

Department of Planning and Environment

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Whitehaven Coal Limited
Kamilaroi Country

By email only: NCO-approval@whitehavencoal.com.au

24/05/2023

**Narrabri Coal Mine (MP08_0144)
Annual Review 2022**

Dear Mr Rily

Reference is made to your post approval matter, MP08_0144-PA-42, Narrabri Coal Mine Annual Review (AR) for the period 1 January 2022 to 31 December 2022, submitted as required by Schedule 6, Condition 6 of MP08_0144 as modified (the approval) to the Department of Planning and Environment (the department) on 31 March 2023.

The department has reviewed the 2022 Annual Review and considers it to generally satisfy the reporting requirements of the approval and the department's *Annual Review Guideline* (October 2015). Please make publicly available a copy of the 2022 Annual Review on the company website.

Please note that the department's acceptance of the 2022 Annual Review is not an endorsement of the compliance status of the project. The department notes that all non-compliances identified in the 2022 Annual Review (with the exception of Schedule 4 Condition 30 identified in the 2022 Independent Environmental Audit) have previously been addressed by the department.

Should you wish to discuss the matter further, please contact Joel Curran, Senior Compliance Officer, on 02 4904 2702 or compliance@planning.nsw.gov.au

Yours sincerely



Heidi Watters
Team Leader Northern
Compliance

As nominee of the Planning Secretary

NARRABRI MINE 2022 ANNUAL REVIEW



Table 1: Annual Review Title Block

Name of Operation	Narrabri Mine
Name of Operator	Narrabri Coal Operations Pty Ltd
Development consent / Project Approval #	Project Approval 08_0144
Name of holder of development consent/project approval	Narrabri Coal Operations Pty Ltd
Mining lease #	ML 1609
Name of holder of mining lease	Narrabri Coal Pty Ltd
Water Licence #	Refer to Water Licences in Table 5
Name of holder of water licence	Narrabri Coal Pty Ltd, Narrabri Coal Australia Pty Ltd, Posco International Narrabri Investments Pty Ltd, J-Power Australia Pty Ltd, Kores Narrabri Pty Ltd and Upper Horn Investments (Australia) Pty Ltd
MOP/RMP start date	1 December 2020
MOP/RMP end date	31 December 2023
Annual Review Commencement Date	01 January 2022
Annual Review Completion Date	31 December 2022
<p>I, Gerald Linde, certify that this audit report is a true and accurate record of the compliance status of the Narrabri Mine for the period 01 January 2022 to 31 December 2022, and that I am authorised to make this statement on behalf of Narrabri Coal Operations Pty Ltd.</p> <p>Note.</p> <p>a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</p> <p>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).</p>	
Name of Authorised Reporting Officer	Gerald Linde
Title of Authorised Reporting Officer	General Manager – Narrabri Mine
Signature	
Date	18/4/23

Amendment A: Updates to address NSW DPE RFI dated 6 April 2023

(Major Projects Portal Reference MP08_0144-PA-42)

TABLE OF CONTENTS

1	STATEMENT OF COMPLIANCE	1
2	INTRODUCTION	4
2.1	PROJECT DESCRIPTION.....	4
2.2	MINE CONTACTS	4
3	APPROVALS	7
4	OPERATIONS SUMMARY	9
4.1	MINING OPERATIONS	10
4.2	OTHER OPERATIONS.....	10
4.2.1	Exploration Activities	10
4.2.2	Construction.....	10
4.2.3	Hours of Operation	11
4.3	NEXT REPORTING PERIOD	11
4.3.1	Mine Operations	11
4.3.2	Exploration.....	11
4.3.3	Construction Activities	11
4.3.4	Mining Fleet Upgrades	11
5	ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW.....	13
6	ENVIRONMENTAL PERFORMANCE	16
6.1	NOISE	18
6.1.1	Environmental Management.....	18
6.1.2	Environmental Performance	18
6.1.3	Proposed Improvement Measures	21
6.2	BLAST	21
6.3	AIR QUALITY	21
6.3.1	Environmental Management.....	21
6.3.2	Environmental Performance	22
6.3.3	Proposed Improvement Measures	25
6.4	METEOROLOGICAL DATA.....	25
6.5	GREENHOUSE GAS	26
6.5.1	Environmental Management.....	26
6.5.2	Environmental Performance	26

6.5.3	Proposed Improvement Measures	27
6.6	BIODIVERSITY	27
6.6.1	Environmental Management.....	27
6.6.2	Environmental Performance and BOMP Implementation	31
6.6.2.1	Mine Site Environmental Performance	31
6.6.2.2	BOS Environmental Performance	40
6.6.3	Proposed Improvement Measures	44
6.7	ABORIGINAL CULTURAL HERITAGE	45
6.7.1	Environmental Management.....	45
6.7.2	Environmental Performance	45
6.7.3	Proposed Improvement Measures	46
6.8	HISTORIC HERITAGE	46
6.9	TRANSPORT	46
6.9.1	Environmental Management.....	46
6.9.2	Environmental Performance	46
6.9.3	Proposed Improvement Measures	46
6.10	WASTE MANAGEMENT	47
6.10.1	Environmental Management.....	47
6.10.2	Environmental Performance	47
6.10.3	Proposed Improvement Measures	48
6.11	VISUAL & LIGHTING	48
6.11.1	Environmental Management.....	48
6.11.2	Environmental Performance	49
6.11.3	Proposed Improvement Measures	49
6.12	BUSHFIRE	49
6.12.1	Environmental Management.....	49
6.12.2	Environmental Performance	49
6.12.3	Proposed Improvement Measures	50
6.13	MINE SUBSIDENCE.....	50
6.13.1	Environmental Management.....	50
6.13.1.1	Subsidence Monitoring	50
6.13.2	Environmental Performance	50
6.13.2.1	Comparison against Predictions	51
6.13.3	Proposed Improvement Measures	51
7	WATER MANAGEMENT	53
7.1	WATER SUPPLY.....	53

7.2	SURFACE WATER MANAGEMENT	55
7.2.1	Environmental Management.....	55
7.2.2	Environmental Performance	55
7.2.3	Proposed Improvement Measures	57
7.3	GROUNDWATER	57
7.3.1	Groundwater Monitoring	57
7.3.2	Environmental Performance	58
7.3.3	Proposed Improvement Measures	59
7.4	SITE WATER BALANCE	60
8	REHABILITATION.....	61
8.1	REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD.....	61
8.1.1	Status of Mining and Rehabilitation	61
8.1.2	Post Rehabilitation Land Uses	62
8.1.3	Rehabilitation Performance Indicators.....	62
8.1.4	Decommissioning and Demolition Activities	63
8.1.5	Other Rehabilitation Activities.....	63
8.1.6	Departmental Sign-off of Rehabilitated Areas	63
8.1.7	Variations in Activities against MOP/RMP	63
8.1.8	Monitoring.....	64
8.1.9	Trials, Research Projects and Initiatives	64
8.1.10	Key Issues to Achieving Successful Rehabilitation	64
8.2	ACTIONS FOR THE NEXT REPORTING PERIOD	64
8.2.1	Proposed Research and Rehabilitation for 2023.....	65
9	COMMUNITY.....	68
9.1	COMMUNITY ENGAGEMENT ACTIVITIES	68
9.2	COMMUNITY CONTRIBUTIONS & INITIATIVES	68
9.3	COMMUNITY COMPLAINTS	69
9.3.1	Complaint Trends	69
9.4	ACTIONS & PROPOSED IMPROVEMENTS.....	70
10	INDEPENDENT AUDIT	70
10.1	INDEPENDENT ENVIRONMENTAL AUDIT	70
11	INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD	72
11.1	NON-COMPLIANCES	72
11.2	REPORTABLE INCIDENTS OR EXCEEDANCES	72

11.3 REGULATORY ACTIONS	72
12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD.....	73

LIST OF TABLES

Table 1: Annual Review Title Block	i
Table 2: Statement of Compliance.....	1
Table 3: Compliance Status Key.....	2
Table 4: Non-Compliances.....	3
Table 5: Licences, Leases and Approvals	7
Table 6: Production Summary	10
Table 7: Hours of Operation.....	11
Table 8: Actions from the Previous Annual Review (2021)	13
Table 9: Noise Monitoring Summary 2022.....	19
Table 10: SPL Testing Summary	20
Table 11: Deposited Dust Monitoring Data Summary for the Reporting Period	22
Table 12: PM ₁₀ Annual Average (2018 – 2022)	25
Table 13: Summary of Meteorological Conditions 2022	26
Table 14: Biodiversity Management Plan 2022 Monitoring Results	31
Table 15: Land Management Plan 2022 Monitoring Results.....	35
Table 16: Subsidence Parameters – Predicted and Measured	52
Table 17: Narrabri Mine Water Take.....	54
Table 18: Controlled Discharge Monitoring.....	56
Table 19: Groundwater Monitoring Summary	57
Table 20: Stored Water	60
Table 21: Rehabilitation Status	62
Table 22 Decommissioned monitoring bores.....	63
Table 23: 2022 Independent Environmental Audit (IEA) – non-conformance actions summary	71
Table 24: Non-Compliance Details and Proposed Action Plan	72

LIST OF FIGURES

Figure 1: Regional Scale Locality Plan	5
Figure 2: Local Scale Locality Plan	6
Figure 3: Environmental Monitoring Locations.....	17
Figure 4: Trended Attended Noise Monitoring (2019 – 2022) Day LAeq (15 min)	20
Figure 5 Average Depositional Dust Results 2018 - 2022.....	23
Figure 6: ND9 PM ₁₀ Results including extraordinary weather events.....	24
Figure 7: ND10 PM ₁₀ including extraordinary weather events.....	24
Figure 8: Regional location of Biodiversity Offset Areas.....	28
Figure 9: Kenna Biodiversity Offset Area.....	29
Figure 10: Onsite BOA and future onsite offset areas	30
Figure 11: Comparison of waste streams over the previous 5 years.....	48
Figure 12: Waterfall Chart: Water Inputs/Outputs for 2022 water year (financial year).....	61

Figure 13: Mine Domains Reporting Period 2022	66
Figure 14 Rehabilitated Areas, Reporting Period 2022	67
Figure 15: Complaints Trend since commencement of operations	70

LIST OF APPENDICES

Appendix A – <i>Flora Species List</i>	74
Appendix B – <i>Photo Monitoring Points</i>	75
Appendix C – <i>Fauna Species List</i>	76
Appendix D – <i>Surface Water Monitoring</i>	77
Appendix E – <i>Groundwater Monitoring</i>	78
Appendix F – <i>Ambient Flow Monitoring</i>	79
Appendix G – <i>Subsidence Pond Monitoring</i>	80

1 STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the environmental performance of the Narrabri Coal Operations (NCO) over the reporting period, 1 January 2022 to 31 December 2022. The compliance status of the mine against relevant approvals was assessed as at the end of the reporting period and is summarised in Table 2.

Table 2: Statement of Compliance

Were all the conditions of the relevant approvals complied with?	Yes/No
Project Approval (PA) 08_0144	No
Rehabilitation Management Plan (RMP)	Yes
Mining Lease (ML) 1609	Yes
Subsidence Management Plan (SMP) Approval 10/9000	Yes
90CA811347	Yes
90WA812891	Yes
90CA802130	Yes
90WA822539	Yes
WAL15922	Yes
WAL12833	Yes
WAL12822	Yes
WAL20131	Yes
WAL6762	Yes
WAL2671	Yes
WAL2728	Yes
WAL20152	Yes
WAL29549	Yes
WAL43017	Yes
Groundwater Monitoring Bores: 90BL254481-487, 90BL254658-663, 90BL254701, 90BL254958-967, 90BL255167-173, 90BL255216-218, 90BL255769-772, 90BL256060-064, 90BL256344 and 90BL256346	Yes

Any non-compliances during the reporting period are ranked according to the compliance status key in Table 3 and are described in Table 4. Section 11 of this Annual Review further explains any non-compliances and mitigation measures implemented or proposed for the following reporting period to prevent re-occurrence and potential adverse effects.

Table 3: Compliance Status Key

Risk Level	Colour Code	Description
High	Non-Compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-Compliant	Non-compliance with: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> potential for moderate environmental consequences, but is unlikely to occur; or potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-Compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 4: Non-Compliances

Relevant Approval	Cond. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
MP08_0144	Condition 4 of Schedule 6	The Proponent shall notify the Secretary in writing via the Major Projects website and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident	Non-compliant	<p>NCO failed to notify NSW DPE as soon as practicable and in a detailed report within 7-days of an incident.</p> <p>NSW DPE acknowledged that NCO had complied with all requirements/actions from the relevant management plan/s pertinent to the incident. NSW DPE noted that the non-compliance had been recorded on this occasion.</p>	<p>Section 7.3.2</p> <p>Section 11.1</p>

2 INTRODUCTION

This is the sixteenth Annual Review produced for the Narrabri Mine (Figure 1) and has been prepared in accordance with the NSW Department of Planning, Industry and Environment (DPIE) Integrated Mining Policy – Annual Review Guideline, October 2015. This document has been prepared to satisfy the following requirements:

- The Annual Review requirements of the DPIE under Project Approval (PA) 08_0144 (Schedule 6, Condition 6);
- Environmental Management Report requirements of the Resources Regulator under the Narrabri Mine Mining Lease (ML) 1609; and
- The routine reporting expectations of DPIE-Water.

The Annual Review covers the period 1 January 2022 to the 31 December 2022. The Annual Review provides information on historical aspects of the Narrabri Mine, longer term trends in environmental monitoring results and information on proposed activities to be undertaken during the following reporting period.

2.1 PROJECT DESCRIPTION

Narrabri Mine is located within the Narrabri Local Government Area (LGA), approximately 30 km south-southeast of Narrabri, and 10 km north-northwest of Baan Baa (Figure 1). Mining Lease (ML) 1609 was originally approved on the 18th of January 2008 and set to expire 18th January 2029, in accordance with the provisions of Mining Act 1992. The ML encompasses an area of 5,298ha for the predominate purpose of mining for coal.

The current PA 08_0144 Modification 7 will allow the undertaking of mining operations until the 26 July 2031. Modification 5 of PA 08_0144 allows NCO to produce up to 11 Mtpa of ROM coal. In accordance with the NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021, the Mining Operations Plan (MOP) no longer took effect from 1 August 2022. The MOP was replaced with a site Rehabilitation Management Plan (RMP).

Development Consent for SSD-10269 was received 1 April 2022. This consent has not taken effect as approval under the EPBC Act is required prior to commencement.

Narrabri Mine is operated by Narrabri Coal Operations Pty Ltd (NCO). Narrabri Mine is owned by a joint venture between Narrabri Coal Pty Ltd (NCPL), Narrabri Coal Australia Pty Ltd, Upper Horn Investments (Australia) Pty Ltd, J-Power Australia Pty Ltd, Posco International Narrabri Investment Pty Ltd and Kores Narrabri Pty Ltd.

2.2 MINE CONTACTS

The key personnel responsible for operational and environmental management at the Narrabri Mine during the reporting period include:

- *Gerald Linde* – General Manager, retains overall responsibility for all activities and performance at the mine. Contact: (02) 6794 4755.
- *Shane Rily* – Environmental Superintendent, oversees day to day environmental performance across the site. Contact: (02) 6794 4167.

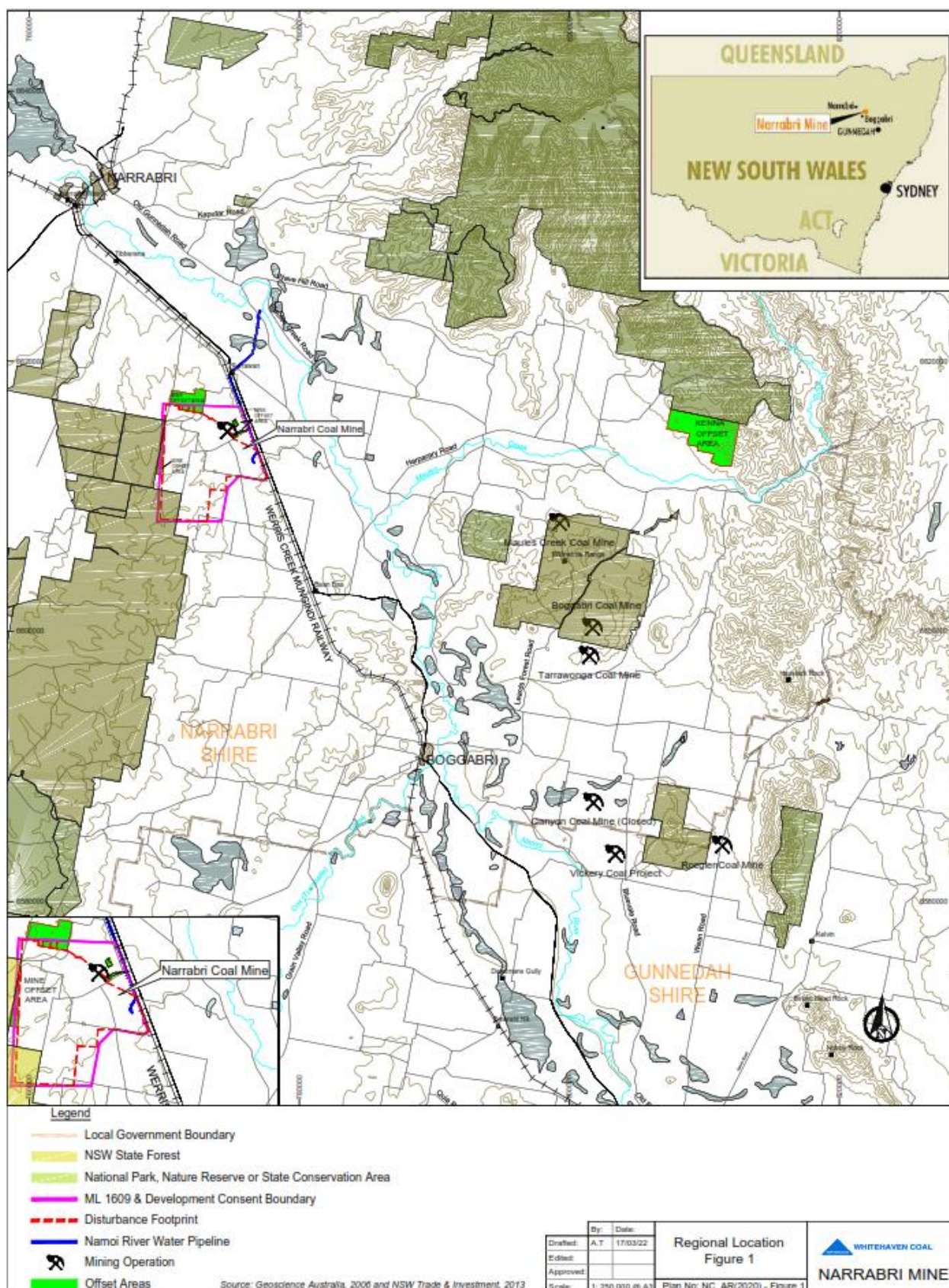


Figure 1: Regional Scale Locality Plan

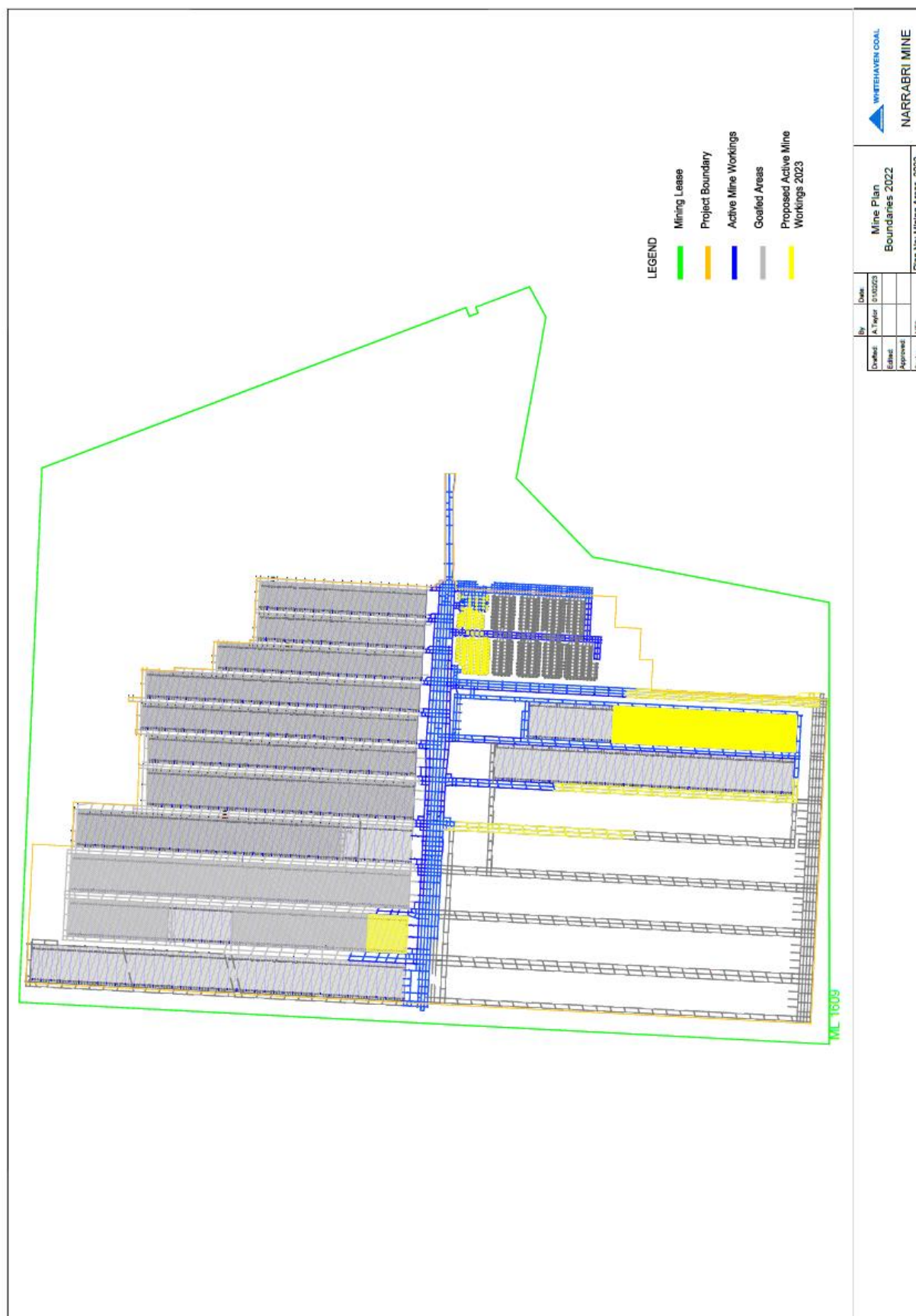


Figure 2: Local Scale Locality Plan

3 APPROVALS

Table 5 provides a summary of the key licences, leases and approvals that have been obtained for the Narrabri Mine to enable the construction and operation of the mine.

Table 5: Licences, Leases and Approvals

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Resources Regulator	ML 1609	18 January 2008	18 January 2029	Approval for mining Variation of lease conditions 19 August 2022 taking effect on 17 October 2022. <ul style="list-style-type: none"> to address changes made to NSW Mining Regulation 2016 (Rehabilitation Reforms).
	ML 1839	13 September 2022	13 September 2043	Operations under this Mining Lease have not commenced.
Environment Protection Authority (EPA)	Environment Protection Licence (EPL) 12789	20 February 2008	Nil – Anniversary: 20 February	For mining operation >5,000,000 T (handled and produced annually). Variation of licence 9 September 2022 which included: <ul style="list-style-type: none"> Removal of Condition U1.1 Review of pit top dust suppression systems as requirements have been addressed.
Narrabri Shire Council (NSC)	Construction Certificate DP 816020	17 October 2008	N/A	Stage 1 Mine Surface Facilities
	Inspection Report/Permit to Occupy No 2413	6 August 2009		
Department of Planning, Industry and Environment (DPIE)- Water	90WA822539 / WAL15922	Various	Various	GAB – Water supply (248 units)
	90WA812891 / WAL20131			Upper Namoi Zone 5 groundwater (150 units)
	90WA812891/ WAL12833			Upper Namoi Zone 5 groundwater (67 units)
	90WA812891/WAL12822			Upper Namoi Zone 5 groundwater (43 units)
	90CA802130 / WAL6762			River – High Security (20 units)
	90CA802130 / WAL2671			River (48 units)
	90CA802130 / WAL2728			River (10 units)
	90CA802130 / WAL20152			River (600 units)
	90WA822539 / WAL29549			Mining – Gunnedah Oxley Basin (818 units)
	TBC/WAL43017			Mining – Gunnedah Oxley Basin (403 units)
Department of Planning, Industry and Environment (DPIE)- Water	90BL254481-254487	Various	Various	Groundwater Monitoring Purposes
	90BL254658-254663			
	90BL254701			
	90BL254958-254967			
	90BL255167- 255173			
	90BL255216-255218			
	90BL255769-255772			
	90BL256060-256064			
	90BL256289			
	90BL256293			
	90BL256344			
	90BL256346			
	90BL256386			
	90BL256396-256397			
	90BL256402			
	90BL256410			

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
WorkCover NSW	Notification for explosives use and storage	20 December 2020	20 July 2025	Licence Number – XSTR100215

Issuing / Responsible Authority	Type of Lease, Licence, Approval	Date of Issue	Expiry	Comments
Narrabri Shire Council (NSC)	Construction Certificate DP 816020	23 September 2010	N/A	Stage 2 Mine Surface Facilities
Minister for Planning	PA 08_0144	26 July 2010	26 July 2031	Project Approval for Stage 2
	PA 08_0144 MOD1	30 March 2011	26 July 2031	Notice of modification under Section 75W of the EP&A Act to update the subsidence management conditions.
	PA 08_0144 MOD2	21 December 2011	26 July 2031	Notice of modification under Section 75W of the EP&A Act to allow for a one-off road transport of coal to Tarrawonga Coal Mine.
	PA 08_0144 MOD4	22 September 2015	26 July 2031	Notice of modification under Section 75W of the EP&A Act for an expansion of the coal stockpiles.
	PA 08_0144 MOD5	9 December 2015	26 July 2031	Notice of modification under Section 75W of the EP&A Act to widen the longwall face and increase the annual production limit.
	PA 08_0144 MOD6	13 January 2017	26 July 2031	Notice of modification under Section 75W of the EP&A Act to vary the annual reporting timeframe.
	PA 08_0144 MOD7	23 November 2021	26 July 2031	Notice of modification under Section 75W of the EP&A Act for a change in mining method from longwall to bord and pillar for panels 201 and 202.
Resources Regulator	Mining Operations Plan	1 December 2020	31 December 2023	The MOP no longer took effect from 1 August 2022 in accordance with the NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation
Resources Regulator	Rehabilitation Management Plan	1 August 2022	N/A	Took effect 1 August 2022 in accordance with NSW Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation

4 OPERATIONS SUMMARY

During the reporting period longwall mining extracted panel 110. Underground development continued into longwall (LW) panels LW204 and the 200 Mains. The longwall has previously extracted panels LW101 to LW109.

Table 6 presents the production summary for the previous and current reporting periods and the forecast production schedule for the next reporting period.

4.1 MINING OPERATIONS

Table 6: Production Summary

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next Reporting period (forecast)
Waste Rock / Overburden	657,000 m ³ (2010 MOP, Table 3.8)	0	0	0
ROM Coal*	11 Million Tonnes CY (PA 08_0144 Sch. 2, Cond.6) > 5 Million Tonnes produced (EPL 12789)	6.71	3.37	6.04
Reject Material	N/A (Million Tonnes)	0.05	0.15	0.08
Saleable Product**	> 5 Million Tonnes handled (EPL 12789)	6.45	3.43	6.01

* - ROM Coal is total production at the mine site. The difference between ROM Coal and final product is related to changes in stockpile volumes at the mine.

** - Saleable Product is coal railed from site.

4.2 OTHER OPERATIONS

4.2.1 Exploration Activities

No exploration drilling was undertaken within ML1609 during the 2022 reporting period.

4.2.2 Construction

The following construction activities were undertaken during the reporting period:

- Construction of an alternative access track to improve truck access for deliveries to site commenced within the reporting period. The site had been cleared for agricultural purposes prior to the commencement of mining activities and was previously approved as part of the Mining Operations Plan which was updated in early 2022;
- As part of ongoing development of the pit-top water management infrastructure, construction of a new HDPE lined Brine Dam commenced within the reporting period. The dam is being constructed in a designated area approved under existing PA 08_0144; northwest of the existing pit-top surface water infrastructure and adjacent to the Kamilaroi Highway. Construction of additional surface development associated with the Brine Dam includes a sediment dam (SD7) to manage runoff from the disturbed construction and operational areas, an access track and services corridors from the existing rail loop dam complex;
- Installation of a MOS building within the coal handling and processing plant (CHPP) area was commenced;
- Installation of temporary office and bathhouse facilities within the pit-top infrastructure area; and
- Installation of security lighting and CCTV on the site entrance road.

Underground development works have been described in Section 4.1.

4.2.3 Hours of Operation

The approved hours of operation are provided in Table 7.

Table 7: Hours of Operation

Activity	Hours / Days
Mining Operations	
Pit Bottom Area development	24 hours / 7 days
Underground mining	24 hours / 7 days
Gas drainage	24 hours / 7 days
Ventilation fan operation	24 hours / 7 days
Coal processing and handling	24 hours / 7 days
Rail loading and transportation	24 hours / 7 days
Surface maintenance	24 hours / 7 days
CHPP reject disposal	24 hours / 7 days ¹
Raw materials / supply delivery	7:00am to 10:00pm / 7 days
1: Reject disposal activities will generally be restricted to 7:00am to 10:00pm, 7 days per week. However, it is possible that the proportion of reject material generated by the CHPP may exceed the predicted average 5% level for short periods. To account for these periods of elevated reject production, contingent hours of operation will be 24 hours / 7 days (when inversion conditions do not prevail).	

4.3 NEXT REPORTING PERIOD

4.3.1 Mine Operations

The planned mine production rate for the next reporting period will be 6.04 Mt of ROM coal which is expected to contain approximately 0.08 Mt of coarse reject material. Longwall extraction of LW110B will conclude early 2022, followed by the commencement of LW203. Development (first workings) will be carried out for LW205, LW206 and 200 Mains.

4.3.2 Exploration

Exploration drilling will continue to be undertaken at the Narrabri Mine. The primary focus of the exploration activities during the next reporting period will be structure/fault definition through the drilling of 6 exploration bore holes on ML 1609.

4.3.3 Construction Activities

Proposed construction activities during the next reporting period include:

- Completion of the alternate access track to improve truck deliveries to site
- Completion of the new brine dam (as described in Section 4.2.2).
- Ongoing expansion of the internal network of access tracks
- As part of the ongoing development of mine ventilation infrastructure construction of a downcast ventilation shaft at the southern extent of Longwall 205. Construction activities will require clearing of a hardstand area to locate temporary amenities, equipment storage areas, shaft construction plant and equipment, settlement dams, topsoil stockpiles, and a stormwater run-off catch dam to contain all rainwater on the site. Water from the dam will be used in the shaft construction boring process.
- Storage sheds within the pit-top infrastructure area.

4.3.4 Mining Fleet Upgrades

Modification 7 to PA 08_0144 was approved on 23 November 2021, and allows the bord and pillar mining of longwall panels 201 and 202. Mining equipment to facilitate the bord and pillar operations that will be introduced to the project during this reporting period include:

- 1 x continuous miner Komatsu Joy 12CM12;

- 2 x shuttle cars;
- 2 x underground mining LHD (load haul dump) loaders;
- 2 x underground personnel transport SMVs; and
- Multi bolter

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

The 2022 Annual Review identified the following actions, summarised in Table 8.

Correspondence was received from NSW DPE 14 June 2022 stating that the 2021 Annual Review report had satisfied the reporting requirements of the approval and did not include any additional corrective actions.

Correspondence was received from NSW DPE 16 December 2022 requesting that all coal mine annual reviews include the status and management of biodiversity offsets, and the reporting of greenhouse gas management measures by coal mines to address community concern. Action taken to address this request is summarised in Table 8.

Table 8: Actions from the Previous Annual Review (2021)

Action required from Previous Annual Review	Requested By	Action Taken by the Operator	Where discussed in Annual Review
Biodiversity Offsets: Report on the status of the long-term security arrangement for biodiversity offsets required by the development consent for the mine. Please include information on the type(s) of long-term security arrangements that have been implemented and/or are to be implemented for the mine.	DPE	Seven Conservation Agreements on land title for seven offset properties have been registered as required on the Biodiversity Offset Strategy (BOS).	6.6.2.2
Greenhouse Gas: Report on greenhouse gas emissions for the reporting period and include a comparison of actual greenhouse gas emissions against the predictions in the environmental assessment(s) for the mine. Please ensure that the method used to calculate the environmental assessment prediction(s) and annual emissions are calculated the same.	DPE	The total of Scope 1 + Scope 2 GHG emissions attributed to the mine reported for the NGERs FY2022 reporting year were 588,839 t CO ₂ -e. The FY2022 EA prediction was 410,129 t CO ₂ -e. Fugitive emissions methodology used in FY22 GHG reporting and EA predictions was Method 4. However the global warming potential (GWP) for Methane utilised in FY22 calculations has increased from 21 in the year of EA predictions to 28 for the FY22 GHG reporting. Fugitive emissions and therefore total emissions for FY22 have been recalculated using a comparable GWP. Therefore, the recalculated total emissions using an EA comparable method is 461,099.	6.5.2
Greenhouse Gas: Report all reasonable and feasible steps undertaken during the reporting period to improve energy	DPE	NCO is currently working with Palaris to develop a Decarbonisation Pathway, which involves mapping carbon footprint, identifying abatement	6.5.3

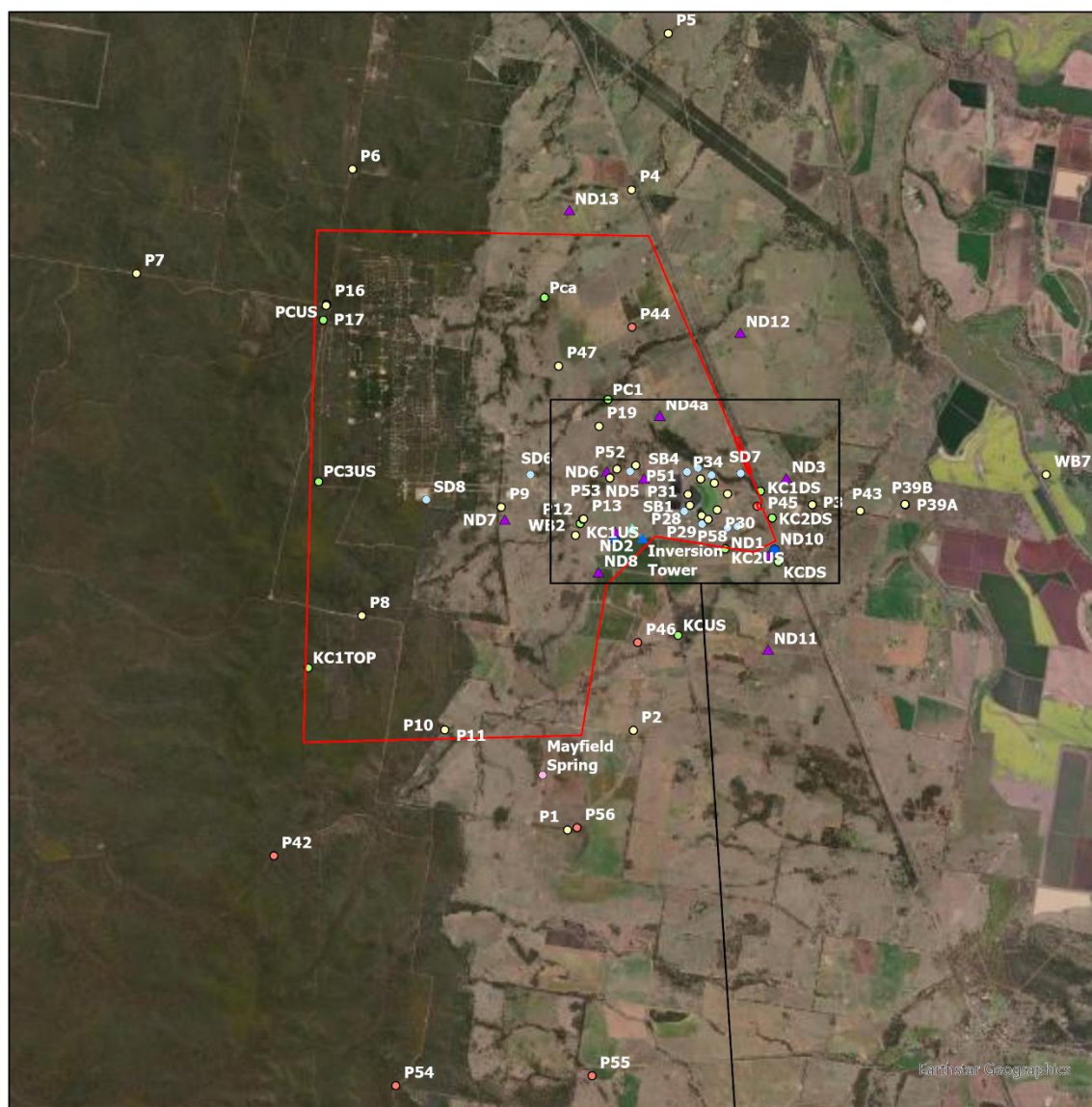
Action required from Previous Annual Review	Requested By	Action Taken by the Operator	Where discussed in Annual Review
efficiency and reduce greenhouse gas emissions generated by the mine.		opportunities and pathway prioritisation.	
Noise: The two Caterpillar D11T stockpile dozers DZ308 and DZ368 were purchased in the previous reporting period and as reported in the 2020 Annual Return exhibited lower sound power levels of 113.5dB and 115dB respectively. The reported SPL of these two machines for the current reporting period show an increase, with DZ308 slightly above the modelled level of 118dB. Investigations will be undertaken during the next reporting period into the increased noise from DZ308 and DZ368 and a review of maintenance requirements.	Operator	Noise attenuation rings were mounted to the final drive of the two stockpile Caterpillar D11T dozers to reduce the noise of the track slap during the reporting period. Thearle Engineering conducted SPL monitoring on these two units during May 2022, both units measuring below the modelled level of 118dBA. (DZ308 = 115 and DZ368 = 117).	6.1.2
Air Quality: Further improvements to the site dust suppression system identified by the Pollution Reduction Study which will be implemented during this reporting period: The assessment of the effectiveness of water sprays identified that two SR100 water cannons at locations 3 and 6 installed for product coal stockpile spray coverage are ineffective under TARP levels 3 and 4. These two stockpile sprays will be upgraded to SR150 nozzles, which have been assessed as effective under all TARP level wind conditions.	Operator	SR150 water cannons were installed at the Narrabri Mine CHPP Product Stockpile spray locations 3 and 6 in June 2022. A licence variation to EPL12789 was received 7 September 2022 removing Condition U1.1 regarding dust suppression measures at the premises.	6.3.2
Groundwater: Monitoring bores that have become obsolete due to mining through these areas will be grouted during the next reporting period. These include P14 (90BL254661), P15	Operator	The monitoring bores listed have been sealed with cement grout and decommissioned in accordance with the requirements within ' <i>minimum construction requirements for water bores in Australia</i> '.	8.1.5

Action required from Previous Annual Review	Requested By	Action Taken by the Operator	Where discussed in Annual Review
(90BL254961), and P18 (90BL254662).			
Biodiversity: Subsidence Pond investigations: during the next reporting period Narrabri Mine will engage specialists to undertake engineering studies into geomorphic design options that would enable the subsidence pond areas to freely drain in a safe and stable way. Following the engineering design options an environmental assessment will be completed to determine the options for implementation	Operator	An engineering study into geomorphic design options has been completed during the 2022 reporting period. An environmental assessment will be completed during the 2023 reporting period to determine the most appropriate option for implementation.	Mine Site Environmental Performance 6.6.2.1
Transport: The Shuttle Bus Traffic Control Protocol will be developed and implemented to address the new conditions associated with Modification 7	Operator	Following the approval of the Extraction Plan for panels 201 – 202, the Shuttle Bus Traffic Control Protocol was developed and approved by NSW DPE March 2022. Monitoring was conducted in accordance with the Shuttle Bus Traffic Control Protocol during the reporting period.	6.9.2
Mine Subsidence: Further actions will be undertaken to establish an integrated electronic GIS based monitoring platform for environmental monitoring, including subsidence crack monitoring	Operator	An electronic GIS based monitoring platform for subsidence crack monitoring was implemented during the reporting period. It records the size and location of subsidence related cracking, rehabilitation records and inspection areas.	6.13.2
Surface Water Management: As a result of updates to the Water Balance Model during the 2021 reporting period, there are a number of actions planned for the next reporting period, which include: Construction of additional brine storage; Improvements to the capacity and performance of the site water treatment plants; and Enhanced evaporation of brine through the use of evaporator fans during favourable conditions; and	Operator	Construction of the new brine dam commenced in mid-2022 with completion expected to be in Quarter 2 of 2023. The additional hire RO treatment plant, which was commissioned in November 2021 to assist with treating an increased amount of water from excess runoff received throughout the year, continued to be used in 2022. Evaporator fans to enhance evaporation during a year where above average rainfall was received onsite. A weather station was installed at the	7.2.2

Action required from Previous Annual Review	Requested By	Action Taken by the Operator	Where discussed in Annual Review
Development of Raffinate Discharge Control and Monitoring Plan in consultation with DPI&E. – not submitted		<p>power source for these evaporation fans to allow for them to be automatically shut down during unfavourable conditions, using wind speeds as the trigger.</p> <p>Development of the Raffinate Discharge Control and Monitoring Plan was commenced during the reporting period and will continue into the next reporting period.</p> <p>No raffinate discharge events were required during the reporting period.</p>	
<p>Proposed Research and Rehabilitation: An integrated electronic GIS based monitoring platform was proposed in the 2021 Annual Review. This project was delayed to ensure that NSW mining lease rehabilitation reforms were captured within this program. This application is expected to be developed and implemented within the 2022 reporting period to capture and track surface disturbance and rehabilitation.</p>	Operator	A GIS specialist was engaged to begin work on the GIS based rehabilitation monitoring system. The system has been built and is currently being tested and refined. The system is expected to be running alongside the current paper-based system during the reporting period.	8.1.9

6 ENVIRONMENTAL PERFORMANCE

The following sub-sections report on the environmental performance achieved during the reporting period and provides a summary of the environmental monitoring data compared to data predictions, trends and management measures. Environmental monitoring locations are illustrated on Figure 3.



NCO Environmental Monitoring Locations

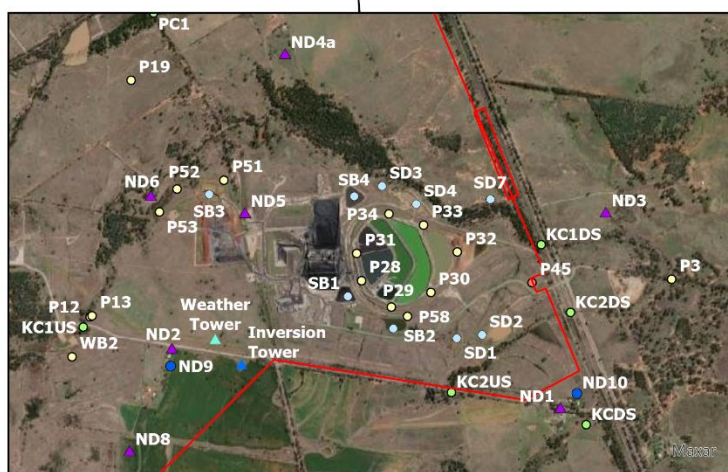
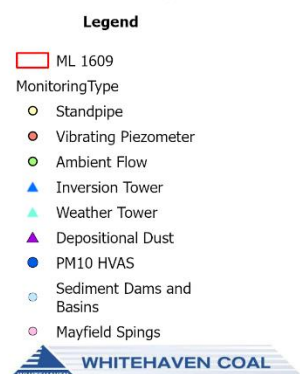


Figure 3: Environmental Monitoring Locations

6.1 NOISE

6.1.1 Environmental Management

Potential noise impacts associated with the Narrabri Mine are managed in accordance with the:

- Noise Criteria and Operating Conditions prescribed under Schedule 4, Conditions 1 to 5 of PA 08_0144;
- EPL 12789 Conditions L4, M7, R4 and E2; and
- NCO has previously prepared the Narrabri Mine Noise Management Plan (NMP) to address the requirements of condition 4, schedule 4 of the PA 08_0144, the NMP was approved by DPIE on the 5 July 2018.

During the reporting period various controls were implemented to manage noise including:

- Progressive replacement of reversing alarms on all existing surface vehicles and machinery to be of the low frequency type;
- Cleaning and maintenance of the acoustic attenuators on the fan discharge duct at the main ventilation fan
- Rail track inspections and maintenance activities to mitigate train related noise;
- Maintenance activities along the main entrance road were undertaken to repair potholes and thereby minimise traffic noise;
- The approved hours of operation were adhered to; and
- Monitoring of emitted noise levels is undertaken during mining operations to verify compliance with noise criteria and to assess the need, if any, for additional noise attenuation measures.

The Narrabri Mine noise monitoring network includes:

- Continuous monitoring at three real-time monitoring units for management purposes;
- Temperature Inversion monitoring is undertaken continuously by directly measuring temperature at two elevations 50m apart (10m and 60m from ground level); and
- Quarterly attended monitoring at locations as described in the EPL and Noise Management Plan.

6.1.2 Environmental Performance

Attended Monitoring

Attended noise monitoring is conducted on a quarterly basis during the reporting period by an independent consultant. The attended noise monitoring is used to assess compliance with licence and approval limits for mine contributed noise. A summary of the noise monitoring results are outlined in Table 9 with compliance achieved at all locations for all the monitoring events.

Table 9: Noise Monitoring Summary 2022

Plan	Site ID	Site name	Criteria ($L_{Aeq}(15 \text{ minute})$, dB(A))	Criteria ($L_A(1 \text{ minute-Night})$, dB(A))	Quarter 1		Quarter 2		Quarter 3		Quarter 4	
					7-10 March (Mine Contribution, dB(A)) ¹		20-23 June (Mine Contribution, dB(A)) ¹		12-14 Sept (Mine Contribution, dB(A)) ¹		21-24 Dec (Mine Contribution, dB(A)) ¹	
					L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night	L_{Aeq} 15 min	L_A 1 min Night
NMP	N3	Ardmona	35	45	<25	26	I/A	I/A	33	37	I/A	N/M
EPL	N5	Oakleigh ²	35	45	26	N/M	38	35	37	40	28	25
EPL	N6	Newhaven	35	45	31	31	30	35	<25	N/M	34	44
EPL	N8	Haylin View ²	35	45	39	42	30	36	37	40	I/A	I/A
EPL	N9	High Range ²	35	45	30	30	32	28	I/A	I/A	29	30

I/A = Inaudible, N/M = Not Measurable

Note 1: Noise levels presented are the highest measured noise level under compliant weather conditions over the monitoring period.

Note 2: Property is owned by Narrabri Coal Operations

Quarterly monitoring is also undertaken at N1, however a private agreement is in place and therefore the results are not included in this AR.

Figure 4 (below) displays attended noise monitoring results for the reporting periods of 2019 to 2022. During the 2022 reporting period, noise levels above 35dBA were recorded at N5, Oakleigh (Q2, Q3) and N8, Haylin View (Q1, Q3). These two properties are owned by Narrabri Coal and are not a private residence, therefore the EPL noise criteria does not apply. Compliance was achieved at all locations within 2022. Excluding Oakleigh and Haylin View, the noise monitoring results were comparable to results in the 2021 reporting period.

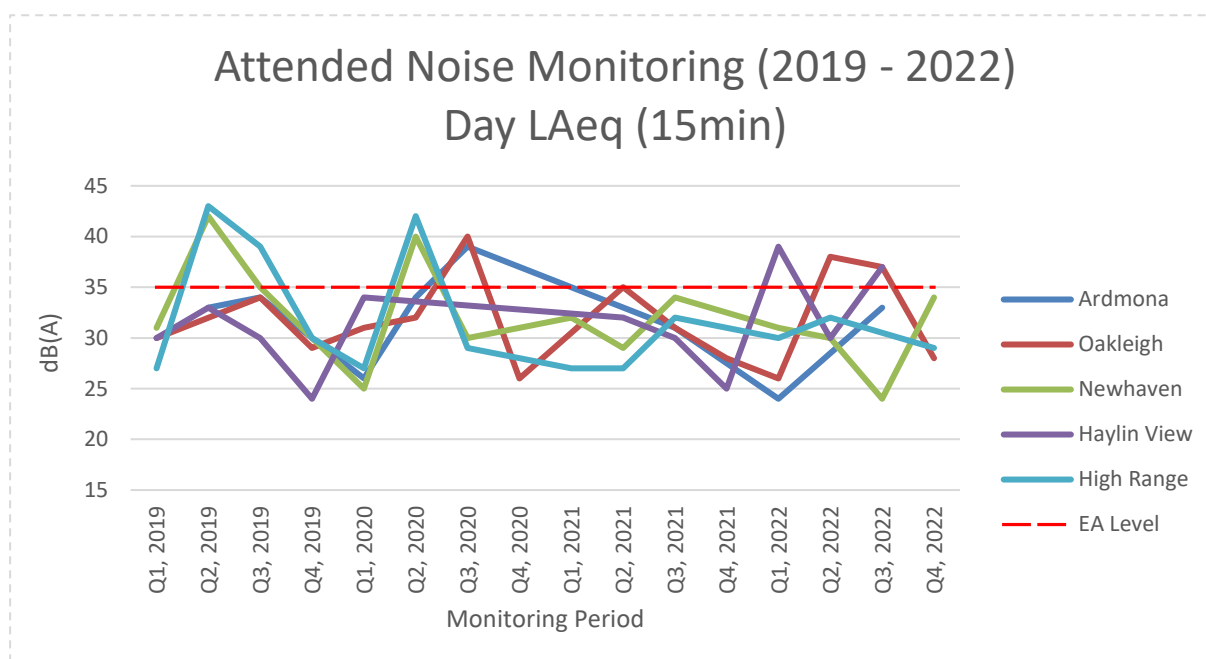


Figure 4: Trended Attended Noise Monitoring (2019 – 2022) Day LAeq (15 min)

Note 1: Noise levels presented are the highest measured noise level under compliant weather conditions over the monitoring periods, excluding results that were Inaudible or Not Measurable.

Sound Power Testing (SPL)

SPL testing was undertaken on key mobile plant and other fixed equipment during the reporting period, results are summarised in Table 10. The Main Ventilation Fan exceeded the Modelled SPL by 2dB. Following this event, the units were taken off line for cleaning and maintenance. Retesting of the SPL measurements will be undertaken in early 2023 to determine if these actions have been successful in reducing results.

The Caterpillar D11T stockpile dozer DZ308 returned a dB result above the modelled SPL in the 2021 reporting period, however the dB result has decreased from 119dB to 115dB in 2022. During the 2022 reporting period, further maintenance requirements were investigated, and implemented, including installation of a new noise attenuation ring.

Table 10: SPL Testing Summary

Unit	Equipment Type	Parameter	Modelled SPL (dB)	Result dB
N/A	Main Ventilation Fans	In Service	117	119
MEU004	Goaf Drainage Unit	In Service	102	99
MD29	Sandvik DE840 Drill Rig	In Service	109	107
DZ308	Caterpillar D11T Dozer	Dynamic cycle	118	115
DZ368	Caterpillar D11T Dozer	Dynamic cycle	118	117
DZ004	Komatsu D375A Dozer	Dynamic cycle	118	110
DZ005	Komatsu D475A Dozer	Dynamic cycle	118	112

6.1.3 Proposed Improvement Measures

Retesting of the Main Ventilation Fan SPL measurements will be undertaken in early 2023 to determine if these actions have been successful in reducing results.

Predictive meteorological software that provides forecasts specific to the Narrabri Mine location will be integrated into day-to-day operations. The software will integrate weather observations from the onsite meteorological station into regional forecasts to provide a more accurate weather forecast. This software will assist with the site's noise mitigation as it provides a forecast of when the meteorological conditions are likely to exhibit conditions outlined in the sites trigger action response plan (TARP). This information will be disseminated across the sites work groups to allow for better planning of operational activities.

6.2 BLAST

As there has not been any surface or near-surface blasting at the site during the reporting period, no blast monitoring has been required or conducted.

6.3 AIR QUALITY

6.3.1 Environmental Management

Potential air quality impacts associated with the Narrabri Mine are managed in accordance with the:

- Air quality criteria prescribed under Schedule 4, Condition 6 of the PA 08_0144;
- EPL 12789 Conditions O3, P1 and M2; and
- NCO has previously prepared the Narrabri Mine Air Quality Management Plan (AQMP) to address the requirements of condition 7A, schedule 4 of the PA 08_0144; the AQMP was approved by DPIE on the 26 May 2015.

Narrabri Mine employs a range of air pollution control measures including:

- Cleared trees and branches will be retained for use in stabilising disturbed areas until they are rehabilitated are no longer required;
- Trigger Action Response Plans (TARPs) have been developed for the major dust generating activities onsite which currently includes: the coal processing area; surface drilling activities; and surface civil works;
- All conveyers will be fitted with appropriate cleaning and collection devices to minimise the amount of material falling from the return conveyor belts and are partly enclosed to minimise dust lift-off;
- The coal rotary breaker is enclosed;
- The CHPP and stockpile areas have a fully automated water spray systems, including conveyor belt sprays and stockpile sprays;
- Clear definition of all the site roads and the restriction of vehicles and equipment to the roads. All site roads and hardstand areas are routinely watered by a mobile water cart;
- Progressive rehabilitation of areas of disturbance including topsoil and subsoil stockpiles;
- Maintaining a perimeter amenity bund and windbreaks.

The Narrabri Mine air quality monitoring network is illustrated on Figure 3 and includes:

- PM₁₀ levels are measured by two High Volume Air Samplers (HVAS) for a twenty-four hour period every six days. Total Suspended Particulate (TSP) matter is inferred at a ratio of 1:2 from the measured PM₁₀ data; and

- a network of eight Dust Deposition Gauges (DDGs), measuring deposited dust and particulates collected monthly.

6.3.2 Environmental Performance

Depositional Dust results for the reporting period (Table 11) indicate that all monitoring locations are below the annual average criteria of 4 g/m²/month Total Insoluble Solids. All dust monitoring locations are located on mine owned properties, with the exception of ND3.

The reporting period average for ND3 was 0.5 g/m²/month and the long-term average is 1.7 g/m²/month. The reporting period average is below the annual average criteria. All depositional dust sites were below the predicted EA levels.

Table 11: Deposited Dust Monitoring Data Summary for the Reporting Period

Site	EPL ID No.	Property Name	PA 08_0144 Annual Average Criteria		Modification 5 EA Levels (g/m ² /month)	Annual Mean Total Insoluble Solids (g/m ² /month)
			Max Increase (g/m ² /month)	Max Total (g/m ² /month)		
ND1	-	Turrabaa	2	4	2.2	0.8
ND2	-	Claremont	2	4	1.9	0.9
ND3	3	Bow Hills	2	4	2.0	0.5
ND4A	-	Matoppo	2	4	2.3	1.0
ND5	-	Willarah	2	4	2.9	1.8
ND6	-	Willarah	2	4	2.9	1.3
ND7	-	Claremont	2	4	1.9	0.9
ND8	-	Claremont	2	4	1.9	1.5

Depositional Dust for all sites during the reporting period recorded lower or the same results than previous years (Figure 5). Lower results within the reporting period may be attributed to higher rainfall recorded than previous years. Previous Annual Reviews also highlighted the occurrence of bush fires and regional dust storms (extraordinary events as per PA08_0144 Schedule 4 Condition 6) as impacting on results during previous reporting periods. This is reflected in the exceedance of the annual average criteria at ND1 and ND6 for the 2018 reporting period. An assessment of the ash content of the sites (at the time of reporting 2018) indicated that these two dusts gauges were impacted by combustible material not indicative of dust sources associated with the mining operation.

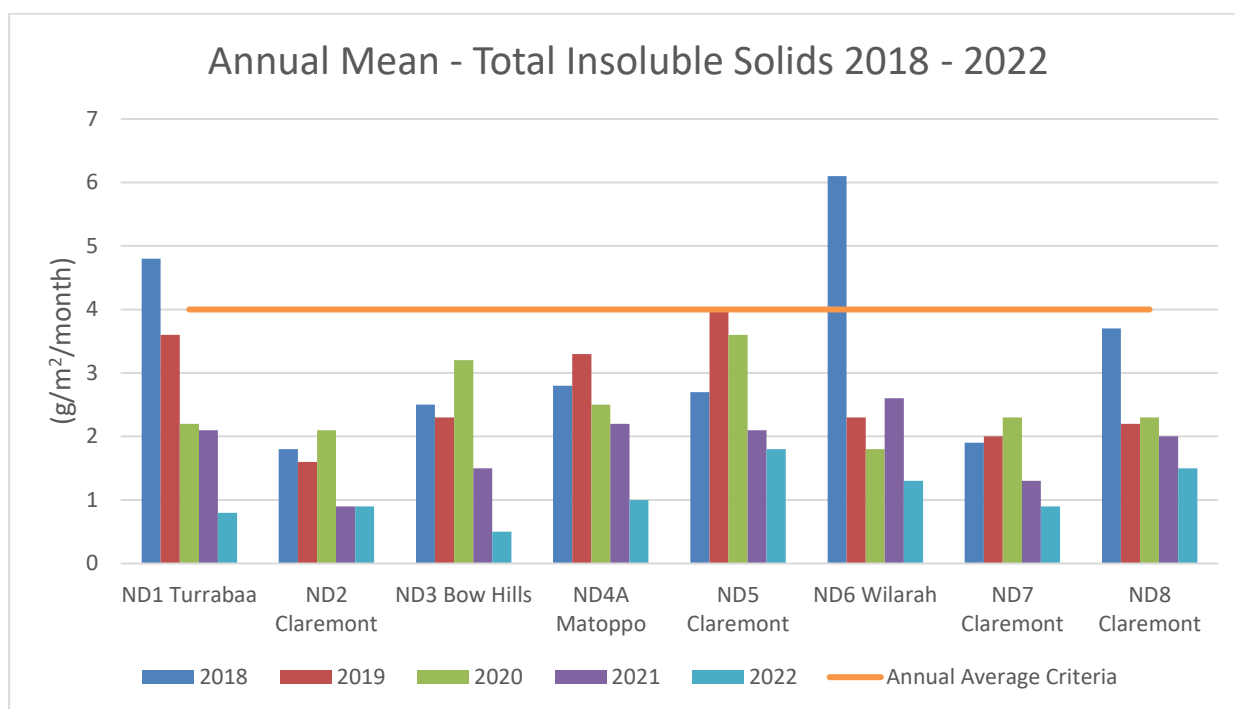


Figure 5 Average Depositional Dust Results 2018 - 2022

The HVAS monitoring conducted (Figure 4 and Figure 5) indicate that the PM₁₀ annual average results remain below the applicable criteria of 30 µg/m³ at both monitoring locations; with PM₁₀ results of 4.28 µg/m³ at ND9 and 4.26 µg/m³ at ND10. The results for the PM₁₀ monitoring confirm that the TSP criteria for the mine are within the annual average compliance limit. The DPI&E have previously advised that Whitehaven's method for determining TSP concentrations by multiplying PM₁₀ concentrations by a factor of 2, is satisfactory. Based on the above, the calculated annual average TSP concentrations of 8.55 µg/m³ at ND9 and 8.53 µg/m³ at ND10 are both below the 90 µg/m³ annual average AQ impact assessment TSP criterion.

During the reporting period there were no exceedances of the 24-hour criterion (50 µg/m³).

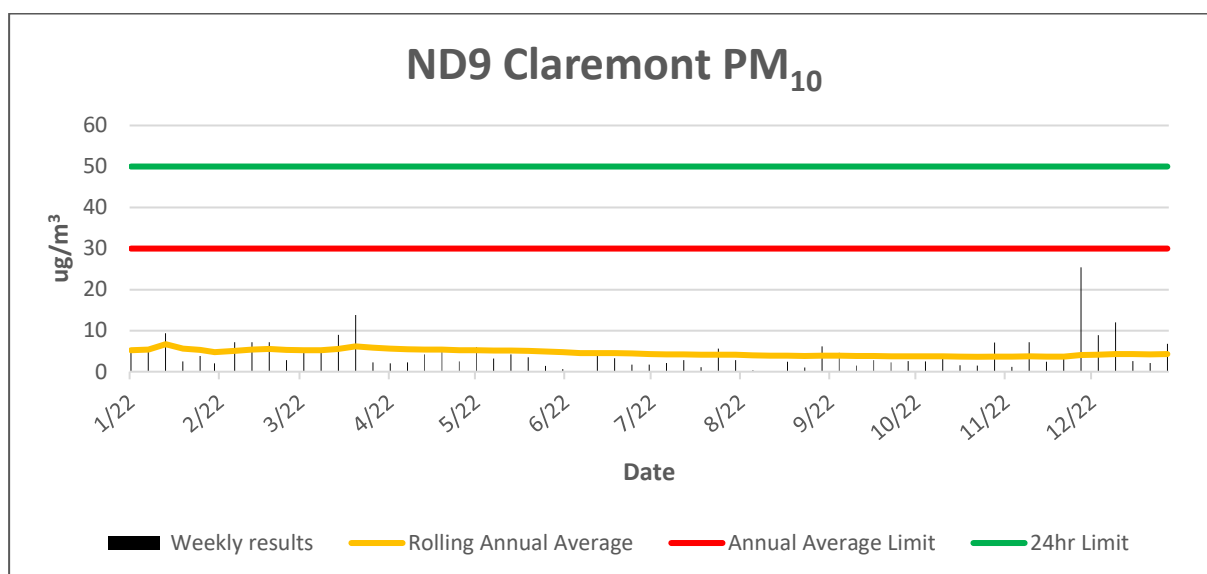


Figure 6: ND9 PM₁₀ Results including extraordinary weather events

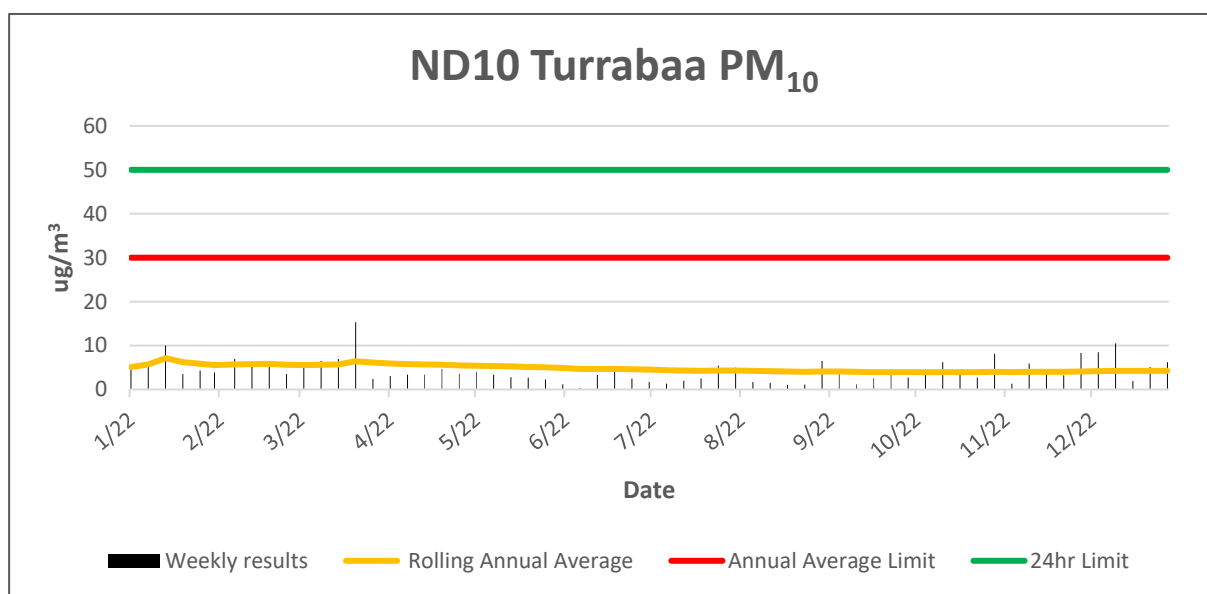


Figure 7: ND10 PM₁₀ including extraordinary weather events

Table 12 displays that PM₁₀ levels have remained below the annual averaging criteria of 30 $\mu\text{g}/\text{m}^3$ across previous years; with the current reporting periods PM₁₀ results averaging 4.28 $\mu\text{g}/\text{m}^3$ at ND9 and 4.26 $\mu\text{g}/\text{m}^3$ at ND10. These results were lower than the results from the previous two reporting periods; with PM₁₀ results of 4.66 $\mu\text{g}/\text{m}^3$ at ND9 and 5.69 $\mu\text{g}/\text{m}^3$ at ND10. The Stage 2 EA determined that NCOs' Assumed Ambient background level for annual PM₁₀ Average is 15.8 $\mu\text{g}/\text{m}^3$. The 2022 results are below this level. As discussed, higher results in previous years can be attributed to low rainfall within the region, particularly for the years 2018 and 2019. This period has also seen the occurrence of regional dust storms as well as bushfires being recorded in the region for 2019, both of which impacted regional air quality. Previous Annual Report commentary suggests that the data for these extraordinary events (as per PA08_0144) has not been excluded from data summaries.

Table 12: PM₁₀ Annual Average (2018 – 2022)

Site		2018	2019	2020	2021	2022
ND9	µg/m ³	19.38	19.24	10.33	4.66	4.29
ND10	µg/m ³	18.50	25.10	9.13	5.69	4.26

Narrabri Coal Operations Pty Ltd (NCO) was issued a variation to Environmental Protection Licence (EPL) 12789 in the form of a Pollution Reduction Program (EPA Notice Number 1582323) on 3 December 2019 which required a Review of the Pit Top Dust Suppression System (Condition U1.1). On the 22nd of December 2021 NCO submitted a report to address the requirements of condition U1.1. This condition was removed as of the 7th of September 2022, as the report and a site inspection confirmed mitigation measures have been established and the requirements have been met.

The assessment of the effectiveness of water sprays identified that two SR100 water cannons at locations 3 and 6 installed for product coal stockpile spray coverage are ineffective under TARP levels 3 and 4. These two stockpile sprays were upgraded to SR150 nozzles June 2022, which were assessed as effective under all TARP level wind conditions.

6.3.3 Proposed Improvement Measures

Predictive meteorological software that provides forecasts specific to the Narrabri Mine location will be integrated into day-to-day operations. The software will integrate weather observations from the onsite meteorological station into regional forecasts to provide a more accurate weather forecast. This software will assist with the site's dust mitigation as it provides a forecast of when the meteorological conditions are likely to exhibit conditions outlined in the sites trigger action response plan (TARP). This information will be disseminated across the sites work groups to allow for better planning of operational activities.

6.4 METEOROLOGICAL DATA

Meteorological monitoring is conducted onsite in accordance with Schedule 4, Condition 8 of PA 08_0144 at the Narrabri Mine meteorological station. The location of the Narrabri Mine meteorological station is illustrated on Figure 3. Table 13 summarises the monthly meteorological conditions recorded at the Narrabri Mine station for the reporting period.

The total rainfall for the reporting period was recorded at 1010.6 millimetres (mm), which is higher than the historical average of 581.1mm recorded from the Narrabri Airport and higher than the 1001.8mm recorded during the 2021 reporting period.

The minimum temperature during the reporting period was -1.6°C in June 2022 and the maximum temperature was 39.4°C in January 2022. The minimum and maximum temperatures recorded were slightly below historical averages.

The predominant wind direction in the 2022 reporting period was SE, which is comparable to previous reporting periods.

Inversion conditions are calculated from measurements recorded by the site 60m Inversion Tower. Inversions occur during E, F and G stability categories (these categories represent weak, moderate and strong inversion conditions).

Table 13: Summary of Meteorological Conditions 2022

Month	Rain (mm)	Cumulative Rainfall (mm)	Rainfall Days (>1mm)	2m Temperature (°C)			Wind		Inversion Conditions
				Min	Mean	Max	Av. Speed (m/s)	Predominant Direction	% of Evening/Night Time Period
Jan-22	86.4	86.4	6	15.0	25.6	39.4	2.4	SE	27.2%
Feb-22	65.4	151.8	8	11.3	23.3	36.0	3.3	SE	28.5%
Mar-22	76.8	228.6	7	13.7	22.0	34.1	3.2	SE	31.7%
Apr-22	40.6	269.2	7	6.9	18.2	29.6	2.4	SE	44.2%
May-22	70	339.2	9	1.7	14.6	27.1	2.7	SE	49.1%
Jun-22	19	358.2	2	-1.6	9.0	20.8	2.0	SE	59.6%
Jul-22	19.6	377.8	2	-1.5	10.1	20.6	2.6	SE	63.0%
Aug-22	114.4	492.2	8	-0.6	11.8	23.0	2.4	NW	55.8%
Sep-22	190.4	682.6	9	4.5	14.0	25.8	2.2	SE	51.1%
Oct-22	172.4	855	7	6.5	17.9	31.1	2.0	SE	39.8%
Nov-22	111	966	3	4.6	18.9	33.4	2.2	S	36.9%
Dec-22	44.6	1010.6	5	6.1	21.7	35.4	2.7	SE	32.1%

6.5 GREENHOUSE GAS

6.5.1 Environmental Management

Greenhouse Gas (GHG) emissions at the Narrabri Mine are managed in accordance with Schedule 4 Conditions 30 and 32 of PA 08_0144 and the Greenhouse Gas Minimisation Plan (GHGMP). The main sources of GHG emissions considered in the GHGMP are:

- Consumption of diesel fuel – Scope 1;
- Consumption of electricity – Scope 2; and
- Fugitive emissions associated with gas drainage and ventilation – Scope 1.

6.5.2 Environmental Performance

GHG emissions are reported through participation in the National Pollutant Inventory (NPI) and as part of the Whitehaven Group in the National Greenhouse and Energy Reporting Scheme (NGERS). The total of Scope 1 + Scope 2 GHG emissions attributed to the mine reported for the NGERS FY2022 reporting year were 588,839 t CO₂-e. The FY2022 EA prediction was 410,129 t CO₂-e. Fugitive emissions methodology used in FY22 GHG reporting and EA predictions was Method 4. However the global warming potential (GWP) for Methane utilised in FY22 calculations has increased from 21 in the year of EA predictions to 28 for the FY22 GHG reporting. Fugitive emissions and therefore total emissions for FY22 have been recalculated using a comparable GWP. Therefore, the recalculated total

emissions using an EA comparable method is 461,099. The following sections detail the key contributors for the NGERS FY2022 reporting year.

Scope 1 emissions

Scope 1 greenhouse gas emissions for the FY2022 NGERS reporting period were 519,704 t CO₂-e. The FY2022 EA prediction for Scope 1 emissions was 357,890 CO₂-e. The breakdown of contributors to the Scope 1 emissions total is as follows:

- Fuel combustion (emissions released from combustion of liquid fuels- stationary and transport, and petroleum based oils and greases): approximately 5033kl was consumed equating to 11,304 t CO₂-e. The fuel usage figures have increased since the previous reporting period.
- Fugitive emissions (from extraction of coal): The reported figure of 508,385 t CO₂-e is an increase from the previous reporting period. The recalculated fugitive emissions using EA comparable method is 2022 is 381,289 t CO₂-e
- Industrial processes (emissions of hydrofluorocarbons and sulphur hexafluoride gases): The reported figure of 15 t CO₂-e is a decrease from the previous reporting period.

Scope 2 emissions

Approximately 87,510 MWh electricity was purchased by the mine during the 2022FY reporting period equating to 69,133 t CO₂-e GHG emissions. This is less than the previous reporting period and above the FY22 EA predicted consumption of 52,239 t CO₂-e.

6.5.3 Proposed Improvement Measures

NCO is currently working with Palaris to develop a Decarbonisation Pathway, which involves mapping carbon footprint, identifying abatement opportunities and pathway prioritisation.

6.6 BIODIVERSITY

6.6.1 Environmental Management

Biodiversity is managed in accordance with:

- Schedule 5, Conditions 1 to 7 of PA 08_0144; and
- the Narrabri Mine Landscape Management Plan (LMP) and Biodiversity Offset Strategy (BOS) prepared to satisfy the requirements of PA 08_0144.

To meet these BOS approval requirements; WHC established Kenna BOA (Kenna offset property) (Figure 9) and the Onsite BOA (includes offset properties: Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven) (Figure 10). These properties are displayed at a regional scale in Figure 8. The Narrabri Coal Mine Stage 1 and 2 Biodiversity Offset Strategy (Eco Logical Australia, 2014 and revised 2019) confirmed the ability of these properties to meet “like for like or better” and “maintain or improve” conservation outcomes’ and outlined that the Narrabri BOA covers an area of native vegetation greater than 1,243ha from the Kenna offset property and greater than 422ha from the Onsite offset properties. Furthermore, up to 1,168 ha of woodland vegetation that was subject to subsidence impacts at NCM, will also be established as the “future” offset, adjoining the Onsite offset properties to be progressed at the end of the mine life, resulting in an overall NCM BOS of 2,833ha. The NCM BOS includes the protection of *B. opposens* and Superb Parrot habitat within nearly 380 ha of Red Ironbark – Brown Bloodwood shrubby woodland and a further 297 ha of the same vegetation type occupied by *B. opposens* located within the 1,168 hectares affected by subsidence. The NCM BOS provides an estimated 327,094 plants in the Onsite offset properties with an additional estimated 169,184 plants within the “future” offset for a total of approximately 500,000 plants.

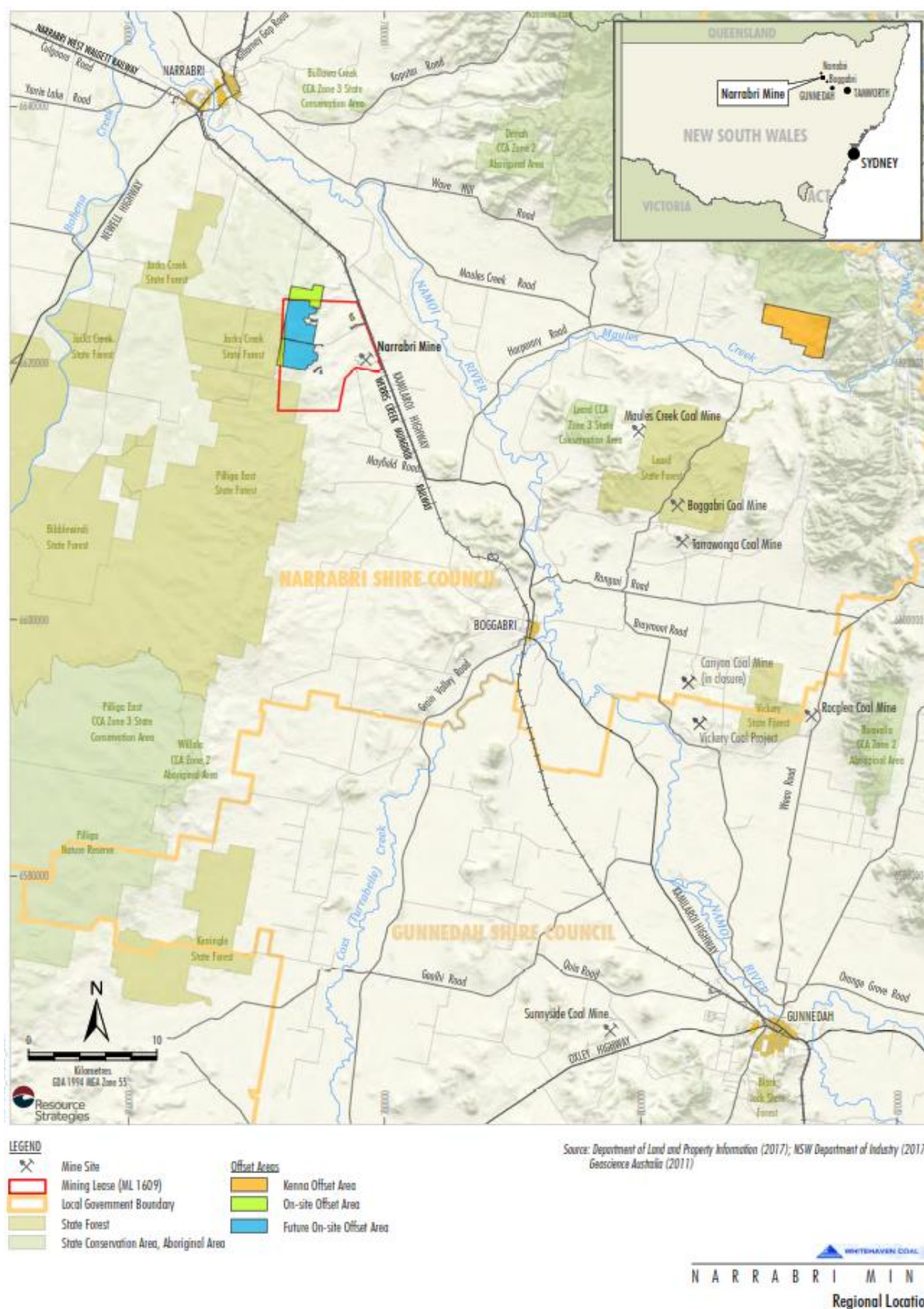


Figure 8: Regional location of Biodiversity Offset Areas

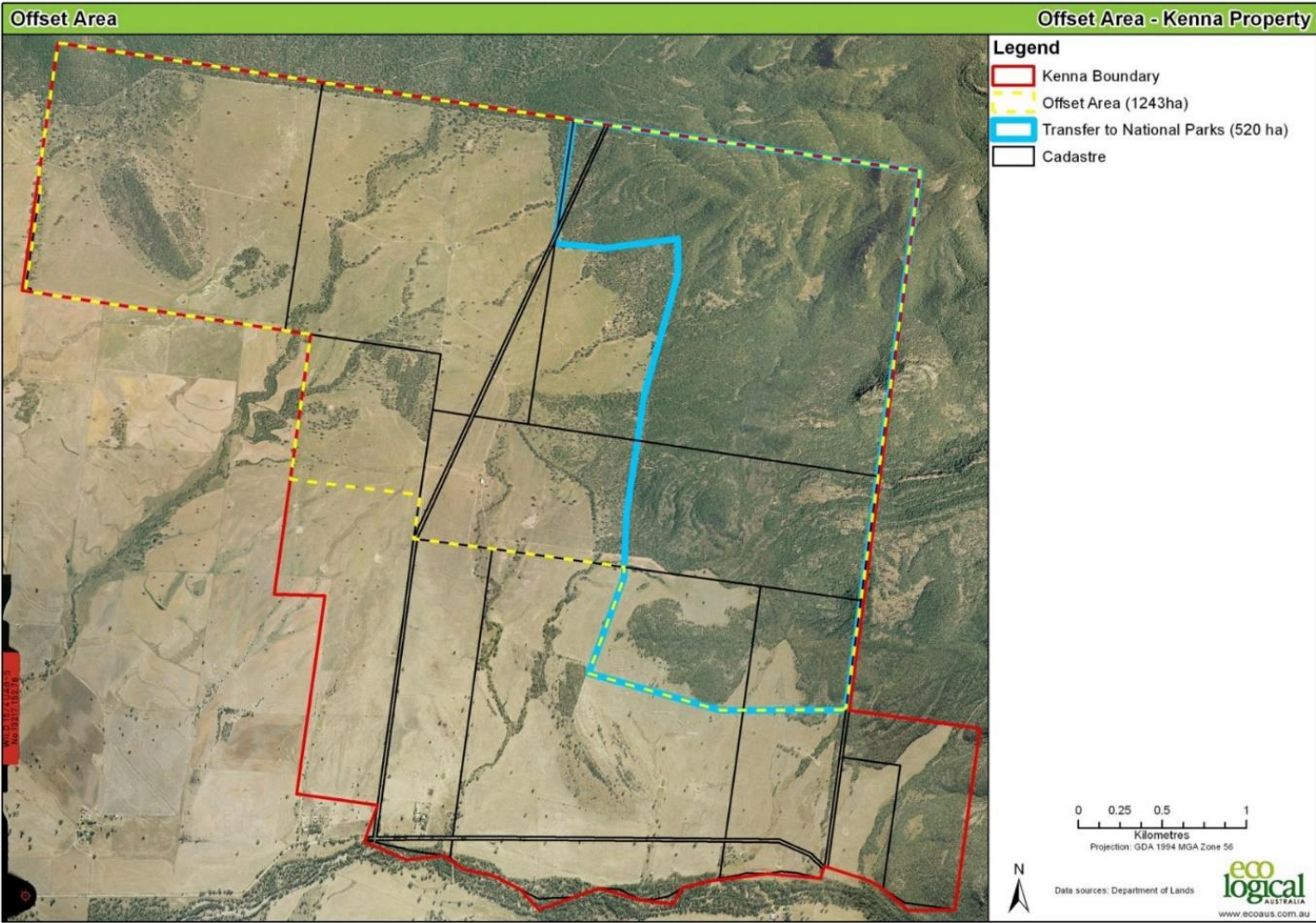


Figure 9: Kenna Biodiversity Offset Area

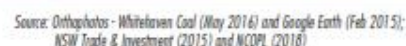


Figure 10: Onsite BOA and future onsite offset areas

Various treatments were implemented during the reporting period to mitigate impacts of the Narrabri Mine including (but not limited to):

- Weed monitoring and inspections;
- Feral animal monitoring, inspections and control;
- Flora and Fauna monitoring.

6.6.2 Environmental Performance and BOMP Implementation

6.6.2.1 Mine Site Environmental Performance

Weed Management

Weed management programs were implemented at NCO during 2022. Weed management consists of spot spraying programs periodically throughout the year when conditions are favourable. Locations requiring management are identified through:

- Weed Management Mapping supported by the ArcGIS software application Field Maps;
- ecological monitoring reports and locations of listed weed species.

Weed control in the pastoral areas is planned to be managed by landholder management and pasture improvement (or as recommended in subsequent monitoring reports). Weeds targeted in the reporting period include African boxthorn, Common Pear and Mother of Millions.

Feral Animals

A vertebrate animal control program was undertaken at NCO in Spring 2022, targeting both feral pigs and foxes producing the following results;

- Feral pigs
 - 3 sites were setup across site;
 - A total of 36 pigs were successfully baited.
- Foxes
 - 44 baits were presented at 22 stations set up across site
 - A total of 16 foxes were successfully baited.

Motion sensors were used to record the number of foxes eating the baits.

Appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

Annual Extraction Plan Monitoring

The results of annual monitoring undertaken during the reporting period, as required by the Extraction Plan, which includes the LMP, are summarised in Table 14 and Table 15.

Table 14: Biodiversity Management Plan 2022 Monitoring Results

Performance Measures	BMP Performance Criteria	2022 Results
LW101-106		

Performance Measures	BMP Performance Criteria	2022 Results
Woodland vegetation (Inland Grey Box EEC) composition and health	Clearing does not exceed the allowable limit of the Project Approval	Performance criteria met (17.73 of 22.9ha)
	Less than 10% change in floristic composition (relative to natural variation found in control areas)	In-field vegetation monitoring was not completed in 2022 due to high rainfall and access limitations for fieldwork.
	Less than 10% increase in exotic species numbers and cover	In-field vegetation monitoring was not completed in 2022 due to high rainfall and access limitations for fieldwork. A review of previous years' monitoring data indicates that subsidence ponding is the key contributor to decreases in floristic composition, including fluctuations in weed cover. It is recommended to adopt an opportunistic and continual assessment approach to document any significant weed outbreaks. This has been addressed with the introduction of the Weed Management tool which operates on the ArcGIS platform as discussed in Section 6.6.2.1.
	No increase in feral animal presence	In-field fauna monitoring was limited to bird monitoring in 2022 due to high rainfall and access limitations for fieldwork. Review of previous years' monitoring results indicates that feral species remain present in low numbers consistent with the general landscape and continued management in accordance with the RMP is required (discussed above in Section 6.6.2.1)..
Riparian vegetation composition and health	Clearing does not exceed the allowable limit of the Project Approval	Performance criteria met (2.28 of 4.1ha)
	Less than 10% change in floristic composition (relative to natural variation found in control areas)	In-field vegetation monitoring was not completed in 2022 due to high rainfall and access limitations for fieldwork. Multi-spectral image analysis was the key component of the BMP 2022 monitoring program. Most significant decreases in PAB (i.e. greater than 1 standard deviation from the mean change and greater than 0.1 ha in area) in 2022 since pre-mining conditions identified in LW101 to LW106 can be attributed to increased inundation of known subsidence ponds, caused by a combination of inundation and foliage cover loss from tree deaths. The construction of mining tracks and pads is also a significant contributor.
	Less than 10% increase in exotic species numbers and cover	In-field vegetation monitoring was not completed in 2022 due to high rainfall and access limitations for fieldwork. A review of previous years' monitoring data indicates that subsidence ponding is the key

Performance Measures	BMP Performance Criteria	2022 Results
		<p>contributor to decreases in floristic composition, including fluctuations in weed cover.</p> <p>It is recommended to adopt an opportunistic and continual assessment approach to document any significant weed outbreaks. This has been addressed with the introduction of the Weed Management tool which operates on the ArcGIS platform.</p>
	No increase in feral animal presence	<p>In-field fauna monitoring was limited to bird monitoring in 2022 due to high rainfall and access limitations for fieldwork.</p> <p>Review of previous years' monitoring results indicates that feral species remain present in low numbers consistent with the general landscape and continued management in accordance with the RMP is required</p>
	Less than 20% increase in length of eroding creek	Creek line surveys undertaken from baseline to 2022 did not detect significant changes in morphology or increases in erosion of greater than 20% when compared to controls.
Terrestrial fauna habitat for threatened species	Fauna populations do not experience adverse impacts	Review of previous years' monitoring results indicates that fauna occurrences are relatively low for species other than birds, and variability between control land impacts sites year to year has not identified any trends (increases or decreases in fauna records).
	Fauna records decrease by greater than 10% (relative to natural variation found in control areas)	<p>Fauna habitat is assessed similarly to vegetation, indicating that the primary contributor to any decreases is subsidence ponding affecting plant health, particularly trees.</p> <p>Water bird species richness has improved in 2022 coinciding with ponding events and continued inundation. The ponds continue to provide intermittent aquatic habitat for these birds.</p>
Aquatic macro-invertebrate and macrophyte assemblages	No decline in aquatic habitat quality relatively to natural variation in control areas	Not able to be assessed in 2022 due to high rainfall and access limitations.
LW107-LW110		

Performance Measures	BMP Performance Criteria	2022 Results
Woodland and riparian vegetation health and habitat value	Areas of NDVI change greater than 1 standard deviation from the mean change and greater than 0.1 ha in area.	Significant decreases in PAB were identified from NDVI change along watercourses including Pine Creek above LW107, LW108 and LW110, which indicate a decrease in PAB may be due to increased water levels, potentially related to subsidence ponding.
	Canopy dieback is not substantially greater than that observed during baseline traverses and considered beyond natural seasonal dieback and natural variation due to weather. Data does not indicate declining trend in vegetation and habitat conditions	Review of all years' monitoring data and the 2022 NDVI mapping indicated a decline in canopy health above LW107, both at the FBS plot locations and larger areas associated with a decline in PAB. FBS monitoring above LW108 showed a slight decline in canopy health to 2021, although this was not reflected in the 2022 NDVI analysis.
	Less than 10% increase in weed cover in impact quadrats in comparison to control quadrats.	Exotic species percentage cover has historically remained below 1% across FBS sites in previous monitoring years to 2021, with no markable increase in weed cover being recorded across FBS sites.
	Clearing does not exceed the estimated area of clearing assessed by the Stage 2 EA and as updated in Modification 5 (Resource Strategies, 2015) for infrastructure above LW107 to LW110.	Clearing amount to date is within the limits as set out in the Stage 2 EA and as updated in Modification 5.

Performance Measures	BMP Performance Criteria	2022 Results
Observance of trapped Delicate Mouse or Pale-headed Snake within surface cracks	Incidence of Delicate Mouse and/or Pale-headed snake becoming trapped in surface cracks.	Capture rates for the target species are low (Delicate mouse) or nil (Pale-headed snake). Neither species has been observed within or trapped within surface cracks. Cessation of monitoring is recommended.

Table 15: Land Management Plan 2022 Monitoring Results

Performance Measures	Performance Criteria	Comment
LW101-LW106		
<i>Surface Cracking</i>		
Surface cracking inspection	Permanent cracks (which do not self-close within one month of longwall face passing) are remediated as soon as practicably possible (and safe to do so) Surface cracking is remediated to prevent erosion and slope instability issues within 6 months of each longwall pass.	No new subsidence cracks have been identified within past monitoring reports since undermining was completed in 2017. Routine inspections will continue to be carried out to identify cracks and ensure the appropriate contingency response is implemented in accordance with the LMP; however, it is likely that subsidence has stabilised across LW101 – 106.
<i>Topographic form (Lidar)</i>		
Landscape morphology	Subsidence across landscape does not exceed subsidence predictions for LW101-LW106.	LIDAR analysis is undertaken every 3 years and was last undertaken in 2020. Therefore, LIDAR analysis was not undertaken in 2022.

Performance Measures	Performance Criteria	Comment
Creeklines	No identifiable change in overall drainage pattern.	<p>Creek line surveys undertaken from baseline to 2022 did not detect significant changes in morphology.</p> <p>As part of the SPMP, the Department of Planning and Environment (DPE) recommended the LW104, and upstream ponds be managed by pumping until a permanent solution be found. Given the further regression of riparian vegetation within this area, ELA recommends that a site-specific management report should be prepared and implemented where necessary that aligns with Narrabri Coal Rehabilitation Management Plan (RMP) (ELA, 2016) and a permanent solution to the LW104 - LW106 subsidence ponds be investigated.</p> <p>Pumping was undertaken when inundation of subsidence ponds over the longwalls occurred. This was prevalent over November 2022 due to above average rainfall onsite.</p> <p>NCO engaged a specialist during the reporting period to undertake geomorphic re-design options of Pine and Kurrajong Creek that would enable the subsidence pond areas to freely drain in a safe and stable way</p>

Multi-spectral image analysis

Groundcover (multi-spectral images – erosion and pasture cover)	Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	Assessment of NDVI change between 2012 and 2022, and 2020 and 2022, were completed. Areas of significant decrease since 2012 have been previously identified, are largely associated with surface ponding, correlating with a decline in plant health.
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Pasture

Performance Measures	Performance Criteria	Comment
Pasture biomass	Less than 20% reduction in pasture biomass in impact zones in comparison to control zones	Assessment of monitoring data against performance criteria from baseline to 2021 identified that despite variability in both biomass and weed cover, no significant differences were detected between impact and control sites, indicating a failure in the performance criteria. NDVI change is considered a more accurate assessment of increases or reductions in biomass and has therefore been used to assess and monitor pasture parameters in 2022. NDVI change analysis identified multiple areas of decreases associated with surface ponding, correlating with declining plant health.
Weed species	Weed species identified and managed according to the weed management measures provided in the Rehabilitation Management Plan	It is recommended to adopt an opportunistic and continual assessment approach to document any significant weed outbreaks, decline in pasture and identify rehabilitation issues as identified by mine staff and contractors. This has been addressed with the introduction of the Weed Management tool which operates on the ArcGIS platform as discussed in Section 6.6.2.1. This would be supported via continuations of the remote sensing analysis, which would document significant changes in pasture PAB and therefore activate the existing monitoring trigger as set out in the LMP.
Weed cover	Less than 10% increase in weed cover in impact zones in comparison to the control zone	
Soil nutrient status		
pH	pH remains within +/- 0.5 pH unit of baseline pH. If soil amelioration is undertaken, pH is to remain within recommended pH range for pasture (5.2-8.0).	Soil surveys are to be undertaken at baseline and then at a frequency of every three years. The next soil survey is scheduled for spring 2023 as the last survey was undertaken in spring 2020
EC	Less than 20% increase in EC in comparison to baseline values.	Soil surveys are to be undertaken at baseline and then at a frequency of every three years. The next soil survey is scheduled for spring 2023 as the last survey was undertaken in spring 2020
Organic matter	Less than 20% reduction in organic matter in comparison to baseline values.	Soil surveys are to be undertaken at baseline and then at a frequency of every three years. The next soil survey is scheduled for spring 2023 as the last survey was undertaken in spring 2020

Performance Measures	Performance Criteria	Comment
Nitrogen	Less than 20% reduction in total nitrogen in comparison to baseline values.	Soil surveys are to be undertaken at baseline and then at a frequency of every three years. The next soil survey is scheduled for spring 2023 as the last survey was undertaken in spring 2020
Phosphorous	Less than 20% reduction in phosphorous in comparison to baseline values.	Soil surveys are to be undertaken at baseline and then at a frequency of every three years. The next soil survey is scheduled for spring 2023 as the last survey was undertaken in spring 2020

Creek stability and condition

Field survey of creek stability and condition	Field survey of creek stability and condition	<p>LiDAR which is ordered annually by NCOPL, was used as a more accurate measurement for cross sectional change. Creek line surveys undertaken from baseline to 2022 did not detect significant changes in morphology or increases in erosion of greater than 20% when compared to controls.</p> <p>Significant rainfall experienced in the lead up to the LiDAR measurement for 2022 is likely to have resulted in higher water levels at a number of points, as LiDAR will not penetrate water resulting in false surface level, evidenced in LW104 control site and LW104 impact site. This is further demonstrated for the site which is now inundated within the subsidence pond on LW101.</p>
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LW107-LW110

Surface cracking

Surface cracking Inspection	Permanent cracks (which do not self-close within one month of longwall face passing) are remediated as soon as practicably possible (and safe to do so).	<p>No notable subsidence cracks were recorded in the period.</p> <p>Two subsidence cracks were observed above LW109 by ELA during field surveys in 2021,</p>
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Performance Measures	Performance Criteria	Comment
	Surface cracking is remediated to prevent erosion and slope instability issues within 6 months of mining of each longwall.	locations and dimensions of which are provided in the 2021 monitoring report (ELA 2022). Confirmation that these cracks have been remediated was provided by NCOPL in November 2022. All known subsidence cracks identified within past monitoring reports that occur over LW107, LW108 and LW109 have been remediated since undermining was completed. LW110 is due for completion in 2023 – routine inspections will continue to be carried out to identify cracks.

Topographic form (Lidar)

Landscape morphology	Subsidence across the landscape does not exceed subsidence predictions for LW107 to LW110.	LiDAR analysis completed on a three-year cycle, due for completion in 2023.
Creek lines	No identifiable change to overall drainage pattern.	PAB increased over time at all POI sites with the exception of POI 3. Further investigation in the field is required to determine the cause of a significant reduction in PAB, potentially due to creek bank erosion.
Groundcover (multi-spectral images – erosion and pasture cover)	Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	Significant decreases in PAB were identified from NDVI change along watercourses including Pine Creek above LW107, LW108 and LW110, which indicate a decrease in PAB may be due to increased water levels, potentially related to subsidence ponding
	Site specific management report prepared and recommendations implemented where necessary.	

Subsidence Pond Monitoring

The results of annual monitoring undertaken during the reporting period, as required by the Subsidence Pond Management Plan (SPMP) are summarised below:

- NDVI analysis in 2022 identified a continued decline in photosynthetically active biomass (PAB) which can be attributed to the increase in water within the site due to significant rainfall since 2020. Increased water in the subsidence ponds and creeks have resulted in a reduction in PAB of the area, whilst areas in depressions and surrounding water sources have experienced increases in groundcover.
- 2022 EC water quality data has decreased from 2020 in most samples, due to persistent and increased rainfall. A small amount of data points from 2022 are higher than 2020 results, likely due to localised environmental affects close to sampling dates (including increased sediment

runoff or subsurface disturbances). EC is currently below the Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guideline limits for freshwater ecosystems, and therefore does not trigger any responses for water quality (ponding) under the Trigger Action Response Plan (TARP) within the Water Management Plan (WMP).

NCO engaged a specialist during the reporting period to undertake geomorphic re-design options of Pine and Kurrajong Creek that would enable the subsidence pond areas to freely drain in a safe and stable way, which is continued into 2023. While the geomorphic study is being conducted, temporary pumps have been used to pump ponded areas downstream, reducing vegetation stress.

The 2022 subsidence pond monitoring results are found in Appendix G.

Pre-Clearing and Clearing Surveys

During the reporting period the mine has undertaken clearing to facilitate surface disturbance activities. The ecological works for the clearing consisted of the following activities;

- Fauna and flora Pre-clearing Surveys;
- Clearance Supervision; and
- Post-felling inspections.

Prior to the commencement of any disturbance activities the limits of clearing are surveyed and physically marked with flagging tape. Targeted threatened flora surveys were conducted prior to clearing activities commencing with all threatened flora identified during these surveys recorded and their locations mapped using hand held GPS units.

Fauna pre-clearance surveys were also conducted and consisted of identifying, marking and documenting suitable fauna habitat features. These features generally include nests, large woody debris and trees bearing hollows, which have the potential to support species such as bats, gliders, possums, reptiles and birds. All trees with habitat features are felled following a clearing protocol and is done in the presence of a suitably competent ecologist. All trees identified as having habitat features were recorded using a hand-held GPS unit.

Fauna was encountered during clearance works undertaken during the reporting period, including species of birds, mammals and reptiles.

The following threatened fauna species were encountered during the clearing works in 2022:

- *Pomatostomus temporalis* (Grey-crowned Babblers) - listed as vulnerable under the State Biodiversity Conservation Act 2016 (BC Act 2016).

The following threatened flora species were encountered during the clearing works in 2022:

- *Bertya opposens* (Coolabah Bertya), which is listed as vulnerable under the NSW Biodiversity Conservation Act 2016 (BC Act) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC),

6.6.2.2 BOS Environmental Performance

The Biodiversity Offset Strategy (BOS - Eco Logical, 2019) was approved by NSW DPIE on 25 September 2019 and by the Commonwealth DAWE on 16 September 2019 which commits NCO to managing the offset areas to achieve a 'like for like or better' and 'maintained or improved' biodiversity outcomes on the 1,244ha Kenna Offset property located offsite adjacent to the southern boundary of the Kaputar National Park and the 431 ha Onsite (Rosevale, Greylands, Omeo, Greylands Park,

Kurrajong Park and West Haven) Offset properties located within and adjacent to the western boundary NCO mining lease and to the east of Jacks Creek State Forest apart of the large “Pilliga Forest” remnant.

Offset Security Management

Between 27 September 2019 and 16 July 2021; NCO successfully registered seven Conservation Agreements on the land titles for the seven Offset properties as required of the BOS. The Conservation Agreements were secured under Part 4 Division 12 of the NSW National Parks and Wildlife Act 1974 in accordance with Commonwealth EPBC Act Approval 2009/5003 Conditions 2a&b and NSW Project Approval 08_0144 Schedule 5 Condition 7. WHC will reengage with NPWS that had previously shown interest in certain NCO Offset properties being transferred to National Park Estate.

Weather Summary of NCO Offset Properties

Regionally central meteorological station to the BOAs is the Gunnedah Pool site (BOM 2023) which has recorded highly variable rainfall over the last 4 years; from driest in 140 years of 237mm in 2019, followed by above average rainfall years in 2020, 2021 and 2022 of 833mm, 990mm and 860mm respectively resulting in major flooding of the Namoi River in October and November 2022. NCO maintain two meteorological stations across the BOA with a summary of weather conditions experienced at Kenna Offset property during the 2022 reporting period being a maximum monthly average temperature of 33°C in January 2022 and a minimum monthly average temperature of 4°C in June 2022. Annual temperature ranges were -1°C to 38°C in 2022. The total annual rainfall in 2022 was 718mm with the maximum in October (149mm) and minimum in June (11mm). A summary of weather conditions experienced at Rosevale Offset property during the 2022 reporting period being a maximum monthly average temperature of 32°C in January 2022 and a minimum monthly average temperature of 1°C in June 2022. Annual temperature ranges were -3°C to 37°C in 2022. The total annual rainfall in 2022 was 813mm with the maximum in September (133mm) and minimum in June (18mm).

Infrastructure Management

During the reporting period, a total of 4.4km of new fencing (fauna friendly) was constructed along the perimeter of the NCO Offset and prospective properties of Kenna, Greylands, Rosevale and Caloola North as well as maintenance of signage and gates undertaken as required to continue to restrict unauthorised access and minimise livestock incursion. Also during the reporting period, 4.5km of redundant internal fences were deconstructed on offset and prospective properties of Kenna, Greylands, Omeo, Rosevale and Caloola North and 66 items of redundant or derelict assets/infrastructure were removed, previously associated with the former agricultural use of the NCO BOA. Waste removed is either recycled (in the case for scrap metal) or disposed offsite (general municipal waste and tyres) at local Waste Management Facilities. Any remaining derelict assets/infrastructure items will continue to be assessed, removed and remediated as required prior to potential transfer of NCO Offset properties to National Park Estate.

Seed Management

The routine seed assessments on the NCO BOA aims to identify on a seasonal basis the life cycle stage and development of native plants to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs. During the reporting period, no seed collection onsite was undertaken but as part of the WHC group wide revegetation planning; previously collected onsite seed was supplemented with other collected regionally provident seed by reputable seed collectors as well as commercially sourced local seed stock. A local revegetation provider was engaged to propagate

the seed to produce Box Gum and non-EEC/CEEC Woodland overstorey species seedlings required for the 2022 revegetation program for the NCO BOA.

Revegetation Management

The NCO BOMP revegetation strategy focuses on restoration and revegetation of cleared non-native grassland (former cultivation) and derived native grasslands and assisting natural regeneration in better quality woodland areas. During the reporting period, revegetation ground preparation utilised tractors augering holes (to a depth >0.3m) to relieve compaction, improve permeability and infiltration to increase sub-surface soil moisture for planting. During the reporting period, 13ha of understorey revegetation carried out on the Kenna Offset property. The overstorey revegetation program was undertaken between May and June 2022 with 1775 hiko seedlings of Box-Gum and other Woodland species planted over 37ha on the Kenna and Rosevale Offset properties. Combined with good seasonal conditions, routine tree watering and maintenance activities post planting have been successful to ensure that over 57% survival has been achieved for the NCO BOA which is commensurate with the target Woodland vegetation structure.

Heritage Management

During the reporting period, annual heritage inspections were completed on the 15 known Aboriginal archaeological heritage sites within the NCO BOA with each site maintained with 1.5km of demarcation fencing around the heritage site perimeter and signage to mitigate access and inadvertent disturbance.

Habitat Management

During the reporting period, habitat augmentation was undertaken with 16 nest boxes targeted for Small Gliders, Greater Gliders, Microbats, Turquoise Parrots, Brown Treecreepers and Pale-headed Snakes installed on the Kenna Offset Property.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across NCO BOA in February, May, September and December 2022. The priority weeds identified included legacy weeds inherited from previous owner's management regimes such as African Lovegrass, Mother of Millions, Fleabane, Green Cestrum, Coolatai Grass, Cobbler's Peg, Sweet Briar, Turnip, Bathurst Burr, Noogoora Burr, African Box Thorn, Thistles and Common Prickly Pear as well as a range of broadleaf weeds within revegetation areas. The weed monitoring/inspections ensure that timely and prioritised weed control is undertaken on a seasonal basis with the spatial information directly given to spraying contractors to identify what, where, when and how to target appropriate resources across the NCO BOA for weed control. During the reporting period, WHC implemented a weed control program across the Narrabri BOA including 903ha treated between January and December 2022 targeting primarily Fleabane, Coolatai Grass, African Love Grass, Box Thorn, Prickly Pear, Mother of Millions, Cobbler's peg, Sweet Briar, Turnip, Bathurst Burr, Patterson's Curse, Marshmallow, St Barnaby's thistle and Broadleaf weed species as required. Only appropriately qualified and experienced weed contractors (AQF3 accreditation or higher for use of herbicide) were engaged to undertake weed control works for WHC.

Pest Animals Management

WHC coordinated routine formal pest animal monitoring across NCO BOA adopting the "monitor, measure and manage" approach to feral animal management; which will allow WHC to implement adaptive management in response to changes being measured through monitoring in pest animal abundance specific to the different geographical regions of the NCO BOAs. Pest animal monitoring

primarily utilises remote sensor cameras for pest animals generally in accordance with the NSW DPI Monitoring Techniques for Vertebrate Pests as cameras now provide the best option of detection for the greatest range of species as well as being complemented by pest animal sighting reports. Monitoring demonstrated that certain animals like Eastern Grey Kangaroos and Feral Pigs are in high abundance throughout the year; Feral Cats and Foxes can be seasonally in medium abundance and all other feral animal species recorded as low or scarce abundance levels across 2022. The pest animal monitoring ensures that timely and prioritised pest animal control is undertaken on a seasonal basis identifying what, where, when and how to target appropriate resources across the NCO BOAs for pest animal management. During the reporting period, WHC implemented a comprehensive pest animal control program across the NCO BOAs with routine 1080 baiting and canid pest ejectors as well as Hoggone baits and trapping programs for Feral Pigs undertaken throughout 2022. During the reporting period; the 1080 baiting program removed 86 Foxes from 337 baits presented and 5 from 19 canid pest ejectors were consumed. The Feral Pig control programs resulted in 21 of 56 Hoggone baits taken and a further 60 Feral Pigs trapped in 2022. There were 132 Goats harvested at the NCO BOA during the reporting period with saleable Goats on sold to an abattoir. Only appropriately qualified and experienced feral animal contractors (appropriate feral animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake feral animal control works for WHC.

Soil & Erosion Management

Annual inspections were undertaken including unsealed fire break tracks and associated drainage structures across the NCO BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004)). Despite the above average rainfall during the reporting period; no locations of targeted additional maintenance was identified out of 3 observations within the NCO BOA to mitigate further erosion and sedimentation. The remaining sites and tracks/drainage structures are maintained during routine WHC Biodiversity fire break track maintenance program with no other erosion sites present on NCO BOA.

Grazing Management

NCO BOA were destocked in September 2016 and continued to be destocked and no strategic grazing occurring during the reporting period. There were five instances of stock incursion during the reporting period; with stock on each occasion retrieved and fencing repaired as required.

Bushfire Management

In accordance with the BOMP, annual fuel load monitoring was undertaken between September and November 2022 as part of planning and assessment of bushfire hazard and ecological burn program for 2023; with the results indicating moderate to high overall fuel loads present. No woodland ecological burns were possible across 2022 due to excessive fuel moisture and above average rainfall; but a brief window in April 2022 allowed one grassland ecological burns to be undertaken with 24.7 hectares burnt with moderate intensity on the Kenna Offset property. Other fire management implemented by WHC during the reporting period was maintenance carried out as required on 82.2km of fire trails to a zero fuel barrier standard across the NCO BOA. WHC maintains regular communications throughout the reporting period with both the Namoi-Gwydir Zone RFS teams around planning of WHC BOA site ecological burn programs as well as maintain contact points in case of emergency. WHC maintains a specialist fire fighting contractor for an oncall engagement during the fire season to respond in the event of a bushfire on WHC BOAs and non-mining lands.

Monitoring Program

During the reporting period, the ecological monitoring program of the Narrabri BOA included winter bird surveys that were undertaken in June/July 2022 and annual spring flora monitoring of 43 plots across eight vegetation zones (VZs) undertaken during September – October 2022 while annual fauna monitoring was undertaken between January and October 2022 at 26 bird survey sites and 14 echolocation sites. During the winter bird surveys, no threatened species were recorded. During flora monitoring, three VZs (Western Slopes Dry Sclerophyll Forests – Good condition, at both Kenna and Onsite BOAs, Western Slopes Dry Sclerophyll Forests – DNG/Cleared and Western Slopes Grassy Woodlands – Semi-cleared condition) were recorded as meeting or exceeding completion criteria for all four biometrics. Native plant species richness (NPS) completion criteria (native species richness benchmark for relevant biometric vegetation communities) was met or exceeded at 6 out of 8 VZs. Native overstorey cover (NOS) completion criteria (minimum overstorey cover benchmark for relevant biometric vegetation communities) was met or exceeded at 3 out of 8 VZs. Native midstorey cover (NMS) completion criteria (minimum midstorey cover benchmark for relevant biometric vegetation communities) was met or exceeded at 6 out of 8 VZs. Native ground cover grass (NGCG) completion criteria (minimum groundcover benchmark for relevant biometric vegetation communities) was met or exceeded at all eight VZs. Comparison of individual plot data shows that NPS slightly decreased from 86% last year to 81% of plots meeting or exceeding completion criteria in 2022. Native overstorey cover (NOS) increased from 23% last year to 42% of plots meeting or exceeding the completion criteria. Native midstorey cover (NMS) increased from 56% last year to 63% of plots meeting or exceeding the completion criteria in 2022. Native ground cover grass (NGCG) increased from 84% last year to 86% of plots meeting or exceeding the completion criteria in 2022. A total of 72 bird species were recorded during standardised bird surveys compared with 73 bird species in 2021 were detected and 77 bird species in 2020. Across 26 sites, species richness values ranged between 0 to 29 per site. By habitat, 56 species were detected in 7 remnant woodland sites (average = 15.6; range 6 to 29), 29 species in 10 revegetation sites (average = 7.8; range 3 to 16), and 37 species in 9 naturally regenerating sites (average = 9.12; range 0 to 16). Up to 9 species of microbat were positively identified from echolocation recordings across 15 sites including one species listed as threatened under the BC Act. Species richness values ranged between 5 and 10. By habitat, 8 species were detected in remnant woodland sites (average 4.6, range 1-8), 10 species in naturally regenerating (average = 3.8, range 1 – 10) and 1 species in revegetation sites (average 0.25, range 0 - 1).

6.6.3 Proposed Improvement Measures

- Subsidence Pond investigations: during the previous reporting period Narrabri Mine engaged specialists to undertake engineering studies into geomorphic design options that would enable the subsidence pond areas to freely drain in a safe and stable way. During the next reporting period, the engineering design options and an environmental assessment will be completed to determine the most appropriate options for implementation.
- Review the monitoring requirements in the BOS as per the above recommendations.
- Continue the weed control programs and subsequent monitoring utilizing the ArcGIS mapping software to generate greater efficiencies for targeted programs.
- Continue the feral animal control programs and subsequent monitoring.

6.7 ABORIGINAL CULTURAL HERITAGE

6.7.1 Environmental Management

Aboriginal Cultural Heritage is managed in accordance with the Aboriginal Cultural Heritage Management Plan (ACHMP), which was prepared to satisfy Schedule 4, Condition 23, and the Statement of Commitments (SoC) detailed in the PA 08_0144. Revision 5 of the ACHMP was provided to the DPI&E for review and approval in April 2021. Revision 5 of the ACHMP incorporated additional Aboriginal cultural heritage sites identified during surveys for the *Narrabri Underground Mine Stage 3 Extension Project* (the Stage 3 Project). This plan was withdrawn June 2022 to avoid duplicated work that would be required to review the Stage 3 ACHMP (submitted July 2022 and accepted by NSW DPE December 2022).

6.7.2 Environmental Performance

Soil Disturbance Monitoring

As outlined in the ACHMP, any soil disturbance work within 100 m of a drainage line or in areas not already cleared for agriculture requires the presence of the Registered Aboriginal Parties (RAPs) to minimise the risk of sites/objects of Aboriginal Cultural Heritage significance being disturbed by clearing activities.

Archaeological Salvage Program

During risk assessments of the sites new Brine Dam (BR1), it was determined that nine (9) Aboriginal cultural heritage sites registered on AHIMS will be impacted by the proposed project. As a result, a short archaeological salvage program of surface collection was undertaken to recover artefacts from these sites. Archaeological salvage was undertaken in accordance with Section 3.6 of the approved Narrabri Coal Mine Aboriginal Cultural Heritage Management Plan (ACHMP) 2019 and involved an archaeologist and representatives of Registered Aboriginal Parties (RAPs).

A total of fifty-nine (59) artefacts were identified in the vicinity of the nine (9) AHIMS sites, exceeding the original artefact numbers recorded. All identified artefacts were recorded and collected, with each artefact allocated a Unique Reference Number (URN) for archival purposes. These artefacts have been stored in accordance with the 'application for the transfer of Aboriginal objects for safekeeping' which was submitted to the Heritage NSW office February 2022.

Ongoing Consultation

Narrabri Mine maintains regular contact with a representative of the RAPs in order to ensure appropriate cultural heritage supervision is available for planned surface disturbance activities.

Formal biennial consultation meetings are held with the RAPs senior representatives.

Previously Unidentified Sites

No new sites were recorded during the reporting period.

Non-compliance

No non-compliances were recorded for the reporting period.

6.7.3 Proposed Improvement Measures

A fencing audit was undertaken during the 2020 reporting period identifying potential for improvements to be made to fencing around ACH sites. An improved fencing standard was established in late 2020 with improvement works commencing in early 2021. Fencing surrounding all registered ACH sites is to be upgraded to the new standard, with upgrades occurring throughout the reporting period and are expected to continue throughout the next reporting period.

6.8 HISTORIC HERITAGE

There are no items of historic heritage identified in the mining area and hence no specific management measures are required.

6.9 TRANSPORT

6.9.1 Environmental Management

Traffic impacts associated with the Narrabri Mine are managed in accordance with:

- Schedule 4, Conditions 25 to 27 of the PA 08_0144.
- the Narrabri Mine Shuttle Bus Traffic Control Protocol prepared to satisfy the requirements of PA 08_0144;

6.9.2 Environmental Performance

The portion of Greylands Road that traverses the mining area has been purchased by the mine and is no longer accessible to the public. Scratch Road, in the western portion of the mining lease, has not been utilised to construct mining related infrastructure and as such no agreement has been developed with Narrabri Shire Council (NSC) for the use of this road.

The mine constructed the intersection to the mine in consultation with both NSC and Transport for NSW (TfNSW). TfNSW has advised the mine that the ongoing maintenance of the intersection is the responsibility of the TfNSW.

Modification 7 to the Project Approval 08_0144 for a change in mining method for longwall panels 201 and 202 to bord and pillar mining was approved on 23 November 2021. Schedule 4 Condition 25 requires at least 15 employees, calculated as a weekly average to be transported to and from site by shuttle bus, during the peak morning and evening traffic periods. To achieve this the Shuttle Bus Traffic Control Protocol was developed and approved by NSW DPE March 2022. Monitoring was conducted in accordance with the Shuttle Bus Traffic Control Protocol during the reporting period, with the overall daily average for shuttle bus usage equalling 18 employees.

6.9.3 Proposed Improvement Measures

During the 2022 Independent Environmental Audit (IEA), an observation that adherence with the shuttle bus protocol was not verified by onsite personnel. The development of a verification method will be developed and submitted for approval. The verification method will be implemented into operations during the next reporting period.

6.10 WASTE MANAGEMENT

6.10.1 Environmental Management

Narrabri Mine aims to implement all reasonable and feasible measures to minimise waste and ensure it is appropriately stored, handled and disposed. Waste materials at the mine are managed in accordance with:

- Schedule 4, Condition 33 of PA 08_0144;
- the Narrabri Mine Waste Management Plan (Waste MP) prepared to satisfy the requirements of PA 08_0144;
- the Pollution Incident Response Management Plan (PIRMP); and
- the legal and strategic framework for managing wastes in NSW.

Narrabri Mine waste streams include general waste, underground waste, oil & greases, recyclables (steel and paper/cardboard), drill cuttings and effluent.

6.10.2 Environmental Performance

Waste Streams

Inspections of waste management practices are carried out to ensure general, hydrocarbon and recyclable waste is segregated. Additional segregation of general waste occurs at the licenced contractor's facility to ensure the maximum amount of material can be recycled. Data on waste streams are collated using information provided by the licenced contractors. These records have been included in Figure 11 which shows waste stream volumes over a 5 year period. It should be noted that the licensed waste contractor changed halfway through 2018, which affected the availability of some waste records.

A total of approximately 1764 tonnes (t) of general waste was removed during the reporting period. These figures are comparable to the previous reporting period. Approximately 7 tonnes of cardboard/paper, 172 tonnes of timber and 859 tonnes of steel were recycled during the reporting period. Approximately 66,900 L of used oils were collected and recycled during the reporting period by an authorised contractor, which has increased from the previous reporting period.

Effluent from the sewage and ablutions facilities at the mine is managed through a Sewage Treatment Plant (STP) with a Continuous Extended Aeration Process. The plant is made up of a series of industrial plastic tanks. Each tank provides a separate function in order to treat the sewage for the required quality and quantity. During the STP process a waste product (sludge) is collected weekly and transported by a licensed contractor. During the reporting period a total of 687,100 L was collected and transported off-site, which is higher than previous reporting period quantities.

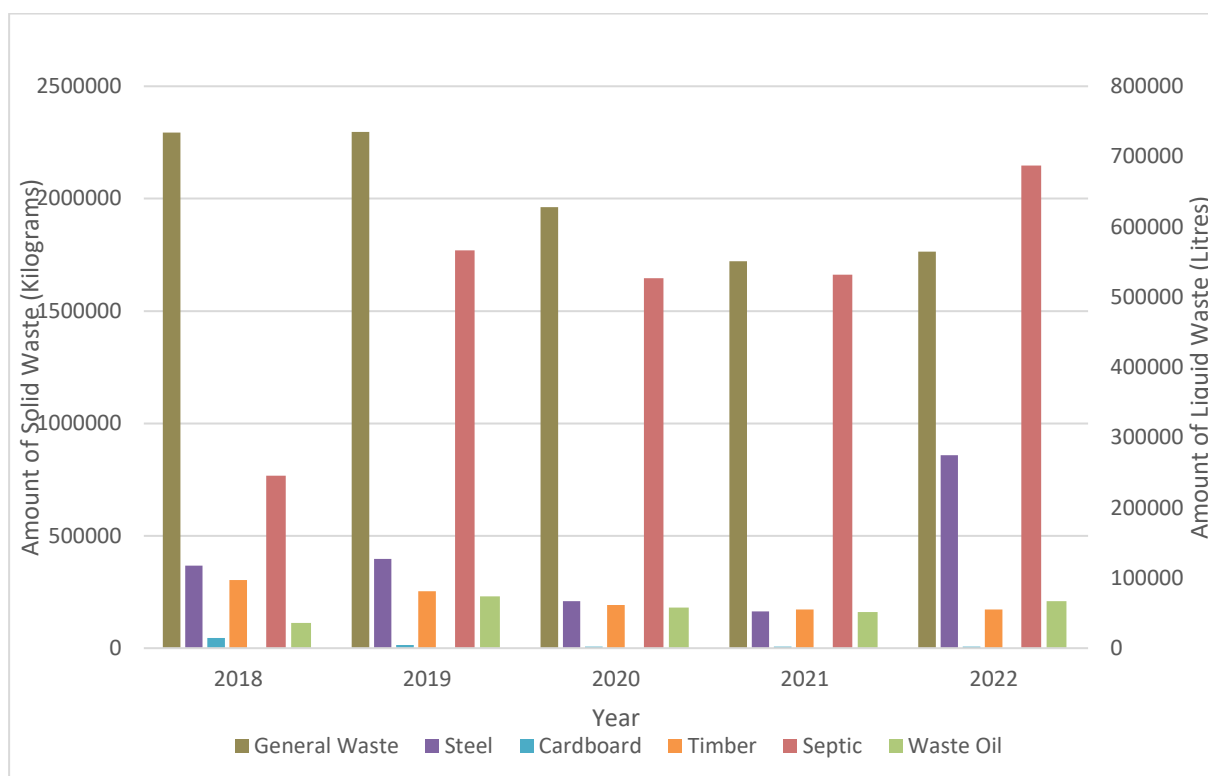


Figure 11: Comparison of waste streams over the previous 5 years

Drill cuttings from exploration, gas drainage and service borehole drilling are excavated from sumps and disposed of in the Rejects Emplacement Area as per site approval conditions.

Waste Incident

During the 2019 reporting period it was reported that an incident occurred involving the disposal of used underground self-rescuer emergency breathing canisters in to the General Waste stream at the mine which were subsequently disposed of into the Narrabri Landfill facility. The NSW EPA issued Narrabri Mine with several Clean-Up Notices during the 2019 reporting period. On the 2nd of June 2022, NCO provided a report to the EPA detailing the results of the leachate monitoring, and associated reports in response to Clean Up Notices #1593529 and #1597023. The EPA confirmed the requirements of the Clean Up Notices have been complied with and all clean up actions have been completed (dated 20 June 2022).

6.10.3 Proposed Improvement Measures

Narrabri Mine will continue to monitor wastes on a regular basis to effectively manage waste generated by the operation and maximise re-use and recycling opportunities.

6.11 VISUAL & LIGHTING

6.11.1 Environmental Management

Visual amenity and lighting impacts associated with the Narrabri Mine are managed in accordance with Schedule 4, Conditions 28 and 29 of the PA 08_0144 and the Statement of Commitments (SoC). As required by the SoC, the mine must not impact the Siding Springs Observatory, by following the Dark

Sky Planning Guideline. Various onsite measures have been implemented during previous reporting periods to mitigate visual impacts of the mine including (but not limited to):

- construction of an amenity bund on the southern and western boundaries of the site to obscure views from the south and west;
- the train load-out bin, CHPP, secondary crusher and rotary breaker buildings are manufactured from a green sheeting;
- use of directional lighting in lieu of general area lighting;
- consideration of fixed versus mobile lighting, locations and orientation;
- fixed lighting designed and procured in accordance with *Australian Standard (AS) 4282 – 1997: Control of Obtrusive Effects of Outdoor Lighting* (AS4282); and
- visual lighting inspections as required.

6.11.2 Environmental Performance

No direct community complaints were received during the reporting period relating to the visual amenity or lighting associated with the mine.

6.11.3 Proposed Improvement Measures

No additional improvement measures are proposed during the next reporting period.

Management measures described above will continue to be implemented.

6.12 BUSHFIRE

6.12.1 Environmental Management

Bushfire hazards and risks associated with the Narrabri Mine are managed in accordance with Schedule 5, Conditions 3 and 4 of PA 08_0144, i.e. the Rehabilitation Management Plan (RMP) that forms part of the Landscape Management Plan (LMP). Various treatments have been implemented during the reporting period and previous periods to manage and control potential bushfire risks including:

- implementation of the Bushfire Prevention Standard and Bushfire Emergency Response Procedure;
- Supervisors providing bushfire ratings prior to contractors working on site and providing regular updates on bushfires nearby;
- implementing bushfire Trigger Action Plans (TARPs) and PIRMP;
- participation by Whitehaven Coal personnel in the Narrabri Rural Bushfire Brigade meetings;
- implementation of various bushfire hazard controls, including Hot Work areas/permits, the mine is a non-smoking site and maintenance of equipment/infrastructure;
- monitoring of fuel loads occurred in the Narrabri Mine offset area known as 'Kenna';
- implementing onsite training programs; and,
- maintenance of the roads and tracks within the Narrabri Mine ML was undertaken prior to the bushfire season. Roads and tracks can act as firebreaks and help to facilitate access across the site.

6.12.2 Environmental Performance

No bushfires occurred adjacent to or within the Narrabri Mine ML 1609 area during the reporting period.

Narrabri Mine have been in consultation with Forestry Corporation of NSW to undertake controlled hazard reduction burns in areas of Jacks Creek State Forest adjacent to the Western boundary of the Mine Lease. The burns were scheduled to occur during 2022, however, due to the high rainfall in the region from August to November, the burns have been delayed until an appropriate time can be determined.

6.12.3 Proposed Improvement Measures

No additional improvement measures are proposed during the next reporting period.

Management measures described above will continue to be implemented during the next reporting period.

6.13 MINE SUBSIDENCE

6.13.1 Environmental Management

During the reporting period longwall mining extracted panel 110. Underground development continued into longwall (LW) panels LW204 and the 200 Mains. The extraction height averaged 4.3 m and the depth of cover ranged between 250 m and 290 m.

6.13.1.1 Subsidence Monitoring

Subsidence monitoring was conducted in accordance with the approved Extraction Plan. Subsidence remained within predicted ranges for all matter except maximum compressive strain and maximum total tensile strain for 108 Line, and Maximum Subsidence in Line H (Table 16). Amendments to the Extraction Plan LW101-106 and LW107-LW110 were previously approved; the amendments included the removal of subsidence monitoring lines above LW106 and LW107

6.13.2 Environmental Performance

Electricity Transmission Lines

The 11 kV power line that traverses LW101 to LW105 has been decommissioned and as such, the Essential Energy Management Plan and its monitoring requirements are no longer in effect.

Telecommunications Infrastructure

No telecommunications infrastructure exists within the Extraction Plan area for LW101 to LW110.

Public Roads

The one public road within the mining area, known as Greylands Road, has been purchased by the mine and is no longer accessible to the public. Repairs required for traffic-ability for mine personnel are undertaken as required.

Land Surface

One new subsidence related pond has been identified in LW110 during the reporting period. Subsidence monitoring has been undertaken in accordance with the Extraction Plan requirements, and the internal document 'Subsidence Management Procedure'. There have been rehabilitation activities of subsidence cracks across the active subsidence areas and previously subsided longwall panels.

An electronic GIS based monitoring platform for subsidence crack monitoring was implemented during the reporting period. It records the size and location of subsidence related cracking, rehabilitation records and inspection areas.

Buildings and Other Structures

No buildings or sheds were undermined during the reporting period.

Water Storage Dams and Contour Banks

A stock watering dam located on the northern section of LW110 was undermined during the reporting period. The dam is located within land owned by Narrabri Coal Operations and was monitored in accordance with the regime outlined in Extraction Plan 107-110 Appendix C Subsidence Monitoring Program. No subsidence related impacts were identified following monitoring.

Fences and gates

Narrabri Mine has excluded all stock from the active mining area by erecting a fence outside of the subsidence zone to the east of LW101. Any fences/gates required post-mining will be re-instated.

Mine Infrastructure

Pipelines connecting gas drainage wells and the Personal Emergency Device (PED) cable were undermined during the reporting period however no impacts were recorded on this infrastructure. All gas drainage infrastructure in the active mining area is inspected and maintained to ensure subsidence does not adversely impact this equipment. Narrabri Mine also decommissions gas drainage infrastructure when it is no longer required.

6.13.2.1 Comparison against Predictions

Narrabri Mine has monitored the subsidence movement across the surface of LW 108, LW109, LW110, Line H and I in accordance with the approved Extraction Plans. The table below outlines the maximum subsidence parameters recorded as part of the subsidence monitoring program and a comparison with the maximum predicted subsidence parameters as outlined in the Extraction Plan. Subsidence prediction exceedances did not occur during the reporting period. The results are summarised below:

Summary of results for the most recently completed survey measurements indicate:

- The maximum subsidence measurement of Line H 2.55m was within the predicted value of 2.75m
- The maximum subsidence measurement of Line I 1.53m is within the predicted value of 2.75m
- The maximum tilt measurements recorded were within the predicted values.
- The maximum tensile and compressive strain measurements for LW108 exceeds predicted values. Line H measurements were within predicted values.

No mine emergency response procedures were activated because of subsidence during the reporting period.

6.13.3 Proposed Improvement Measures

The integrated electronic GIS based monitoring platform for environmental monitoring, including subsidence crack monitoring was introduced during the previous reporting period. This system will continue to be refined during the next reporting period.

Table 16: Subsidence Parameters – Predicted and Measured

Longwall Panels (LW) 109		
	Maximum Predicted Extraction Plan	Maximum Measured
Line 101 – Centre of LW101 – Monitoring has ceased		
Line 102 – Centre of LW102 – Monitoring has ceased		
Line 103 – Centre of LW103 – Northern – Monitoring has ceased		
Line 103 – Centre of LW103 – Southern – Monitoring has ceased		
Line 104 – Centre of LW104 – Northern – Monitoring has ceased		
Line 104 – Centre of LW104 – Southern – Monitoring has ceased		
Line 105 – Centre of LW105 – Northern – Monitoring has ceased		
Line 105 – Centre of LW105 – Southern – Monitoring has ceased		
Line 106 – Centre of LW106 – Northern – Being closed out		
Line 107 – Centre of LW107 – Northern – Monitoring has ceased		
Line 108 (measured 29/06/2022)		
Subsidence (m)	2.75	2.71
Tilt (mm/m)	38	36.3
Tensile Strain (mm/m)	10	16.2
Compressive Strain (mm/m)	13	38.9
Line 108 – Southern		
Line A – Cross Panel Survey Line – Being closed out		
Line B – Pine Creek Tributary 1 – Monitoring has ceased		
Line D – Pine Creek – Monitoring has ceased		
Line E – Pine Creek Tributary 1 Crossline 1 – Monitoring has ceased		
Line F – Pine Creek Tributary 1 Crossline 2 – Monitoring has ceased		
Line G – Pine Creek Tributary 1 Crossline 3 – Monitoring has ceased		
Line H – Cross Panel Survey Line (measured 9/11/2022) (LW108-110)		
Subsidence (m)	2.75	2.55
Tilt (mm/m)	53	31.80
Tensile Strain (mm/m)	13 – 20^	17.5
Compressive Strain (mm/m)	16 – 24^	18.3
Line I – Cross Panel Survey Line (measured 10/10/2022)		
Subsidence (m)	2.75	1.53
Tilt (mm/m)	53	11.1
Tensile Strain (mm/m)	13 – 20^	6.1
Compressive Strain (mm/m)	16 – 24^	4.9

7 WATER MANAGEMENT

7.1 WATER SUPPLY

A pipeline from the Namoi River is the main source of raw water supply for the Narrabri Mine. Water from this pipeline can be taken from either the Namoi Alluvium or the Namoi River. Table 17**Error! Reference source not found.** summarises the water licences held by Narrabri Coal for mining purposes and water during the 2021/2022 water year (i.e. the 2022 financial year).

Table 17: Narrabri Mine Water Take

Water Access Licence	Water Sharing Plan	Water Source and Management Zone	Annual Use limit	Passive Take / Inflows	Water Take	Total Take
WAL 12833	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	134 ³	6 ²	0	0
WAL 20131	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	300 ³		157	157
WAL 12822	Upper and Lower Namoi Groundwater Sources	Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	86 ³		0	6
WAL15922	NSW Great Artesian Basin Groundwater Source	Southern Recharge Groundwater Source	322.4	21 ^{1,2}	0	21 ¹
WAL 29549	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin MDB Groundwater Source	1,022.5	407	407	407
WAL43017	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah – Oxley Basin MDB Groundwater Source	503.8		0	0
WAL 2671	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	60	7 ²	0	0
WAL 6762	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source (High security)	20		0	7
WAL 2728	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	12.5		0	0
WAL 20152	Upper Namoi and Lower Namoi Regulated River Water Sources	Lower Namoi Regulated River Water Source	750		116 ⁴	68

¹ Statement from NSW Water records 248 ML groundwater usage (total licenced units). No active pumping from Narrabri Mine was undertaken. The Predicted Peak Annual Inflow Volume during Mining from the 2020 NCO Groundwater Recalibration (AGE) modelled as 21 ML for the year. The 248ML has been included on WAL29549.

² Predicted Peak Annual Inflow Volume during Mining, extracted from the 2020 NCO Groundwater Recalibration (AGE)

³ NRAR determined that the combined Annual Use Limit from the Namoi Groundwater Work Approval (WA) was determined to be 400ML in August 2020.

⁴Water Order debits for WAL20152 totalled 116ML, actual water extraction was 68ML. WAL6762 water order debits was 0ML, total extraction was 0ML and reported Total Take includes Passive Take/Inflow equalled 7ML.

7.2 SURFACE WATER MANAGEMENT

7.2.1 Environmental Management

The Narrabri Mine water management system is managed in accordance with:

- Schedule 4, Conditions 10 to 17 of PA 08_0144;
- EPL 12789 Conditions P1, L1, L2 and M2; and
- the Narrabri Mine Water Management Plan (WMP) and the Extraction Plan – Water Management Plan (EP–WMP) prepared to satisfy the requirements of PA 08_0144.

During the reporting period various strategies were implemented to manage surface water including:

- Separation of clean water, i.e. surface water runoff where water quality is not affected by mining operations, utilizing clean water diversion drains;
- Collection of water from disturbed areas in sediment control dams, i.e. SD1- SD8;
- Containment of water potentially affected by coal or other substances and stored within HDPE lined ponds, e.g. hydrocarbons, either from the underground operation or as runoff from the surface facilities/coal processing area, i.e. SB1-SB4;
- The use of appropriate erosion and sediment controls, including silt fences, rock checks and other measures as required;
- No uncontrolled discharge of mine water off-site;
- Increased capacity of water treatment plants to reduce increased levels of stored mine process water captured as a result of the above average rainfall recorded during the reporting period;
- Engaged suitably qualified experts to design additional brine storage dam;
- Updated the site water balance model to ensure on-site water demands are satisfied whilst minimising offsite water impacts; and
- Regular sampling and inspections of the onsite and surrounding surface water system. Surface water monitoring locations are illustrated on Figure 3.

7.2.2 Environmental Performance

Surface Water Quality

Narrabri Mine undertakes a surface water monitoring program which includes water pumped from the underground workings. The results of the water quality sampling conducted during the reporting are shown in Appendix D and F, refer to results for the 'Box Cut' sampling location for water pumped from the underground workings. All water contained within the rail loop dam complex and sediment basins (SB1-4) are contained in HDPE lined ponds and either processed via a Reverse Osmosis treatment plant or reused in operational areas of the mine. The additional hire RO treatment plant, which was commissioned in November 2021 to assist with treating an increased amount of water from excess runoff received throughout the year, continued to be used in 2022. The subsequent brine produced from the RO plant is stored in HDPE lined dams within the rail loop.

Wet Weather Discharge Monitoring

Routine surface water monitoring undertaken around the site includes sediment dam discharges and upstream and downstream locations within the approved ML 1609 were sampled when flowing, for pH, Electrical Conductivity (EC), Oil & Grease (O&G) and Total Suspended Solids (TSS).

Controlled discharges were undertaken during the months August to November from EPL locations SD2, SD4 and SD7. The discharge events were in response to significant rainfall with the monthly totals

from the onsite meteorological station recording 114.4, 190.4, 172.4, and 111 millimetres respectively. Table 13 contains the full meteorological summary for the reporting period. There was a total of 18 discharge events during the reporting period.

During discharge events the sediment dams and streams were monitored according to discharge criteria limits and timings outlined within EPL 12789. Surface water results for pH, electrical conductivity, oil and grease and total suspended solids from discharge events are included in Appendix D and in Table 18 below. Results from the discharge samples are also reported to the NSW EPA in the Annual Return. All wet weather discharges were within EPL12789 criteria.

Table 18: Controlled Discharge Monitoring

Location	Date	5 day Rolling Rainfall Total (mL)	pH (field)	Oil and Grease (mg/L)	Total Suspended Solids (mg/L)
EPL Criteria		n/a	6.5 - 8.5	10	50*
SD2	25-Aug-22	2	7.88	<5	<5
	30-Aug-22	1	8.04	<5	<5
	16-Sep-22	71.8	7.75	<5	18
	21-Oct-22	120.6	8.25	<5	128
	01-Nov-22	50.8	7.43	<5	176
	14-Nov-22	61	8.23	<5	64
SD4	30-Aug-22	1	8.28	<5	19
	05-Sep-22	39	8.44	<5	27
	16-Sep-22	71.8	8.36	<5	225
	21-Oct-22	120.6	7.92	<5	53
	01-Nov-22	50.8	8.07	<5	122
	14-Nov-22	61	8.32	<5	421
SD7	16-Sep-22	71.8	7.93	<5	1730
	22-Sep-22	48.6	8.31	<5	1040
	09-Oct-22	43.6	8.50	<5	953
	21-Oct-22	120.6	8.43	<5	4480
	01-Nov-22	50.8	8.2	<5	3700
	14-Nov-22	61	7.51	<5	595

*as per EPL12789 L2.5 (a), TSS concentration limits are permitted to be exceeded for water discharged following rainfall measured at the premises that exceeds 38.4mm over any consecutive 5 day period

No raffinate was discharged to Namoi River during the reporting period. Development of the Raffinate Discharge Control and Monitoring Plan was commenced during the reporting period however ground water modelling and operational requirements meant that NCO were not faced with a need to discharge raffinate to the Namoi River. Investigations into methods for raffinate discharge will continue into the next reporting period.

Subsidence Surface Water Impacts

Refer to Section 6.6.2.1 (Subsidence Pond Monitoring) of this report. Results of the subsidence ponding water quality sampling conducted during the reporting period are shown in Appendix G.

Brine Management

The Narrabri Mine Water Balance Model was updated during 2021, identifying the requirement to have additional brine storage capacity onsite. The site for this new facility was presented in the previously approved Mining Operations Plan (MOP) 2021–2023 Amendment B, showing the location north of the existing Rail Loop Dams. The new dam will be connected to the existing infrastructure through a pipeline which will be installed underneath Kurrajong Creek. Construction of the new brine dam commenced in mid-2022 with completion expected to be in Quarter 2 of 2023.

Evaporator fans were used throughout the reporting period in an effort to enhance evaporation during a year where above average rainfall was received onsite. A weather station was installed at the power source for these evaporation fans to allow for them to be automatically shut down during unfavourable conditions, using wind speeds as the trigger.

7.2.3 Proposed Improvement Measures

The planned improvements for the next reporting period will be to complete the construction of the additional brine storage dam and associated sediment dam.

7.3 GROUNDWATER

7.3.1 Groundwater Monitoring

Groundwater at the Narrabri Mine is managed in accordance with the WMP prepared to satisfy the requirements of the PA 08_0144. Currently groundwater monitoring is conducted at sites located within and surrounding the mine as illustrated on Figure 3 and as outlined in Table 19.

Table 19: Groundwater Monitoring Summary

Location	Parameters	Frequency
All Standpipes P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P16, P17, P19, P28, P29, P30, P31, P32, P33, P34, P58, P39a, P39b, P43, P47, P51, P52, P53, P58, WB2, WB3a, WB3b, WB4, WB5a, WB5b, WB6a, WB6b, and WB7	Water level EC pH TDS Metals Anions and Cations	Monthly (water level, pH and EC) Quarterly for P28-34 and P58 (water Level, pH, EC, cations and anions) Annually (full water quality)
Vibrating Wire Piezometers P40, P42, P44, P45, P46, P48, P54, P55 and P56	Water pressure (level)	Daily (Data Logger)
Mine water pumped into and out of the mine (Box Cut)	EC pH TDS Metals Anion and Cations Flow	Monthly (full water quality and flow)

7.3.2 Environmental Performance

Annual Hydrogeological Review

An annual hydrogeological review was undertaken by Australasian Groundwater and Environmental Consultants (AGE) Pty Ltd for the period 1 January 2022 to 31 December 2022. The results of the review are summarised below. Groundwater monitoring results for this reporting period are provided in Appendix E as required by the WMP.

Groundwater Levels

Rainfall patterns over the past few years have been highly variable with an extended below average rainfall period occurring from early 2017 through to early 2020 followed by above average rainfall in 2020 to 2022. These climatic conditions are the primary driver to impacts in the alluvium bores.

Monitoring bore P9, which is installed in the Purlawaugh Formation and located near the central mains on longwall 203, was impacted by the progression of mining towards the bore in 2015. Since then, groundwater levels have been steadily declining. The groundwater level in P9 is above the modelled maximum predicted drawdown level by approximately 2 m.

Monitoring bores P11 and P16, screened in the Purlawaugh Formation and the Garrawilla Volcanics respectively, have been impacted by mining. No recovery of groundwater level has occurred during the above average periods of rainfall recorded in 2020 to 2022 and the consistent decline in P11 began at the start of operations on LW103. Groundwater levels at P11, which is located at the southern edge of longwall 206, remains 13 m above maximum predicted drawdown level. The groundwater level in P16, which is located on the western edge of longwall 111, is currently approximately 12 m below maximum predicted drawdown level.

It's worth mentioning that groundwater levels in monitoring bores outside the mine lease (i.e., P1 – P7) show no impacts of mining activities.

Groundwater monitoring bores installed near the rail loop and reject emplacement area all experienced fluctuations resulting in a correlation to the above average rainfall recorded between 2020 and 2022.

Groundwater Quality

pH has exceeded the 97.5th percentile at sites that have recorded more than 18 data points above the limit of detection (P12, P16, P19, P8, P9 and WB7). It's important to note that all of the bores that have exceeded the 97.5th percentile, pH is within the ANZECC (2000) guidelines for stock watering and irrigation, which is a range between 6.0 and 8.5. Updated trigger values will be prepared and presented as part of the Stage 3 Groundwater Management Plan (Whitehaven, 2022¹) which will provide more accurate and robust trigger values for pH.

Electrical conductivity (EC) is an important analyte used to assess trends and potential unexpected impacts on the groundwater environment. It is acknowledged that with the implementation of the Stage 3 Groundwater Management Plan later in 2023, the TARP will provide a more robust statistical method of analysis for trigger levels of specific water quality parameters. In 2022 the most significant increases in EC were observed in bores P10 and P19. Pumps were installed in monitoring bores P10 and P19 following an earlier recommendation to review sample collection methods and it appears that a more appropriate purging method during sampling is responsible for these changes. Historical data collected from P10 and P19 prior to the pumps being installed was clearly not well understood, and the elevated EC levels being recorded at each bore since the new pumps were installed is representative of aquifer conditions.

¹ The GWMP developed for the Stage 3, was submitted to NSW DPE-Water in late 2022 and is still under review and pending approval.

There were six additional monitoring bores in the Purlawaugh Formation (P8, P9 and P11), Garrawilla Volcanics (P16) and the Napperby Formation (P29 and P4) that recorded elevated EC values, i.e., above the 97.5th percentile, with an increasing trend forming. These monitoring bores will need to be monitored closely during the next reporting period when they have a more appropriate, statistically robust trigger value established.

Rail loop monitoring bores P29, P34 and P58 all recorded EC above the 97.5th percentile trigger with an increasing upward trend, as did monitoring bores P51 and P53 at the reject emplacement area. Monitoring bores P30 and P31 also exceeded the trigger value. The EC trigger value for these bores require a review with a more appropriate, statistically robust trigger value. In the case of P51 and P53, the EC is increasing which may be influenced by non-climatic factors, whereas the remaining bores could be experiencing elevated EC due to the above average rainfall and recharge experienced between 2020 and 2022.

A number of bores reported exceeding the 97.5th percentile trigger for dissolved metals and to a lesser degree nutrients and major anions and cations in 2022. These exceedances occurred in bores screened in the alluvium, Purlawaugh Formation, Garrawilla Volcanics and the Napperby Formation all of which had groundwater level responses to the above average rainfall observed between 2020 and 2022 indicating the exceedances may be linked to groundwater recharge after a period of below average rainfall. There were also observable upward trends in a small sub-set of these bores that will need to be fully understood, which will occur when the analysis for the new trigger exceedance methodology is released in the Stage 3 GWMP due in 2023.

Rail loop seepage detection

Generally speaking, water levels measured in the vibrating wire piezometers at Narrabri Mine were stable throughout 2022. Water levels in the Digby Formation are declining and appear to be influenced by mining. The water levels in the Napperby formation, measured in VWPs P46, P54 and P56, have been recovering and all increased in pressure during the period of reporting. Data collected in the Napperby formation has either remained steady or recovered slightly. The Hoskissons coal seam measured at P55 declined by approximately 1.5 m during 2022 as a result of mining activities.

Data collected at P56 seems to have been compromised in December 2020. The sensors collecting data in the Pamboola Formation malfunctioned and either stopped working or started recording conflicting data compared to pre-December 2020. This data should be used with caution. The data collected in the Watermark Formation at P46, the Porcupine Formation P45 and the Digby Formation at P42 and P55 is erratic and may be due to a sensor malfunction.

Compensatory Water Supply

No compensatory water has been required as no privately-owned water supplies have been affected.

7.3.3 Proposed Improvement Measures

In June 2022, NCO commissioned Australasian Groundwater and Environmental (AGE) to undertake a full re-calibration of the Groundwater Model. This recalibration will draw on updated groundwater level datasets for the entire site monitoring network. Once a satisfactory calibration has been achieved, the predicted simulations will then be rerun to generate revised predictions of drawdown and other impacts. Revised drawdown trigger levels will be incorporated into the site groundwater monitoring program.

7.4 SITE WATER BALANCE

Surface water

Table 20 presents an estimate of the volume of stored water at the beginning and end of the reporting period (i.e. calendar year). Narrabri Coal pumped 200ML into Dam D from Namoi Alluvium or the Namoi River water sources via approved Water Access Licences during the reporting period (i.e. calendar year). Narrabri Coal also utilised water from sediment basins for mine supply.

Table 20: Stored Water

	Volumes Held (ML)		Capacity at the end of the Reporting Period (ML)
	Start of Reporting Period	At end of Reporting Period	
Raw Water (Dam D and B1 in Rail loop)	64.1	95.6	79.3
Dirty Water (in Sediment Dams and Basins SD1-SD8 and SB1-SB4)	99.5	91.0	102.98
Rail Loop Dams (A1-A3, B2 and C)	506.2	490.3	77.5
* Additional 40ML of storage in containment bund in rail loop.			

Groundwater Inflows

The annual groundwater inflow to the workings has been less than the water use limits of WAL29549 (nominated works 90WA822539) of 818ML/year. In accordance with future impact predictions associated with the groundwater assessment, additional allocation was sought through a controlled action in 2019 for an additional 403 units. The WAL43017 (403 units) was issued in November 2019. The annual inflow that was predicted to be extracted from mining activities from the recalibrated groundwater model during 2021 was 813ML. The pumped volume from the box cut was 436ML during 2021 and 513ML for the reporting period. The modelled predicted groundwater inflows for 2022 predicted groundwater inflows at 2.5 ML/day (or 927 ML/year). The results for the 2021-2022 groundwater inflows are significantly lower than predicted at 0.3 ML/day (or 107 ML/yr).

The calculated water take utilising inputs and losses of water within the mine are represented by the waterfall chart below (Figure 12).

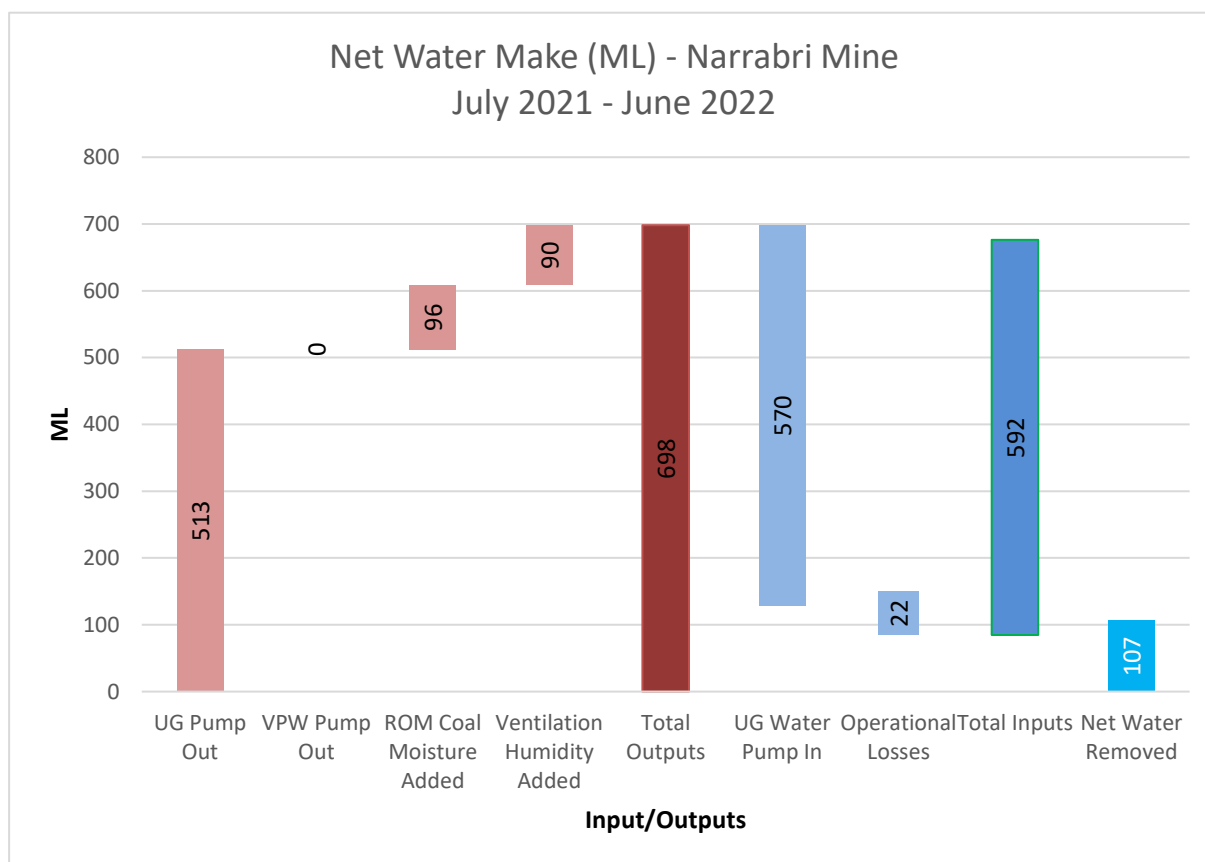


Figure 12: Waterfall Chart: Water Inputs/Outputs for 2022 water year (financial year).

8 REHABILITATION

A Rehabilitation Management Plan (RMP) was prepared 1 August 2022 in accordance with Clause 9 of Schedule 8A to the NSW Mining Regulation 2016. The RMP addresses the rehabilitation objectives for the Narrabri Mine as described in Schedule 5, Conditions 1 to 4 of PA 08_0144.

The RMP summarises the key elements for rehabilitation as well as providing a description of activities and mine landforms. As required by the Mining Regulation 2016, an Annual Rehabilitation Report and Forward Program (ARRFP) has been prepared and has been provided in **Error! Reference source not found.** The ARRFP is required to be submitted on the NSW Resources Regulator Portal to highlight how key elements of the RMP are implemented.

The following section provides an overview of the rehabilitation practices that were conducted during the reporting period, consistent with the ARRFP.

8.1 REHABILITATION PERFORMANCE DURING THE REPORTING PERIOD

8.1.1 Status of Mining and Rehabilitation

Rehabilitation activities were undertaken over the disturbed areas above LW108-110 during the reporting period, with approximately 20 hectares progressed to Active Rehabilitation. Rehabilitation activities undertaken during the reporting period included: decommissioning drill holes; filling in sumps

associated with drilling activities; grading landforms and re-spreading topsoil/subsoil and weed management.

8.1.2 Post Rehabilitation Land Uses

The rehabilitation completion criteria is consistent with the description in the Rehabilitation Management Plan (RMP). The area in the west of ML1609 will be returned to native woodland and the area in the east of the ML will be returned to the relevant land capability class.

8.1.3 Rehabilitation Performance Indicators

Table 21 summarises the rehabilitation status for the Narrabri Mine, also refer to Figure 13 and Figure 14. Note that areas for each 'Main Area Type' have been reported to align with definitions in the *Annual Review Guideline* (DP&E 2015).

Table 21: Rehabilitation Status

Mine Area Type	Previous Reporting Period (2020)	This Reporting Period (31/12/2022-Actual)	Next Reporting Period 2023 (Forecast)
A. Total mine footprint	416	449	460
B. Total active disturbance	262	278	265
C. Land being prepared for rehabilitation	31	28	40
D. Land under active rehabilitation	123	143	155
E. Completed rehabilitation	0	0	0

8.1.4 Decommissioning and Demolition Activities

No decommissioning activities were undertaken during the reporting period outside of the reclaiming of gas drainage infrastructure, which is re-used where possible.

8.1.5 Other Rehabilitation Activities

Narrabri Coal Operations (NCO) Pty Ltd operates a groundwater monitoring network in accordance with a water management plan (WMP) under project approval PA08_0144. The groundwater monitoring network is reviewed and revised as mining progresses and some of the network becomes obsolete once mining progresses through the area. Table 22 shows a list of monitoring bores that have become obsolete due to mine progression. The monitoring bores have been sealed with cement grout and decommissioned in accordance with the requirements within 'minimum construction requirements for water bores in Australia'. NCO have commenced the process to seek relinquishment for these locations, which is expected to be completed in the next reporting period.

Table 22 Decommissioned monitoring bores

Narrabri Coal ID	Groundwater Works Number	Bore licence ID	Easting	Northing	Elevation (mAHD)	Screen Depth	Grouted to surface
P14	GW968637	90BL254661	775221	6622816	277.41	72-78	YES
P15	GW968638	90BL254961	775221	6622818	277.41	24-30	YES
P18		90BL254662	776826	6621802	270.9	143-146	YES
P20	GW968643	90BL254964	776482	6621837	272.94	159-162	YES
P21	GW969508	90BL254965	776851	6620363	275	160	YES
P22	GW969509	90BL254966	776744.9	6620406	274.12	165	YES
P23(NC175CR)	GW969510	90BL254967	776226.1	6620693	286.04	188	YES
P24(NC179)	GW969642	90BL254701	776674.9	6621043	277.60	180	YES
P25	GW969661	90BL255167	776702.5	6620327	270	165	YES
P26	GW969973	90BL255168	776537.1	6620528	275.41	176	YES
P27	GW969974	90BL255169	776539.6	6620485	275.35	176	YES
P35	GW969937	90BL255769	776429.5	6620348	278.71	173	YES
P36	GW969936	90BL255770	776329.4	6620442	281.5	176	YES
P37	GW969934	90BL255771	776474.1	6620492	277.38	177	YES
P38	GW969933	90BL255772	776385.1	6621640	274.16	153.5	YES
P40		90BL256064	772814.7	6620823	321.22	360	YES
P48		90BL256293	775295.7	6623039	276.00	194.5	YES
P50		90BL256289	775724.6	6620655		15-60	YES
P57		90BL256042	773895.5	6624092	302.81	180	YES

8.1.6 Departmental Sign-off of Rehabilitated Areas

Departmental sign-off was not requested during the reporting period.

8.1.7 Variations in Activities against MOP/RMP

Narrabri Mine prepared a Mining Operations Plan to cover the period 01 December 2020 to 31 December 2023. The latest MOP Amendment (B) was approved 16 May 2022 to incorporate the:

- construction and operation of a new Brine Dam north-west of the existing pit-top surface water infrastructure;
- construction of a ventilation fan pad in the south-eastern area of ML1609;
- lengthening and widening an existing access track; and

- widening an existing access track.

The MOP was superseded by a Rehabilitation Management Plan (RMP) and Forward Program from 1 August 2022 in accordance with Clause 9 of Schedule 8A to the NSW Mining Regulation 2016. The RMP and Forward Program addresses the rehabilitation objectives for the Narrabri Mine as described in Schedule 5, Conditions 1 to 4 of PA 08_0144.

Rehabilitation activities scheduled for the Reject Emplacement Area (REA) during the reporting period were unable to be completed, due to ongoing consultation with the Resources Regulator and subsequent changes to the landform design to incorporate elements of geomorphic design. This design is now finalised and will be incorporated onsite during the next reporting period.

8.1.8 Monitoring

Internal rehabilitation/revegetation monitoring undertaken to date has primarily been limited to inspections of roads/creeks impacted by subsidence, water management structures, soil stockpiles and seeded areas for evidence of instability/erosion or poor germination, and borehole sealing. This process will continue over the life of the mine, with the extent and nature of activities undertaken being consistent with the relevant Rehabilitation Management Plan, Extraction Plan, Landscape Management Plan and other relevant management plans prepared in satisfaction of PA 08_0144.

8.1.9 Trials, Research Projects and Initiatives

During the reporting period Narrabri engaged specialist consultants to assist with the implementation of an electronic GIS based monitoring platform. The system has been built and is currently being tested and refined. Testing is expected to continue throughout the reporting period prior to transitioning to the online GIS program.

8.1.10 Key Issues to Achieving Successful Rehabilitation

The key issues to achieving successful rehabilitation include:

- Poor quality or lack of volume of topsoil;
- Loss or alteration to existing habitats due to subsidence, erosion, weeds and/or pests;
- Alteration of drainage lines due to subsidence;
- Contaminated land occurring onsite;
- Ongoing greenhouse gas emissions due to inadequate sealing of mine entries etc;
- Loss of agricultural resources due to mining disturbance; and
- Discharge of saline or contaminated water.

In cases where the performance is sub-optimal, additional management measures will be implemented (e.g. replanting, repairing landform and water management features, application of mulch/fertilisers, feral animal and weed control etc.).

8.2 ACTIONS FOR THE NEXT REPORTING PERIOD

Work will continue to progress on removing houses and associated infrastructure on mine-owned land that are no longer required or that have been affected by subsidence. Asbestos assessments have been completed in the reporting period and now an appropriately licenced contractor is being sought to complete the remainder of these works.

Weed and pest animal control programs and monitoring will continue.

The rehabilitation actions for the next reporting period are detailed in the RMP Forward Program, which covers the next three calendar years. Narrabri Mine are amending the Rehabilitation Management Plan to ensure compliance with the new rehabilitation conditions required by the rehabilitation reform amendments to the *Mining Act 1992*.

Staged rehabilitation of the REA will progress following acceptance of the revised Rejects Emplacement Area Capping Assessment and Closure Design, which incorporates aspects of geomorphic design.

8.2.1 Proposed Research and Rehabilitation for 2023

An integrated electronic GIS based monitoring platform was proposed in the 2021 Annual Review. This project was originally delayed to ensure that NSW mining lease rehabilitation reforms were captured within this program. This application has been introduced onsite in sections, which deal with different aspects of environmental management onsite (i.e. subsidence crack monitoring and rehabilitation forms one component). In the 2023 reporting period, it is proposed that a Permit to Work (PTW) component be introduced onsite to be operated alongside the current paper-based format for the PTW. This method will be used to identify any issues or additional resources that will be required to introduce the electronic format, with the main objective being that the electronic GIS based format will take over as the sole system for PTW's.

The PTW system is a structured form that is required to be completed and signed by the relevant positions within the mine, prior to conducting any clearance or excavation works. This process requires an environmental constraints assessment which includes capturing the amount and type of vegetation that is to be cleared. By using an electronic format, it is expected that capturing rehabilitated areas will be made more efficient.

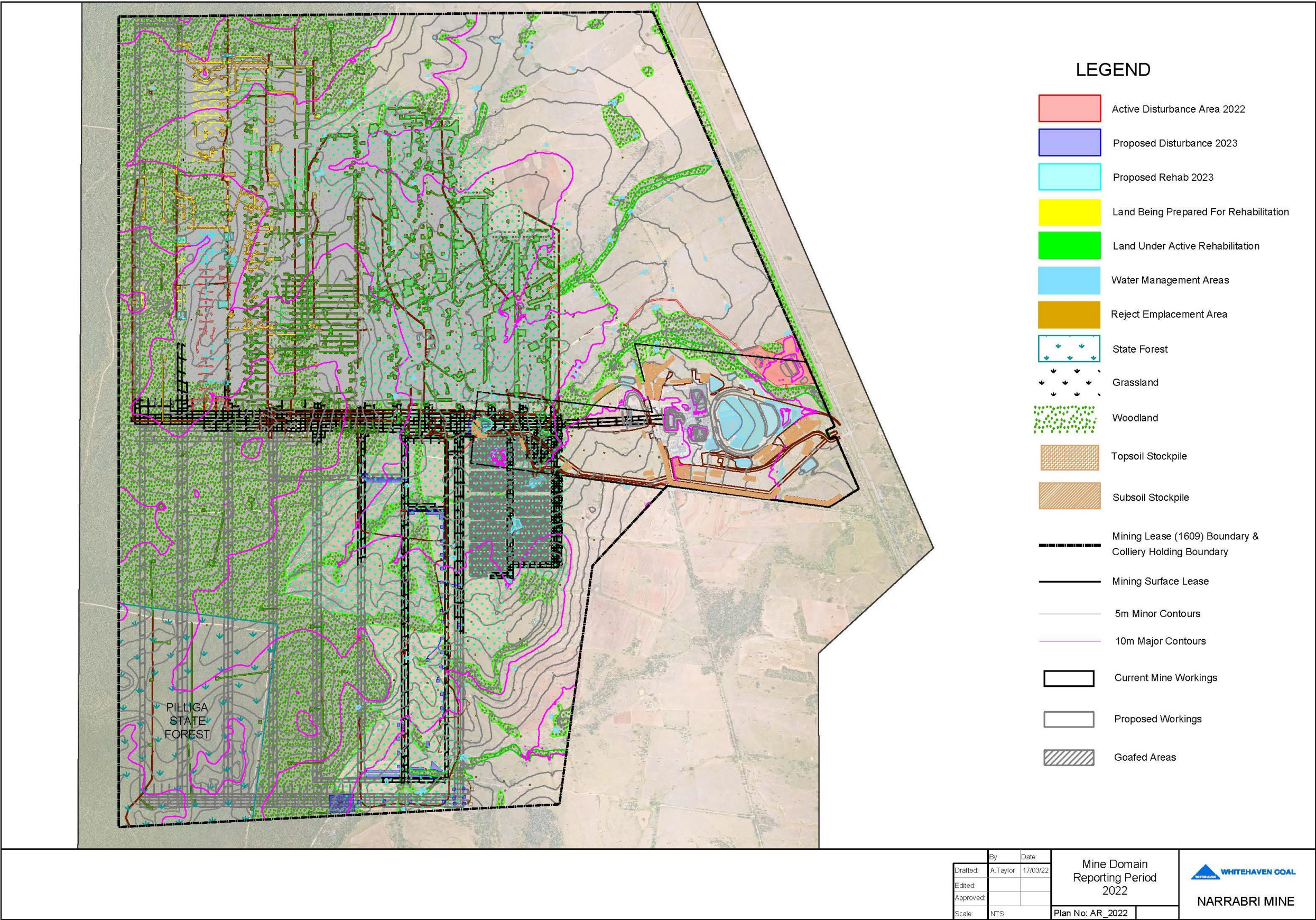


Figure 13: Mine Domains Reporting Period 2022

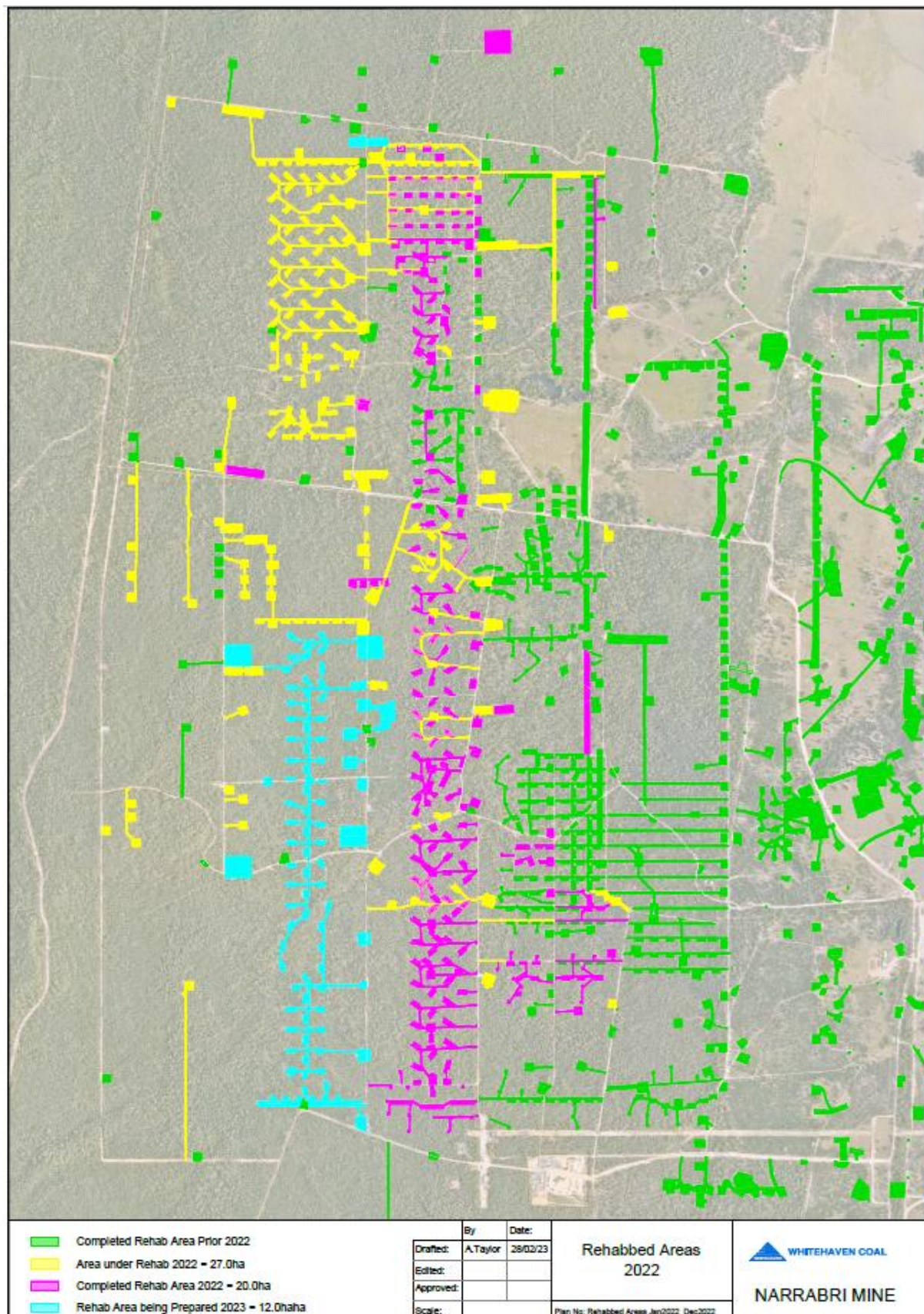


Figure 14 Rehabilitated Areas, Reporting Period 2022

9 COMMUNITY

Social impacts and opportunities associated with the Narrabri Mine are managed in accordance with PA 08_0144 and the Statement of Commitments (SoC) (Appendix 3 of PA 08_0144).

9.1 COMMUNITY ENGAGEMENT ACTIVITIES

In accordance with Schedule 6, Condition 9 of PA 08_0144, a Community Consultative Committee (CCC) has been formed and operating since 2008. The committee comprises representatives of Narrabri Shire Council, Narrabri Mine and the community. Since its inception, the CCC has met quarterly. The CCC met four times during the reporting period on the 16 March 2022, the 15 June 2022, the 21 September 2022 and the 7 December 2022.

Narrabri Mine representatives continue to maintain contact with neighbours near the mine site. These contacts not only provide a means of information dissemination, but also enable Narrabri Mine to ascertain and address any potential concerns.

In addition, information relating to the mine is available: on the Whitehaven Coal website; the annual sustainability report; and at consultation meetings as required with neighbours and a range of stakeholders including government and non-government agencies. Whitehaven Coal meets regularly with the Narrabri Shire Council and is a regular attendee at the Narrabri and Boggabri Business Chamber meetings.

9.2 COMMUNITY CONTRIBUTIONS & INITIATIVES

As well as attending functions, WHC and Narrabri Mine also contributed to the community by providing over \$135,00 in financial support to the Narrabri community and sponsorship to various community events and initiatives during the reporting period, these included:

- 2022 Annual Presentation Night
- Advertising in the Boggabri Weekly
- Assistance to cover daily operation expenses
- Assistance to help high school students further their education
- Attract Connect Stay Narrabri Group
- Carols in the Park
- Costs of installation of new electronic scoreboard
- Donation to help run race meeting
- Donation towards the cost of office & kitchen equipment
- Funding Costs to hold the 2022 Science and Engineering Challenge
- Funding for more sports equipment
- Future EDU Community Group
- Gomeroi Narrabri People Ltd
- Namoi Gwydir Mining Industry Fire Safety Meeting
- Narrabri and Boggabri Business Chamber meetings and Chamber Awards
- Narrabri Childcare Focus Group
- Narrabri Council regular meetings
- Narrabri Create Festival
- Narrabri GP Workforce group
- Narrabri LALC NAIDOC Week 2022
- Narrabri Native Grains Project
- Narrabri SAP meetings

Narrabri town street Christmas party
New Trailer & dolly to move boat around the local water ways
NIN Gala Evening
NIN Gold Membership Level
Pink up Narrabri
Platinum Sponsorship of 2022 Narrabri Show
Purchased 10 new student laptops and charging station
Purchase a new keyboard and licenced music sheets
purchase more resources for the kids
Repairs to the hall to keep the club running
Replacement of the fort
Send players on a South Sydney Trip
Sponsorship for Create 2022
Sponsorship for 2022 season
Sponsorship for Create 2023
Sponsorship for the 2023 Drovers Campfire
Sponsorship for the B to B Bash 2022
Sponsorship Lucas Summers Lawler for NW Primary Boys Softball
Sponsorship of 2022 Camp Draft
Sponsorship of event
Sponsorship seed funding to establish and innovation hub in Narrabri
Upgrade a new food safe BBQ trailer

9.3 COMMUNITY COMPLAINTS

Narrabri Mine maintains a designated complaints line. In the event of a complaint, details pertaining to the complainant, complaint and action taken are recorded on a complaint register. The complaints register is available on the Whitehaven Coal website.

During the reporting period, no complaints were made to the mine.

9.3.1 Complaint Trends

No complaints were received during the reporting period which is a decrease from the one complaint received in the 2021 annual review period (Figure 15).

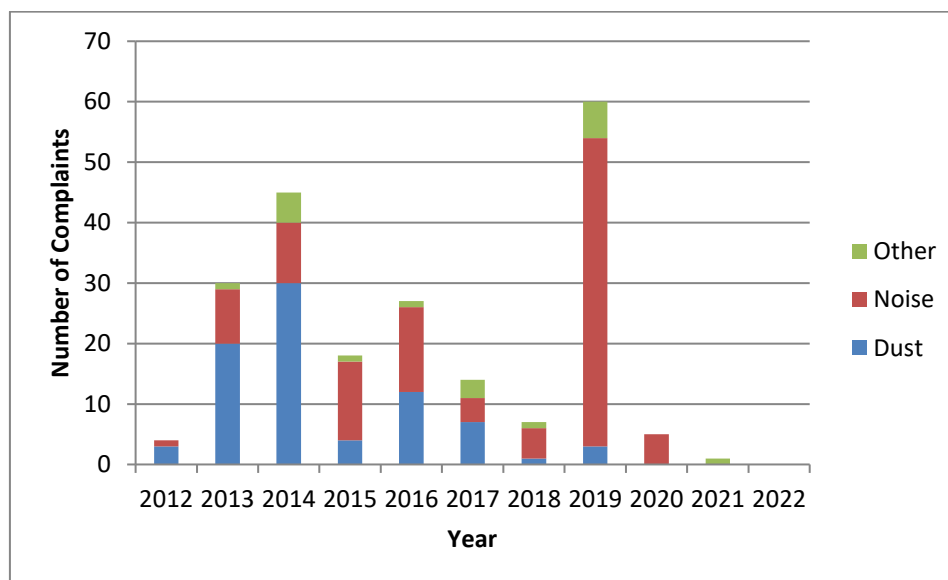


Figure 15: Complaints Trend since commencement of operations

9.4 ACTIONS & PROPOSED IMPROVEMENTS

Narrabri Mine is exploring opportunities with Narrabri Council for additional accommodation within the shire. Narrabri Mine will also continue to continue meeting with Council and the Narrabri Business Chamber regularly and support the Narrabri Shire Community through the Community Investment Committee.

10 INDEPENDENT AUDIT

10.1 INDEPENDENT ENVIRONMENTAL AUDIT

During the reporting period, a 3-yearly Independent Environmental Audit (IEA) was conducted in accordance with PA08_0144 Schedule 6 Condition 7. The IEA covered the period from the 5 December 2019 to 8 December 2022. Four (4) non-compliances were identified (one duplicate) against conditions of consent and one (1) non-compliance against the implementation of plans. Table 23 summarises the non-compliances and relevant recommendations from the auditor.

In accordance with Schedule 6, Condition 7 of PA 08_0144, the next IEA will be commissioned by 13 September 2025. The full 2022 IEA Report and NCO's Response Action Plan (RAP) are available on the Whitehaven Coal (Narrabri Mine) website.

Table 23: 2022 Independent Environmental Audit (IEA) – non-conformance actions summary

Plan	Condition	Response/Action	Status
PA08_0144	Sched 4, Cond 1	Reported NC (duplicate). The mine will continue to implement the Noise Management Plan (NMP). Improvement opportunities will be reported on in the relevant Annual Review.	Complete
EPL12789	L4.1		
PA08_0144	Sched 4, Cond 30	It is recommended the Energy Savings Action Plan (ESAP) is reviewed and updated to consider actual production data since 2013 and work currently underway to review GHG emissions.	31 March 2023
PA08_0144	Sched 6, Cond 4	Reported NC. NCO will update the Groundwater Management Plan (GWMP) in accordance with updated predictions following recalibration of the Groundwater Model.	28 April 2023
SOC	9.18	NCO will update the Aboriginal Cultural Heritage Management Plan (ACHMP) Training Package and revise training schedules.	28 April 2023

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 NON-COMPLIANCES

The compliance status of the Narrabri Mine against relevant approvals during the reporting period was assessed in Section 1 as at the end of the reporting period (i.e. 31 December 2022). Further details of any non-compliance and actions undertaken or proposed for the following reporting period is summarised in Table 24.

Table 24: Non-Compliance Details and Proposed Action Plan

Non - Compliance	Date	Cause	Action Plan	Due Date
An incident was not reported to NSW DPE as soon as possible or in the form of a report within 7-days of becoming aware of the incident.	5 July 2022	A standing water level (SWL) triggering notification to NSW DPE (as an incident) was recorded 5 July 2022. In accordance with the trigger action response plan (TARP) a consulting company confirmed the exceedance 1 September 2022. NCO informed NSW DPE of the incident in a detailed report 9 September 2022 via the Major Projects Portal.	To ensure exceedances are reported to the regulator as soon as possible, NCO has included trigger levels on each field monitoring sheet. This includes a prompt to notify the Environmental Superintendent.	Completed.

11.2 REPORTABLE INCIDENTS OR EXCEEDANCES

The standing water level (SWL) at groundwater monitoring location P16 exceeded the groundwater drawdown trigger as outlined in the Narrabri Mine Water Management Plan (WMP), classifying as an Incident under the Project Approval 08_0144 definition (exceeds a performance measure).

As per the WMP TARP, NCO engaged a consulting hydrogeologist to review the field data to validate that the drawdown trigger level had been exceeded, and to conduct an investigation and report on any identified changes / likely causes and provide recommendations for contingency responses (if any).

The investigation determined that no immediate mitigation was required due to the isolated nature of the occurrence at P16. NCO had commissioned a consulting hydrogeologist company to undertake a full re-calibration of the Groundwater Model, which will draw on updated groundwater level data sets for the entire site monitoring network. Revised drawdown trigger levels will be incorporated into the site groundwater monitoring program. NCO will continue to monitor groundwater at P16 and other bores in the monitoring network in accordance with the Water Management Plan.

11.3 REGULATORY ACTIONS

No regulatory actions were received during the reporting period.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Activities to be completed in the next reporting period to improve the environmental or community performance of the Narrabri Mine, in addition to those separately identified in Section 11 include:

- Subsidence Pond management- an engineering study into geomorphic design options that would enable the subsidence pond areas to freely drain in a safe and stable way was completed in the 2022 reporting period. An assessment into the most appropriate option will be completed and implementation will commence in the 2023 reporting period;
- Earthworks from the revised geomorphic design Reject Emplacement Area Capping Assessment and Closure Design (ATC Williams 2020) will be implemented onsite;
- Construction of the additional brine storage dam will be completed and commissioned in accordance with the relevant statutory requirements;
- Continue the weed and feral animal control programs and subsequent monitoring.
- Further actions will be undertaken to establish an improved GIS based monitoring platform for environmental monitoring, including the addition of an electronic Permit to Work (PTW) system;
- The ACH fencing improvement program will continue around all registered ACH sites;
- Review and revision of various Environmental Management Plans;
- Seeking approval to relevant approval modifications or amendments.
- Continued community liaison and engagement with local stakeholders.

Appendix A – *Flora Species List*

Appendix A - Flora Species List

Scientific Name	Common Name	Native/Exotic	AMBS-1	AMBS-2	GRV-1-G	ROV-1-G	ROV-2-G	ROV-3-G	ROV-4-G	ROV-5-G	ROV-6-D	ROV-7-D	ROV-8-D	ROV-9-D	S-10	S-12	S-12-Rep	S-13	S-13-Rep	S-16	S-16-Rep	S-19-Rep	S-5	WEH-1-G	Grand Total
Abutilon oxycarpum	Straggly Lantern-bush	native																							6
Abutilon tubulosum	(blank)	native																							X
Acacia burrowii	Burrow's Wattle	native		X		X	X	X	X											X		X		X	8
Acacia cheelii	Motherumbah	native													X										3
Acacia deanei	Green Wattle	native								X		X					X				X			X	5
Acacia deanei subsp. deanei	Deane's Wattle	native															X					X			X
Acacia decora	Western Silver Wattle	native																							7
Acacia gladiiformis	Sword Wattle	native																			X				X
Acacia ixiophylla	(blank)	native																						X	X
Acacia leiocalyx subsp. leiocalyx	Curraabah	native	X	X	X	X	X	X	X	X											X	X			X0
Acacia penninervis	Mountain Hickory	native	X				X													X	X				4
Acacia salicina	Cooba	native																							2
Acacia spp.	Wattle	native		X					X							X						X	X	X	X4
Acacia triptera	Spurwing Wattle	native													X										X
Actinotus helianthi	Flannel Flower	native	X		X																				2
Ajuga australis	Austral Bugle	native																							7
Alectryon oleifolius	Western Rosewood	native																							3
Allocasuarina diminuta	(blank)	native	X																		X			X	3
Allocasuarina luehmannii	Bulloak	native								X		X													2
Alphitonia excelsa	Red Ash	native		X		X	X								X							X		X	X8
Alstonia constricta	Quinine Bush	native					X																		5
Alternanthera denticulata	Lesser Joyweed	native																							2
Alternanthera spp.	Joyweed	native																							3
Amyema pendula	(blank)	native																							X
Amyema spp.	Mistletoe	native																							X
Ancistrachne uncinulata	Hooked-hairy Panic Grass	native															X								X
Angophora floribunda	Rough-barked Apple	native																							3
Anthosachne scabra	Wheatgrass, Common Wheatgrass	native															X								5
Arenaria leptoclados	Lesser Thyme-leaved Sandwort	exotic																							8
Arenaria spp.	(blank)	exotic																							2
Argemone ochroleuca subsp. ochroleuca	Mexican Poppy	exotic																							X
Aristida caput-medusae	Many-headed Wiregrass	native				X	X			X														X	4
Aristida lignosa	(blank)	native																							X
Aristida personata	(blank)	native				X	X	X	X											X	X				6
Aristida ramosa	Purple Wiregrass	native									X	X			X		X					X	X		3X
Aristida spp.	(blank)	native					X										X	X	X	X	X	X		X	X5
Aristida vagans	Threeawn Speargrass	native														X									2
Arthropodium milleflorum	Pale Vanilla-lily	native																							2
Arthropodium minus	Small Vanilla Lily	native													X										6
Arthropodium sp. B	(blank)	native																							X
Arthropodium spp.	(blank)	native																					X		XX
Aster subulatus	Wild Aster	exotic																							X
Asteraceae indeterminate	Daisies	native											X												X
Atalaya hemiglauca	Whitewood	native												X											X
Austrostipa scabra	Speargrass	native					X			X			X	X		2	X	X	X				X	X	46
Austrostipa scabra subsp. scabra	Rough Speargrass	native																							2
Austrostipa spp.	(blank)	native											X		X					X					6
Austrostipa verticillata	Slender Bamboo Grass	native								X							X	X	X	X					24
Bertya opposens	Coolabah Bertya	native		X		X	X															X			4

Bertya spp.	(blank)	native																			X	X
Beyeria viscosa	Sticky Wallaby Bush	native																				X0
Bidens pilosa	Cobbler's Pegs	high threat											X	X						X		X7
Bidens spp.	(blank)	high threat																				2
Bidens subalternans	Greater Beggar's Ticks	high threat																				9
Boerhavia dominii	Tarvine	native																				9
Boronia glabra	Sandstone Boronia	native			X													X				2
Boronia occidentalis	(blank)	native				X	X											X				3
Boronia spp.	(blank)	native		X				X														2
Bothriochloa decipiens	Red Grass	native						X												X		2
Bothriochloa decipiens var. decipiens	Pitted Bluegrass	native							X													3
Bothriochloa macra	Red Grass	native																				3
Bothriochloa spp.	Redgrass, Bluegrass	native								X												X3
Brachychiton populneus	Kurrajong	native											X		X							X7
Brachychiton populneus subsp. populneus	(blank)	native																				3
Brachyscome goniocarpa	Dwarf Daisy	native						X														X
Brachyscome spp.	(blank)	native				X	X			X		X		X								5
Breynia oblongifolia	Coffee Bush	native										X										4
Briza minor	Shivery Grass	exotic							X													X
Briza spp.	(blank)	exotic										X										X
Bromus catharticus	Praire Grass	exotic																				6
Bromus molliformis	Soft Brome	exotic																				4
Bromus spp.	(blank)	native																				3
Brunoniella australis	Blue Trumpet	native						X							X	X			X	X	X	X8
Bryophyllum delagoense	Mother of millions	high threat											X	X	X	X						4
Buglossoides arvensis	Sheepweed	exotic																				9
Bulbine bulbosa	Bulbine Lily	native											X									2
Bulbine semibarbata	Wild Onion	native										X										2
Bulbine spp.	(blank)	native																	X			7
Caladenia fuscata	Dusky Fingers	native										X										2
Caladenia spp.	(blank)	native																				3
Calandrinia spp.	(blank)	native										X										X
Callitris endlicheri	Black Cypress Pine	native					X	X								X	X					4
Callitris glaucophylla	White Cypress Pine	native							X	X		X	X					X	X	X		35
Calochilus robertsonii	Purplish Beard Orchid	native	X		X			X	X										X			5
Calotis cuneifolia	Purple Burr-Daisy	native				X	X		X		X						X	X	X			8
Calotis hispidula	Bogan Flea	native																				2
Calotis lappulacea	Yellow Burr-daisy	native							X		X	X		X		X	X			X		47
Calotis spp.	(blank)	native																				X
Calytrix tetragona	Common Fringe-myrtle	native	X		X			X									X	X				6
Capparis mitchellii	Native Orange	native																				X
Capsella bursa-pastoris	Shepherd's Purse	exotic																				XX
Carex inversa	Knob Sedge	native														X				X		26
Carthamus lanatus	Saffron Thistle	high threat																		X		X2
Cassinia laevis	Cough Bush	native										X										5
Cassinia quinquefaria	(blank)	native																				X
Cassinia spp.	(blank)	native					X														X	2
Cassytha glabella	(blank)	native		X	X																	2
Cassytha spp.	(blank)	native	X																			X
Casuarina cristata	Belah	native											X	X								4
Centaurea calcitrapa	Star Thistle	exotic																				2
Centaurea melitensis	Maltese Cockspur	exotic																	X			25
Centaureium erythraea	Common Centaury	exotic									X								X			7
Centaureium spp.	(blank)	exotic							X		X	X										X5

Centipeda spp.	(blank)	native																					X
Cerastium glomeratum	Mouse-ear Chickweed	exotic																					3
Cerastium spp.	(blank)	exotic									X												X
Cestrum parqui	Green Cestrum	high threat																					2
Chamaesyce drummondii	Caustic Weed	native											X								X		7
Chamaesyce spp.	(blank)	native																					X
Cheilanthes austrotenuifolia	Rock Fern	native														X							X
Cheilanthes distans	Bristly Cloak Fern	native				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X5
Cheilanthes sieberi	Rock Fern	native		X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	47
Cheilanthes sieberi subsp. sieberi	Rock Fern	native																					9
Chenopodium spp.	Goosefoot, Crumbweed	native															X						X
Chloanthes glandulosa	(blank)	native		X																			X
Chloanthes parviflora	(blank)	native	X		X			X	X														4
Chloris divaricata var. divaricata	Slender Chloris	native													X								X
Chloris truncata	Windmill Grass	native												X			X						7
Chloris ventricosa	Tall Chloris	native													X	X					X		20
Chondrilla juncea	Skeleton Weed	exotic								X													7
Chrysocephalum apiculatum	Common Everlasting	native								X		X						X	X		X		X6
Chrysocephalum semipapposum	Clustered Everlasting	native																X	X	X			5
Cirsium vulgare	Spear Thistle	exotic																					2
Cleistochloa rigida	(blank)	native	X	X	X				X														4
Clematis decipiens	(blank)	native																					4
Commelina cyanea	Native Wandering Jew	native																					X
Convolvulus spp.	(blank)	native									X												7
Conyza bonariensis	Flaxleaf Fleabane	exotic																					X
Conyza spp.	(blank)	exotic							X	X	X	X	X	X	X	X		X					47
Coronidium oxylepis	(blank)	native																	X				X
Corymbia trachyphloia	White Bloodwood	native	X		X		X	X	X										X				6
Cotula australis	Common Cotula	native																					X2
Crassula colorata	Dense Stonecrop	native																					X
Crassula sieberiana	Australian Stonecrop	native									X												4
Crassula spp.	Stonecrop	native										X	X				X				X		20
Crinum flaccidum	Darling Lily	native										X		X									7
Crinum spp.	(blank)	native											X										X
Cyclospermum leptophyllum	Slender Celery	exotic																					X8
Cymbidium canaliculatum	Tiger Orchid	native																					X
Cymbonotus lawsonianus	Bear's Ear	(blank)																			X		8
Cymbopogon refractus	Barbed Wire Grass	native				X	X			X	X	X		X	X			X		X	X	X	36
Cynodon dactylon	Common Couch	native																			X		XX
Cynoglossum australe	(blank)	native																					2
Cyperus eragrostis	Umbrella Sedge	high threat													X								X
Cyperus gracilis	Slender Flat-sedge	native								X	X				X		X	X			X	X	36
Cyperus spp.	(blank)	native													X						X		XX
Dampiera lanceolata var. lanceolata	(blank)	native	X	X	X			X	X														5
Daucus glochidiatus	Native Carrot	native				X					X		X	X				X			X		44
Denhamia cunninghamii	(blank)	native																	X		X		2
Desmodium brachypodum	Large Tick-trefoil	native																					3
Desmodium gunnii	Slender Tick-trefoil	native																					X
Desmodium spp.	Tick-trefoil	native																					X
Desmodium varians	Slender Tick-trefoil	native																		X			X5
Dianella longifolia	Blueberry Lily	native												X									3
Dianella revoluta	Blueberry Lily	native											X					X	X		X		6
Dianella spp.	(blank)	native		X					X														4
Dichanthium sericeum	Queensland Bluegrass	native								X		X	X										XX

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[illegible]

[illegible]

[illegible]

[illegible]

Sida corrugata	Corrugated Sida	native														X		X	X				X		X7
Sida cunninghamii	Ridge Sida	native																X				X		X	8
Sida rhombifolia	Paddy's Lucerne	exotic															X								3
Sida sp. A	(blank)	native							X																X
Sida spinosa	(blank)	exotic																							XX
Sida spp.	(blank)	native			X	X			X		X		2		X							2	X		X2
Sigesbeckia australiensis	(blank)	native												X											5
Sigesbeckia spp.	(blank)	native																							2
Silene gallica	French Catchfly	exotic								X	X														2
Silybum marianum	Variegated Thistle	exotic																							X
Sisymbrium irio	London Rocket	exotic																							X
Sisymbrium orientale	Indian Hedge Mustard	exotic																							9
Sisymbrium spp.	(blank)	exotic																							7
Sisyrinchium spp.	(blank)	exotic																							X
Solanum cinereum	Narrawa Burr	native																							X2
Solanum ferocissimum	Spiny Potato-bush	native			X				X												X				3
Solanum jucundum	(blank)	native			X	X			X									X	X		X			X	7
Solanum nigrum	Black-berry Nightshade	exotic															X	X							6
Solanum parvifolium subsp. parvifolium	Nightshade	native							X								X	X	X	X					8
Solanum spp.	(blank)	native											X		X						X				4
Solenogyne bellioides	Solengyne	native																				X			2
Solenogyne dominii	(blank)	native																							X
Solenogyne spp.	(blank)	native																							X
Soliva sessilis	Bindyi	exotic																							2
Soliva spp.	(blank)	exotic																							X
Sonchus asper	Prickly Sowthistle	exotic																							3
Sonchus oleraceus	Common Sowthistle	exotic								X	X			X	X	X						X	X		43
Sonchus spp.	Sowthistle	native										X													X
Sporobolus caroli	Fairy Grass	native																							X
Sporobolus creber	Slender Rat's Tail Grass	native								X	X	X	X	X	X	X	X	X	X			X	X		42
Sporobolus spp.	Rat's Tail Couch	native																							X
Stachys arvensis	Stagger Weed	exotic																				X			X8
Stackhousia spp.	(blank)	native																							3
Stackhousia viminea	Slender Stackhousia	native																							5
Stellaria media	Common Chickweed	exotic																							4
Stellaria spp.	Prickly Starwort	native																							X
Stuartina muelleri	Spoon Cudweed	native				X	X							X						X	X				XX
Swainsona galegifolia	Smooth Darling Pea	native												X											X4
Swainsona spp.	(blank)	native													X										X
Taraxacum officinale	Dandelion	exotic														X									3
Teucrium betchei	(blank)	native																							6
Teucrium corymbosum	Forest Germander	native																							X
Themeda triandra	(blank)	native														X									2
Thyridolepis mitchelliana	Mulga Mitchell Grass	native				X	X			X									X				X		5
Tragus australianus	Small Burrgrass	native																							X
Tribulus micrococcus	Spineless Caltrop	native																							X
Tricoryne spp.	(blank)	native														X									X
Trifolium arvense	Haresfoot Clover	exotic									X	X	X	X								X			33
Trifolium campestre	Hop Clover	exotic								X	X			X											X2
Trifolium dubium	Yellow Suckling Clover	exotic										X	X												4
Trifolium glomeratum	Clustered Clover	exotic								X			X									X			X4
Trifolium spp.	(blank)	exotic																							9
Triptilodiscus pygmaeus	Common Sunray	native												X					X			X			X2
Unknown A	(blank)	native										X			X										2

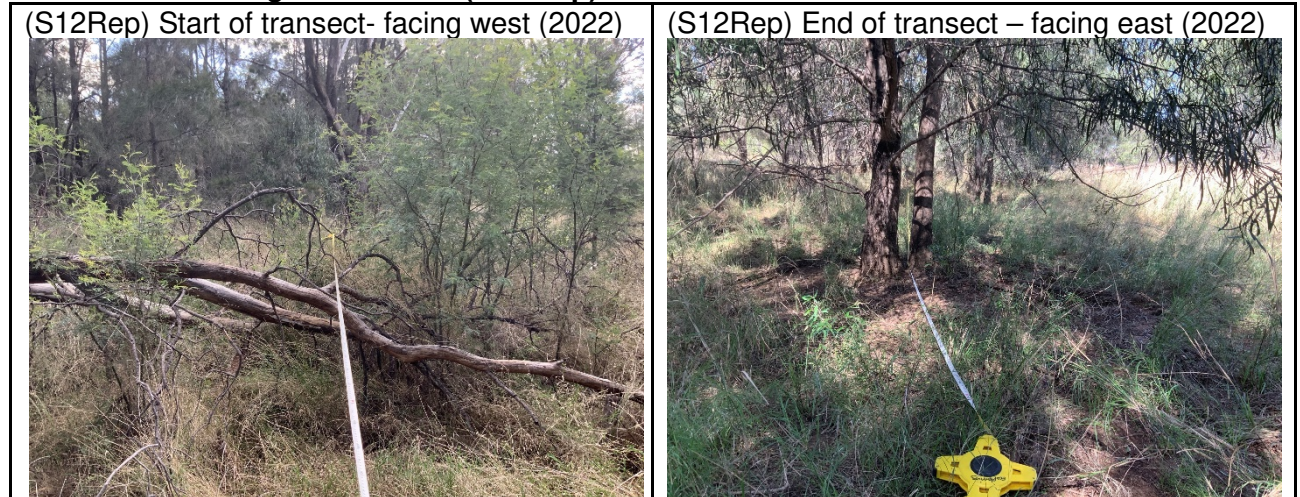
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Appendix B – *Photo Monitoring Points*

Greylands

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
S12 Rep	S12 Rep	777944/6622967	West	PCT 88 Pilliga Box- White Cypress - Buloke shrubby woodland in the Brigalow Belt South Bioregion - moderate condition
		777892/6622974	East	

Floristic Monitoring Site 12 REP (S12 Rep)



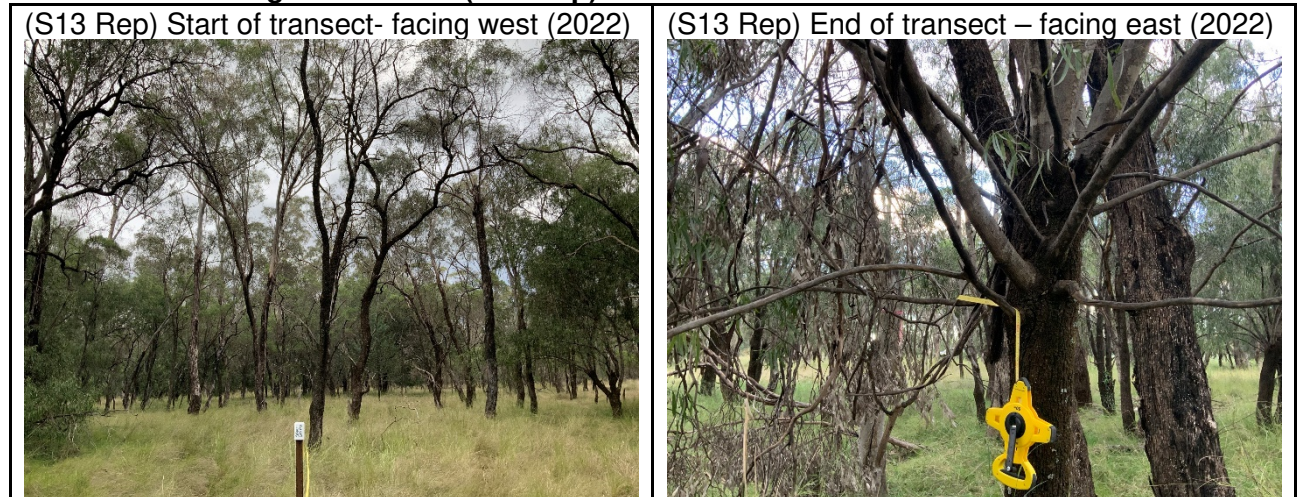
Omeo

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
S13	S13	777504/6623536	West	PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion – moderate condition
		777455/6623552	East	
S13 Rep	S13 Rep	777518/6623447	West	PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion – moderate condition
		777460/6623460	East	

Floristic Monitoring Site 13 (S13)



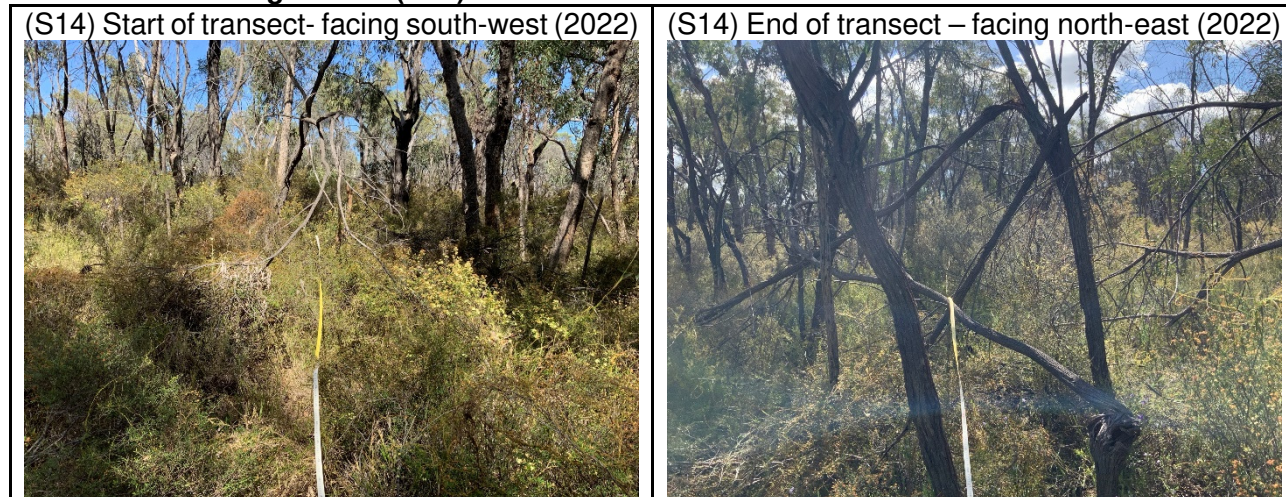
Floristic Monitoring Site 13 REP (S13 Rep)



Greylands Road

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
S14	GRY1	772042/6622013	SW	PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
		772002/6621987	NE	

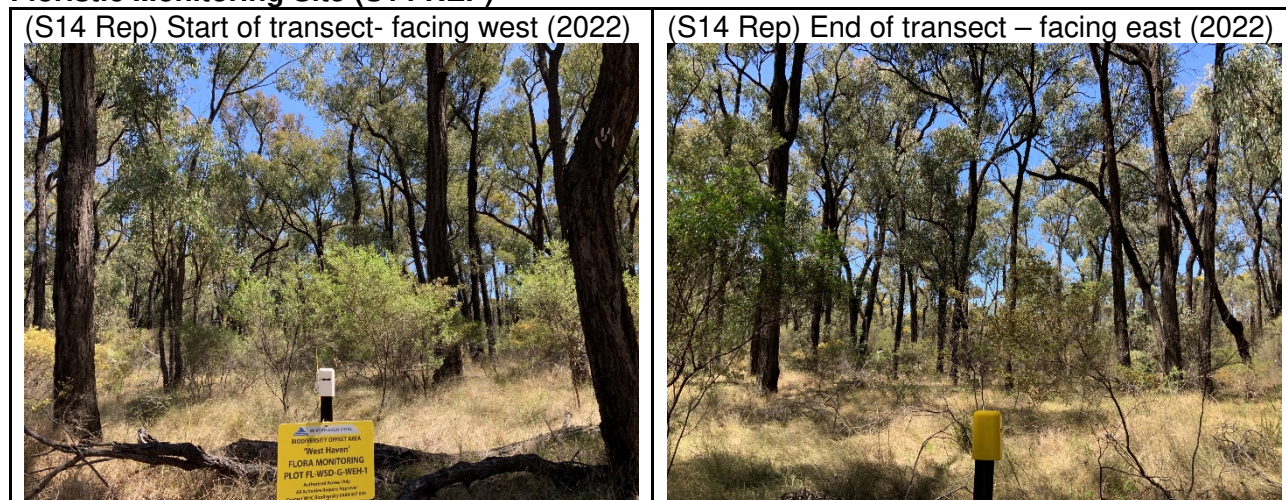
Floristic Monitoring Site 14 (S14)



West Haven

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
S14 Rep	WEH1	772007/6620721	West	PCT 404 Red Ironbark – White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests – good condition
		771956/6620721	East	

Floristic Monitoring Site (S14 REP)



Rosevale

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
S15	ROV6	774822/6624361	NE	PCT 619 Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion
		774865/ 6624384	SW	
S15 Rep	ROV7	775169/6625904	NE	PCT 619 Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion
		775209/ 6625942	SW	
S16	S16	774550/6624448	West	PCT 409 Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion – good condition
		774512/ 6624457	East	
S16 Rep	S16 Rep	774579/6624563	NE	PCT 401 Rough-barked Apple- Blakely's Red Gum – Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region – good condition
		774610/ 6624602	SW	
S17	ROV1	774876/6625271	NW	PCT 404 Red Ironbark – White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests – good condition
		774843/ 6625302	SE	
S17 Rep	ROV2	774785/ 6624729	SW	PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests – good condition
		774738/ 6624717	NE	
S18	ROV3	773697/ 6625385	SE	PCT 404 Red Ironbark – White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests – moderate condition
		773739/ 6625364	NW	
S18 Rep	ROV4	773626/ 6625135	ENE	PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests – moderate condition
		773678/ 6625141	WSW	
S19	ROV5	774783/ 6625874	NW	PCT 404 Red Ironbark – White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests – good condition
		774748/ 6625907	SE	
S19 Rep	S19 Rep	774451/ 6625857	SE	PCT 404 Red Ironbark – White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests – good condition
		774492/ 6625835	NW	

Floristic Monitoring Site (S15)

(S15) Start of transect- facing NE (2022)



(S15) End of transect – facing SW (2022)



Floristic Monitoring Site (S15 Rep)

(S15 Rep) Start of transect- facing NE (2022)



(S15 Rep) End of transect – facing SW (2022)



Floristic Monitoring Site (S16)

(S16) Start of transect- facing west (2022)

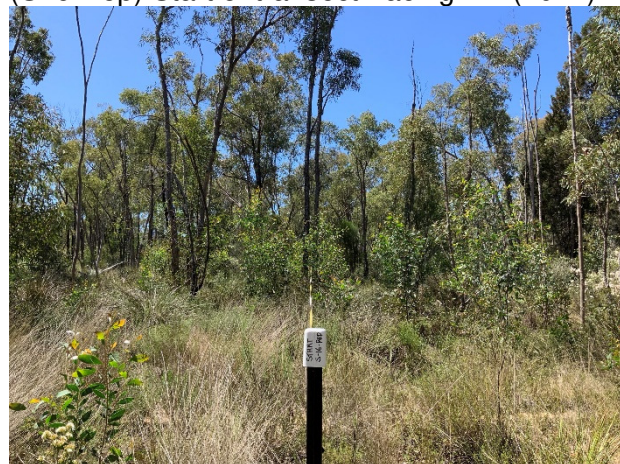


(S16) End of transect – facing east (2022)



Floristic Monitoring Site (S16 Rep)

(S16 Rep) Start of transect- facing NE (2022)



(S16 Rep) End of transect – facing SW (2022)



Floristic Monitoring Site (S17)

(S17) Start of transect- facing NW (2022)



(S17) End of transect – facing SE (2022)



Floristic Monitoring Site (S17 Rep)

(S17 Rep) Start of transect- facing SW (2022)



(S17 Rep) End of transect – facing NE (2022)



Floristic Monitoring Site 18 (S18)

(S18) Start of transect- facing SE (2022)



(S18) End of transect – facing NW (2022)



Floristic Monitoring Site 18 Rep (S18 Rep)

(S18 Rep) Start of transect- facing ENE(2022)



(S18 Rep) End of transect – facing WSW (2022)



Floristic Monitoring Site 19 (S19)

(S19) Start of transect- facing NW (2022)



(S19) End of transect – facing SE (2022)



Floristic Monitoring Site 19 Rep (S19 Rep)

(S19 Rep) Start of transect- facing SE (2022)



(S19 Rep) End of transect – facing NW (2022)



Kurrajong Park

Photo Point	Plot ID	Easting/Northing GDA 94 MGA 55	Photo bearing	Vegetation Community Represented
MP1	AMBS1	772041/6621848	SSW	PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
		772014/6621800	NNE	
MP2	AMBS2	772013/6621505	SSW	PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
		771989/6621452	NNE	

Floristic Monitoring Site MP1

(MP1) Start of transect- facing SSW (2022)



(MP1) End of transect – facing NNE (2022)



Floristic Monitoring Site MP2

(MP2) Start of transect- facing SSW (2022)



(MP2) End of transect – facing NNE (2022)



Appendix C – *Fauna Species List*

Appendix C - Fauna Species List

Birds																
Common Name	Scientific Name	RB1	RB2	RB3	RB4	RB5	RB6	RB7	RB8	RB9	RB10	RB11	RB13	RB14	OPP	Total
apostlebird	Struthidea cinerea		8		8	11					6		2			35
australian magpie	Gymnorhina tibicen							3								3
australian raven	Corvus coronoides	2	2						1			1		1		7
bar-shouldered dove	Geopelia humeralis					1								1		2
black-eared cuckoo	Chalcites osculans								1				1	1		3
black-faced Cuckoo-shrike	Coracina novaehollandiae		2	1		1		4	1		1					10
blue-faced honeyeater	Entomyzon cyanotis							4		1						5
brown honeyeater	Lichmera indistincta		1				1									2
brown quail	Synoicus ypsilophorus		1	3		1			1							6
brown treecreeper	Climacteris picumnus														1	1
brown-headed honeyeater	Melithreptus brevirostris				2											2
chestnut-rumped thornbill	Acanthiza uropygialis						2			2		4				8
common bronzewing	Phaps chalcoptera		2					1								3
crested pigeon	Ocyphaps lophotes	1		1		2										4
diamond dove	Geopelia cuneata		1													1
double-barred finch	Taeniopygia bichenovii	4														4
dark woodswallow	Artamus cyanopterus cyanopterus							2							1	3
eastern rosella	Platycercus eximius			8					1		2					11
eastern yellow robin	Eopsaltria australis		1		2	1	2	3		1	1	1	1			13
fan-tailed cuckoo	Cacomantis flabelliformis		1		2		1	1	2			1				8
galah	Eolophus roseicapilla	1						2								3
golden whistler	Pachycephala pectoralis				1					2	1			1		5
grey butcherbird	Cracticus torquatus					1										1
grey fantail	Rhipidura fuliginosa				4		2			4		2				12
grey shrike-thrush	Colluricincla harmonica		1						1	2			1	2		7
grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis					4			2		6					12
horsefields bronze cuckoo	Chrysococcyx basalis				1					1		1				3
inland thornbill	Acanthiza apicalis						2		2	1		2				7
jacky winter	Microeca fascians			1					1					1		3
laughing kookaburra	Dacelo novaeguineae		1				1		1		1					4
leaden flycatcher	Myiagra rubecula							1								1
little corella	Cacatua sanguinea	2														2
magpie-lark	Grallina cyanoleuca			2							2					4
mistletoebird	Dicaeum hirundinaceum				1		1				1		1			4
musk lorikeet	Glossopsitta concinna		8					2					2			12
noisy friarbird	Philemon corniculatus				1				2				1			4
noisy miner	Manorina melanocephala		12				4	8			14					38
olive-backed oriole	Oriolus sagittatus		1													1
pallid cuckoo	Heteroscenes pallidus								1							1

peaceful dove	Geopelia placida				2					2		1				5
pied butcherbird	Cracticus nigrogularis		1					2			1			1		5
pied currawong	Strepera graculina					1		1								2
rainbow bee-eater	Merops ornatus							2		4				1		7
red-rumped parrot	Psephotus haemattonotus			8			2									10
rufous songlark	Cincloramphus mathewsi	4						1								5
rufous whistler	Pachycephala rufiventris				2			4	2	2	2	1	2	1		16
sacred kingfisher	Todiramphus sanctus					1										1
shining bronze-cuckoo	Chalcites lucidus		1													1
singing honeyeater	Gavicalis virescens	1							1			2	3	1	2	10
speckled warbler	Chthonica sagittata				1	2						1	2	2		8
spiny-cheeked honeyeater	Acanthagenys rufogularis				1	1		1				1				4
striated pardalote	Pardalotus striatus		1			1				1		1				4
striped honeyeater	Plectorhyncha lanceolata				2			2								4
superb fairy-wren	Malurus cyaneus					2					1		2			5
torresian crow	Corvus orru	1								2						3
turquoise parrot	Neophema pulchella														12	12
varied sittella	Daphoenositta chrysoptera									5						5
weebill	Smicrornis brevirostris				1	2	4	2	1			2	6	1		19
welcome swallow	Hirundo neoxena	11										1				12
western gerygone	Gerygone fusca				1							1				2
white-bellied cuckoo-shrike	Coracina papuensis				2											2
white-eared honeyeater	Nesoptilotis leucotis							1								1
white-throated gerygone	Gerygone olivacea				1									1		2
white-throated treecreeper	Cormobates leucophaea		2								2					4
white-winged chough	Corcorax melanorhamphos		14						8		4					26
white-winged triller	Lalage tricolor		1											1		2
willie wagtail	Rhipidura leucophrys	1						1			1					3
yellow thornbill	Acanthiza nana		8					2			2		2			14
yellow-faced honeyeater	Caligavis chrysops		2						4		2	2	4	1		15
zebra finch	Taeniopygia guttata	4		14												18
		32	72	38	35	32	22	50	33	30	50	25	30	17	16	482

Mammals, Reptiles and Frogs											
Group	Scientific Name	RVL-AF	RVL-AF	RVL-AF	RVL-AF	RVL-AF	RVL-AF	RVL-AF	RVL-AF	OPP	Total
Amphibian	Litoria rubella	0	0	0	0	0	1	0	0	0	1
Amphibian	Litoria latopalmata	0	0	0	0	0	0	4	0	0	4
Amphibian	Crinia signifera	0	0	0	0	0	0	1	0	0	1
Mammal	Sminthopsis murina	0	1	0	0	0	0	0	0	0	1
Reptile	Amphibolurus burnsi	0	0	0	0	0	0	0	0	1	1
Reptile	Amphibolurus muricatus	0	1	2	0	1	0	0	0	0	4
Reptile	Anomalopus luekarti	0	0	0	1	0	0	0	0	0	1
Reptile	Cryptoblepharus pulcher	0	0	0	0	0	1	0	0	0	1

Reptile	Cryptoblepharus pannosus	0	0	0	0	0	0	0	1	0	1
Reptile	Ctenotus allotropis	0	0	0	0	1	0	1	2	0	4
Reptile	Ctenotus robustus	1	0	0	0	0	0	0	0	0	1
Reptile	Diporiphora nobbi	0	0	3	0	0	0	0	0	0	3
Reptile	Lerista punctatovittata	0	0	0	0	0	1	0	0	0	1
Reptile	Lerista timida	0	1	0	0	0	0	0	0	0	1
Reptile	Morethia boulengeri	0	3	0	0	0	1	0	0	0	4
Reptile	Pogona barbata	0	1	0	0	0	0	0	0	0	1
Reptile	Delma inornata	0	0	0	1	0	0	0	0	0	1
Reptile	Diplodactylus vittatus	0	0	0	0	0	0	0	1	0	1
Reptile	Heteronotia binoei	0	1	0	0	1	1	0	1	0	4
Reptile	Pseudonaja textilis	0	0	0	0	0	0	0	0	1	1
Reptile	Pseudechis guttatus	0	0	0	0	0	0	0	0	1	1
Reptile	Demansia psammophis	0	0	0	0	0	0	0	0	2	2
Reptile	Egernia striolata	0	1	0	2	0	2	0	1	0	6
	Total	1	9	5	4	3	7	6	6	5	46

Appendix D – *Surface Water Monitoring*

Appendix D - Surface Water Monitoring Results

Data Point	Date	EC - Field (µS/cm)	Oil & Grease (mg/L)	pH - Field	Total Organic Carbon (mg/L)	Total Suspended Solids (mg/L)	Comments
A1	25 January 2022	5570	<5	9.07	12	51	
	23 February 2022	5748	9	9.01	15	44	
	23 March 2022	6323	<5	8.88	26	29	
	28 April 2022	5201	<5	8.97	6	82	
	17 May 2022	4394	<5	9	4	93	
	21 June 2022	4451	<5	9.01	28	39	
	19 July 2022	5996	<5	9.03	5	25	
	23 August 2022	5601	<5	9.06	14	46	
	21 September 2022	4714	<5	9.13	6	106	
	18 October 2022	4567	<5	9	1	50	
	22 November 2022	4645	<5	9.03	7	34	
	6 December 2022	5425	<5	9.05	26	14	
A2	25 January 2022	35420	<5	9.8	3600	62	
	23 February 2022	36770	7	9.59	3530	93	
	23 March 2022	41170	<5	9.41	222	66	
	28 April 2022	37480	<5	9.41	153	75	
	17 May 2022	34030	<5	9.44	86	67	
	21 June 2022	32770	<5	9.46	111	28	
	19 July 2022	42820	<5	9.5	66	21	
	23 August 2022	39830	6	9.55	294	84	
	21 September 2022	37690	7	9.62	3	65	
	18 October 2022	39870	<5	9.53	4	5	
	22 November 2022	38.41	<5	9.59	73	52	
	6 December 2022	40250	<5	9.52	43	27	
	25 January 2022	20630	<5	9.73	44	39	
	23 February 2022						Level too low to sample
	23 March 2022	39640	<5	9.68	246	54	

A3	28 April 2022	35510	<5	9.7	174	36	
	17 May 2022	32460	<5	9.73	95	77	
	21 June 2022	36640	<5	9.75	289	240	
	19 July 2022	39950	<5	9.73	63	44	
	23 August 2022	37120	<5	9.75	123	88	
	21 September 2022	33910	<5	9.87	3080	209	
	18 October 2022	36810	<5	9.79	6	51	
	22 November 2022	35440	<5	9.82	61	20	
	6 December 2022	38220	<5	9.75	86	60	
B1	25 January 2022	459	<5	7.92	2	5	
	23 February 2022	769	<5	7.99	4	5	
	23 March 2022	991	<5	8.49	6	5	
	28 April 2022	1025	<5	7.98	1	5	
	17 May 2022	959	<5	8.44	1	5	
	21 June 2022	765	<5	8.14	1	5	
	19 July 2022	990	<5	8.1	6	5	
	23 August 2022	927	<5	7.68	8	5	
	21 September 2022						Heavy rain - Not safe to sample
	18 October 2022	971	<5	8.2	1	5	
	22 November 2022	1201	<5	8.23	2	5	
	8 December 2022	1248	<5	8.06	18	5	
B2	25 January 2022	22790	<5	9.69	48	21	
	23 February 2022	23000	<5	9.64	47	31	
	23 March 2022	24640	<5	9.6	104	41	
	28 April 2022	22340	<5	9.59	90	24	
	17 May 2022	20840	<5	9.55	5	36	
	21 June 2022	19870	<5	9.56	98	30	
	19 July 2022	24720	<5	9.41	52	18	
	23 August 2022	24280	<5	9.49	90	30	
	21 September 2022	21700	<5	9.49	84	65	
	18 October 2022	21210	<5	9.39	10	61	
	22 November 2022	20240	<5	9.4	41	16	
	6 December 2022	21280	<5	9.47	34	28	
	25 January 2022	39810	<5	9.7	113	226	

C	23 February 2022	35720	<5	9.71	88	38	
	23 March 2022	39300	<5	9.71	127	54	
	28 April 2022	36040	<5	9.67	240	70	
	17 May 2022	35300	<5	9.66	69	67	
	21 June 2022	28550	<5	9.65	365	32	
	19 July 2022	42210	<5	9.62	64	34	
	23 August 2022	41790	<5	9.62	26	36	
	21 September 2022	38630	8	9.67	217	96	
	18 October 2022	42480	<5	9.55	6	12	
	22 November 2022	41980	<5	9.55	57	37	
	6 December 2022	42950	<5	9.54	35	55	
D	25 January 2022	572	<5	8.96	28	200	
	23 February 2022	1048	<5	8.75	18	340	
	23 March 2022	1004	<5	9.12	22	199	
	28 April 2022	781	<5	8.49	6	110	
	17 May 2022	467	<5	8.72	3	56	
	21 June 2022	459	<5	8.79	120	36	
	19 July 2022	836	<5	8.61	7	20	
	23 August 2022	835	<5	8.8	1	81	
	21 September 2022	786	<5	8.59	1	52	
	18 October 2022	945	<5	8.79	15	116	
	22 November 2022	768	<5	8.53	3	51	
	6 December 2022	817	<5	8.58	20	60	
Box Cut	19 January 2022	5068	666	8.5	75	545	
	16 February 2022	7945	20	8.57	56	1180	
	15 March 2022	5568	<5	8.53	51	558	
	6 April 2022	4981	<5	8.58	16	358	
	11 May 2022	3888	<5	8.98	15	1760	
	15 June 2022	3392	36	8.57	38	5330	
	13 July 2022	7245	6	8.48	4	128	
	16 August 2022	5441	7	8.91	1	1800	
	14 September 2022	4806	51	8.55	624	1480	
	12 October 2022	5412	29	8.44	149	604	
	16 November 2022	4003	12	8.73	55	1710	

	6 December 2022	4049	13	8.53	15	3140	
SB1	19 January 2022	2930	<5	9.3	24	101	
	16 February 2022	6736	<5	9.05	27	128	
	15 March 2022	6052	<5	9	18	53	
	6 April 2022	5588	10	9	13	63	
	11 May 2022	4280	<5	9.08	20	72	
	14 June 2022	4070	<5	9.05	63	56	
	13 July 2022	5024	12	8.88	9	138	
	16 August 2022	5577	<5	9.05	17	82	
	20 September 2022	5566	<5	9.01	25	82	
	12 October 2022	5499	<5	9.03	5	79	
	16 November 2022	6069	<5	8.93	7	33	
	6 December 2022	9080	<5	8.97	36	9050	
SB2	19 January 2022	2687	<5	9.44	11	47	
	16 February 2022	3138	<5	9.39	4	16	
	15 March 2022	3256	<5	9.45	16	13	
	6 April 2022	3001	<5	9.36	7	26	
	11 May 2022	3593	<5	9.27	16	18	
	14 June 2022	2813	<5	9.29	4	5	
	13 July 2022	4101	7	9.08	11	12	
	16 August 2022	2925	<5	9.28	9	48	
	20 September 2022	2157	<5	9.2	26	6	
	12 October 2022	2648	<5	9.19	4	8	
	16 November 2022	2792	<5	9.03	6	18	
	6 December 2022	5320	<5	9.1	18	27	
SB3	19 January 2022	1624	<5	9.3	11	633	
	16 February 2022	2548	<5	9.28	18	75	
	15 March 2022	3170	<5	9.47	63	204	
	6 April 2022	2787	<5	9.4	27	588	
	11 May 2022	3320	<5	9.41	38	128	
	14 June 2022	2274	<5	9.27	7	382	
	13 July 2022	4371	8	9.04	30	249	
	16 August 2022	1410	<5	9.21	4	519	
	20 September 2022	860	<5	8.96	5	336	

	12 October 2022	1731	<5	8.99	6	436	
	16 November 2022	1402	10	8.84	8	922	
	6 December 2022	6060	<5	9.11	50	19	
SB4	19 January 2022	1867	<5	9.32	9	36	
	16 February 2022	2098	<5	9.38	13	22	
	15 March 2022	2156	<5	9.35	12	19	
	6 April 2022	1933	5	9.27	12	26	
	11 May 2022	1720	<5	9.28	15	46	
	14 June 2022	1473	<5	9.25	9	5	
	13 July 2022	2069	<5	9.01	9	5	
	16 August 2022	1916	<5	9.13	6	179	
	20 September 2022	1593	<5	9.25	12	157	
	12 October 2022	15458	<5	9.21	8	46	
	16 November 2022	1116	<5	9.03	7	116	
	6 December 2022	1740	<5	8.84	9	8	
SD1	5 January 2022	2832	<5	9.11	20	44	
	16 February 2022	2597	<5	9.33	28	15	
	15 March 2022	2880	<5	9.44	24	20	
	6 April 2022	2236	<5	9.27	22	22	
	11 May 2022	2008	<5	9.32	30	54	
	15 June 2022	801	<5	8.47	26	21	
	13 July 2022	1368	10	8.39	30	35	
	16 August 2022	1367	<5	8.86	14	52	
	20 September 2022	352	<5	8.02	10	14	
	12 October 2022	1139	<5	8.39	16	20	
	16 November 2022	1469	<5	8.46	14	71	
	6 December 2022	3140	<5	8.79	9	19	
	5 January 2022	2030	<5	9	9	5	
	16 February 2022	1830	<5	9.17	12	30	
	15 March 2022	1929	<5	9.37	12	17	
	6 April 2022	1535	<5	9.05	13	13	
	11 May 2022	1419	<5	9.16	30	13	
	15 June 2022	740	<5	8.92	13	5	
	13 July 2022	1225	10	8.71	15	5	

SD2	16 August 2022	659	<5	8.01	11	25	
	25 August 2022	696	<5	7.88	19	5	EPL Discharge sample
	30 August 2022	697	<5	8.04	14	5	EPL Discharge sample
	16 September 2022	353	<5	7.75	10	18	EPL Discharge sample
	20 September 2022	424	<5	8.12	11	8	
	12 October 2022	1310	<5	8.87	15	5	
	21 October 2022	444	<5	8.25	9	128	EPL Discharge sample
	1 November 2022	453	<5	7.43	14	176	EPL Discharge sample
	14 November 2022	592	<5	8.23	11	64	EPL Discharge sample
	16 November 2022	887	<5	8.53	13	52	
	6 December 2022	1510	<5	8.96	14	22	
SD3	5 January 2022	618	<5	8.37	9	20	
	16 February 2022	655	<5	8.73	14	65	
	15 March 2022	710	<5	8.64	10	33	
	6 April 2022	652	<5	8.35	9	34	
	11 May 2022	539	<5	8.37	13	39	
	15 June 2022	347	<5	8.18	15	9	
	13 July 2022	776	6	8.09	15	12	
	16 August 2022	491	<5	7.87	9	57	
	20 September 2022	272	<5	7.92	5	72	
	12 October 2022	595	<5	8.97	10	40	
	16 November 2022	314	<5	8.17	9	92	
	6 December 2022	476	<5	8.13	6	97	
SD4	5 January 2022	1400	<5	9.22	14	7	
	16 February 2022	1550	<5	9.2	16	21	
	15 March 2022						Dam being de-silted - no sample
	6 April 2022						Dam being de-silted - no sample
	11 May 2022						Dam being de-silted - no sample
	15 June 2022						Dam being de-silted - no sample
	13 July 2022						Dam being de-silted - no sample
	16 August 2022	661	<5	8.5	10	34	
	30 August 2022	841	<5	8.28	9	19	EPL Discharge sample
	5 September 2022	943	<5	8.44	12	27	EPL Discharge sample
	16 September 2022	463	<5	8.36	8	225	EPL Discharge sample

	20 September 2022	420	<5	8.01	6	92	
	12 October 2022	445	<5	8.73	7	7	
	21 October 2022	698	<5	7.92	6	53	EPL Discharge sample
	1 November 2022	608	<5	8.07	10	122	EPL Discharge sample
	14 November 2022	699	<5	8.32	7	421	EPL Discharge sample
	16 November 2022	556	<5	8.14	8	47	
	6 December 2022	721	<5	8.7	3	8	
SD6	5 January 2022	578	<5	8.69	11	10	
	16 February 2022	622	<5	9	12	5	
	15 March 2022	502	<5	9.04	15	5	
	6 April 2022	544	<5	8.9	14	13	
	11 May 2022	481	<5	8.99	7	11	
	14 June 2022	340	<5	8.9	13	5	
	13 July 2022	652	5	8.7	12	6	
	16 August 2022	605	<5	8.74	9	9	
	20 September 2022	498	<5	8.47	10	5	
	12 October 2022	485	<5	8.82	10	32	
	16 November 2022	432	<5	8.11	14	18	
	6 December 2022	481	<5	8.82	14	5	
SD7	16 September 2022	61	<5	7.93	3	1730	EPL Discharge sample
	22 September 2022	92	<5	8.31	9	1040	EPL Discharge sample
	9 October 2022	153	<5	8.5	10	953	EPL Discharge sample
	12 October 2022	188	<5	7.89	22	1420	
	21 October 2022	17	<5	8.43	6	4480	EPL Discharge sample
	1 November 2022	118	<5	8.2	14	3700	EPL Discharge sample
	14 November 2022	279	<5	7.51	8	595	EPL Discharge sample
SD8	5 January 2022	158	<5	7.45	7	42	
	16 February 2022	176	<5	8.87	8	23	
	15 March 2022	204	<5	8.14	8	22	
	6 April 2022	165	<5	8.12	5	24	
	11 May 2022	154	<5	8.75	7	11	
	14 June 2022	56	<5	8.5	6	27	
	13 July 2022	287.8	<5	8.43	6	27	
	16 August 2022	148	<5	8.91	4	58	

	20 September 2022	147	<5	8.07	5	74	
	12 October 2022	139	<5	7.61	5	17	
	16 November 2022	111	<5	7.92	6	80	
	6 December 2022	177	<5	7.24	4	27	

Appendix E – *Groundwater Monitoring*

Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mngb	Depth to Stand - mmboc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Major Anions					Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassi um (K) - mg/L			Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - meq/L	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mbgl	Depth to Stand - mbloc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions							Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOx as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mbgl	Depth to Stand - mbloc	Field Parameters			Total Metals													Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Major Anions				Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids			
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Manganese (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L				Zinc (Zn) - mg/L	Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L			Potassium (K) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L								Bicarbonate Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L	
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000					1000													
		17-Aug-09	1430	19.90	20.51	6.7	22500	24		<0.001	0.077	<0.001	<0.0001	0.003	0.002	0.01	6.94	0.001	0.122	<0.005	<0.01	0.009	<0.0001		23000	402	635	3560	62	229	7150	1830	<1	<1	641	641	253	4.96	1.6				16000	
		18-Nov-09	1120	19.84	20.45	6.61	22870	28.1	0.04	<0.001				<0.005		0.005	0.38	<0.001	0.127	0.004			<0.005	<0.0001	6.63	21200	249	535	3830	74	225	7260	1720	<1	<1	392	392	248	5.02		<0.01	<0.01	<0.01	
		17-Feb-10	1120	19.92	20.53																																							
		22-Jun-10	1150	20.00	20.61	6.58	23010	23	<0.01	<0.001				<0.005		0.004	4.86	<0.001	0.098	0.002			0.008	<0.0001	6.69	22000	329	493	4020	59	233	7240	1570	<1	<1	599	599	249	3.22		<0.01	<0.01	<0.01	
		02-Sep-10	1050	19.92	20.53	7.07	17050	23.7																																				
		07-Feb-11	1215	20.18	20.79	6.5	17180	25.7	0.02	0.003				<0.001		0.004	2.96	<0.001	0.102	0.002			0.006	<0.0001	6.4	22500	348	547	3830	61	230	7410	1590	<1	<1	604	604	254	4.86		<0.01	0.02	0.02	
		09-Jun-11	1115	20.31	20.92	6.55	17080	20.5																																				
		11-Oct-11	1220	18.86	19.47	6.40	15360	23.5	0.12	0.011	0.046	<0.001	<0.0001	0.01	0.001	0.012	6.14	0.021	0.182	0.003	<0.01	0.058	<0.0001	7.12	21000	354	534	4680	58	267	7310	1550	<1	<1	553	553	250	3.3	2.72	<0.01	0.52	0.52	15400	
		08-Dec-11	1100	19.56	20.17	6.60	15670	23.1																																				
		04-Apr-12	1040	20.05	20.66	7.2	1133	24.7	0.61	0.003	0.046	<0.001	0.0001	0.002	0.006	0.03	1.22	0.411	0.008	0.041	<0.01	0.195	<0.0001	7.51	3350	74	60	585	22	34.6	828	212	<1	<1	257	257	32.9	2.55	27.2	0.7	2.48	3.18	1930	
		31-May-12	1030	19.87	20.48	6.8	12970	21.7																																				
		29-Aug-12	1150	19.96	20.57	6.73	14420	22.6	0.32	<0.001	0.076	<0.001	0.0002	0.006	0.001	0.028	2.27	0.029	0.338	0.004	<0.01	0.218	<0.0001	7.42	19100	336	516	4460	71	255	6670	1590	<1	<1	681	681	235	4.1	10.4	0.04	4.28	4.32	12400	
		04-Dec-12	1335	20.17	20.78	6.74	16220	23.4																																				
		07-Mar-13	1130	20.09	20.7	6.63	18400	23.3	0.06	<0.001	0.031	<0.001	0.0002	<0.001	<0.001	0.034	7.28	0.006	0.167	0.001	<0.01	0.072	<0.0001	6.92	21900	372	536	4260	68	250	6320	1820	<1	<1	649	649	229	4.28	1.67	0.04	0.71	0.75	12900	
		03-Jul-13	1200	20.07	20.68	7.21	18960	21.7																																				
		03-Sep-13	1115	20.19	20.8	7.18	18900	23.5	1.46	0.002	0.095	<0.001	0.0005	0.012	0.002	0.324	5.51	0.169	0.257	0.01	<0.01	0.567	<0.0001	7.78	21300	340	501	4500	71	256	6500	1700	<1	<1	607	607	231	5.03	1.86	0.03	4.88	4.91	14100	
		27-Nov-13	1220	20.36	20.97	6.9	19970	21.2																																				
		05-Mar-14	1215	20.00	20.61	6.9	19700	24.2	0.23	0.001	0.053	<0.001	0.0003	0.017	0.003	0.099	2.07	0.018	0.21	0.011	<0.01	0.364	<0.0001	7.28	21600	305	506	4720	69	264	6160	1740	<1	<1	641	641	223	8.43	0.88	0.04	0.66	0.7	14400	
		11-Jun-14	1240	20.23	20.84	6.7	20330	21.6																																				
		29-Sep-14	1315	20.84	21.45	6.6	19510	22.9	0.02	<0.001	0.046	<0.001	<0.0001	<0.001	<0.001	<0.001	4.99	<0.001	0.188	0.003	<0.01	0.047	<0.0001	7.25	21700	282	451	3370	58	199	6480	1620	<1	<1	582	582	228	6.77	1.78	<0.01	0.07	0.07	13400	
		04-Dec-14	1125	21.02	21.63	6.6	19380	21.9																																				
		13-Mar-15	1100	21.11	21.72	6.7	21190	23.7	1.13	0.002	0.09	<0.001	0.0002	0.014	0.002	0.073	5.34	0.028	0.17	0.011	<0.01	0.288	<0.0001	6.98	22000	355	475	4130	53	238	6860	1810	<1	<1	709	709	245	1.58	1.64	<0.01	0.44	0.44	14000	
		03-Jun-15	1215	21.60	22.21	6.9	20160	21.5																																				
		08-Sep-15	1305	23.61	24.22	6.9	19870	22.1	0.59	<0.010	0.077	<0.010	<0.0010	<0.010	<0.010	<0.010	6.73	<0.010	0.151	<0.010	<0.10	0.055	<0.0001	7.55	21600	354	340	3190	45	186	5250	1610	<1	<1	677	677	195	2.53	1.91	<0.01	0.02	0.02	14400	
		14-Dec-15	1050	24.21	24.82	7	19820	23.4																																				
		09-Mar-16	1145	24.52	25.13	7.2	20930	23.2	0.55	0.001	0.73	<0.0001	<0.0001	0.003	0.001	0.034	5.5	0.006	0.176	0.005	<0.01	0.114	<0.0001	7.51	22100	401	443	3710	50	219	6040	1900	<1	<1	770	770	225	1.41	1.9	0.04	<0.01	0.02	14000	
		02-Jun-16	1130	25.09	25.7	7.2	20760	21.1																																				
		26-Sep-16	1100	25.07	25.68	7.1	18540	22.1	0.23	0.001	0.072	<0.001	<0.0001	0.001	<0.001	0.012	3.79	0.002	0.151	0.003	<0.01	0.126	<0.0001	7.47	21800	412	498	3850	48	230	6350	1790	<1	<1	812	812	233	0.53	1.54	<0.01	0.42	0.42	14400	
		25-Oct-16	1050	25.32	25.93	7	18630	22.4																																				
		24-Nov-16	1055	25.15	25.76	7	18790	22.6																																				
		20-Dec-16	1040	25.28	25.89	7.1	18630	23.4		</																																		

Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mbgl	Depth to Stand - mbloc	Field Parameters			Total Metals																Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Major Anions				Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L	Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L				Sodium (Na) - mg/L	Potassi um (K) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L			Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - me/L	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water m bgl	Depth to Stand m bgl	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassi um (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water m bgl	Depth to Stand - m bblc	Field Parameters			Total Metals													Mercury (Hg) - mg/L	pH Lab	EC - Lab - µS/cm	Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids	
						pH - Field	EC - Field µS/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L			Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassiu m (K) - mg/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - mg/L	Alkalinity - mg/L									
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000					1000								1500	400		4000	
		07-Feb-11	1030	36.49	37.24	7.32	2560	25.8	0.03	0.011				<0.001			<0.001	0.002	0.943	0.024		0.009	<0.0001	7.46	2880	48	29	703	10	35.6	431	1	<1	<1	1040	1040	33.1	3.66		<0.01	0.01	0.02	
		09-Jun-11	1000	36.73	37.48	7.45	2610	19.8																																			
		11-Oct-11	1045	36.80	37.55	7.50	2390	22.9	0.98	0.011	0.137	<0.001	<0.0001	0.003	0.005	0.038	2.17	0.02	1.13	0.028	<0.01	0.144	<0.0001	7.76	3170	40	24	732	8	36	442	9	<1	<1	1030	1030	33.2	3.97	0.51	<0.01	0.04	0.04	1870
		08-Dec-11	1010	36.77	37.52	7.50	2480	22.4																																			
		04-Apr-12	910	37.33	38.08	7.8	2550	23.2	0.64	0.011	0.129	<0.001	<0.0001	0.005	<0.001	0.023	1.56	0.921	0.016	0.009	<0.01	0.104	<0.0001	7.94	3080	36	28	790	9	38.7	479	11	<1	<1	1070	1070	35.1	4.8	0.58	0.02	0.22	0.24	1960
		31-May-12	915	37.44	38.19	7.51	2450	20.3																																			
		29-Aug-12	1040	37.49	38.24	7.68	2790	21.6	0.11	0.009	0.106	<0.001	<0.0001	<0.001	0.005	0.04	1.08	0.004	0.879	0.015	<0.01	0.202	<0.0001	7.98	3160	42	24	711	9	35.2	458	11	<1	<1	1170	1170	36.5	1.85	0.49	<0.01	0.07	0.07	1880
		04-Dec-12	1230	37.65	38.4	7.67	2870	24.1																																			
		07-Mar-13	1145	37.85	38.6	7.78	3020	24.1	0.06	0.01	0.105	<0.001	<0.0001	<0.001	0.006	0.009	0.92	0.005	0.839	0.013	<0.01	0.038	<0.0001	7.81	3230	32	23	751	9	36.4	416	11	<1	<1	1120	1120	34.3	2.84	0.37	0.02	0.11	0.13	1890
		03-Jul-13	1230	37.83	38.58	7.81	3060	23.2																																			
		03-Sep-13	1000	40.35	41.1	7.89	3290	22.1	0.28	0.011	0.118	<0.001	<0.0001	0.002	0.008	0.178	1.52	0.017	0.836	0.014	<0.01	0.088	<0.0001	8.09	3330	38	26	762	11	37.5	455	21	<1	<1	1140	1140	36	1.88	0.68	0.01	0.27	0.28	1780
		27-Nov-13	1300	40.69	41.44	7.9	3080	21.4																																			
		05-Mar-14	1300	41.46	42.21	7.9	3280	24.3	0.14	0.012	0.102	<0.001	<0.0001	0.013	0.01	0.058	0.9	0.009	0.801	0.016	<0.01	0.087	<0.0001	7.96	3350	39	23	932	10	44.6	436	24	<1	<1	1100	1100	34.8	12.4	0.51	0.03	0.06	0.09	1870
		11-Jun-14	1300	41.80	42.55	7.8	3340	20.9																																			
		29-Sep-14	1340	41.89	42.64	7.6	3040	22.1	0.09	0.013	0.104	<0.001	<0.0001	<0.001	0.007	0.009	1.09	0.006	0.748	0.013	<0.01	0.045	<0.0001	7.98	3190	25	16	550	9	26.7	417	15	<1	<1	994	994	31.9	8.94	0.62	0.02	0.05	0.07	2390
		04-Dec-14	1045	42.11	42.86	7.5	2970	21.7																																			
		13-Mar-15	1130	42.29	43.04	7.6	3220	25.4	0.17	0.012	0.093	<0.001	<0.0001	<0.001	0.006	0.012	1.05	0.001	0.576	0.015	<0.01	0.045	<0.0001	7.79	3260	42	35	864	10	42.8	431	17	<1	<1	1190	1190	36.3	8.2	0.76	<0.01	0.04	0.04	1660
		03-Jun-15	1310	42.36	43.11	7.7	3140	20.9																																			
		09-Sep-15	925	42.44	43.19	7.6	3110	21.1	0.33	0.016	0.096	<0.001	<0.0001	0.001	0.006	0.012	1.83	0.004	0.666	0.016	<0.01	0.059	<0.0001	8.01	3270	38	22	704	8	34.5	319	17	<1	<1	1120	1120	31.7	4.18	0.72	<0.01	<0.01	<0.01	1740
		14-Dec-15	940	42.56	43.31	7.6	3140	22.9																																			
		09-Mar-16	1240	42.52	43.27	7.7	3120	24.5	0.05	0.017	0.111	<0.001	<0.0001	<0.001	0.006	0.02	1.74	0.002	0.866	0.018	<0.01	0.038	<0.0001	7.98	3250	41	25	680	8	33.9	407	20	<1	<1	1140	1140	34.7	1.2	0.73	0.02	0.09	0.11	1780
		02-Jun-16	1055	42.63	43.38	7.7	3060	21.2																																			
		26-Sep-16	940	42.61	43.36	7.6	3030	22.1	0.68	0.014	0.088	<0.001	<0.0001	0.001	0.007	0.003	1.52	0.003	0.369	0.019	<0.01	0.064	<0.0001	7.96	3190	36	22	638	8	31.6	400	15	<1	<1	1240	1240	36.4	7.12	0.58	<0.01	<0.01	<0.01	1730
		25-Oct-16	920	42.65	43.4	7.6	3020	21.8																																			
		24-Nov-16	940	42.66	43.41	7.6	3040	21.6																																			
		20-Dec-16	915	42.66	43.41	7.6	3090	22.2																																			
		25-Jan-17	940	42.69	43.44	7.6	3110	22.6																																			
		22-Feb-17	1025	42.74	43.49	7.7	3070	22.6																																			
		29-Mar-17	900	42.68	43.43	7.6	3180	22.1																																			
		26-Apr-17	1020	42.70	43.45	7.7	3160	22.7																																			
		29-May-17	945	42.82	43.57	7.7	3130	22.4																																			
		29-Jun-17	1320	42.79	43.54	7.7	3100	22.1																																			
		26-Jul-17	920	43.04	43.79	7.7	3130	21.3																																			
		29-Aug-17	915	43.10	43.85	7.8	3160	21																																			
		26-Sep-17	910	43.22	43.97	7.8	3170	22.4	0.12	0.012	0.078	<0.001	<0.0001	<0.001	0.005	0.006	0.96	0.004	0.505	0.017	<0.01	0.014	<0.0001	8.14	3210	30	19	622	7	30.3	405	14	<1	<1	1120	1120	34.1	5.9	0.68	<0.01	<0.01	<0.01	1930
		26-Oct-17	915	43.51	44.26	7.7	3180	23.2																																			
		27-Nov-17	920	43.26	44.01	7.6	3240	22.1																																			
		20-Dec-17	1035	43.68	44.43	7.6	3180	22.3																																			
		30-Jan-18	930	43.81	44.56	7.7	3200	22.7																																			
		28-Feb-18	915	43.92	44.67	7																																					

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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water m bgl	Depth to Stand - m bblc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µS/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Major Anions				Bicarbona te Alkalinity as CaCO3 - meq/L	Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NO3 as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
						pH - Field	EC - Field µS/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassiu m (K) - mg/L				Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mbgl	Depth to Stand - mbloc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids		
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassiu m (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - me/L	Alkalinity - mg/L									
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000					1000											1500	400		4000
		27-Nov-20	1210	7.12	7.72	7.3	22700	21.6																																					
		21-Dec-20	1300	7.14	7.74	7.5	22300	20.4																																					
		20-Jan-21	1115	7.18	7.78	7.5	22000	21.9																																					
		02-Mar-21	1125	7.07	7.67	7.4	22100	21.3																																					
		30-Mar-21	1250	7.13	7.73	7.4	22100	21.4																																					
		29-Apr-21	1200	7.17	7.77	7.5	20900	21.5																																					
		31-May-21	1140	7.04	7.64	7.5	20800	22.3																																					
		23-Jun-21	1030	7.20	7.8	7.4	21200	22.8																																					
		30-Jul-21	1500	7.11	7.71	7.05	19558	22.8																																					
		27-Aug-21	930	7.05	7.65	7.21	20389	18.6																																					
		06-Oct-21	1400	7.06	7.66	7.25	19615	21.7	1.34	0.002	0.12	<0.001	<0.0001	0.002	0.002	0.005	1.46	0.003	0.168	0.005	<0.01	0.019	<0.0001	7.95	20500	40	400	3560	11	190	6610	802	<1	<1	824	824	220	7.22	0.02	<0.01	0.04	0.04	12800		
		11-Jan-22	1230	6.83	7.43	7.4	20843	24.3																																					
		28-Mar-22	800	6.47	7.07	7.39	20560	23.8																																					
		05-Jul-22	1605	6.29	6.89	7.24	20549	22.2																																					
		15-Sep-22	836	6.61	7.21	7.6	22223	21.5	0.9	0.002	0.075	0.001	<0.0001	0.004	0.001	0.003	0.73	0.001	0.101	0.003	0.01	0.011		7.99	20200	43	424	3670	11	197	6040		<1	<1	772	772	202	1.37		0.01	0.04	0.04	12800		
		22-Nov-22	1155	6.34	6.94	7.1	22041	22.2																																					
P52		15-Dec-15	1100	7.51	8.02	7.1	2480	22.8	40.5	0.022	0.802	0.004	0.0004	0.17	0.091	0.292	66.7	0.072	1.56	0.224	0.14	0.322	0.0002	7.56	2490	104	144	245	6	27.8	455	126	<1	<1	578	578	27	1.53	0.34	0.01	3.08	3.09	2030		

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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water m bgl	Depth to Stand m bblot	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Major Anions					Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOx as N - mg/L	Total Dissolved Solids																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L	Potassi um (K) - mg/L			Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - me/l	Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L				Zinc (Zn) - mg/L	Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L		Potassiu m (K) - mg/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbona te Alkalinity as CaCO3 - me/l								Alkalinity - mg/L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water m bgl	Depth to Stand - m bblc	Field Parameters			Total Metals													Mercury (Hg) - mg/L	pH Lab	EC - Lab - µs/cm	Major Cations				Total Cations - meq/L	Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Major Anions			Alkalinity - mg/L	Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids		
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane se (Mn) - mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L				Zinc (Zn) - mg/L	Calcium (Ca) - mg/L	Magnesi um (Mg) - mg/L	Sodium (Na) - mg/L				Potassiu m (K) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L									Bicarbona te Alkalinity as CaCO3 - me/L	
ANZECC Guideline - stock drinking water									5	0.5			0.01	1	1	1		0.1		1		20	0.002			1000					1000										1500	400		4000
		25-Mar-19	1100	8.94	9.45																																							
		26-Apr-19	1050	8.96	9.47																																							
		28-May-19	1050	9.09	9.60																																							
		24-Jun-19	1000			no access - lock changed																																						
		31-Jul-19				no access - lock changed																																						
		23-Aug-19				no access - lock changed																																						
		25-Sep-19				no access - lock changed																																						
		29-Oct-19				no access - lock changed																																						
		29-Nov-19				no access - lock changed																																						
		18-Dec-19				no access - lock changed																																						
		16-Dec-21	1218		6.55	6.49	879	22.187	WaterNSW started monitoring																																			
		12-Jan-22	828		6.57	7.46	921	21.341																																				
		21-Feb-22	753		6.92	6.76	969	21.37																																				
		18-Mar-22	1010		7.11	6.99	986	21.737																																				
		01-Apr-22	1033		7.12	6.99	931	21.089																																				
		17-May-22	1135		7.04	6.74	948	21.027																																				
		01-Jun-22	1229		7.32	6.79	791	20.861																																				
		07-Sep-22				6.78	815	21.388			0.001			<0.0001	<0.001		0.001		<0.001	0.788	<0.001		<0.005		7.59	884	63	37	62	2	8.94	78		<1	<1	315	315	8.87	0.38	0.04	0.01	0.06	0.06	456
WB3b		11-Sep-08	1245	7.99	8.50	7.6	1250	19.8			<0.001	0.175	<0.001	<0.0001	<0.001	<0.001	0.002	0.31	0.001	0.255	0.001	<0.01	0.007	<0.0001		706	38	20	77	4	7.01	52	10	<1	<1	268	268	7.02	0.17	0.18				415
GW030229.1.2		14-Nov-08	0854	8.05	8.56																																							
Depth	Unknown Alluvium	01-Dec-08	1057	7.99	8.50																																							
Format.		12-Jan-09	1303	7.84	8.33																																							
		01-Dec-09	1310	8.20	8.71																																							
		18-Feb-10	1210	8.05	8.56																																							
		23-Jun-10	1320	8.10	8.61																																							
		03-Sep-10	1215	7.88	8.39	7.38	693	22.7																																				
		09-Feb-11	1310	7.20	7.71																																							
		31-May-11	1200	7.33	7.84																																							
		27-Sep-11	1210	7.45	7.96																																							
		03-Jan-12	1200	6.73	7.24																																							
		22-Mar-12	1220	5.61	6.12																																							
		01-Jun-12	1210	6.17	6.68																																							
		10-Sep-12	1100	6.34	6.85																																							
		04-Dec-12	935	6.57	7.08																																							
		07-Mar-13	1330	6.24	6.75																																							
		03-Jul-13	1350	6.92	7.43																																							
		04-Sep-13	1005	7.24	7.75																																							
		04-Dec-13	1010	7.85	8.36																																							
		07-Mar-14	1220	7.40	7.91																																							
		10-Jun-14	1300	7.34	7.85																																							
		25-Sep-14	1130	7.99	8.50																																							
		03-Dec-14	1220	7.73	8.24																																							

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Site ID	Piezometer / Water Bore	Date	Time	Depth to Water mhd	Depth to Stand- mhtoc	Field Parameters			Total Metals														Mercury (Hg) - mg/L	pH Lab	EC- Lab - µs/cm	Major Cations				Total Cations - meq/L	Major Anions						Total Anions - meq/L	Ionic Balance	Ammonia as Nitrogen (N)	Nitrite as N - mg/L	Nitrate as N - mg/L	NOX as N - mg/L	Total Dissolved Solids
						pH - Field	EC - Field µs/cm	Temp - Field - °C	Aluminium (Al) - mg/L	Arsenic (As) - mg/L	Barium (Ba) - mg/L	Beryllium (Be) - mg/L	Cadmium (mg/L)	Chromium (Cr) - mg/L	Cobalt (Co) - mg/L	Copper (Cu) - mg/L	Iron (Fe) - mg/L	Lead (Pb) - mg/L	Mangane- se (Mn)- mg/L	Nickel (Ni) - mg/L	Vanadium (V) - mg/L	Zinc (Zn) - mg/L				Calcium (Ca) - mg/L	Magnesium (Mg) - mg/L	Sodium (Na) - mg/L	Potassium (K) - mg/L		Chloride (Cl) - mg/L	Sulfate (SO4) - mg/L	Hydroxide Alkalinity as CaCO3 - mg/L	Carbonate Alkalinity as CaCO3 - mg/L	Bicarbonate Alkalinity as CaCO3 - meq/L	Alkalinity - mg/L							
ANZECC Guideline - stock drinking water									5	0.5				0.01	1	1	1		0.1		1		20	0.002			1000					1000								1500	400		4000
		30-Jun-17	1125	8.17	8.72																																						
		25-Jul-17	1125	8.19	8.74																																						
		24-Aug-17	1110	8.20	8.75																																						
		21-Sep-17	1110	8.20	8.75																																						
		25-Oct-17	1110	8.21	8.76																																						
		24-Nov-17	1105	8.25	8.80																																						
		19-Dec-17	1055	8.27	8.82																																						
		25-Jan-18	1050	8.29	8.84																																						
		20-Feb-18	1050	8.30	8.85																																						
		27-Mar-18	1045	8.32	8.87																																						
		24-Apr-18	1150	8.31	8.86																																						
		28-May-18	1145	8.33	8.88																																						
		25-Jun-18	1050	8.38	8.93																																						
		25-Jul-18	1050	8.40	8.95																																						
		27-Aug-18	1035	8.42	8.97																																						
		20-Sep-18	1110	8.44	8.99																																						
		29-Oct-18	1110	8.39	8.94	</																																					

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Appendix F – *Ambient Flow Monitoring*

Appendix F - Ambient Flow Monitoring Results 2022

Date	Data Point	EC - Field ($\mu\text{S}/\text{cm}$)	Oil & Grease (mg/L)	pH - Field	Total Organic Carbon (mg/L)	Total Suspended Solids (mg/L)	Comments
2 February 2022	KC1DS						No flow
2 February 2022	KC2DS						No flow
2 February 2022	KCDS						No flow
2 February 2022	KC2US						No flow
2 February 2022	KCUS						No flow
2 February 2022	KC1US						No flow
2 February 2022	PC1						No flow
2 February 2022	PCa						No flow
2 February 2022	KC1TOP						No flow
2 February 2022	PC3US						No flow
2 February 2022	PCUS						No flow
25 February 2022	KC1DS						No flow
25 February 2022	KC2DS						No flow
25 February 2022	KCDS						No flow
25 February 2022	KC2US						No flow
25 February 2022	KCUS						No flow
25 February 2022	KC1US						No flow
25 February 2022	PC3US						No flow
25 February 2022	PCUS						No flow
25 February 2022	KC1TOP						No flow
25 February 2022	PCa						No flow
25 February 2022	PC1						No flow
28 March 2022	PC1						No flow
28 March 2022	PCa						No flow
28 March 2022	PCUS						No flow
28 March 2022	PC3US						No flow
28 March 2022	KC1TOP						No flow
28 March 2022	KC1DS						No flow
28 March 2022	KC2DS						No flow
28 March 2022	KCDS						No flow
28 March 2022	KC2US						No flow
28 March 2022	KCUS						No flow

28 March 2022	KC1US						No flow
13 May 2022	KC1DS						No flow
13 May 2022	KC2DS						No flows
13 May 2022	KCDS						No flow
13 May 2022	KC2US						No flow
13 May 2022	KCUS	45	<5	7.94	18	52	Steady flow, brown sample, no odour
13 May 2022	KC1US						No flow
13 May 2022	PC3US						No flow
13 May 2022	PCUS						No flow
13 May 2022	KC1TOP						No flow
13 May 2022	PCa						No flow
13 May 2022	PC1	231		8.93	20	29	Steady flow, brown sample, turbid, no odour
5 August 2022	KC1DS	358	<5	8.81	16	451	Fast flow
5 August 2022	KC2DS	69	<5	7.49	17	40	Steady/light flow
5 August 2022	KCDS	103	<5	6.79	14	170	Steady/fast flow
5 August 2022	KC2US	119	<5	6.61	23	48	Fast flow
5 August 2022	KCUS	349	<5	6.69	12	434	Fast flow
5 August 2022	KC1US	92	<5	7.48	12	686	Fast flow
5 August 2022	PCUS						No Flow
5 August 2022	KC1TOP						No Flow
5 August 2022	PC3US						No Flow
5 August 2022	PC1	141	<5	7.55	18	59	Steady flow
5 August 2022	PCa						No Flow
25 August 2022	KC2DS	248	<5	7.62	19	13	Low flow
25 August 2022	KC1DS						No Flow
25 August 2022	KCDS						No Flow
25 August 2022	KC2US						No Flow
25 August 2022	KCUS						No Flow
25 August 2022	KC1US						No Flow
25 August 2022	PC1						No Flow
25 August 2022	PCa	146	<5	7.03	12	10	Low flow. LW104 pond pumping upstream
5 September 2022	KC1DS	707	<5	8.35	12	30	Steady flow rate
5 September 2022	KC2DS	304	<5	7.49	14	6	Slow flow rate
5 September 2022	KCDS						Pooled water, no flow
5 September 2022	KC2US						Pooled water, no flow
5 September 2022	KCUS	513	<5	7.54	12	26	Steady flow rate
5 September 2022	KC1US	121	<5	7.93	14	29	Low flow

5 September 2022	PCa	141	<5	7.58	15	28	Low flow, pigs
5 September 2022	PC1	156	<5	7.35	12	25	Steady flow
16 September 2022	PCa						No access to sample point
16 September 2022	PC1	77	<5	7.22	7	135	Slightly turbid. no water. Fast flow.
16 September 2022	KC1DS	112	<5	7.29	9	177	Slightly turbid. No odour. Very fast flow.
16 September 2022	KC2DS	105	<5	6.8	9	43	Quite Clear. No Odour. Very fast flow.
16 September 2022	KCDS	114	<5	6.63	7	118	Very fast flow. Slightly turbid.
16 September 2022	KC2US	57	<5	7.1	8	84	Turbid sample. brown sample. Slow/steady flow.
16 September 2022	KCUS	183	<5	7.25	8	153	Fast flow. Slightly turbid.
16 September 2022	KC1US	77	<5	6.74	8	71	Steady/fast flow. Slightly turbid. No odour.
22 September 2022	PCa						No access to sample point
22 September 2022	KC1DS	133	<5	7.51	11	99	Fast flow. Rubbish near sample site
22 September 2022	KC2DS	221	<5	7.49	10	28	Steady flow. Frogs nearby
22 September 2022	KCDS	108		7.31	10	88	Fast flow
22 September 2022	KC2US	49	<5	7.17	9	59	Steady flow
22 September 2022	KCUS	96	<5	7.13	9	139	Fast flow
22 September 2022	PC1	90	<5	7.3	8	83	Fast flow across road
22 September 2022	KC1US	90	<5	7.29	12	58	
9 October 2022	PC1	125	<5	7.06	9	30	Steady flow
9 October 2022	PCa	120	<5	6.51	15	26	Steady flow
9 October 2022	KC1US	133	<5	7.28	14	46	Slow/steady flow
9 October 2022	KCUS	276	<5	7.25	12	60	
9 October 2022	KC2US	71	<5	7.23	14	52	Low flow
9 October 2022	KCDS	223	<5	7.04	12	51	Fast flow
9 October 2022	KC2DS	91	<5	7.3	13	52	Steady flow
9 October 2022	KC1DS	165	<5	7.22	11	442	
21 October 2022	PC3US						No access to sample point
21 October 2022	KC1TOP						No access to sample point
21 October 2022	PCa						No access to sample point
21 October 2022	PCUS						No access to sample point
21 October 2022	KC1DS	86	<5	7.23	8	274	
21 October 2022	KC2DS	48	<5	7.81	8	338	
21 October 2022	KCDS	65	<5	7.08	8	142	
21 October 2022	KC2US	34	<5	7.31	6	48	
21 October 2022	KCUS	40	<5	7.35	6	78	
21 October 2022	KC1US	56	<5	8.27	7	126	
21 October 2022	PC1	29	<5	7.5	6	24	

1 November 2022	PCa						No access to sample point
1 November 2022	PCUS	128	<5	5.45	44	14	steady flow, no odour, slightly turbid
1 November 2022	PC3US	133	<5	5.86	53	8	very low flow, no odour, slightly turbid
1 November 2022	KC1DS	146	<5	8.06	16	214	strong flow, no odour, slightly turbid
1 November 2022	KC2DS	74	<5	6.93	17	40	strong flow, no odour, slightly turbid
1 November 2022	KC1TOP	91	<5	5.37	45	27	very low flow, no odour, slightly turbid
1 November 2022	KCDS	144	<5	7.16	16	80	strong flow, no odour, slightly turbid
1 November 2022	KC2US	73	<5	7.11	17	44	strong flow, no odour, slightly turbid
1 November 2022	KCUS	116	<5	6.99	14	148	strong flow, no odour, slightly turbid
1 November 2022	KC1US	105	<5	7.17	16	108	strong flow, no odour, slightly turbid
1 November 2022	PC1	100	<5	7.28	13	58	strong flow, no odour, slightly turbid
14 November 2022	PCa						Inaccessible
14 November 2022	PC3US						No Flow
14 November 2022	KC2DS	66	<5	7.26	11	40	Strong flow
14 November 2022	KCDS	100	<5	6.31	10	55	Strong flow
14 November 2022	KC2US	62	<5	6.47	10	20	Strong flow
14 November 2022	KC1DS	117	<5	7.94	11	327	Strong flow
14 November 2022	KC1US	88	<5	7.59	14	125	Strong flow
14 November 2022	KCUS	100	<5	6.78	11	94	Strong flow
14 November 2022	PCUS	131	<5	6.86	41	8	Low flow
14 November 2022	KC1TOP	133	<5	6.47	33	8	Low flow
14 November 2022	PC1	100	<5	6.6	10	74	Strong flow

Appendix G – *Subsidence Pond Monitoring*

Appendix G - Subsidence Pond Monitoring

Date	Data Point	EC - Field ($\mu\text{S}/\text{cm}$)	Comments
24 January 2022	LW104 North	237	
24 January 2022	LW105 North	172	
24 January 2022	LW106 North	129	
24 January 2022	LW108 North	DRY	
24 January 2022	LW107 North	206	
24 January 2022	LW108 South	260	
24 January 2022	LW105 South	70	
24 January 2022	LW103 Ponding	421	
24 January 2022	LW102 South	192	
24 January 2022	LW102 North	377	
24 January 2022	LW101 Ponding	194	
22 February 2022	LW104 North	308	
22 February 2022	LW105 North	168	
22 February 2022	LW106 North	250	
22 February 2022	LW107 North	232	
22 February 2022	LW108 North	DRY	
22 February 2022	LW108 South	282	
22 February 2022	LW105 South	DRY	
22 February 2022	LW103 Ponding	679	
22 February 2022	LW102 South	212	
22 February 2022	LW102 North	505	
22 February 2022	LW101 Ponding	245	
22 March 2022	LW104 North	414	
22 March 2022	LW105 North	222	
22 March 2022	LW106 North	DRY	
22 March 2022	LW107 North	312	
22 March 2022	LW108 South	376	
22 March 2022	LW108 North	DRY	
22 March 2022	LW105 South	DRY	
22 March 2022	LW103 Ponding	912	
22 March 2022	LW102 South	232	
22 March 2022	LW102 North	635	
22 March 2022	LW101 Ponding	315	
30 March 2022	LW104 North	275	
30 March 2022	LW105 North	171	
30 March 2022	LW107 North	233	
30 March 2022	LW108 North	206	
30 March 2022	LW108 South	268	
30 March 2022	LW103 Ponding	569	
30 March 2022	LW102 South	184	
30 March 2022	LW102 North	491	
30 March 2022	LW101 Ponding	228	
30 March 2022	LW105 South	DRY	
30 March 2022	LW106 North	DRY	
21 April 2022	LW104 North	156	
21 April 2022	LW105 North	154	
21 April 2022	LW106 North	DRY	
21 April 2022	LW107 North	DRY	
21 April 2022	LW108 North	DRY	
21 April 2022	LW105 South	DRY	
21 April 2022	LW108 South	255	
21 April 2022	LW103 Ponding	630	

21 April 2022	LW102 South	184	
21 April 2022	LW102 North	539	
21 April 2022	LW101 Ponding	257	
13 May 2022	LW105 South	20	
13 May 2022	LW108 South	220	
13 May 2022	LW104 North	158	
13 May 2022	LW105 North	306	
13 May 2022	LW106 North	DRY	
13 May 2022	LW107 North	257	
13 May 2022	LW108 North	DRY	
13 May 2022	LW103 Ponding	369	
13 May 2022	LW102 South	123	
13 May 2022	LW102 North	327	
13 May 2022	LW101 Ponding	191	
22 June 2022	LW104 North	1	EC probe faulty - inaccurate result
22 June 2022	LW105 North	54	
22 June 2022	LW106 North	DRY	
22 June 2022	LW108 North	DRY	
22 June 2022	LW107 North	27	
22 June 2022	LW108 South	20	
22 June 2022	LW105 South	DRY	
22 June 2022	LW103 Ponding	149	
22 June 2022	LW102 South	1	EC probe faulty - inaccurate result
22 June 2022	LW101 Ponding	1	EC probe faulty - inaccurate result
22 June 2022	LW102 North	431	
21 July 2022	LW104 North	256	
21 July 2022	LW105 North	360	
21 July 2022	LW106 North	DRY	
21 July 2022	LW107 North	318	
21 July 2022	LW108 North	DRY	
21 July 2022	LW105 South	DRY	
21 July 2022	LW108 South	300	
21 July 2022	LW102 South	196	
21 July 2022	LW101 Ponding	277	
21 July 2022	LW102 North	786	
21 July 2022	LW103 Ponding	597	
5 August 2022	LW109 North	DRY	
5 August 2022	LW110 North	DRY	
5 August 2022	LW109 South	151	
5 August 2022	LW108 South	226	
5 August 2022	LW104 North	174	
5 August 2022	LW105 North	131	
5 August 2022	LW106 North	123	
5 August 2022	LW107 North	216	
5 August 2022	LW108 North	67	
5 August 2022	LW105 South	119	
5 August 2022	LW101 Ponding	186	
15 August 2022	LW101 Ponding	129	
15 August 2022	LW104 North	110	
15 August 2022	LW106 North	105	
15 August 2022	LW107 North	120	
15 August 2022	LW108 North	70	
15 August 2022	LW105 North	105	
15 August 2022	LW105 South	123	
15 August 2022	LW108 South	164	
15 August 2022	LW109 South	207	
15 August 2022	LW109 North	DRY	

15 August 2022	LW110 North	DRY	
6 September 2022	LW104 North	151	
6 September 2022	LW105 North	143	
6 September 2022	LW106 North	133	
6 September 2022	LW107 North	150	
6 September 2022	LW108 North	90	
6 September 2022	LW108 South	213	
6 September 2022	LW109 South	256	
6 September 2022	LW109 North	DRY	
6 September 2022	LW110 North	DRY	
6 September 2022	LW105 South	121	
6 September 2022	LW101 Ponding	153	
16 September 2022	LW105 North	DRY	
16 September 2022	LW106 North	DRY	
16 September 2022	LW108 North	32	
16 September 2022	LW107 North	96	
16 September 2022	LW108 South	117	
16 September 2022	LW105 South	64	
16 September 2022	LW109 South	166	
16 September 2022	LW110 North	DRY	
16 September 2022	LW109 North	99	
16 September 2022	LW101 Ponding	68	
16 September 2022	LW104 North	75	
10 October 2022	LW104 North	131	
10 October 2022	LW105 North	118	
10 October 2022	LW106 North	156	
10 October 2022	LW107 North	201	
10 October 2022	LW108 North	100	
10 October 2022	LW109 North	138	
10 October 2022	LW109 South	275	
10 October 2022	LW108 South	245	
10 October 2022	LW110 North	DRY	
10 October 2022	LW105 South	140	
10 October 2022	LW101 Ponding	141	
24 October 2022	LW104 North	117	
24 October 2022	LW105 North	115	
24 October 2022	LW106 North	169	
24 October 2022	LW108 South	237	
24 October 2022	LW105 South	132	
24 October 2022	LW109 South	265	
24 October 2022	LW109 North	143	
24 October 2022	LW110 North	148	
24 October 2022	LW108 North	124	
24 October 2022	LW107 North	211	
24 October 2022	LW101 Ponding	94	
2 November 2022	LW105 North	DRY	
2 November 2022	LW106 North	DRY	
2 November 2022	LW104 North	119	
2 November 2022	LW105 South	113	
2 November 2022	LW109 North	143	
2 November 2022	LW110 North	145	
2 November 2022	LW109 South	151	
2 November 2022	LW108 South	217	
2 November 2022	LW101 Ponding	106	
2 November 2022	LW107 North	150	
2 November 2022	LW108 North	180	
20 December 2022	LW104 North	198	

20 December 2022	LW105 North	221	
20 December 2022	LW105 South	DRY	
20 December 2022	LW108 North	219	
20 December 2022	LW107 North	256	
20 December 2022	LW106 North	219	
20 December 2022	LW108 South	477	
20 December 2022	LW109 South	DRY	
20 December 2022	LW109 North	203	
20 December 2022	LW110 North	DRY	
20 December 2022	LW101 Ponding	162	