PZ203**	**PZ211**	**PZ213**	**PZ214**	**PZ217**	**PZ221**
Jan-21	382.2	367.9	478.8	460.8	419.8		412.9	395.5	347.4	402.1		412.0	412.2	492.7	470.2
Feb-21	382.1	367.5	479.0	460.9	419.9		412.9	395.5	347.3	402.1		411.9	412.1	492.6	469.9
Mar-21	382.1	367.3	479.1	460.8	419.9		412.4	395.6	347.3	402.0		411.8	412.1	492.5	469.8
Apr-21	382.1	366.9	479.6	460.9	420.0		412.4	395.7	347.5	402.2		411.8	412.0	493.1	469.8
May-21	382.2	368.7	479.8	461.0	420.1		412.3	395.6	347.5	402.2		411.7	412.0	493.1	469.7
Jun-21	382.2	366.4	480.1	461.0	420.1		412.3	395.4	347.4	402.2		411.7	411.9	493.0	469.5
Jul-21	382.2	365.6	480.4	461.0	420.8		412.2	392.9	347.3	402.2		411.6	411.9	493.2	469.4
Aug-21	382.0	364.9	480.3	461.0	420.8		412.1	391.7	347.2	402.1		411.4	411.8	493.2	469.6
Sep-21	382.0	364.5	480.5	461.0	420.8		412.1	391.9	347.2	402.0		411.3	411.7	493.2	469.7
Oct-21	382.2	364.0	481.0	461.1	420.7		412.0	392.0	347.2	402.0		411.2	411.6	493.1	469.9
Nov-21	382.2	363.8	481.1	461.0	420.7		411.9	391.8	347.2	402.0		411.1	411.5	493.1	470.0
Dec-21	382.2	363.8	481.2	461.2	420.6		411.8	392.1	347.2	402.5		411.0	411.4	493.6	470.4
min	382.0	363.8	479.6	460.9	420.0		411.8	391.7	347.2	402.0		411.0	411.4	493.0	469.4
max	382.2	368.7	482.0	461.3	420.8		412.9	395.7	347.7	402.5		412.0	412.2	493.6	470.8

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

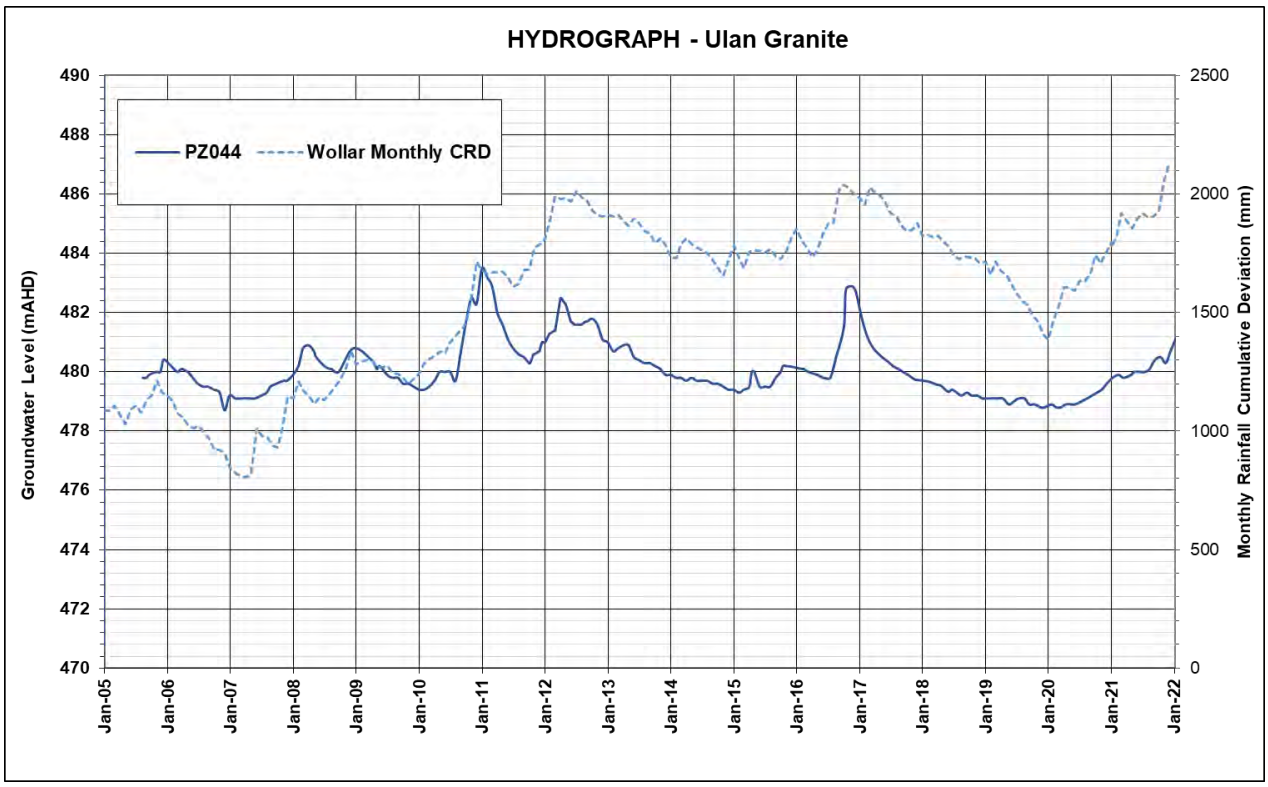


Figure 3-h: Marrangaroo and Ulan Seam Composite Hydrograph

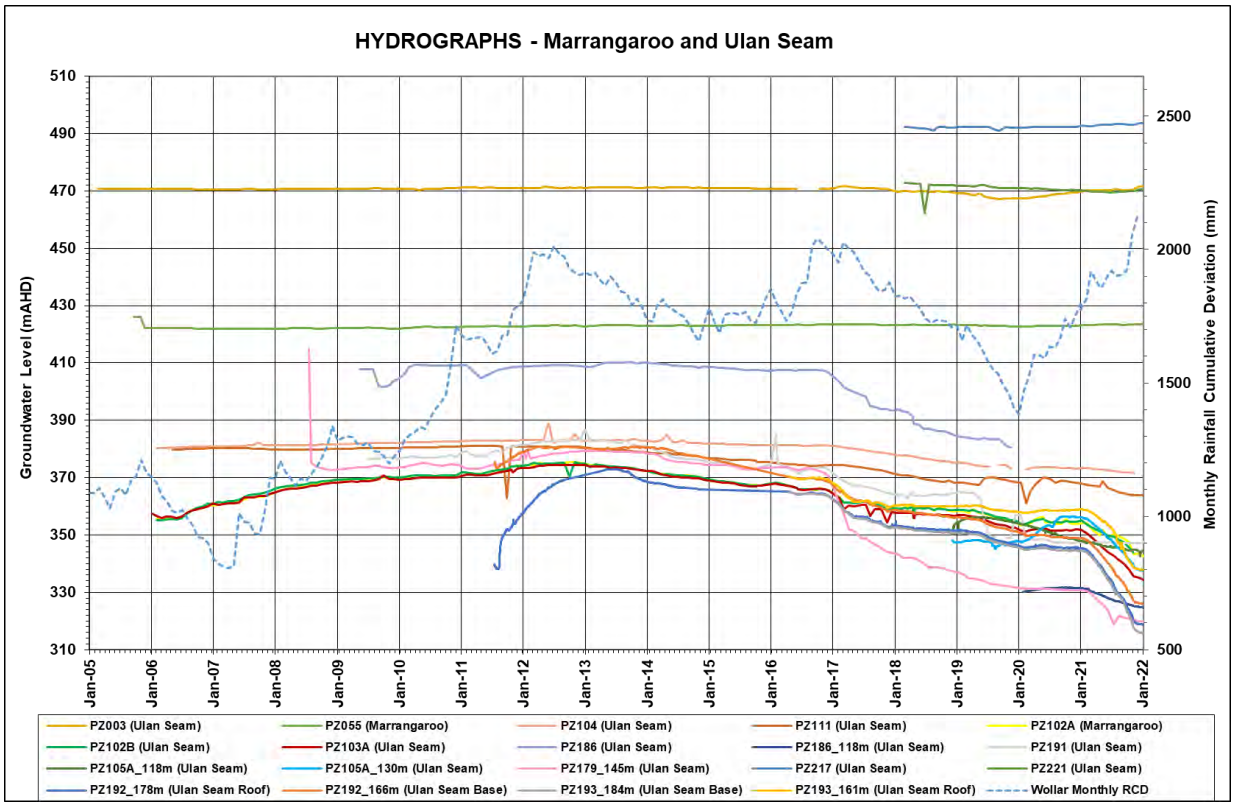


Figure 3-i: Permian Overburden Composite Hydrograph

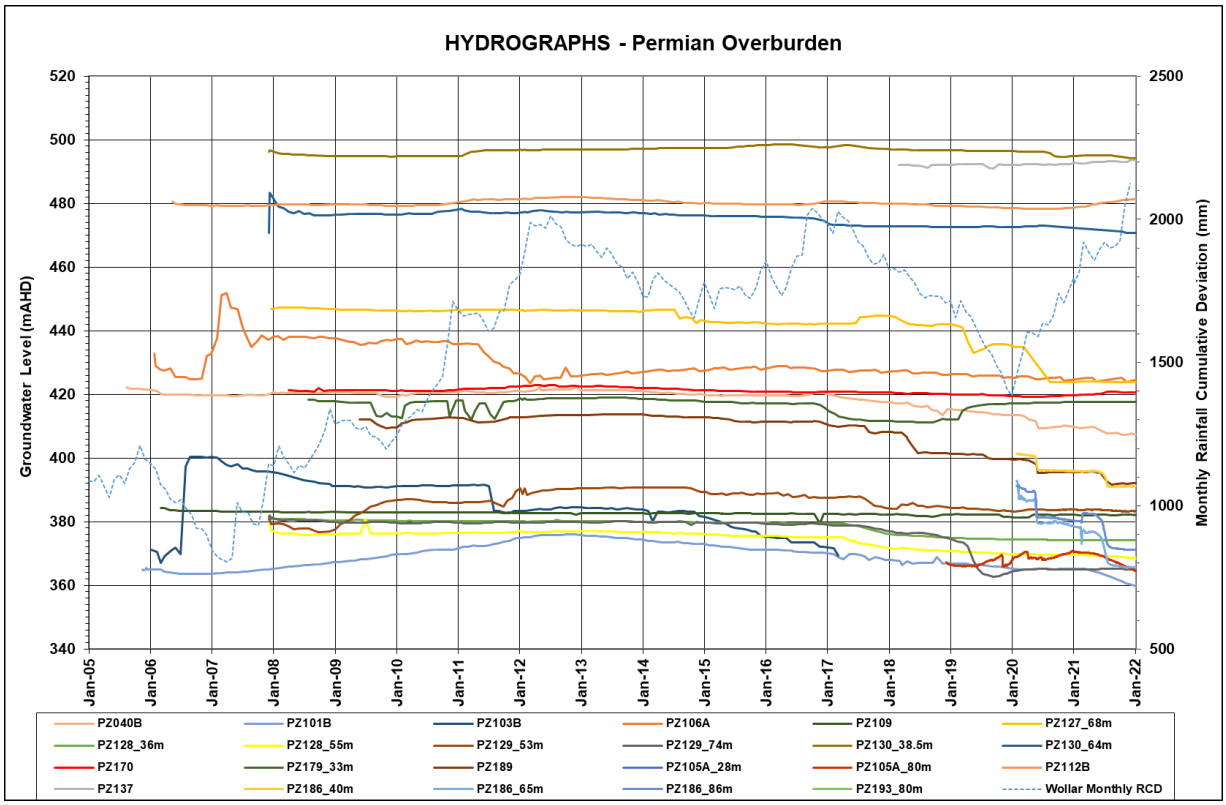


Figure 3-j: Triassic Composite Hydrograph

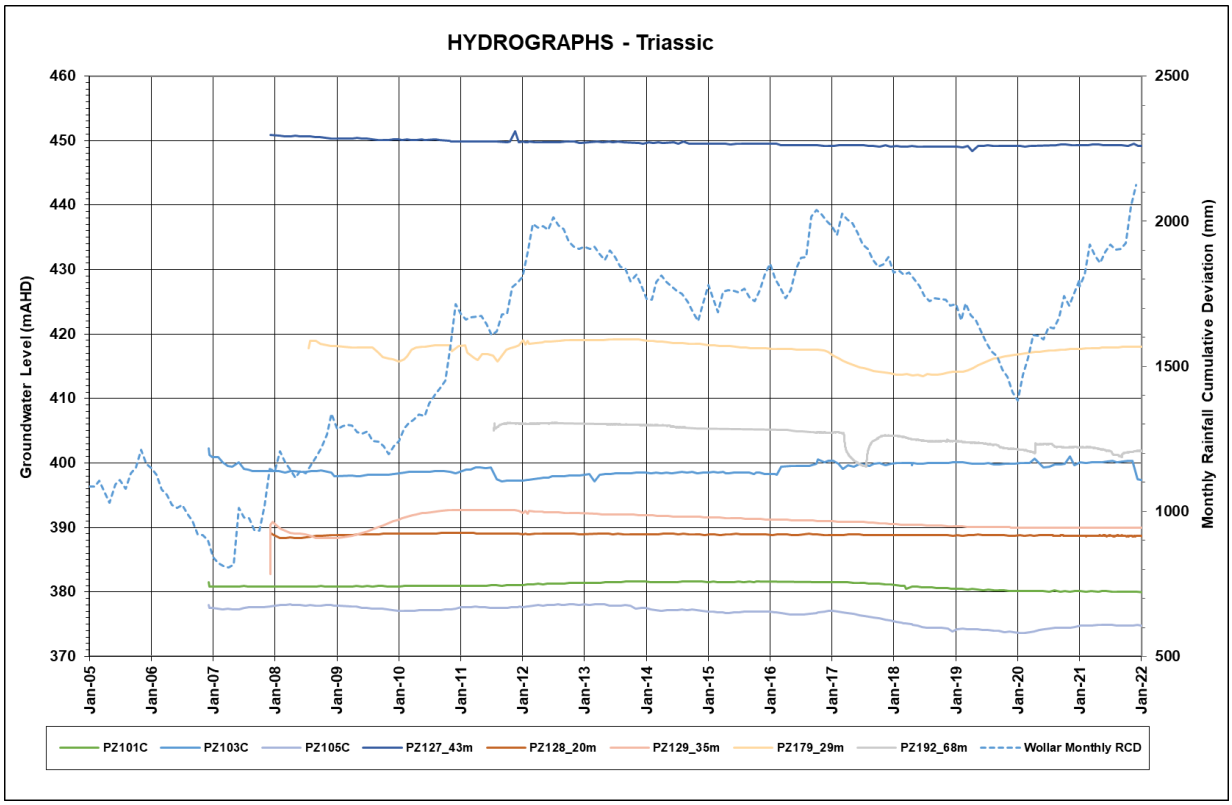
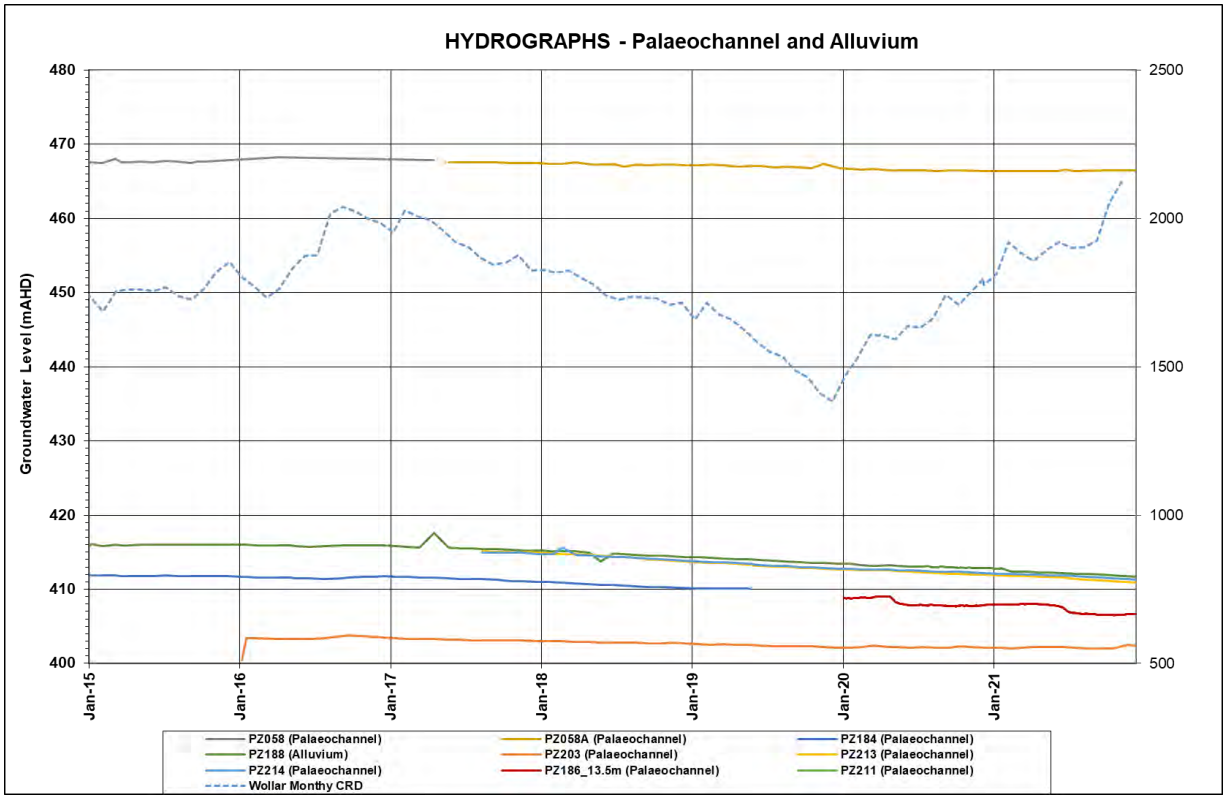


Figure 3-k Alluvium Composite Hydrograph



APPENDIX 4. COMMUNITY COMPLAINTS SUMMARY 2021

Date	Type	Location	Complaint Description
27/12/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
22/12/2021	Noise	Nimoola 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.
22/12/2021	Noise	Nimoola 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.
21/12/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
8/12/2021	Noise	Winchester Crs	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.
3/12/2021	Noise	Winchester Crs	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
30/11/2021	Noise	Nimoola Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
18/11/2021	Air (Odour)	Winchester Crs	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant not contacted upon their request.
7/11/2021	Noise	Winchester Crs	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.
11/10/2021	Noise	Nimoola Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
27/09/2021	Noise	Ridge Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
27/09/2021	Noise	Nimoola 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.
13/09/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
11/09/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
9/09/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
9/09/2021	Air (Dust)	Winchester Crs	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
30/08/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
29/08/2021	Noise	Winchester Crs	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.
15/08/2021	Other	Cope Rd	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
9/08/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.

Date	Type	Location	Complaint Description
6/08/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
31/07/2021	Noise	Winchester Crs	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
6/07/2021	Noise	Ridge 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.
2/07/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
29/06/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
28/06/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
24/06/2021	Other	Cooks Gap	Investigation revealed no unusual mining operations were occurring at the time. Operational changes were made. Complainant advised of investigation, results and actions.
23/06/2021	Noise	Nimoola Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
9/06/2021	Blasting (V/O)	Winchester Crs	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
17/05/2021	Noise	Ridge 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.
13/05/2021	Noise	Ridge 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.
28/04/2021	Noise	Ridge Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
26/04/2021	Air (Odour)	Saddlers Creek Rd	Investigation revealed no unusual mining operations were occurring at the time. No actions required. Complainant advised of investigation, results and actions.
31/03/2021	Noise	Ridge 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.
30/03/2021	Noise	Nimoola 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.
15/03/2021	Noise	Nimoola 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.
16/02/2021	Noise	Nimoola Rd	Investigation revealed no unusual mining operations were occurring at the time. Monitoring results indicated acceptable Noise levels. No actions required. Complainant advised of investigation, results and actions.
20/01/2021	Noise	Nimoola 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.
10/01/2021	Noise	Nimoola 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.

APPENDIX 5. COMMUNITY CONTRIBUTIONS

Community Support Program

Beneficiary	Project/Event
Mudgee Rotary Club	2021 Rotary District Conference
Educar	2021 Max Potential Program
The Business Concierge	2021 Survivor Life Skills Program
Gulgong & District Avicultural Society	2021 Annual Gulgong Bird Show
Rylstone Kandos Show Society	2021 Bull-a-Rama
Mudgee Aero Club	2021 Wings, Wheels & Wine Show
Mudgee Lions Club	2021 Community Christmas Markets
Gulgong Holtermann Museum Inc	Holtermann Museum Outdoor Experience App
Gulgong Arts Council	2021 Scarecrow Stroll
Gulgong Fishing Club	Fingerling restocking program in the Cudgegong River
Mudgee Mens Shed	Metal Art Sculptures Design Program
Mudgee Show Society	2021 Mudgee Show
Gulgong Show Society	2021 Gulgong Show
Lue Public School	New playground equipment
Mudgee Hospital	Anaesthetic Pump
Mudgee Bowling Club	Honey& Wine Bowls tournament
North West Legacy Branch	New Television and sound equipment
Gulgong Little Athletics	Equipment upgrades
Gulgong Showground	Equipment upgrades
Eurunderee Public Recreation Reserve	Replace boundary fencing
Mudgee Junior League	Equipment Upgrades
Sculptures in the Garden	2021 Sculptures in the Garden
Cudgegong Cruisers	2021 Can Cruise Event
Mudgee Rotary Club Sunrise	2021 Showground Carols
Western Area Health Service	Hospital Carer's lounge refurbishment
Westpac Rescue Helicopter Service	2021 Charity Golf Day
Westpac Rescue Helicopter Service	2021 Charity Bike Ride
Cassillis Camp Draft	Arena refurbishment
Hargraves Hill End Pest Group	Purchase Meat for Autumn Wild Dog baiting
Lake Windamere under canvas camping	Supply and install tree guards

Additional Donations

Beneficiary	Project/Event
Gulgong Public School	Special needs room upgrades
Dunedoo Sports Club	New irrigation pump
Dunedoo Sports Club	2021 Tunes on the Turf
Gulgong Chamber of Commerce	Transport to Riding with the disabled
Mudgee Chamber of Commerce	2021 Magnificent Mudgee Awards
Gulgong High School	Award ceremony monetary prize
Kandos High School	Award ceremony monetary prize
Mudgee Rugby Club	Redundant ice machine donation
Lifeskills Plus	PPE donation