BHP

Mt Arthur Coal

Annual Review FY24

27 September 2024

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Table 1: Annual Review title block

Document Details	
Name of Operation	Mt Arthur Coal
Name of Operator	Hunter Valley Energy Coal Pty Ltd
Project Approvals	PA 09_0062 (MOD 1) PA 06_0091
Name of holder of project approvals	Hunter Valley Energy Coal Pty Ltd
Mining Leases	CCL 744, CL 396, ML 1358, ML 1487, ML 1548, ML1593, ML1655, ML 1739, ML 1757, MPL 263
Name of holder of mining leases	Hunter Valley Energy Coal Pty Ltd; Mt Arthur Coal Pty Limited
Water Licences	WAL 917, WAL 918, WAL 1296, WAL 18141, WAL 18247, WAL 41495, WAL 41556, WAL 41557, WAL 18175
Name of holder of water licences	Hunter Valley Energy Coal Pty Ltd
Forward Program Commencement Date	1 August 2023
Forward Program Completion Date	30 June 2026
Annual Review Commencement Date	1 July 2023
Annual Review Completion Date	30 June 2024
I, Sarah Bailey, certify that this audit report is a true and accurate record of the compliance status of Mt Arthur Coal for the period 1 July 2023 to 30 June 2024 and that I am authorised to make this statement on behalf of Hunter Valley Energy Coal Pty Ltd. Note. • 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. • The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).	
Name of authorised reporting officer	Sarah Bailey
Title of authorised reporting officer	Manager Approvals, Land Access, Heritage and Environment – Mt Arthur Coal
Signature of authorised reporting officer	
Date	10/01/2025

1 Statement of Compliance

A statement of Mt Arthur Coal's compliance with its project approvals and mining leases is presented in Table 2 with four identified non-compliances during the reporting period being discussed in Table 3.

Table 2: Statement of compliance

Were all conditions of the relevant approval(s) complied with?	
PA 09_0062	YES
EPL 11457	NO
EPBC 2011/5866	YES
EPBC 2014/7377	YES
ML	YES

Table 3: Non-compliance summary

Relevant approval	Condition	Description Summary	Compliance Status	Comment	Report Reference
EPL 11457	O2.1	Workshop Drain Condition Warning Letter	Non-compliant (Low)	EPA issued Warning Letter due to partially clogged hardstand drainage grates and a drainage line containing other items and rubbish.	Section 11
EPL 11457	M9.6	<95% data capture at EPL Air Quality Monitoring Point	Non-compliant (Low)	Mt Arthur Coal recorded <95% data capture at one EPL air quality monitoring point.	Section 11
EPL 11457	M7.1	Sewage Treatment Plant (STP) Flow Capture	Non-compliant (Low)	The STP flow meter ceased to continue totalisation of flow rate and as such, the data could not be recovered between 31 October 2023 and 16 January 2024.	Section 11
EPL 11457	O2 and R5.5	Additional STPs On-site Maintenance Records	Non-compliant (Low)	MAC recently identified additional minor STP's that discharge to land/water on-site where maintenance records were unable to be provided for the Annual Return Reporting Period	Section 11

Note: Compliance Status key for Table 3

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: ➢ potential for serious environmental consequences, but is unlikely to occur; or ➢ potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: ➢ potential for moderate environmental consequences, but is unlikely to occur; or ➢ potential for low environmental consequences, but is unlikely 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)

Acronyms

Acronyms	
AHMP	Aboriginal Heritage Management Plan
ARA	Annual rapid assessment
BioMP	Biodiversity Management Plan
BMP	Blast Management Plan
CCC	Community Consultative Committee
CCL	Consolidated coal lease
CHPP	Coal handling and preparation plant
CL	Coal lease
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPHI	Department of Planning, Housing and Infrastructure
DPIE	Former NSW Department of Planning, Industry and Environment, superseded by DPHI
DPE	Former NSW Department of Planning and Environment, superseded by DPIE, then superseded by DPHI
DRG	Former Division of Resources and Geoscience
EA	Environmental assessment
EIS	Environmental impact statement
EL	Exploration licence
EMS	Environmental management system
EPA	NSW Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
FY	Financial year
HRSTS	Hunter River Salinity Trading Scheme
HVEC	Hunter Valley Energy Coal (Mt Arthur Coal)
MAC	Mt Arthur Coal
ML	Mining lease
MSC	Muswellbrook Shire Council
NGER	*National Greenhouse and Energy Reporting Act 2007*
NRAR	Natural Resources Access Regulator

Acronyms	
NSW	New South Wales
PA	Project Approval
ROM	Run of mine
RR	NSW Resources Regulator
VPA	Voluntary Planning Agreement
VWP	Vibrating wire piezometers

2 Introduction

The Mt Arthur Coal Complex is located approximately five kilometres southwest of Muswellbrook in the Upper Hunter Valley in New South Wales (NSW) and includes the Mt Arthur Coal Open Cut, the Mt Arthur Coal Underground Project (no underground operations are currently taking place), Coal Handling and Preparation Plant (CHPP), rail loop and rail load out. The Mt Arthur Coal Complex (including biodiversity offset areas) and surrounding region is shown in Figure 1 and Figure 2.

This Annual Review details the environmental and community performance for the period from 1 July 2023 to 30 June 2024 for operations at the Mt Arthur Coal Complex.

This document has been prepared in accordance with the Annual Review guidelines issued by the NSW Department of Planning and Environment in October 2015 and fulfils statutory reporting requirements required in mining leases and Schedule 5 Condition 3 of the Mt Arthur Coal Mine Open Cut Consolidation Project Approval Modification 1 (09_0062 MOD 1).

This report was prepared in consultation with the NSW Resources Regulator (RR), the Department of Planning, Housing and Infrastructure (DPHI), NSW Environment Protection Authority (EPA) and the Natural Resources Access Regulator (NRAR). The report is distributed to a range of external stakeholders and is available on the BHP website at https://www.bhp.com/sustainability/environment/regulatory-information/.

Contact details for personnel associated with environmental management at Mt Arthur Coal can be found in Table 4.

Table 4: Mt Arthur Coal management contact details

Name and role	Phone contact details
Grant Clouten - General Manager, BHP Mt Arthur Coal	(02) 6544 5800
Sarah Bailey - Manager Approvals, Land Access, Heritage and Environment, BHP Mt Arthur Coal	(02) 6544 5800

BHP

Geospatial Team
Brisbane

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Kilometres

Projection: GDA2020 MGA Zone 56

MT ARTHUR MINE

MINING LEASES, APPROVED DISTURBANCE BOUNDARY AND OFFSET AREAS

Drawn: K.Reedy	Date: 28/08/2024	Revision: 1
Checked: C. Christensen	Filename: 20240827-2_Fig3.mxd	

INSET A

Oakvale Offset Conservation Area

Middle Deep Creek Offset Conservation Area

MUSWELLBROOK

60km to Inset A (Oakvale and Middle Deep Creek Offset Areas)

Racecourse Road

Ramrod Creek

Bengalla Road

Roxburgh Road Offset Area

Roxburgh Road

Mangoola Road

HUNTER RIVER

Whites Creek

Denman Road

Quarry Creek

ML1757

Thomas Mitchell Drive

Thomas Mitchell Drive Offsite Offset Area

Thomas Mitchell Drive Onsite Offset Area

ML1655

ML1487

MT ARTHUR

DRAYTON

New England Highway

Hebden Road

ML1548

Orica Road

MPL263

CCL744

CL396

ML1739

ML1358

Mount Arthur Conservation Area

Mount Arthur Access Road

EL5965

EL5965
ML1593S

ML1593

Edderton Road

Saddlers Creek Conservation Area

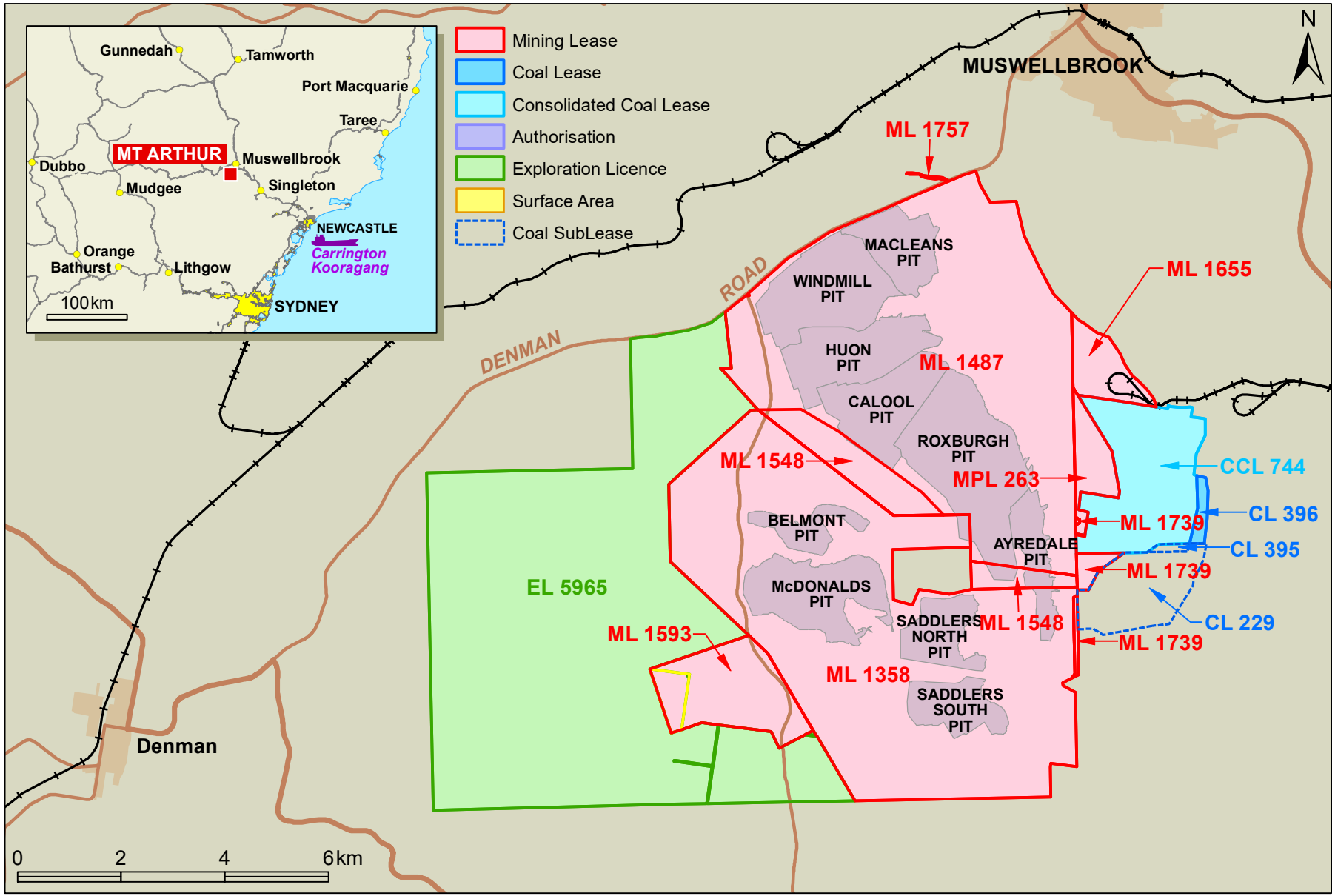
Saddlers Creek

Jerrys Plains Road

6425000
6420000
6415000
290000
295000
300000
305000

LEGEND

- Conservation Offset Areas
- Lease Areas
- Approved Disturbance Boundary


Gunnedah
Tamworth
Port Macquarie
Taree
MT ARTHUR
Dubbo
Muswellbrook
Mudgee
Singleton
NEWCASTLE
Carrington
Kooragang
Orange
Bathurst
Lithgow
100 km
SYDNEY
Mining Lease
Coal Lease
Consolidated Coal Lease
Authorisation
Exploration Licence
Surface Area
Coal SubLease
N
MUSWELLBROOK
ML 1757
ML 1655
ROAD
DENMAN
MACLEANS PIT
WINDMILL PIT
HUON PIT
ML 1487
CALOOL PIT
ROXBURGH PIT
ML 1548
MPL 263
CCL 744
CL 396
ML 1739
BELMONT PIT
AYREDALE PIT
CL 395
ML 1739
EL 5965
McDONALDS PIT
SADDLERS NORTH PIT
ML 1548
CL 229
ML 1739
ML 1593
ML 1358
SADDLERS SOUTH PIT
Denman
0
2
4
6 km

3 Approvals

Mt Arthur Coal has several statutory approvals, leases and licences that regulate activities on site.

Table **5** shows Mt Arthur Coal's existing statutory approvals as at 30 June 2024.

Table 5: Mt Arthur Coal's existing statutory approvals as at 30 June 2024

Description	Issue date	Expiry date
Project approvals issued by the DPHI		
Mt Arthur Coal Mine Open Cut Consolidation Project Modification 1 (09_0062 MOD 1)	26/09/2014	30/06/2026
Mt Arthur Coal Mine Underground Project (06_0091)	02/12/2008	31/12/2030
Mining leases and exploration licences issued by the DRG		
CCL 744	03/07/1989	21/01/2028
CL 396	23/06/1992	03/02/2045
ML 1358	21/09/1994	21/09/2036
ML 1487	13/06/2001	12/06/2043
ML 1548	31/05/2004	30/05/2025
ML 1593	30/04/2007	29/04/2028
ML 1655	03/03/2011	03/03/2032
ML 1739	25/07/2016	25/07/2037
ML1757	07/07/2017	07/07/2038
MPL 263	17/10/1990	17/10/2032
EL 5965	14/07/2007	15/07/2026
Drayton sublease CL 395	13/04/2006 (registered 14/06/2013)	21/01/2029
Drayton sublease CL 229	13/04/2006 (registered 14/06/2013)	02/02/2045
EPL issued by the EPA		
EPL11457	09/10/2001 (varied on 09/01/2024	Not specified
EPBC approval issued by the DAWE		
EPBC 2011/5866	30/04/2012 (varied on 29/06/2017)	30/06/2026

Description	Issue date	Expiry date
EPBC 2014/7377	05/12/2016	30/06/2026

4 Operations Summary

4.1 Mining Operations

Mining and processing operations at Mt Arthur Coal continued 24 hours a day, seven days a week during the reporting period. Mining continued within the Ayredale, Calool, Roxburgh, Saddlers Central and Windmill open cut pits. Thiess, a subsidiary of the CIMIC Group, operates under a total services contract to mine the Saddlers and Ayredale pits, located in the southern areas of the Mt Arthur Coal mine. Overburden and interburden material was removed by excavator / shovel and transported via rear dump truck to overburden emplacements, including visual dumps 5 (VD5), contingency dumps 1 to 5 (CD1 to CD5), Out Of Pit Dump North (OP1N), conveyor corridor dump (CC1) and Saddlers dump. Raw coal was extracted by excavator and transported to the CHPP by rear dump truck.

Raw coal was processed at the CHPP, with approximately 15 million tonnes of product coal being railed to the port of Newcastle for export. Coarse coal waste (rejects) was co-disposed within overburden emplacements and fine coal waste (tailings) was pumped to the tailings storage emplacement in East Pit. Production figures for raw, product and waste materials produced during the reporting period are summarised in Table 6.

Table 6: Production summary

Material	Unit	Approved limit	Previous reporting period (actual FY23)	This reporting period (actual FY24)	Next reporting period (estimate)
Overburden	bank cubic meters	N/A	123,342,629	140,328,460	135,016,054
Run-of-mine coal	tonnes	32,000,000	20,503,845	22,334,755	21,436,021
Coarse and fine reject	tonnes	N/A	3,807,050	4,483,968	4,403,298
Tailings	tonnes (dry)	N/A	1,853,867	1,714,182	2,076,075
Product (saleable) coal	tonnes	27,000,000 (by rail)	14,172,415	15,367,907	15,024,503

4.2 Other Operations

Other operations at Mt Arthur Coal during the reporting period included:

- Land Preparation: During the reporting period approximately 199,000 bcm of topsoil was recovered from 250 hectares of clearing ahead of mining and for additional dump space using excavators, dozers and trucks.
- Material was either stockpiled or placed directly onto reshaped areas to be rehabilitated where able to. The remaining topsoil was placed in stockpiles Between 100 to 300 millimetres of topsoil was recovered during stripping.

Infrastructure Construction and Management: The following major projects that were commenced, progressed, or completed during the reporting period:

Continuing works:

- Proposed demolition of Dragline
- Installation of additional water and sediment infrastructure to support ongoing water management strategies.
- Third phase of the Tailings Dam wall raise to RL 252 to support tailings deposition to 2030 (raising of existing embankments, new embankment, spillway, emergency spillway, dam monitoring and instrumentation).
- Rehabilitation and Land management Works, comprising of:

- Bulk pushing of overburden to shape the landform
- Topsoil placement, seeding and land use establishment
- Pest management such as dog and pig control programs
- Weed management program
- Establishment of rock crushing operations for rehabilitation.

Completed works:

- Dewatering, surface capping and construction of a buttress along the western perimeter of the facility to landform requirements
- Establishment of an out of pit dump to cater for insufficient dump capacity on low wall over five-year plan, particularly with the impact of the monocline
- Demolition of redundant Bayswater CHPP
- Closure-related works for the North Cut tailing storage facility
- TSF2B works complete which included raise to West Cut Void TSF Dam walls to RL 245, construction of spillway and installation of monitoring instrumentation.
- New bioremediation pad

During the reporting period there were no variations from the current Forward Plan related to construction works on site.

4.3 Employment Details

As of 30 June 2024, Mt Arthur Coal employed approximately 1200 permanent and fixed-term contract employees, and 1400 service contractors on a full-time equivalent basis. Approximately 65 per cent of Mt Arthur Coal's employees resided in the local community areas of Muswellbrook, Denman, Aberdeen, Scone and Singleton as at 30 June 2024.

4.4 Next Reporting Period

Forecast operations for the next reporting period, in particular significant changes in the mine, include:

- Commissioning of the first phase of the tailings flocculation system.
- Continue installation of additional water pipelines and associated pumps to support ongoing water management strategies.
- Ongoing maintenance and pumping infrastructure upkeep for Main dam till end of life mine

5 Actions Required from Previous Annual Review

The DPHI notified HVEC by letter dated 15 April 2024 that the FY23 Annual Review was considered by the Department to satisfy the requirements of the Project Approval and the Department's Annual Review Guideline, October 2015.

Regulator feedback following review of the FY23 Annual Review is summarised in Table 7. Regulator feedback on additional requirements to be considered during the preparation of the FY24 Annual Review is also summarised in Table 7.

Table 7: Actions required from FY23 Annual Review and additional requirements for FY24 Annual Review

Action required	Requested by	Action taken by HVEC	FY24 Annual Review section
Regulator feedback from FY23 Annual Review			
No specific feedback from FY23 has been provided for consideration in the development of the FY24 Annual Review.	DPHI, EPA, RR and NRAR	N/A	N/A
Regulator feedback on additional requirements for the FY24 Annual Review			
Please provide information on how the works carried out under the PRPs have addressed the recommendations made by the [IEA] auditor and how HVEC monitors and maintains the capacity of mine water and sediment dams to reduce the risk of uncontrolled off-site discharges.	DPHI	Included additional information in relevant section	Section 10 Independent Review Table 45

6 Environmental Performance

6.1 Noise

6.1.1 Environmental Management

Noise management at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-032 Noise Management Plan; and
- MAC-ENC-PRO-056 Noise Management Procedure.

The Noise Management Plan (NMP) was prepared to fulfil the requirements of the Project Approval, meet the conditions of Environmental Protection Licence (EPL) 11457, as well as manage and minimise mine noise impact on the community and environment. Mt Arthur Coal has eight statutory monitoring locations as detailed in the NMP and four real-time monitoring locations utilised for internal use. Noise monitoring locations are shown in Figure 3.

6.1.2 Environmental Performance

An analysis of monthly attended noise monitoring results indicates Mt Arthur Coal's operations did not exceed the $L_{Aeq(15min)}$ or the $L_{A1(1min)}$ limits during the reporting period. A summary of results from Mt Arthur Coal's attended noise monitoring in the reporting period is provided in Table 8. Data capture was 100 per cent at all attended noise monitoring sites.

$L_{Aeq(15min)}$ noise level predictions modelled for 2026 in the 2013 noise impact assessment were used for comparison with monitoring results for this reporting period, as shown in Table 8. Maximum $L_{Aeq(15min)}$ noise results are below modelled predictions from all noise monitoring sites except for NP10 where the criteria did not apply due to adverse weather.

Table 8: Monthly attended night-time noise monitoring results in decibels

Noise Monitoring Location	$L_{Aeq(15min)}$ dB			$L_{A1(1min)}$ dB		Trend / key management implications	Implemented / proposed management actions
	Approval criteria	2026 prediction	Reporting period performance (min/ log ave/ max^)	Approval criteria	Reporting period performance (min/log ave/max^)		
NP04	38	38	20 / 33 / 38*	45	25 / 39 / 46*	No exceedance reported for the monitoring period	Continuation of management and monitoring in accordance with NMP
NP07	39	37	25 / 33 / 37*	45	30 / 37 / 40*		
NP10	39	36	31 / 35 / 38*	45	32 / 40 / 45*		
NP12	39	40	30* / 33 / 36*	45	30* / 36 / 40*		
NP13	35	N/A	20 / 23 / 27*	45	20 / 26 / 30*		
NP14	35	35	25 / 28 / 32*	45	25 / 32 / 37*		
NP15	35	36	25* / 30 / 34*	45	25* / 33 / 39*		
NP16	37	37	30 / 34 / 37*	45	33 / 38 / 41*		

^ Measurable noise levels only – does not include *inaudible* or *not measurable* results
* Approval criteria does not apply due to winds greater than three metres per second (at a height of 10 metres), or temperature inversion conditions greater than or equal to four degrees Celsius per 100 metres.

A comparison of FY24 noise monitoring results to previous reporting years is assessed and presented in Table 9. Overall, in FY24 $L_{Aeq(15min)}$ noise levels were higher than historical results for four noise monitoring locations - NP07,

NP10, NP12 and NP14 with a maximum increase of 3dB. A decrease in the noise levels was observed at two noise monitoring locations, NP13 and NP15 with the remaining monitoring locations unchanged. Noise levels from Mt Arthur Coal were audible but too low to measure at NP15 on one occasion.

The additional impact of low frequency noise was assessed during the monthly noise monitoring in accordance with the EPA's 2017 Noise Policy for Industry.

Table 9: Attended noise monitoring results in decibels in comparison to previous years

Noise Monitoring Location	FY24		FY23		FY22	
	Min	Max	Min	Max	Min	Max
$L_{Aeq(15\ min)}$ dB						
NP04	IA	37*	IA	37	IA	38
NP07	IA	36	IA	34	IA	38
NP10	IA	37*	IA	34*	IA	39
NP12	IA	38*	IA	37	IA	35*
NP13	IA	26*	IA	30*	IA	31*
NP14	IA	31*	IA	30*	IA	34*
NP15	IA	34*	IA	35	IA	32*
NP16	IA	35	IA	35	IA	30
$L_{Aeq(1\ min)}$ dB						
NP04	IA	39*	IA	42	IA	47*
NP07	IA	38	IA	39	IA	41
NP10	IA	41*	IA	37*	IA	41
NP12	IA	39*	IA	39	IA	38*
NP13	IA	35*	IA	35*	IA	33*
NP14	IA	35*	IA	35*	IA	40
NP15	IA	39*	IA	40	IA	42*
NP16	IA	37	IA	37	IA	34

* Approval criteria does not apply due to winds greater than three metres per second (at a height of 10 metres), or temperature inversion conditions greater than or equal to four degrees Celsius per 100 metres.
IA – Mt Arthur Coal's operations were inaudible.

6.1.3 Complaints and Reportable Incidents

No noise complaints were received in FY24 indicating that Mt Arthur Coal successfully minimised noise during its operations throughout the reporting period.

6.1.4 Proposed Improvements

As proposed in the previous reporting period, Mt Arthur Coal has integrated three noise compasses for unattended noise monitoring into the real time noise management system (DCS). This has enhanced system capability, monitoring performance, and available technology. During FY25 Mt Arthur Coal will be investigating the possibility for integration of fleet data into the DCS, which will enable noise risk forecasting based on fleet positions and weather conditions. In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

BHP

Geospatial Team
Brisbane

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Projection: GDA2020 MGA Zone 56

MT ARTHUR MINE

MONITORING LOCATIONS
AIR QUALITY, BLASTING, NOISE & METEOROLOGICAL

Drawn: K.Reedy	Date: 28/08/2024	Revision: 1
Checked: A. Johnston	Filename: 20240827-2_Fig3.mxd	

BENGALLA
MUSWELLBROOK
MT ARTHUR
DRAYTON
Bengalla Road
Racecourse Road
Remrod Creek
Muscle Creek
Thomas Mitchell Drive
New England Highway
Roxburgh Road
Mangoola Road
HUNTER RIVER
Denman Road
Wilkes Creek
Quarry Creek
Saddlers Creek
Orica Road
Edderton Road
Mount Arthur Access Road
Jerrys Plains Road
ML1757
ML1487
ML1655
ML1548
ML1358
ML1593
ML1739
MPL263
CCL744
CL396
CL395
CL229
EL5965
NP16
NP7
DD19
NC2
DC2
NC1
DD21
NC4
NP10
BP4
DC4
BP10
DD22
DC11
WS02
WS06
DD14
DC5
DF5
WS13
BP8
DC8
DD16
WS01
DC10
WS11
NP14
WS14
DD15
WS10
DC9
NP15
NC3
BP9B
BP9R
DD12
DD10
EWU
DD1
NC7
NC6
BP11
WS12
NP4
NP12
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DD3
WS09
WS04
DC13
DC12
WS03
DD5
DC6
WS07
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LEGEND

- Mining Lease
- Coal Lease
- Consolidated Coal Lease
- Exploration Lease
- Surface Area
- Coal SubLease
- Approved Disturbance Boundary
- Air (Blast) Monitor
- Air (High Volume Sampler) Monitor
- Air (TEOM) Monitor
- Depositional Dust Monitor
- Noise Monitor
- Weather Monitor

6.2 Blasting

6.2.1 Environmental Management

Blasting at Mt Arthur Coal is managed in accordance with MAC-ENC-MTP-015 Blast Management Plan (BMP).

The BMP details the relevant blast overpressure and vibration impact assessment criteria and compliance procedures and controls related to open cut blasting activities. It includes the blast monitoring program, as well as public infrastructure monitoring requirements, and road closure requirements. It also includes the blast fume management strategy, which aims to minimise visible blast fume and reduce potential for offsite fume migration.

Mt Arthur Coal has six blast monitors:

- BP04 (South Muswellbrook);
- BP07 (Sheppard Avenue);
- BP08 (Edinglassie);
- BP09R (Denman Road West); *
- BP10 (Yammanie North); and
- BP11 (Balmoral Road).

*Note: During the reporting period the Denman Road West blast monitor (previously BP09B) was relocated approximately 1.5km to the west (now BP09R). This relocation was the result of BHP acquisition of land where the relocation was considered necessary to provide the most accurate and representative blast monitoring results of the new nearest sensitive receptor. The BMP and EPL were amended to allow this change and the new monitor came online effective as of the 9 January 2024.

Blast monitoring locations are shown in Figure 3.

The modification project approval states a ground vibration limit for public infrastructure of 50 millimetres per second (mm/s) unless Mt Arthur Coal has a written agreement with the relevant owner of the public infrastructure to exceed these criteria and has advised DPHI in writing of the terms of the agreement. Written agreements with Roads and Maritime Services (RMS), Telstra and Ausgrid are in place allowing increases in the ground vibration blast impact assessment criteria as follows:

- 150 mm/s with no allowable exceedances (RMS, Ausgrid); and
- 10 per cent (%) of the total number of blasts over a period of 12 months are allowed to exceed 100 mm/s (Telstra, Ausgrid); and
- Notification prior to blasting for blasts predicted to exceed 100 mm/s at Denman Road (RMS).

6.2.2 Environmental Performance

During the reporting period 181 blasts were undertaken. Blast data capture rates for the reporting period were 100 per cent (%) at all statutory sites. Blasting was undertaken between 8 am and 5 pm Monday to Saturday, with no blasts being undertaken on Sundays or public holidays.

Of the 181 blast events fired during the reporting period:

- No blasts recorded ground vibration above the maximum of 10 mm/s;
- No blasts exceeded the ground vibration lower limit of 5mm/s;
- No blasts recorded an airblast overpressure result above the maximum 120 dBL limit; and
- One blast (0.6 %) resulted in an exceedance of the 115 dBL lower limit at BP08, Edinglassie (119.4 dBL) remaining below the 5% allowable exceedance limit; and
- An additional four blasts also recorded results above the 115 dBL lower limit, however investigation by third party consultants indicated the results were wind affected and not representative of blast impact. The investigation reported actual levels from blast impact were below the limit. Initial and actual results are summarised below:

- Denman Rd West (BP09B) on 5 October (11:10am) initially reported 118.5 dBL, actual blast result was 97.0 bBL;
- Denman Rd West (BP09B) on 20 September (2:24pm) initially reported 116.2 dBL, actual blast result was 100.5 bBL;
- Sheppard Ave (BP07) on 20 September (2:24pm) initially reported 116.8 dBL, actual blast result was 90.5 bBL;
- Balmoral (BP11) on 4 November 23 (3:29pm) initially reported 115.3 dBL, actual blast result was 109.5 dBL;

Results reflect predictions made in the 2013 environmental assessment and generally do not show a significant difference in average or maximum results compared to previous reporting periods. A summary of the results and comparison of FY24 blast monitoring results with previous years is provided in Table 10.

During the reporting period, conditions of public infrastructure agreements were met in accordance with the BMP. There were no exceedances of the upper or lower criteria limits for public infrastructure.

Table 10: Summary of blast monitoring results

Parameter	Statistic	FY24	FY23	FY22
Ground vibration (mm/s)	Average	0.17	0.20	0.24
	Maximum valid result	3.63 (BP09B)	4.78 (BP09B)	13.50 (BP09)
	Valid blasts above 5 mm/s threshold	0	0	4
Airblast overpressure (dBL)	Average	94.1	95.67	95.5
	Maximum valid result	119.4 (BP08)	117.1 (BP08)	118.8 (BP10)
	Valid blasts above 115 dBL threshold	1	3	3

6.2.3 Complaints and Reportable Incidents

During the reporting period, 6 blast complaints were recorded, which is a decrease from the 12 blast complaints recorded in FY23. These complaints are discussed further in Section 9.

No reportable blast incidents were recorded during the reporting period.

6.2.4 Proposed Improvements

The blast monitoring system was successfully upgraded to the 4G network during the reporting period. Mt Arthur will continue to manage blasting in accordance with relevant procedures and legislative requirements.

In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

6.3 Meteorological Data

6.3.1 Environmental Management

Meteorological monitoring at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-040 Air Quality Management Plan.
- MAC-ENC-PRO-083 Air Quality Data Validation Procedure

Mt Arthur Coal's primary statutory real-time meteorological station located at the mine's industrial area (WS09) is an essential component of the operation's environmental monitoring system. Wind speed, wind direction, temperature, rainfall, solar radiation and humidity data is collected at 15-minute intervals and relayed using radio telemetry.

A secondary statutory real-time meteorological station, located off site to the north-west of the mine at Wellbrook (WS10), also provides representative weather data for the mine site, including prevailing wind conditions, and is used in conjunction with WS09 to determine the presence and strength of temperature inversions in the local atmosphere as part of the pre-blast environmental assessment and for noise compliance monitoring. These meteorological stations are shown on Figure 3.

Both statutory meteorological stations comply with the Australian Standard 2923-1987 *Ambient Air – Guide for measurement of horizontal wind for air quality applications* and the EPA's 2017 Noise Policy for Industry.

6.3.2 Environmental Performance

Meteorological data capture rate for the reporting period was 94.80 per cent at WS09 and 99.95 percent at WS10.

Total rainfall for the reporting period was 561.6 mm, which is approximately 9 per cent lower than the long-term average of 619 mm. Wind direction at Mt Arthur Coal (WS09) during the reporting period was predominantly from South-Southeast and North during winter/spring seasons; and from South-Southeast during summer/autumn.

6.3.3 Proposed Improvements

To improve meteorological data capturing, a new meteorological station (WS14 Windmill West) was installed to the North-west of the site during the reporting period. Additionally, new rain gauges have been recently installed at five environmental monitoring locations.

Mt Arthur Coal will continue to upgrade the meteorological stations as necessary and will also record and utilise meteorological data from its two statutory monitors (WS09 and WS10) throughout the next reporting period.

In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

6.4 Air Quality

6.4.1 Environmental Management

Air quality at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-040 Air Quality Management Plan.

Mt Arthur Coal operates an air quality monitoring network consisting of:

- Two dust deposition gauges recording dust deposition, which are derived from mining and non-mining activities. These provide a measure of changing air quality;
- Six statutory real-time dust monitors, referred to as tapered element oscillating microbalance samplers (TEOMs), which record PM_{10} levels on a continuous basis;
- Five additional TEOMs, which also record continuous PM_{10} levels are included in the monitoring network. These are non-statutory and are used for proactive internal management purposes; and
- A Dust Control System (DCS), which is monitored 24 hours a day, seven days a week by the onsite Dispatch team who contact in field personnel to activate the Dust Trigger Action Response Plan (TARP) when dust trigger levels are exceeded. Operational responses are recorded in the DCS.

Air Quality monitoring locations are shown in Figure 3.

Mt Arthur Coal utilises a predictive dust model that predicts meteorological conditions and PM_{10} concentrations up to 72 hours in advance. This tool is used for operational dust management planning and notification of mining supervisors when adverse weather conditions are predicted.

6.4.2 Environmental Performance

Air dispersion modelling completed for the 2026 representative mining scenario, as part of the 2013 environmental assessment, has been used to evaluate monitoring results for the reporting period.

Depositional Dust Gauges

The results from the depositional dust monitoring is summarised in Table 11. Depositional dust data capture rates for the reporting period were 100 per cent at both sites.

For the reporting period, no depositional dust gauges exceeded the annual average assessment criteria, as shown in Table 11.

Monitoring results for the reporting period are slightly higher than those in FY23, suggesting that the drier conditions experienced throughout the reporting period may have influenced the monitoring results. Rainfall recorded in FY24 was approximately 20% lower compared to FY23 and 27% lower than in FY22.

Table 11: Comparison of annual average deposited dust results

Monitor Location	Approval criteria (annual average)	Annual average depositional dust (g/m^2/month)			Trend / key management implications	Implemented / proposed management actions
		FY24	FY23	FY22		
Edderton Homestead (DD08)	4 g/m^2/ month	1.4	1.0	1.1	No exceedances	Continue dust management in accordance with AQMP
Roxburgh Road (DD14)		2.3	2.1	2.2		

Tapered Element Oscillating Microbalance Samplers

A summary of the results from the statutory real-time TEOM PM_{10} monitoring sites for the reporting period is provided in Table 12.

The data capture for all monitors were above the 90 percent target, as shown below:

- DC02 – 98.6%
- DC04 – 99.6%
- DC05 – 98.7%
- DC06 – 99.0%
- DC07 – 99.4%
- DC08 – 99.3%
- DC09 – 98.2%
- DC10 – 98.9%
- DC11 – 98.1%
- DC12 – 92.2%
- DC13 – 98.0%

During the reporting period, the short term 24-hour cumulative impact assessment criteria (50 µg/m3) was exceeded 51 times at statutory TEOM monitoring sites over a total of 34 days. All exceedances of the cumulative criteria were reported to DPHI, as recorded in Table 13. For the recorded exceedances it was determined that the incremental increase in concentrations due to the Mt Arthur Coal project was less than 50 µg/m3.

The long-term annual average increased in comparison to concentrations recorded during FY23 and FY22 except at the Sheppard Avenue DC02 monitoring site. However, concentrations from all of Mt Arthur Coal's statutory TEOM monitoring sites remained below the long-term annual impact assessment criteria of 30 µg/m3.

Air dispersion modelling predictions for the 2026 mining scenario has been used to evaluate annual average TEOM PM10 results for the reporting period, as summarised in Table 12. PM10 results are within the modelled predictions from all TEOM monitoring sites.

Table 12: Summary of TEOM PM_{10} monitoring results using validated data

Monitor location	Approval criteria (µg/m³)	2026 – predicted cumulative (µg/m³) +	TEOM PM_{10} monitoring results (µg/m³)						Trend / key management implications	Implemented / proposed management actions
			FY24		FY23		FY22			
			Max 24-hour avg	Annual Ave µg/m³	Max 24-hour avg	Annual Ave µg/m³	Max 24-hour avg	^Annual Ave µg/m³		
Sheppard Avenue (DC02)	Short term 24-hour average: 50 Long term annual average: 30	19	68	17	72	17	50	16	No valid exceedances of the incremental impact assessment criteria due to the Mt Arthur Coal project.	Continue dust management in accordance with AQMP
South Muswellbrook (DC04)		19	57	20	47	17	42	17		
Roxburgh Road (DC05)		19	103	26	74	19	43	14		
Edderton Homestead (DC06)		N/A	70	21	44	14	35	11		
Antiene (DC07)		18	56	19	56	17	37	14		
Wellbrook (DC09)		19	67	24	61	19	45	15		

+ these predictions were modelled in 2013, Emissions from Bengalla Mine are not included in these cumulative predictions as detailed emissions information for the Bengalla Continuation Project were not publicly available for inclusion in the modelling for 2026. This has led to the predicted cumulative levels being potentially artificially low.

Table 13: 24-hour PM_{10} exceedances and calculated Mt Arthur Coal incremental impact for statutory TEOMs

Date of event	Monitor location	24-hour PM_{10} result ($\mu g/m^3$)	Mt Arthur Coal contribution ($\mu g/m^3$) (Incremental impact)
21/07/2023	Wellbrook DC09	53.8	23
5/08/2023	Roxburgh Rd DC05	70	36.9
17/09/2023	Roxburgh Rd DC05	57.3	13.7
18/09/2023	Roxburgh Rd DC05	56.5	8.5
	Edderton Road DC06	63.9	15.8
	Wellbrook DC09	53.3	5.3
19/09/2023	Edderton Road DC06	55.6	9.4
30/09/2023	Wellbrook DC09	52.1	18.5
02/10/2023	Roxburgh Rd DC05	71.7	20.5
	Edderton Road DC06	53.1	2
	Antiene DC07	50	0
	Wellbrook DC09	64.1	13
10/10/2023	Roxburgh Rd DC05	55.6	24.6
15/10/2023	Edderton Road DC06	60.8	25.8
16/10/2023	Shephard Avenue DC02	58	13.3
	Wellbrook DC09	58	13.3
21/10/2023	Roxburgh Rd DC05	52.5	8.8
	Wellbrook DC09	50.4	6.8
22/10/2023	Shephard Avenue DC02	55.6	8.2
	South Muswellbrook DC04	53.2	5.8
25/10/2023	South Muswellbrook DC04	57	3.3
	Edderton Road DC06	52.9	0
	Antiene DC07	56.3	2.6
13/11/2023	Roxburgh Rd DC05	51.8	17.5
06/12/2023	Roxburgh Rd DC05	63.2	25.3
	Wellbrook DC09	67	17.1
07/12/2023	Roxburgh Rd DC05	79.6	31.8
09/12/2023	Roxburgh Rd DC05	51.5	0.5
10/12/2023	Roxburgh Rd DC05	67.6	39.4
11/12/2023	Roxburgh Rd DC05	95.7	32.1
	Wellbrook DC09	55.1	3.2
12/12/2023	Roxburgh Rd DC05	55	26.7
15/12/2023	Roxburgh Rd DC05	80.5	31.6
17/12/2023	Roxburgh Rd DC05	74.8	33.5
18/12/2023	Roxburgh Rd DC05	69.7	18.9
	Edderton Road DC06	50.5	0.1
19/12/2023	Roxburgh Rd DC05	102.5	18.7
	Edderton Road DC06	70.3	0.6
	Wellbrook DC09	53.5	0
22/01/2024	Roxburgh Rd DC05	52.3	16.8
02/02/2024	Roxburgh Rd DC05	50.2	7.4
03/02/2024	Roxburgh Rd DC05	62.5	24.4

Date of event	Monitor location	24-hour PM_{10} result ($\mu g/m^3$)	Mt Arthur Coal contribution ($\mu g/m^3$) (Incremental impact)
04/02/2024	Edderton Road DC06	56.7	6.4
05/02/2024	Edderton Road DC06	53.7	0.0
	Wellbrook DC09	52.9	4.4
17/02/2024	Roxburgh Rd DC05	53	8.4
03/03/2024	Shephard Avenue DC02	68.4	35.8
07/03/2024	Roxburgh Rd DC05	64.8	15.4
13/03/2024	Roxburgh Rd DC05	68.6	13.6
	Edderton Road DC06	52.7	1.0
	Wellbrook DC09	51.3	9.0
26/03/2024	Roxburgh Rd DC05	54.9	11.0

Note: The results reported in this table are based on data as reported to regulators.

Total Suspended Particulates

TEOM PM_{10} monitoring data is used to calculate annual average total suspended particulate (TSP) levels. TSP results were calculated by multiplying the annual average PM_{10} results by 2.5, in accordance with the approved AQMP.

During the reporting period, the TSP annual average at each of the monitoring locations was greater than the reported values for FY23 and FY22 except for Sheppard Avenue DC02. However, TSP remained considerably below the long-term annual impact assessment criteria at all statutory sites, as shown in Table 14.

Table 14: Summary of total suspended particulate results

Site name	Approval criteria	TSP annual average monitoring results ($\mu g/m^3$)			Trend / key management implications	Implemented / proposed management actions
		FY24	FY23	FY22		
Sheppard Avenue (DC02)	Long term annual average: 90 $\mu g/m^3$	43	43	41	No exceedances	Continue dust management in accordance with AQMP
South Muswellbrook (DC04)		50	43	43		
Roxburgh Road (DC05)		66	49	34		
Edderton Homestead (DC06)		53	35	28		
Antiene (DC07)		49	42	34		
Wellbrook (DC09)		59	47	37		

6.4.3 Complaints and Reportable Incidents

Two dust-related complaints were received from one complainant during the reporting period. Investigations indicated that real-time dust levels and 24-hour averages remained within regulatory limits at the monitoring location nearest to the complainant. Complaints are discussed further in Section 9.

The Mt Arthur Dust Control System (DCS), implemented in 2019 and redesigned and rebuilt on a new platform in 2022, has improved the site's capability to better monitor and manage its dust performance, which is evidenced in the reduction in the number of dust related complaints during this and the previous reporting periods.

6.4.4 Proposed Improvements

Mt Arthur Coal has consistently upgraded the DCS to maximise efficiencies and enhance support for operational dust and noise management. During the reporting period, Mt Arthur Coal implemented stale data alerts in the DCS to quickly identify and address equipment issues. Additionally, enclosure temperature sensors were installed across all air quality monitoring stations to maintain ideal temperature for the quality of the TEOMs.

In FY25, Mt Arthur Coal is investigating the possibility of incorporating fleet data into the DCS which will enable assessment of dust emission risk based on fleet positions. This could improve reactive controls and reduce dust emissions. In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

6.5 Biodiversity

6.5.1 Environmental Management

Flora and fauna at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-047 Rehabilitation Strategy;
- MAC-ENC-MTP-050 Biodiversity Management Plan (BioMP);
- MAC-ENC-PRO-012 Land Management (internal document);
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring Procedure (REMP, internal document); and
- MAC-HSE-PRO-002 Pest Animal Management Procedure (internal document).

The BioMP outlines Mt Arthur Coal's biodiversity management and monitoring approach, addressing both State and Commonwealth approval conditions in relation to biodiversity management.

The biodiversity offset areas managed by Mt Arthur Coal, as per the BioMP, are as follows:

- Mt Arthur Conservation Area (100.8 hectares);
- Saddlers Creek Conservation Area (431.3 hectares);
- Thomas Mitchell Drive Offset Area (on-site) (219.4 hectares);
- Thomas Mitchell Drive Offset Area (off-site) (492 hectares);
- Roxburgh Road 'Constable' Offset Area (109 hectares); and
- Middle Deep Creek Offset Area (1257 hectares).

In accordance with the Project Approval, long-term security for the Mt Arthur Coal biodiversity offset areas is provided through conservation agreements, formally registered on title.

Mt Arthur Coal undertakes annual flora and fauna monitoring to track progress against the BioMP and RMP objectives. The monitoring program tracks the condition of habitat areas over time and ensures that the BioMP's established performance indicators and project approval requirements are being met. The program includes monitoring sites throughout site woodland rehabilitation areas and remnant vegetation areas onsite and within offset areas. Remnant vegetation monitoring sites are used to assess mine impact and natural regeneration, as well providing reference data for comparative assessment of rehabilitation monitoring sites.

Weed Assessment and Treatment

Mt Arthur Coal conducted an annual weed assessment in FY24. A site weed action plan was used to inform weed treatment works.

Mt Arthur Coal's weed treatment programs are guided by the Hunter Regional Strategic Weed Management Plan 2017 – 2022 (Hunter Local Land Services, 2017). Mt Arthur Coal primarily targets Weeds of National Significance, as well as State Priority weeds and Regional Priority weeds for the Hunter Region, declared under the Biosecurity Act 2015.

Pest Animal Control

Feral animal presence is continually monitored through scheduled inspections and workforce feedback. Information from these sources is used to plan the feral animal control programs across the mine site and all biodiversity offset and conservation areas.

The vertebrate pest management program continued during the reporting period, with the annual campaign utilising 1080 baiting to target wild dogs (Canis lupus familiaris) and Pindone baiting for rabbits (Oryctolagus cuniculus).

6.5.2 Environmental Performance

The annual ecological development monitoring program, consisting of vegetation community assessment and fauna surveys, was undertaken in November and December 2023 by independent consultants. The REMP monitoring schedule identifies a total of 5 monitoring sites scheduled to be monitored in FY25. Those sites are listed in Table 15.

Table 15 FY24 rehabilitation monitoring sites

Site Name	Site Location	Easting (MGA56)	Northing (MGA56)	Vegetation Type (PCT No.)	Reference site	First Year of Monitoring
MA4	Mt Arthur Conservation Area	298750	6417578	Woodland (1604)	Reference Site	2019 (FY20)
MA6	Mt Arthur Conservation Area	297830	6416775	Box Gum Woodland (1606)	Reference Site	2019 (FY20)
TMON4	Thomas Mitchell Onsite Conservation Area	300885	6421637	Woodland (1692)	Reference Site	2019 (FY20)
SDS1*	Saddlers Creek Central - Southern Woodland Corridor	299549	6414655	Woodland (1604)	Rehabilitation	2020 (FY21)
CD1	Central Dump - Central Woodland Corridor	299969	6419995	Woodland (1604)	Rehabilitation	2021 (FY22)
VB2**	Visual Bund - Northeast Woodland Corridor	299327	6423177	Woodland (1604)	Rehabilitation	2021 (FY22)
VB3	Visual Bund - Box Gum Woodland Establishment Area	298529	6423293	Box Gum Woodland (1606)	Rehabilitation	2021 (FY22)
MD1	Main Dam - Eastern Woodland Corridor	301408	6420437	Woodland (1604)	Rehabilitation	2020 (FY21)
Dump 11***	Dump 11 - Eastern Woodland Corridor	302822	6420201	Woodland (1604)	Rehabilitation	2019 (FY20)

**SDS1 was formerly referred to as 'SDC1'.*
***The most recent Mt Arthur Coal Rehabilitation Strategy Conceptual Final Land Use Plan identifies VB2 as no longer being within an area earmarked to be revegetated as Box Gum Woodland. Therefore target vegetation type and associated reference site have been updated to PCT 1604 and MA4, respectively.*
****Dump11 was formerly referred to as 'Export'.*

Biodiversity Monitoring Results

Results of flora and vertebrate fauna species for the monitoring sites are provided in

Table **16**, along with a condition assessment score, which indicates ecological health based on condition attributes such as dieback, canopy health, erosion, vegetation patch shape, epicormic growth, weed invasion, mid strata native density, ground strata native density and connectivity of vegetation.

Table 16: Summary of native and introduced flora species within 20 x 20 m plots and condition scores across FY24 rehabilitation sites

Item	SDS1	CD1	VB2	VB3	MD1	Dump11
Native species (No.)	12	28	11	10	11	13
Native species (% of total)	55%	72%	55%	67%	65%	59%
Introduced species (No.)	10	11	9	5	6	9
Introduced species (% of total)	45%	28%	45%	33%	35%	41%
Total species	22	39	20	15	17	22
Native species total cover (%)	45%	114%	28%	21%	48%	44%

Item	SDS1	CD1	VB2	VB3	MD1	Dump11
Introduced species total cover (%)	98%	38%	31%	69%	52%	57%
HTW total cover (%)	95%	27%	31%	69%	42%	51%
Total condition score out of 32	27	28	25	26	26	25

SDS1

Monitoring site SDS1 is a rehabilitation site located in the southern rehabilitation woodland corridor near Saddlers Creek. The vegetation present is considered to be 'best-fit' to PCT 1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass open forest on the central and lower Hunter. A tree canopy is yet to develop at this site with only small trees/shrubs present dominated by *Acacia falcata*. Additional small trees shrubs include *Corymbia maculata* (Spotted Gum), *Acacia salicina* (Cooba) and *Acacia parvipinnula* (Silver-stemmed Wattle) individuals. Native groundcovers are present in low numbers and coverage, and include the grasses *Chloris ventricosa* (Tall Chloris) and *Panic effusum* (Hairy Panic). The total number of native species recorded at SDS1 was 12, with an estimated cover of 45%.

Weed cover at SDS1 is very high with the exotic grass *Cenchrus clandestinus* (Kikuyu Grass) being the most prevalent with an estimated cover of 95%. The total number of exotic species recorded at SDS1 was 10, with an estimated cover of 98%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 17 and Table 18.

Table 17 SDS1: Comparison between reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1604 Narrow-leaved Ironbark -Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter													
Bench-mark values	**5**	**8**	**12**	**14**	**2**	**5**	**53**	**16**	**58**	**9**	**1**	**4**	**40**
MA4 (FY24)	3	8	12	14	1	5	45.3	7.5	49.2	2.1	0.1	0.5	56
SDS1 (FY24)	2	4	4	2	0	0	15	28.5	0.8	0.2	0	0	29
Highlighted cells indicate values that are at or above either benchmark or reference site values for the same year													

Table 18 SDS1 assessment against phase and domain specific criteria

Completion Criteria	Compliance Assessment
Native Woodland	
2,142 hectares of self-sustaining woodland ecosystems as per the Mt Arthur Coal Mine Rehabilitation Strategy Conceptual Final Land Use Plan figure (Mt Arthur Coal 2023).	Not Compliant. A total area of 2,142 ha has not been established and maintained.
<50% coverage of high threat perennial weed species.	Not Compliant. >95% coverage of HTW

Completion Criteria	Compliance Assessment
Canopy density of 10-40% with keystone species present: *Allocasuarina luehmannii*; and *Brachychiton populneus*; and *Eucalyptus crebra* OR *Corymbia maculata* OR; *Eucalyptus albens* OR *Eucalyptus moluccana*, OR *Eucalyptus albens x moluccana* OR *Eucalyptus blakelyi.*	Not Compliant. No canopy yet, only small trees present. Canopy includes only one keystone species, *Corymbia maculata*.
Shrub density 1-30% with keystone species present: *Notelaea microcarpa*; *Acacia decora*; and *Myoporum montanum*; OR Native woodland vegetation representative of characteristic of the best- fit PCT's as described in the Mt Arthur Coal Rehabilitation Strategy (Section 6.1, Table 6-1); and All structural dominant species apparent in reference sites are represented.	Not Compliant. Shrub density is ~29%; however, no keystone species present. Native vegetation is not characteristic of best-fit PCT (1604) or reference site (MA4). SDS1 has one canopy species (*Corymbia maculata*) and no shrub species present at reference site MA4.
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the Rehabilitation Strategy Rehabilitation Strategy Conceptual Final Land Use Plan.	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at SDS1 (~98%) compared to reference site MA4 (~1%). Signage and fencing not checked.

CD1

Monitoring site CD1 is a rehabilitation site located in the central east rehabilitation woodland corridor. The vegetation present is considered to be 'best-fit' to PCT 1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass open forest on the central and lower Hunter. The vegetation includes a canopy of *Corymbia maculata* (Spotted Gum), *Eucalyptus camaldulensis* (River Red Gum), *Eucalyptus albens* (White Box) and *Eucalyptus crebra* (Narrow-leaved Ironbark) individuals. A small open native shrub layer is present that includes the natives *Myoporum montanum*

(Western Boobialla), *Acacia implexa* (Hickory Wattle), *Acacia falcata* and *Eremophila debilis* (Amulla). The ground stratum includes the natives *Chloris ventricosa* (Tall Chloris), *Sporobolus creber* (Slender Rat's Tail Grass) and *Bothriochloa decipiens* (Pitted Bluegrass). The total number of native species recorded at CD1 is 28, with an estimated cover of 114%.

Weed cover at CD1 is high with *Chloris gayana* (Rhodes Grass) and *Panicum coloratum* (Coolah Grass) being common in the area. The total number of exotic species recorded at CD1 is 11, with an estimated cover of 37.5%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 19 and Table 20.

Table 19 CD1: Comparison between historic data, reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1604 Narrow-leaved Ironbark -Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter													
Bench-mark values	**5**	**8**	**12**	**14**	**2**	**5**	**53**	**16**	**58**	**9**	**1**	**4**	**40**
MA4 (FY24)	3	8	12	14	1	5	45.3	7.5	49.2	2.1	0.1	0.5	56
CD1 (FY24)	6	6	11	4	9	1	64	3.9	45.1	0.5	0	0.1	50
Highlighted cells indicate values that are at or above either benchmark or reference site values for the same year.													

Table 20 CD1 data comparison to draft completion criteria

Completion Criteria	Compliance Assessment
Native Woodland	
2,142 hectares of self-sustaining woodland ecosystems as per the Mt Arthur Coal Mine Rehabilitation strategy Rehabilitation Strategy Conceptual Final Land Use Plan figure.	Not Compliant. A total area of 2,142 ha has not been established and maintained.
<50% coverage of high threat perennial weed species.	Compliant. <50% coverage of HTW.
Canopy density of 10-40% with keystone species present: *Allocasuarina luehmannii*; and *Brachychiton populneus*; and *Eucalyptus crebra* OR *Corymbia maculata* OR; *Eucalyptus albens* OR *Eucalyptus moluccana*, OR *Eucalyptus albens x moluccana* OR *Eucalyptus blakelyi*.	Partially Compliant. Canopy density is >40%. Canopy includes keystone species *Corymbia maculata*, *Eucalyptus crebra* and *Eucalyptus albens*.

Completion Criteria	Compliance Assessment
Shrub density 1-30% with keystone species present: *Notelaea microcarpa*; *Acacia decora*; and *Myoporum montanum*; OR Native woodland vegetation representative of characteristic of the best- fit PCT's as described in the Mt Arthur Coal Rehabilitation Strategy (Section 6.1, Table 6-1); and All structural dominant species apparent in reference sites are represented.	Compliant. Shrub density is ~4% and the keystone species *Myoporum montanum* is present. Native vegetation is characteristic of best-fit PCT (1604) and all structural dominant species at MA4 are represented (*Corymbia maculata*, *Myoporum montanum*, *Aristida ramosa*) or reference site (MA4).
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the Biodiversity corridors consistent with the Rehabilitation Strategy Conceptual Final Land Use Plan (Mt Arthur Coal 2023).	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at CD1 (~38%) compared to reference site MA4 (~1%). Not applicable.

VB2

Monitoring site VB2 is a rehabilitation site that is located in the north-east rehabilitation woodland corridor (Figure 1). This area was originally designated to be rehabilitated as Box Gum Woodland, consistent with PCT 1606 White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter, which conforms to the threatened ecological community White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (Box Gum Woodland) listed under both the BC Act and EPBC Act. However, the Mt Arthur Coal Rehabilitation Strategy's Final Land Use Plan was updated in 2023 which now identifies this area to be rehabilitated as part of the woodland corridor rather than Box Gum Woodland. The vegetation present is considered to be 'best-fit' to PCT 1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass open forest on the central and lower Hunter.

The vegetation includes a canopy comprised of *Corymbia maculata* (Spotted Gum) and *Acacia salicina* (Cooba). A small open native shrub layer is present that includes the natives *Myoporum montanum* (Western Boobialla), *Acacia implexa* (Hickory Wattle) and *Enchylaena tomentosa* (Ruby Saltbush). The ground stratum includes the natives

Austrostipa verticillata (Slender Bamboo Grass), *Sporobolus creber* (Slender Rat's Tail Grass) and *Panicum effusum* (Hairy Panic). The total number of native species recorded at VB2 was 11, with an estimated cover of 28%.

Weed cover at VB2 is moderate to high with *Megathyrsus maximus* being the most exotic species present. The total number of exotic species recorded at VB2 was 9, with an estimated cover of 31%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 21 and Table 22.

Table 21 VB2: Comparison between historic data, reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1604 Narrow-leaved Ironbark -Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter													
Bench-mark values	**5**	**8**	**12**	**14**	**2**	**5**	**53**	**16**	**58**	**9**	**1**	**4**	**40**
MA4 (FY24)	3	8	12	14	1	5	45.3	7.5	49.2	2.1	0.1	0.5	56
VB2 (FY24)	2	3	3	3	0	0	25.3	1.0	1.8	0.3	0.0	0.0	72.8

Table 22 VB2 data comparison to draft completion criteria

Completion Criteria	Compliance Assessment
Native Woodland	
2,142 hectares of self-sustaining woodland ecosystems as per the Mt Arthur Coal Mine Rehabilitation strategy Rehabilitation Strategy Conceptual Final Land Use Plan figure.	Not Compliant. A total area of 2,142 ha has not been established and maintained.
<50% coverage of high threat perennial weed species.	Compliant. <50% coverage of HTW.
Canopy density of 10-40% with keystone species present: *Allocasuarina luehmannii*; and *Brachychiton populneus*; and *Eucalyptus crebra* OR *Corymbia maculata* OR; *Eucalyptus albens* OR *Eucalyptus moluccana*, OR *Eucalyptus albens x moluccana* OR *Eucalyptus blakelyi*.	Partially Compliant. Canopy density is between 10-40%. Only one canopy keystone species is present, *Corymbia maculata*.
Shrub density 1-30% with keystone species present: *Notelaea microcarpa*; *Acacia decora*; and *Myoporum montanum*; OR Native woodland vegetation representative of characteristic of the best- fit PCT's as described in the Mt Arthur Coal Rehabilitation Strategy (Section 6.1, Table 6-1); and All structural dominant species apparent in reference sites are represented.	Compliant. Shrub density is ~4% and the keystone species *Myoporum montanum* is present.

Completion Criteria	Compliance Assessment
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the Rehabilitation Strategy Conceptual Final Land Use Plan (Mt Arthur Coal 2023).	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at VB2 (~31%) compared to reference site MA4 (~1%). Not applicable.

VB3

Monitoring site VB3 is a rehabilitation site located in the north-east rehabilitation woodland corridor and is within an area designated to be rehabilitated as Box Gum Woodland (Figure 1), consistent with PCT 1606 White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter, which conforms to the threatened ecological community White Box – Yellow Box – Blakely's Red Gum Grassy Woodland (Box Gum Woodland) listed under both the BC Act and EPBC Act.

The vegetation includes a canopy comprised of *Eucalyptus albens* (White Box) and *Eucalyptus melliodora* (Yellow Box). A native shrub layer is generally absent, with the exception of scattered *Solanum cinereum* (Narrawa Burr) present. The ground stratum includes the natives *Sporobolus creber* (Slender Rat's Tail Grass), *Aristida ramosa* (Purple Wiregrass), *Bothriochloa decipiens* (Pitted Bluegrass) and *Dichanthium sericeum* (Queensland Bluegrass) and *Sida cunninghamii* (Ridge Sida). The total number of native species recorded at VB3 was ten, with an estimated cover of 21%.

Weed cover at VB3 is high with *Megathyrsus maximus* being the most exotic species present. The total number of exotic species recorded at VB3 was five, with an estimated cover of 69%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 23 and Table 24.

Table 23 VB3: Comparison between historic data, reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1606 White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter													
Bench-mark values	**6**	**13**	**10**	**13**	**2**	**5**	**68**	**49**	**30**	**8**	**1**	**3**	**50**
MA6 (FY24)	4	8	8	10	2	7	60	9.5	58	3.0	0.2	1	36
VB3 (FY24)	2	1	4	3	0	0	14	0.1	6.1	0.5	0	0	38.0

Highlighted cells indicate values that are at or above either benchmark or reference site values for the same year.

Table 24 VB3 data comparison to draft completion criteria

Completion Criteria	Compliance Assessment
Box Gum Woodland	
<50% coverage of high threat perennial weed species.	Not Compliant. >50% coverage of HTW.
Canopy density of 10-40% with keystone species present: *Eucalyptus albens* OR *Eucalyptus moluccana*, OR *Eucalyptus albens x moluccana* AND *Eucalyptus blakelyi*.	Compliant. Canopy density is between 10-40% and the keystone species Eucalyptus albens is present.
Shrub density of 1-30% with 2 or more of these keystone species present: *Olearia elliptica*; *Notelaea macrocarpa*; *Acacia decora*; *Myoporum montanum*; and *Pandorea pandorana*.	Not Compliant. Shrub density is <1% and no keystone species present.
An average native ground cover layer of ≥40%.	Not Compliant. Average native ground cover layer is <40%.
All structural dominant species apparent in reference sites are represented.	Not Compliant. VB2 lacks structurally dominant species present at reference site MA6 for all layers.
A total of 12 or more native species non – grass species.	Not Compliant. Six (6) native non-grass species recorded.
Box Woodland Establishment Area of 500 ha as per the Mt Arthur Coal Mine Rehabilitation Strategy Conceptual Final Land Use Plan figure.	Compliant. 500 ha earmarked for Box Woodland Establishment.
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the Rehabilitation Strategy Conceptual Final Land Use Plan figure (Mt Arthur Coal 2023).	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.

Completion Criteria	Compliance Assessment
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at VB3 (~69%) compared to reference site MA6 (<1%). Not applicable.

MD1

This monitoring site is a rehabilitation site located in the east rehabilitation woodland corridor near Thomas Mitchell Drive. The vegetation present is considered to be 'best-fit' to PCT 1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass open forest on the central and lower Hunter.

The vegetation includes a canopy comprised of *Corymbia maculata* (Spotted Gum) and *Acacia salicina* (Cooba). A small open native shrub layer is present that includes the natives *Enchylaena tomentosa* (Ruby Saltbush) and *Eremophila debilis* (Amulla). The ground stratum includes the natives *Cymbopogon refractus* (Barbed Wire Grass), *Aristida ramosa* (Purple Wiregrass), *Austrostipa scabra* (Speargrass), *Microlaena stipoides var. stipoides* (Weeping Grass) and *Einadia nutans subsp. nutans* (Climbing Saltbush). The total number of native species recorded at MD1 was 11, with an estimated cover of 48%.

Weed cover at MD1 is high with *Megathyrsus maximus* being the most exotic species present. The total number of exotic species recorded at MD1 was 6, with an estimated cover of 52%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 25 and Table 26.

Table 25 MD1: Comparison between historic data, reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1604 Narrow-leaved Ironbark -Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter													
Bench-mark values	**5**	**8**	**12**	**14**	**2**	**5**	**53**	**16**	**58**	**9**	**1**	**4**	**40**

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
MA4 (FY24)	3	8	12	14	1	5	45.3	7.5	49.2	2.1	0.1	0.5	56
MD1 (FY24)	2	2	4	3	0	0	38.0	1.1	6.6	2.2	0.0	0.0	69.0

Highlighted cells indicate values that are at or above either benchmark or reference site values for the same year.

Table 26 MD1 data comparison to draft completion criteria

Completion Criteria	Compliance Assessment
Native Woodland	
2,142 hectares of self-sustaining woodland ecosystems as per the Mt Arthur Coal Mine Rehabilitation strategy Rehabilitation Strategy Conceptual Final Land Use Plan figure.	Not Compliant. A total area of 2,142 ha has not been established and maintained.
<50% coverage of high threat perennial weed species.	Compliant. <50% coverage of HTW.
Canopy density of 10-40% with keystone species present: *Allocasuarina luehmannii*; and *Brachychiton populneus*; and *Eucalyptus crebra* OR *Corymbia maculata* OR; *Eucalyptus albens* OR *Eucalyptus moluccana*, OR *Eucalyptus albens x moluccana* OR *Eucalyptus blakelyi*.	Partially Compliant. Canopy density is between 10-40%. Canopy includes only one keystone species *Corymbia maculata*.
Shrub density 1-30% with keystone species present: *Notelaea microcarpa*; *Acacia decora*; and *Myoporum montanum*; OR Native woodland vegetation representative of characteristic of the best- fit PCT's as described in the Mt Arthur Coal Rehabilitation Strategy (Section 6.1, Table 6-1); and All structural dominant species apparent in reference sites are represented.	Partially Compliant. Shrub density is between 1-30%, but no keystone shrub species are present. Native vegetation is characteristic of best-fit PCT (1604), but not all structural dominant species at MA4 are represented as *Myoporum montanum* is the dominant shrub species at reference site (MA4), which was not recorded at MD1.
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the Rehabilitation Strategy Conceptual Final Land Use Plan figure (Mt Arthur Coal 2023).	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.

Completion Criteria	Compliance Assessment
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at MD1 (~52%) compared to reference site MA4 (~1%). Signage and fencing not checked.

Dump 11

Monitoring site Dump 11 is a rehabilitation site located in the east rehabilitation woodland corridor near Thomas Mitchell Drive. The vegetation present is considered to be 'best-fit' to PCT 1604 Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass open forest on the central and lower Hunter.

The vegetation includes a canopy comprised of *Corymbia maculata* (Spotted Gum) and *Eucalyptus blakelyi* (Blakely's Red Gum). No native shrub layer was recorded. The ground stratum includes the natives *Cymbopogon refractus* (Barbed Wire Grass), *Bothriochloa decipiens* (Pitted Bluegrass), *Sporobolus creber* (Slender Rat's Tail Grass) and *Calotis lappulacea* (Yellow Burr-daisy). The total number of native species recorded at Dump 11 was 13, with an estimated cover of 44%.

Weed cover at Dump 11 is high with *Megathyrsus maximus* and *Hyparrhenia hirta* (Coolatai Grass) being the most prevalent exotic species present. The total number of exotic species recorded at Dump11 was nine, with an estimated cover of 57%. Assessment of SDS1 against reference sites, phase and domain specific criteria draft completion criteria are presented in Table 27 and Table 28.

Table 27 Dump 11: Comparison between historic data, reference site and benchmark values

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
1604 Narrow-leaved Ironbark -Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter													
Bench-mark values	**5**	**8**	**12**	**14**	**2**	**5**	**53**	**16**	**58**	**9**	**1**	**4**	**40**
MA4 (FY24)	3	8	12	14	1	5	45.3	7.5	49.2	2.1	0.1	0.5	56

Site ID (Year)	Tree Richness	Shrub Richness	Grass and Grass like Richness	Forb Richness	Fern Richness	Other Richness	Tree Cover	Shrub Cover	Grass and Grass Like Cover	Forb Cover	Fern Cover	Other Cover	Litter Cover
Dump 11 (FY24)	2	0	5	5	0	1	25.0	0.0	17.1	1.6	0.0	0.1	25

Table 28 Dump 11 data comparison to draft completion criteria

Completion Criteria	Compliance Assessment
Native Woodland	
2,142 hectares of self-sustaining woodland ecosystems as per the Mt Arthur Coal Mine Rehabilitation Strategy Conceptual Final Land Use Plan figure (Mt Arthur Coal 2023).	Not Compliant. A total area of 2,142 ha has not been established and maintained.
<50% coverage of high threat perennial weed species.	Not Compliant. >50% coverage of HTW.
Canopy density of 10-40% with keystone species present: *Allocasuarina luehmannii*; *Brachychiton populneus*; *Eucalyptus crebra*; *Corymbia maculata*; *Eucalyptus albens*; *Eucalyptus moluccana*; *Eucalyptus albens x moluccana*; *Eucalyptus blakelyi*.	Compliant. Canopy density is between 10-40%. Canopy includes two keystone species *Corymbia maculata* and *Eucalyptus blakelyi*.
Shrub density 1-30% with keystone species present: *Notelaea microcarpa*; *Acacia decora*; and *Myoporum montanum*; OR Native woodland vegetation representative of characteristic of the best- fit PCT's as described in the Mt Arthur Coal Rehabilitation Strategy (Section 6.1, Table 6-1); and All structural dominant species apparent in reference sites are represented.	Not Compliant. No native shrub layer is present. Native vegetation is characteristic of best-fit PCT (1604), but not all structural dominant species at MA4 are represented as Dump 11 lacks a native shrub layer, as well as MA4's dominant groundcover species, Aristida ramosa.
Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the Rehabilitation Strategy Conceptual Final Land Use Plan (Mt Arthur Coal 2023).	Compliant. Once completion criteria are met, the rehabilitation area will contribute to linking areas of onsite and near-site native vegetation consistent with biodiversity corridors.

Completion Criteria	Compliance Assessment
The development of a multilayered community structure is evident, and (for communities over time) consists of canopy, understory and groundcover species comparable with reference sites; Vegetation health indicators (i.e. weed dominance, disease, water stress, premature dieback) comparable to that of reference sites; Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area; Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area; Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species; Weed trends comparable to reference sites; and Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	Partially Compliant. Vegetation health is comparable to reference site. Evidence of reproduction observed. Evidence of nutrient recycling observed. No fauna monitoring carried out. Weed coverage is significantly higher at Dump11 (~57%) compared to reference site MA4 (~1%). Signage and fencing installed

Weed Control

FY24 weed assessment work consisted of the following elements:

- Biodiversity monitoring weed assessment work completed by independent consultants as part of the Rehabilitation and Ecological Monitoring Program and Conservation Agreement monitoring; and
- A site weed survey.

The following weed species were targeted during the reporting period:

- African boxthorn (*Lycium ferocissimum*);
- African Olive (*Olea europaea Cuspidate*)
- Bambasti panic *(Panicum coloratum)*
- Blue heliotrope (*Heliotropium amplexicaule*);
- Buffel grass *(Cenchrus ciliaris)*
- Coolatai Grass (*Hyparrhenia hirta*)
- Fireweed (*Senecio madagascariensis*)
- Flax Leaf Flea Bane (*Conyza bonariensis*)
- Galenia (*Galenia pubescens*)
- Golden wreath wattle (*Acacia saligna*)
- Guinea grass *(Megathyrsus maxima)*
- Inkweed (*Phytolacca octandra*)
- Johnson grass *(Sorghum halepense)*
- Kikuyu (*Cenchrus clandestinus*)
- Klein grass *(Panicum colaratum)*
- Mallow (*Malva sp.*)

- Noogoora Burr (*Xanthium Occidentale*)
- Onion Weed (*Asphodelus fistulosus*)
- Paddys Lucern (*Sida rhombifolia*)
- Pampas grass *(Cortaderia sellona)*
- Prickly Pear (*Opuntia stricta*);
- Purple Top (*Verbena bonariensis*)
- Rhodes Grass (*Chloris gayana*)
- *(Setaria Sp.)*
- Saffron Thistle (*Carthamus sp*)
- Spiny rush *(Juncus acutus)*
- St. John's wort *(Hypericum perforatum)*

Mt Arthur Coal targeted the following areas of operational land for weed treatment during the reporting period:

- *VDs 1, 4 and 5;*
- *CD1;*
- *Drayton Void;*
- *Saddlers South;*
- *McDonald's South;*
- *Dump 11;*
- *Western boundary Adjacent the Core Shed and EME pad;*
- *Adjacent the Environment and Dirty Water Dams; and*
- *Rail loop.*

Weed treatment for Biodiversity Offset Areas included slashing and spraying of weeds across all areas.

Pest Animal Control

During the reporting period Mt Arthur conducted the following pest animal control programs:

- Wild dog/fox and rabbit control programs were conducted during May and June 2024. The programs utilised 1080 baiting for wild dog and foxes were completed across the Mt Arthur Coal mine site operational areas and biodiversity offset areas in additional pindone baiting for rabbit control was undertaken near warrens around the Environmental Dam Area and VD5 foothills.
- Wild pig trapping program commenced at the end of the reporting period and numbers will be included in the FY25 report and control of goats was not untaken in FY24.

Table 29 shows the breakdown of species humanely destroyed during pest control programs.

Table 29 Pest animal control program results for FY24

Species	Count
Fox	6
Wild Dog	15
Rabbits	10 Hutches baited four times. 17/30 baited hutches taken. Unknow number of rabbits controlled.

6.5.3 Complaints and Reportable Incidents

There were no biodiversity complaints received in FY24. Mt Arthur Coal did not receive any government fines or penalties related to flora and fauna during the reporting period and there were no related reportable incidents.

6.5.4 Proposed Improvements

Mt Arthur Coal will continue to implement the REMP and action recommendations as required during the next reporting period, with monitoring of woodland rehabilitation, remnant woodland community sites and revegetation/regeneration areas within conservation areas. Mt Arthur Coal will also continue to implement annual landform stability assessments of existing rehabilitation in the next reporting period. Note it was determined that aerial weed assessment was not cost effective so was discontinued, however the use of remote sensing for assessing vegetation is now being assessed for FY25. Erosion quantification monitoring using remote sensing is now utilised as business as usual.

During the next reporting period, Mt Arthur Coal will also implement another vertebrate pest management program on site. Improvements in the management of additional pest animal species will be a particular focus, with expanded shooting, trapping and baiting programs to be completed to include rabbits, goats and pigs.

6.6 Visual Amenity and Lighting

6.7.2 Environmental Management

Visual amenity and lighting management at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring;
- MAC-PRD-PRO-073 Procedure for Lighting Plant Movement and Setup; and
- MAC-ENC-PRO-077 Light Management Procedure.

Mt Arthur Coal's visual assessment procedure ensures overburden emplacement development is monitored and assessed against modelled predictions in the environmental assessment.

Management measures presented in the Light Management Procedure aim to control and reduce the impact of lighting on the surrounding area. The procedure is used in conjunction with the procedure for lighting plant movement and setup, which advises operational staff on correct alignment of lights to avoid offsite impact.

6.6.2 Environmental Performance

Visual impact inspections were completed 3 November 2023. The inspection indicated that viewpoint locations to the east of Mt Arthur Coal have extensive views of rehabilitated overburden dumps, with reduced visual contrast to surrounding non-mined landforms and peripheral visual impact from active mining activities. Viewpoint locations to the north and west of MAC recorded that a distinct visual contrast between mining activity and the surrounding non-mined landscape is evident due to exposure to low wall overburden dumps. For all locations the shape and size of the overburden dumps are generally in line with the predicted model as shown in the environmental assessment.

Management measures designed to reduce the visual impact created by the overburden emplacement have been incorporated into the mine plan. Such measures include:

- The integration of tree corridors on overburden emplacements as part of progressive rehabilitation;
- Incorporating micro relief features (stag trees, ripping, rock features and habitat trees) throughout overburden emplacements to provide an enhanced naturally appearing landform and fauna habitat;
- The practical consideration of geomorphic designs on emplacements to sustainably manage water and create a natural looking and stable landform;
- The strategic design and rehabilitation of overburden emplacements for increased visual shielding of operations;
- Establishing visual and ecological planting patterns of native trees to achieve landscape patterns that complement the existing spatial distribution of tree and grass cover in a grazing landscape; and
- Minimising exposure of work areas to sensitive receivers where possible, largely through the timely rehabilitation of visible overburden emplacements.

6.6.3 Complaints and Reportable Incidents

During the reporting period, 11 lighting complaints were received, which is less than FY23 (26 complaints). On notification of the complaints, action was taken to address the complainant's concerns, including location and redirection of offending lights, as well as communication to operational teams. Complaints are discussed further in Section 9.

Mt Arthur Coal did not receive any government fines or penalties related to lighting or visual amenity during the reporting period and there were no related reportable incidents.

6.6.4 Proposed Improvements

During the reporting period Mt Arthur Coal continued to incorporate fluvial geomorphic principles into the design of overburden emplacements. Rehabilitated landforms were reshaped to facilitate natural surface flow processes, resulting in a final shape that more closely mimics the adjacent non-mined landscape and reduces visual impact. This process will be developed further in subsequent reporting periods.

Lighting from Mt Arthur Coal will continue to be implemented in accordance with the Light Management Procedure and managed to minimise impacts on the local community whilst maintaining the minimum level necessary for operational and safety needs. Screen planting for visual amenity will continued to be reviewed and planned in FY25.

6.7 Aboriginal Cultural Heritage

6.7.1 Environmental Management

Aboriginal cultural heritage at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-042 Aboriginal Heritage Management Plan.

Mt Arthur Coal has implemented a management plan that provides the framework to identify, assess, monitor, protect and manage Aboriginal cultural heritage. The management plan assists Mt Arthur Coal to mitigate the impacts of its operations on Aboriginal cultural heritage, comply with the requirements of the *National Parks and Wildlife Act 1974*, *Environmental Planning and Assessment Act 1979* and the Project Approval and continue its active partnership with the Aboriginal community.

6.7.2 Environmental Performance

Minor survey and / or salvage activities and due diligence assessments were completed and recorded during the reporting period for the following site works in accordance with the methodology detailed in the Aboriginal Heritage Management Plan:

- Areas required for future mining and overburden emplacement;
- Exploration Drill Sites; and
- Minor changes to roads, access tracks and powerlines

All site cards required by section 89A of the National Parks and Wildlife Act are being prepared to be lodged with Heritage NSW.

Grinding grooves and Scar trees within the Site boundary and Biodiversity Offset areas were audited by an archologist and RAPs as required by the Aboriginal Heritage Management Plan.

6.7.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to Aboriginal cultural heritage during the reporting period and there were no related reportable incidents.

6.7.4 Proposed Improvement

All measures to protect Aboriginal Cultural Heritage described in the approved Aboriginal Heritage Management are planned to continue along with consultation with our key Aboriginal stakeholders.

6.8 European Cultural Heritage

6.8.1 Environmental Management

European cultural heritage at Mt Arthur Coal is managed in accordance with the:

- MAC-ENC-MTP-046 European Heritage Management Plan;
- MAC-ENC-MTP-048 Edinglassie and Rous Lench Conservation Management Plan - Volume 1;
- MAC-ENC-MTP-049 Edinglassie and Rous Lench Conservation Management Plan - Volume 2.

Mt Arthur Coal owns and manages five heritage-listed homesteads as follows:

- Edinglassie Homestead (state significance);
- Rous Lench Homestead (state significance);
- Edderton Homestead Complex (local significance);
- Belmont Homestead Complex (local significance); and
- Balmoral Homestead (local significance).

The two State-significant historic heritage items with possible impacts from the Mt Arthur Coal operation are the Edinglassie and Rous Lench homesteads.

The European Heritage Management Plan assists Mt Arthur Coal to coordinate and manage the European heritage items affected or potentially affected by its operations, comply with the requirements of the *Heritage Act 1977* and the Project Approval and mitigate impacts of its operations on European cultural heritage.

6.8.2 Environmental Performance

Edinglassie and Rouse Lench Complex

During the reporting period, Mt Arthur Coal inspected Edinglassie and, Rouse Lench and related buildings to ensure properties were maintained to an acceptable standard.

Annual actions described in the Conservation Management Plan were undertaken such as pest control, ground maintenance, annual inspections, fire protection and check of sewerage system.

During the reporting period major refurbishment was undertaken including replacement of termite damaged areas of the main staircase, lower floor refurbishment including kitchen, interior painting, new floor coverings and interior fittings. The servant quarters were also refurbished with stair repairs, interior painting, and plumbing repairs. The water tower and tank were also replaced. All works were guided by a heritage consultant.

Assessments on potential works at Rouse Lench were undertaken with a structural engineer and heritage consultant.

Balmoral Homestead

Exterior painting was undertaken of the main homestead. Work commenced on the restoration of the servant's quarters including risk assessments, structural assessments, heritage assessments and work planning.

6.8.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to European cultural heritage during the reporting period and there were no related reportable incidents.

6.8.4 Proposed Improvements

All heritage structures are planned to remain in situ during the next reporting period with no impacts predicted from the current mine plan. Inspections and maintenance measures will continue to be implemented during the next reporting period to conserve all historic homesteads and related buildings. MAC continues to invest in restoration of its heritage properties with large scale works being undertaken in the past year and planned into the next financial year.

6.9 Contaminated Land and Hydrocarbon Contamination

6.9.1 Environmental Management

Contaminated land at Mt Arthur Coal is managed in accordance with the following internal documents:

- MAC-ENC-PRO-029 Spill Response;
- MAC-ENC-PRO-074 Contaminated Land Management;
- MAC-STE-PRO-013 Hazardous Materials Management Procedure; and
- MAC-STE-015-Restricted and Banned tools, Equipment and Activities.

Hydrocarbons and other hazardous substances are kept in designated storage compounds designed and managed in accordance with relevant standards and procedures. Monitoring and inspection programs are maintained for these facilities to ensure hazardous materials and wastes are being adequately stored and disposed of and that any spills or leaks are promptly reported and managed in line with site procedures. Use of some substances (i.e. PFAS foams) are restricted or banned from site which is managed through internal tracking and ordering systems as well as routine inspections.

6.9.2 Environmental Performance

During the reporting period, all spills were controlled and contained using emergency spill kits or earthmoving equipment to form a temporary bund. Spills were managed in line with site procedures.

6.9.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to contaminated land or hydrocarbon contamination during the reporting period and there were no related reportable incidents.

6.9.4 Proposed Improvements

Mt Arthur Coal will finalise the multi-year project to install a new hydrocarbon remediation and management area, the project will be completed FY25.

In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

6.10 Spontaneous Combustion

6.10.1 Environmental Management

Spontaneous combustion at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRG-002 Spontaneous Combustion Control Program.

Mt Arthur Coal has implemented a spontaneous combustion control program to prevent, monitor, control and report outbreaks of spontaneous combustion.

6.10.2 Environmental Performance

Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas at Bayswater No. 2 and the Drayton sublease area. This is a result of the higher levels of carbon and sulphuric material in the coal seams mined in these Greta measures in comparison to those mined in current active mining areas.

At the end of the reporting period, there was a total of 10252.0 m^2 of area affected by spontaneous combustion. This is an increase to the 8365.3 m^2 reported in FY23. A total of 1678.5 m^2 of land was treated for spontaneous combustion in the reporting period which is lower than FY23 (11,340.4 m^2). A summary of spontaneous combustion in the reporting period is shown in Table 30.

Table 30: Summary of spontaneous combustion at Mt Arthur Coal in FY24 (July 23 - June 24)

Month	Total area affected at start of month (m²):	Area naturally extinguished in month (m²):	Area treated in month (m²):	New areas discovered in month (m²):	Total area remaining at end of month (m²):
July	8365.3	0.0	4.1	0.0	8361.2
August	8361.2	0.0	26.4	0.0	8334.8
September	8334.8	0.0	903.1	420.5	7852.2
October	7852.2	0.0	141.4	1573.5	9284.3
November	9284.3	0.0	420.5	0.0	8863.8
December	8863.8	0.0	0.0	146.2	9010.0
January	9010.0	0.0	0.0	68.3	9078.3
February	9078.3	0.0	0.0	631.9	9710.2
March	9710.2	0.0	0.0	84.1	9794.3
April	9794.3	0.0	0.0	290.6	10084.9
May	10084.9	0.0	48.0	335.1	10372.0
June	10372.0	0.0	135.0	14.9	10252.0
Total		0.0	1678.5		

6.10.3 Complaints and Reportable Incidents

During the reporting period there was no complaints relating to spontaneous combustion which is a decrease from FY23 (one complaint received).

Mt Arthur Coal did not receive any government fines or penalties related to spontaneous combustion during the reporting period.

6.10.4 Proposed Improvements

Mt Arthur Coal will continue to monitor spontaneous combustion during the next reporting period, and cap readily accessible areas.

6.11 Bushfire

6.11.1 Environmental Management and Performance

Bushfire at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-076 Bushfire Prevention Procedure (internal document); and
- MAC-STE-PRO-010 Emergency Procedure – Bushfires (internal document).

Specific prevention and fire suppression control measures are implemented in order to protect remnant vegetation communities as well as Mt Arthur Coal infrastructure. Preventative measures include fuel load assessment and reduction programs, the establishment and maintenance of fire breaks and the prevention of ignition sources. Fire suppression and control is achieved through on-site fire-fighting equipment, including a rescue truck and water carts, facilitated by a network of roads and vehicle access trails, which provide access to most areas of Mt Arthur Coal owned land. Mt Arthur Coal also maintained a trained emergency response team on each shift. Fire extinguishers are fitted in vehicles and buildings.

No major grass or bushfires occurred on site or at the conservation or offset areas during the reporting period. Hazard reduction burning was undertaken at the Roxburgh and Saddlers Creek Conservation Areas.

6.11.2 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to bushfire during the reporting period and there were no related reportable incidents.

6.11.3 Proposed Improvements

During the next reporting period Mt Arthur Coal will continue to manage bushfire risk in accordance with relevant procedures.

6.12 Greenhouse Gas and Energy

6.12.1 Environmental Management

Greenhouse gas and energy at Mt Arthur Coal is managed in accordance with the MAC-ENC-MTP-040 Air Quality Management Plan.

Mt Arthur Coal undertakes regular reviews and monitoring of greenhouse gas emissions and energy efficiency initiatives to ensure that greenhouse gas emissions per tonne of product coal are kept to the minimum practicable level. During the reporting period Mt Arthur Coal continued greenhouse gas and energy consumption monitoring with the use of a centralised database to assist with monthly tracking and reporting of key emission sources. A key focus during the reporting period was to ensure the operation complied with the regulations under the *National Greenhouse and Energy Reporting* (NGER) *Act 2007* and the Safeguard Mechanism reforms.

6.12.2 Environmental Performance

Total emissions were 664 kt CO2-e in the FY24 reporting period, of which direct (scope 1) emissions accounted for 90 per cent, and scope 2 emissions from the use of grid-based electricity accounted for the remaining 10 per cent. As in the previous reporting period, Mt Arthur Coal used NGER Method 2 measurement of its open fugitive emissions, which were reduced for the period (to 44 kt CO2-e) and as a proportion of total scope 1 emissions (7 per cent). Nevertheless, fugitive emissions are expected to increase over time as mining progresses into areas with higher in-situ methane contents.

Fuel combustion will continue to constitute the bulk of emissions from Mt Arthur Coal, accounting for 93 per cent of scope 1 emissions and 83 per cent of total emissions in the reporting period. Energy use was similarly dominated by diesel fuel (95 per cent), with other fuels accounting for just under two per cent and electricity making up the balance.

Scope 1 and Scope 2 emissions predictions modelled in the 2013 Air Quality and Greenhouse Gas Assessment were used for comparison with the results for this reporting period, as shown in Table 31. The FY24 Scope 1 emissions profile increased on FY23 as predicted in the Environmental Assessment (EA) in line with increased production. Annual emissions continue to remain below predicted estimates for both Scope 1 and Scope 2 emissions.

Table 31 Annual GHG Emissions (Scope 1 & 2)

	t CO2-e					
Year*	**Predicted Scope 1**	**Actual Scope 1**	**Predicted Scope 2**	**Actual Scope 2**	**Total (Predicted)**	**Total (Actuals)**
FY22	584,305	503,403	114,281	79,428	698,586	582,831
FY23	596,988	528,632	122,671	73,148	719,659	601,780
FY24	625,627	594,767	120,941	69,101	746,568	663,868

*In accordance with the EA, the predicted emissions estimates are provided by calendar year. In accordance with the NGER reporting requirements, the actual emissions data is provided by financial year.

Please note that the most recent Environmental Assessment (EA) was prepared in 2013 to support the NSW Project Approval Modification of PA09_0062. This EA included an assessment of greenhouse gas impacts, Appendix F Air Quality and Greenhouse Gas Assessment (the assessment), Mt Arthur Coal Open Cut Modification prepared by PAEHolmes in January 2013.

Due to a change in reporting methodology from Method 1 to Method 2, the fugitive emissions estimates prepared in the assessment in January 2013 are not directly comparable to the fugitive emissions that are now reported under the Commonwealth National Greenhouse and Energy Reporting Act 2007 (NGER Act). The January 2013 predictions were calculated using Method 1, utilising a default emissions factor across NSW as set out in the Commonwealth Department of Climate Change and Energy Efficiency National Greenhouse Accounts 2011. Since this time Mt Arthur Coal has changed to the more accurate and site-specific Method 2 methodology as outlined in the NGER Act which is subject to a rigorous process which includes independent assurance. As such, a direct comparison of current emissions reported under the NGER Act to those predicted in the EA by PAEHolmes in January 2013 is not considered practicable or informative, and therefore Table 31 removes fugitive emissions from the comparison.

6.12.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to greenhouse gas or energy during the reporting period and there were no related reportable incidents.

6.12.4 Proposed Improvements

BHP is committed to reducing its operational emissions globally. The company has released a new 2024 Climate Transition Action Plan which sets out BHP's climate change strategy, commitments, targets and goals, and forward-looking plans. BHP remains on track for the previously set medium-term goal to reduce its operational emissions by at least 30% by 2030 on the way towards the longer-term commitment to achieve net-zero operational GHG emissions by 2050. Mt Arthur Coal will continue to investigate and, where feasible, implement projects to decarbonise, reduce fossil fuel energy consumption and greenhouse gas emissions in accordance with BHP's sustainability commitments, including the company's greenhouse gas emission targets.

6.13 Waste Management

6.13.1 Environmental Management

Waste at Mt Arthur Coal is managed in accordance with MAC-ENC-PRO-033 Waste Handling and Disposal (internal document).

6.13.2 Environmental Performance

During the reporting period, Mt Arthur Coal's activities generated approximately 9,072 tonnes of both recycled and non-recycled waste that was sent off-site for management. This a slight increase of approximately 7% per cent from the FY23 total of 8,442 tonnes. During the reporting period, approximately 85% (7,709 tonnes) of the total waste produced and sent off site for management was recycled. This is the same as the FY23 percentage (7,148 tonnes) that was recycled off-site. Waste disposal amounts for the reporting period are shown in Figure 4.

6.13.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to waste during the reporting period and there were no related reportable incidents.

6.13.4 Proposed Improvements

During the next reporting period Mt Arthur Coal will continue to manage waste in accordance with relevant procedures.

In line with the continuous improvement principles integral to the site Environmental Management System, Mt Arthur Coal will continue to review the site systems and implement improvement opportunities as they arise.

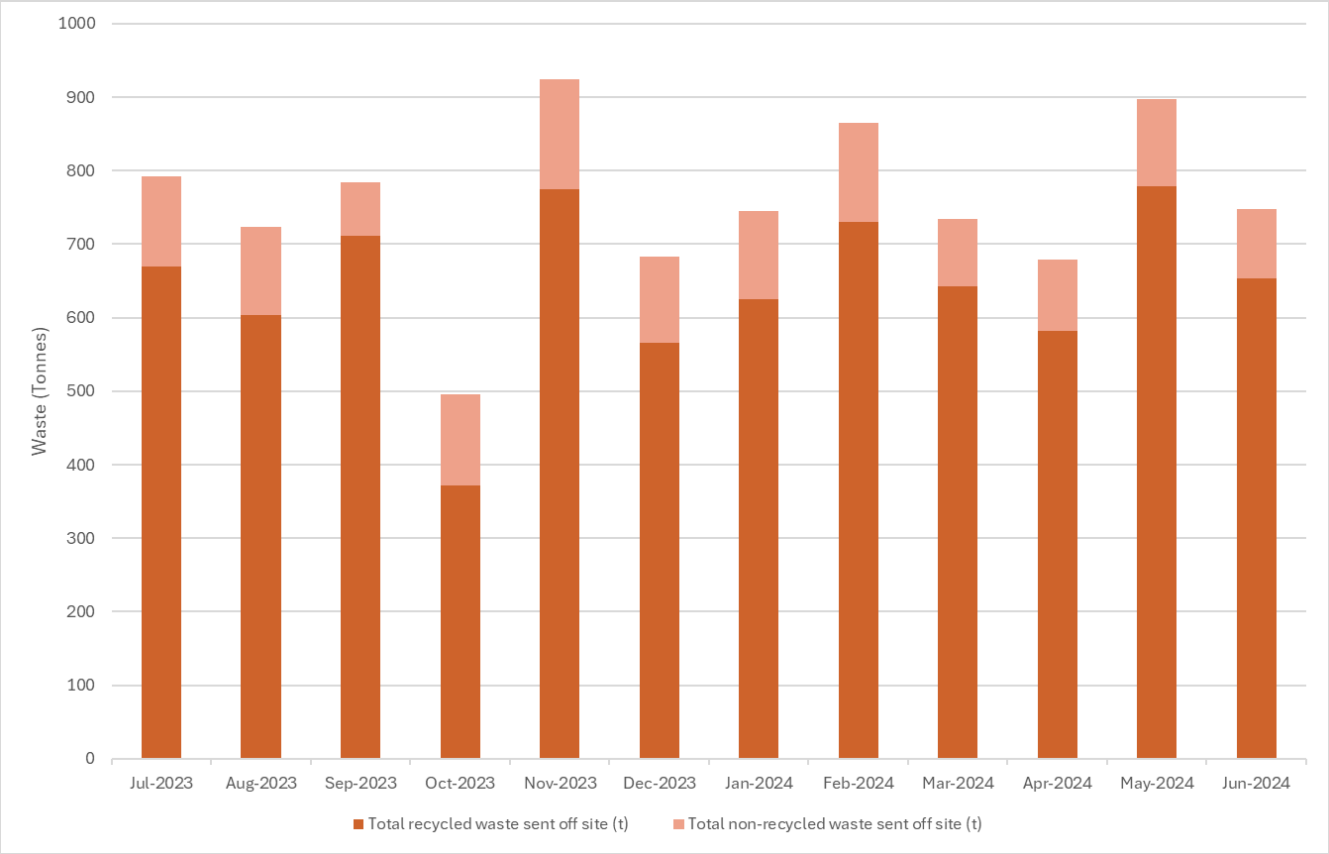


Figure 4: Waste disposal Mt Arthur Coal FY24 (tonnes)

6.14 Public Safety

6.14.1 Environmental Management and Performance

During the reporting period Mt Arthur Coal maintained a boundary security fence around much of the perimeter of its site to ensure no unauthorised access to mining areas. A number of boom gates also exist to restrict unauthorised or unintentional access to the active mining and infrastructure areas. Routine patrols of these boundaries and access points are conducted through the engagement of third-party security specialists and by internal statutory compliance personnel with no identified security or access breaches occurring during the reporting period.

During the reporting period Mt Arthur Coal maintained a permanent emergency response team consisting of BHP Emergency Services Officers and Paramedics. These personnel, along with the existing emergency response team, provide a professional emergency response service to site. The team are dedicated to ongoing continuous improvement, standardisation and preventative work.

6.14.2 Complaints and Reportable Incidents

Mt Arthur Coal did not receive any complaints, government fines or penalties related to public safety during the reporting period and there were no related reportable public safety incidents.

6.14.3 Proposed Improvements

Mt Arthur Coal will continue to maintain and monitor site security and ensure public safety during the next reporting period.

7 Water Management

7.1 Water Balance

7.1.1 Environmental Management and Performance

Mt Arthur Coal maintains a site water balance model incorporating surface and groundwater inputs and outputs. The model is used to interpret current conditions and forecast future mine water inventories and use. The model build generally aligns to the Minerals Council of Australia Water Accounting Framework.

Mt Arthur Coal discharges water into the Hunter River from its licensed discharge point under the Hunter River Salinity Trading Scheme (HRSTS). There were no discharges during FY24 under the HRSTS.

Mt Arthur Coal reports in accordance with the Minerals Council of Australia Water Acounting Framework. In accordance with these reporting metrics, Total Water Withdrawal during FY24 was 8,100ML compared to 13,730 in FY23, water withdrawal measures the water captured from the environment including catchment runoff and groundwater infiltration, as such it is significantly influenced by rainfall runoff. The difference between FY24 and FY23 is due to the reduced rainfall in FY24 (561.6mm) compared to FY23 (700.8mm). Water Re-use and Recycling in FY24 was 4,400ML compared to 5,600ML in FY23. Water consumption in FY24 was 10,361ML was consistent with FY23 10,194ML, water consumption includes evaporation, product entrainment and task loss. Ongoing improvements to the water model have been undertaken throughout the reporting period, including the installation of additional water meters to improve the accuracy of the model inputs and accuracy. the Mt Arthur Coal Water Accounting Framework is audited annually as part of the BHP Sustainability reporting assurance program.

Mt Arthur Coal extracted 2,502.9ML of water from the Hunter River under water extraction license, shown in Table 32.

Mt Arthur Coal continued to source water from the Muswellbrook Shire Council treated effluent scheme to reduce the demand from other external sources, 745ML of recycled effluent was brought onto site for reuse in site operations.

Table 32: Water take for FY24

Water Licence number	Water sharing plan, source and management zone	Entitlement (Unit Shares)	Passive take / inflows (ML)	Active pumping (ML)	Total (ML)
WAL 917 20AL201126	Hunter Regulated River Water Source (High Security), Zone 1A Management Zone	2,197	-	1,286.1	0
WAL 918 20AL201127	Hunter Regulated River Water Source (General Security), Zone 1A Management Zone	3,564	-	1216.8	0
WAL 1296	Hunter Regulated River Water Source (Supplementary), Zone 1A Management Zone	301	-	0	0
WAL 18141	Hunter Regulated River Alluvial Water Source, U/S Glennies Creek Management Zone	104	50*	-	50*
WAL 18247	Hunter Regulated River Alluvial Water Source, U/S Glennies Creek Management Zone	247	191*	-	191*
WAL 41495	Sydney Basin-North Coast Groundwater Source	750	750^	-	750^
WAL 41556	Sydney Basin-North Coast Groundwater Source	250	58^	-	58^

* Alluvial inflow has been calculated, based on predicted flux to and from alluvium (ML/day) as reported in the EIS, to be a total of 241 ML, which has been allocated across the two alluvial licences.

^ Groundwater seepage has been calculated, based on predicated average inflow to the pits (ML/day) as reported in the EIS, to be a total of 808 ML, which has been allocated across the two groundwater licences.

7.1.2 Proposed Improvements

Mt Arthur Coal will continue to use site water collected in both in-pit and out-of-pit storages prior to the use of water from the Hunter River. Where plans indicate that there would be sufficient water stored on site, water allocations for the Hunter River will continue to be offered to leaseholders and near neighbours as a temporary transfer.

In the coming year an additional 15 water meters will be added to the sites water network, these will improve the understanding of water movement on site and consumption. The data will improve water model accuracy and allow for improved planning strategies and efficiencies in the water management system.

During the FY25 period Mt Arthur is continuing major infrastructure improvement projects for the water management network. The expansion of the water management network will provide improved connectivity of water storages, active mining areas and infrastructure across the site. The improvements allow more effective operation in all weather extremes from flood to drought. Increasing the ability to reuse water stored onsite leading to reduction in reliance on the Hunter River licence intake, reducing compliance risks and also improve pit dewatering activities enabling more efficient mining activities.

7.2 Erosion and Sediment

7.2.1 Environmental Management

Erosion and sediment at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-PRO-060 Erosion and Sediment Control Plan;
- MAC-ENC-MTP 034 Site Water Management Plan

7.2.2 Environmental Performance

Total suspended solids (TSS) results remained low during the reporting period at the majority of statutory sites. The TSS results were mostly consistent compared with results from previous financial years. TSS results are summarised in Table 34, with further results presented in Appendix 1 - Surface Water Quality Monitoring Results. Water management structures were also routinely inspected after rain events > 25mm and maintained to ensure they are performing to design and prevent impacts on downstream waters.

In November 2023 the annual monitoring of riparian vegetation was undertaken as part of the annual riparian vegetation and channel stability assessment, in accordance with the Water Management Plan.

RARC Methodology

The RARC method is composed of five sub-indices, each with several indicator variables as follows:

- Habitat continuity and extent
- Vegetation and structural complexity
- Native vegetation dominance versus exotics
- Standing dead trees, leaf litter, fallen logs
- Indicative features like native vegetation regeneration and presence of native tussock grasses and reeds

These indicator values are recorded along a transect at predetermined sites using the RARC site assessment sheet proposed by Jansen et al. (2005). The indicator values are tallied to provide a score indicating riparian health. These scores enable the ranking of each site from either ‘Very Poor’ through to ‘Excellent’. The collected information is useful to compare this total score over time to see how the biodiversity and functionality of the riparian zone is progressing at each of the transects.

CSIRO Methodology

The CSIRO assessment uses four main classes of indicators to evaluate the condition of the stream bed and banks:

- The type and condition of the vegetation present, if any;
- The shape and profile of the drainage line and type of materials on the drainage line floor;
- The nature of the drainage line wall materials; and
- The nature of the stream bank bordering flats and/or slopes and regulation of lateral flow into the drainage line.

The indicators produce a rating based on a scoring system, and the combined total of the indicators rank each location from very actively eroding through to very stable.

The assessment was completed on the four areas as per previous years (SW03, SW04, SW12 and SW15) and was split up into 30 sites along the transect. Refer to Figure 5 below for the site locations.

Table 33 below outlines the results of the RARC and CSIRO assessments for each Creek within the assessment.

Table 33: Riparian vegetation assessment – FY24 RARC and CSIRO Assessment Results

Site	SW03 (Saddlers Creek)	SW04 (Quarry Creek)	SW12 (Ramrod Creek)	SW15 (White's Creek Diversion)
RARC Assessment Score	3 / 12 sites – average 4 / 12 sites – poor 5 / 12 sites – very poor	7 / 7 sites – very poor	1 / 7 sites – average 2 / 7 sites – poor 4 / 7 sites – very poor	4 / 4 sites – very poor
CSIRO Assessment Score	1 / 12 sites – active 4 / 12 sites – potentially stabilising 1 / 12 sites – stable 1 / 12 sites – very stable	1 / 7 sites – active 4 / 7 sites – potentially stabilising 1 / 7 sites – stable 1 / 7 sites – very stable	2 / 7 sites – potentially stabilising 3 / 7 sites – stable 2 / 7 sites – very stable	4 / 4 sites – very stable
Recommendations	Include treatment of priority weeds in future land management work.	Include treatment of priority weeds in future land management work.	Include treatment of priority weeds in future land management work.	Maintain annual inspections in line with the Checklist and inspect using the Checklist following >59 mm of rainfall in 24 hours (GHD, 2017). Include treatment of priority weeds in future land management work.

The application of the RARC method to streams within the study area shows the condition of the streams to ranged from "average" to "very poor" condition. Most streams that recorded scores of "average" were in areas where minimal disturbance has occurred and generally in areas close or connected to larger patches of native vegetation with wider canopy widths. Those sites that recorded scores of "very poor" or "poor" were consistent with areas where creek diversion works have occurred or areas where the riparian vegetation had been cleared for past and current grazing practices. Such low condition scores are not unexpected given the land use history within the study area, which has included a range of historic agricultural practices and, more recently, mining.

The CSIRO ratings for the 30 (monitoring locations along the creeks ranged from 'active' to 'very stable'. In summary, the initial condition assessment showed:

- Quarry Creek has a generally poor, yet stabilising channel condition throughout. Actively eroding channel walls are apparent from QC2 throughout QC5, and multiple locations between monitoring points along Quarry Creek are noted as active erosion sites. Downstream, around QC6 and QC7 are potentially stabilising.
- Ramrod Creek has generally variable stability and only a handful of locations between monitoring sites were identified for continued monitoring, in dispersed with stable, and very stable areas. Between RC1 and RC5 are predominantly stable areas, with further upstream and downstream becoming more active.
- Saddlers Creek channel condition differs markedly upstream and downstream along the monitored section. The majority of the downstream section is in stable condition, whereas upstream Saddlers Creek contains an array of actively eroding locations (between monitoring points).
- Whites Creek diversion channel condition appears excellent with little to no erosion was observed at or between monitoring sites.

Weed management practices at MAC will continue to be reviewed to ensure that the presence of priority weed species do not continue to have a negative effect on the overall condition of riparian areas and stream health.

Stream health and channel stability monitoring will continue at MAC in 2024/2025. Identification of channel degradation through ongoing monitoring programs continues to ensure appropriate response and management of water courses.

Continuing from previous years, no active remediation was recommended. Consistently, treatment of priority weeds will remain included in future land care management across the four sites.

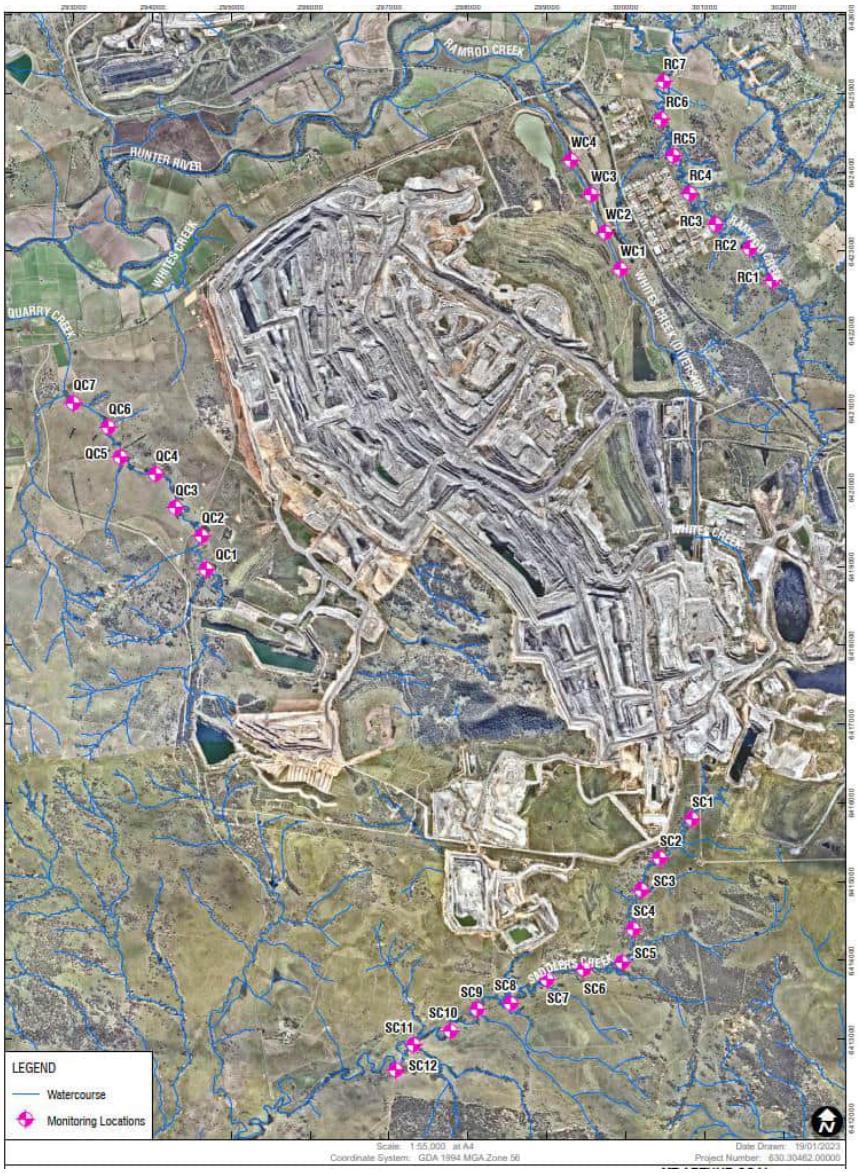


Figure 5 Riparian Vegetation and Channel Stability Monitoring Locations

7.2.3 Complaints and Reportable Incidents

Mt Arthur Coal did not record any erosion or sediment control complaints or incidents during the reporting period.

7.2.4 Proposed Improvements

During the report period an upgrade to the Export Stockpile water control facility was undertaken. This upgrade included increasing the capacity of the Export Stockpile Dam, installation of new pumping infrastructure with increased pumping capacity, construction of a new drive-in sump, design and construction of an improved water drainage network to provide enhanced clean and dirty water separation.

In the next reporting period inspections will continue to be completed of sediment dams post storm events to ensure appropriate management and pump out strategies are in place and erosion and sediment controls will be implemented as part of the Permit to Disturb process and inspected on an as needed basis.

7.3 Surface Water

7.3.1 Environmental Management

Surface water at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-034 Site Water Management Plan (WMP);
- MAC-ENC-PRO-084 Water Monitoring Procedure (internal document); and
- MAC-ENC-PRO-032 Water Management (internal document).

Water quality downstream of Mt Arthur Coal's operation is currently monitored by an independent consultant at six statutory monitoring sites, plus Mt Arthur Coal's licensed discharge point as well as one upstream monitoring site in the Hunter River.

Mt Arthur Coal's WMP outlines measures for managing water on site, while the Surface Water Monitoring Program establishes impact assessment criteria against which monitoring results are compared. Impact assessment criteria are presented as trigger values which, if exceeded, lead to a response such as more intensive monitoring, investigation and if required, remedial action.

7.3.2 Environmental Performance

A summary of the surface water quality data for statutory sites during the reporting period is provided in Table 34, with further results provided in Appendix 1 - Surface Water Quality Monitoring Results.

Water quality parameters in natural watercourses surrounding the mine including Saddlers Creek (SW02 and SW03), Quarry Creek (SW04), Ramrod Creek (SW12) and Whites Creek (SW15) were subject to normal variations in response to the ephemeral nature of the creeks, local geology and weather conditions. Water quality parameters are recorded at the HRSTS discharge point (SW28) during an active discharge.

No HRSTS discharges occurred during the reporting period. Reports were provided to the EPA accordance with the Hunter River Salinity Trading Scheme Regulations.

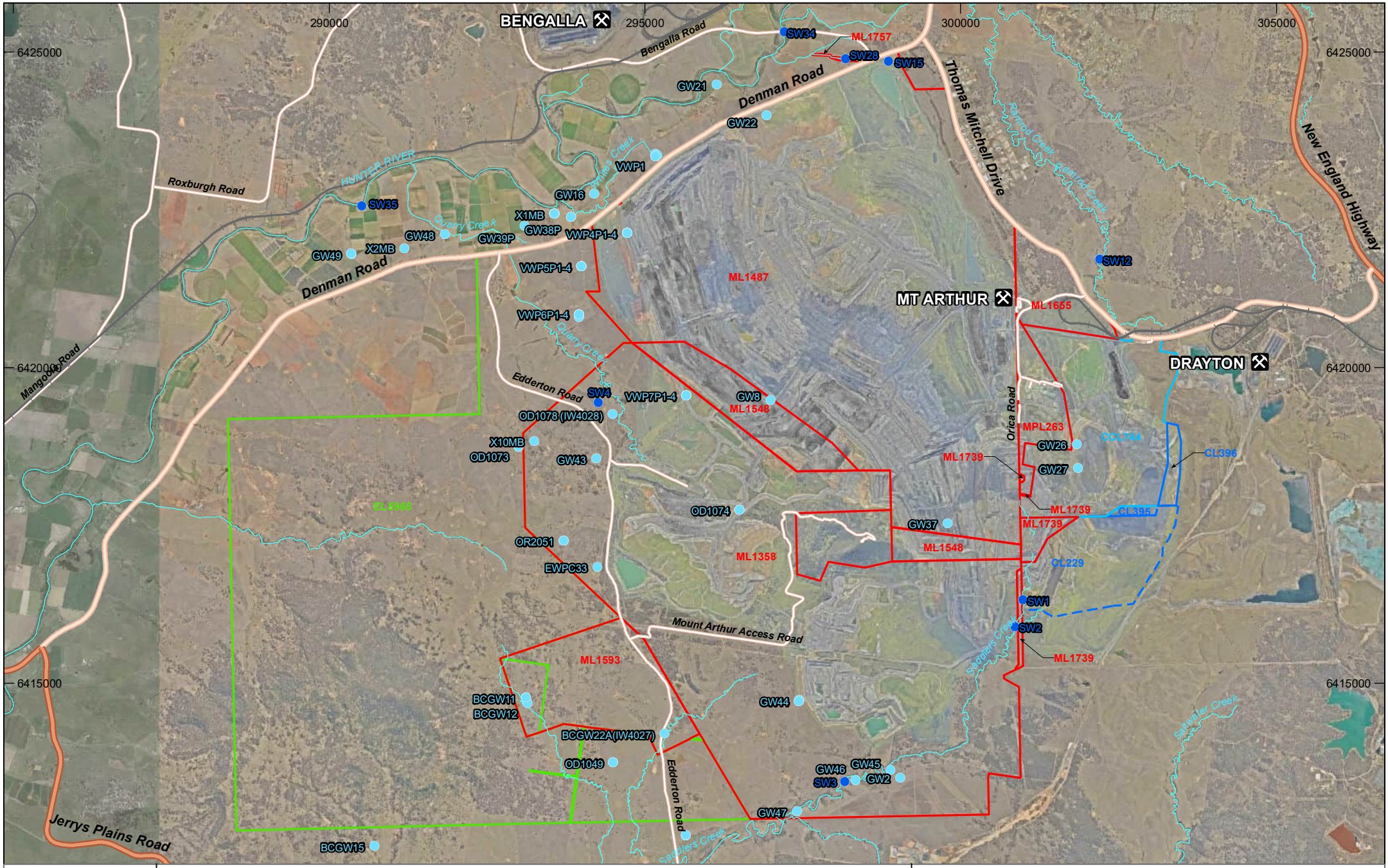
Surface water pH measured at individual statutory sites remained relatively constant during the reporting period and within the impact assessment trigger levels, with the exception of SW35 exceeding the upper limit of 8.5 in September.

Surface water EC measured at individual statutory sites remained below trigger levels during the reporting period with the exception of SW12. SW12 recorded exceedances above stage 1 in October, and exceedances above stage 2 in November and December, triggering a reporting of an interim exceedance with DPHI and subsequent written report as per the Site Water Management Plan. SW12 water level was too low to sample between January and March of 2024, then reported below the stage 1 level in April 2024. SW12 reported above stage 1 in May, this did not trigger any reporting requirements. SW12 recorded below the trigger levels in June.

Surface water TSS measured at individual statutory sites remained below trigger levels during the reporting period. Results are summarised in Table 34.

SW02 was dry for nine months of the reporting period and too low to sample for one month. SW12 was too low to sample between January and March 2024. SW15 was too low to sample for four months, and dry for 6 months of the monitoring period.

Surface water monitoring locations are shown in Figure 6.



BHP
Geospatial Team
Brisbane

- Surface Water Monitor (Statutory Use)
- Groundwater Monitor (Statutory Use)
- Mining Lease
- Coal Lease
- Consolidated Coal Lease
- Exploration Lease
- Coal Lease (sublease)

0 1,000 2,000 3,000 m

Transverse Mercator Projection
GDA2020 MGA Zone 56

MT ARTHUR MINE
SURFACE WATER AND GROUNDWATER MONITORING LOCATIONS

Drawn: K. Reedy	Date: 28/08/2024	Revision: 0	**FIGURE 6**
Checked: C. Crhistensen	Filename: MAC Monitoring Groundwater		

Table 34: Summary of statutory surface water quality monitoring results

Site	Impact Assessment Criteria Trigger Values			Monitoring Results			Trend/ key management implications
				min	ave	max	
SW02	pH	6.5 – 9.0		7.93	8.2	8.42	No assessment criteria triggered. Dry during the reporting period after August.
	EC (µS/cm)	Stage 1	12,365	8620	8770	8920	
		Stage 2	13,900				
	TSS (mg/L)	Stage 1	219	-	-	-	
		Stage 2	277				
SW03	pH	6.5 – 9.0		7.50	7.92	8.51	No assessment criteria triggered
	EC (µS/cm)	Stage 1	10,133	1,929	8,042	9,330	
		Stage 2	11,402				
	TSS (mg/L)	Stage 1	37	<5	10.9	18	
		Stage 2	46				
SW04	pH	6.5 – 9.0		7.91	8.1	8.41	No assessment criteria triggered
	EC (µS/cm)	Stage 1	13,959	7,140	7,767	8440	
		Stage 2	15,509				
	TSS (mg/L)	Stage 1	82	<5	13	27	No assessment criteria triggered
		Stage 2	104				
SW12	pH	6.5 – 9.0		7.33	8.22	8.83	No assessment criteria triggered
	EC (µS/cm)	Stage 1	6,659	2,468	6,112	9,700	Stage 1 criteria triggered in Oct 2023 and May 2024. First stage 1 trigger, no report to DPHI required. Stage 2 criteria triggered Nov and Dec 2023. Reported to DPHI. Too low to sample Jan through March 2024
		Stage 2	7,153				
	TSS (mg/L)	Stage 1	555	<5	73	284	No assessment criteria triggered
		Stage 2	708				
SW15	pH	6.5 – 9.0		7.14	7.22	7.29	No assessment criteria triggered. Dry or too low to sample during the reporting period except for Apr and Jun 2024.
	EC (µS/cm)	Stage 1	7,128	411	874	1,338	
		Stage 2	8,262				
	TSS (mg/L)	Stage 1	103	10	29	48	
		Stage 2	130				
SW34	pH	N/A		7.91	8.12	8.44	No assessment criteria triggered
	EC (µS/cm)	N/A		439	631	815	
	TSS (mg/L)	N/A		7	17	28	
SW35	pH	7.8 – 8.5		8.117	8.26	8.81	Upper limit of assessment criteria triggered in Sept 2023. No report to DPHI required
	EC (µS/cm)	Stage 1	893	454	672	835	No assessment criteria triggered
	TSS (mg/L)	Stage 1	54	8	20	35	No assessment criteria triggered

7.3.3 Complaints and Reportable Incidents

Mt Arthur Coal did not receive complaints relating to surface water during the reporting period.

7.3.4 Proposed Improvements

Mt Arthur Coal will continue to use site water collected in both in-pit and out-of-pit storages prior to the use of water from the Hunter River.

7.4 Ground Water

7.4.1 Environmental Management

Groundwater at Mt Arthur Coal is managed in accordance with:

- MAC-ENC-MTP-034 Site Water Management Plan; and
- MAC-ENC-PRO-084 Water Monitoring Procedure

The (WMP) aims to minimise any adverse impacts on aquifers in proximity to the operation, including the two major aquifer areas, the hard rock coal measures and the shallow alluvial deposits associated with the Hunter River.

The WMP includes a Groundwater Monitoring Program, in accordance with Schedule 3 Condition 29 and 33 of Project Approval 09_0062. The Groundwater Monitoring Program outlined in Section 9.3 of the WMP details the monitoring methodology, monitoring locations, frequency impact assessment criteria (water levels and quality), mine inflows/licensing, impacts to private bores and groundwater dependent ecosystems (GDEs), cut-off wall and flood levee monitoring and monitoring records.

7.4.2 Environmental Performance

A groundwater review was undertaken by an external specialist consultant for the reporting period. The scope of work included:

- Comparison between modelled and observed water levels to June 2024;
- Compare monitoring data to drawdown predictions for the Mt Arthur Coal Consolidation Project Environmental Assessment and the current modelling for the approved operations;
- Review site water quality monitoring data, field reports and laboratory reports and check performance;
- Review of groundwater triggers and report on any trigger exceedances, where review will be based on both the current established groundwater triggers for the site; and
- Review performance of the cut-off wall using available data.

The full Annual Groundwater assessment report is included as Appendix 2 Ground Water Monitoring Results and Groundwater Level Drawdown Analysis.

Drawdown performance

There has generally been a negligible change in water levels within the Hunter River alluvium, as shown in Figure 4.1 of Appendix 2. However, the change in total drawdown did vary spatially, with bores GW16 and GW21 recording a minor decline in levels, while bores further to the west (GW41A (IW4029) and X2MB) recorded a slight increase in water levels. It is noted that bore X1MB recorded a minor increase in water levels whereas bore GW38A (IW4030), 300m to the southeast, recorded a minor decline in water levels. It should be noted that the total drawdown recorded in bores GW16 and GW21 covers a much larger time frame (25 years) compared to bores GW38A (IW4030) and GW41A (IW4029) (8 years) and X1MB and X2MB (4 years).

Groundwater levels in the alluvial bores along Saddlers Creek have fluctuated over time, potentially in response to rainfall trends, with an overall increasing trend in groundwater levels since the end of 2020. However, since monitoring began in 2016 there has been an overall minor decline in water levels (drawdown) within the Saddlers Creek alluvium (Figure 4.1) but less than predicted by the 2020 groundwater model. Total drawdown varied spatially,

with bore GW45, located in the upper reaches of Saddlers Creek, recording the most drawdown in the Saddlers Creek alluvium. The model predicted drawdown for of 2.71 m between 2016 and 2024 for GW45; however, the total measured drawdown over the same period was 0.79 m. Therefore, the model predicted more drawdown than has occurred. The total drawdown between July 2023 and June 2024 was 0.54 m, with levels fluctuating slightly in response to climatic conditions.

There has been a decline in groundwater levels within the Saddlers Creek shallow Permian (regolith), as shown in Figure 4.2 of Appendix 2 Ground Water Monitoring Results and Groundwater Level Drawdown Analysis. Bore X14MB-1S, located to the north of Saddlers Creek, recorded the most drawdown. In comparison, deeper paired bore X14MB-2D screened within the Glen Munro Seam, recorded an increase in water levels (i.e., no drawdown). Figure 4.3 of Appendix 2 Ground Water Monitoring Results and Groundwater Level Drawdown Analysis shows, with the exception of bores EWPC33. GW48, X10MB and X14MB-2D, a general decline in groundwater levels within the Permian coal measures to the southwest of open cut operations, showing a response to the progression of mining to the southwest. However, in-pit water storage (Belmont, McDonalds and Saddlers pits) potentially buffers the extent of drawdown in localised areas.

Groundwater Level

Groundwater level data collected over the reporting period have been compared to the trigger values outlined in the WMP. Over the monitoring period bores VWPs VWP07 (Ramrod Creek Seam) and X1 (Mt Arthur Seam) recorded groundwater level exceedances between July 2023 and March 2024. A summary of the exceedances is presented in Table 35.

Table 35: Groundwater Level Trigger Exceedances

Bore ID	Exceedance	Screened Lithology and Location	Comment	Action
VWP07_418	Pressure level reading below trigger level of: 142.3 mAHD In the Ramrod Creek Seam since June 2023	Ramrod Creek Seam Onsite, 200m west of Windmill Pit	Levels in the Ramrod Creek Seam, recorded in VWP07_418, have exceeded the trigger level since June 2023, when the revised trigger level was implemented. The continuing declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations by SLR (2020). The SLR (2020) model predicted continued drawdown in this area with simulated water levels in all seams. However, observed water levels have declined at a faster rate than predicted in the model in the Ramrod Creek Seam.	Water level readings have exceeded the trigger threshold and were notified in May 2024. Initial review indicates no adverse impacts beyond those predicted for the approved operations. The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Updates to the model will include additional baseline data which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.
X1_S-2 (59)	Pressure level reading below trigger level of: 91.0 mAHD In the Mt Arthur Seam since June 2023	Mt Arthur Seam Onsite, approximately 1.2km west of MAC open pit and 100m south of the Hunter River	VWP X1 was installed in April 2020. Levels in the Mt Arthur Seam, recorded in X1_S-2 (59), have exceeded the trigger level since June 2023, when the new trigger level was implemented. The declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations by SLR (2020).The SLR (2020) model	Water level readings have exceeded the trigger threshold and were notified in May 2024. Initial review indicates no adverse impacts beyond those predicted for the approved operations. The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Updates to the model will include additional baseline data

Bore ID	Exceedance	Screened Lithology and Location	Comment	Action
			predicted higher starting heads in this location but does capture the trend of declining groundwater levels over time consistent with the observed data. The model under predicts drawdown in all layers in this area indicating the area was less saturated than predicted.	which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.

Groundwater Quality

Bore GW48 recorded a pH reading in March 2024 above the upper pH trigger level specified in the WMP. However, it is not a consecutive reading and therefore not considered an exceedance. During the reporting period, bore X142MB-2D recorded three consecutive readings above the upper pH trigger level constituting a reportable exceedance. Bore X14MB-2D was added to the groundwater compliance monitoring network in the revised WMP, which came into effect in April 2023. An analysis of the trigger exceedances for trigger exceedance is summarised in Table 36.

Trigger exceedances have been reviewed by comparing groundwater levels and climate indicated by the cumulative rainfall departure plot. Graphs of pH and EC for all monitoring bores are presented in Appendix 2 Ground Water Monitoring Results and Groundwater Level Drawdown Analysis.

Table 36: Groundwater Quality Trigger Exceedances

Bore ID	Exceedance	Screened Lithology and Location	Comment	Action
X14MB-2D	Five consecutive pH readings above the upper trigger level of 8.3 since June 2023	Glen Munro Seam On site, approximately 5km south of McDonalds Pit Dam and 3.5km southwest of Saddlers Pit	The pH of groundwater recorded within the bore has ranged from 6.77 (November 2020) to 11.63 (June 2021), with an average pH of 9.29. The pH peaked at 11.63 and has continued to decline from June 2021 to present, with the most recent reading of 9.34. Levels have remained relatively stable since July 2022. The initial high pH readings are potentially related to grout contamination within the bore following construction. The pH level has been above the revised Glen Munro Seam pH trigger level since June 2021. It should be noted that the trigger level in the WMP is based on grouped data from all bores monitoring the Glen Munro Seam. At the time of trigger derivation, only eight water quality samples had been collected from bore X14MB-2D. In comparison, pH has ranged between 7.04 and 9.97 in bore X10MB which also monitors the Glen Munro Seam and is located approximately 8 km to the north of X14MB-2D.	The pH level recorded in Q4 is the fifth consecutive reading above the upper trigger level and was notified in February and May 2024. The pH levels should continue to be monitored and reviewed for any changes outside of the historical range.

7.4.3 Proposed Improvements

In the next reporting period Mt Arthur Coal will continue the project to replace and repair current boreholes and telemetry at boreholes. A review of the WMP will be undertaken once the borehole upgrade project is complete to ensure the most representative sampling and monitoring is being undertaken.

8 Rehabilitation

8.1 Buildings and Infrastructure

During the reporting period decommissioning and removal infrastructure included: tanks above the Mt Arthur Underground Portal and associated pipelines and powerlines, and the infrastructure associated with the Bayswater CHPP.

8.2 Topsoil

Topsoil management at Mt Arthur Coal focuses on maintaining the quality of the topsoil resource as a rehabilitation growth medium. Activities undertaken during the reporting period included:

- Prioritising direct placement of topsoil;
- Testing topsoil to determine appropriate depths for stripping and recovery as well as ameliorant requirements;
- Felling and mulching trees in situ on disturbance areas to increase organic content within the topsoil that was used directly on rehabilitation areas; and
- Reusing felled trees from disturbance areas on new rehabilitation areas to provide habitat.
- Additional measures generally undertaken when stockpiling topsoil include locating stockpiles so as to reduce the requirement for re-handling.

Topsoil was placed and spread to an approximate depth of approximately 100 millimetres on rehabilitation areas where required. The newly spread topsoil surface was ripped on the contour prior to sowing to provide a suitable environment that encourages water infiltration in the soil.

8.3 Landform Design

Mt Arthur Coal aims to create rehabilitation that is safe, stable and non-polluting, that is self-sustaining and comparable to the surrounding natural landscape. Landform and rehabilitation established since 2014 utilises geomorphic design and incorporates micro-relief and drainage lines for landforms designed and constructed post the current modification project approval. The geomorphic design uses the characteristics of stable natural alluvial landforms in the local environment as an analogue on which to base the design of overburden landform.

The final landform design can be seen in Figure 7 and Figure 8. Figure 7 and Figure 8 show the shaped waste rock with topsoil being placed. Although this geomorphic design has been implemented on other sites within NSW and also worldwide there are many defining characteristics that restrict its use such as space, waste characterisation, rainfall, availability of suitable rock, availability of mulch, final landuse, landform height and steepness of the landform. Mt Arthur Coal has larger higher landforms than other sites in the Hunter Valley and is also space constrained for emplacement area. The resultant design aligns with industry best practice but will be monitored over the coming years to ensure further natural landform design incorporates learnings and improvement from the current work.

Figure 7: FY24 pasture rehabilitation in the OPD emplacement

Figure 8 Bulk shaping and topsoil spreading at VD4 and VD5 Box Gum Woodland rehabilitation

Rehabilitation of land is carried out in accordance with:

- MAC-ENC-MTP-052 Mt Arthur Coal Forward Program;
- MAC-ENC-MTP-055 Mt Arthur Coal Rehabilitation Management Plan

- MAC-STE-STD-214 Mine Rehabilitation Standard
- MAC-ENC-MTP-047 Rehabilitation Strategy;
- MAC-ENC-MTP-050 Biodiversity Management Plan; and
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring.

Rehabilitation is designed to achieve a stable final landform compatible with the surrounding environment and to meet the landform commitments presented in the Rehabilitation Management Plan (RMP).

During the reporting period Mt Arthur Coal completed (achieved Phase 4 – Ecosystem and Landuse Establishment) 145.7 hectares of rehabilitation across four areas (VD4, VD5, Out of Pit Dump [OPD] and Saddlers North). In addition, 47 hectares of capping and shaping was achieved in the North Cut Tailings Dam (Phase 2 – Landform Establishment) with the completion expected to be completed (Phase 4 – Ecosystem and Landuse Establishment) in the next reporting period. Comparison with the FY24 targets are shown in Table 38. Table 39 provides the Mt Arthur Coal rehabilitation summary for the operation. These areas were seeded with either the pasture species mix (OPD) or the Box Gum Woodland mix, see Table 37.

Table 37 Mt Arthur Coal pasture seed mix

Common name	Species name	Seed mix kg/ha
Couch	*Cynodon dactylon*	10
Lucerne	*Medicago Sativa*	3
Green Panic	*Panicum Coloratum*	3
Seaton Park Sub-clover	*Trifolium Subterranean*	3
Haifa White Clover	*Trifolium Repens*	3
Kikuyu	*Pennisetum Clandestinum*	3
Wimmera Rye	*Lolium Rigidum*	7
Perennial Rye	*Lolium Perenne*	7
Phalaris	*Phalaris Aquatica*	5
Shirohie Millet (summer)	*Echinochloa Esculenta*	10
Oats (winter)	*Avena Sativa*	10

Table 38: Mt Arthur Coal rehabilitation claimed for FY24

Rehabilitation phase	FY24 FWP rehabilitation commitments (hectares)	FY24 areas in active rehabilitation phases (hectares)
Phase 2 – Landform Establishment	0	47
Phase 3 – Growing Media Development	0	0.8
Phase 4 – Ecosystem and Landuse Establishment	145	145.7
Total	145	192.7

Note: All areas calculated using GDA2020 Zone 56 coordinate system

Table 39: Mt Arthur Coal rehabilitation summary

Mine area type	Previous reporting period (FY23 actual)	This reporting period (FY24 actual)	This reporting period (FY24 forecast)	Next reporting period (FY25 forecast)
A. Total mine footprint[1]	5,762.84	5868.76	5,908.30	6019.30
B. Total active disturbance[2]	4,650.94	4680.35	4,732.07	4716.59
C. Land being prepared for rehabilitation[3]	0.87	0.8	0.8	0.8
D. Land under active rehabilitation[4]	1,111.90	1188.41	1,176.24	1302.71
E. Completed rehabilitation[5] (as formally certified by NSW Government)	0	0	0	0

Note: All areas calculated using GDA1994 Zone 56 coordinate system
1 Total mine footprint includes all areas within a mining lease that either have at some point in time or continue to pose a rehabilitation liability due to mining and associated activities.
2 Total active disturbance includes all areas ultimately requiring rehabilitation.
3 Land being prepared for rehabilitation includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growing media development.
4 Land under active rehabilitation includes areas under rehabilitation and being managed to achieve relinquishment includes the sum of mine disturbed land that is under the following rehabilitation phases - .
5 Completed rehabilitation requires formal signoff by the NSW Resources Regulator that the area has successfully met the rehabilitation land use objectives and completion criteria.

8.4 Other Activities

8.4.1 Maintenance and Improvement

Weed control for rehabilitation maintenance and improvement occurred across:

- VDs 1, 4 and 5;
- CD1;
- Drayton Void;
- Saddlers South; and
- McDonald's South.

Work completed in VD4 and VD5 continued from the rework completed in the FY24 reporting period. Locations of rehab areas are presented in Figure 9.

Improvement works focussed on a targeted revegetation program in the VD5 area. The scope included:

- Slashing and ripping of planting beds;
- Tube stock diversification in Box Gum Woodland area of VD5 (see Table 40) of approximately 4ha;

Table 40 Diversity Tube stock mix used on VD5

Species	Number of individuals
Trees	
Brachychiton populneus	150
Eucalyptus blakelyi	254
Eucalyptus crebra	240
Eucalyptus molucanna x albens	240
Eucalyptus moluccana	285
Shrubs	
Acacia decora	80
Acacia falcata	855
Acacia implexa	165
Acacia paradoxa	40
Acacia parvipinnula	280
Bursaria spinosa	50
Cassinia arcuata	200
Dodonaea viscosa	580
Indigofera australis	160
Myoporum montanum	14

BHP

Geospatial Team
Brisbane

Scale: 1: 47,000

0 1 2 km

Transverse Mercator Projection
GDA94 MGA Zone 56

MT ARTHUR COAL

Mt Arthur Coal Rehabilitation Strategy
Rehabilitation Area Nomenclature

Drawn: A. Johnston	Date: 04/08/2023	Revision: 3	**Figure 9**
Checked: J. Deacon	Filename: 20230726-9		

ML1757
VD5
CD5
VD1
VD4
Windmill
CD4
ML1487
CHPP Bund
ML1655
CD3
Main Dam
CD2
North Cut
Export
Dump 11
Calool
CD1
ML1548
MPL263
CCL744
CL396
Roxburgh
ML1739
Belmont
Conveyor Corridor
EL5965
ML1739
CL395
Ayredale
ML1739
OOPD
ML1548
ML1358
AUTH437
CL229
Mt Arthur S Slopes
Drayton
Macdonalds East
Macdonalds South
Saddlers North
ML1739
ML1593
Saddlers Central
Saddlers South
AUTH 437

6425000
6420000
6415000
300000
305000
295000

- Rehabilitation Area Names
- Approved Disturbance Boundary
- Mining Lease
- Authorisation
- Coal Lease
- Consolidated Coal Lease
- Exploration Lease
- Surface Area
- Coal Lease (sublease)

8.4.1 Rehabilitation Improvements

Mt Arthur Coal will continue the use of remote sensing to assess erosion building on work completed in FY23. Results focused on use of lidar to identify erosion gullies of certain depth and length and classifying them on as a risk to rehabilitation. See Appendix 5 Rehabilitation Plan for the FY24 report Rehab Plan. Remote sensing of the FY24 rehabilitation areas and other existing rehabilitation areas has been planned for FY25 and results will be detailed in the FY25 Annual Review.

Next reporting period will see:

- Continued refinement of the draft Completion Criteria and associated performance indicators
- Improvements in the use of analogue sites in assessing rehabilitation performance
- Improvements to pasture monitoring program
- Continued improvement of the GIS rehabilitation Tracking system:
    - Integration GIS monitoring data of TARP triggers; and
    - Tracking of TARP triggers in the rehabilitation contract.

8.4.2 Trials

During the FY24 rehabilitation campaign Mt Arthur undertook the following trials:

Ripping:

- Shallow ripping of pasture areas to a depth of 200mm compared to a ripping depth of 500mm in woodland areas. In addition, woodland areas were ripped with an argi-plough and expect for steeper areas which were dozer ripped. The aim of these trials is to look at if there are areas of increased/ unexpected erosion picked up in the erosion assessment of the FY24 rehab and as well as to look at differences in vegetation establishment.

Growth Media

- Comparing the use of topsoil, subsoil/alluvial material to a 50/50 mix of topsoil and subsoil/alluvial material in woodland areas. The aim of the trial is to look at ecological development in different mixes and consider the effects of weed load in topsoil, pH limitation in the subsoil/alluvial material and whether a mix of topsoil and subsoil/alluvial material will provide a balance between a reduced weed seed load in the topsoil and higher pHs in the subsoil/alluvial material.

8.5 Rehabilitation Activities for Next Reporting Period

Following the announcement of cessation of mining at Mt Arthur in 2030, Mt Arthur will continue detailed studies into the closure of the mine. These studies are expected to improve rehabilitation practices at Mt Arthur.

Rehabilitation activities for the next reporting period include the continuation of natural landform design rehabilitation techniques and the inclusion of habitat in new areas as they become available. FY25 has an annual rehabilitation area target of 145 hectares.

New rehabilitation of land will be carried out in accordance with:

- Mt Arthur Coal’s Forward Program;
- Mt Arthur Coal’s Rehabilitation Management Plan;
- MAC-ENC-MTP-047 Rehabilitation Strategy
- MAC-ENC-MTP-050 Biodiversity Management Plan
- MAC-TCS-STD-002 Landform Design; and
- MAC-STE-STD-214 Mine Rehabilitation Standard.

9 Community

9.1 Community Engagement

Mt Arthur Coal continues to actively engage and build relationships with key stakeholders and the local community through its program of community engagement and consultation. Mt Arthur Coal's community engagement and consultation process was ongoing throughout the reporting period with the following consultation measures undertaken:

- Quarterly Community Consultative Committee (CCC) meetings
- MAC representatives attendance at Muswellbrook Chamber of Commerce and Industry, Business Singleton and Business Hunter events
- Participation in the Upper Hunter Mining Dialogue and several of its working groups
- Telephone and face-to-face engagement with neighbouring landholders as well as written correspondence
- Site tours from school groups, universities and Government representatives
- 24-hour BHP Mt Arthur Coal Community Response Line: 1800 882 044
- Annual Community Perception Survey, conducted by independent research firm IPSOS, to provide the local community and key stakeholders with a way to provide feedback to Mt Arthur Coal on its business activities and key issues of concern for the community.
- Comprehensive engagement with local stakeholders regarding the transition to closure in 2030 and rehabilitation of the Mt Arthur Coal site, including dedicated community information sessions in November 2023 and May 2024.
- Community engagement at key local events including: Great Cattle Dog Muster, Upper Hunter Show, Tocal Field Days, Scone Horse Festival, and Aberdeen Highland Games.
- Quarterly Community Newsletter to update the community about the transition to closure as well as current relevant topics and provide information on how the community can provide input and feedback through various touch points.

Mt Arthur Coal invites feedback about its activities through a free-call 24-hour Community Response Line (1800 882 044) and/or a dedicated email address (nswec.community@bhp.com), which are advertised in local newspapers, in community newsletters, at community events and on the BHP website at: https://www.bhp.com/sustainability/environment/regulatory-information/

9.1.1 Community Response Line

During the reporting period, Mt Arthur Coal received 22 complaints from community members and near neighbours. A comparison of complaints received during the reporting period against previous financial years is shown in Figure 10 and a complete register of complaints is presented in Appendix 3 Community Complaints.

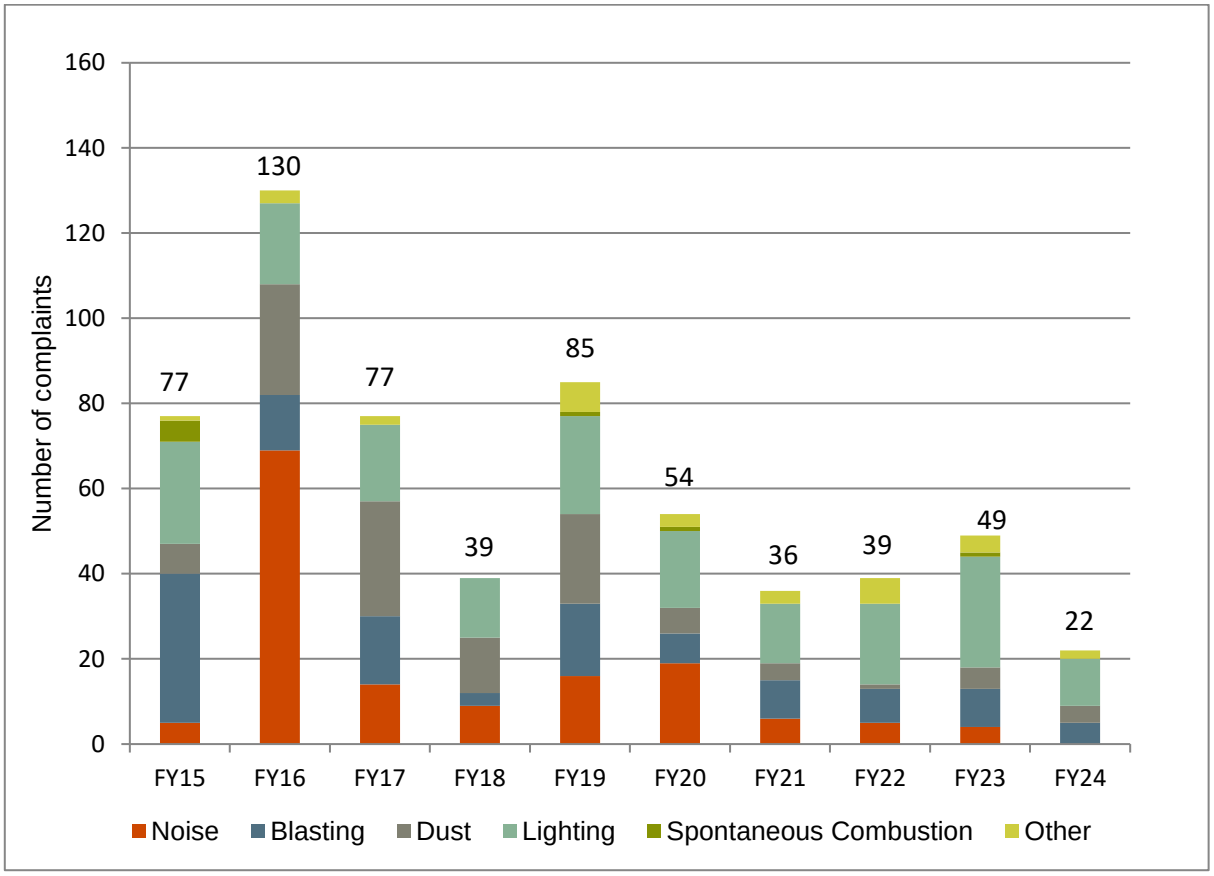


Figure 10: Comparison of complaints received during current and previous financial years

9.1.2 Q1 (July to September 2023)

Mt Arthur Coal received eight (8) complaints during this period. Of the 8 complaints, four (4) were related to lighting; one (1) to blasting activity; one (1) to dust and two (2) in the “other” category related to notifications. All eight of the eight (8) complaints received for the three-month reporting period came from residents at Roxburgh Rd.

9.1.3 Q2 (October to December 2023)

Mt Arthur Coal received eight (8) complaints during this period. Of the 8 complaints, six (6) were related to lighting; and two (2) to dust. All 8 complaints received for the three-month reporting period, were from Roxburgh Rd.

9.1.4 Q3 (January to March 2024)

Mt Arthur Coal received three (3) complaints during this period. Of the 3 complaints: one (1) was related to lighting; one (1) to blasting activity; and one (1) to dust. Of the 3 complaints received for the three-month reporting period, one (1) came from residents at Roxburgh Road, one (1) from Denman Rd and one (1) from Old Bengalla Road.

9.1.5 Q4 (April to June 2024)

Mt Arthur Coal received three (3) complaints during this period. All 3 complaints were for blast activity. One (1) complaint was from Balmoral Rd and two (2) for New England Hwy.

9.1.6 Website

Mt Arthur Coal provides information about the operation through the BHP website at https://www.bhp.com/sustainability/environment/regulatory-information/, including project approval documents, blast schedules, coal transport information, Community Consultative Committee (CCC) meeting minutes, community complaint records, environmental monitoring information, independent environmental audits,

environmental management plans, EPBC compliance reports and Annual Reviews. Note that the Annual Coal Transport Report is now provided as part of this Annual Review in Appendix 4 Annual Coal Transport Report FY24.

9.1.7 Community Consultative Committee

During the reporting period, Mt Arthur Coal coordinated four CCC meetings in accordance with the Community Consultative Committee Guidelines (DPHI, formerly DPE, 2023) on:

- 9 August 2023
- 8 November 2023
- 14 February 2024
- 15 May 2024

9.2 Community Investment

During the reporting period Mt Arthur Coal voluntary contributed more than $730,000 to the local community, including $87,000 in one-off grants through the Benefiting My Community program.

Central to Mt Arthur Coal's commitment to the local community is its Voluntary Planning Agreement (VPA) with Muswellbrook Shire Council, of which $673,090 was provided in FY24 toward the Mt Arthur Coal Community Fund. Established under the *Environmental Planning and Assessment Act 1979*, the VPA is an annual commitment that contributes to public amenities and services that may be impacted by the growth of mining operations.

9.2.1 Local Buying Program

Mt Arthur Coal continues to engage and support eligible small, local and indigenous businesses by procuring goods and services through the Local Buying Program – a program delivered in partnership between BHP and C-Res, a cost-neutral entity. A record $23,616,298 was spent in NSW in FY23, primarily in the shires of Muswellbrook, Singleton and Upper Hunter. Audited figures for FY24 are not yet available.

9.2.2 Local Buying Foundation

The Local Buying Foundation is an important element of the Local Buying Program; each time BHP procures goods and services through the Program additional funds are provided to the Local Buying Foundation. The Foundation directs these funds to programs, initiatives and events that focus on building stronger and more resilient local business communities.

In NSW as of July 2024 and since inception in 2017, the Local Buying Foundation has supported 46 projects valued in excess of $1 million – supporting key initiatives such as business development and capacity building programs in Muswellbrook, Singleton, and Scone.

10 Independent Audit

An Independent Environmental Audit (IEA) was undertaken at Mt Arthur Coal in during October 2023. The IEA covered the Mt Arthur Coal Complex. The IEA period was 7th October 2020 to 5th October 2023. The Department of Planning, Housing and Infrastructure (DPHI) endorsed the following IEA team in the letter dated 13 June 2023:

- Andrew Lewis – IEA Lead (ERM)
- Leanne Lee – IEA Assistant (ERM)
- Heather McKay – Project Manager (ERM)
- Robert Smith – Technical Oversight (ERM)
- Chris Gimber – Surface Water (ERM)
- Muller Retief – Groundwater (ERM)
- Keshav Dhayam – Blasting and Noise (ERM)
- Clayton Richards – Rehabilitation (Minesoils)
- Shane Lakmaker – Air Quality (Airen Consulting)

The IEA covered the requirements of Schedule 5 Condition 9 of the Project Approval (PA 09-0062).

The IEA included a series of specialists including surface water, groundwater, noise/blast, air and rehabilitation.

The IEA generally identified a high level of compliance with an improvement on the 2020 IEA non-compliances from 24 total non-compliances in 2020 to 16 (with 6 duplicates) identified in 2023.

As summarised in Table 41 the following non – compliances were observed:

- 13 instances of non-compliance with the Project Approval with 5 additional duplicate non-compliances
- 3 instances of non-compliance relating to the implementation and adequacy of management plans with one duplicate

This resulted in a total of 8 recommendations.

Table 41: Summary of IEA Non-Compliances and Recommendations

Review	Non- Compliances (NC)	Observations (Obs NC)	Observations (Obs C)	Recommendations
Statutory Instruments	13 (+5 duplicates)	Nil	1	7
Implementation of Plans	3 (+1 duplicate)	Nil	Nil	1

Of the 2 actions agreed with DPHI, one of them has now been completed. Please see further information on Schedule 3 Condition 29 as per request by DPHI on 26 July 2024.

Table 42: 2023 Independent Environmental Audit Non-compliance Recommendations and Actions

<table>
<tr><th>Schedule and Condition Number</th><th>Condition</th><th>Compliance Status</th><th>Recommendations</th><th>Mt Arthur Coal Response/ Agreed Action</th><th>Status</th></tr>
<tr><td colspan="5">Environment Protection Licence 11457</td><td></td></tr>
<tr><td>L1.1</td><td>Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.</td><td>Non - Compliant</td><td>Corrective actions have been implemented. No further action is required.</td><td><u>Response Comments</u>:

No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. This included significant expenditure to upgrade the relevant infrastructure (export area dam and mine water pipelines) including the completion of Pollution Reduction Study and Program via the EPL.

<u>Proposed Action Due Date:</u>

Not applicable.</td><td>No action required</td></tr>
<tr><td>L5.1</td><td>Noise generated at the premises must not exceed the noise limits presented in the table below.
Residences referenced in this table are from Project Approval 09_0062 and summarised in EPA Re DOC19/1103289

<table><tr><th>Location</th><th>Day LAeq (15 minute) dBA</th><th>Evening LAeq (15 minute) dBA</th><th>Night LAeq (15 minute) dBA</th><th>Night LA1 (1 minute) dBA</th></tr><tr><td>EPA Point 16</td><td>37</td><td>40</td><td>38</td><td>45</td></tr><tr><td>EPA Point 17</td><td>41</td><td>40</td><td>39</td><td>45</td></tr><tr><td>EPA Point 18</td><td>39</td><td>39</td><td>39</td><td>45</td></tr><tr><td>EPA Point 19</td><td>41</td><td>40</td><td>39</td><td>45</td></tr><tr><td>EPA Point 20</td><td>35</td><td>35</td><td>35</td><td>45</td></tr><tr><td>EPA Point 21</td><td>37</td><td>36</td><td>35</td><td>45</td></tr><tr><td>EPA Point 22</td><td>37</td><td>36</td><td>35</td><td>45</td></tr><tr><td>EPA Point 23</td><td>39</td><td>38</td><td>37</td><td>45</td></tr></table></td><td>Non - Compliant</td><td>Implement requirements of the Noise Management Plan to prevent the noise generated by the site exceeding the noise limit.</td><td><u>Response Comments</u>:

Mt Arthur varied EPL 11457 to remove Condition L5.3 e) in April 2023 thus aligning the requirements in Condition L5.3 to that those listed in Appendix 10 of Project Approval 09_0062. This variation has addressed the inconsistency that caused the non-compliance relevant to L5.1. The noise limits should not have applied given a category G temperature inversion was in place.

Mt Arthur proposes that no further action is required. Note that compliance to the Noise Management Plan is captured in subsequent sections of this report.

<u>Proposed Action Due Date:</u></td><td>No action required</td></tr>
</table>

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response/ Agreed Action	Status
				Not applicable.	
L6.5	The ground vibration peak particle velocity from blasting operations carried out in or on the premises must not exceed: 10mm/second at any time; At either monitoring point 7, 8, 10 or 25 in Condition P1.4	Non - Compliant	Since the monitoring point has been relocated, no further action is recommended.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
O1.1	Licenced activities must be carried out in a competent manner. This includes: **a)** The processing, handling, movement and storage of materials and substances used to carry out the activity; and **b)** The treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	Non - Compliant	Identify measures to prevent hydrocarbon contamination migrating to stormwater or groundwater based on the Remedial Action Plan. Consider updating the Plan if required. The site should consult with subcontractor Thiess on such measures. Undertake periodic inspections to assess the performance of contamination prevention measures.	**Response Comments**: A Remedial Action Plan (RAP) established for the Bayswater (Thiess) area as per PA Schedule 3 Condition 35. This RAP will be updated in conjunction with Closure Studies program. **Proposed Action:** MAC will consult with Thiess to establish a routine to complete periodic inspections to assess the performance of contamination prevention measures. This inspection routine will be scheduled in 1SAP work management system. **Proposed Action Due Date:** 31 October 2024	**In progress**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response/ Agreed Action	Status
O2.5 O2.6	O2.5 The licensee must record each inspection and any actions required or recommended by the technician including all results of tests performed on the sewage treatment system by the technician as required in Condition O2.4 O2.6 The licensee must prepare a sewage treatment system maintenance program. The program must include: a) Certification from the system provider that the sewage treatment system is operating within its capacity; b) Date, time and results of all routine maintenance procedures undertaken to the sewage treatment system; and c) Provide written records or an electronic confirmation of each quarterly inspection	Non - Compliant	No further actions required.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
O7.1	All above-ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment in place.	Non - Compliant (Duplicate with O1.1)	As per O1.1	**Response Comments**: A Remedial Action Plan (RAP) established for the Bayswater (Thiess) area as per PA Schedule 3 Condition 35. This RAP will be updated in conjunction with Closure Studies program. **Proposed Action:**	**In progress**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response/ Agreed Action	Status
				MAC will consult with Thiess to establish a routine to complete periodic inspections to assess the performance of contamination prevention measures. This inspection routine will be scheduled in 1SAP work management system. **Proposed Action Due Date:** 31 October 2024	
M2.2	Air monitoring requirements Point 11, 12, 13, 14 	Non - Compliant	No further action required.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
M6.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	Non - Compliant	The Warning Letter identifies that measures aimed at preventing a recurrence have already been enacted to the satisfaction of the DPE. Therefore, no further action is recommended.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
M7.1	For each discharge point or utilisation areas pecified below, the licensee must monitor:	Non - Compliant – Point 6 finding	NC at Point 6:	**Response Comments**: NC at Point 6	

<table>
<tr><th>Schedule and Condition Number</th><th>Condition</th><th>Compliance Status</th><th>Recommendations</th><th>Mt Arthur Coal Response/ Agreed Action</th><th>Status</th></tr>
<tr><td></td><td>a) The volume of liquids discharged to water or applied to the area;
b) The mass of solids applied to the area;
c) The mass of pollutants emitted to the air;
At the frequency and using the method and units of measure, specified below.
POINT 6<table><tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr><tr><td>Continuous during discharge</td><td>Megalitres per day</td><td>Weir structure and level sensor</td></tr></table>POINT 15<table><tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr><tr><td>Continuous during discharge</td><td>Kilolitres per day</td><td>Flow meter and continuous logger</td></tr></table></td><td>Observations (Obs C) – Point 15 finding</td><td>Since the flow meter was in working order during the discharge in July to November 2022, no further action is required.

C (Obs) at Point 15:

Auditors noted that the measurement at Point 15 is continuous but the records are not saved automatically. It is recommended that the site investigate a logging system where at least daily measurement is recorded. Alternatively, ensure manual record of reading is logged regularly, at a reasonable frequency.</td><td>No further action is required as Auditor verified that corrective actions have been implemented for NC at Point 6.

C (Obs) at Point 15:

MAC will investigate options for a logging system where a more regular measurement of flow rate is recorded at Point 1 and provide an update in FY24 Annual Review.

<u>Proposed Action Due Date:</u>

Action Completed

A new digital flow meter interface was installed at the discharge point during January 2024. The data from the flow meter has now been integrated into the on-site process control system where daily flow data is captured daily.</td><td>Complete</td></tr>
<tr><td>R1.1</td><td>The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
1 A Statement of Compliance
2 A Monitoring and Complaints Summary
3 A Statement of Compliance – Licence Conditions
4 A Statement of Compliance – Load Based Fee
5 A Statement of Compliance – Requirement to Prepare Pollution Incident Response Management Plan</td><td>Non - Compliant</td><td>Complete the Annual Returns as required.</td><td><u>Response Comments</u>:

Recommendation noted. MAC will complete comprehensive reviews prior to submitting annual reports.

No proposed action.

<u>Proposed Action Due Date:</u>

Not applicable.</td><td>No action required</td></tr>
</table>

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response/ Agreed Action	Status
	6 A Statement of Compliance – Requirement to Publish Pollution Monitoring Data; and 7 A Statement of Compliance – Environmental Management Systems and Practices At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.				
R2.1	R2.1 Notifications must be made by telephoning the Environment Line service on 131 555. R4.3 The Licensee must notify the EPA by telephoning the Environment Line service on 131 555 immediately after the Licensee becomes aware of any contravention or potential contravention of Condition L1 of the Licence.	Non - Compliant	Notify all incidents to the EPA Environment Line as required by this condition.	**Response Comments**: Please note that the events referred to in Table 3.2 (Page 36) of the ERM Final Report are not relevant to this non-compliance; all three events were reported correctly to the EPA. The relevant non-compliance is referred to in the body of the Report - Section 3.3. This finding is noted with no further action proposed as reporting was completed within a very short period. Mt Arthur has reported correctly on several occasions with one event delayed. **Proposed Action Due Date:** Not applicable.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response/ Agreed Action	Status
R4.2	The Licensee must report any exceedance of licence noise limits to the EPA Regulatory Operations Metro North at info@epa.nsw.gov.au as soon as practicable after the exceedance becomes known to the Licensee or to one of the Licensee's employees or agents.	Non - Compliant	Since the misalignment between EPL and Project Approval has been resolved, no further action is required.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
R5.5	The sewage treatment system maintenance program required by Condition O2.6 must be submitted annually to the EPA with the Annual Return.	Non - Compliant	No further action required.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
Ministers Conditions of Approval PA 09_0062					
Sch 3 - 9	The Proponent shall prepare and implement a Noise Management Plan for the Mt Arthur mine complex to the satisfaction of the Secretary. This plan must: a) Describe the measures that would be implemented to ensure compliance with the noise criteria and operating conditions in this approval; b) Describe the proposed noise management system in detail; and c) Include a monitoring program that: • Evaluates and reports on: -the effectiveness of the noise management system -compliance against the noise -criteria in this approval; and compliance against the noise operating conditions • Includes a program to calibrate and validate the real-time noise monitoring results with the attended monitoring results over time (so the real-time noise monitoring program can be used as a better indicator of compliance with the noise criteria in this approval and trigger for further attended monitoring); and • Defines what constitutes a noise incident, and includes a protocol	Non - Compliant	MAC has addressed the issue through additional training to the OCEs. No further action is required.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. In addition to the OCE training and in line with correspondence with DPE on the 18 October 2021 exceedance, Mt Arthur committed to upgrading the real-time noise monitoring network (to Environmental Noise Compass') to improve the quality of data by which decisions are made. The real time monitoring platform has also been upgraded to improve functionality and accessibility in the field for operational personnel. This work has been completed. **Proposed Action Due Date:** Not applicable.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
	for identifying and notifying the Department and relevant stakeholders of any noise incidents.				
Sch 3 - 27	Unless an EPL or the EPA authorises otherwise, the Proponent shall comply with Section 120 of the POEO Act and the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002.	Non - Compliant (Duplicate with EPL L1.1)	Remedial actions have already been undertaken and completed. No further action is recommended.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
Sch 3 - 29	The Proponent shall prepare and implement a Water Management Plan for the Mt Arthur mine complex to the satisfaction of the Secretary. This plan must: a) be prepared in consultation with NOW and the EPA; and b) include a: • Site Water Balance; •Erosion and Sediment Control Plan; • Surface Water Monitoring Program; • Groundwater Monitoring Program; and • Surface and Ground Water Response Plan.	Non - Compliant	Implement an inspection and maintenance program so that dam capacities and pipeline infrastructure are maintained.	**Response Comments:** MAC would like to propose no further action is required as corrective actions in line with recommendation have been implemented. This included the completion of significant expenditure to upgrade the relevant infrastructure (export area dam and site mine water pipelines) including the completion of a Pollution Reduction Study and Program via the EPL. Please also refer to EPL Condition L1.1 response above. The PRP that was recently completed included upgrades and re-routing of pipelines with offsite discharge risk. At the completion of this work package, the pipeline and dam inspection requirements were transitioned into business as usual, which consists of pipeline and dam inspections on a routine basis and additional inspections during wet weather.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
				Proposed Action Due Date: Not applicable.	
Sch 5 - 1	The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. The strategy must: (a) provide the strategic framework for environmental management of the project; (b) identify the statutory approvals that apply to the project; (c) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project; (d) describe the procedures that would be implemented to: • keep the local community and relevant agencies informed about the operation and environmental performance of the project; • receive, handle, respond to, and record complaints; • resolve any disputes that may arise during the course of the project; • respond to any non-compliance; • respond to emergencies; and (e) include: • copies of the various strategies, plans and programs that are required under the conditions of this	Non - Compliant	The Warning Letter identifies that measures aimed preventing a recurrence have already been enacted to the satisfaction of the DPE. Therefore, no further action is recommended.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
	approval once they have been approved; and • a clear plan depicting all the monitoring to be carried out in relation to the project.				
Sch 5 - 5	The Proponent shall establish and operate a CCC for the project to the satisfaction of the Secretary. This CCC must be established by the end of March 2011 and be operated in general accordance with the Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007, or its latest version). Notes • The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval. • In accordance with the Guideline, the Committee should comprise an independent chair and appropriate representation from the Proponent, affected councils and the general community.	Non - Compliant	MAC uploaded the missing information once notified and have continued to maintain the required information, up to date on the website since the incident. Therefore, no further action is recommended.	**Response Comments**: No further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**
Sch 5 - 11	From the end of December 2010, the Proponent shall: (a) make the following information publicly available on its website: • a copy of all current statutory approvals for the project; • a copy of the current environmental management strategy	Non - Compliant (Duplicate with Sch 5 - 5)	As per Sch 5 - 5	**Response Comments**: As per Sch 5 - 5 response, no further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:**	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
	and associated plans and programs; • a summary of the monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval; • a complaints register, which is to be updated on a monthly basis; • a copy of the minutes of CCC meetings; • a copy of any Annual Reviews (over the last 5 years); • a copy of any Independent Environmental Audit, and the Proponent's response to the recommendations in any audit; • any other matter required by the Secretary; and (b) keep this information up to date, to the satisfaction of the Secretary. (c) place a copy of the document/s on its website; and (d) remove superseded copies of strategies/plans/programs from its website.			Not applicable.	

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
Consolidated Coal Lease 744, Mining Leases 1358, 1548, 1593, 1655, 1739, 1757, 1487, Mining Purpose Lease 263 (7 October 2020 to 1 July 2022)					
CCL 744 (18) ML 1548 (16) ML 1593 (16)	CCL 744 (18), ML 1548 (16), ML 1593 (16) Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purposes of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard. ML 1655 (12) Prospecting operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. ML 1487 (25)	Non - Compliant (Duplicate with EPL L1.1)	N/A, refer to EPL L1.1	**Response Comments:** As per previous responses to EPL L1.1, no further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**

Schedule and Condition Number	Condition	Compliance Status	Recommendations	Mt Arthur Coal Response	Status
	The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse, groundwater or catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse, groundwater, or catchment area or any undue interference to fish or their environment.				
ML 1487 (33a)	Operations shall be carried out in such a way as not to cause any pollution of the Hunter River Catchment Area.	Non - Compliant (Duplicate with EPL L1.1)	N/A, refer to EPL L1.1	**Response Comments:** As per previous responses to EPL L1.1, no further action is required as the Auditor verified that corrective actions have been implemented for relevant events. **Proposed Action Due Date:** Not applicable.	**No action required**

11 Incidents and Non-Compliances

Workshop Drain Condition Warning Letter

During an inspection by the EPA on 1 December 2023 it was identified that several hardstand drainage grates (referred by the EPA as drainage pits) were partially clogged with sediment, rocks and workshop rubbish (i.e. bolts) and a drainage line contained items and rubbish. This was considered to be a failure to maintain the workshop drainage line and pits in a proper and efficient manner in accordance with EPL 11457 Condition O2.1(a).

The EPA issued a formal Warning Letter on 19 January 2024. No known pollution or environmental harm occurred because of the non-compliance and drains were cleared of all blockages as soon as possible. To prevent recurrence of this non-compliance the accountabilities for the drainage system and maintenance tasks were reviewed. Various routines were updated to prioritise the inspection and cleaning of drains, and the workshop inspection form was updated to include additional detail regarding expectations around drain condition.

<95% data capture at EPL Air Quality Monitoring Point

During the reporting period Mt Arthur Coal recorded <95% data capture at one EPL air quality monitoring point as required by EPL 11457 Condition M9.6, data capture rate as below.

- EPL Monitoring Point 13: 88.9%

The reason for the missed data capture was due to routine servicing / calibrations as well as a few minor technical issues and equipment malfunctions, and intermittent power outages. To prevent recurrence of non-compliance and increase valid data capture, Mt Arthur Coal conducts daily system checks on the PM10 air quality monitoring units. Regular maintenance and calibration are also carried out in accordance with the manufacturer's specifications. Mt Arthur will also undertake a detailed review to identify if there are any primary reasons for data capture failure at this monitoring point.

Sewage Treatment Plant (STP) Flow Capture

Mt Arthur Coal is required to capture the volume of liquids from the STP discharged to water or applied to an area as per EPL 11457 Condition M7.1. During the reporting period it was found that the STP flow meter ceased to continue totalisation of flow rate and as such, the data could not be recovered between 31 October 2023 and 16 January 2024. There is no known pollution or environmental harm that has occurred because of the non-compliance.

Based on previously captured data it was been estimated that the daily flow throughout the time where data was not available was expected to be between approximately 20 – 60kL / day.

As a short-term action, the broken flow meter was replaced with a digital flow meter. To prevent this from occurring again digital flow readings have been integrated into existing on-site process control systems including the development of an alarm notification if daily flow rate ceases. A preventative maintenance program will also be implemented to ensure new digital flow meter is maintained.

Mt Arthur Coal intends to initiate a licence variation to introduce a reasonable data capture rate percentage that considers routine maintenance and servicing requirements.

Additional STPs On-site

MAC recently identified 4 additional minor STP's that discharge to land/water on-site. It was previously understood that these facilities were pumped out and transferred to the main STP on-site, it has recently been confirmed this is not the case.

The issue was discussed with the EPA to understand reporting requirements for this Annual Return. The EPA advised that it was their opinion this should be reported as a non-compliance under conditions O2 and R5.5 as the records of maintenance could not be obtained for three of the four additional STPs.

HVEC will continue to consult with the EPA and will initiate a licence variation to capture requirements for all STPs on-site. This may include modification of the current licence conditions to align to the service and maintenance requirements of the various systems as they are all different in nature. HVEC is also investigating the possibility of decommissioning some of these STPs prior to the variation. Maintenance programs will be reviewed and updated after the variation.

Surface Water Trigger Exceedance

During the reporting period there was one reportable Surface Water trigger event. The event was reported to DPHI and is detailed in Section 7.3 and Appendix 1. Assessment determined that the trigger event was not caused by mining activities at Mt Arthur Coal and as such, it has not been captured in Section 1 Table 3 as a non-compliance.

Mt Arthur will continue to review trigger levels to ensure they are appropriate and where required revise the Site Water Management Plan.

Groundwater Trigger Exceedances

During the reporting period there were Groundwater Quality and Level trigger events. All trigger events reported to DPHI and are detailed in Section 0 and 0. Assessment by expert groundwater consultants determined that the trigger events were not caused by mining activities at Mt Arthur Coal and as such, they have not been captured in Section 1 Table 3 as non-compliances.

Mt Arthur will continue to review trigger levels to ensure they are appropriate and where required revise the Site Water Management Plan.

Air Quality Exceedances

During the reporting period, the short term 24-hour cumulative impact assessment criteria (50 µg/m^3) was exceeded 51 times at statutory TEOM monitoring sites over a total of 34 days. All exceedances of the cumulative criteria were reported to the DPHI, as recorded in Table 13.

Investigations, in accordance with the Mt Arthur Coal Air Quality Management plan, determined that the exceedances were not caused by mining activities at Mt Arthur Coal. In accordance with the site Air Quality Management Plan and the Project Approval, Mt Arthur Coal employed all reasonable and feasible avoidance and mitigation measures and as such, they have not been captured in Section 1 Table 3 as non-compliances.

12 Activities during Next Reporting Period

Mt Arthur Coal has established the following targets for the next reporting period:

- Mt Arthur Coal is investigating the possibility of incorporating fleet data into the DCS which will enable assessment of dust and noise emission risk based on fleet positions. This could improve reactive controls and reduce dust and noise emissions.
- Mt Arthur Coal will continue to investigate and, where feasible, implement projects to reduce fossil fuel energy consumption and greenhouse gas emissions in accordance with BHP's sustainability commitments, including the company's greenhouse gas emission targets.
- Mt Arthur Coal will finalise the multi-year project to install a new hydrocarbon remediation and management area.
- Mt Arthur Coal will continue to work through milestones for the project to replace and repair current boreholes and telemetry at boreholes for better monitoring capability.
- Mt Arthur Coal will update the Water Management Plan once the borehole upgrade project is to complete to ensure the most representative sampling and monitoring is being undertaken.
- Mt Arthur Coal will continue to work on a project to install additional water meters to the site water network. These will improve the understanding of water movement on site and consumption. The data will improve water model accuracy and allow for improved planning strategies and efficiencies in the water management system.
- Mt Arthur Coal will investigate and review the potential for a project to complete further tree planting for visual amenity purposes.
- Mt Arthur Coal will work with the EPA to undertake the 5-year Environment Protection Licence review.

These targets will be closely monitored and an update on the status of each will be reported in the next Annual Review. Table 43 outlines a progress summary of Mt Arthur Coal's performance against targets set for the FY24 period.

Table 43: Mt Arthur Coal's performance against targets for FY24

Target	Status	Performance
Mt Arthur Coal upgraded the site real time monitoring platform and technology to incorporate further user improvements. In FY24, further improvements will be made to incorporate data from the fleet management system as well as reviewing potential for real time forecasting and modelling. Mt Arthur Coal also intends to introduce a local and regional background calculation method to improve the assessment for the mine's incremental contribution.	Completed	Mt Arthur Coal introduced the local and regional background calculation method to enhance the accuracy of dust TARP alerts in FY24.
Mt Arthur Coal will continue to assess and upgrade real time monitoring sites to improve reliability and data capture rates across all real time monitoring including replacements of communication devices at monitoring sites including dust, noise, and blast.	Completed	In FY24 three noise compasses for unattended noise monitoring were integrated into the real-time noise management system (DCS), enhancing monitoring capabilities and performance. Additionally, the project to install new wind speed sensors & communication loggers at all environmental stations was completed. Replacement of communication devices for dust and noise monitoring will be carried out as needed moving forward. Communication loggers at all blast monitors were successfully upgraded for compatibility with the 4G network.
Mt Arthur Coal will continue to investigate and, where feasible, implement projects to reduce fossil fuel energy consumption and greenhouse gas emissions in accordance with BHP's sustainability commitments, including the company's greenhouse gas emission targets.	Ongoing	Ongoing review for projects to reduce fossil fuel consumption and GHG emissions.
Mt Arthur Coal will finalise the installation of a new hydrocarbon remediation and management area.	Ongoing	The new hydrocarbon management area project is still underway and expected to be complete in FY25.
Improvements to the mine water pipeline network will be completed in FY24 to reduce the risk of pollution of waters from mine water pipeline breaks in accordance with the PRP schedule.	Completed	PRP Complete
Mt Arthur Coal will commence a project to replace and repair current boreholes and telemetry at boreholes as required.	Ongoing	The project to replace and repair current boreholes was being executed throughout FY24. This project is expected to be complete in FY25.
Mt Arthur Coal will engage an air quality specialist to complete a quality check and review of the newly implemented real time monitoring system.	Completed	External specialists have assisted in the maintenance and optimisation of the DCS in FY24. Including recommendations for the installation of new wind sensors to improve the system reliability in low wind conditions.
Mt Arthur Coal will look to relocate a blast monitor to a more representative location following an acquisition.	Completed	The blast monitor was moved to a more representative location in FY24.
Mt Arthur Coal will update the Blast Management Plan and Environmental Protection Licence in accordance with the relocated blast monitoring site.	Completed	The Blast Management Plan and the Environmental Protection Licence were updated in accordance with the relocated site in FY24.

Target	Status	Performance
Mt Arthur Coal will undertake the next three yearly Independent Environmental Audit	Completed	Mt Arthur Coal undertook the three yearly IEA in FY24. See Section 10 for further details.
Mt Arthur Coal will install additional water meters to the site water network, these will improve the understanding of water movement on site and consumption. The data will improve water model accuracy and allow for improved planning strategies and efficiencies in the water management system.	Ongoing	This project is still underway and will continue to be worked on throughout FY25.
Mt Arthur Coal will continue to use remote sensing in the assessment of landform stability as part of the review of the REMP and complete the review of the aerial weed assessment.	Ongoing	It was determined that aerial weed assessment was not cost effective so was discontinued, however use of remote sensing for assessing vegetation is now being assessed. Erosion quantification monitoring using remote sensing is now utilised as business as usual.

Appendix 1 - Surface Water Quality Monitoring Results

Surface Water Quality Results

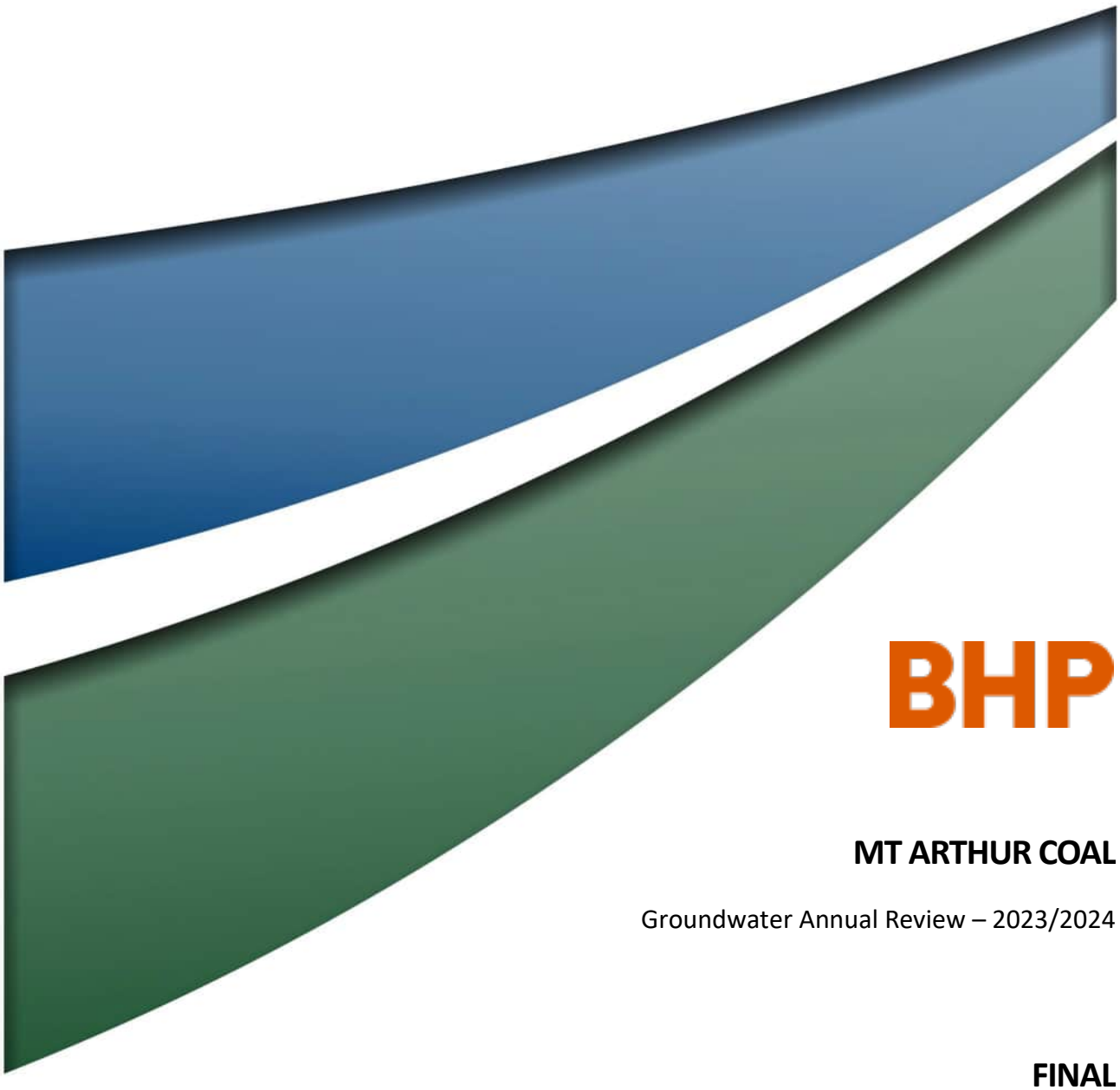
Site	Month	Date sampled	Flow (description)	Field pH	Field EC (uS/cm)	TSS (mg/L)
SW02	Jul-23	18/07/2023	Still	7.93	8920	<5
	Aug-23	16/08/2023	Still	8.42	8620	<5
	Sep-23	20/09/2023	Dry			
	Oct-23	17/10/2023	Dry			
	Nov-23	13/11/2023	Dry			
	Dec-23	18/12/2023	Dry			
	Jan-24	24/01/2024	Dry			
	Feb-24	22/02/2024	Dry			
	Mar-24	27/03/2024	Dry			
	Apr-24	23/04/2024	Dry			
	May-24	23/05/2024	Dry			
	Jun-24	18/06/2024	Too low to sample			
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**12365**	**219**
			Stage 2 Trigger		**13900**	**277**
SW03	Jul-23	18/07/2023	Still	7.98	8050	15
	Aug-23	16/08/2023	Still	7.98	8640	8
	Sep-23	20/09/2023	Still	8.46	8520	18
	Oct-23	17/10/2023	Still	7.58	8990	10
	Nov-23	13/11/2023	Still	7.76	8760	6
	Dec-23	18/12/2023	Still	7.59	9160	15
	Jan-24	24/01/2024	Still	7.50	9010	<5
	Feb-24	21/02/2024	Still	8.51	9210	12
	Mar-24	27/03/2024	Still	7.74	9330	9
	Apr-24	23/04/2024	Still	8.26	7020	14
	May-24	23/05/2024	Still	7.75	7890	14
	Jun-24	18/06/2024	Still	7.96	1929	<5
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**10133**	**37**
			Stage 2 Trigger		**11402**	**46**

Site	Month	Date sampled	Flow (description)	Field pH	Field EC (uS/cm)	TSS (mg/L)
SW04	Jul-23	18/07/2023	Trickle	7.92	7350	7
	Aug-23	16/08/2023	Trickle	8.08	7520	<5
	Sep-23	20/09/2023	Trickle	8.17	7550	16
	Oct-23	17/10/2023	Trickle	8.14	7670	14
	Nov-23	13/11/2023	Still	8.20	7890	11
	Dec-23	18/12/2023	Still	8.41	8200	27
	Jan-24	24/01/2024	Still	8.13	8190	8
	Feb-24	21/02/2024	Still	8.04	7140	15
	Mar-24	27/03/2024	Still	8.29	8440	20
	Apr-24	23/04/2024	Trickle	7.91	7980	11
	May-2	23/05/2024	Still	7.95	7590	10
	Jun-24	18/06/2024	Trickle	8.02	7680	6
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**13959**	**82**
			Stage 2 Trigger		**15509**	**104**
SW12	Jul-23	18/07/2023	Still	8.46	5840	51
	Aug-23	16/08/2023	Still	8.65	5950	65
	Sep-23	20/09/2023	Still	8.53	6310	39
	Oct-23	17/10/2023	Still	8.36	6750	19
	Nov-23	13/11/2023	Still	8.65	7330	30
	Dec-23	18/12/2023	Still	8.83	9700	87
	Jan-24	24/01/2024	Too low to sample			
	Feb-24	22/02/2024	Too low to sample			
	Mar-24	27/03/2024	Too low to sample			
	Apr-24	23/04/2024	Still	7.38	2468	10
	May-2	23/05/2024	Still	7.77	6860	284
	Jun-24	18/06/2024	Still	7.33	3800	<5
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**6659**	**555**
			Stage 2 Trigger		**7153**	**708**
SW15	Jul-23	17/07/2023	Dam			
	Aug-23	14/08/2023	Too low too sample			
	Sep-23	19/09/2023	Dry			
	Oct-23	16/10/2023	Dry			
	Nov-23	14/11/2023	Dry			
	Dec-23	12/12/2023	Dry			
	Jan-24	22/01/2024	Too low to sample			
	Feb-24	21/02/2024	Too low to sample			
	Mar-24	25/03/2024	Dry			
	Apr-24	22/04/2024	Dam sample	7.29	1338	10
	May-2	21/05/2024	Too low to sample			
	Jun-24	17/06/2024	Dam sample	7.14	411	48
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**6.5< >9.0**	**7128**	**103**
			Stage 2 Trigger		**8262**	**130**
SW34	Jul-23	18/07/2023	Steady	8.23	739	12
	Aug-23	16/08/2023	Steady	8.24	798	21
	Sep-23	20/09/2023	Slow	8.44	815	20
	Oct-23	17/10/2023	Steady	7.98	644	24
	Nov-23	13/11/2023	Steady	8.02	645	20
	Dec-23	18/12/2023	Steady	7.91	501	28
	Jan-24	24/01/2024	Steady	8.19	579	27

	Feb-24	22/02/2024	Steady	8.04	560	7
	Mar-24	27/03/2024	Steady	8.04	439	13
	Apr-24	23/04/2024	Steady	8.12	557	18
	May-24	23/05/2024	Steady	8.04	726	10
	Jun-24	18/06/2024	Steady	8.17	565	8
	Impact Assessment Criteria Trigger Values		**N/A**	**N/A**	**N/A**	**N/A**
SW35	Jul-23	18/07/2023	Steady	8.17	832	18
	Aug-23	16/08/2023	Steady	8.39	835	20
	Sep-23	20/09/2023	Steady	8.81	833	20
	Oct-23	17/10/2023	Steady	8.26	722	30
	Nov-23	13/11/2023	Steady	8.20	722	21
	Dec-23	18/12/2023	Steady	8.13	563	35
	Jan-24	24/01/2024	Steady	8.27	645	14
	Feb-24	22/02/2024	Steady	8.11	486	24
	Mar-24	27/03/2024	Steady	8.12	454	18
	Apr-24	23/04/2024	Steady	8.22	624	19
	May-24	23/05/2024	Steady	8.19	818	11
	Jun-24	18/06/2024	Steady	8.21	525	8
	Impact Assessment Criteria Trigger Values		**Stage 1 Trigger**	**7.8< >8.5**	**893**	**54**

Appendix 2 Ground Water Monitoring Results and Groundwater Level Drawdown Analysis

umwelt
Environmental & Social Consultants



BHP

MT ARTHUR COAL

Groundwater Annual Review – 2023/2024

FINAL

August 2024

MT ARTHUR COAL

Groundwater Annual Review – 2023/2024

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
BHP

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Report No.	21576/R31
Date:	August 2024

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Prepared By		Approved for Issue	
	Name	Date	Name	Date
V1 Draft	K Cooksey	15/08/2024	I Unsworth	19/08/2024
V2 Final	K Cooksey	30/08/2024	K Cooksey	30/08/2024

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1.0 Introduction

1.1 Overview

The Mt Arthur Coal (MAC) mine is located approximately 5 km southwest of Muswellbrook within the Muswellbrook Shire Local Government Area (LGA) in the Upper Hunter Valley of NSW. MAC sits within 15 mining leases and consists of open cut pits, tailings storage facilities, a coal handling preparation plant, a rail loop and associated rail loading facilities, in addition to an approved underground operation. Over 2023 and 2024 open cut mining continued at MAC, progressing down-dip to the southwest. Mining occurred in the Windmill, Calool, Roxburgh, Ayredale and Saddlers pits.

The Water Management Plan (WMP) covers approval commitments in Project Approval 09_0062 MOD1 and conditions of Environment Protection Licence 11457. This includes requirements for the monitoring of groundwater, assessment of potential impacts and reporting.

Umwelt has been engaged to undertake a review of the groundwater monitoring data collected from 1 July 2023 to 30 June 2024 (reporting period). This report has been prepared to address conditions of approval relating to groundwater, and as a requirement of MAC's 2023/2024 Annual Review.

1.2 Groundwater Management Plan

The WMP includes a Groundwater Monitoring Program, in accordance with Schedule 3 Condition 29 and 33 of Project Approval 09_0062. The Groundwater Monitoring Program outlined in Section 9.3 of the WMP details the monitoring methodology, monitoring locations, frequency impact assessment criteria (water levels and quality), mine inflows/licensing, impacts to private bores and groundwater dependent ecosystems (GDEs), cut-off wall and flood levee monitoring and monitoring records.

In 2020 an updated numerical groundwater model was developed by SLR (2020), which was calibrated with observation data to June 2020. The predictions for approved operations from the updated numerical model were used to inform the proposed water level triggers. The groundwater monitoring locations, schedule and triggers from the WMP are presented in **Appendix A** and discussion on the network included in **Section 3.1**.

The threshold criteria as outlined in Section 10 Response Plan of the WMP is included in **Table 1.1**.

Table 1.1 Surface Water and Groundwater Exceedance Protocol (BHP, 2023)

Impact Assessment Criteria	Exceedance Criterion	Exceedance Response
pH surface water or groundwater quality	Measured values that are outside the trigger level shall trigger the exceedance response.	Step 1: Quality assurance check of the sampling procedure and analytical data acquired, reported and entered. Step 2: For a single exceedance of the trigger value, no further action is required other than to record the exceedance. If the trigger value of the same parameter is exceeded at the same location for **three consecutive monitoring periods**, then the actions required for exceedance of the trigger values should be carried out.

Impact Assessment Criteria	Exceedance Criterion	Exceedance Response
		Step 3: Consult with the DPE to determine if a written report on the exceedance will be required and implement identified corrective/preventative actions.
pH surface water or groundwater quality	pH values recorded outside the trigger level range for three consecutive monitoring periods shall trigger the groundwater quality exceedance response.	Step 1: Notify the DPE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance of information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, and the trigger level is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPE to determine if a written report on the exceedance will be required and implement identified corrective/preventative actions.
Electrical Conductivity (EC) **Stage 1 surface water or groundwater quality**	Measured values that are above the Stage 1 trigger level shall trigger the exceedance response.	Step 1: Quality assurance check of the sampling procedure and analytical data acquired, reported and entered. Step 2: For a single exceedance of a 1st stage trigger value, no further action is required other than to record the exceedance. If the 1st stage trigger value of the same parameter is exceeded at the same location for **three consecutive monitoring periods**, then the actions required for exceedance of the 2nd stage trigger values should be carried out.
Electrical Conductivity (EC) **Stage 2 surface water or groundwater quality**	Measured values above Stage 1 trigger levels for three consecutive monitoring periods shall trigger the exceedance response. Measured values above Stage 2 trigger levels for two consecutive monitoring periods shall trigger the exceedance response.	Step 1: Notify the DPE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance of information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, and the trigger level is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPE to determine if a written report on the exceedance will be required and implement identified corrective/preventative actions.
Total Suspended Solids **Stage 1 surface water**	Measured values that are above the Stage 1 trigger level shall trigger the exceedance response.	Step 1: Quality assurance check of the sampling procedure and analytical data acquired, reported and entered. Step 2: For a single exceedance of a 1st stage trigger value, no further action is required other than to record the exceedance. If the 1st stage trigger value of the same parameter is exceeded at the same location for **three consecutive monitoring periods**, then the actions required for exceedance of the 2nd stage trigger values should be carried out.
Total Suspended Solids **Stage 2 surface water**	Measured values above Stage 1 trigger levels for three consecutive monitoring periods shall trigger the exceedance response.	Step 1: Notify the DPE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance of information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, and the

Impact Assessment Criteria	Exceedance Criterion	Exceedance Response
	Measured values above Stage 2 trigger levels for two consecutive monitoring periods shall trigger the exceedance response.	trigger level is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPE to determine if a written report on the exceedance will be required and implement identified corrective/preventative actions.
Groundwater Level	Any monitoring bore groundwater level or vibrating wire piezometer groundwater head pressure recorded below the trigger level for three consecutive monitoring periods shall trigger the groundwater level exceedance response.	Step 1: Notify the DPE of an 'interim exceedance' as soon as practicable after becoming aware of the exceedance and relevant information required for the notification is confirmed (including preliminary quality assurance information). Step 2: If quality assurance check of the sampling procedure and analytical data acquired, reported and entered, and the trigger level is still exceeded, then an investigation of the exceedance should be carried out and reasons for the exceedance identified. Step 3: Consult with the DPE to determine if a written report on the exceedance will be required and implement identified corrective/preventative actions.

2.0 Hydrogeological Setting

2.1 Climate

The climate within the MAC area is sub-tropical, with temperatures, rainfall and evaporation highest over the summer months of December to February. Climate data was obtained from the Scientific Information for Land Owners (SILO) database of historical climate records for Australia hosted by the Department of Environment and Science (DES). This service interpolates raw rainfall and evaporation records obtained from the Bureau of Meteorology (BOM), with data gaps addressed through data processing in order to provide a spatially and temporally complete climate dataset.

Climate data was obtained for a SILO grid point (Latitude -32.35, Longitude 150.85) at MAC between 01/01/1900 to 30/06/2024. A summary of rainfall data for SILO is presented in **Table 2.1**. The historical average rainfall data indicates slightly higher rainfall over the summer months, from December to February. Based on the SILO dataset, the historical average annual rainfall is 610.9 mm.

Table 2.1 Monthly Rainfall (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Historical Average	72.2	65.2	56.9	43.1	36.6	46.1	43.3	37.1	41.8	49.3	57.4	61.9	**610.9**
2023	-	-	-	-	-	-	13.6	31.7	15.9	40.0	40.8	74.7	**633.3**
2024	44.2	57.4	38.9	126.3	61.2	88.6	-	-	-	-	-	-	

Note: Based on SILO dataset date range January 1900 to June 2024.

The SILO database provides the most complete long-term dataset and is therefore the most useful for assessing long term rainfall trends in the vicinity of MAC. Monthly records from the SILO dataset were used to calculate the Cumulative Rainfall Departure (CRD). The CRD shows graphically trends in recorded rainfall compared to long-term averages and provides a historical record of relatively wet and dry periods. A rising trend in slope in the CRD graph indicates periods of above average rainfall, whilst a declining slope indicates periods when rainfall is below average. A level slope indicates average rainfall conditions.

Figure 2.1 shows the CRD and total monthly rainfall. The graph indicates the area has generally experienced a period of relatively average rainfall from 2000 to 2007. Above average rainfall was experienced from 2007 to 2017. From 2017 to 2020 the area experienced below average rainfall and between the start of 2020 and the end of 2022 area experienced above average rainfall. In 2023, rainfall was predominantly below average, followed by above average rainfall from April 2024 onwards.

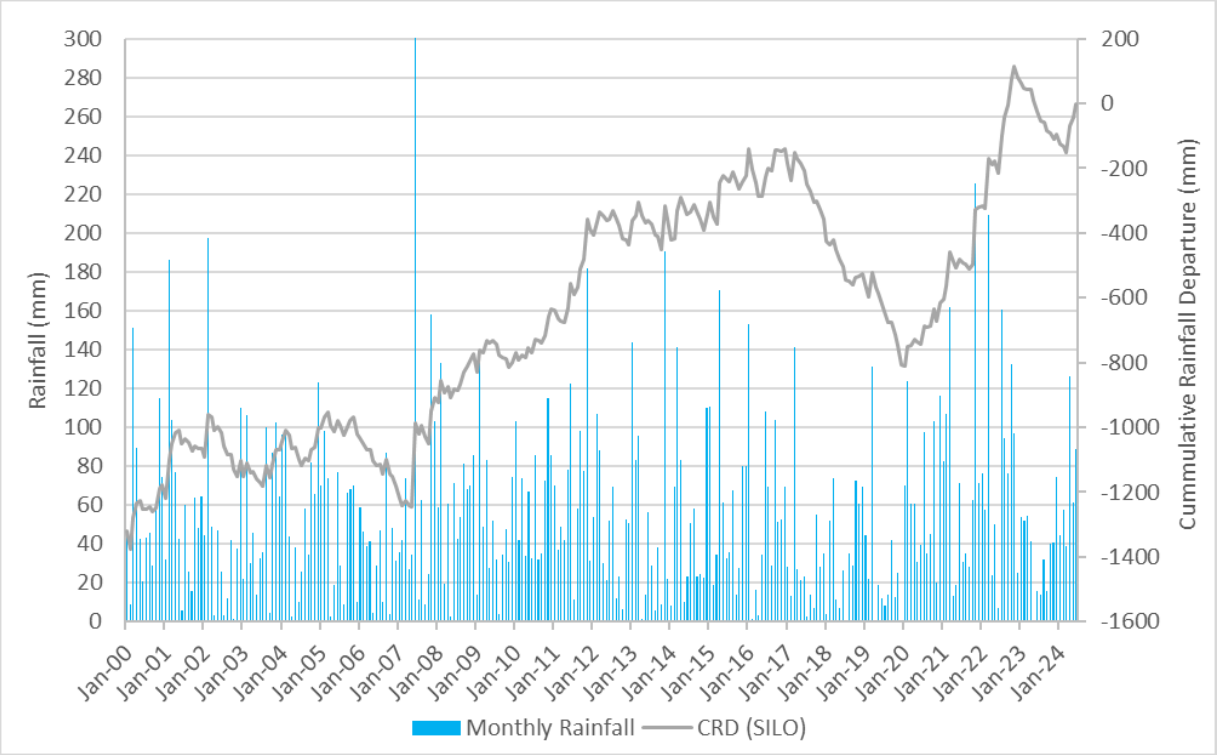


Figure 2.1 SILO Monthly Rainfall and CRD

2.2 Terrain and Drainage

The surface topography at MAC varies between approximately 127 metres (m) Australian Height Datum (AHD) to the northwest of the site along Whites Creek and rises up to a maximum of approximately 465 mAHD on the top of Mt Arthur to the south of the site. Within MAC, the surface areas are drained by Saddlers Creek and its tributaries to the southeast, as well as Quarry Creek, Whites Creek and Ramrod Creek that all flow towards the Hunter River.

Saddlers Creek is an ephemeral creek that is around 5 to 10 m wide and consists of sand, silt and scattered woody debris (EcoLogical, 2019). Historical mining at Drayton truncated the upper reaches of Saddlers Creek, which previously had a catchment of approximately 78 km^2. The creek bed is dry much of the year, with shallow (20 cm) isolated pools of water (Hydrosimulations, 2019). Historically, high flow events occurred in response to rainfall events, with available data indicating the majority of stream flow occurred in the summer months, from January to March, with negligible flows from July to December.

Within the region, the Hunter River is around 20 m to 50 m wide and flows in a predominantly southerly direction with meanders to the east and west. Flows within the Hunter River are monitored at gauging stations under the Hunter Integrated Telemetry System (HITS) operated by WaterNSW. Based on flow data recorded between 1913 and 2024, the Hunter River has perennial flows, ranging between 0 ML/day and 175,834 ML/day, with an average flow of 800 ML/day. Over the reporting period flows recorded at HITS gauging station 210002 ranged between 50 ML/day and 28,162 ML/day, with an average flow of 1,083 ML/day. There were no high flow/flood events, with flows over 10,000 ML/day, during the reporting period. However, on 3 June 2024 a peak flow of 5,711 ML/day was recorded, as shown in **Figure 2.2**.

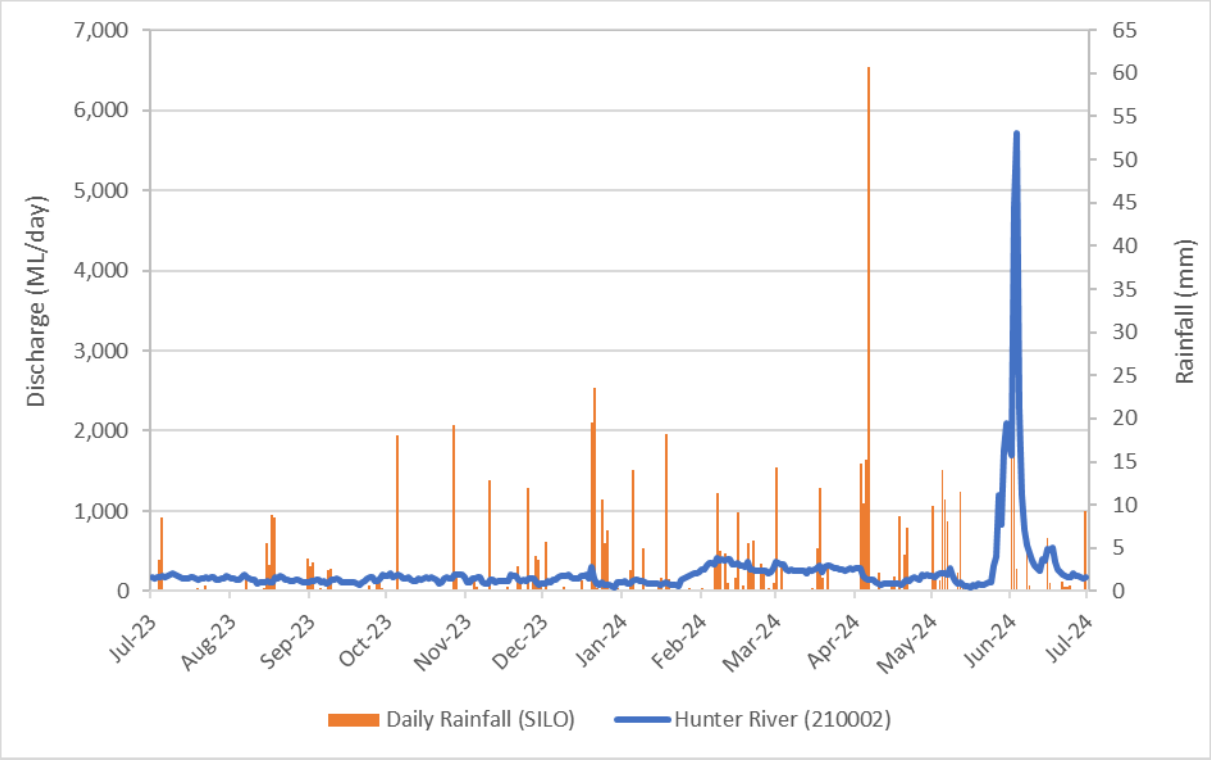


Figure 2.2 Hunter River Flow and Daily Rainfall Over Monitoring Period

2.3 Hydrogeology

2.3.1 Hunter River Alluvium

The Hunter River alluvium generally comprises surficial clays underlain by sands and gravels. The alluvium can be variably saturated spatially and temporally, with unconfined groundwater conditions and fresh to brackish water quality. The alluvium is recharged from rainfall and streamflow. The water levels in the alluvium are generally 5 to 10 m below surface and approximately 2 m below the base of the Hunter River, indicating variable losing conditions depending on peak flood events. There is also potential for upward seepage from the underlying Permian coal measures where gradients enable this.

Groundwater flow in the alluvium generally follows the Hunter River flow direction and topography.

2.3.2 Saddlers Creek Alluvium

The Saddlers Creek alluvium is unconfined and recharged from occasional streamflow and rainfall, with potential recharge from water storage in localised areas. The alluvium also potentially receives upward seepage from the underlying coal measures, with coal seams occurring at subcrop beneath the alluvium.

The water levels in the alluvium have been recorded around 3 m to 10 m below surface, indicating losing conditions. However, gaining conditions can occur downstream near the confluence with the Hunter River. The water quality in the alluvium along Saddlers Creek has been characterised as moderately saline (SLR, 2020b).

2.3.3 Permian Coal Measures

The Permian coal measures include the hydraulically 'tight' interburden sequences of siltstone and sandstone, and the coal seams that exhibit secondary porosity associated with the fractures and cleats in the coal. The coal measures occur at subcrop in the north and east of MAC where groundwater conditions are semi-confined, becoming confined with depth. The coal measures are recharged by rainfall and downward seepage from overlying alluvium, regolith and spoil. Groundwater flow in the coal measures is locally influenced by mining at MAC, Drayton and Bengalla, but is generally towards the south. The water quality is moderately saline (SLR, 2020b).

3.0 Groundwater Monitoring Program

3.1 Groundwater Monitoring Network

The groundwater monitoring network at MAC is comprised of a series of monitoring bores and vibrating wire piezometers (VWPs).

The groundwater monitoring network outlined within the WMP, shown in **Figure 3.1** and detailed in **Appendix A**, includes:

- 22 monitoring bores, including:
    - two bores along Saddlers Creek alluvium
    - six bores within Hunter River alluvium
    - three bores in the Saddlers Creek shallow Permian (regolith)
    - eleven monitoring bores predominantly targeting coal seams down to the Ramrod Creek Seam.
- Six VWPs with sensors in the interburden and coal seams, including:
    - two sites around the mapped F4 fault with a sensor in the fault zone at 216.5 mbgl (VWP2_P1), and a sensor in the Edinglassie Seam at 227 mbgl (VWP3_P1)
    - four sites (VWP05, VWP06, VWP07 and X1) southwest of MAC open cut with sensors in the different coal seams.

Monitoring of groundwater levels and groundwater quality is undertaken at the bores detailed in the WMP, and defined below:

- Groundwater Level (22 bores):
    - Manual groundwater elevation/depth to groundwater every three months.
    - Timeseries groundwater level data is recorded with data loggers installed in selected alluvial bores, as indicated in **Appendix A**.
    - VWP data logger download, and verification and validation of instrument drift and correction.
- Groundwater Quality Analysis (19 bores):
    - Standard – quarterly: Field readings of water temperature, pH and EC, as well as laboratory analysis of pH, EC, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), dissolved iron, sulphate, chloride, calcium, magnesium, potassium, sodium, carbonate and bicarbonate.
    - Comprehensive – annually: the standard analyses with the addition of total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc. All metals and metalloids required as dissolved analytes.

Groundwater quality sampling is undertaken quarterly by external contractor Carbon Based Environmental Pty Ltd (CBE) in accordance with *AS 5667.1-1998*, *Guidance on the Sampling of Groundwater's*. Field sheets, detailing the sample location, date, time, field EC, field pH and water level below top of casing are completed by CBE during each monitoring round. The field sheets and database compiled by CBE have been reviewed by Umwelt for this report.

3.2 Data Recovery

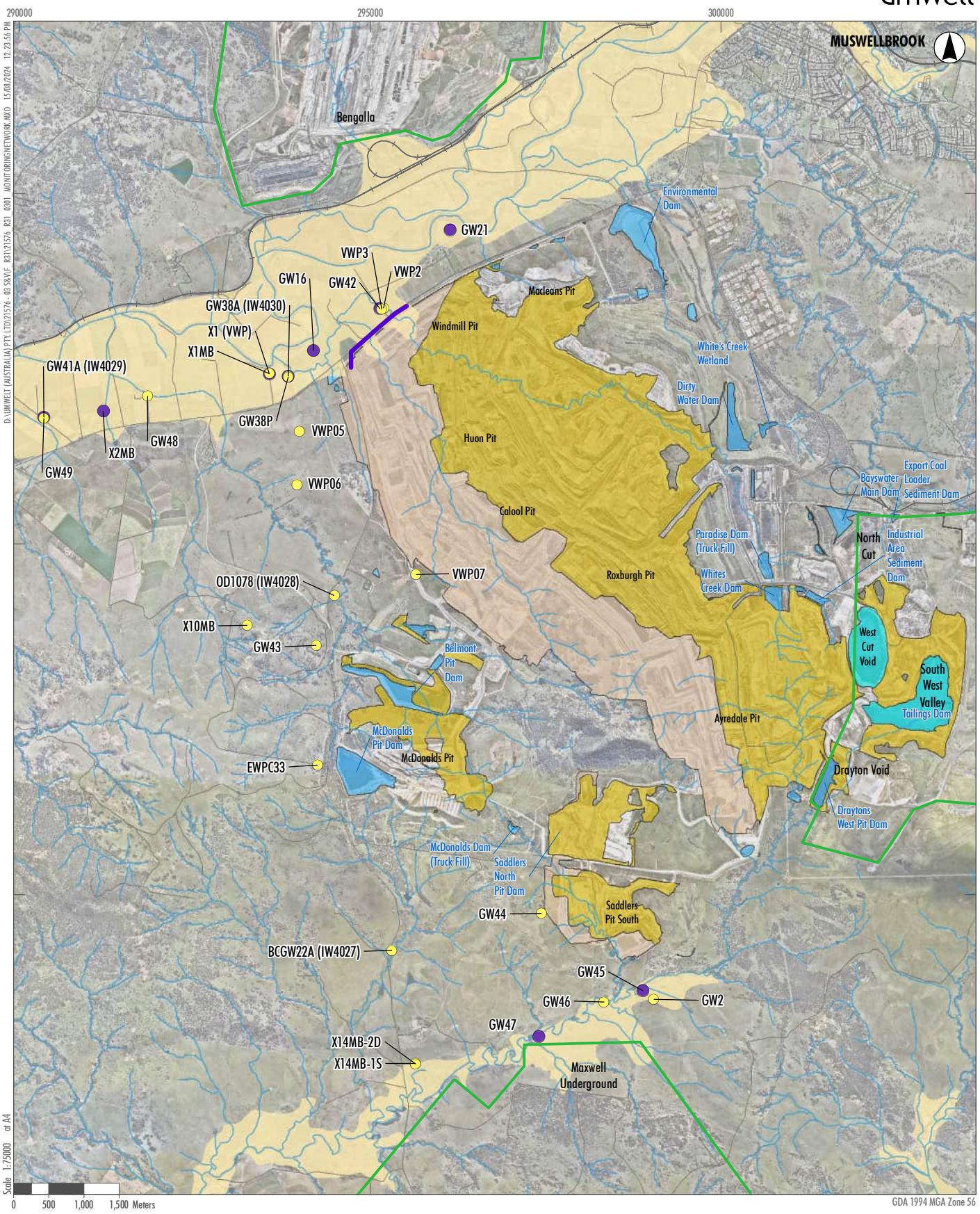
The WMP specifies the monitoring frequency and trigger levels for groundwater level and groundwater quality for the monitoring network. This includes water quality monitoring at 19 bores and water level monitoring at 28 sites, which includes 22 bores and six VWPs.

Groundwater levels in all of the 22 monitoring bores specified in the WMP were monitored over the reporting period. VWP sites VWP2, VWP3, VWP05, VWP06, VWP07 and X1 were operational over the reporting period.

Of the 19 bores included for water quality monitoring schedule, 19 were sampled. Sites with a data capture rate less than 100 per cent are outlined in **Table 3.1**.

Table 3.1 Groundwater Monitoring Data Recovery

Bore/VWP ID	Type	Data Recovery	Comment
OD1078 (IW1028)	Water Level	75%	Not measured in Q4 as the paired bore OD1078-Piezo has likely been measured in error instead



Legend

- Surrounding Mines
- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Tailings Storage Facility
- Water Management - Dam
- Alluvium Extent
- Cut-off Wall
- Railway
- Roads
- Watercourse
- Alluvium Monitoring Bore
- Permian Coal Measure Monitoring Bore

FIGURE 3.1

Groundwater Compliance Monitoring Network (July 2023 to June 2024)

Image Source: Nearmap (May 2022) Data source: Qspatial (2021)

4.0 Groundwater Levels

Groundwater levels for the WMP compliance bore network, as shown in **Figure 3.1** are summarised in **Table 4.1**. Details of the compliance bore network presented in **Appendix A** summarises:

- Bore details including surveyed location, elevation, depth and target formation.
- Groundwater levels measured in each bore (initial measurement, July 2023 and June 2024).
- Change in groundwater levels since records commenced and for the period July 2023 to June 2024.
- Groundwater levels predicted by the numerical model for July 2023 to June 2024.
- Difference in groundwater levels predicted by the numerical model and measured in the monitoring network.

Groundwater level graphs showing manual dip and continuous logger data are presented in **Appendix B**.

Table 4.1 Groundwater Level Monitoring Results Over Reporting Period

Bore ID	Depth to Water (mAHD)				
	Trigger Level	Q1	Q2	Q3	Q4
Hunter River Alluvium					
GW16	*119.0*	122.28	120.02	122.17	122.35
GW21	*118.3*	126.55	126.50	126.62	126.71
GW38A (IW4030)	*119.7*	122.28	122.07	121.93	121.97
GW41A (IW4029)	*116.7*	119.52	119.38	119.42	119.43
X1MB	*118.7*	121.57	121.46	121.41	121.47
X2MB	*117.9*	120.44	120.33	120.21	120.24
Saddlers Creek Alluvium					
GW45	*137.7*	142.50	145.29	141.82	141.67
GW47	*126.9*	130.18	129.88	129.71	129.87
Saddlers Creek Shallow Permian					
BCGW22A (IW4027)	*136.6*	140.31	140.09	140.03	140.52
GW46	*132.5*	136.45	136.12	135.81	136.02
X14MB-1S	*114.5*	119.25	119.03	119.51	119.41
Permian Coal Measures					
EWPC33	*190.4*	199.86	199.48	199.03	198.82
GW2	*140.0*	145.77	145.39	145.05	144.98
GW38P	*117.3*	121.40	121.38	121.44	121.98
GW39P-25mm	*117.2*	120.60	120.51	120.43	120.48
GW43	*166.8*	170.23	169.18	169.07	169.11
GW44	*65.6*	99.15	99.12	98.34	95.65
GW48	*115.9*	119.96	119.80	119.70	119.78
GW49	*115.8*	119.25	119.14	119.00	119.01
OD1078 (IW4028)	*132.9*	135.50	135.18	134.69	**117.19**
X10MB	*179.6*	188.21	187.68	187.15	186.82
X14MB-2D	*116.1*	124.16	123.74	124.84	122.68

Bore ID	Depth to Water (mAHD)				
	Trigger Level	Q1	Q2	Q3	Q4
Permian Coal Measures - VWPs					
VWP2_P1	*-64.4*	-0.87	-2.15	-2.15	-2.91
VWP3_P1	*-46.5*	-5.09	-7.42	-11.31	-11.24
VWP05_164	*-46.2*	38.24	37.98	37.09	38.91
VWP05_192	*-29.1*	35.50	34.40	33.85	32.91
VWP05_227	*-74.1*	31.63	30.34	29.73	28.57
VWP06_269	*-15.3*	59.76	55.59	53.68	50.76
VWP06_304	*-59.8*	46.92	42.31	40.52	38.12
VWP06_366	*-4.5*	48.31	44.83	43.23	41.26
VWP07_223	*64.7*	83.10	79.10	78.3	76.50
VWP07_271	*57.3*	81.10	75.30	73.4	72.40
VWP07_286	*-17.1*	78.80	75.80	72.9	71.00
VWP07_326	*-91.3*	73.50	71.20	69.7	68.60
VWP07_418	*142.3*	**82.22**	**76.77**	**77.73**	**79.71**
X1_S-1 (35)	*97.6*	100.74	99.84	98.94	99.82
X1_S-2 (59)	*91.0*	**90.50**	**90.30**	**89.70**	**89.39**
X1_S-3 (128.5)	*24.6*	51.64	53.94	55.34	55.76
X1_S-4 (164)	*16.1*	41.84	41.04	40.24	38.67
X1_S-5 (215)	*-31.7*	56.34	55.14	53.94	52.84
X1_S-6 (255)	*-55.6*	-16.66	-17.66	-21.96	-24.93
X1_S-7 (276.5)	*-64.6*	-23.66	-23.86	-29.66	-30.38

Note:

** Exceedance based on 2023 Impact Assessment Criteria (less than 3 readings).*

** Exceedance based on 2023 Impact Assessment Criteria (3 consecutive readings).*

** EC exceedance based on 2023 Impact Assessment Criteria - Second Stage (1 reading).*

4.1 Drawdown

The calculated total drawdown is based on the difference between the first recorded groundwater level compared to levels recorded in June 2024 measured at each bore, as shown in the table in **Appendix C**. A negative value represents a decline in water levels, while a positive value represents a rise in water levels over the reporting period. **Figure 4.1** shows the change in groundwater levels in the alluvium, **Figure 4.2** shows the change in groundwater levels within the shallow Permian and **Figure 4.3** shows the change in groundwater levels the Permian coal measures.

There has generally been a negligible change in water levels within the Hunter River alluvium, as shown in **Figure 4.1**. However, the change in total drawdown did vary spatially, with bores GW16 and GW21, recording a minor decline in levels, while bores further to the west (GW41A (IW4029) and X2MB) recorded a slight increase in water levels. It is noted that bore X1MB recorded a minor increase in water levels where as bore GW38A (IW4030), 300 m to the southeast, recorded a minor decline in water levels. It should be noted that the total drawdown recorded in bores GW16 and GW21 covers a much larger time frame (25 years) compared to bores GW38A (IW4030) and GW41A (IW4029) (eight years) and X1MB and X2MB (four years).

Groundwater levels in the alluvial bores along Saddlers Creek have fluctuated over time, potentially in response to rainfall trends, with an overall increasing trend in groundwater levels since the end of 2020. However, since monitoring began in 2016 there has been an overall minor decline in water levels (drawdown) within the Saddlers Creek alluvium (**Figure 4.1**) but less than predicted by the 2020 groundwater model. Total drawdown varied spatially, with bore GW45, located in the upper reaches of Saddlers Creek, recording the most drawdown in the Saddlers Creek alluvium. The model predicted drawdown for of 2.71 m between 2016 and 2024 for GW45; however, the total measured drawdown over the same period was 0.79 m. Therefore, the model predicted more drawdown than has occurred. The total drawdown between July 2023 and June 2024 was 0.54 m, with levels fluctuating slightly in response to climatic conditions.

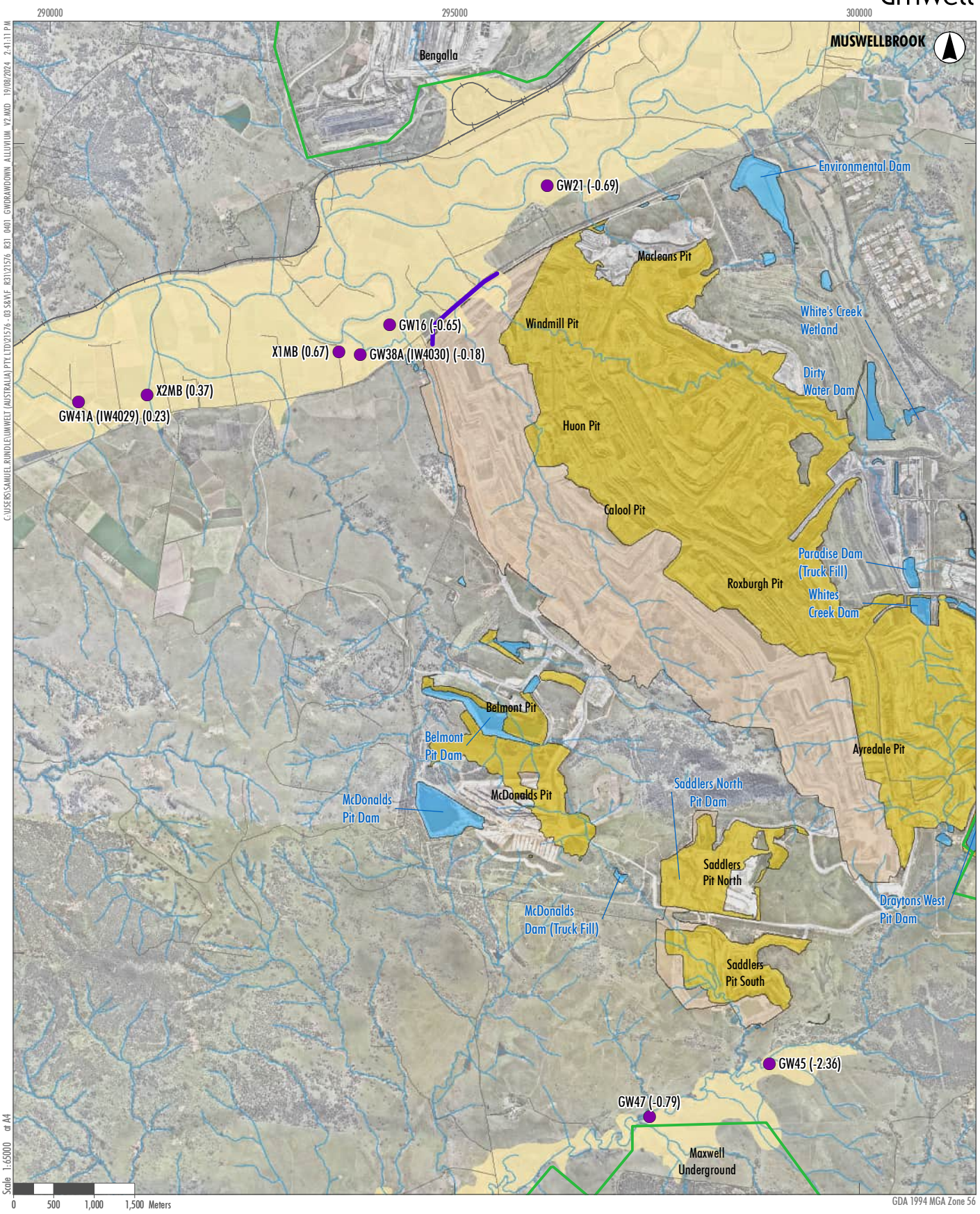
There has been a decline in groundwater levels within the Saddlers Creek shallow Permian (regolith), as shown in **Figure 4.2**. Bore X14MB-1S, located to the north of Saddlers Creek, recorded the most drawdown. In comparison, deeper paired bore X14MB-2D screened within the Glen Munro Seam, recorded an increase in water levels (i.e., no drawdown).

Figure 4.3 shows, with the exception of bores EWPC33, GW48, GW49, X10MB and X14MB-2D, there was a general decline in groundwater levels within the Permian coal measures to the southwest of open cut operations, showing a response to the progression of mining to the southwest. However, in-pit water storage (Belmont, MacDonald and Saddlers pits) potentially buffers the extent of drawdown in localised areas.

4.2 Trigger Exceedances

Groundwater level data collected over the reporting period have been compared to the trigger values outlined in the WMP. Over the monitoring period bores VWPs VWP07 (Ramrod Creek Seam) and X1 (Mt Arthur Seam) recorded groundwater level exceedances between July 2023 and March 2024. A summary of the exceedances is presented in **Table 4.2**.

It is noted that the water level in bore OD1078 (IW4028) was below the trigger level in June 2024 (Q4) as shown in **Table 4.1**; however, this is likely a reading from paired bore OD1078-Piezo instead of a reading from OD1078 (IW4028). It is recommended the total depth of each bore is checked during monitoring to confirm the correct bore is being monitored.



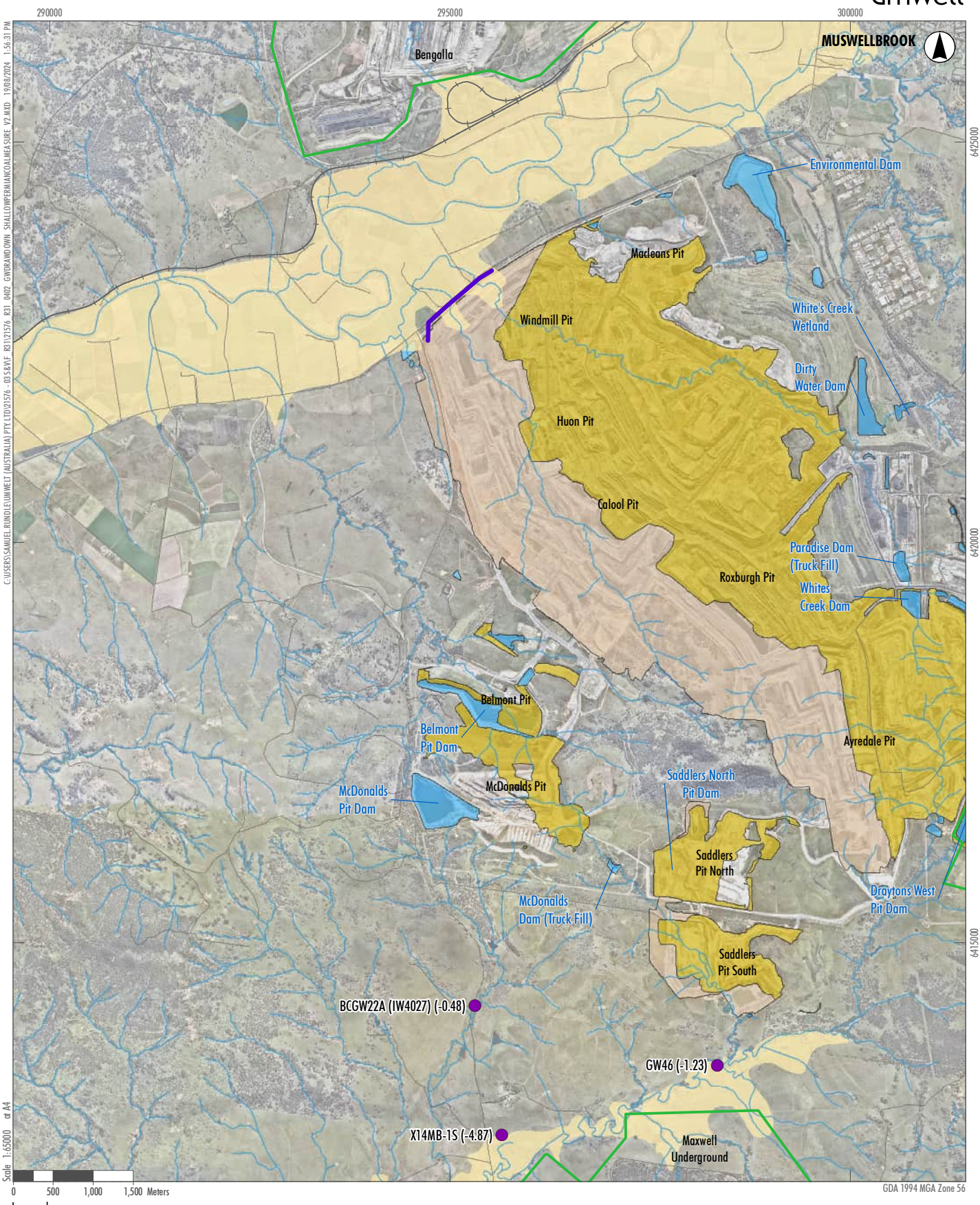
Legend

- Surrounding Mines
- Cut-off Wall
- Alluvium Extent
- Alluvium Monitoring Locations
- Railway
- Roads
- Watercourse
- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Water Management - Dam

FIGURE 4.1

Total Groundwater Drawdown to June 2024
Alluvium

Image Source: Nearmap (May 2022) Data source: NSW DFSI (2021)



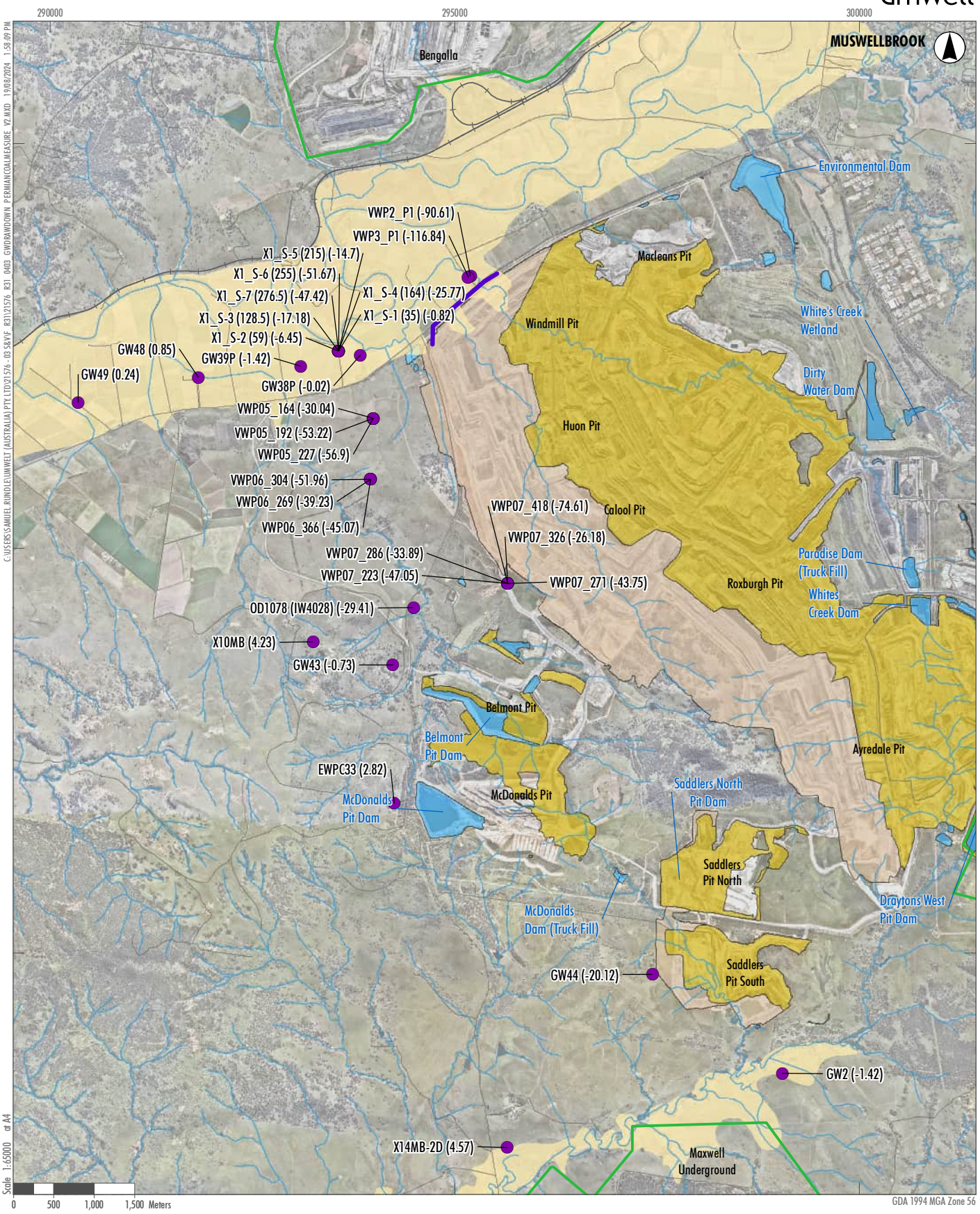
Legend

- Surrounding Mines
- Cut-off Wall
- Alluvium Extent
- Shallow Permian Coal Monitoring Locations
- Railway
- Roads
- Watercourse
- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Water Management - Dam

FIGURE 4.2

Total Groundwater Drawdown to June 2024
Shallow Permian Coal Measures (Regolith)

Image Source: Nearmap (May 2022) Data source: NSW DFSI (2021)



Legend

- Surrounding Mines
- Cut-off Wall
- Alluvium Extent
- Permian Coal Monitoring Locations
- Railway
- Roads
- Watercourse
- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Water Management - Dam

FIGURE 4.3

Total Groundwater Drawdown to June 2024
Permian Coal Measures

Image Source: Nearmap (May 2022) Data source: NSW DFSI (2021)

Table 4.2 Groundwater Level Trigger Exceedances

Bore ID	Exceedance	Screened Lithology	Location	Comment	Action
VWP07_418	Pressure level reading below trigger level of: 142.3 mAHD In the Ramrod Creek Seam since June 2023	Ramrod Creek Seam	On site, 200 m west of MAC open pit (Windmill Pit)	Levels in the Ramrod Creek Seam, recorded in VWP07_418, have exceeded the trigger level since June 2023, when the revised trigger level was implemented (refer **Figure 4.4**). The continuing declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations by SLR (2020). The SLR (2020) model predicted continued drawdown in this area with simulated water levels in all seams (refer **Figure 4.5**). However, observed water levels have declined at a faster rate than predicted in the model in the Ramrod Creek Seam.	Water level readings have exceeded the trigger threshold and were notified in May 2024. Initial review indicates no adverse impacts beyond those predicted for the approved operations. The current trigger level is based on the predicted levels and trends from the current site groundwater model. The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Any updates to the model will include additional baseline data which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.
X1_S-2 (59)	Pressure level reading below trigger level of: 91.0 mAHD In the Mt Arthur Seam since June 2023	Mt Arthur Seam	On site, approximately 1.2 km west of MAC open pit and 100 m south of the Hunter River	VWP X1 was installed in April 2020. Levels in the Mt Arthur Seam, recorded in X1_S-2 (59), have exceeded the trigger level since June 2023, when the new trigger level was implemented (refer **Figure 4.6**). The declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations by SLR (2020) (refer **Figure 4.7**). The SLR (2020) model predicted higher starting heads in this location but does capture the trend of declining groundwater levels over time consistent with the observed data. The model under predicts drawdown in all layers in this area indicating the area was less saturated than predicted.	Water level readings have exceeded the trigger threshold and were notified in May 2024. Initial review indicates no adverse impacts beyond those predicted for the approved operations. The current trigger level is based on the predicted levels and trends from the current site groundwater model. The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Any updates to the model will include additional baseline data which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.

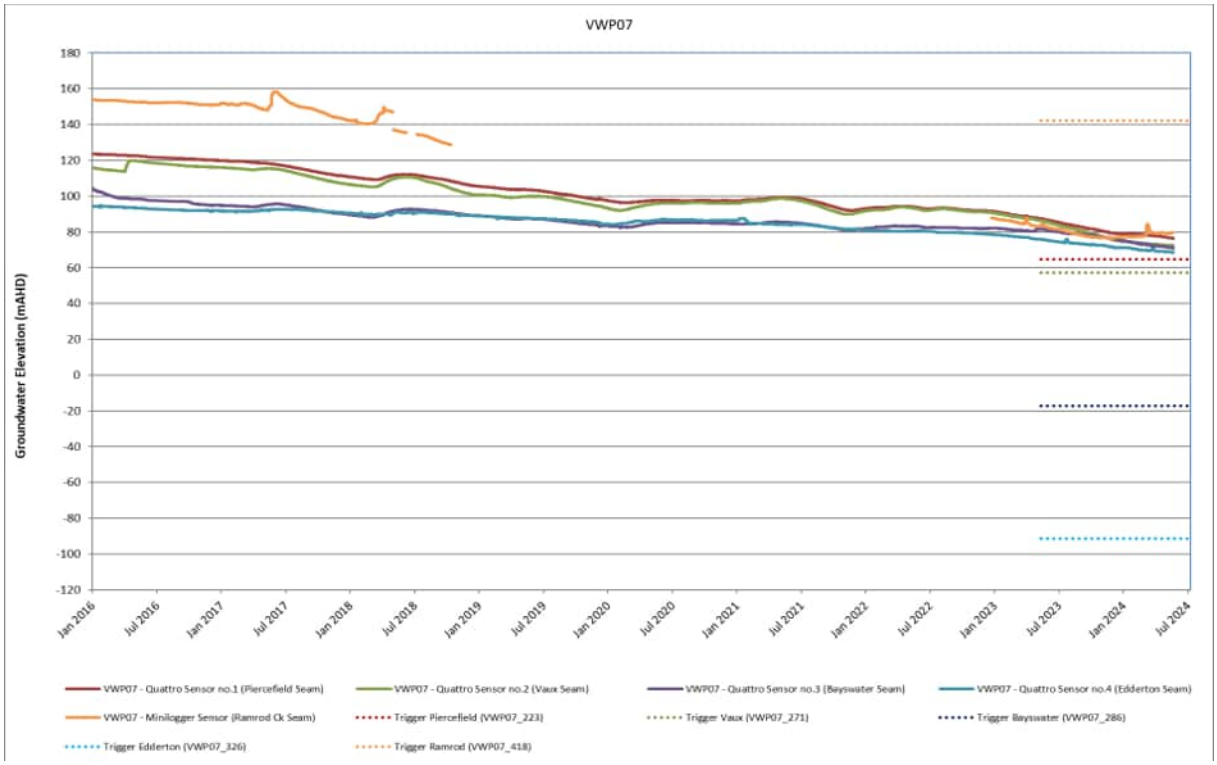


Figure 4.4 VWP07 – Trigger Levels

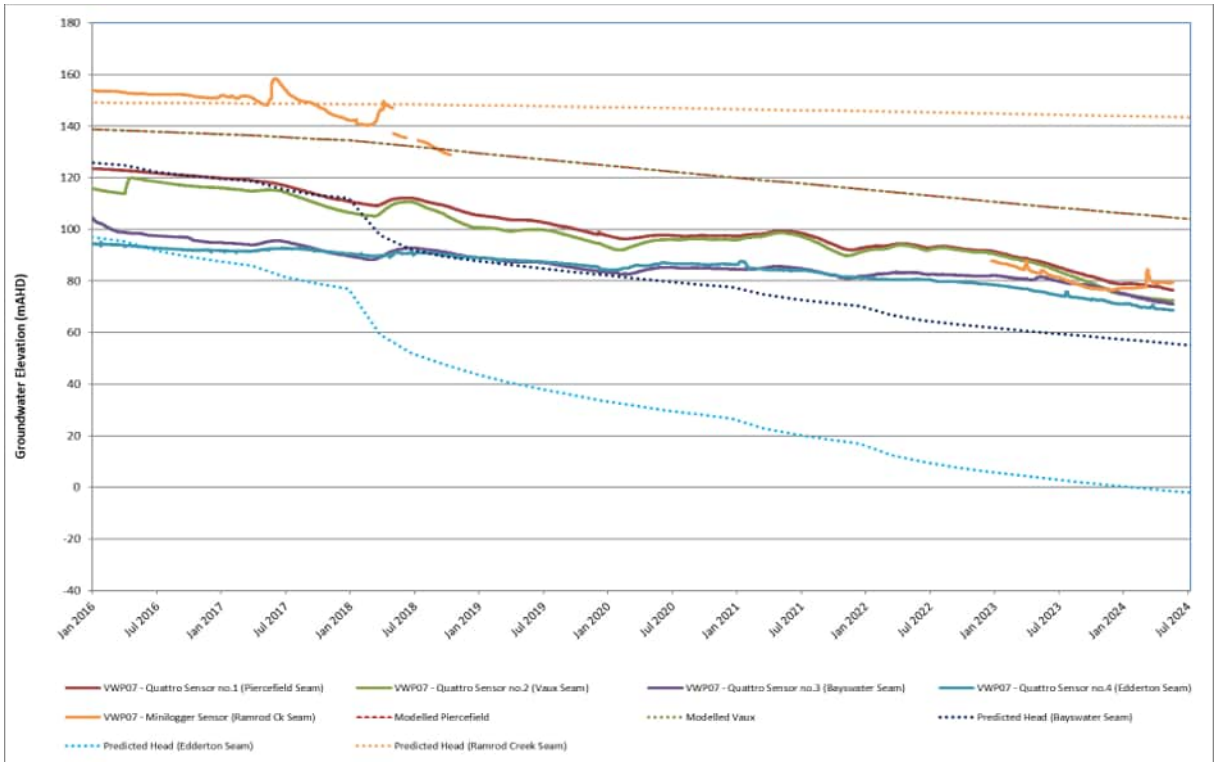


Figure 4.5 VWP07 – Modelled and Observed Water Levels

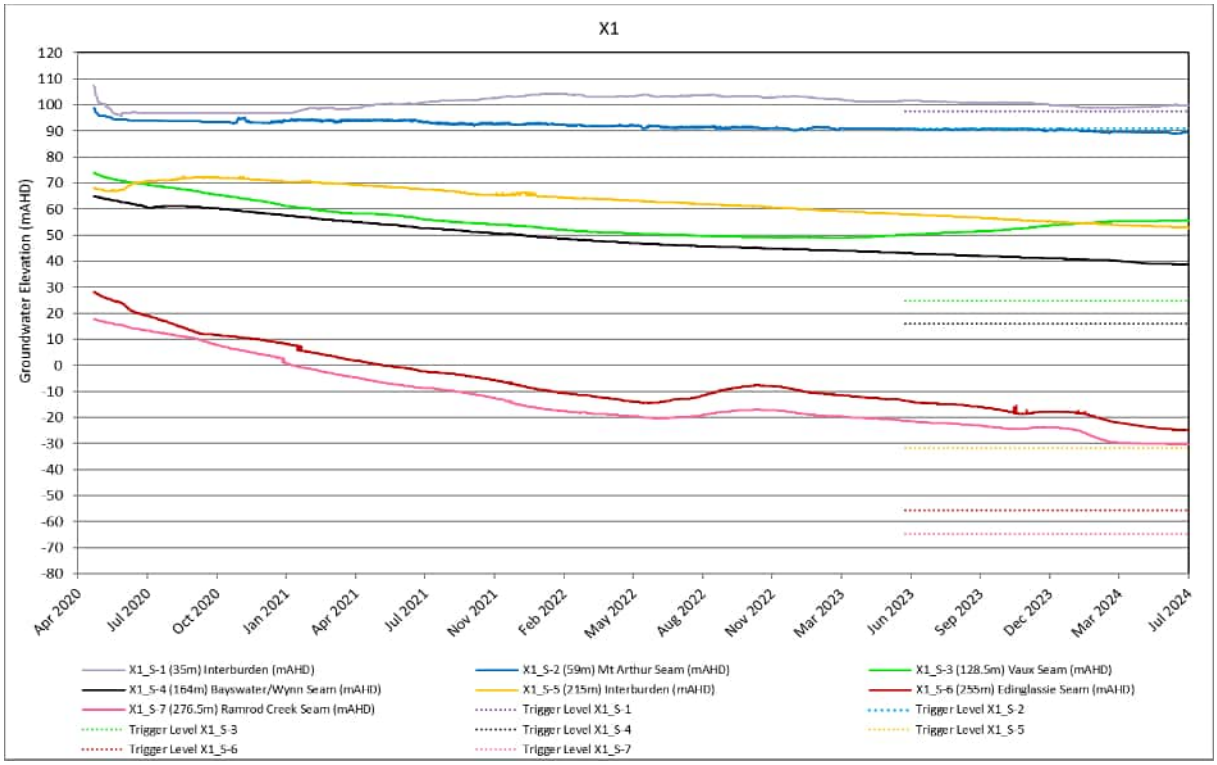


Figure 4.6 X1 – Trigger Levels

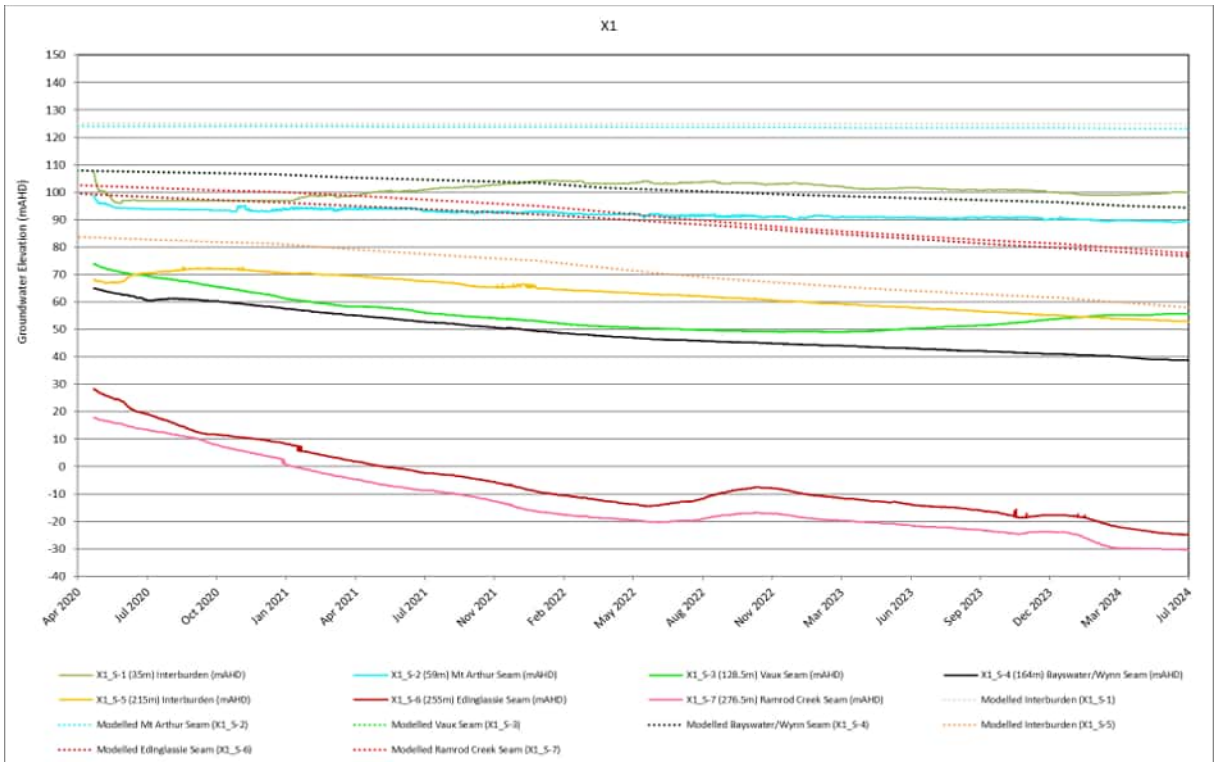


Figure 4.7 X1 – Modelled and Observed Water Levels

5.0 Groundwater Quality

Groundwater quality monitoring is conducted to identify any impacts from mining of coal measures to alluvial aquifers. Under the WMP, standard groundwater quality monitoring is required quarterly, and a comprehensive water quality analysis is required annually for 19 of the monitoring bores within the network, as outlined in **Appendix A**. A summary of groundwater quality (field pH and field EC) for the reporting period is presented in **Table 5.2**. A detailed summary of groundwater quality results for the review period are summarised in **Appendix D** with water quality graphs presented in **Appendix E**.

5.1 Laboratory Water Quality Results

Groundwater quality samples are submitted quarterly to ALS for laboratory analysis of TDS, TSS, iron, sulphate, chloride, calcium, magnesium, potassium, sodium, carbonate and bicarbonate and annually for total phosphorus, aluminium, antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, molybdenum, selenium and zinc. Review of the data indicates that over the reporting period most bores have recorded relatively consistent concentrations of TDS, TSS, iron and major ions (sulphate, chloride, calcium, magnesium, potassium, sodium, carbonate and bicarbonate). A summary of the quarterly water quality data is shown in **Appendix D**.

5.2 Trigger Exceedances

Water quality data collected over the reporting period have been compared to the trigger values outlined in the WMP. As specified in the WMP, bores that recorded pH or EC levels outside of the trigger level range over the reporting period are highlighted in **Table 5.2**.

Bore GW48 recorded a pH reading in March 2024 above the upper pH trigger level specified in the WMP (BHP, 2023), as shown in **Table 5.2**. However, it is not a consecutive reading and therefore not considered an exceedance. During the reporting period, bore X142MB-2D recorded three consecutive readings above the upper pH trigger level constituting a reportable exceedance. An analysis of the trigger exceedance is summarised in **Table 5.3**.

Trigger exceedances have been reviewed by comparing groundwater levels and climate indicated by the cumulative rainfall departure plot (refer **Figure 2.1**). Graphs of pH and EC for all monitoring bores are presented in **Appendix E**.

Table 5.1 Groundwater Quality Monitoring Results Over the Reporting Period

Bore ID	Field pH						Field EC (µS/cm)					
	Lower Trigger (5th Percentile)	Upper Trigger (95th Percentile)	Q1	Q2	Q3	Q4	Stage 1 EC Trigger (95th Percentile)	Stage 2 EC Trigger (Maximum Value)	Q1	Q2	Q3	Q4
Hunter River Alluvium												
GW16	*6.9*	*7.7*	7.27	7.27	7.24	7.22	*5228*	*9090*	2650	2490	2804	3180
GW21	*6.9*	*7.7*	6.93	6.94	7.03	6.97	*5228*	*9090*	1212	1224	1274	1099
GW38A (IW4030)	*6.9*	*7.7*	7.28	7.37	7.41	7.19	*5228*	*9090*	3020	3130	3260	3680
GW41A (IW4029)	*6.9*	*7.7*	7.22	7.31	7.12	7.21	*5228*	*9090*	4220	3790	4360	4910
X1MB	*6.9*	*7.7*	7.23	7.43	7.52	7.26	*5228*	*9090*	3710	1240	3690	3860
X2MB	*6.9*	*7.7*	7.32	7.18	7.32	7.15	*5228*	*9090*	4690	4250	4330	4720
Saddlers Creek Alluvium												
GW45	*6.6*	*7.6*	7.22	7.41	7.39	7.22	*8783*	*11380*	1794	1808	1344	1125
GW47	*6.6*	*7.6*	7.02	7.19	7.06	6.89	*8783*	*11380*	5240	4660	3780	4500
Saddlers Creek Shallow Permian												
BCGW22A (IW4027)	*6.7*	*7.1*	6.80	6.87	6.93	6.84	*14800*	*21480*	10700	9780	10800	11000
GW46	*6.7*	*7.1*	6.90	7.07	6.92	6.93	*14800*	*21480*	6750	7070	6460	6520
X14MB-1S	*6.7*	*7.1*	6.83	7.09	6.89	6.81	*14800*	*21480*	10600	10300	9030	10900
Permian Coal Measures												
EWPC33	*6.8*	*7.5*	6.99	7.04	6.94	6.89	*2973*	*3040*	2601	2555	2480	2554
GW2	*7.0*	*8.5*	7.64	7.69	7.65	7.63	*4802*	*5810*	4210	4130	3760	4050
GW38P	*7.2*	*8.1*	7.72	7.67	7.71	7.58	*6170*	*9170*	2375	2326	2230	2414
GW39P-25mm	*No Trigger*		7.41	7.53	7.39	7.57	*No Trigger*		4760	4740	4760	4740
GW43	*7.0*	*8.5*	7.00	7.02	7.03	7.10	*4802*	*5810*	4420	4800	3940	4210

Bore ID	Field pH						Field EC (µS/cm)					
	Lower Trigger (5th Percentile)	Upper Trigger (95th Percentile)	Q1	Q2	Q3	Q4	Stage 1 EC Trigger (95th Percentile)	Stage 2 EC Trigger (Maximum Value)	Q1	Q2	Q3	Q4
GW44	*No Trigger*		*Not Required*				*No Trigger*		*Not Required*			
GW48	*6.8*	*7.7*	7.68	7.57	**7.95**	7.51	*7891*	*8300*	3510	3300	3400	3570
GW49	*6.7*	*8.9*	7.07	6.93	6.84	6.81	*7831*	*8210*	5940	5370	5680	6050
OD1078 (IW4028)	*No Trigger*		*Not Required*				*No Trigger*		*Not Required*			
X10MB	*6.7*	*8.3*	7.38	8.17	7.20	7.04	*11200*	*14710*	4380	3640	3700	4090
X14MB-2D	*6.7*	*8.3*	**9.46**	**9.59**	**9.48**	**9.34**	*11200*	*14710*	5900	5870	5460	5680

Note:

** Exceedance based on 2023 Impact Assessment Criteria (less than 3 readings).*

** Exceedance based on 2023 Impact Assessment Criteria (3 consecutive readings).*

** EC exceedance based on 2023 Impact Assessment Criteria - Stage 2 (1 reading).*

Table 5.2 Groundwater Quality Trigger Exceedances

Bore ID	Exceedance	Screened Lithology	Location	Comment	Action
X14MB-2D	Five consecutive pH readings above the upper trigger level of 8.3 since June 2023	Glen Munro Seam	On site, approximately 5 km south of McDonalds Pit Dam and 3.5 km southwest of Saddlers Pit	The purpose of the bore is to monitor the Glen Munro Seam near an unnamed tributary of Saddlers Creek, between McDonalds Pit Dam and Saddlers Creek. The bore was installed in July 2020 to assess any impact from mining activities adjacent to mining areas to the southwest of MAC. A paired bore with X14MB-1S to assess the hydraulic gradient between the regolith and Glen Munro Seam. Bore X14MB-2D was added to the groundwater compliance monitoring network in the revised WMP, which came into effect in April 2023. The pH of groundwater recorded within the bore has ranged from 6.77 (November 2020) to 11.63 (June 2021), with an average pH of 9.29. The pH peaked at 11.63 and has continued to decline from June 2021 to present, with the most recent reading of 9.34. Levels have remained relatively stable since July 2022. The initial high pH readings are potentially related to grout contamination within the bore following construction. The pH level has been above the revised Glen Munro Seam pH trigger level since June 2021, as shown in **Figure 5.3**. It should be noted that the trigger level in the current WMP is based on grouped data from all bores monitoring the Glen Munro Seam. At the time of trigger derivation, in 2022, only eight water quality samples had been collected from bore X14MB-2D. In comparison, pH has ranged between 7.04 and 9.97 in bore X10MB which also monitors the Glen Munro Seam and is located approximately 8 km to the north of X14MB-2D.	The pH level recorded in Q4 is the fifth consecutive reading above the upper trigger level and was notified in February and May 2024. The pH levels should continue to be monitored and reviewed for any changes outside of the historical range.

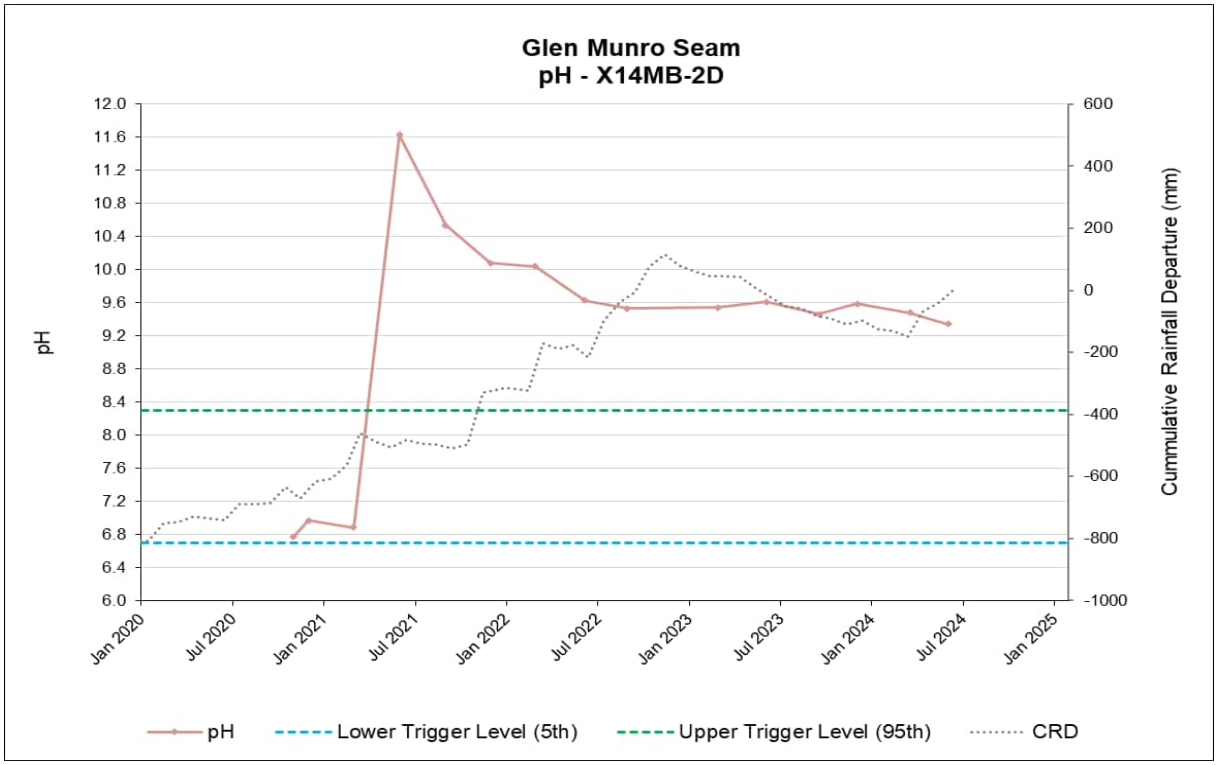


Figure 5.1 X14MB-2D – pH

6.0 Trigger Investigations

As specified in the WMP, MAC are required to report on the effectiveness of the WMP in the MAC Annual Groundwater Review, which includes a summary of management/mitigation measures undertaken in the event of a confirmed exceedance of the impact assessment criteria and the effectiveness of the management/mitigation measures. A number of exceedances have been identified during routine monitoring, which have already been reported to DPE over the reporting period. Details of the trigger exceedances reported to DPE during the reporting period are summarised in **Table 6.1**. There were no detailed trigger investigations undertaken over the reporting period.

Table 6.1 Summary of Investigations Undertaken Over Reporting Period

Bore ID	Background	Investigations Completed	Action Being Undertaken
X14MB-2D	The purpose of the bore is to monitor the Glen Munro Seam near an unnamed tributary of Saddlers Creek, between McDonalds Pit Dam and Saddlers Creek. The initial review of the trigger exceedance indicated that pH exceeded the upper trigger level on four consecutive occasions over the reporting period.	The initial review of the trigger exceedance indicates that pH has exceeded the upper trigger level; however, has remained stable since July 2022.	pH levels will continue to be monitored and reviewed for any changes outside the historical range. The condition of the bore will be reviewed with a downhole camera.
VWP07	Water levels in the Piercefield Seam recorded at VWP07 have exceeded the trigger level since October 2021. The continuing declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations. The model predicted continued drawdown in this area with simulated water levels in all seams. The model predicted slightly lower starting heads in this location but does capture the trend of declining groundwater head over time consistent with the observed data.	Initial review indicated no adverse impacts beyond those predicted for the approved operations.	The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Any updates to the model will include additional baseline data which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.
X1_S-2	VWP X1 was installed in April 2020. Levels in the Mt Arthur Seam, recorded in X1_S-2, have exceeded the trigger level since June 2023, when the new trigger level was implemented in the updated WMP. The declining groundwater level trend represents mining induced depressurisation as predicted for the approved operations by SLR (2020). The SLR (2020) model predicted higher starting heads in this location but does capture the trend of declining groundwater levels over time consistent with the observed data. The model under predicts drawdown in all layers in this area indicating the area was less saturated than predicted.	Initial review indicated no adverse impacts beyond those predicted for the approved operations.	The site groundwater model is due to be reviewed in 2025 as specified in the WMP. Any updates to the model will include additional baseline data which will be used to revise water level predictions. The trigger levels in the WMP can then be updated to reflect the predictions from the updated model.

7.0 Quality Assurance Review

An assessment of the quality assurance measures implemented by CBE for the quarterly groundwater sampling is required as part of the WMP to identify potential errors with either the sampling methodology or laboratory techniques. This review includes:

- Comparison of duplicate samples and calculation of Relative Percentage Difference (RPD) for the laboratory analysis results for each sampling round.
- Review of the CBE groundwater sampling field sheets for assessment of field parameter stabilisation and purging volume for collection for a representative water sample. Review of equipment calibration records.
- Review of sample holding times prior to being dispatched to the Australian Laboratory Services Pty Ltd (ALS).

The quality assurance review results are summarised in **Table 7.1** and detailed in **Appendix D**. The results of the quality assurance review, with recommendations, are summarised below:

- CBE provided sample stabilisation data for all sampling events with the acceptable deviations for temperature set at (±0.2°C), pH (±0.1 pH units) and EC (±5 %). On average, three bore volumes were purged for each bore before sampling. Where less than three volumes were purged, the field sheets note that it was due to dry bores, slow recovery or when hand bailing was implemented. Where hand bailing is required in smaller diameter bores, it is recommended a small diameter pump is used.
- Three sample batches received by ALS were above the recommended temperature of 4°C. It is recommended that all samples should be chilled sufficiently to reach the lab below 4°C.
- In each monitoring round the bores were monitored in a consistent manner and the samples are considered representative of the aquifer at each monitoring location. However, equipment calibration sheets were not provided by CBE for review.
- All samples were within the specified holding times for the parameters analysed. The exception to this is laboratory pH where holdings time breaches ranged from one to four days. All of the samples were also analysed for field pH, which is considered a more reliable source of data and has been used for the trigger level review in this report.
- Duplicate samples were collected and field parameters for pH, EC, and temperature were recorded for each duplicate sample. RPDs greater than 20% were identified for Total Suspended Solids (TSS) and iron in December 2023 and calcium, total phosphorus, boron, and zinc in June 2024. The results indicate variation in the laboratory analysis between the primary and duplicate samples. This is potentially influenced by sampling methodology and timing between the samples, which can influence results for TSS and metals. The RPDs do not correlate to any reported trigger exceedances for the reporting period.

Table 7.1 Summary of Groundwater Quality Assurance Review

Monitoring Round	Field Data	Field Parameter Stabilisation	Frequency of Analyses	Analysis Parameters	Holding Time (days)	Duplicate Sample	Relative Percentage Difference (RPD)	Comments
Q1 Sep-23	WL, T (°C), pH, EC	All samples within stabilisation parameters.	Quarterly	All samples: pH, EC, TSS, TDS, Cl, Ca, Mg, K, Na, SO4, Alkalinity, Dissolved Fe.	Lab Quality Control Report indicates ten sample submissions were outside the specified holding times for pH.	GW43	No RPDs greater than 20%	All bores purged approximately 3 x bore volumes prior to sampling, with the exception of several bores due to slow recovery rates (e.g. X14MB-1S and X14MB-2D) or hand bailing. Where legible on the lab submission sheet, it is noted that all of the sample submissions reached the lab below the specified temperature of 4 °C. Equipment calibration sheets not provided.
Q2 Dec-23	WL, T (°C), pH, EC	All samples within stabilisation parameters.	Quarterly	All samples: pH, EC, TSS, TDS, Cl, Ca, Mg, K, Na, SO4, Alkalinity, Dissolved Fe.	Lab Quality Control Report indicates five sample submissions were outside the specified holding times for pH.	GW50	Total Suspended Solids and Iron greater than 20% RPD	All bores purged approximately 3 x bore volumes prior to sampling, with the exception of several bores due to slow recovery rates (e.g. X14MB-1S and X14MB-2D) or hand bailing. Where legible on the lab submission sheet, it is noted that all of the sample submissions reached the lab below specified temperature of 4 °C. Equipment calibration sheets not provided.
Q3 Mar-24	WL, T (°C), pH, EC	All samples within stabilisation parameters.	Quarterly	All samples: pH, EC, TSS, TDS, Cl, Ca, Mg, K, Na, SO4, Alkalinity, Dissolved Fe.	Lab Quality Control Report indicates three sample submissions were outside the specified holding times for pH.	EPWC33	No RPDs greater than 20%	All bores purged approximately 3 x bore volumes prior to sampling, with the exception of several bores due to slow recovery rates (e.g. X14MB-1S and X14MB-2D) or hand bailing. Where legible on the lab submission sheet, it is noted that three sample submissions reached the lab above specified temperature of 4 °C. Equipment calibration sheets not provided.
Q4 Jun-24	WL, T (°C), pH, EC	All samples within stabilisation parameters.	Quarterly/ Annually	All samples: pH, EC, TSS, TDS, Cl, Ca, Mg, K, Na, SO4, Alkalinity, Dissolved Al, Sb, As, Ba, Ca, Cr, Cu, Ni, Pb, Zn, Mo, Se, B, Fe, Hg, Total P.	Lab Quality Control Report indicates two sample submissions were outside the specified holding times for pH.	GW2	Calcium, total phosphorus, boron and zinc greater than 20% RPD	All bores purged approximately 3 x bore volumes prior to sampling, with the exception of several bores due to slow recovery rates (e.g. X14MB-1S and X14MB-2D) or hand bailing. Where legible on the lab submission sheet, it is noted that all of the sample submissions reached the lab below specified temperature of 4 °C. Equipment calibration sheets not provided.

8.0 Cut-off Wall Performance

The alluvial cut-off wall is a bentonite barrier wall constructed between the Hunter River and the Windmill Open Cut pit, close to the F4 fault. The cut-off wall was extended to the west in November 2020 ahead of the progression of active mining towards the west. The purpose of the cut-off wall is to minimise drawdown within the Hunter River alluvium.

To monitor drawdown within the Hunter River alluvium, VWPs were installed near the cut-off wall to monitor the Permian coal measures underlying the Hunter River alluvium. The location of the VWPs is shown in **Figure 3.1**. The VWP sensors monitor:

- VWP2 – F4 fault at 216.5 m depth (-81.1 mAHD).
- VWP3 – Sensor 1 – Edinglassie Seam (hanging wall) at 227.0 m depth (-91.6 mAHD).

Continuous data has been captured by the VWPs since December 2013. However, the footwall of the Edinglassie Seam is no longer monitored as VWP1 has been decommissioned due to sensor failure in 2020. VWP3 Sensor 2 (Ramrod Creek) also failed in June 2020. **Figure 8.1** shows groundwater levels have declined 90 m in the F4 fault and 119 m in the Edinglassie Seam since installation in 2011.

The Hunter River alluvium and shallow weathered sandstone (regolith) lay above the Permian coal measures near the cut-off wall. The closest alluvium monitoring bores are GW42, which is located adjacent to the VWPs, and bore GW16 located approximately 400 m to the northwest of the cut-off wall.

Due to the condition of GW42 it was recommended the bore was replaced and has been removed from the current WMP. A replacement bore (GW58) was installed in April 2024 and is located 15 m to the southwest of GW42. It is recommended the water level and water quality in replacement bore GW58 is monitored on a monthly basis for the first 12 months. Bore GW16 has been used to compare trends in the coal seams and alluvium, as a substitute for GW42 in the interim until the replacement bore for GW42 was installed.

In November 2020, six additional monitoring bores were also installed (VB1, VB2, VB3, VB4, VB5 and VB6) in fill/regolith forming the cut-off wall extension to monitor the effectiveness of the barrier wall extension.

Groundwater levels in GW16 have fluctuated over time but have remained relatively stable, with a slight increase of 0.09 m between February 2008 and September 2021. This was followed by an increase of over 1 m by March 2023, followed by a sharp decline of almost 5 m by December 2023 in response to below average rainfall. Water levels increased over 2 m by March 2024, as shown in **Figure 8.2**. However, the measurement in December 2023 is possibly erroneous as the change was not recorded by the data logger. In general, the fluctuations in groundwater levels appear to be a response to increased rainfall and flows within the Hunter River. Depressurisation observed in the Permian coal measures has not impacted the Hunter River alluvium groundwater levels observed in bore GW16.

Groundwater levels have also been monitored in the VB series of bores since September 2021. Groundwater levels remained relatively stable, responding to climatic events, similar to surrounding alluvium monitoring bores. Levels ranged between 121.70 mAHD (VB2 in December 2021) and 124.47 mAHD (VB5 in December 2022). Groundwater levels were recorded at a lower elevation compared to nearby bore GW42. Bore VB6 has been dry since installation and is the closest bore to active mining.

The relatively stable groundwater level trends shown in the alluvial bores indicate that the depressurisation observed in the Permian coal measures does not appear to have impacted the Hunter River alluvium groundwater levels. Monitoring of the Hunter River alluvium shows no adverse impact from mining activities on alluvial groundwater conditions and beneficial use of groundwater.

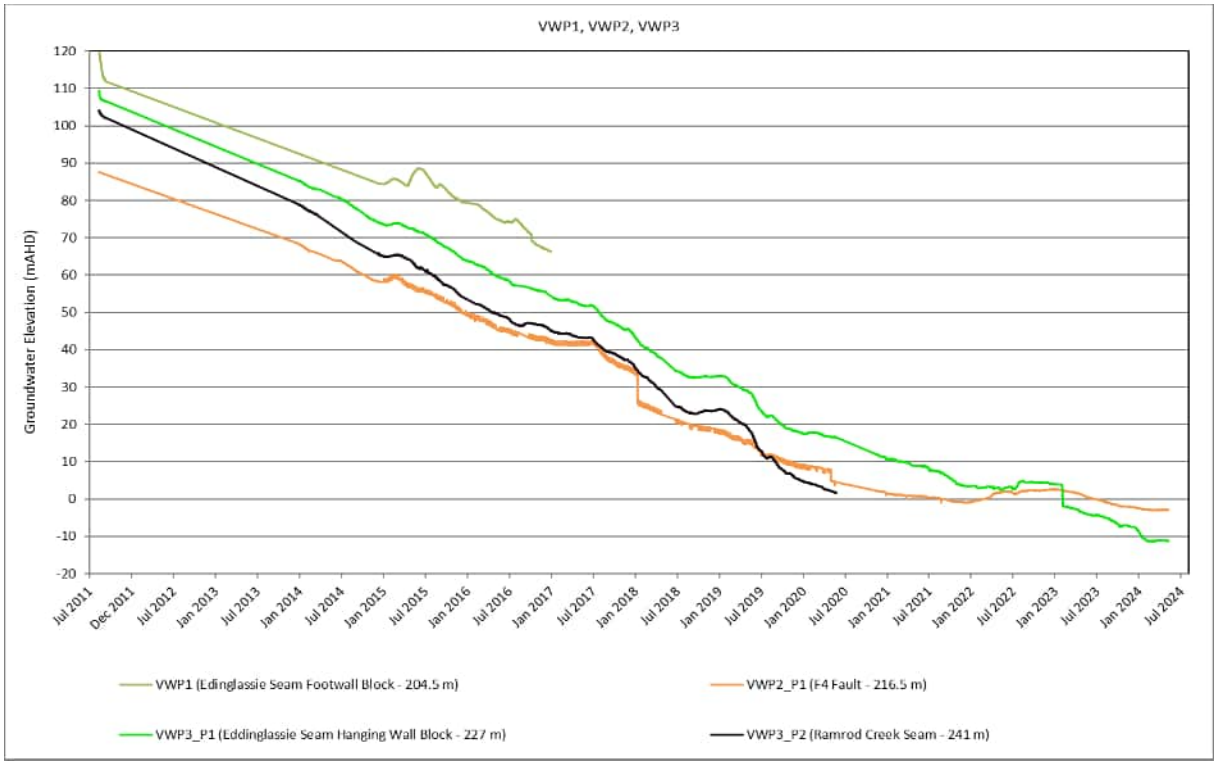


Figure 8.1 Groundwater Levels in Permian Coal Measures Adjacent to the Cut-off Wall

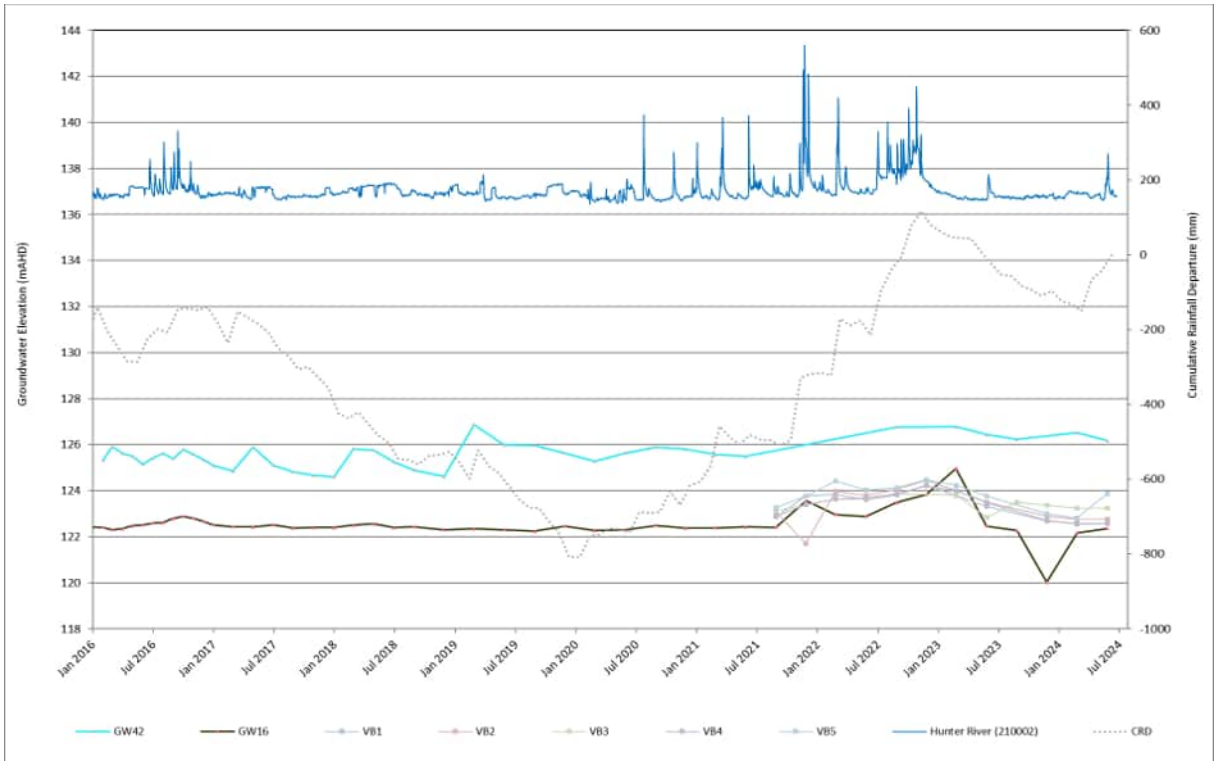


Figure 8.2 Groundwater Levels in the Hunter River Alluvium Adjacent to the Cut-off Wall

9.0 Numerical Model Predictions Review

The WMP requires a review of groundwater level predictions, which are calculated using a groundwater model to support current mining. To validate the model, the predictions are compared on an annual basis to the measured groundwater level data obtained from the monitoring program.

As summarised in SLR (2020), the groundwater assessment was conducted by AGE (2013) concluded that approved operations at MAC would drawdown groundwater levels within 2 km of active mining operations. AGE (2013) also found that drawdown associated with operations at Bengalla Mine, directly to the north of MAC, would not interact with drawdown at MAC. There were no reported potential impacts on GDEs as a result of MAC (AGE, 2013). Less than 1 m drawdown was predicted at all privately owned bores intersecting alluvium and used for stock water supply and irrigation, due to mining at MAC, as shown in **Figure 9.1**. Drawdown of more than 2 m was predicted at some privately owned bores intersecting the Permian coal measures used for stock water supply as shown in **Figure 9.2**.

A review of the groundwater model was conducted by AGE (2020) and found that improvements could be made. BHP engaged SLR (2020) to develop a numerical groundwater model for MAC that included calibration of measured groundwater levels to June 2020. The model was developed in MODFLOW-USG with steady state and transient calibration with a good fit to historical water level and mine inflow data. The updated model predicted:

- Negligible groundwater drawdown in the Saddlers Creek alluvium consistent with previous predictions. However, it is noted that the model generally predicts unsaturated conditions in the regolith and alluvium in the upper reach of Saddlers Creek.
- Localised drawdown of up to 5 m within the alluvium along Hunter River. The extent of predicted water table drawdown is consistent compared to the previous predictions for approved operations by AGE (2013).
- No impacts predicted on landholder bores intersecting alluvium.
- Predicted reduction in groundwater levels at three BHP owned bores that intersect the Permian coal measures.
- Negligible reductions in surface water flows/balance resulting from changes in groundwater baseflows to surface stream systems in Saddlers Creek.
- Up to 13.2 ML/year leakage (indirect take) from the Hunter River as a result of depressurisation due to mining, which is lower than previously predicted.
- Reduction in upward leakage from the Permian coal measures to the overlying alluvium of the Hunter River by a maximum of 82 ML/year (0.22 ML/day) which is lower than previously predicted by AGE (2013) which predicted between 0.63 ML/day to 0.72 ML/day leakage from Hunter River.
- Total groundwater inflows to the MAC open cut of approximately 657.5 ML/year on average (between 2020 to 2027) and ranging up to a peak in the order of 1,114 ML/year in 2026. The predicted inflow is largely consistent with the previously predicted average inflows by AGE (2013), which ranged between 711 ML/year to 912 ML/year from 2020 to 2026.

The updated model predictions by SLR (2020) are consistent or slightly lower than previously predicted impacts on groundwater by AGE (2013). Further details on the up-to-date groundwater model are included in the model report by SLR (2020).

Measured groundwater level elevations for June 2024 were compared to groundwater levels predicted in the current SLR (2020) site model from July 2023 to June 2024. The difference between the model prediction and measured levels (residuals) are shown in **Figure 9.3**. Positive values indicate the model predicted higher groundwater levels (i.e., less drawdown) than is observed (measured). Negative values indicate the model predicted lower groundwater levels (i.e., more drawdown) than was observed (measured).

The groundwater model predictions in the Hunter River alluvium compare well to the measured levels as shown in **Figure 9.3**. Overall, the residual in the Hunter River alluvium is less than 5 m as shown in bores GW16, GW21, GW38A (IW4030), GW41A (IW4029), X1MB and X2MB.

The model also showed a fairly good fit (i.e., less than 5 m difference) between measured and modelled groundwater levels for bore GW16. The bore intersects alluvium and regolith on the north side of the alluvium barrier wall that separates MAC from the Hunter River alluvium. At the same location modelled groundwater levels in underlying coal seams show a fairly good fit with measured depressurisation within the F4 Fault (VWP2).

The model appears to overpredict impacts due to mine progression, with early and greater drawdown in the Ramrod Creek Seam (layer 26) compared to observed data for VWP3 (Sensor 2 – Ramrod Creek). This may relate to how mine progression is represented in the model and the hydraulic properties. It is noted that the model underpredicts the degree of groundwater level drawdown in the Edinglassie Seam (layer 25) measured by VWP3 (Sensor 1 – Edinglassie Seam) by around 12 m compared to observed data between June 2023 and June 2024.

It is noted that the model replicates a downward gradient in the coal measures, which aligns with current observed groundwater trends. However, groundwater levels prior to the influence from mining indicates more confined conditions in the deeper coal seams (Ramrod Creek Seam) that is not captured in the model. This may relate to parameterisation and the change in hydraulic properties with depth (depth dependence function).

The model also shows a fairly good fit for the bores within the Saddlers Creek alluvium and Saddlers Creek shallow Permian (regolith) to the southwest of active mining. The modelled heads for bores GW45, GW47 and X14MB-1S are within 5 m of measured levels.

However, the modelled head for GW46, screened within the Saddlers Creek shallow Permian (regolith) was greater than 5 m of measured levels (-6.47 m residual) indicating the area was more saturated than predicted. It is noted that the model generally predicts unsaturated conditions in the regolith and alluvium in the upper reach of Saddlers Creek. This is likely influenced by the assumption of average streamflow and rainfall and could be improved in future iterations of the model.

With the exception of VWP X1 and VWP3, the response to mining is well represented in the Permian coal measure monitoring bores located along the Hunter River and show a fairly good fit with modelled heads within 5 m of measured levels. The modelled heads in VWP X1 are greater than 5 m of the measured levels. The model under predicted drawdown in all layers in X1 (Interburden, Mt Arthur, Vaux, Bayswater/Wynn, Interburden above Bengalla, Edinglassie and Ramrod Creek seams) indicating the area was less saturated

than predicted. The modelled heads in VWP3 (11.98 m residual) are greater than 5 m of the measured levels, under predicting drawdown in the Eddinglassie Seam indicating the area was less saturated than predicted.

To the west of active mining, the model did not fully capture groundwater levels at GW43 (Woodlands Hill Seam) and X10MB (Glen Munro Seam), near Belmont Pit, and EWPC33 (Blakefield Seam) near McDonalds Pit, to the southwest of mining at GW2 and GW44 (Woodlands Hill Seam), GW46 (shallow Permian) and X14MB-2D (Glen Munro Seam) near Saddlers Pit, where the model predicted levels more than 5 m below measured levels. This likely relates to influence of modelled in-pit water storage in the area, which may not accurately replicate actual dam water storage levels.

The model over predicted drawdown west of the open cut (Windmill Pit, Huon Pit and Calool Pit) in some layers at VWP05 (Edderton Seam), VWP06 (Edderton Seam) and VWP07 (Bayswater and Edderton seams). However, this response is variable and likely reflects the simplified vertical discretisation in the model layers compared to the VWP sensor intervals.

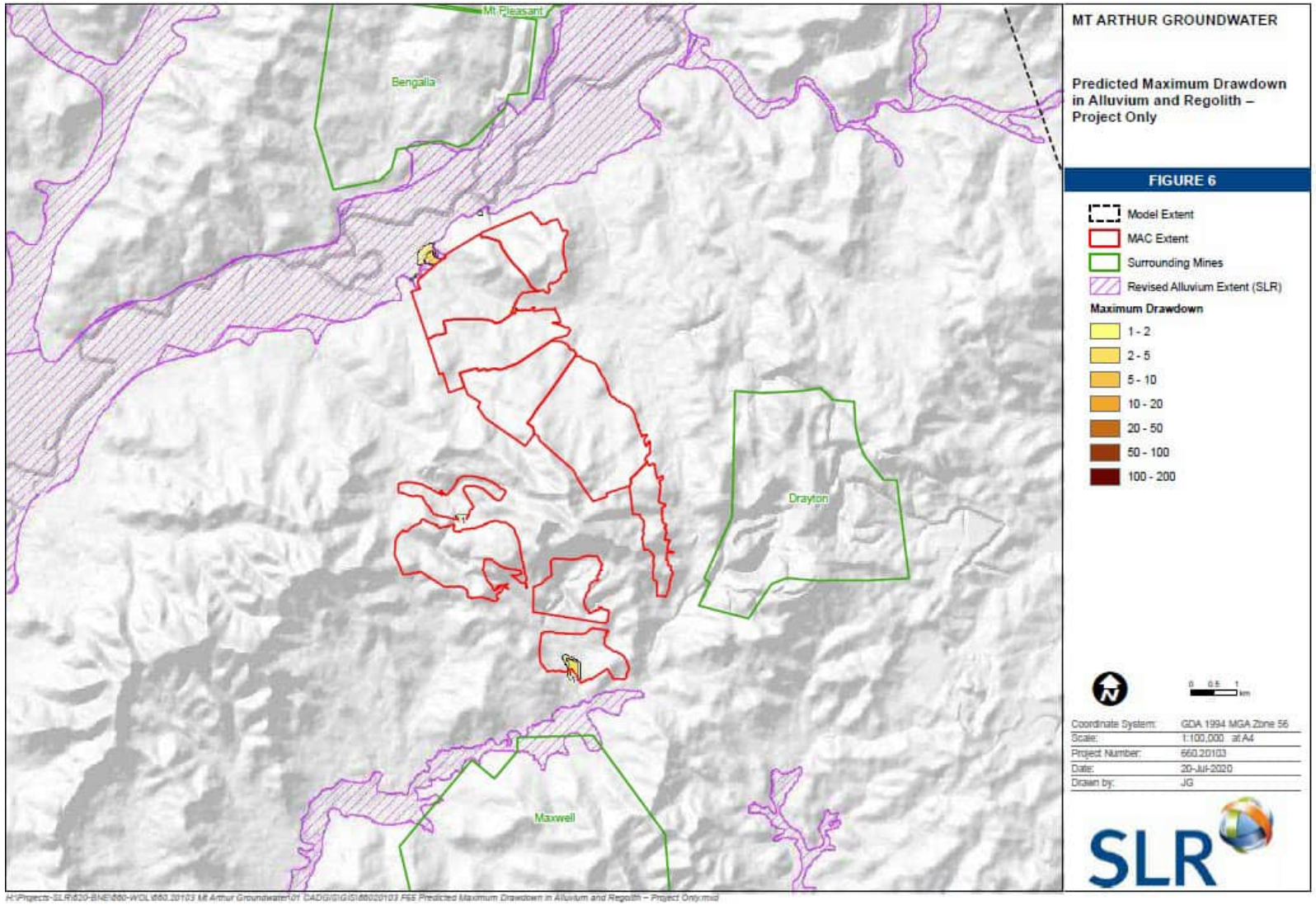


Figure 9.1 Predicted Maximum Drawdown in Unconsolidated (Layer 1 and 2) – Approved Operations (Source: SLR, 2020a)

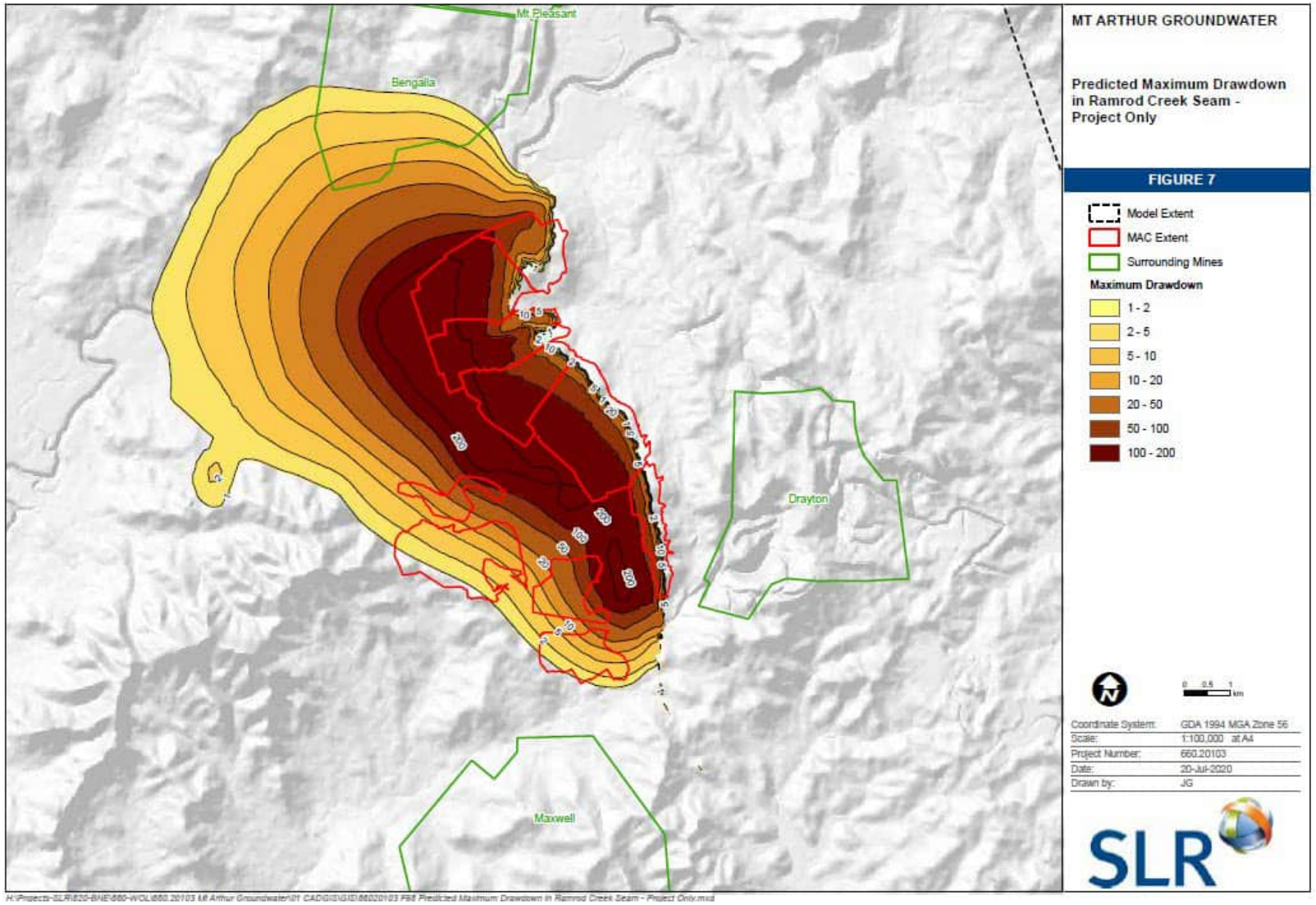
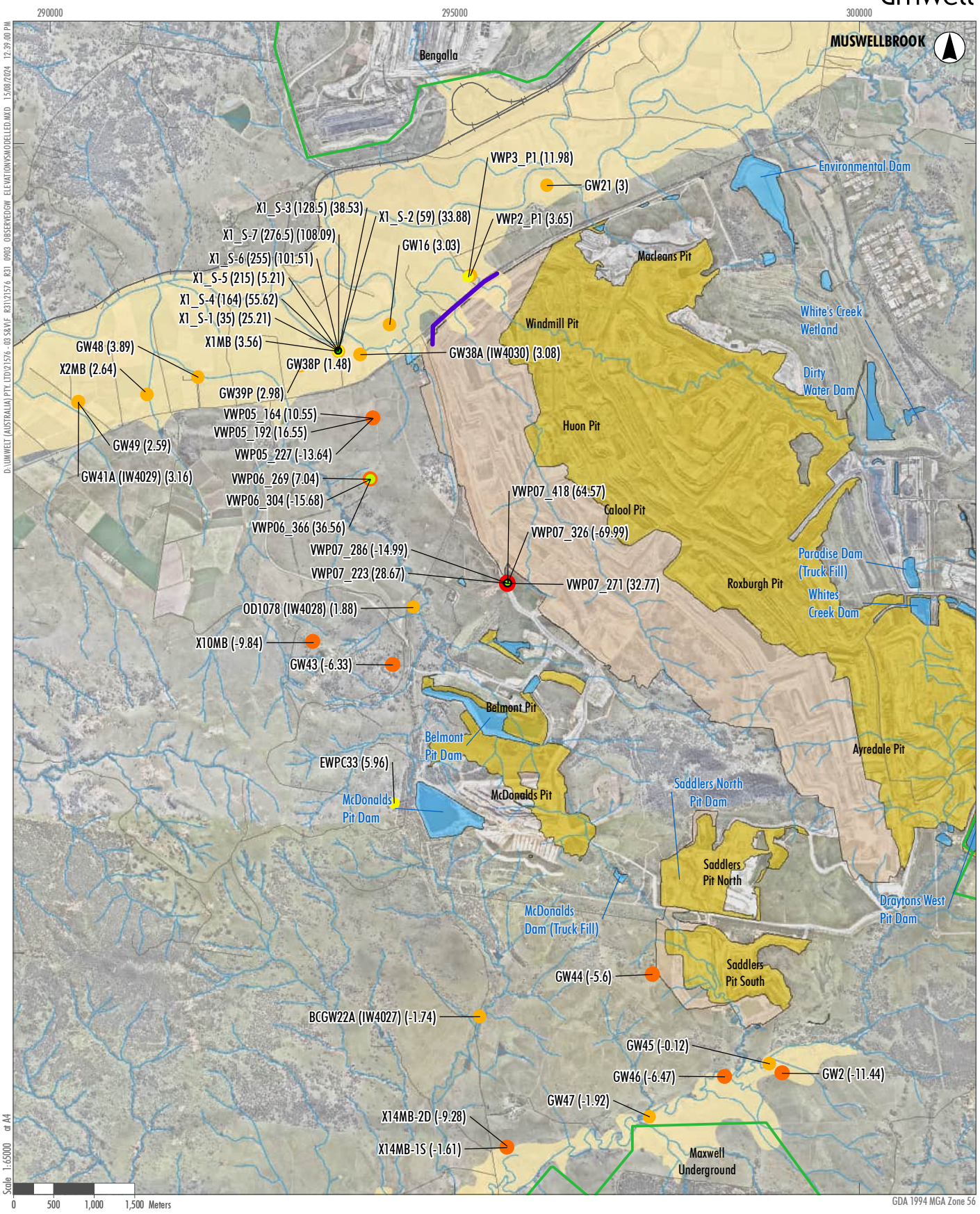


Figure 9.2 Predicated Maximum Drawdown in Ramrod Creek Seam (Layer 26) – Approved Operations (Source: SLR, 2020a)



Legend

- Surrounding Mines
- Cut-off Wall
- Alluvium Extent
- Railway
- Roads
- Watercourse
- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Water Management - Dam

Modelled vs Measured Heads (Residuals) (m)

- -75 to -20
- -20 to -5
- -5 to 5
- 5 to 20
- 20 to 50
- 50 to 100
- 100 to 160

FIGURE 9.3

Modelled versus Measured Heads June 2024

Image Source: Nearmap (May 2022) Data source: NSW DFSI (2021)

10.0 Recommendations

The following improvements to the groundwater monitoring program are recommended:

- X14MB-2D - The pH levels should continue to be monitored and reviewed for any changes outside of the historical range

The following improvements to the field monitoring and sampling programme by CBE are recommended:

- Chilled groundwater lab samples – three sample batches received by ALS were above the recommended temperature of 4°C. It is recommended that all samples should be chilled sufficiently to reach the lab below 4°C.
- Recommend using a small diameter pump in bores where hand bailing is required due to the diameter of the bore.
- Supply equipment calibration sheets for quality review.
- Set logger frequency to 6 am/12 pm/6 pm/12 am, on the hour, in all water level loggers to ensure consistency of logger data.
- Check the naming convention on the field sheet and the total depth of each bore during monitoring to confirm the correct bore is being monitored. Paired bores such as X14MB-1S/X14MB-2D and OD1078-Piezo/OD1078 (IW4028) have possibly been swapped around during monitoring, evident by changes in notation on field sheets and significant changes in water levels between quarterly monitoring rounds.

11.0 References

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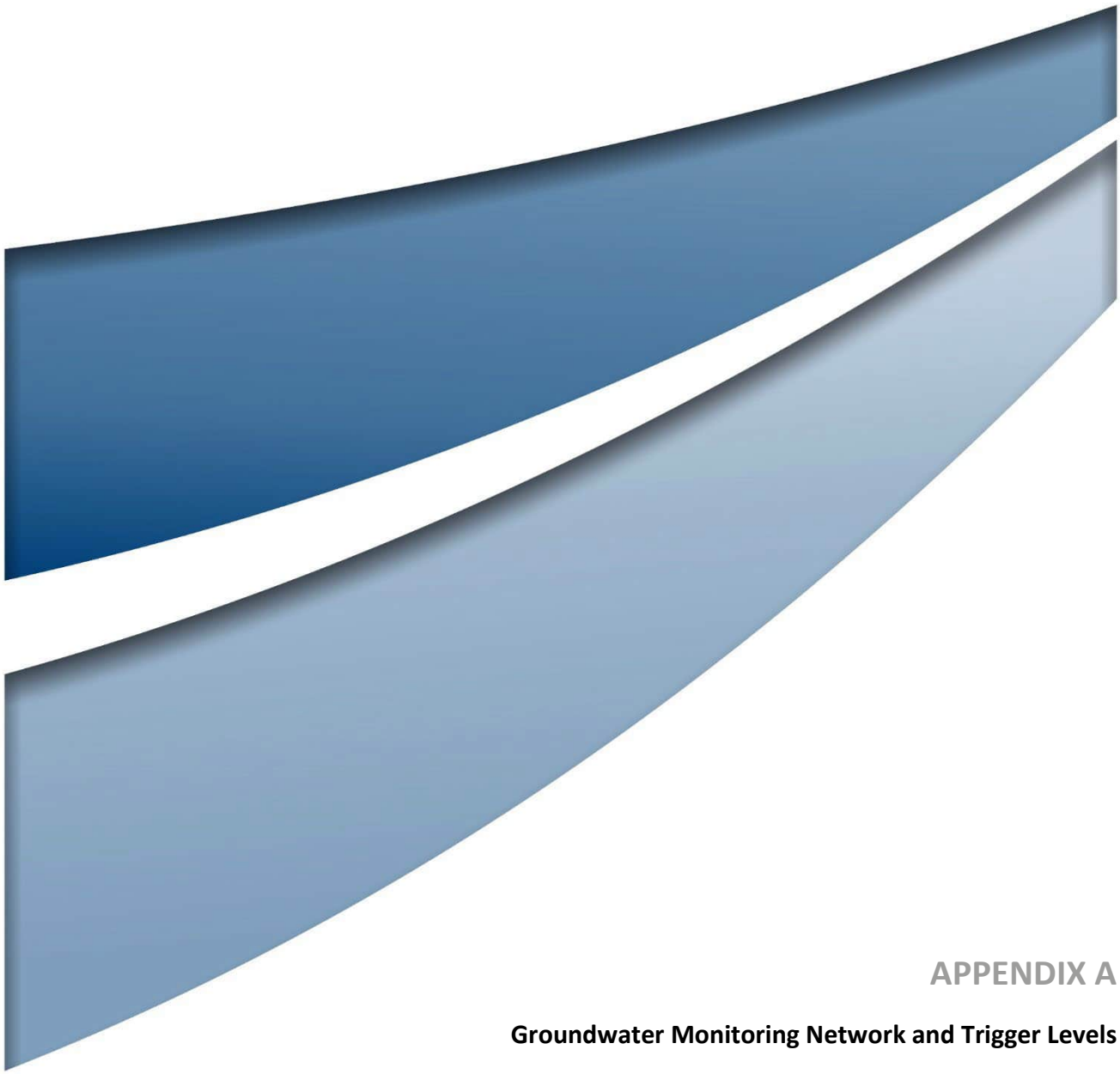


APPENDIX A

Groundwater Monitoring Network and Trigger Levels

2023 WMP Compliance Monitoring Network

Bore ID	Easting (m)	Northing (m)	Type	TOC Elevation (mAHD)	Surface Elevation (mAHD)	Bore/ Sensor Depth (mbgl)	Screen/Sensor (mAHD)	Stratigraphy	Logger/ Sensor Installed	Purpose of Bore	SWL Frequency	WQ Frequency	Water Level Trigger Derivation Method*	Water Level Trigger (mAHD)	Water Level Trigger (mbTOC)	pH Trigger Range	EC Trigger Stage 1 (µS/cm)	EC Trigger Stage 2 (µS/cm)
BCGW22A (IW4027)	295314	6414210	MB	143.8	143.45	14.65	129.3–135.3	Saddlers Creek Shallow Permian (regolith)	Y	Monitoring of regolith in unnamed tributary of Saddlers Creek, between McDonalds Pit/Void and Saddlers Creek. To assess any impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	2	136.6	7.20	6.8-7.1	14800	21480
EWPC33	294253	6416847	MB	230.32	229.32	56.38	175.6–178.6	Blakefield Seam	Y	Monitoring of Blakefield Seam to the west of McDonalds Pit/Void (mined to Blakefield seam) and monitor the impact of mining activities adjacent to mining areas in the area west of MAC.	D/Q	Q/A	2	190.4	39.92	6.8-7.5	2973	3040
GW2	299045	6413511	MB	153.84	153.47	112.63	40.8–43.8	Woodlands Hill Seam	Y	Monitoring of Woodlands Hill Seam in the Saddlers Creek area. A paired bore with GW45 and GW46 to assess vertical hydraulic gradient between Permian Coal measures (Woodlands Hill seam) and alluvium, and the impact of mining activities adjacent to mining areas in the Saddlers Creek area.	D/Q	Q/A	2	140.0	13.84	7.0-8.5	4802	5810
GW16	294197	6422759	MB	131.71	131.57	12.76	120.5–126.5	Hunter River Alluvium	Y	Monitoring of Hunter River alluvium between the Hunter River and northwest end of MAC to identify any leakage from the Hunter River alluvium due to adjacent mining activities at MAC.	D/Q	Q/A	2	119.0	12.71	6.9-7.7	5228	9090
GW21	296141	6424483	MB	136.96	136.96	16.00	122.4–128.4	Hunter River Alluvium	Y	Monitoring of Hunter River alluvium between the Hunter River and north end of MAC to identify any leakage from the Hunter River alluvium due to adjacent mining activities at MAC.	D/Q	Q/A	2	118.3	18.66	6.9-7.7	5228	9090
GW38A (IW4030)	293831	6422393	MB	131.71	131.1	10.76	108.7–131.7	Hunter River Alluvium	Y	Monitoring of Hunter River alluvium close to the Hunter River and northwest end of main pit. A paired bore with GW38P to assess vertical hydraulic gradient between Permian Coal measures (Warkworth Seam) and alluvium, as well as any impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	2	119.7	12.01	6.9-7.7	5228	9090
GW38P	293832	6422384	MB	131.16	131.16	22.52	98.6–131.6	Warkworth Seam	Y	Monitoring of Warkworth Seam close to the Hunter River and northwest end of main pit. A paired bore with GW38A (IW4030) to assess vertical hydraulic gradient between Permian coal measures (Warkworth Seam) and alluvium, and the impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	1	117.3	13.86	7.2-8.1	6170	9170
GW39P-25mm	293094	6422251	MB	130.72	130.3	41.74	88.1–91.1	Warkworth Seam	Y	Monitoring of Hunter River alluvium close to the Hunter River and northwest end of the main pit. To assess any impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	-	1	117.2	13.52	-	-	-
GW41A (IW4029)	290348	6421810	MB	126.48	125.91	7.44	112.5–126.5	Hunter River alluvium	Y	Monitoring of Hunter River alluvium. A paired bore with GW49 to assess vertical hydraulic gradient between Permian coal measures (Arrowfield Seam) and alluvium, as well as any impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	1	116.9	9.58	6.9-7.7	5528	9090
GW43	294233	6418560	MB	197.33	196.83	68.50	133.8–139.8	Woodlands Hill Seam	Y	Monitoring of Woodlands Hill Seam, northwest of Belmont Pit/Void (mined to Glen Munro Seam). To assess any impact of mining activities adjacent to mining areas to the west of MAC.	D/Q	Q/A	1	166.8	30.53	7.0-8.5	4802	5810

Bore ID	Easting (m)	Northing (m)	Type	TOC Elevation (mAHD)	Surface Elevation (mAHD)	Bore/ Sensor Depth (mbgl)	Screen/Sensor (mAHD)	Stratigraphy	Logger/ Sensor Installed	Purpose of Bore	SWL Frequency	WQ Frequency	Water Level Trigger Derivation Method*	Water Level Trigger (mAHD)	Water Level Trigger (mbTOC)	pH Trigger Range	EC Trigger Stage 1 (µS/cm)	EC Trigger Stage 2 (µS/cm)
GW44	297445	6414733	MB	211.03	210.5	132.47	80.5–86.5	Woodlands Hill Seam	Y	Monitoring of Woodlands Hill Seam to the west of Saddlers Central Pit and to monitor the impact of mining activities adjacent to mining areas in the Saddlers Creek area.	D/Q	-	1	65.6	145.43	-	-	-
GW45	298890	6413630	MB	152.41	151.89	14.49	138.9–141.9	Saddlers Creek alluvium	Y	Monitoring of Saddlers Creek alluvium in the Saddlers Creek area. A paired bore with GW2 and GW46 to assess vertical hydraulic gradient between Permian coal measures (Woodlands Hill Seam) and alluvium, and the impact of mining activities adjacent to mining areas in the Saddlers Creek area.	D/Q	Q/A	2	137.7	14.71	6.6-7.6	8783	11380
GW46	298337	6413469	MB	144.14	143.63	20.49	126.1–129.1	Saddlers Creek Shallow Permian (regolith)	Y	Monitoring of Saddlers Creek alluvium in the Saddlers Creek area. A paired bore with GW2 and GW45 to assess vertical hydraulic gradient between Permian coal measures (Woodlands Hill Seam) and alluvium, as well as any impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	2	132.5	11.64	6.7-7.1	14800	21480
GW47	297409	6412974	MB	137.00	136.51	17.51	120.5–123.5	Saddlers Creek alluvium	Y	Monitoring Saddlers Creek alluvium to the south of Saddlers Creek and monitor the impact of mining activities adjacent to mining areas in the Saddlers Creek area.	D/Q	Q/A	2	126.9	10.10	6.6-7.6	8783	11380
GW48	291830	6422111	MB	129.62	129.07	35.6	95.0–98.0	Bowfield Seam	Y	Monitoring of Bowfield Seam and any impact from mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	1	115.9	13.72	6.8-7.7	7891	8300
GW49	290346	6421798	MB	126.62	126.02	35.47	92.1–95.1	Arrowfield Seam	Y	Monitoring of Arrowfield Seam. A paired bore with GW41A (IW4029) to assess vertical hydraulic gradient between Permian coal measures (Arrowfield Seam) and alluvium, and the impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	1	115.8	10.82	6.7-8.9	7831	8210
OD1078 (IW4028)	294491	6419265	MB	171.26	171.26	64.82	107.3–110.3	Arrowfield Seam	Y	Monitoring of Arrowfield Seam close to an old channel of Quarry Creek, to the northwest of Belmont Pit/Void (mined to Glen Munro Seam).	D/Q	-	2	132.9	38.36	-	-	-
X1MB	293566	6422429	MB	131.47	131.47	13.30	65.0–118.2	Hunter River Alluvium	Y	Monitoring of Hunter River alluvium between the Hunter River and north end of MAC to identify any leakage from the Hunter River alluvium due to adjacent mining activities at MAC.	D/Q	Q/A	2	118.7	12.77	6.9-7.7	5228	9090
X2MB	291196	6421899	MB	127.36	126.84	15.00	113.92–119.92	Hunter River Alluvium	Y	Monitoring of Hunter River alluvium between the Hunter River and north end of MAC to identify any leakage from the Hunter River alluvium due to adjacent mining activities at MAC.	D/Q	Q/A	2	117.9	9.46	6.9-7.7	5228	9090
X10MB	293247	6418841	MB	248.19	248.19	80.60	166.93–169.93	Glen Munro Seam	Y	Monitoring of Glen Munro Seam.	D/Q	Q/A	1	179.6	68.59	6.7-8.3	11200	14710
X14MB-1S	295649	6412596	MB	127.58	127.58	20.00	108.08–111.08	Saddlers Creek shallow Permian (regolith)	Y	Monitoring of regolith in unnamed tributary of Saddlers Creek, between McDonalds Pit/Void and Saddlers Creek. To assess any impact of mining activities adjacent to mining areas to the north of MAC. A paired bore with X14MB-2D to assess the hydraulic gradient between the regolith and Permian coal measures (Glen Munro Seam).	D/Q	Q/A	2	114.5	13.08	6.7-7.1	14800	21480

Bore ID	Easting (m)	Northing (m)	Type	TOC Elevation (mAHD)	Surface Elevation (mAHD)	Bore/ Sensor Depth (mbgl)	Screen/Sensor (mAHD)	Stratigraphy	Logger/ Sensor Installed	Purpose of Bore	SWL Frequency	WQ Frequency	Water Level Trigger Derivation Method*	Water Level Trigger (mAHD)	Water Level Trigger (mbTOC)	pH Trigger Range	EC Trigger Stage 1 (µS/cm)	EC Trigger Stage 2 (µS/cm)
X14MB-2D	295648	6412592	MB	128.06	127.48	75.5	52.28–55.28	Glen Munro Seam	Y	Monitoring of Glen Munro Seam near an unnamed tributary of Saddlers Creek, between McDonalds Pit/Void and Saddlers Creek. To assess any impact of mining activities adjacent to mining areas to the north of MAC. A paired bore with X14MB-1S to assess the hydraulic gradient between the regolith and Permian coal measures (Glen Munro Seam).	D/Q	Q/A	2	116.1	11.96	6.7-8.3	11200	14710
VWP2_P1	295195	6423364	VWP	135.41	135.41	216.5	-81.09	F4 Fault	Y	Targeting F4 Fault zone to monitor any variations in water levels within the fault and coals seams either side of, and displaced by, fault movement. Also, to monitor the effectiveness of cut off wall located between the Hunter River and the northern end of MAC. A paired bore with GW42 and VWP3 to assess vertical hydraulic gradient between Permian Coal measures and alluvium, and the impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	Q/A	1	-64.4	-	-	-	-
VWP3_P1	295166	6423349	VWP	135.38	135.38	227.0	-91.62	Edinglassie Seam	Y	Targeting Edinglassie Seam, above F4 fault on footwall, to monitor any variations in water levels within the fault and coals seams either side of, and displaced by, fault movement. Also, to monitor the effectiveness of cut off wall located between the Hunter River and the northern end of MAC. A paired bore with GW42 and VWP2 to assess vertical hydraulic gradient between Permian Coal measures and alluvium, and the impact of mining activities adjacent to mining areas to the north of MAC.	D/Q	-	1	-46.5	-	-	-	-
VWP05_164	293993	6421605	VWP	161.40	161.40	164.0	-2.60	Vaux Seam	Y	Monitoring any depressurisation in Vaux Seam due to mining activities at MAC.	D/Q	-	1	-46.2	-	-	-	-
VWP05_192						192.0	-30.60	Bayswater Seam	Y	Monitoring any depressurisation in Bayswater Seam due to mining activities at MAC.	D/Q	-	1	-29.1	-	-	-	-
VWP05_227						227.0	-65.60	Edderton Seam	Y	Monitoring any depressurisation in Edderton Seam due to mining activities at MAC.	D/Q	-	1	-74.1	-	-	-	-
VWP06_269	293960	6420850	VWP	179.64	179.64	269.0	-89.36	Broonie Seam	Y	Monitoring any depressurisation in Broonie Seam due to mining activities at MAC.	D/Q	-	1	-15.3	-	-	-	-
VWP06_304						304.0	-124.36	Edderton Seam	Y	Monitoring any depressurisation in Edderton Seam due to mining activities at MAC.	D/Q	-	1	-59.8	-	-	-	-
VWP06_366						366.0	-186.36	Edinglassie Seam	Y	Monitoring any depressurisation in Edinglassie Seam due to mining activities at MAC.	D/Q	-	1	-4.5	-	-	-	-
VWP07_223	295656	6419565	VWP	215.95	215.95	223.0	-7.05	Piercefield Seam	Y	Monitoring of Piercefield Seam to assess vertical hydraulic gradient between Permian Coal measures (Vaux, Bayswater, Edderton and Ramrod Creek seams), and the impact of mining activities adjacent to mining areas to the northwest of MAC.	D/Q	-	1	64.7	-	-	-	-
VWP07_271						271.0	-55.05	Vaux Seam	Y	Monitoring of Vaux Seam to assess vertical hydraulic gradient between Permian Coal measures (Piercefield, Bayswater, Edderton and Ramrod Creek seams), and the impact of mining activities adjacent to mining areas to the northwest of MAC.	D/Q	-	1	57.3	-	-	-	-

Bore ID	Easting (m)	Northing (m)	Type	TOC Elevation (mAHD)	Surface Elevation (mAHD)	Bore/ Sensor Depth (mbgl)	Screen/Sensor (mAHD)	Stratigraphy	Logger/ Sensor Installed	Purpose of Bore	SWL Frequency	WQ Frequency	Water Level Trigger Derivation Method*	Water Level Trigger (mAHD)	Water Level Trigger (mbTOC)	pH Trigger Range	EC Trigger Stage 1 (µS/cm)	EC Trigger Stage 2 (µS/cm)
VWP07_286						286.0	-70.5	Bayswater Seam	Y	Monitoring of Bayswater Seam to assess vertical hydraulic gradient between Permian Coal measures (Piercefield, Vaux, Edderton and Ramrod Creek seams), and the impact of mining activities adjacent to mining areas to the northwest of MAC.	D/Q	-	1	-17.1	-	-	-	-
VWP07_326						326.0	-110.1	Edderton Seam	Y	Monitoring of Edderton Seam to assess vertical hydraulic gradient between Permian Coal measures (Piercefield, Vaux, Bayswater and Ramrod Creek seams), and the impact of mining activities adjacent to mining areas to the northwest of MAC.	D/Q	-	1	-91.3	-	-	-	-
VWP07_418						418.0	-202.1	Ramrod Creek Seam	Y	Monitoring of Ramrod Creek Seam to assess vertical hydraulic gradient between Permian Coal measures (Piercefield, Vaux, Bayswater and Edderton seams), and the impact of mining activities adjacent to mining areas to the northwest of MAC.	D/Q	-	1	142.3	-	-	-	-
X1_S-1 (35)	293564	6422437	VWP	131.44	131.44	35.0	96.44	Alluvium	Y	Monitoring any depressurisation in alluvium near the Hunter River due to mining activities at MAC.	D/Q	-	1	97.6	-	-	-	-
X1_S-2 (59)						59.0	72.44	Mt Arthur Seam	Y	Monitoring any depressurisation in the Mt Arthur Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	91.0	-	-	-	-
X1_S-3 (128.5)						128.5	2.94	Vaux Seam	Y	Monitoring any depressurisation in the Vaux Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	24.6	-	-	-	-
X1_S-4 (164)						164.0	-32.56	Bayswater/Wynn Seam	Y	Monitoring any depressurisation in the Bayswater/Wynn Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	16.1	-	-	-	-
X1_S-5 (215)						215.0	-83.56	Interburden above Bengalla Seam	Y	Monitoring any depressurisation in the Interburden above Bengalla Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	-31.7	-	-	-	-
X1_S-6 (255)						255.0	-123.56	Edinglassie Seam	Y	Monitoring any depressurisation in the Edinglassie Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	-55.6	-	-	-	-
X1_S-7 (276.5)						276.5	-145.06	Ramrod Creek Seam	Y	Monitoring any depressurisation in the Ramrod Creek Seam near the Hunter River due to mining activities at MAC.	D/Q	-	1	-64.6	-	-	-	-

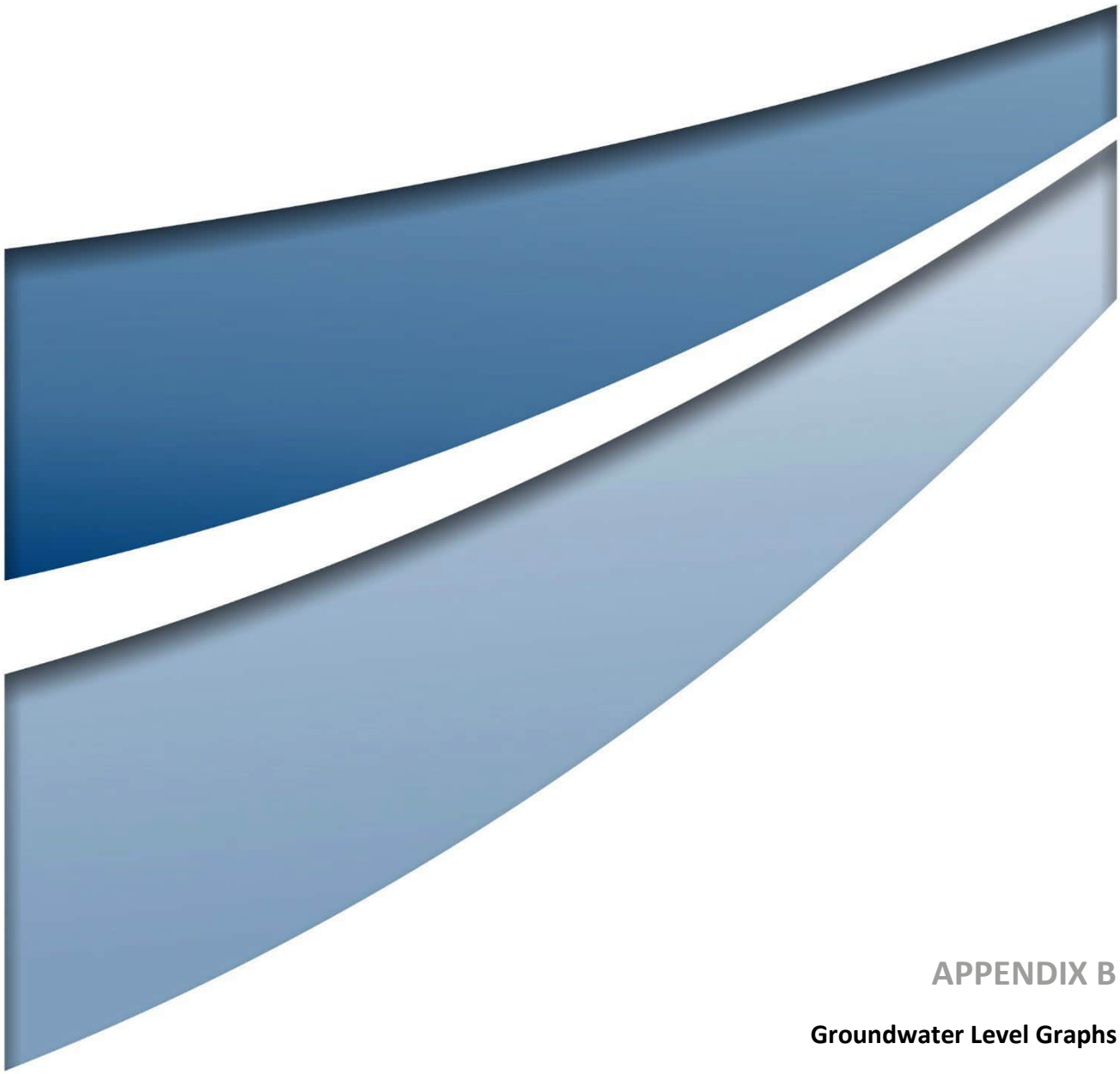
Note: Coordinates – GDA94z56

TOC – Top of Casing

D – Daily

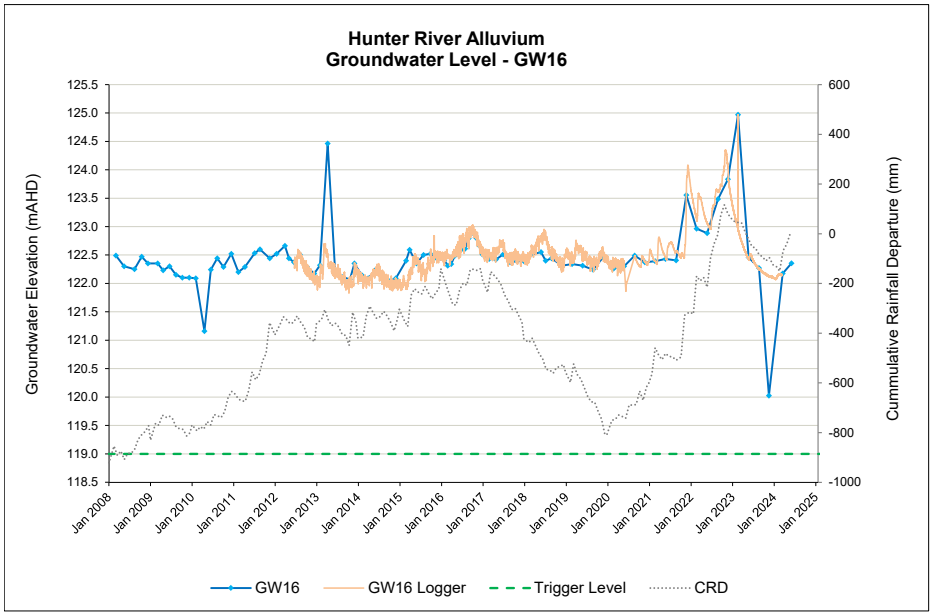
Q – Quarterly

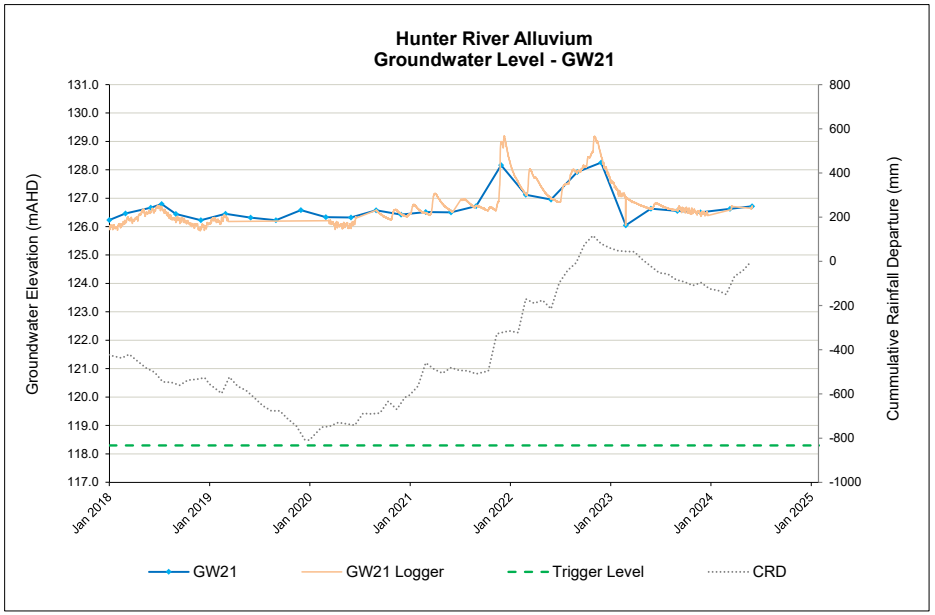
A – Annually

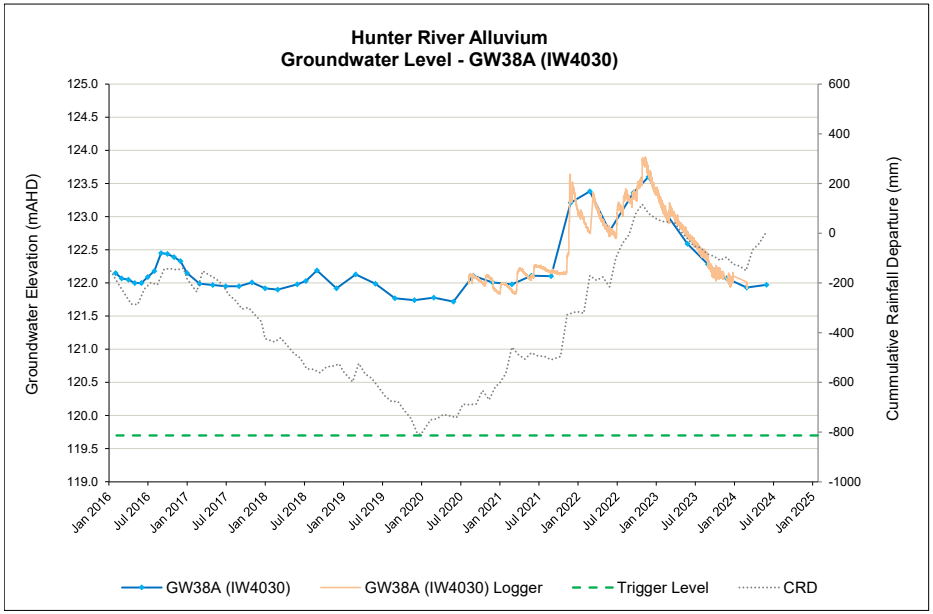


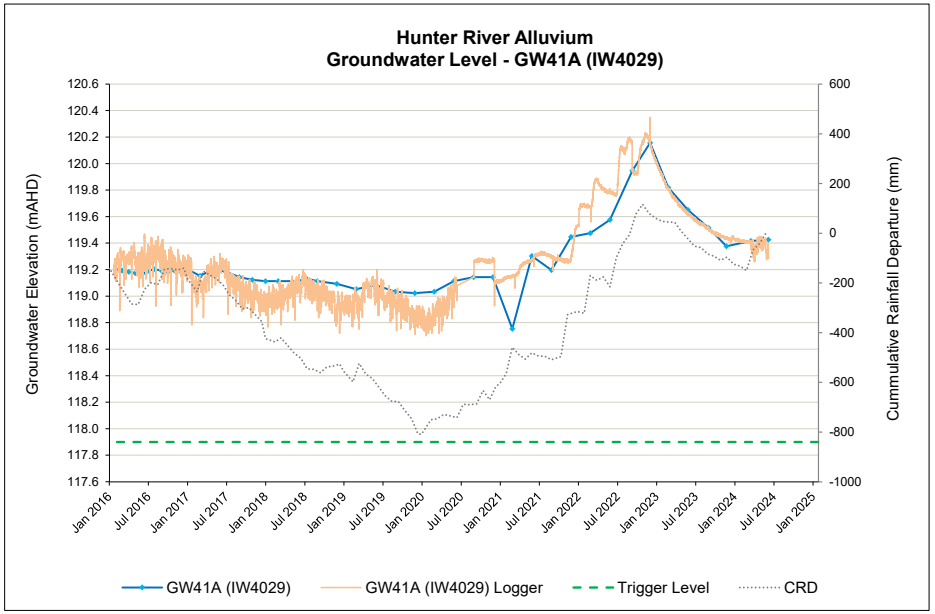
APPENDIX B

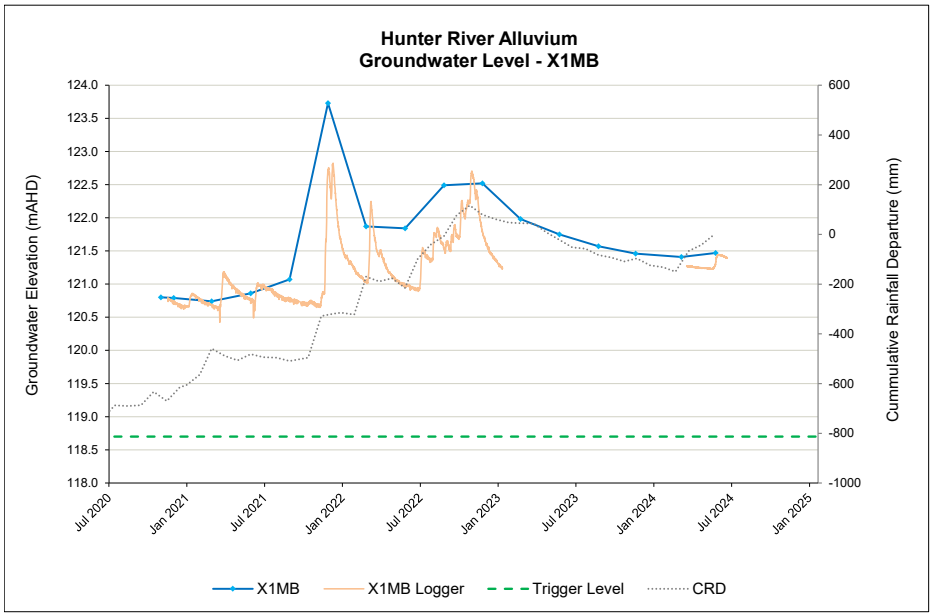
Groundwater Level Graphs

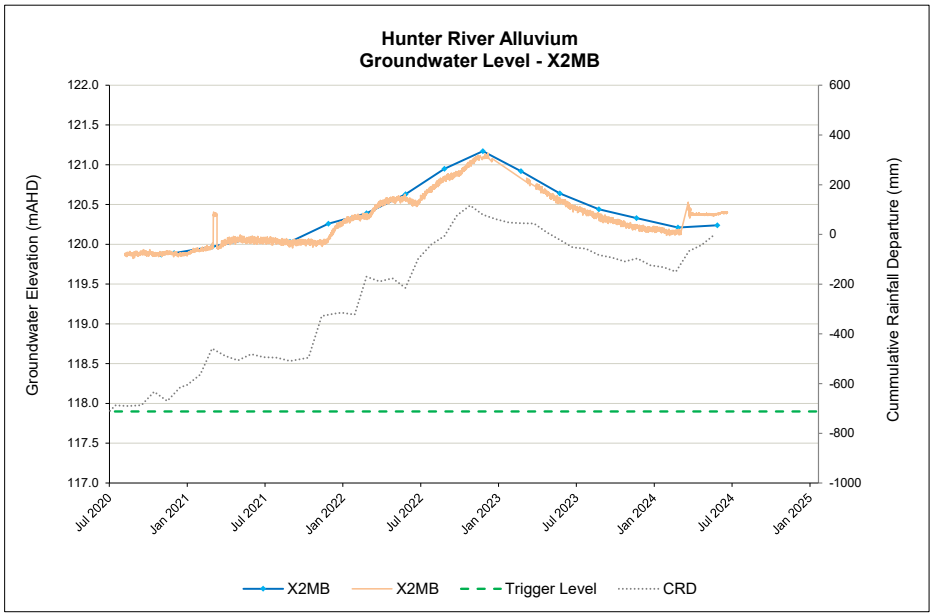

Hunter River Alluvium
Groundwater Level - GW16
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW16
GW16 Logger
Trigger Level
CRD

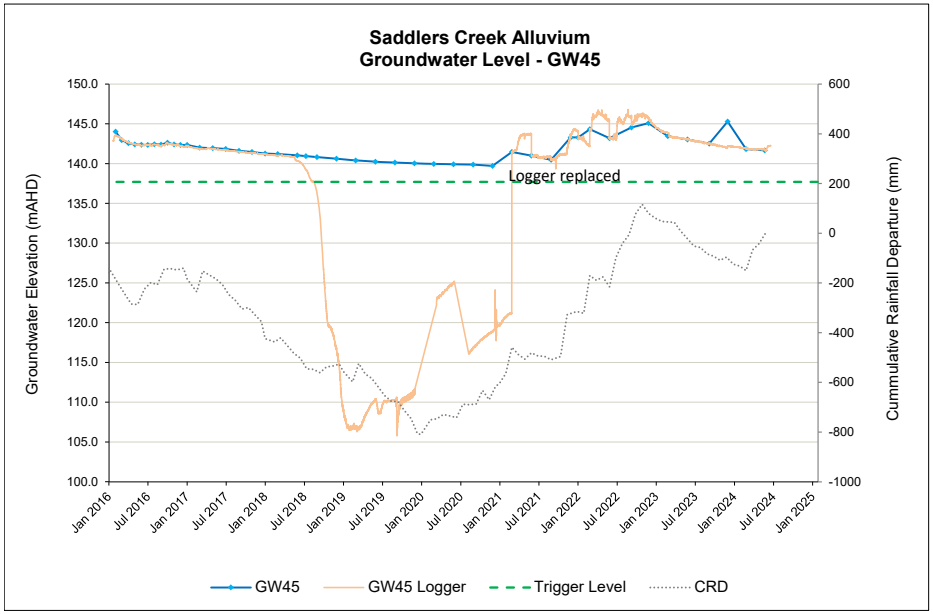

Hunter River Alluvium
Groundwater Level - GW21
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW21
GW21 Logger
Trigger Level
CRD

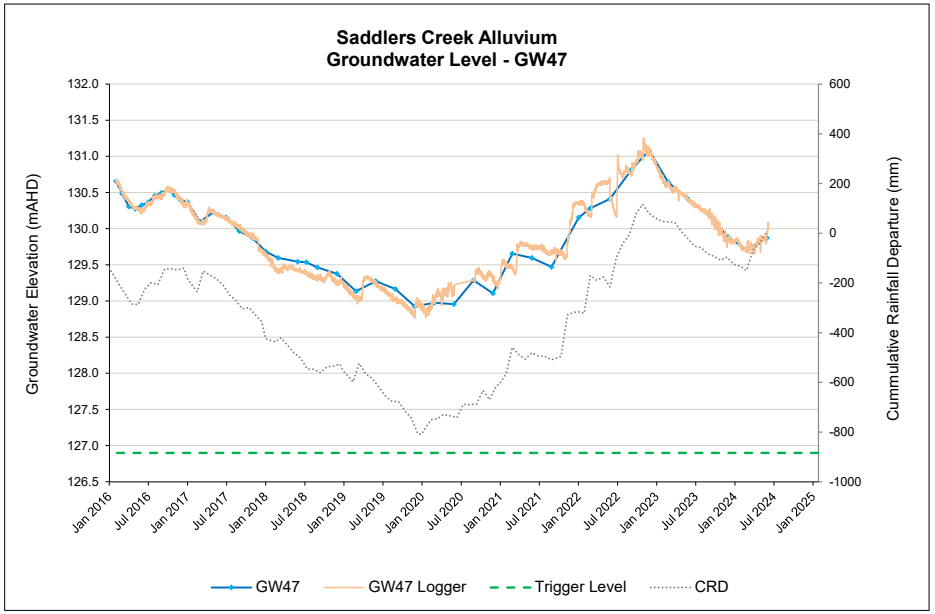

Hunter River Alluvium
Groundwater Level - GW38A (IW4030)
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW38A (IW4030)
GW38A (IW4030) Logger
Trigger Level
CRD

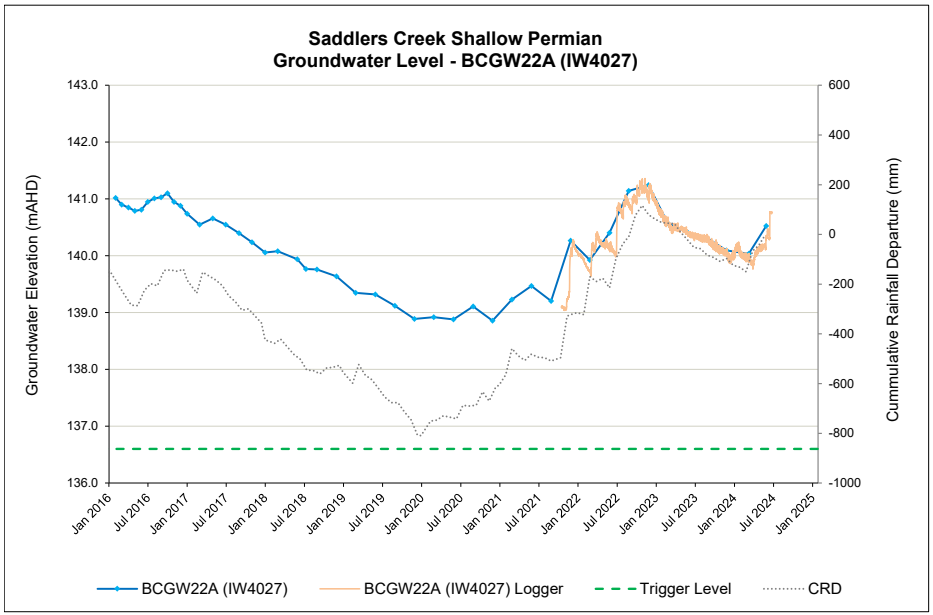

Hunter River Alluvium
Groundwater Level - GW41A (IW4029)
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW41A (IW4029)
GW41A (IW4029) Logger
Trigger Level
CRD

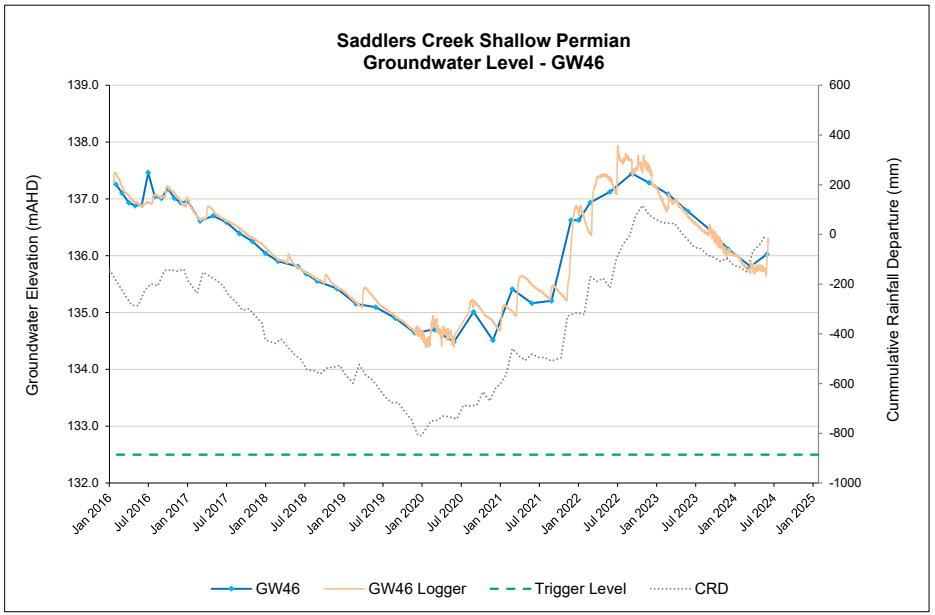

Hunter River Alluvium
Groundwater Level - X1MB
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
X1MB
X1MB Logger
Trigger Level
CRD

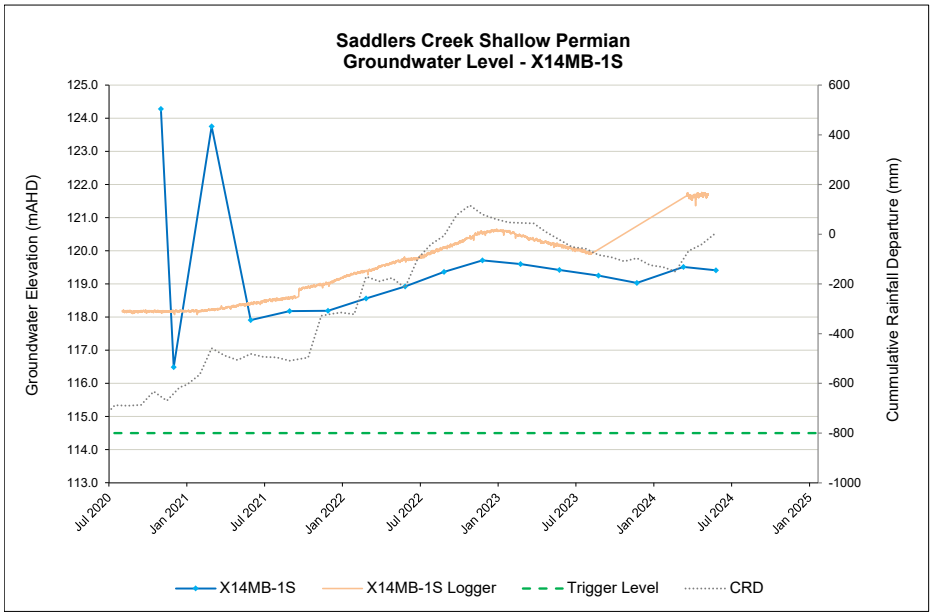

Hunter River Alluvium
Groundwater Level - X2MB
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
X2MB
X2MB
Trigger Level
CRD

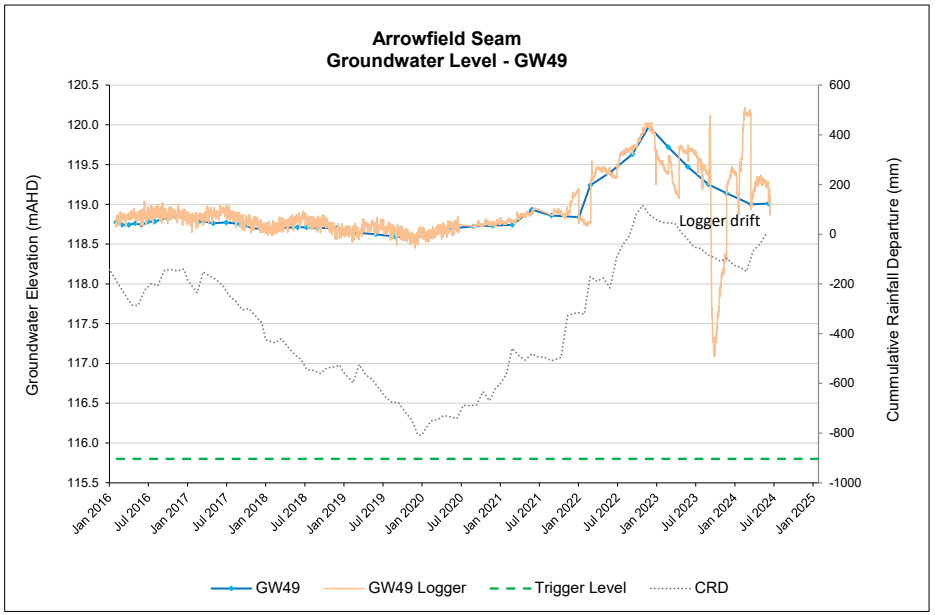

Saddlers Creek Alluvium
Groundwater Level - GW45
Logger replaced
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW45
GW45 Logger
Trigger Level
CRD

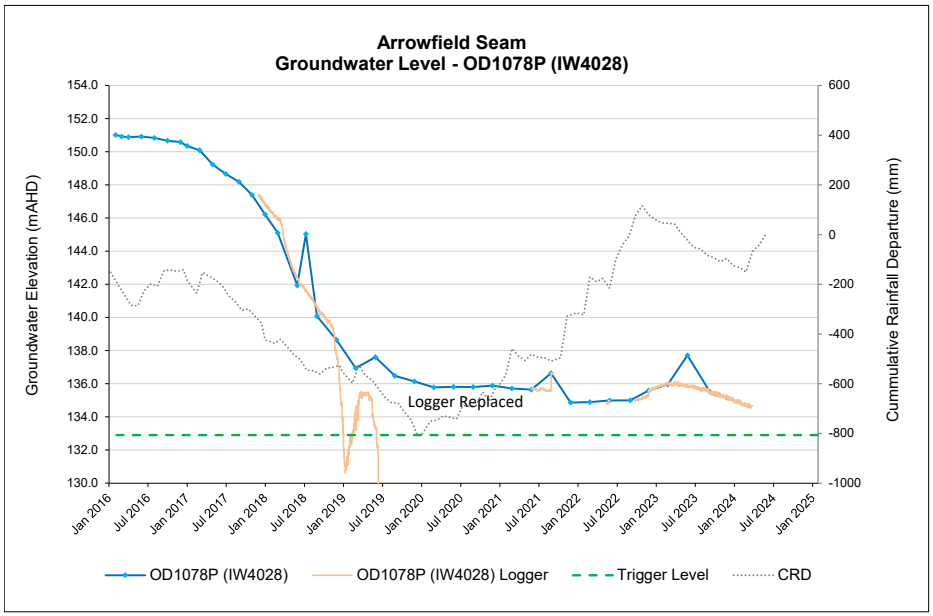

Saddlers Creek Alluvium
Groundwater Level - GW47
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW47
GW47 Logger
Trigger Level
CRD

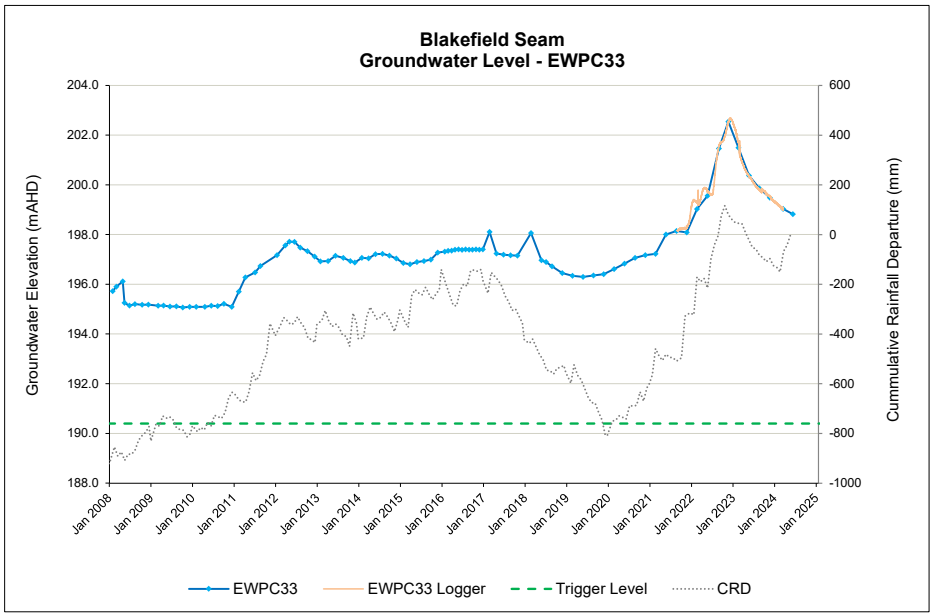

Saddlers Creek Shallow Permian
Groundwater Level - BCGW22A (IW4027)
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
BCGW22A (IW4027)
BCGW22A (IW4027) Logger
Trigger Level
CRD

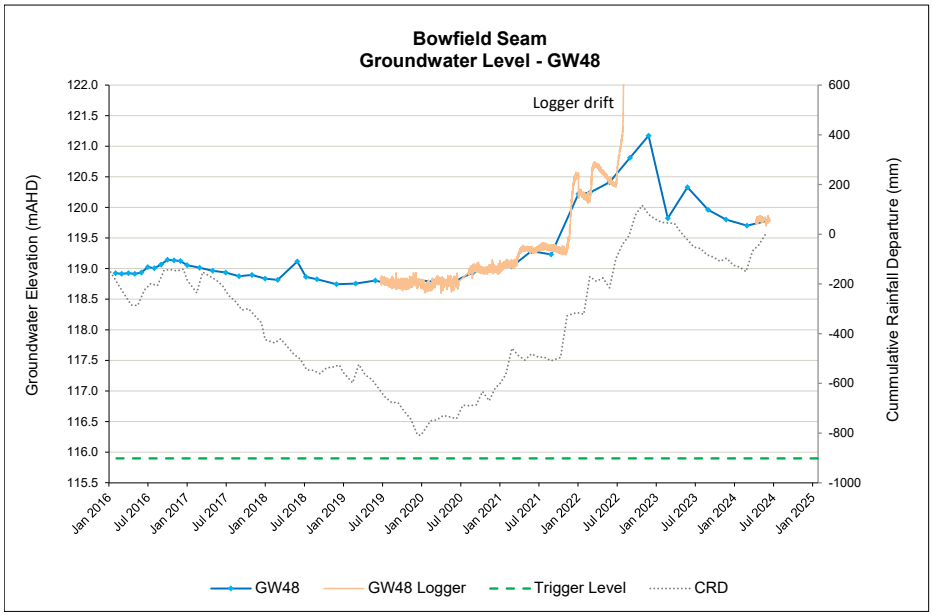

Saddlers Creek Shallow Permian
Groundwater Level - GW46
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW46
GW46 Logger
Trigger Level
CRD

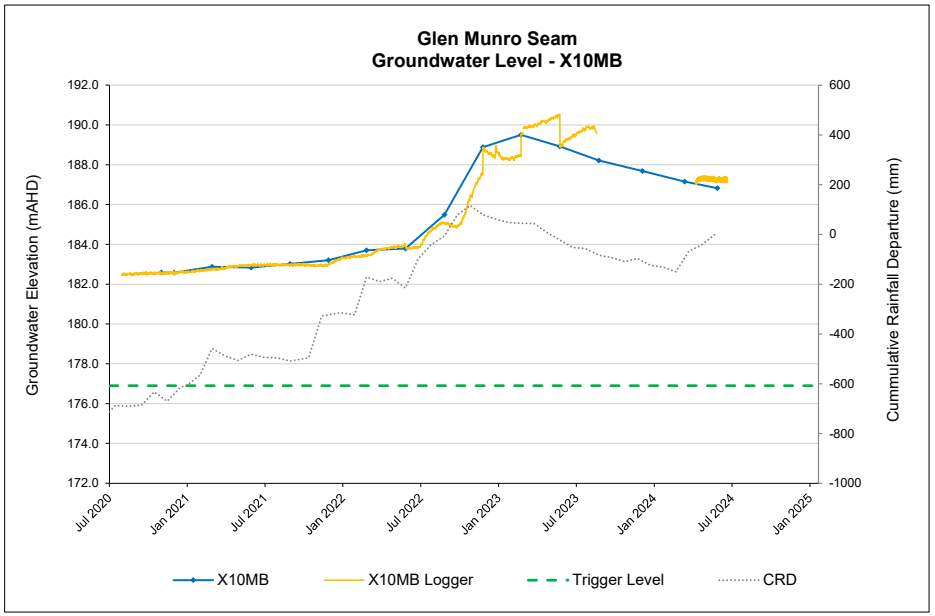

Saddlers Creek Shallow Permian
Groundwater Level - X14MB-1S
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
X14MB-1S
X14MB-1S Logger
Trigger Level
CRD

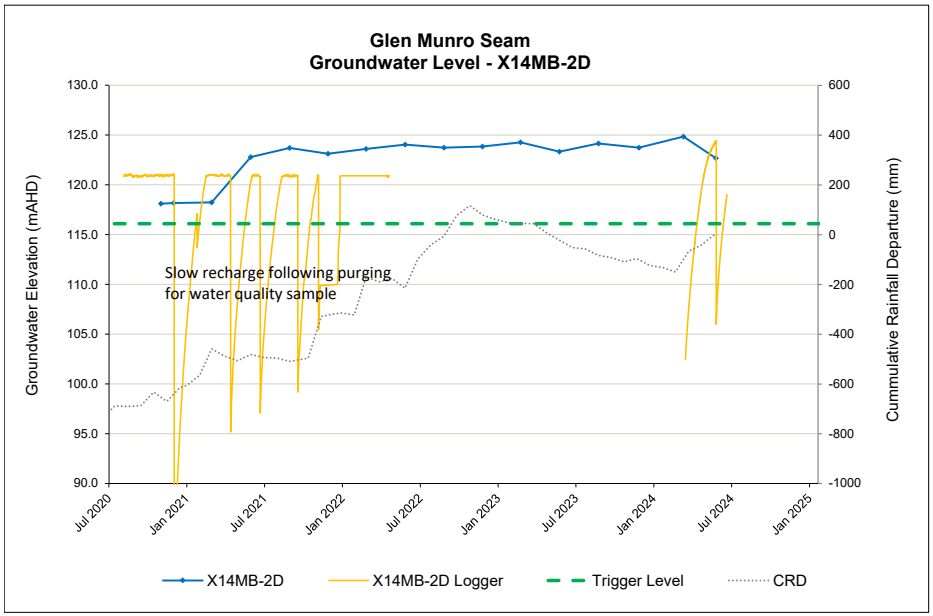

Arrowfield Seam
Groundwater Level - GW49
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
Logger drift
GW49
GW49 Logger
Trigger Level
CRD

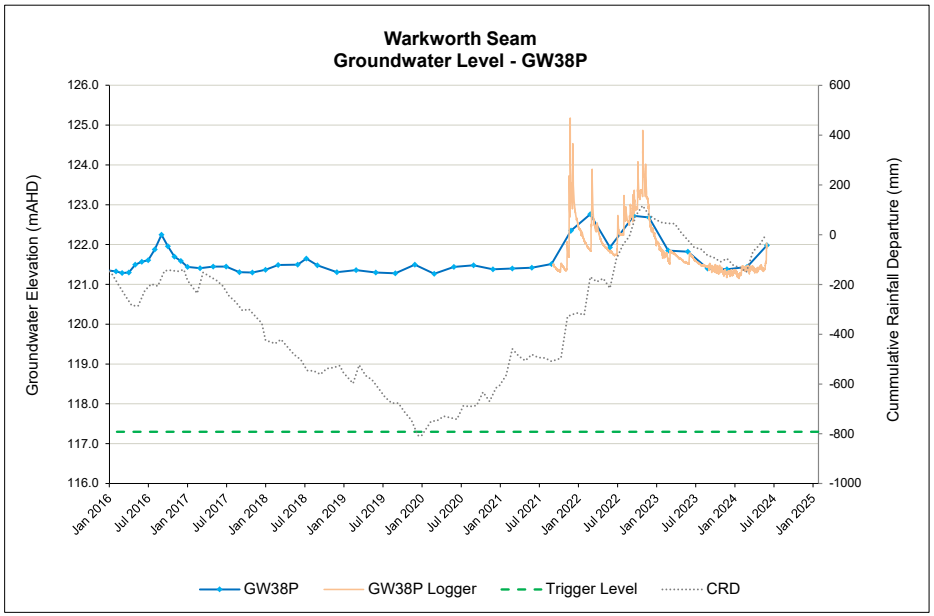

Arrowfield Seam
Groundwater Level - OD1078P (IW4028)
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
Logger Replaced
OD1078P (IW4028)
OD1078P (IW4028) Logger
Trigger Level
CRD

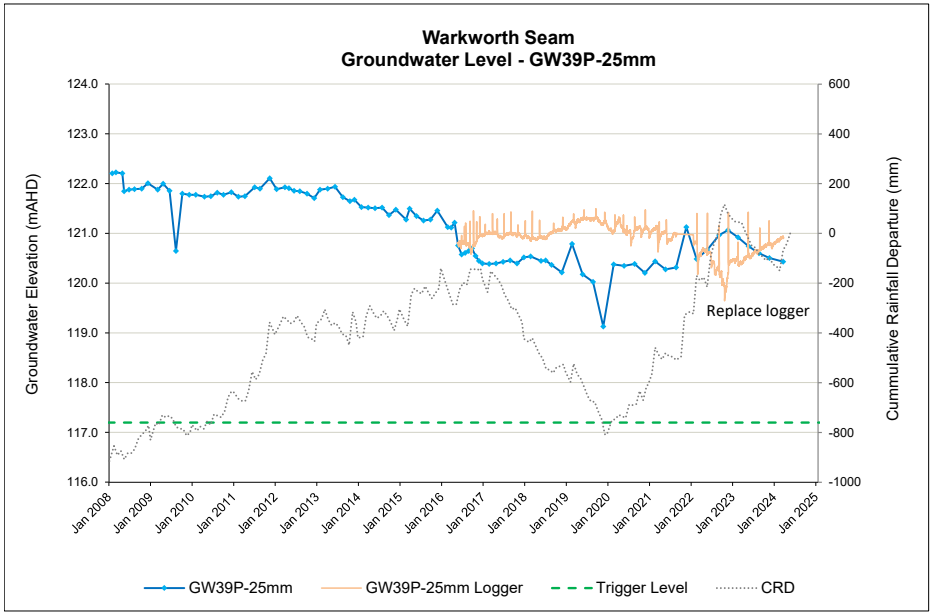

Blakefield Seam
Groundwater Level - EWPC33
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
EWPC33
EWPC33 Logger
Trigger Level
CRD

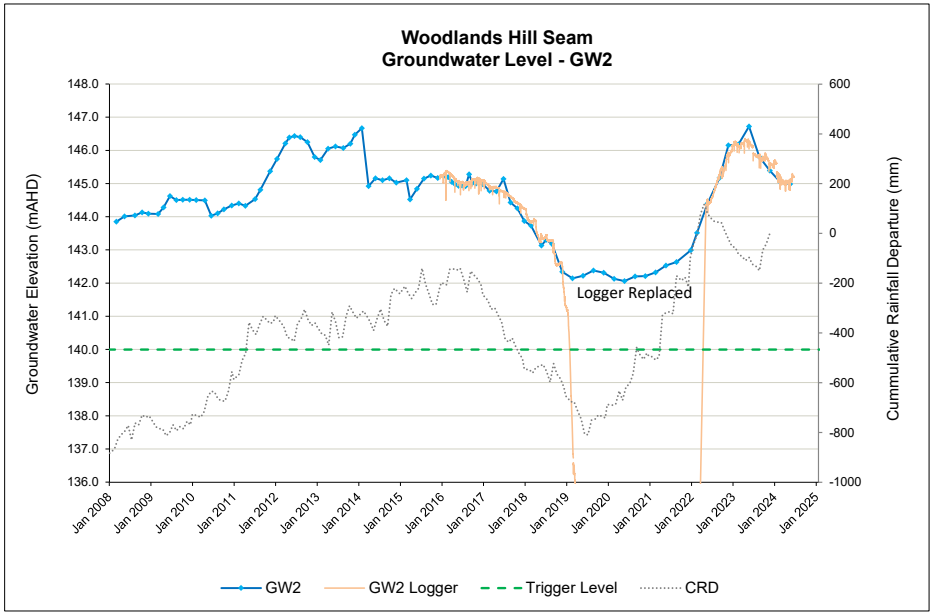

Bowfield Seam
Groundwater Level - GW48
Logger drift
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW48
GW48 Logger
Trigger Level
CRD

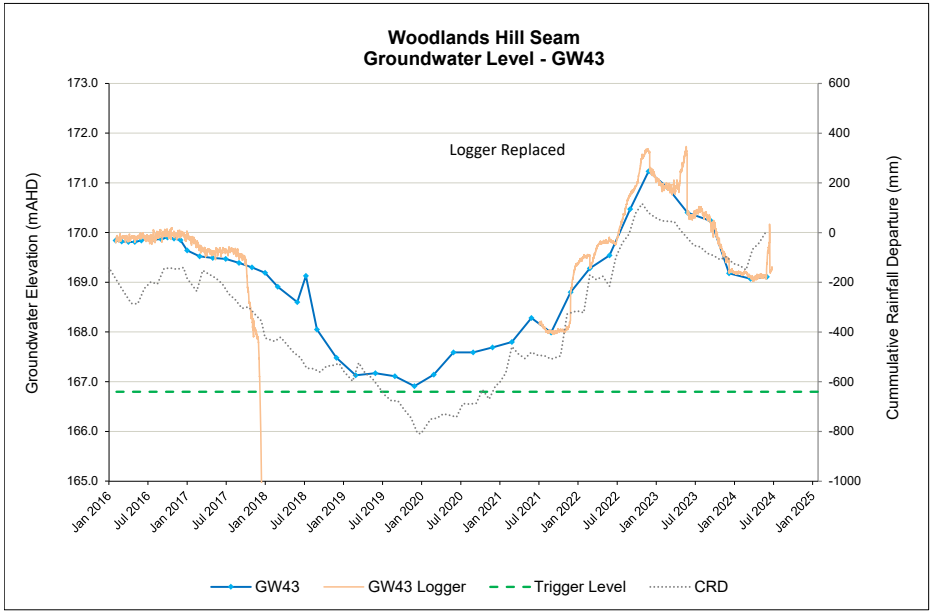

Glen Munro Seam
Groundwater Level - X10MB
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
X10MB
X10MB Logger
Trigger Level
CRD

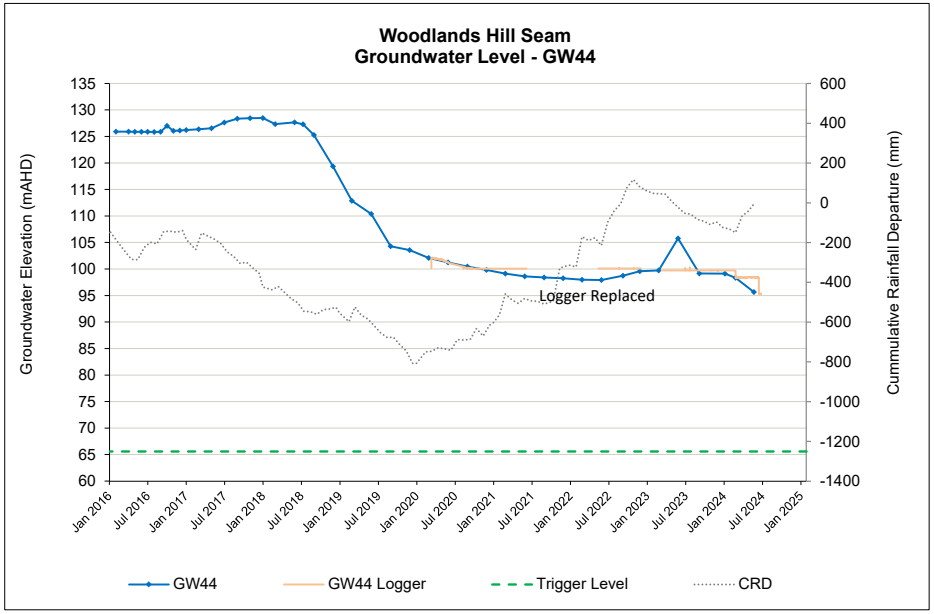

Glen Munro Seam
Groundwater Level - X14MB-2D
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
Slow recharge following purging
for water quality sample
X14MB-2D
X14MB-2D Logger
Trigger Level
CRD

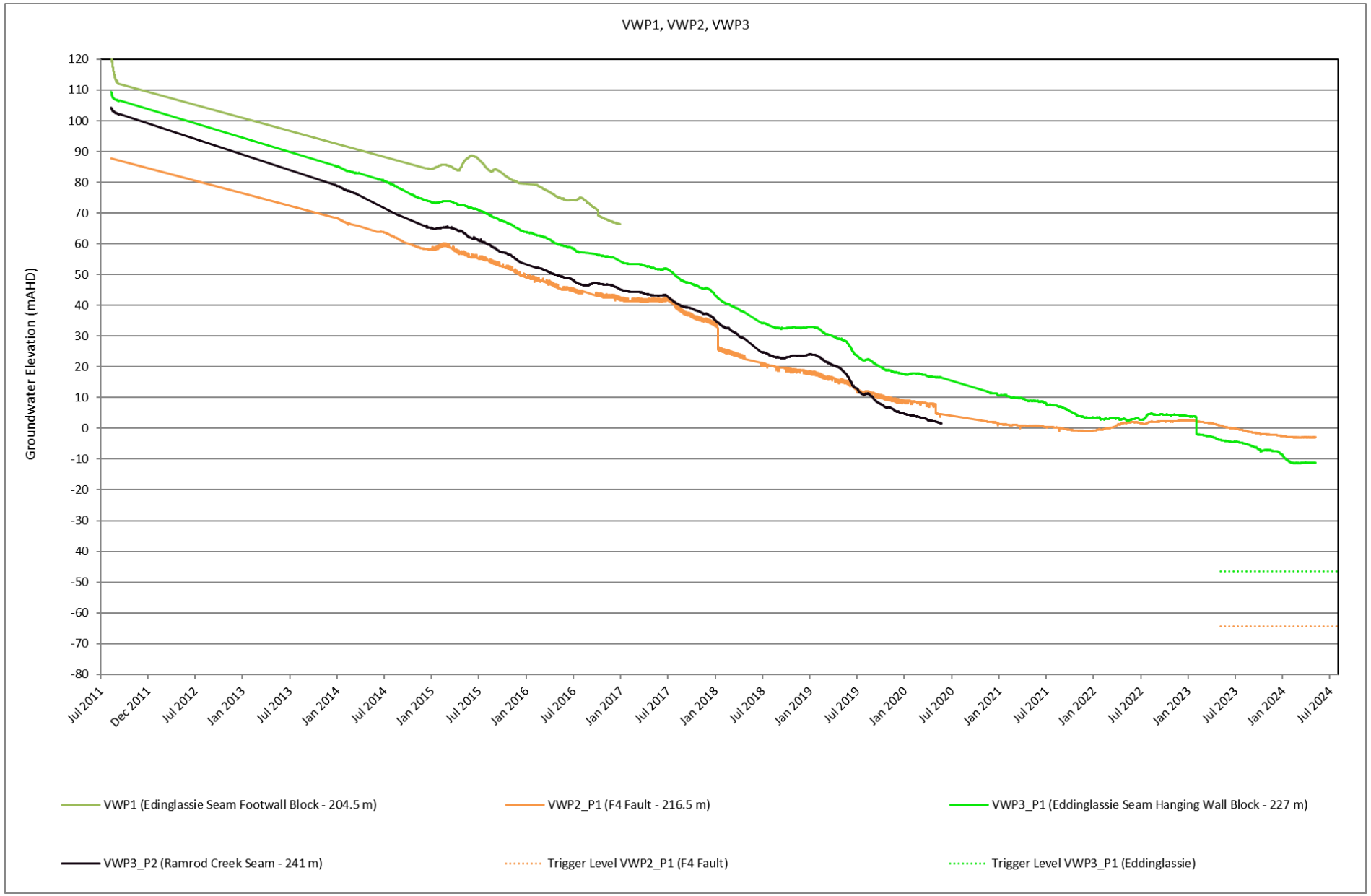

Warkworth Seam
Groundwater Level - GW38P
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW38P
GW38P Logger
Trigger Level
CRD

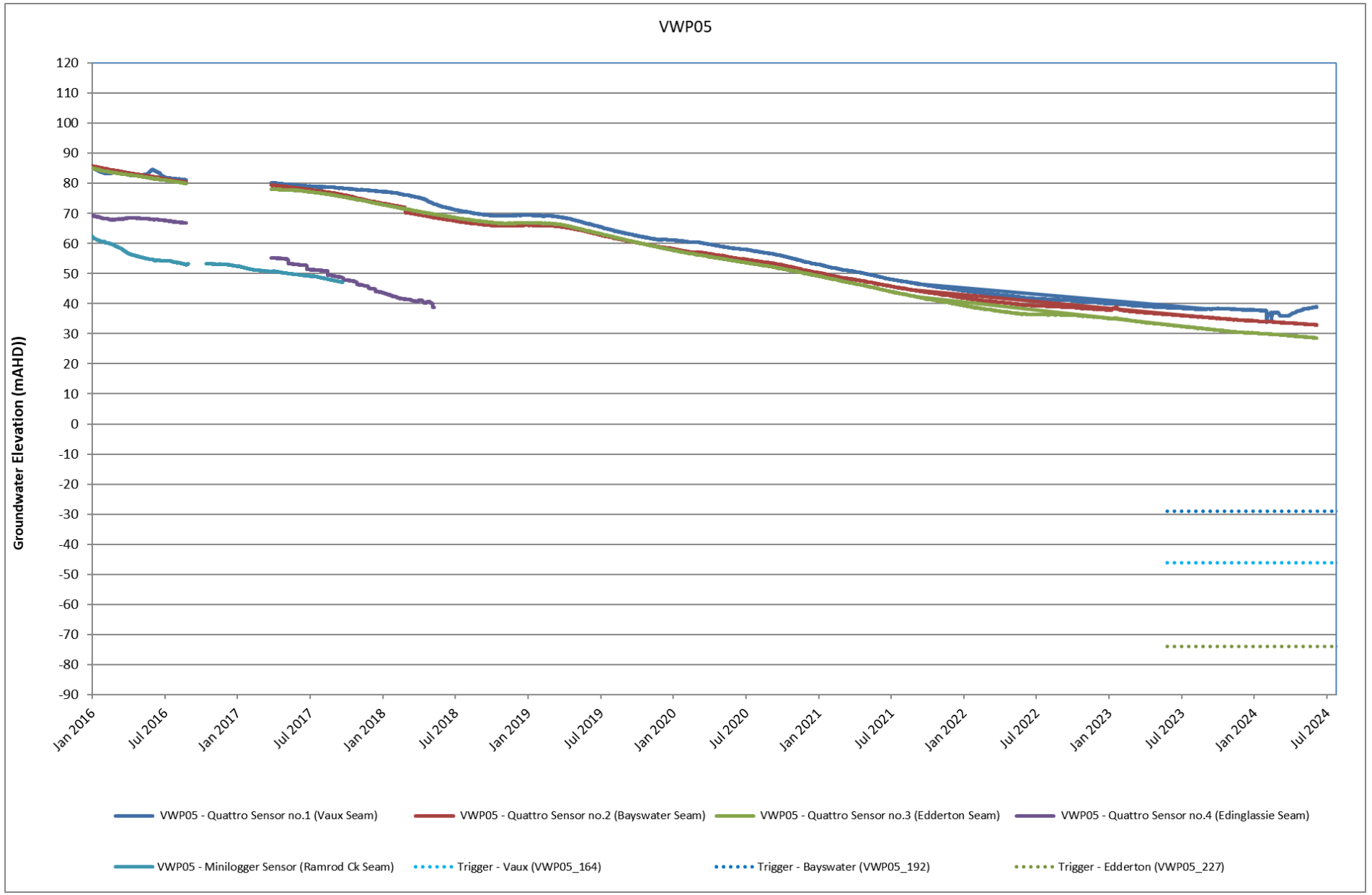

Warkworth Seam
Groundwater Level - GW39P-25mm
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
Replace logger
GW39P-25mm
GW39P-25mm Logger
Trigger Level
CRD

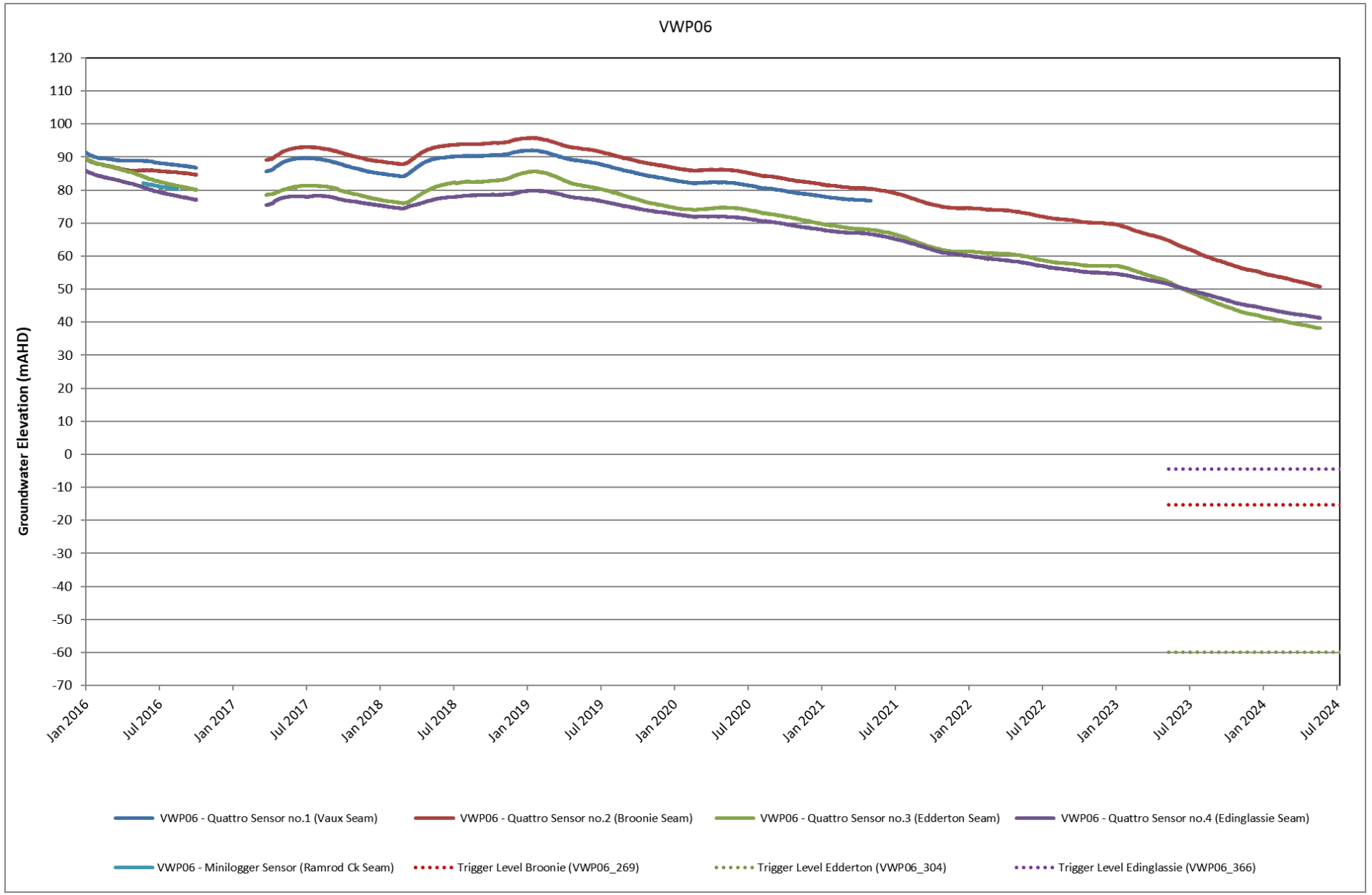

Woodlands Hill Seam
Groundwater Level - GW2
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
Logger Replaced
GW2
GW2 Logger
Trigger Level
CRD

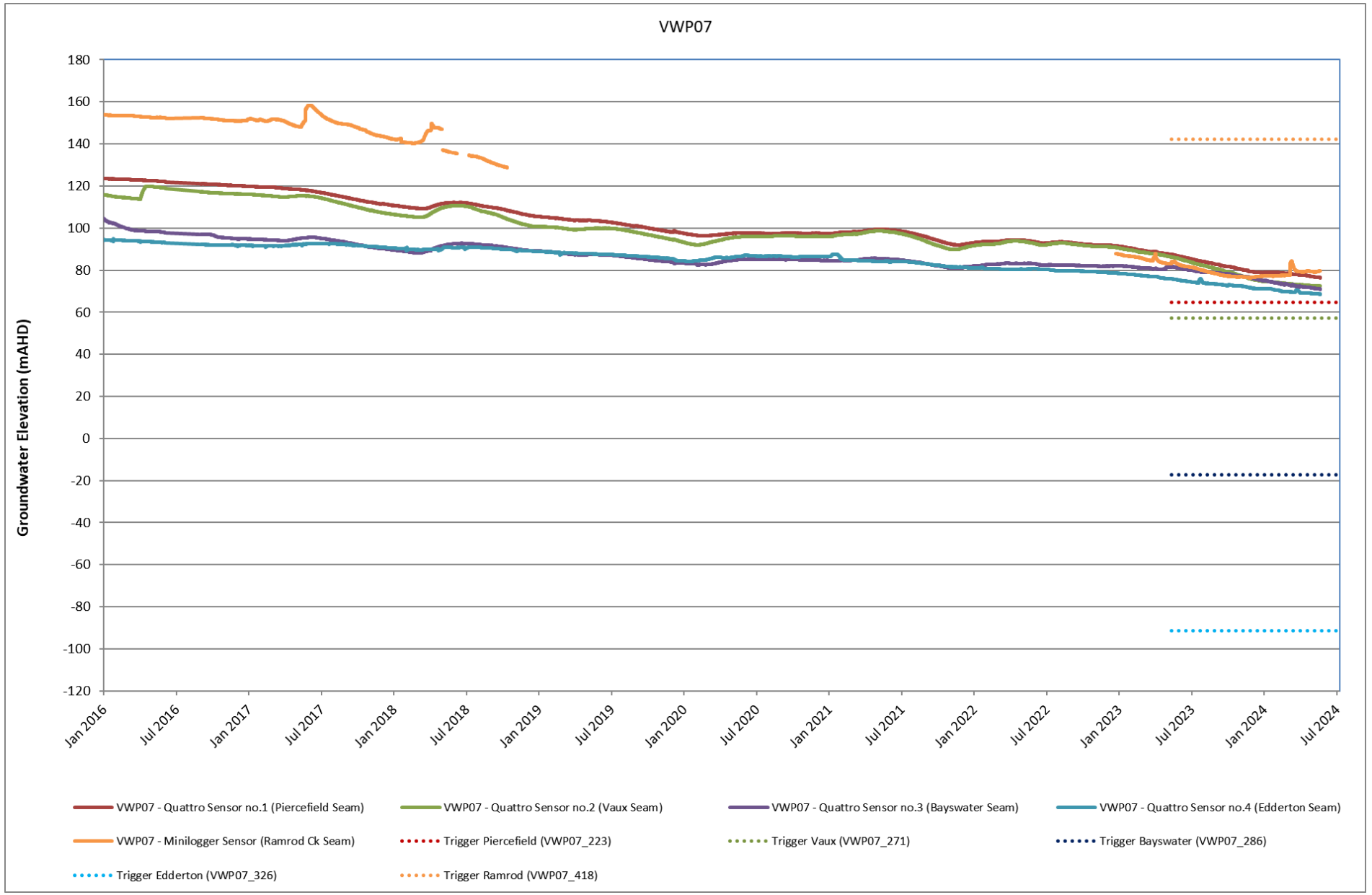

Woodlands Hill Seam
Groundwater Level - GW43
Logger Replaced
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW43
GW43 Logger
Trigger Level
CRD

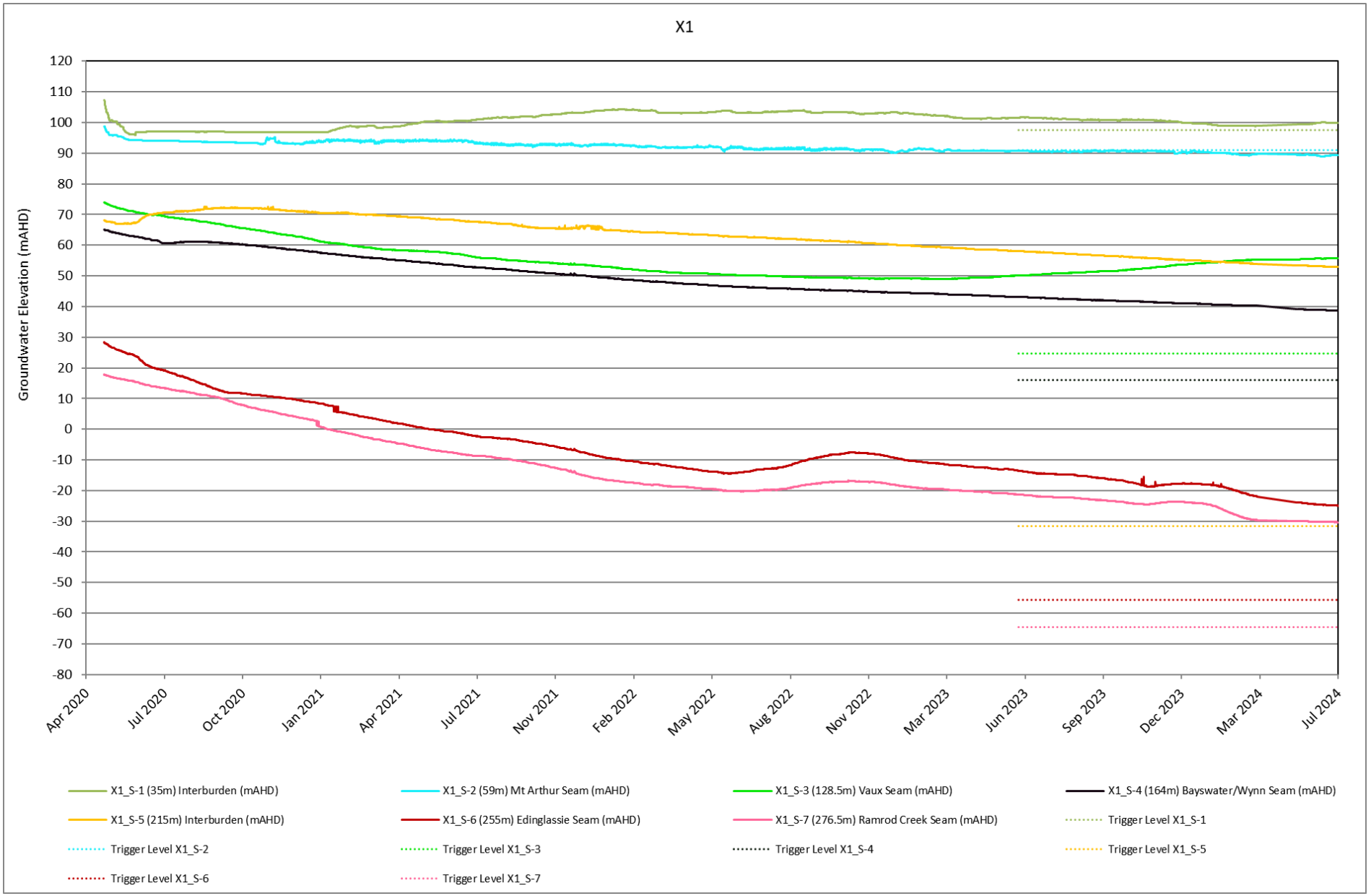

Woodlands Hill Seam
Groundwater Level - GW44
Logger Replaced
Groundwater Elevation (mAHD)
Cummulative Rainfall Departure (mm)
GW44
GW44 Logger
Trigger Level
CRD


VWP1, VWP2, VWP3
Groundwater Elevation (mAHD)
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Jul 2011
Dec 2011
Jul 2012
Jan 2013
Jul 2013
Jan 2014
Jul 2014
Jan 2015
Jul 2015
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
VWP1 (Edinglassie Seam Footwall Block - 204.5 m)
VWP2_P1 (F4 Fault - 216.5 m)
VWP3_P1 (Eddinglassie Seam Hanging Wall Block - 227 m)
VWP3_P2 (Ramrod Creek Seam - 241 m)
Trigger Level VWP2_P1 (F4 Fault)
Trigger Level VWP3_P1 (Eddinglassie)


VWP05
Groundwater Elevation (mAHD))
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
VWP05 - Quattro Sensor no.1 (Vaux Seam)
VWP05 - Quattro Sensor no.2 (Bayswater Seam)
VWP05 - Quattro Sensor no.3 (Edderton Seam)
VWP05 - Quattro Sensor no.4 (Edinglassie Seam)
VWP05 - Minilogger Sensor (Ramrod Ck Seam)
Trigger - Vaux (VWP05_164)
Trigger - Bayswater (VWP05_192)
Trigger - Edderton (VWP05_227)


VWP06
Groundwater Elevation (mAHD)
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
VWP06 - Quattro Sensor no.1 (Vaux Seam)
VWP06 - Quattro Sensor no.2 (Broonie Seam)
VWP06 - Quattro Sensor no.3 (Edderton Seam)
VWP06 - Quattro Sensor no.4 (Edinglassie Seam)
VWP06 - Minilogger Sensor (Ramrod Ck Seam)
Trigger Level Broonie (VWP06_269)
Trigger Level Edderton (VWP06_304)
Trigger Level Edinglassie (VWP06_366)


VWP07
Groundwater Elevation (mAHD)
180
160
140
120
100
80
60
40
20
0
-20
-40
-60
-80
-100
-120
Jan 2016
Jul 2016
Jan 2017
Jul 2017
Jan 2018
Jul 2018
Jan 2019
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
VWP07 - Quattro Sensor no.1 (Piercefield Seam)
VWP07 - Quattro Sensor no.2 (Vaux Seam)
VWP07 - Quattro Sensor no.3 (Bayswater Seam)
VWP07 - Quattro Sensor no.4 (Edderton Seam)
VWP07 - Minilogger Sensor (Ramrod Ck Seam)
Trigger Piercefield (VWP07_223)
Trigger Vaux (VWP07_271)
Trigger Bayswater (VWP07_286)
Trigger Edderton (VWP07_326)
Trigger Ramrod (VWP07_418)


X1
Groundwater Elevation (mAHD)
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
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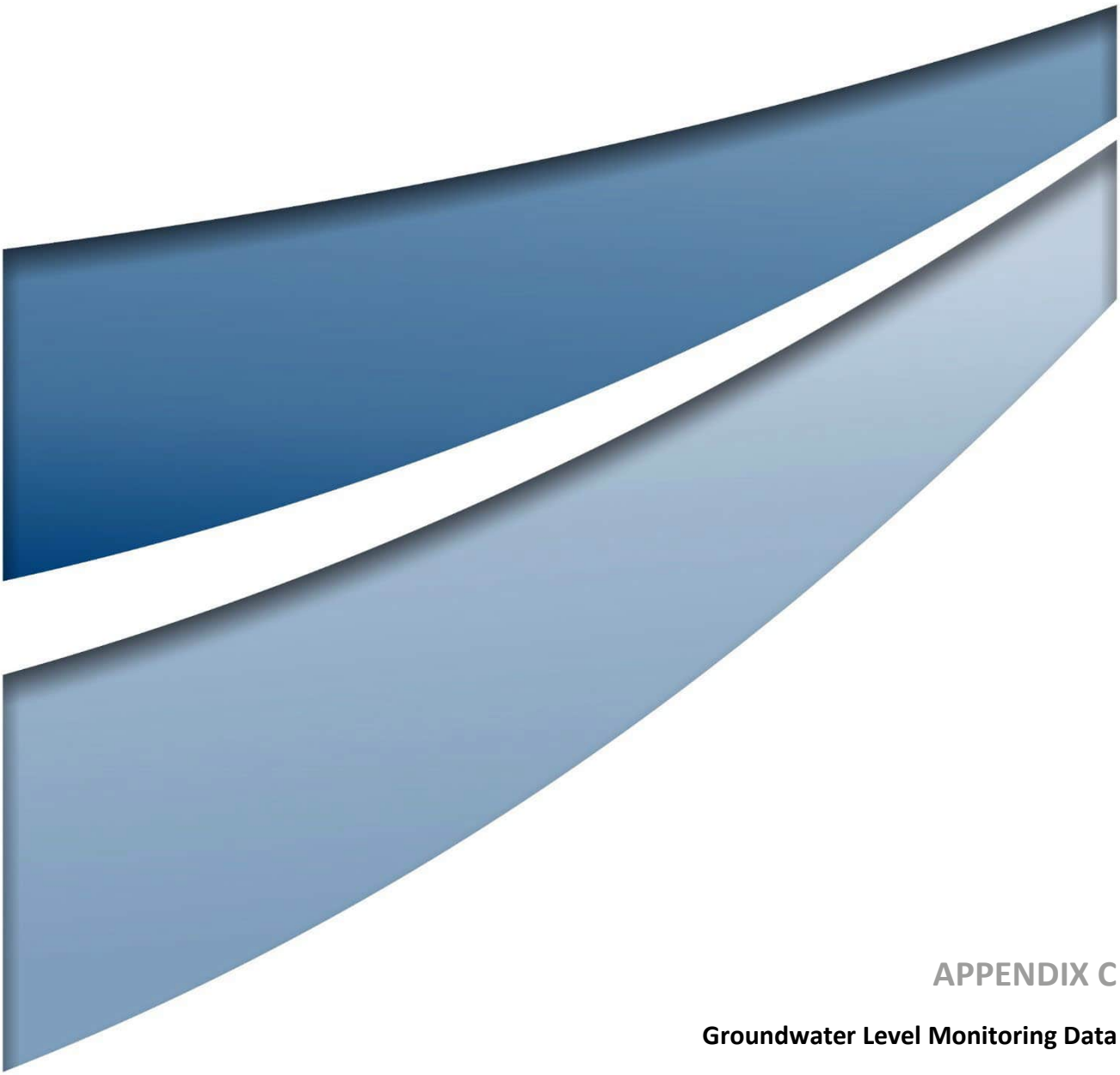
Apr 2020
Jul 2020
Oct 2020
Jan 2021
Apr 2021
Jul 2021
Nov 2021
Feb 2022
May 2022
Aug 2022
Nov 2022
Mar 2023
Jun 2023
Sep 2023
Dec 2023
Mar 2024
Jul 2024
X1_S-1 (35m) Interburden (mAHD)
X1_S-2 (59m) Mt Arthur Seam (mAHD)
X1_S-3 (128.5m) Vaux Seam (mAHD)
X1_S-4 (164m) Bayswater/Wynn Seam (mAHD)
X1_S-5 (215m) Interburden (mAHD)
X1_S-6 (255m) Edinglassie Seam (mAHD)
X1_S-7 (276.5m) Ramrod Creek Seam (mAHD)
Trigger Level X1_S-1
Trigger Level X1_S-2
Trigger Level X1_S-3
Trigger Level X1_S-4
Trigger Level X1_S-5
Trigger Level X1_S-6
Trigger Level X1_S-7



APPENDIX C

Groundwater Level Monitoring Data

Construction								Triggers	Modelled Levels	Measured Groundwater Levels							Drawdown		
										First Record			Jun-23		Jun-24				
Bore ID	Easting (m)	Northing (m)	TOC Elevation (mAHD)	Bore/Sensor Depth (mbTOC)	Target Formation	Type	Classification	WMP Trigger (mAHD)	MAC Consolidation Project June 2024 Modelled Head (mAHD)	WL Date	Depth to Water (mBTOC)	WL Elevation (mAHD)	Depth to Water (mBTOC)	WL Elevation (mAHD)	Depth to Water (mBTOC)	WL Elevation (mAHD)	Head Difference Modelled vs Measured (m) June 2024[1]	Measured Drawdown First Record vs Measured (m) June 2024[2]	Expected Drawdown First Record vs Modelled (m) June 2024[2]
BCGW22A (IW4027)	295313.56	6414209.79	143.80	14.65	Saddlers Creek shallow Permian	MB	Compliance	136.60	138.78	Feb-16	3.02	141.00	3.39	140.41	3.28	140.52	-1.74	-0.48	-2.22
EWPC33	294252.73	6416847.02	230.32	56.38	Blakefield Seam	MB	Compliance	190.40	204.78	Jan-08	34.30	196.00	29.95	200.37	31.50	198.82	5.96	2.82	8.78
GW16	294197.28	6422759.28	131.71	12.76	Hunter River Alluvium	MB	Compliance	119.00	125.38	Feb-99	9.20	123.00	9.25	122.46	9.36	122.35	3.03	-0.65	2.38
GW2	299044.80	6413510.69	153.84	112.63	Woodlands Hill Seam	MB	Compliance	140.00	133.54	Jun-01	7.50	146.40	7.12	146.72	8.86	144.98	-11.44	-1.42	-12.86
GW21	296141.36	6424482.98	135.96	16.00	Hunter River Alluvium	MB	Compliance	118.30	129.71	Feb-99	8.60	127.40	9.33	126.63	9.25	126.71	3.00	-0.69	2.31
GW38A (IW4030)	293831.31	6422393.09	131.71	10.76	Hunter River alluvium	MB	Compliance	119.70	125.05	Feb-16	9.60	122.15	9.12	122.59	9.74	121.97	3.08	-0.18	2.90
GW38P	293831.69	6422384.03	131.64	22.52	Warkworth Seam	MB	Compliance	117.30	123.46	Jan-08	9.50	122.00	9.82	121.82	9.66	121.98	1.48	-0.02	1.46
GW39P	293094.40	6422250.97	130.72	41.74	Warkworth Seam	MB	Compliance	117.20	123.46	Jan-08	8.50	121.90	9.98	120.74	10.24	120.48	2.98	-1.42	1.56
GW41A (IW4029)	290347.78	6421809.93	126.48	7.44	Hunter River alluvium	MB	Compliance	116.70	122.59	Feb-16	7.36	119.20	6.83	119.65	7.05	119.43	3.16	0.23	3.39
GW43	294232.96	6418560.14	197.33	68.50	Woodlands Hill Seam	MB	Compliance	166.80	162.78	Feb-16	27.49	169.84	26.93	170.40	28.22	169.11	-6.33	-0.73	-7.06
GW44	297444.52	6414732.56	211.03	132.47	Woodlands Hill Seam	MB	Compliance	65.60	100.17	Feb-16	85.14	125.89	105.26	105.77	105.26	105.77	-5.60	-20.12	-25.72
GW45	298889.80	6413629.54	152.41	14.49	Saddlers Creek alluvium	MB	Compliance	137.70	141.55	Feb-16	8.43	144.03	9.37	143.04	10.74	141.67	-0.12	-2.36	-2.48
GW46	298336.77	6413469.33	144.14	20.49	Saddlers Creek shallow Permian	MB	Compliance	132.50	129.55	Feb-16	6.91	137.25	7.36	136.78	8.12	136.02	-6.47	-1.23	-7.70
GW47	297408.85	6412974.07	137.00	17.51	Saddlers Creek alluvium	MB	Compliance	126.90	127.95	Feb-16	6.41	130.66	6.59	130.41	7.13	129.87	-1.92	-0.79	-2.71
GW48	291829.60	6422110.67	129.62	35.60	Bowfield Seam	MB	Compliance	115.90	123.67	Feb-16	10.77	118.93	9.29	120.33	9.84	119.78	3.89	0.85	4.74
GW49	290345.74	6421797.57	126.55	35.47	Arrowfield Seam	MB	Compliance	115.80	121.60	Feb-16	7.78	118.77	7.08	119.47	7.54	119.01	2.59	0.24	2.83
OD1078 (IW4028)	294490.61	6419265.17	171.26	64.82	Arrowfield Seam	MB	Compliance	132.90	136.57	Jan-08	7.30	164.10	33.55	137.71	36.57	134.69	1.88	-29.41	-27.53
VWP05_164	293993.30	6421605.10	161.40	164.00	Vaux Seam	VWP	Compliance	-46.20	49.46	Dec-15	89.55	68.95	-	38.77	-	38.91	10.55	-30.04	-19.49
VWP05_192				192.00	Bayswater Seam	VWP	Compliance	-29.10	49.46		116.78	86.13	-	36.48	-	32.91	16.55	-53.22	-36.67
VWP05_227				227.00	Edderton Seam	VWP	Compliance	-74.10	14.93		151.13	85.47	-	33.05	-	28.57	-13.64	-56.90	-70.54
VWP06_269	293960.30	6420850.40	179.64	269.00	Broonie Seam	VWP	Compliance	-15.30	57.80	Dec-15	179.49	89.99	-	64.78	-	50.76	7.04	-39.23	-32.19
VWP06_304				304.00	Edderton Seam	VWP	Compliance	-59.80	22.44		214.63	90.08	-	52.31	-	38.12	-15.68	-51.96	-67.64
VWP06_366				366.00	Edinglassie Seam	VWP	Compliance	-4.50	77.82		272.85	86.33	-	51.58	-	41.26	36.56	-45.07	-8.51
VWP07_223	295656.10	6419564.90	215.95	223.00	Piercefield Seam	VWP	Compliance	64.70	105.17	Dec-15	130.65	123.55	-	86.30	-	76.50	28.67	-47.05	-18.38
VWP07_271				271.00	Vaux Seam	VWP	Compliance	57.30	105.17		171.33	116.15	-	85.00	-	72.40	32.77	-43.75	-10.98
VWP07_286				286.00	Bayswater Seam	VWP	Compliance	-17.10	56.01		175.42	104.89	-	80.60	-	71.00	-14.99	-33.89	-48.88
VWP07_326				326.00	Edderton Seam	VWP	Compliance	-91.30	-1.39		204.93	94.78	-	75.00	-	68.60	-69.99	-26.18	-96.17
VWP07_418				418.00	Ramrod Creek Seam	VWP	Compliance	142.30	144.28		264.50	154.32	-	82.19	-	79.71	64.57	-74.61	-10.04
VWP2_P1	295194.77	6423364.09	135.41	216.50	F4 Fault	VWP	Compliance	-64.40	0.74	Aug-11	47.70	87.70	-	1.00	-	-2.91	3.65	-90.61	-86.96
VWP3_P1	295165.89	6423349.36	135.38	227.00	Edinglassie Seam	VWP	Compliance	-46.50	0.74	Sep-11	29.80	105.60	-	-3.70	-	-11.24	11.98	-116.84	-104.86
X1	293566.00	6422429.00	131.47	13.30	Hunter River Alluvium	MB	Compliance	118.70	125.03	Nov-20	10.67	120.80	10.38	121.75	10.66	121.47	3.56	0.67	4.23
X1_S-1 (35)	293564.00	6422437.00	131.44	35.00	Interbuden	VWP	Compliance	97.60	125.03	May-20	-	100.64	-	101.34	-	99.82	25.21	-0.82	24.39
X1_S-2 (59)				59.00	Mt Arthur Seam	VWP	Compliance	91.00	123.27		-	95.84	-	90.54	-	89.39	33.88	-6.45	27.43
X1_S-3 (128.5)				128.50	Vaux Seam	VWP	Compliance	24.60	94.29		-	72.94	-	50.54	-	55.76	38.53	-17.18	21.35
X1_S-4 (164)				164.00	Bayswater/Wynn Seam	VWP	Compliance	16.10	94.29		-	64.44	-	42.84	-	38.67	55.62	-25.77	29.85
X1_S-5 (215)				215.00	Interburden above Bengalla Seam	VWP	Compliance	-31.70	58.05		-	67.54	-	57.64	-	52.84	5.21	-14.70	-9.49
X1_S-6 (255)				255.00	Edinglassie Seam	VWP	Compliance	-55.60	76.58		-	26.74	-	-14.46	-	-24.93	101.51	-51.67	49.84
X1_S-7 (276.5)				276.50	Ramrod Creek Seam	VWP	Compliance	-64.40	77.71		-	17.04	-	-21.96	-	-30.38	108.09	-47.42	60.67
X2	291196.00	6421899.00	127.36	15.00	Hunter River Alluvium	MB	Compliance	117.90	122.88	Nov-20	7.49	119.87	6.72	120.64	7.12	120.24	2.64	0.37	3.01
X10	293247.00	6418841.00	248.19	80.60	Glen Munro Seam	MB	Compliance	179.60	176.98	Nov-20	65.60	182.59	59.27	188.92	61.37	186.82	-9.84	4.23	-5.61
X14-1S	295649.00	6412596.00	127.58	20.00	Saddlers Creek shallow Permian	MB	Compliance	114.50	117.80	Nov-20	3.30	124.28	8.16	119.42	8.82	119.41	-1.61	-4.87	-6.48
X14-2D	295648.00	6412592.00	128.06	75.50	Glen Munro Seam	MB	Compliance	116.10	113.40	Nov-20	9.95	118.11	4.72	123.34	5.38	122.68	-9.28	4.57	-4.71

Note:

TOC Elev – Top of Casing elevation

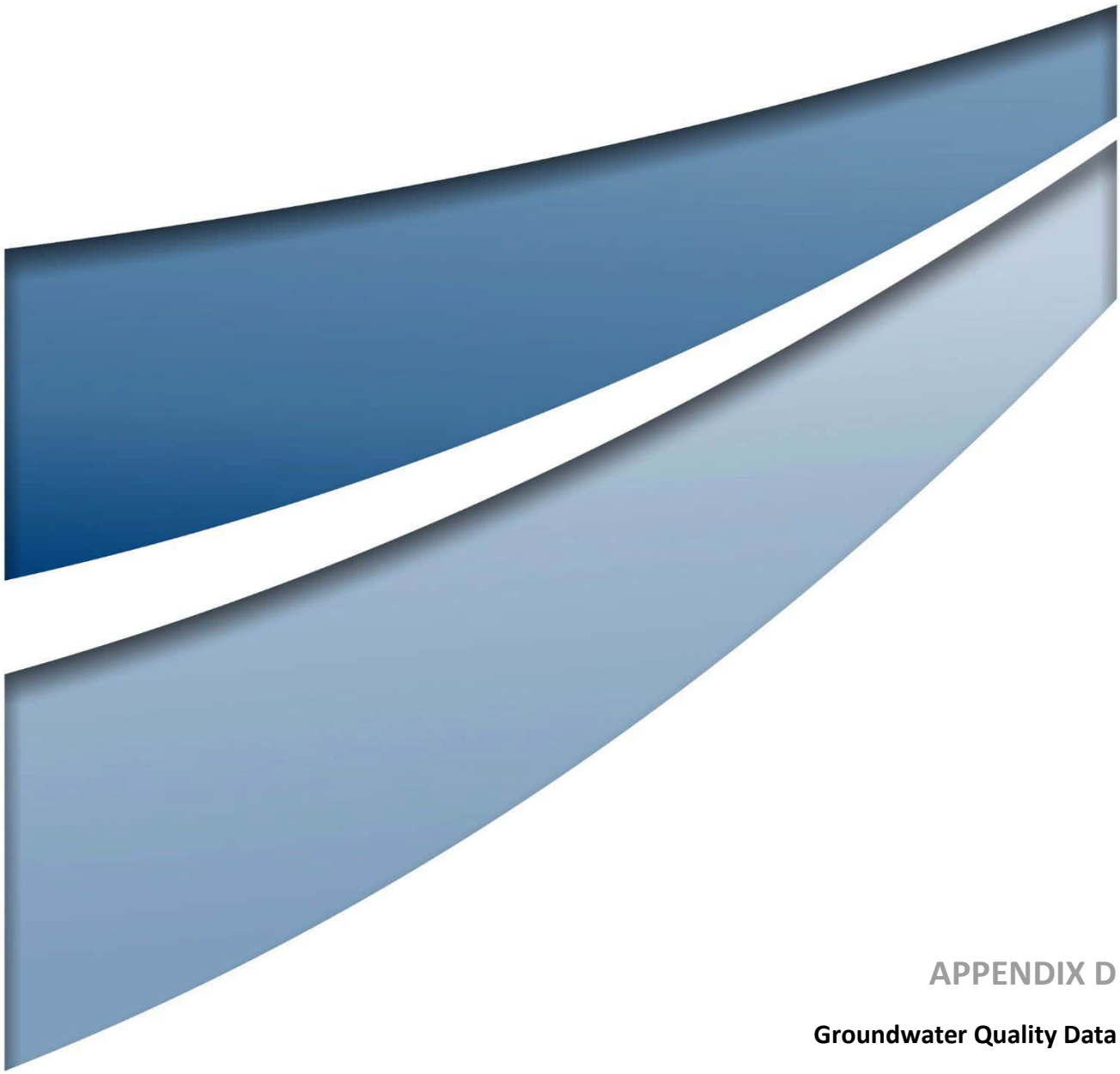
mAHD metres above Australian Height Datum

WL – water level

mBTOC – metres below top of casing

1 Negative values indicate the measured piezometric level is higher than modelled – this means the model is over-predicting effects at this site for FY24

2 Negative values indicate drawdown.



APPENDIX D

Groundwater Quality Data

Water Quality Data

	EWPC33						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.0	7.0	6.9	6.9	6.5	8.0	7.1
Field EC (µS/cm)	2601	2480	2480	2554	290	6280	2297
TDS (mg/L)	1570	1600	1510	1510	149	2060	1280
TSS (mg/L)	<5	23	<5	<5	5	1570	51
Dissolved Fe (mg/L)	0.1	<0.05	0.1	0.11	<0.05	<0.05	<0.05
Sulphate (mg/L)	22.0	20.0	26.0	22	12.0	39.0	23.6
Chloride (mg/L)	247.0	192.0	214.0	213	161.0	316.0	207.6
Calcium (mg/L)	21.0	16.0	20.0	20	13.0	24.0	18.1
Magnesium (mg/L)	98.0	70.0	96.0	94	<1	100.0	83.7
Potassium (mg/L)	17.0	13.0	15.0	16	12.0	18.0	14.3
Sodium (mg/L)	474.0	449.0	471.0	487	379.0	538.0	460.3
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	1170.0	1190.0	0.0	1150	<1	1290.0	1161.7

	GW16						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.3	7.3	7.2	7.2	6.4	8.0	7.3
Field EC (µS/cm)	2650	2490	2804	3180	2139	4690	3322
TDS (mg/L)	1540	1600	1790	1990	1350	2860	1994
TSS (mg/L)	<5	<5	<5	36	5	492	59
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/L)	219.0	228.0	207.0	264	191.0	313.0	246.4
Chloride (mg/L)	473.0	484.0	603.0	714	458.0	869.0	656.6
Calcium (mg/L)	91.0	80.0	109.0	117	76.0	160.0	116.1
Magnesium (mg/L)	83.0	80.0	100.0	103	<1	130.0	102.7
Potassium (mg/L)	2.0	1.0	2.0	2	1.0	2.0	1.8
Sodium (mg/L)	362.0	349.0	391.0	387	305.0	469.0	398.1
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	406.0	433.0	463.0	452	<1	598.0	479.6

	GW2						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.6	7.7	7.7	7.7	6.5	8.5	7.7
Field EC (µS/cm)	4210	4130	3760	3570	3030	5030	3854
TDS (mg/L)	2880	2570	3150	2310	1670	3150	2233
TSS (mg/L)	6	8	<5	<5	<5	432	23
Dissolved Fe (mg/L)	0.1	0.1	0.1	0.1	<0.05	0.2	0.1
Sulphate (mg/L)	122.0	116.0	129.0	102.0	85.0	152.0	117.3
Chloride (mg/L)	692.0	694.0	749.0	578.0	442.0	846.0	633.8
Calcium (mg/L)	15.0	17.0	20.0	18.0	6.0	22.0	14.5
Magnesium (mg/L)	16.0	14.0	14.0	13.0	9.0	17.0	12.4
Potassium (mg/L)	4.0	4.0	4.0	3.0	2.0	5.0	3.5
Sodium (mg/L)	960.0	947.0	984.0	824.0	736.0	1070.0	900.8
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	1070.0	1060.0	1100.0	1130.0	852.0	1240.0	1107.1

	GW21						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	6.9	6.9	7.0	7.0	6.4	8.0	7.2
Field EC (µS/cm)	1212	1224	1274	1099	636	2000	956
TDS (mg/L)	728	832	806	625	370	992	544
TSS (mg/L)	<5	<5	<5	<5	5	280	58
Dissolved Fe (mg/L)	0.1	<0.05	<0.05	<0.05	0.0	10.7	0.6
Sulphate (mg/L)	103.0	102.0	124.0	73	4.0	124.0	39.1
Chloride (mg/L)	99.0	117.0	114.0	106	39.0	147.0	70.8
Calcium (mg/L)	102.0	102.0	129.0	101	50.0	133.0	73.8
Magnesium (mg/L)	66.0	71.0	74.0	65	29.0	81.0	45.7
Potassium (mg/L)	<1	<1	<1	<1	1.0	3.0	1.8
Sodium (mg/L)	65.0	64.0	61.0	64	51.0	81.0	62.4
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	385.0	453.0	508.0	423	288.0	508.0	365.0

	GW38A (IW4030)						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.3	7.4	7.4	7.2	6.5	8.3	7.3
Field EC (µS/cm)	3020	3130	3260	3680	1762	5560	3779
TDS (mg/L)	1750	1920	2210	2130	958	3200	2125
TSS (mg/L)	208	73	39	38	<5	273	72
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/L)	168.0	189.0	173.0	185	108.0	247.0	177.1
Chloride (mg/L)	562.0	606.0	718.0	868	262.0	1130.0	772.0
Calcium (mg/L)	68.0	83.0	89.0	96	30.0	144.0	96.9
Magnesium (mg/L)	76.0	88.0	101.0	111	35.0	157.0	107.3
Potassium (mg/L)	2.0	2.0	2.0	3	1.0	3.0	2.6
Sodium (mg/L)	469.0	524.0	554.0	582	291.0	800.0	559.0
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	622.0	651.0	667.0	624	390.0	845.0	663.2

	GW38P						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.7	7.7	7.7	7.6	7.1	8.6	7.7
Field EC (µS/cm)	2375	2326	2230	2414	1290	3830	2327
TDS (mg/L)	1310	1350	1500	1370	1000	3650	1293
TSS (mg/L)	116	<5	<5	<5	<5	116	17
Dissolved Fe (mg/L)	<0.05	0.1	<0.05	0.09	<0.05	0.5	0.1
Sulphate (mg/L)	45.0	52.0	53.0	46	35.0	69.0	43.4
Chloride (mg/L)	464.0	496.0	482.0	549	397.0	597.0	477.6
Calcium (mg/L)	12.0	13.0	11.0	12	8.0	14.0	11.6
Magnesium (mg/L)	15.0	16.0	16.0	18	12.0	17.0	15.4
Potassium (mg/L)	10.0	6.0	6.0	8	5.0	10.0	6.3
Sodium (mg/L)	459.0	494.0	476.0	512	414.0	599.0	481.1
Carbonate (mg/L)	<1	<1	<1	<1	<1	59.0	20.3
Bicarbonate (mg/L)	492.0	506.0	512.0	486	442.0	607.0	512.9

	GW39P						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.4	7.5	7.4	7.6	6.7	8.5	7.6
Field EC (µS/cm)	4760	4740	4720	4900	500	9170	5192
TDS (mg/L)	3090	3140	3090	2980	230	4140	3015
TSS (mg/L)	106	184	156	93	<5	5100	176
Dissolved Fe (mg/L)	0.2	0.2	0.5	0.47	<0.05	3.2	0.7
Sulphate (mg/L)	<1	<1	<1	<1	2.0	55.0	19.7
Chloride (mg/L)	818.0	830.0	820.0	796	725.0	1080.0	832.4
Calcium (mg/L)	17.0	14.0	15.0	15	14.0	21.0	16.5
Magnesium (mg/L)	16.0	16.0	15.0	16	14.0	20.0	16.5
Potassium (mg/L)	9.0	9.0	9.0	9	<1	12.0	10.0
Sodium (mg/L)	1180.0	1170.0	1080.0	1110	1060.0	1390.0	1198.3
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	1520.0	1600.0	1570.0	1650	1100.0	1850.0	1582.3

	GW41A (IW4029)						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.2	7.3	7.1	7.2	6.6	8.0	7.4
Field EC (µS/cm)	4220	3790	4360	4910	815	10600	4600
TDS (mg/L)	2660	2480	2870	2930	505	6030	2605
TSS (mg/L)	30	85	69	96	14	3340	588
Dissolved Fe (mg/L)	0.2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/L)	153.0	146.0	183.0	176	26.0	368.0	157.3
Chloride (mg/L)	944.0	975.0	1080.0	1260	69.0	2330.0	1025.0
Calcium (mg/L)	124.0	126.0	137.0	131	19.0	260.0	122.3
Magnesium (mg/L)	150.0	150.0	170.0	169	16.0	339.0	146.7
Potassium (mg/L)	7.0	7.0	7.0	7	4.0	12.0	7.4
Sodium (mg/L)	584.0	588.0	612.0	601	134.0	1210.0	598.3
Carbonate (mg/L)	<1	<1	<1	<1	<1	7.0	7.0
Bicarbonate (mg/L)	585.0	624.0	581.0	613	251.0	1660.0	620.6

	GW43						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.0	7.0	7.0	7.1	6.7	7.4	7.1
Field EC (µS/cm)	4420	4800	3940	4210	3900	5210	4300
TDS (mg/L)	2560	2580	2740	2510	2120	3010	2446
TSS (mg/L)	<5	<5	<5	<5	<5	14	10
Dissolved Fe (mg/L)	0.2	0.2	0.2	0.23	0.1	0.3	0.2
Sulphate (mg/L)	55.0	54.0	69.0	79	27.0	69.0	39.9
Chloride (mg/L)	764.0	737.0	715.0	718	581.0	829.0	698.5
Calcium (mg/L)	8.0	10.0	11.0	10	6.0	11.0	8.8
Magnesium (mg/L)	175.0	159.0	183.0	192	130.0	183.0	160.6
Potassium (mg/L)	28.0	21.0	25.0	26	21.0	28.0	24.6
Sodium (mg/L)	731.0	656.0	719.0	799	656.0	834.0	745.1
Carbonate (mg/L)	<1	<1	<1	<1	<1	244.0	244.0
Bicarbonate (mg/L)	1400.0	1350.0	1410.0	1420	1070.0	1540.0	1391.6

	GW45						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.2	7.4	7.4		6.3	8.0	7.2
Field EC (µS/cm)	1794	1808	1344		638	11380	2837
TDS (mg/L)	1060	1100	911		302	7580	1881
TSS (mg/L)	8	<5	<5		6	1680	83
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05		0.1	2.2	0.5
Sulphate (mg/L)	107.0	57.0	73.0		<1	2410.0	455.9
Chloride (mg/L)	301.0	301.0	238.0		22.0	2240.0	504.5
Calcium (mg/L)	85.0	76.0	62.0		30.0	550.0	158.8
Magnesium (mg/L)	80.0	70.0	60.0		30.0	520.0	150.2
Potassium (mg/L)	2.0	2.0	2.0		1.0	9.0	3.1
Sodium (mg/L)	189.0	176.0	166.0		68.0	917.0	233.6
Carbonate (mg/L)	<1	<1	<1		<1	<1	<1
Bicarbonate (mg/L)	399.0	354.0	363.0		253.0	556.0	367.8

	GW46						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	6.9	7.1	6.9		6.5	7.6	7.0
Field EC (µS/cm)	6750	7070	6460		4840	8220	6477
TDS (mg/L)	4650	5060	5610		3290	5660	4189
TSS (mg/L)	<5	<5	<5		5	76	13
Dissolved Fe (mg/L)	0.1	<0.05	<0.05		<0.05	0.1	0.1
Sulphate (mg/L)	1440.0	1050.0	1440.0		213.0	1550.0	756.4
Chloride (mg/L)	1310.0	1450.0	1570.0		899.0	1580.0	1357.4
Calcium (mg/L)	253.0	308.0	319.0		167.0	332.0	208.6
Magnesium (mg/L)	314.0	332.0	358.0		208.0	388.0	268.6
Potassium (mg/L)	6.0	6.0	6.0		5.0	10.0	5.7
Sodium (mg/L)	930.0	980.0	993.0		699.0	1090.0	842.9
Carbonate (mg/L)	<1	<1	<1		<1	<1	<1
Bicarbonate (mg/L)	628.0	669.0	676.0		545.0	766.0	663.4

	GW47						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.0	7.2	7.1		6.8	7.5	7.1
Field EC (µS/cm)	5240	4660	3780		3540	6100	4837
TDS (mg/L)	2940	3120	2990		2130	3840	2858
TSS (mg/L)	39	26	28		6	1080	129
Dissolved Fe (mg/L)	0.1	<0.05	<0.05		<0.05	0.1	0.1
Sulphate (mg/L)	252.0	149.0	164.0		101.0	252.0	177.6
Chloride (mg/L)	1210.0	1000.0	947.0		733.0	1340.0	1040.6
Calcium (mg/L)	118.0	104.0	94.0		68.0	118.0	93.2
Magnesium (mg/L)	321.0	262.0	237.0		188.0	363.0	272.5
Potassium (mg/L)	8.0	8.0	7.0		5.0	8.0	7.0
Sodium (mg/L)	599.0	552.0	533.0		462.0	622.0	543.3
Carbonate (mg/L)	<1	<1	<1		<1	7.0	7.0
Bicarbonate (mg/L)	832.0	799.0	883.0		769.0	991.0	878.0

	GW48						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.7	7.6	8.0	7.5	6.8	8.2	7.6
Field EC (µS/cm)	3510	3300	3400	3570	3090	4750	3705
TDS (mg/L)	2260	2310	2520	2350	1920	2520	2241
TSS (mg/L)	<5	<5	<5	<5	<5	30	11
Dissolved Fe (mg/L)	0.3	0.3	0.2	0.28	0.2	0.6	0.4
Sulphate (mg/L)	<1	<10	<1	<1	2.0	152.0	77.0
Chloride (mg/L)	241.0	256.0	238.0	280	214.0	284.0	240.6
Calcium (mg/L)	13.0	15.0	15.0	13	10.0	15.0	13.6
Magnesium (mg/L)	17.0	14.0	15.0	14	11.0	17.0	14.3
Potassium (mg/L)	10.0	8.0	9.0	8	6.0	11.0	8.2
Sodium (mg/L)	915.0	922.0	987.0	846	756.0	1030.0	926.9
Carbonate (mg/L)	<1	<1	<1	<1	<1	422.0	139.4
Bicarbonate (mg/L)	1820.0	1860.0	1860.0	1760	1380.0	2120.0	1791.8

	GW49						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.1	6.9	6.8	6.8	6.1	7.5	6.9
Field EC (µS/cm)	5940	5370	5680	6050	5020	7530	5896
TDS (mg/L)	3700	3510	4000	3830	2850	4000	3493
TSS (mg/L)	7	<5	<5	<5	<5	54	15
Dissolved Fe (mg/L)	0.5	0.3	0.3	0.37	<0.05	0.6	0.4
Sulphate (mg/L)	<1	<10	<10	<1	1.0	1.0	1.0
Chloride (mg/L)	817.0	837.0	807.0	936	725.0	997.0	826.5
Calcium (mg/L)	53.0	58.0	57.0	54	41.0	68.0	49.3
Magnesium (mg/L)	53.0	53.0	53.0	53	37.0	61.0	47.2
Potassium (mg/L)	34.0	34.0	33.0	33	<1	42.0	32.2
Sodium (mg/L)	1410.0	1420.0	1380.0	1330	1100.0	1460.0	1326.4
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	2230.0	2380.0	2140.0	2260	1530.0	2460.0	2102.0

	X1						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.2	7.4	7.5	7.3	7.1	7.7	7.4
Field EC (µS/cm)	3710	1240	3690	3860	1240	5390	4063
TDS (mg/L)	2240	2350	2330	2390	2170	2700	2366
TSS (mg/L)	744	1990	1460	72	210	1990	850
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	0.2
Sulphate (mg/L)	237.0	220.0	251.0	264	160.0	251.0	202.5
Chloride (mg/L)	783.0	863.0	856.0	887	763.0	975.0	850.5
Calcium (mg/L)	117.0	106.0	120.0	125	106.0	144.0	127.2
Magnesium (mg/L)	112.0	120.0	113.0	123	107.0	134.0	119.5
Potassium (mg/L)	4.0	4.0	4.0	5	3.0	8.0	4.8
Sodium (mg/L)	557.0	573.0	561.0	588	544.0	605.0	569.1
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	636.0	666.0	656.0	624	636.0	790.0	684.9

	X2						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.3	7.2	7.3	7.2	7.0	7.4	7.2
Field EC (µS/cm)	4690	4250	4330	4720	3280	7420	4709
TDS (mg/L)	2870	2910	2980	2700	1840	3620	2695
TSS (mg/L)	<5	<5	<5	43	12	49	26
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/L)	168.0	167.0	157.0	138	119.0	240.0	159.8
Chloride (mg/L)	1120.0	1060.0	1060.0	1000	680.0	1620.0	1051.2
Calcium (mg/L)	87.0	98.0	85.0	83	55.0	129.0	86.8
Magnesium (mg/L)	183.0	184.0	180.0	178	115.0	278.0	176.7
Potassium (mg/L)	8.0	7.0	8.0	8	4.0	8.0	6.8
Sodium (mg/L)	690.0	687.0	674.0	705	454.0	795.0	636.6
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	601.0	628.0	646.0	652	601.0	798.0	656.7

	X10						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	7.4	8.2	7.2	7.0	7.0	10.0	8.5
Field EC (µS/cm)	4380	3640	3700	4090	3520	6570	4664
TDS (mg/L)	2430	2330	2660	2410	2330	3300	2696
TSS (mg/L)	18	305	52	44	<5	308	86
Dissolved Fe (mg/L)	<0.05	<0.05	0.1	0.09	<0.05	<0.05	<0.05
Sulphate (mg/L)	51.0	<1	59.0	51	<1	95.4	46.6
Chloride (mg/L)	689.0	590.0	668.0	650	590.0	776.0	686.6
Calcium (mg/L)	57.0	51.0	54.0	61	4.0	57.0	32.6
Magnesium (mg/L)	158.0	94.0	156.0	156	18.0	158.0	100.6
Potassium (mg/L)	79.0	90.0	68.0	66	68.0	471.0	206.6
Sodium (mg/L)	686.0	528.0	655.0	701	528.0	882.0	703.7
Carbonate (mg/L)	<1	32.0	<1	<1	<1	1250.0	556.9
Bicarbonate (mg/L)	1340.0	1100.0	1370.0	1360	590.0	1510.0	1201.1

	X14-1S						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	6.8	7.1	6.9	7.0	6.8	12.6	7.8
Field EC (µS/cm)	10600	10300	9030	10600	9030	21480	11667
TDS (mg/L)	6240	6270	6260	6160	4350	7390	6204
TSS (mg/L)	<5	110	<5	34	18	302	107
Dissolved Fe (mg/L)	0.7	0.3	0.8	0.4	0.3	105.0	8.4
Sulphate (mg/L)	16.0	19.0	19.0	15.0	<1	155.0	48.7
Chloride (mg/L)	3390.0	3290.0	3250.0	3190.0	849.0	3810.0	3042.5
Calcium (mg/L)	142.0	146.0	164.0	163.0	2.0	197.0	127.9
Magnesium (mg/L)	261.0	241.0	251.0	242.0	5.0	356.0	249.0
Potassium (mg/L)	20.0	19.0	19.0	17.0	15.0	509.0	78.4
Sodium (mg/L)	1840.0	1850.0	1840.0	1710.0	1430.0	2060.0	1795.3
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	1140.0	1050.0	1160.0	1110.0	816.0	1230.0	1093.7

	X14-2D						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	9.5	9.6	9.5	6.9	6.8	11.6	9.2
Field EC (µS/cm)	5900.0	5870.0	5460.0	8930.0	5460	16250	7923
TDS (mg/L)	3400.0	3520.0	3530.0	6060.0	3270	8290	4575
TSS (mg/L)	10.0	146.0	52.0	<5	10	146	56
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	0.7	0.6	3.6	1.6
Sulphate (mg/L)	<1	<1	3.0	18.0	3.0	138.0	44.6
Chloride (mg/L)	1130.0	1120.0	1090.0	2930.0	990.0	3630.0	1580.7
Calcium (mg/L)	2.0	5.0	5.0	151.0	2.0	239.0	53.0
Magnesium (mg/L)	2.0	4.0	4.0	216.0	1.0	392.0	95.4
Potassium (mg/L)	30.0	29.0	28.0	17.0	17.0	168.0	54.3
Sodium (mg/L)	1300.0	1320.0	1300.0	1740.0	1240.0	1960.0	1483.3
Carbonate (mg/L)	532.0	478.0	481.0	<1	<1	<1	<1
Bicarbonate (mg/L)	904.0	977.0	956.0	1140.0	267.0	1240.0	915.7

	BCGW22A (IW4027)						
	2023 / 2024				All Data		
Parameter	Q1	Q2	Q3	Q4	Minimum	Maximum	Average
Field pH	6.8	6.9	6.9	6.8	6.6	7.1	6.9
Field EC (µS/cm)	10700.0	9780.0	10800.0	11000.0	9200	15690	11445
TDS (mg/L)	6740.0	6880.0	7380.0	6590	4580	8930	7135
TSS (mg/L)	<5	12.0	14.0	<5	6	410	51
Dissolved Fe (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sulphate (mg/L)	314.0	330.0	317.0	329	188.0	354.0	259.8
Chloride (mg/L)	3140.0	3500.0	3470.0	3610	2720.0	4140.0	3509.1
Calcium (mg/L)	253.0	218.0	220.0	229	175.0	276.0	231.3
Magnesium (mg/L)	343.0	313.0	326.0	347	274.0	399.0	333.6
Potassium (mg/L)	7.0	6.0	9.0	6	4.0	9.0	6.1
Sodium (mg/L)	1780.0	1680.0	1670.0	1710	1360.0	1920.0	1745.1
Carbonate (mg/L)	<1	<1	<1	<1	<1	<1	<1
Bicarbonate (mg/L)	918.0	935.0	948.0	825	536.0	1030.0	865.2

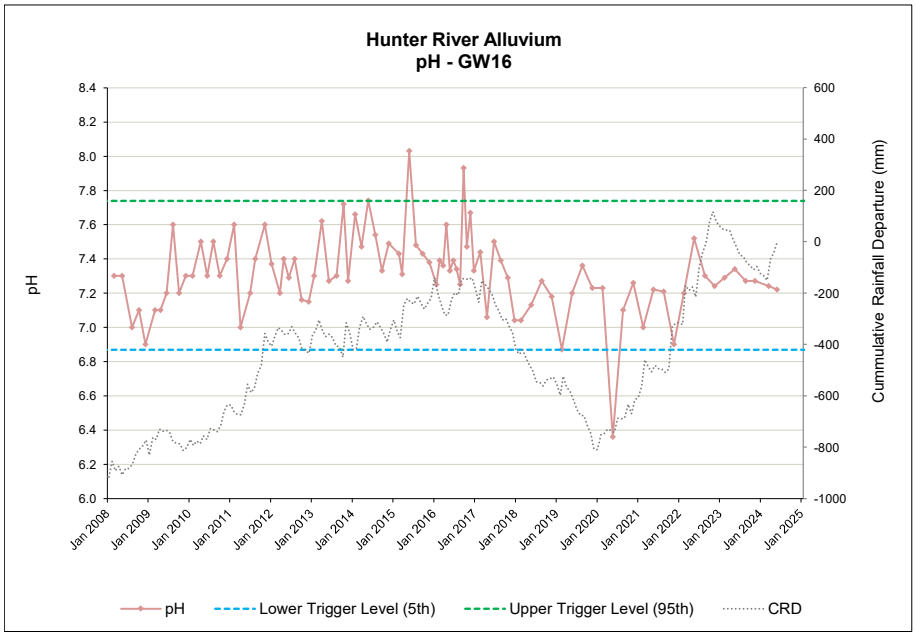
Note: The minimum, maximum and average values are based on all data since monitoring began.

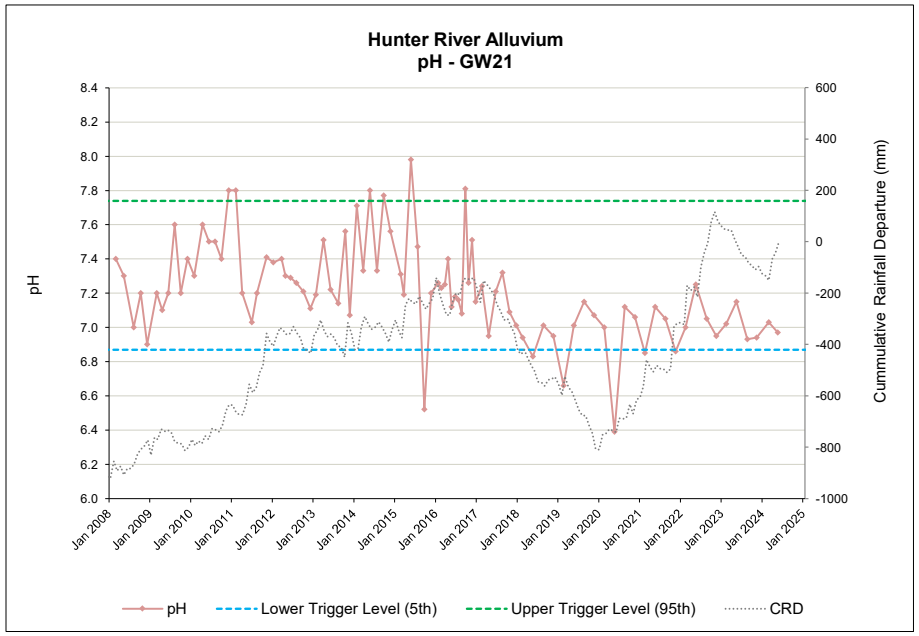
Groundwater Quality Assurance Review

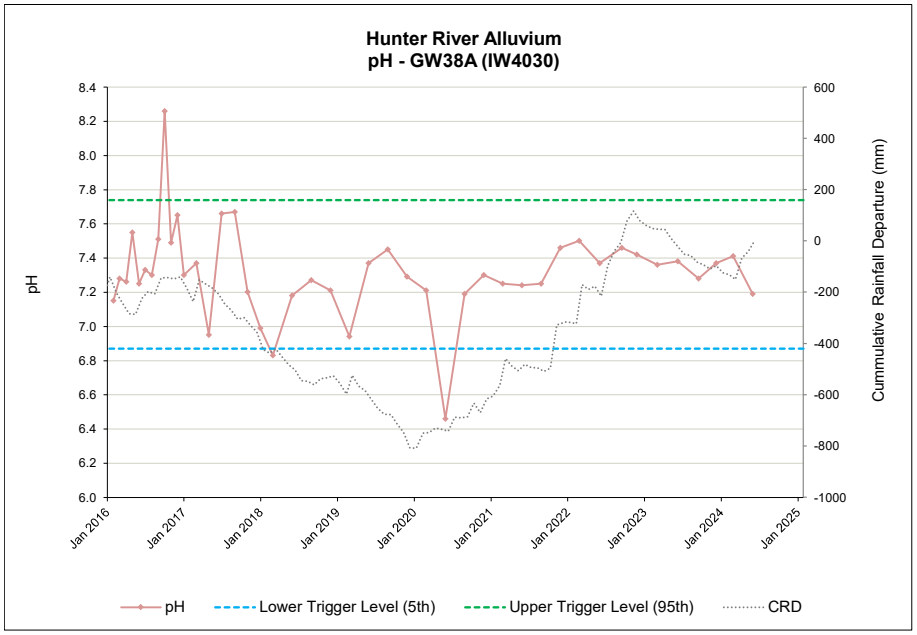
Sample Date:			20/09/2023		Relative Percentage Difference	29/12/2023		Relative Percentage Difference	28/03/2024		Relative Percentage Difference	28/05/2024		Relative Percentage Difference
ALS Batch Number:			ES2232401			ES2344881			ES2410210			ES2417462		
Client sample ID (1st):			GW43	DUPLICATE		GW50	DUPLICATE		EPWC33	DUPLICATE		GW2	DUPLICATE	
Analyte grouping/Analyte	**Unit**	**LOR**												
Physical parameters														
pH Value	pH Unit	0.01	7.12	7.13	-0.1%	7.16	7.32	2.2%	7.09	7.06	-0.4%	7.84	7.83	-0.1%
Electrical Conductivity @ 25°C	µS/cm	1	4270	4240	0.7%	4550	4570	0.4%	2500	2530	1.2%	4000	3940	-1.5%
Total Dissolved Solids @ 180°C	mg/L	10	2560	2580	-0.8%	2910	2930	0.7%	1510	1690	11.3%	2500	2510	0.4%
Total Suspended Solids (TSS)	mg/L	5	<5	<5	0.0%	85	146	**-200.0%**	<5	<5	0.0%	<5	<5	0.0%
Major ions														
Hydroxide Alkalinity as CaCO3	mg/L	1	<1	<1	0.0%	<1	<1	0.0%	<1	<1	0.0%	<1	<1	0.0%
Carbonate Alkalinity as CaCO3	mg/L	1	<1	<1	0.0%	<1	<1	0.0%	<1	<1	0.0%	<1	<1	0.0%
Bicarbonate Alkalinity as CaCO3	mg/L	1	1400	1400	0.0%	916	913	-0.3%	1130	1160	2.6%	1110	1120	-0.9%
Total Alkalinity as CaCO3	mg/L	1	1400	1400	0.0%	916	913	-0.3%	1130	1160	2.6%	1110	1120	-0.9%
Sulfate as SO4 - Turbidimetric	mg/L	1	55	55	0.0%	381	385	0.0%	26	23	-12.2%	102	101	1.0%
Chloride by Discrete Analyser	mg/L	1	764	762	0.3%	861	873	1.4%	214	229	6.8%	660	653	1.1%
Calcium	mg/L	1	8	9	-11.8%	79	80	1.3%	20	21	4.9%	16	21	**-27.0%**
Magnesium	mg/L	1	175	177	-1.1%	99	87	-12.9%	96	93	-3.2%	16	15	6.5%
Sodium	mg/L	1	731	742	-1.5%	864	865	0.1%	471	457	-3.0%	1030	954	7.7%
Potassium	mg/L	1	28	29	0.0%	8	9	11.8%	15	15	0.0%	4	4	0.0%
Total Phosphorus as P	mg/L	0.01	-	-	-	9.0	-	-	-	-	-	0.05	0.04	**22.2%**
Total Anions	meq/L	0.01	50.7	50.6	0.2%	50.5	50.9	0.8%	29.2	30.1	3.0%	42.9	42.9	0.0%
Total Cations	meq/L	0.01	47.3	48.0	-1.5%	49.9	49.0	-1.8%	29.8	29.0	-2.7%	47.0	43.9	6.8%
Dissolved Metals														
Aluminium	mg/L	0.01	-	-	-	<0.01	-	-	-	-	-	<0.01	<0.01	0.0%
Antimony	mg/L	0.001	-	-	-	<0.001	-	-	-	-	-	<0.001	<0.001	0.0%
Arsenic	mg/L	0.001	-	-	-	0.003	-	-	-	-	-	<0.001	<0.001	0.0%
Barium	mg/L	0.001	-	-	-	0.041	-	-	-	-	-	0.052	0.057	-9.2%
Boron	mg/L	0.05	-	-	-	0.35	-	-	-	-	-	0.200	0.250	**-22.2%**
Cadmium	mg/L	0.0001	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001	0.0%
Chromium	mg/L	0.001	-	-	-	0.002	-	-	-	-	-	<0.001	<0.001	0.0%
Copper	mg/L	0.001	-	-	-	0.014	-	-	-	-	-	<0.001	<0.001	0.0%
Iron	mg/L	0.05	0.20	0.21	-4.9%	0.20	<0.05	**-200.0%**	0.09	0.10	10.5%	0.060	0.050	0.0%
Lead	mg/L	0.001	-	-	-	<0.001	-	-	-	-	-	<0.001	<0.001	0.0%
Mercury	mg/L	0.0001	-	-	-	<0.0001	-	-	-	-	-	<0.0001	<0.0001	0.0%
Molybdenum	mg/L	0.001	-	-	-	0.006	-	-	-	-	-	<0.001	<0.001	0.0%
Nickel	mg/L	0.001	-	-	-	0.006	-	-	-	-	-	<0.001	<0.001	0.0%
Selenium	mg/L	0.01	-	-	-	<0.01	-	-	-	-	-	<0.01	<0.01	0.0%
Zinc	mg/L	0.005	-	-	-	<0.005	-	-	-	-	-	0.008	<0.005	**200.0%**

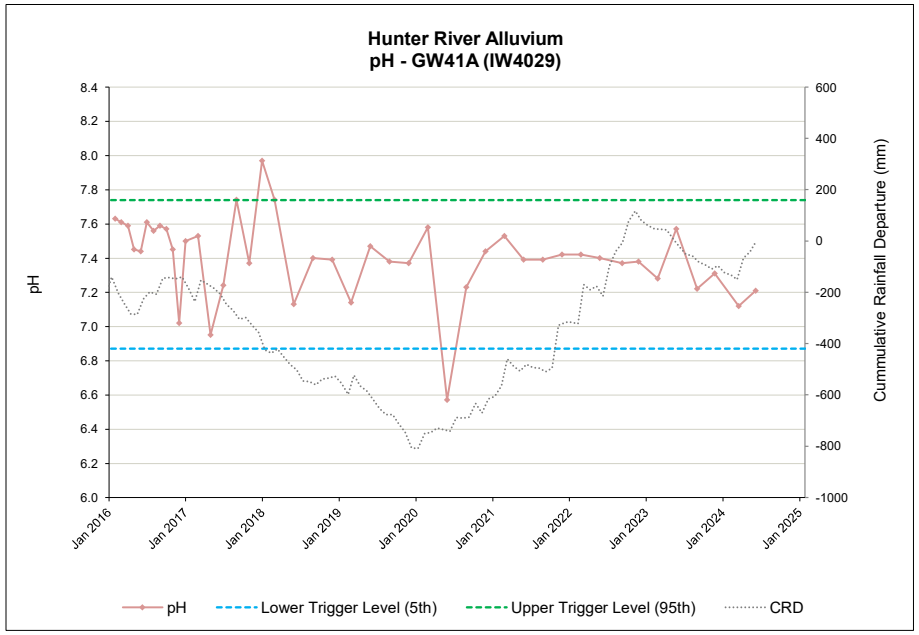
APPENDIX E

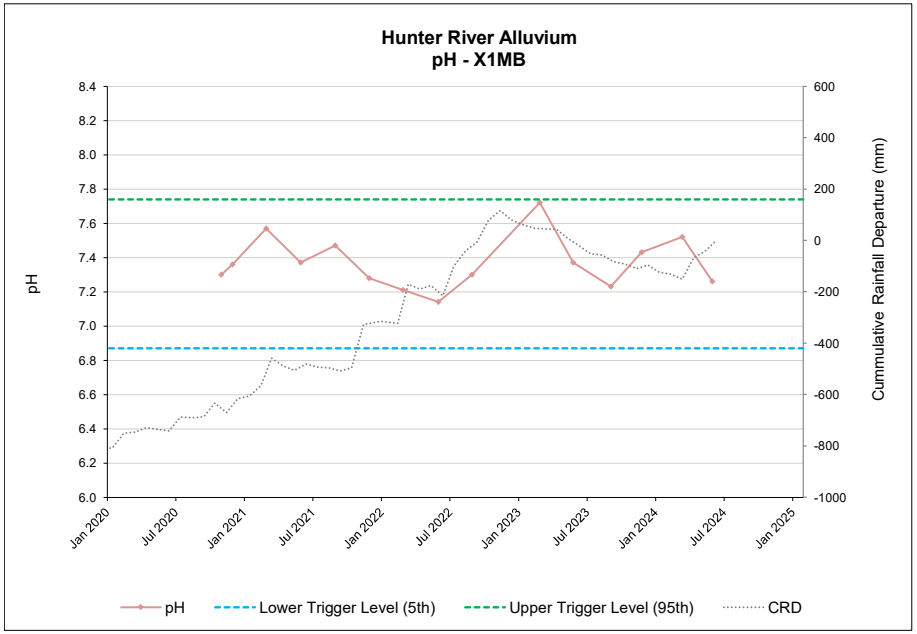
Groundwater Quality Graphs

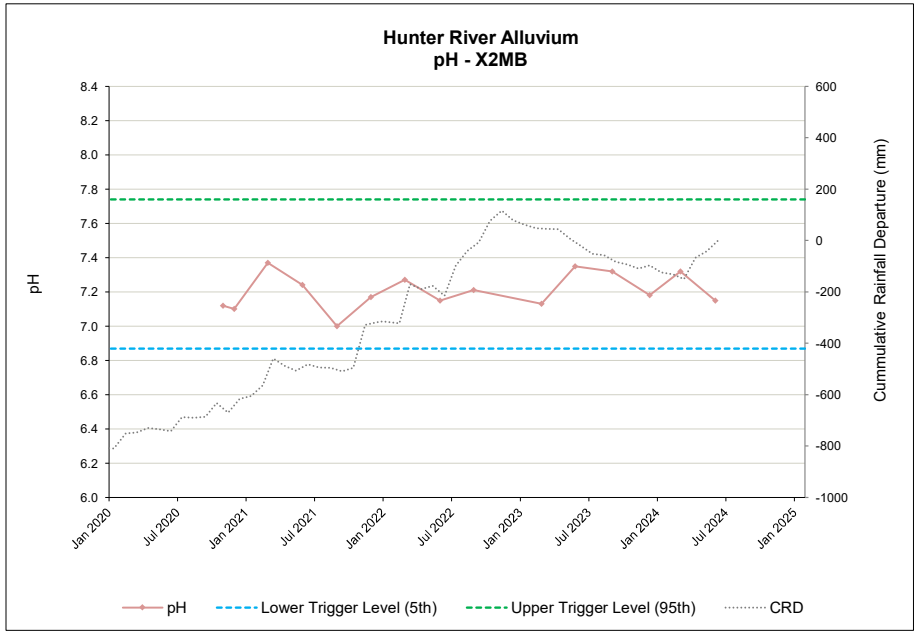

Hunter River Alluvium
pH - GW16
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

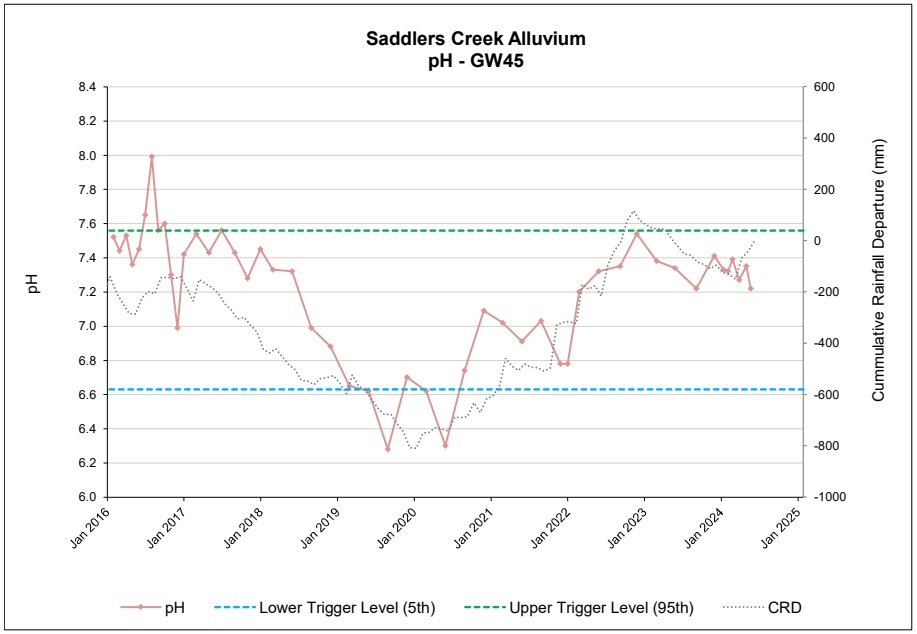

Hunter River Alluvium
pH - GW21
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

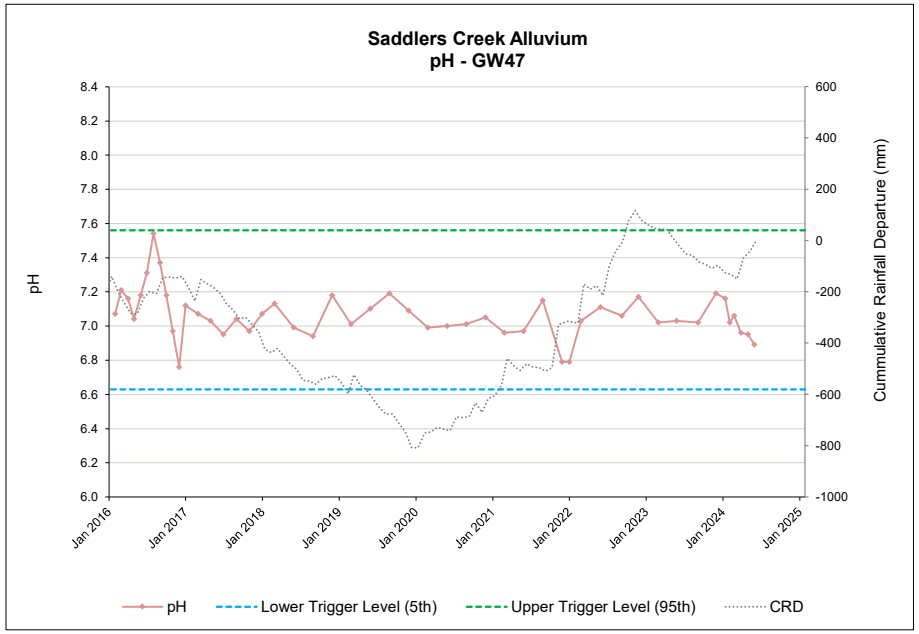

Hunter River Alluvium
pH - GW38A (IW4030)
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

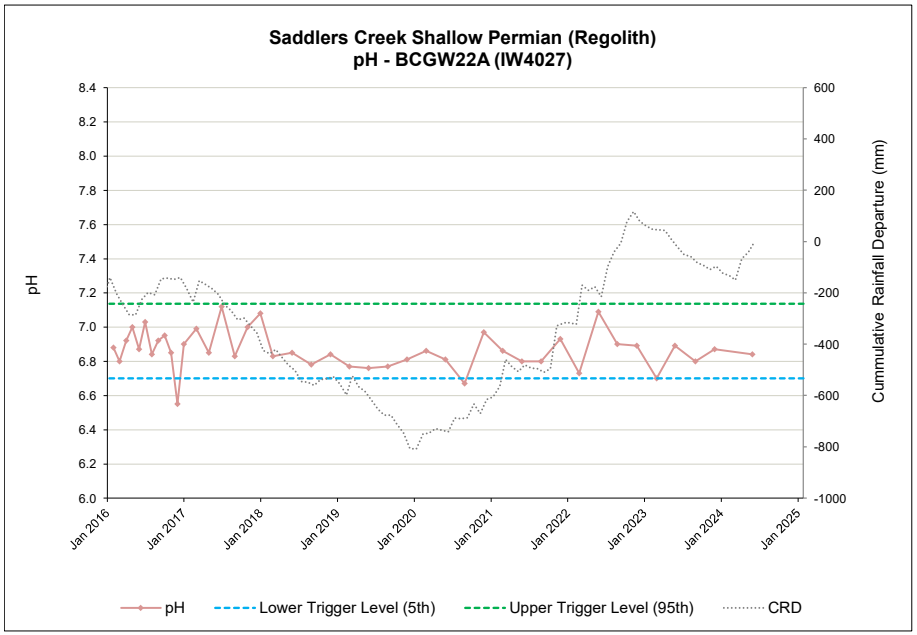

Hunter River Alluvium
pH - GW41A (IW4029)
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

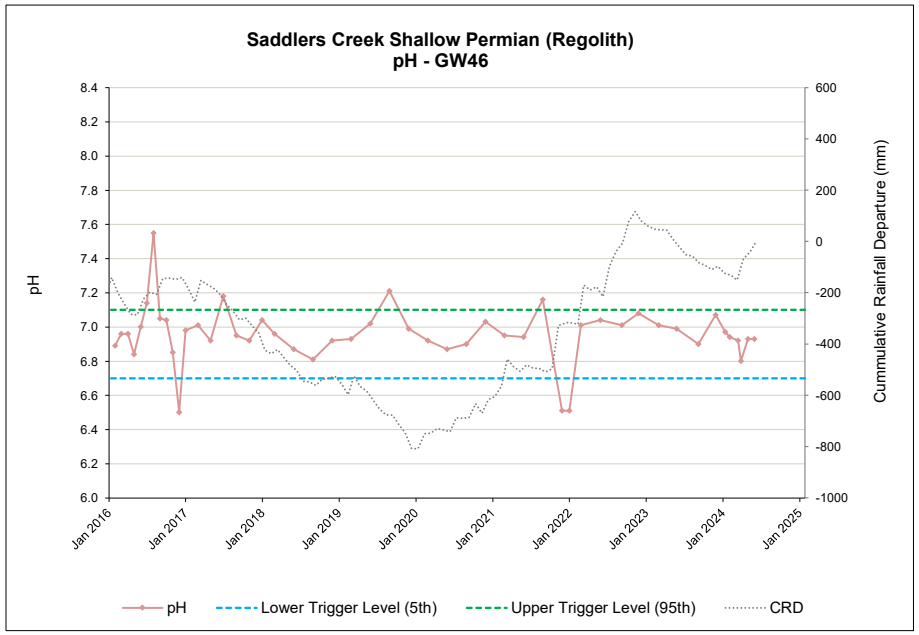

Hunter River Alluvium
pH - X1MB
pH
Cummulative Rainfall Departure (mm)
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
600
400
200
0
-200
-400
-600
-800
-1000
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

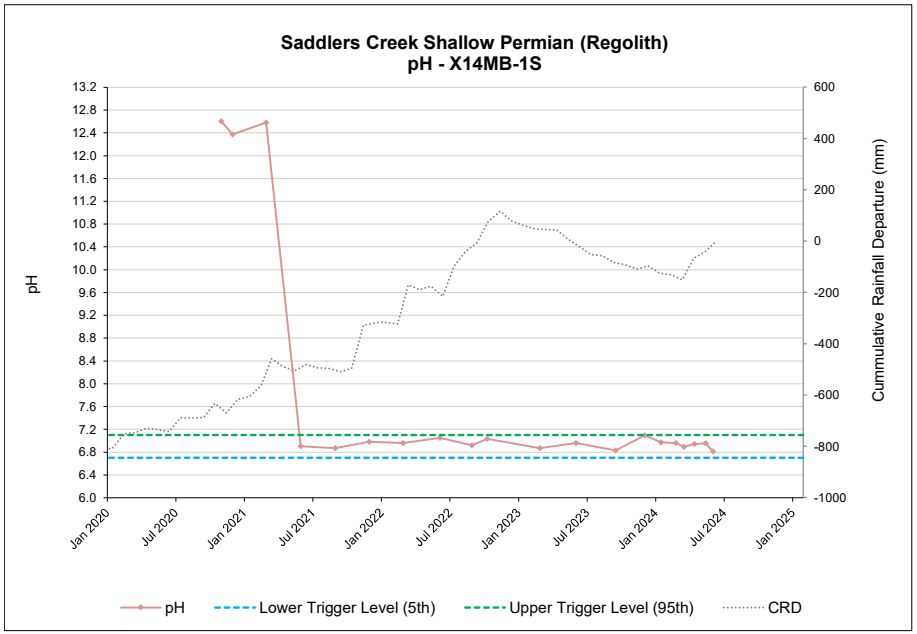

Hunter River Alluvium
pH - X2MB
pH
Cummulative Rainfall Departure (mm)
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
600
400
200
0
-200
-400
-600
-800
-1000
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

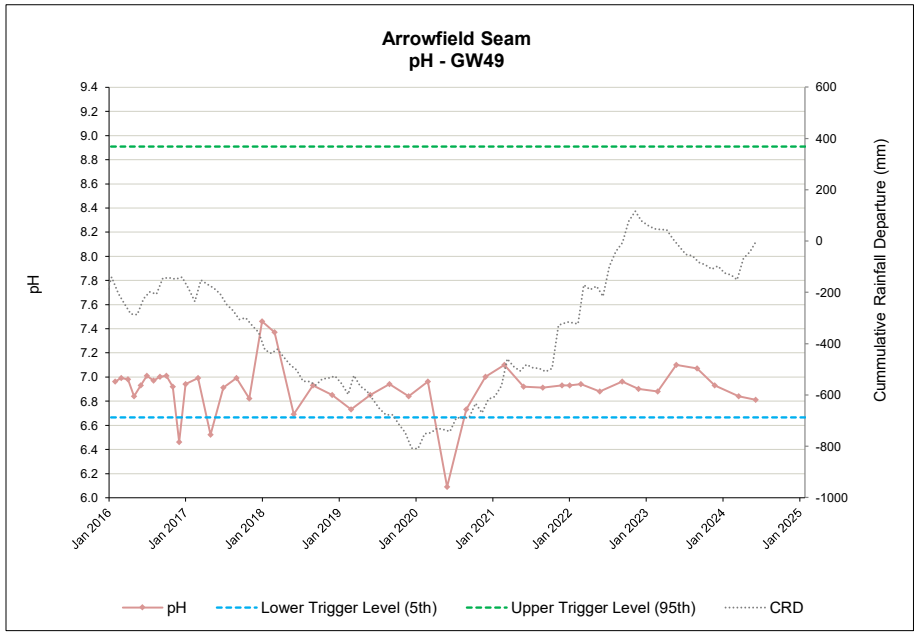

Saddlers Creek Alluvium
pH - GW45
pH
Cummulative Rainfall Departure (mm)
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
600
400
200
0
-200
-400
-600
-800
-1000
Jan 2016
Jan 2017
Jan 2018
Jan 2019
Jan 2020
Jan 2021
Jan 2022
Jan 2023
Jan 2024
Jan 2025
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

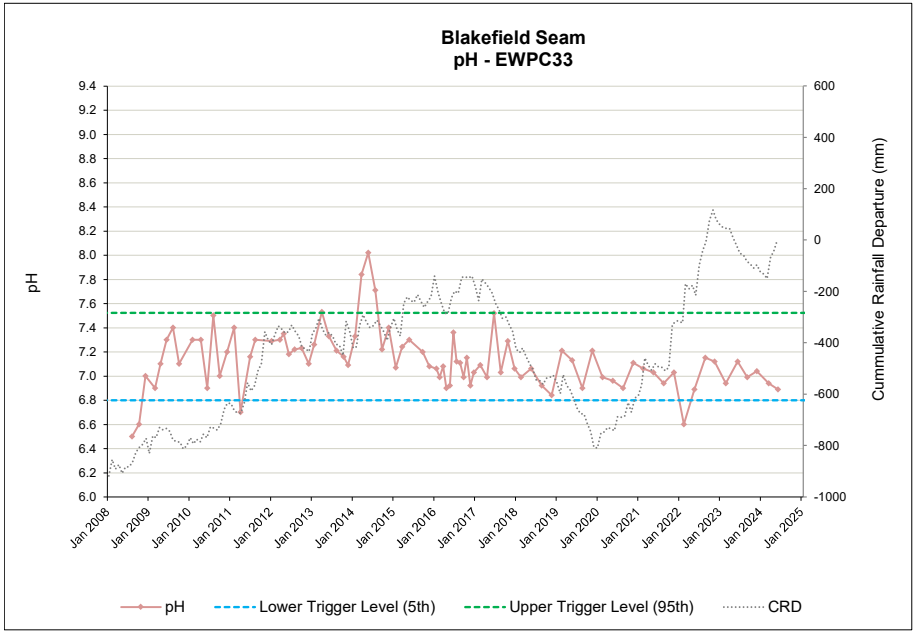

Saddlers Creek Alluvium
pH - GW47
pH
Cummulative Rainfall Departure (mm)
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
600
400
200
0
-200
-400
-600
-800
-1000
Jan 2016
Jan 2017
Jan 2018
Jan 2019
Jan 2020
Jan 2021
Jan 2022
Jan 2023
Jan 2024
Jan 2025
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

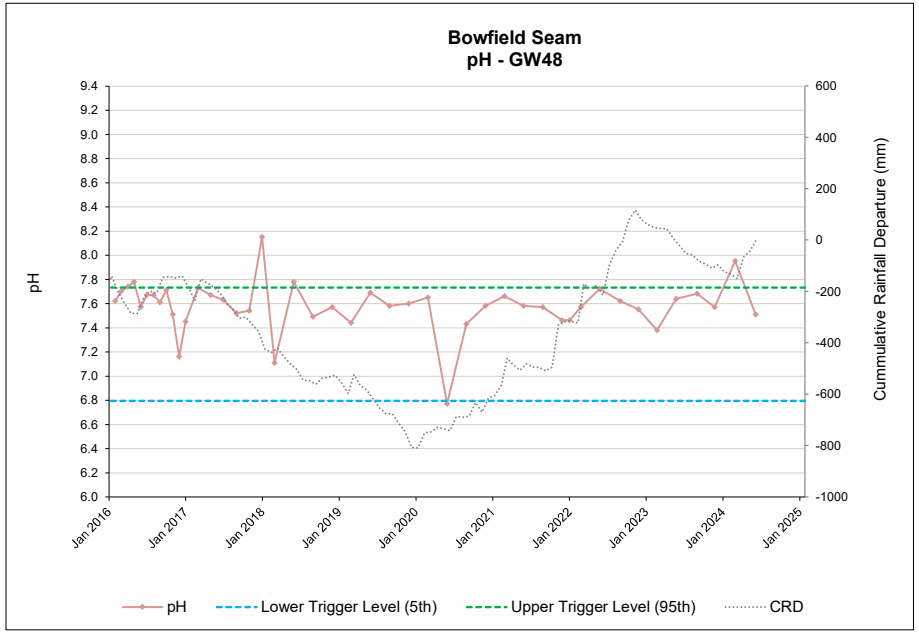

Saddlers Creek Shallow Permian (Regolith)
pH - BCGW22A (IW4027)
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

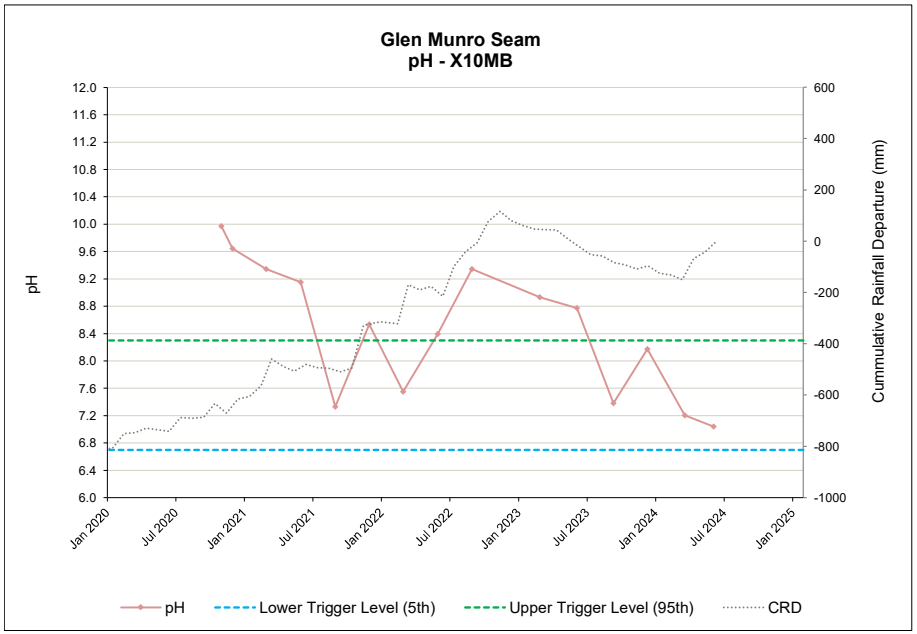

Saddlers Creek Shallow Permian (Regolith)
pH - GW46
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

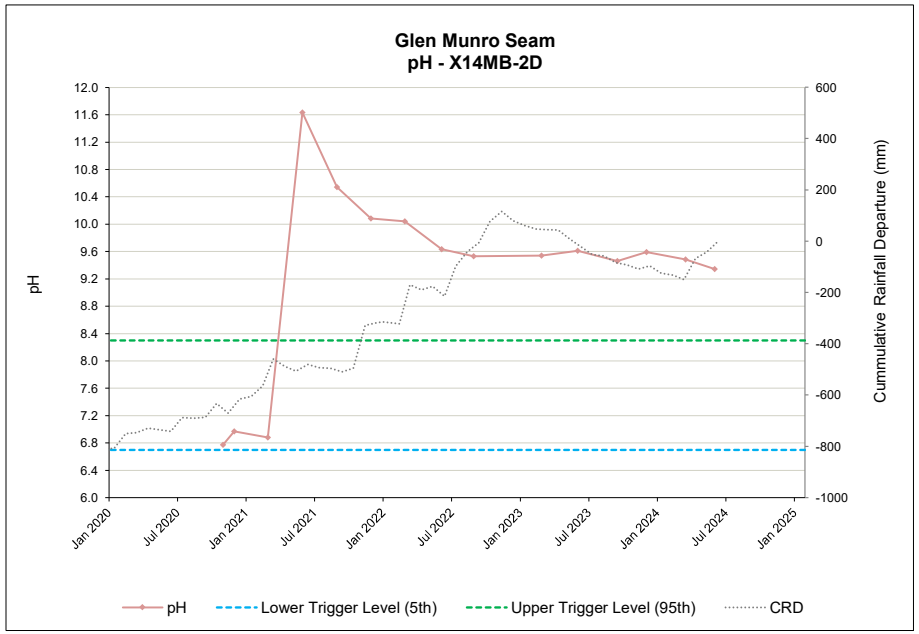

Saddlers Creek Shallow Permian (Regolith)
pH - X14MB-1S
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

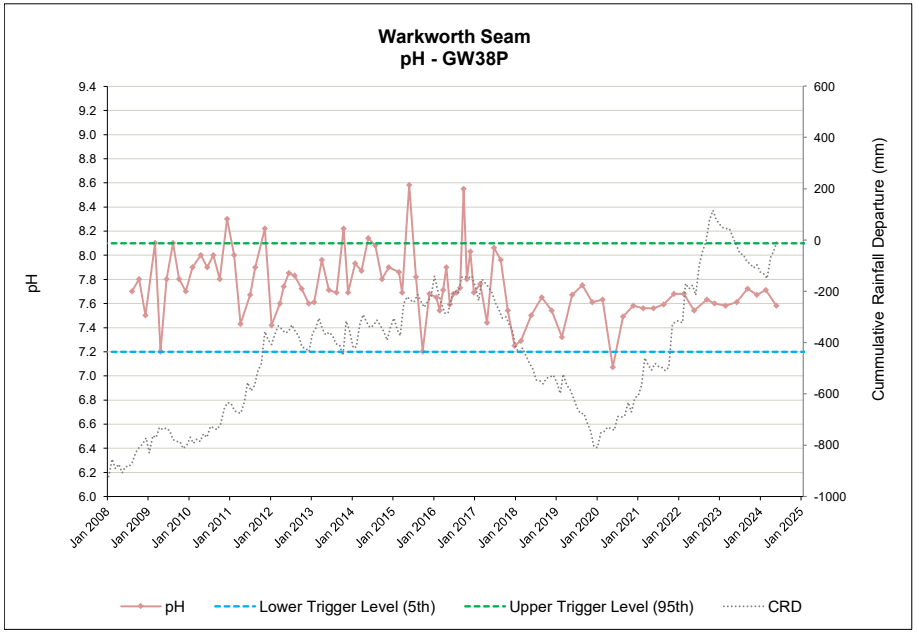

Arrowfield Seam
pH - GW49
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

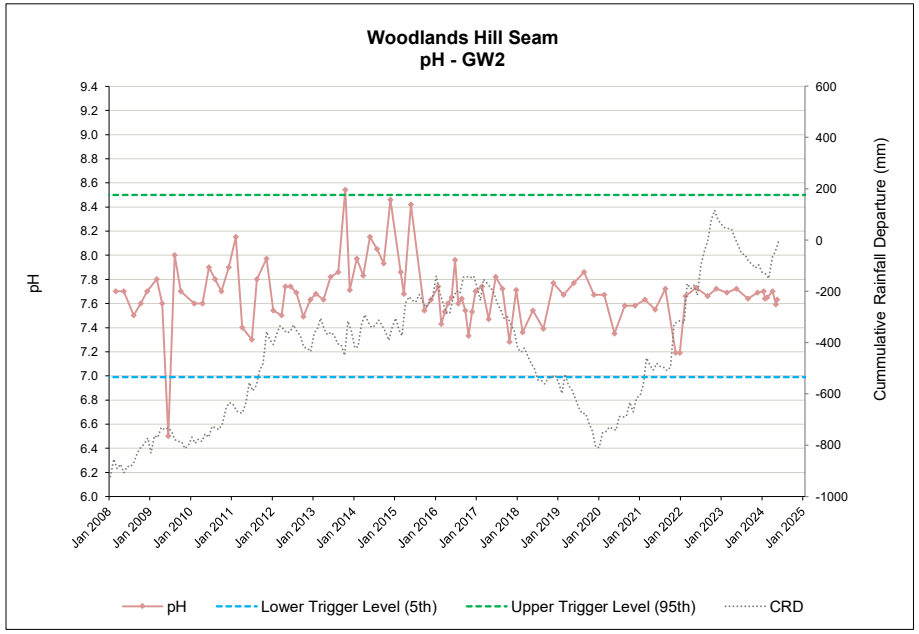

Blakefield Seam
pH - EWPC33
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

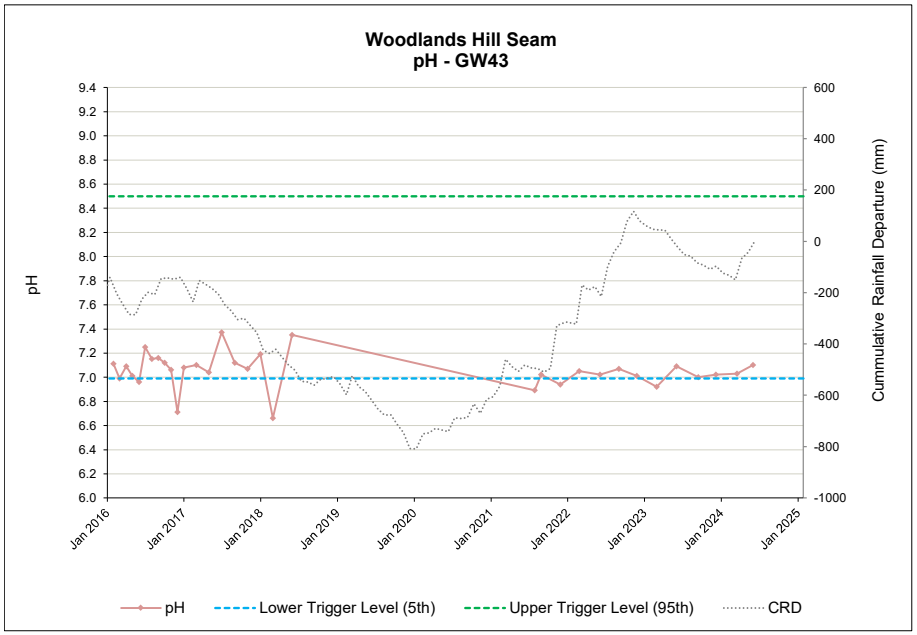

Bowfield Seam
pH - GW48
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

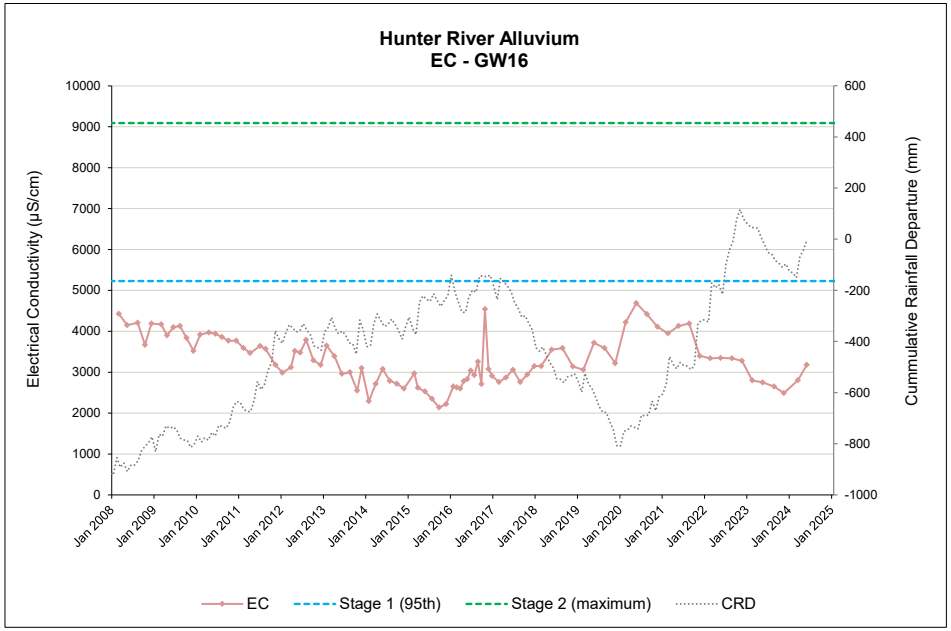

Glen Munro Seam
pH - X10MB
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

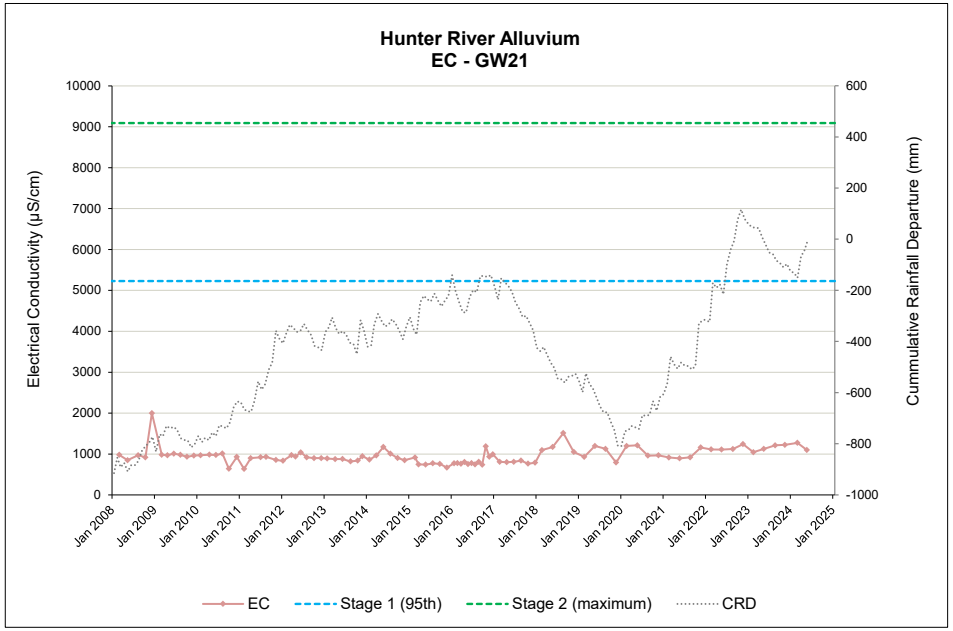

Glen Munro Seam
pH - X14MB-2D
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

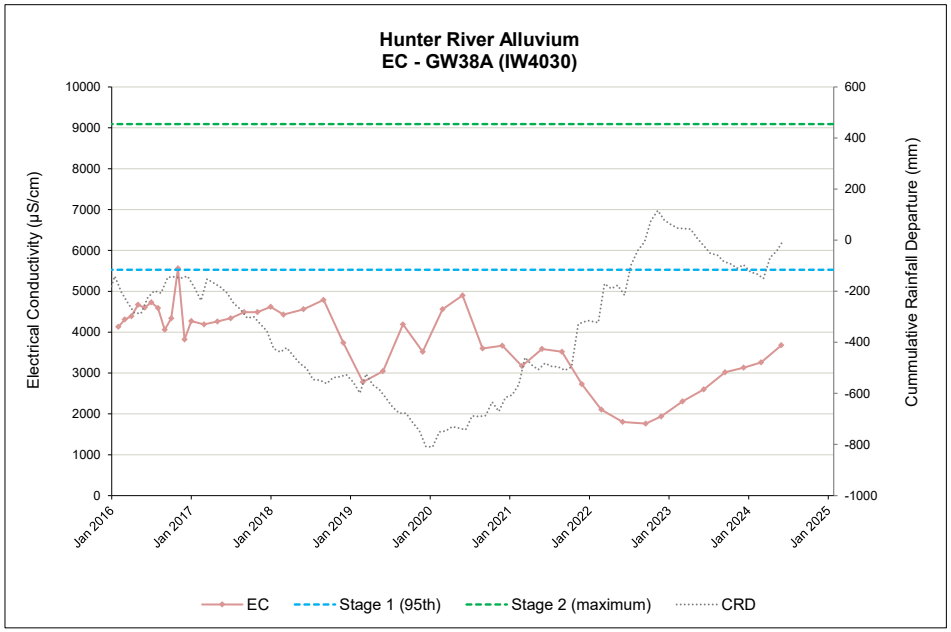

Warkworth Seam
pH - GW38P
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

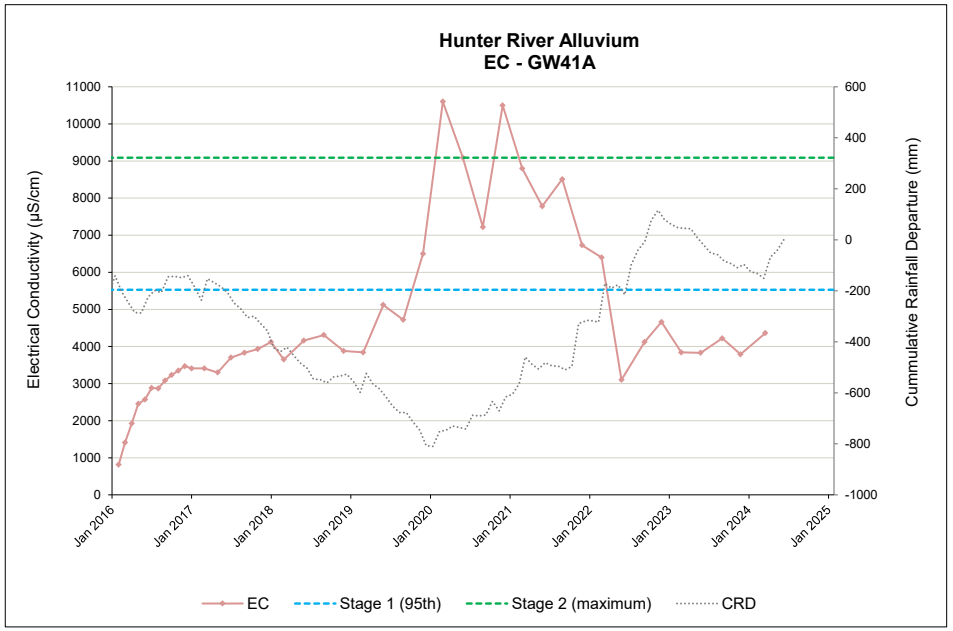

Woodlands Hill Seam
pH - GW2
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

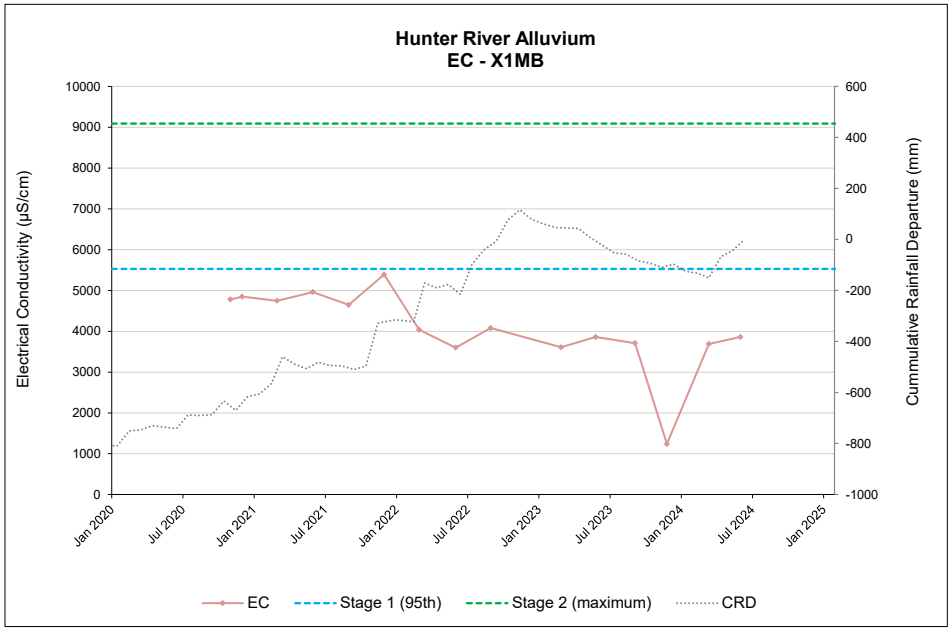

Woodlands Hill Seam
pH - GW43
pH
Cummulative Rainfall Departure (mm)
pH
Lower Trigger Level (5th)
Upper Trigger Level (95th)
CRD

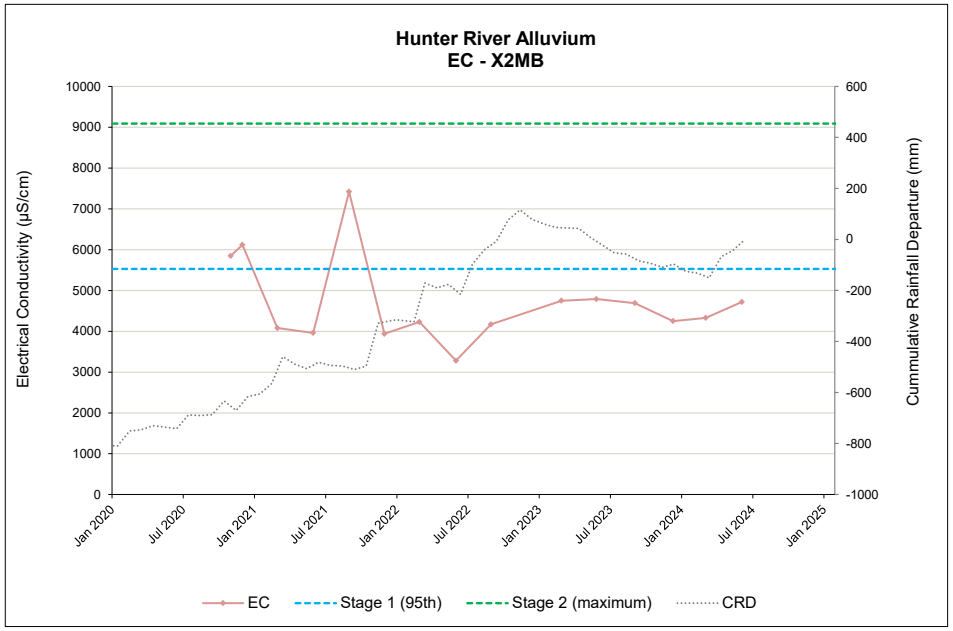

Hunter River Alluvium
EC - GW16
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

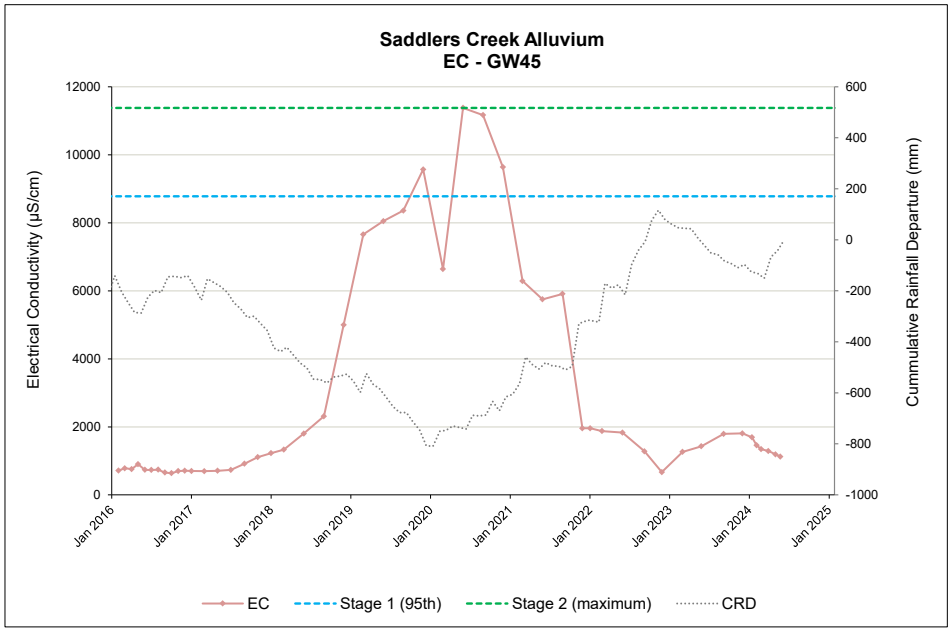

Hunter River Alluvium
EC - GW21
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

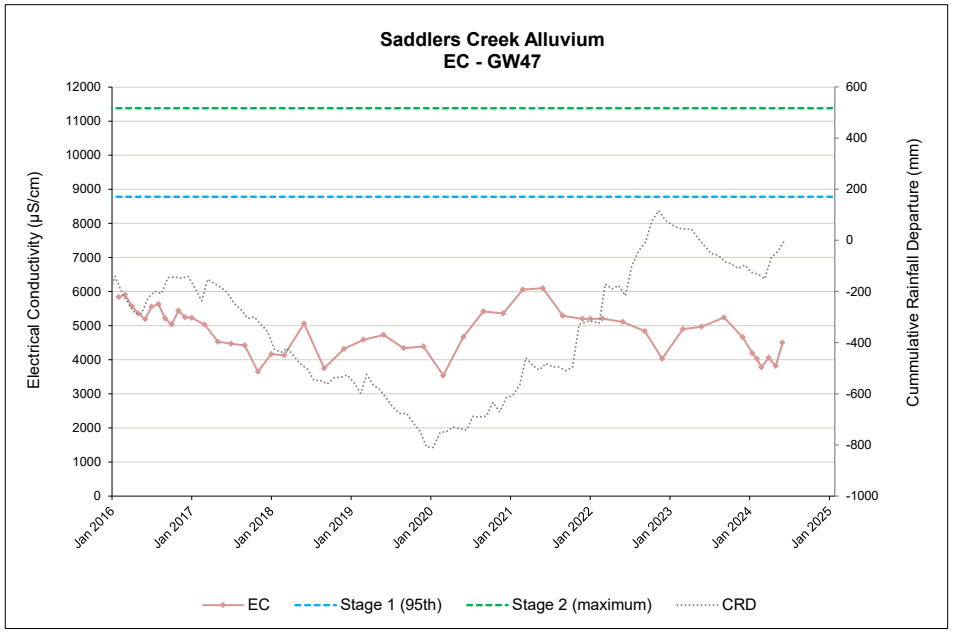

Hunter River Alluvium
EC - GW38A (IW4030)
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

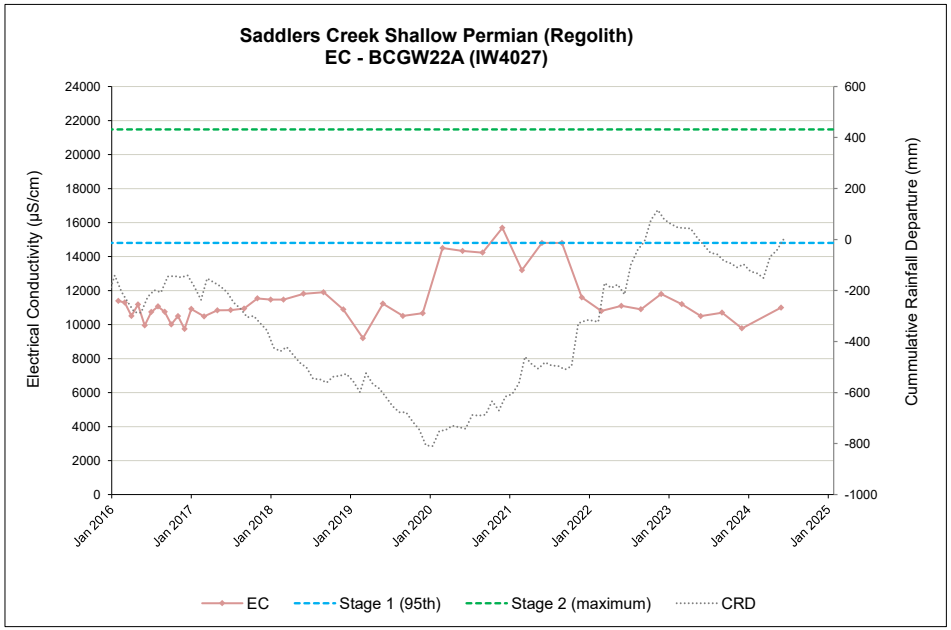

Hunter River Alluvium
EC - GW41A
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

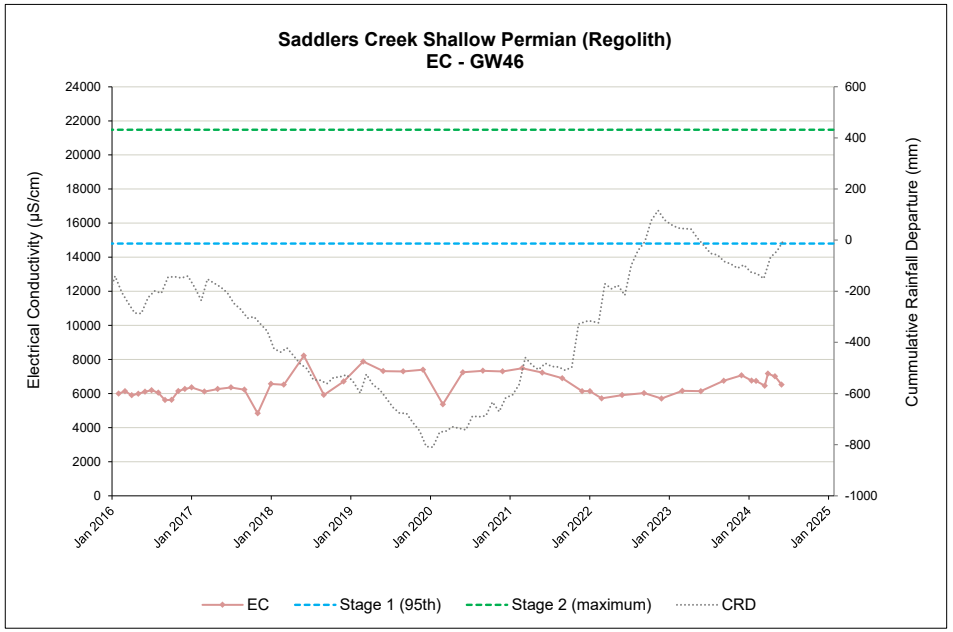

Hunter River Alluvium
EC - X1MB
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

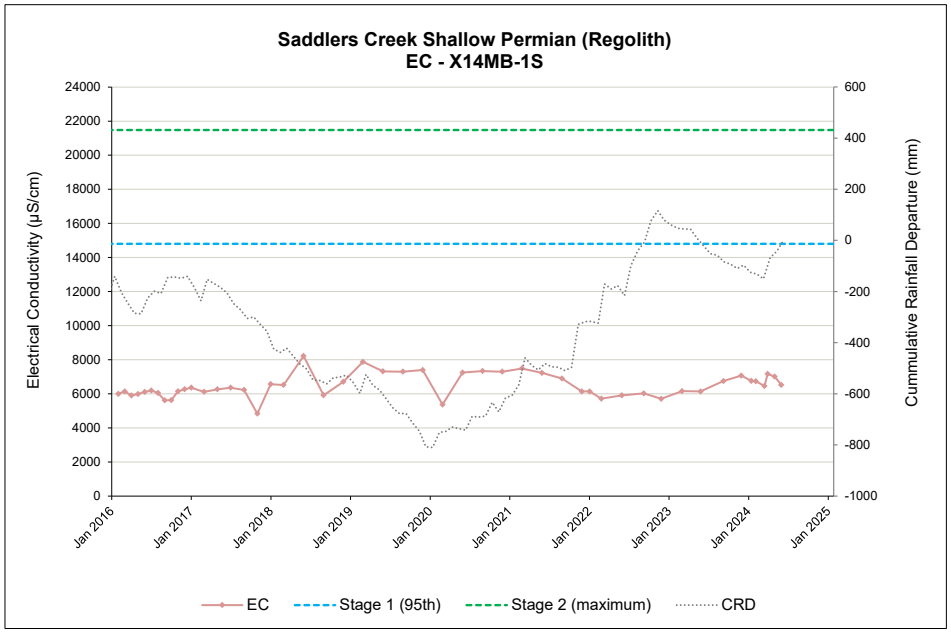

Hunter River Alluvium
EC - X2MB
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

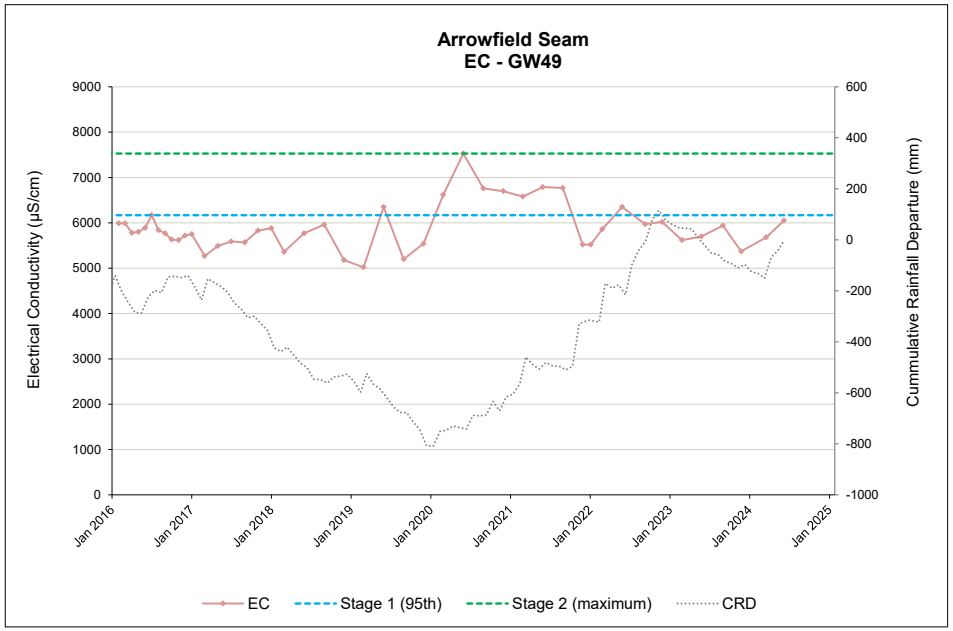

Saddlers Creek Alluvium
EC - GW45
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

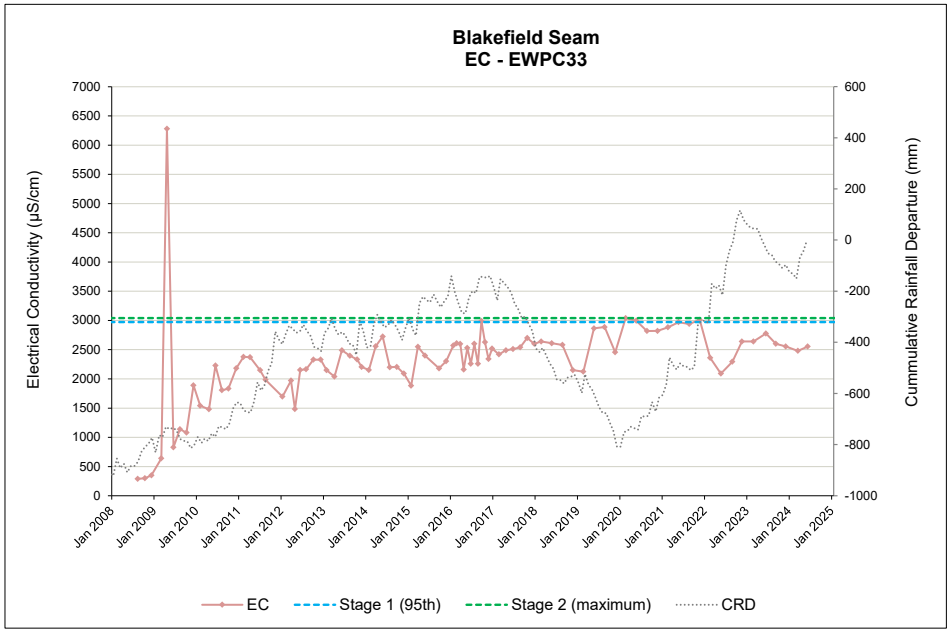

Saddlers Creek Alluvium
EC - GW47
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

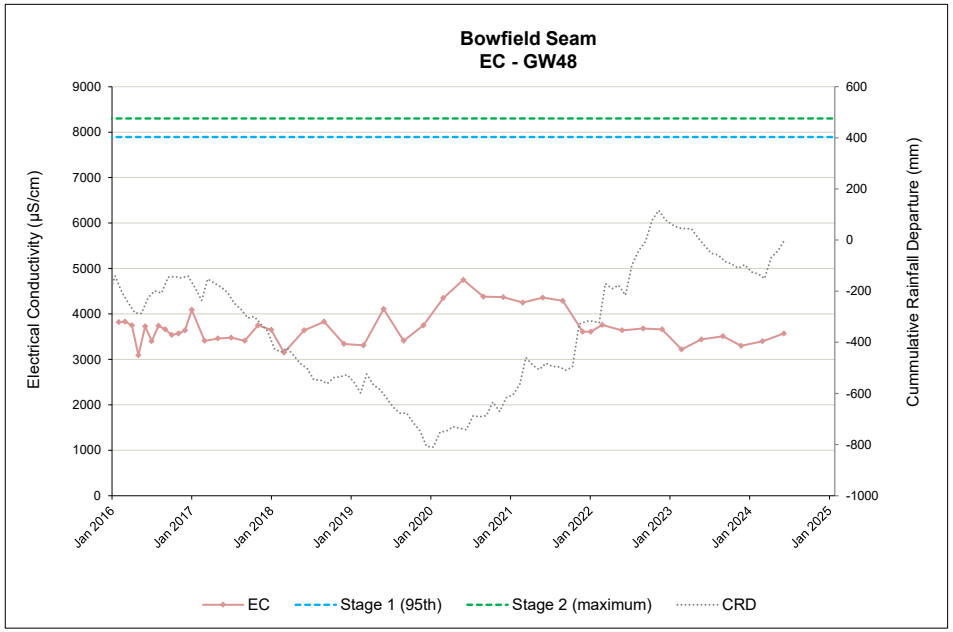

Saddlers Creek Shallow Permian (Regolith)
EC - BCGW22A (IW4027)
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

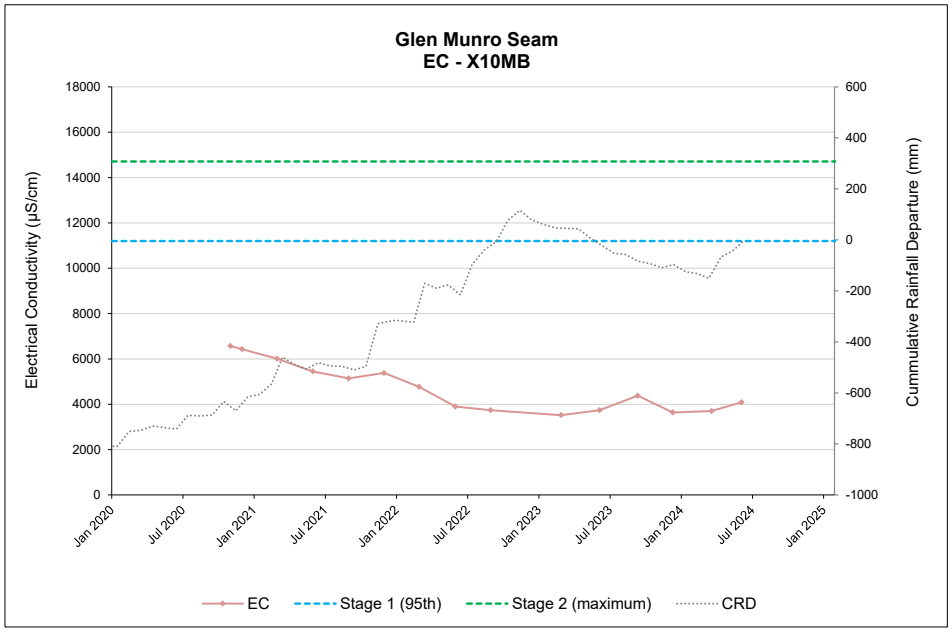

Saddlers Creek Shallow Permian (Regolith)
EC - GW46
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

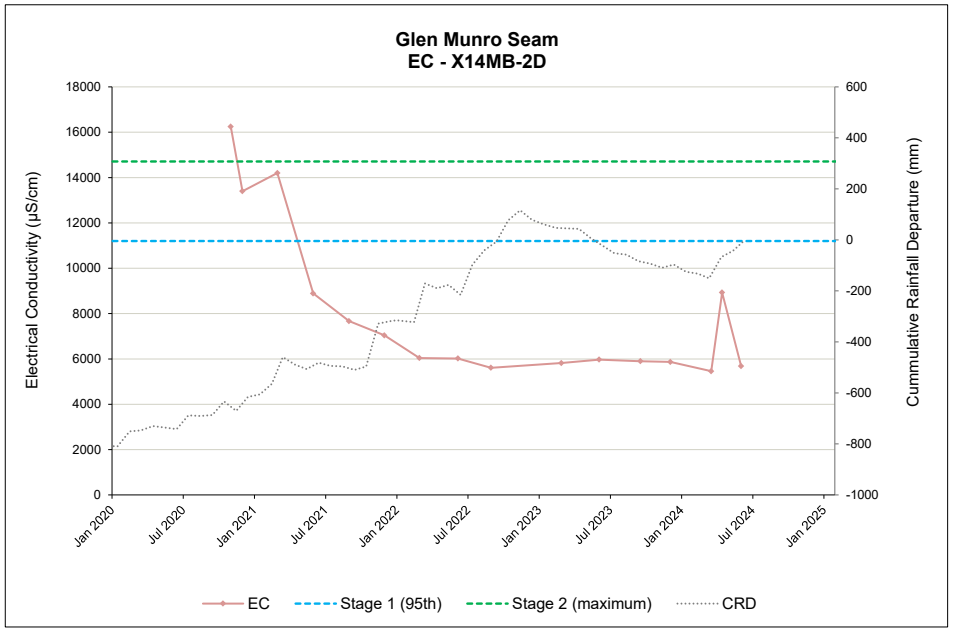

Saddlers Creek Shallow Permian (Regolith)
EC - X14MB-1S
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

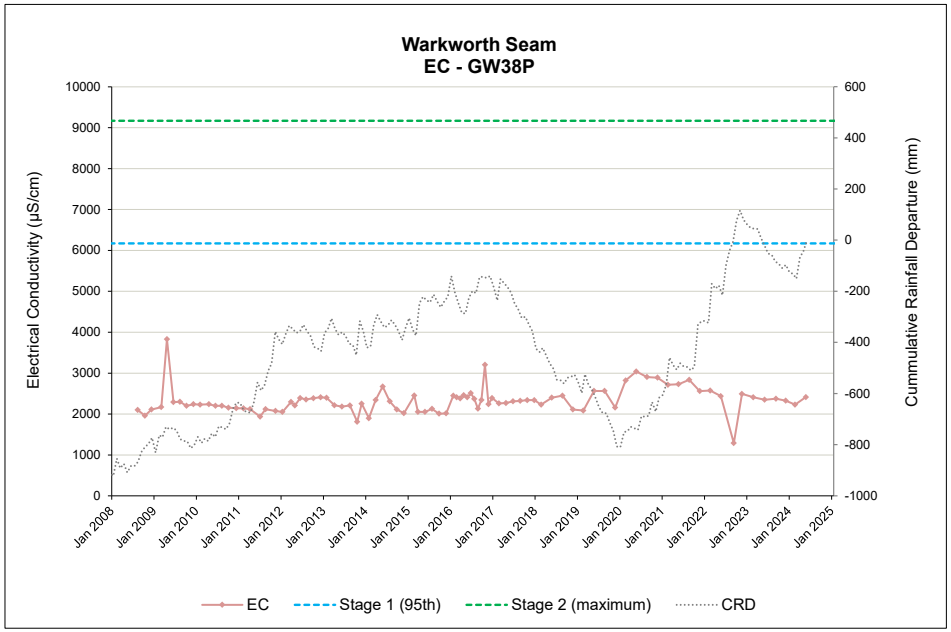

Arrowfield Seam
EC - GW49
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

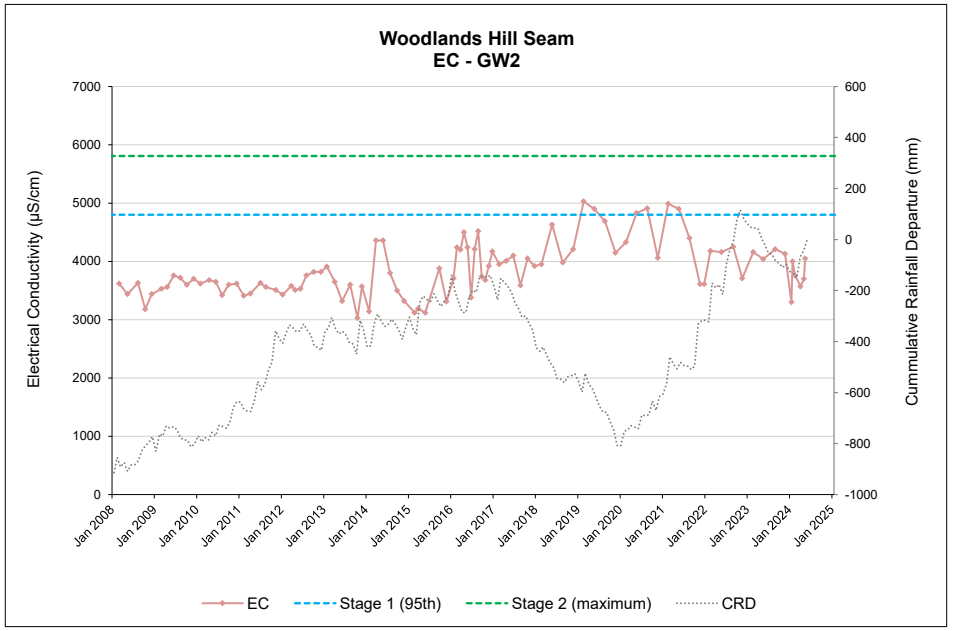

Blakefield Seam
EC - EWPC33
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

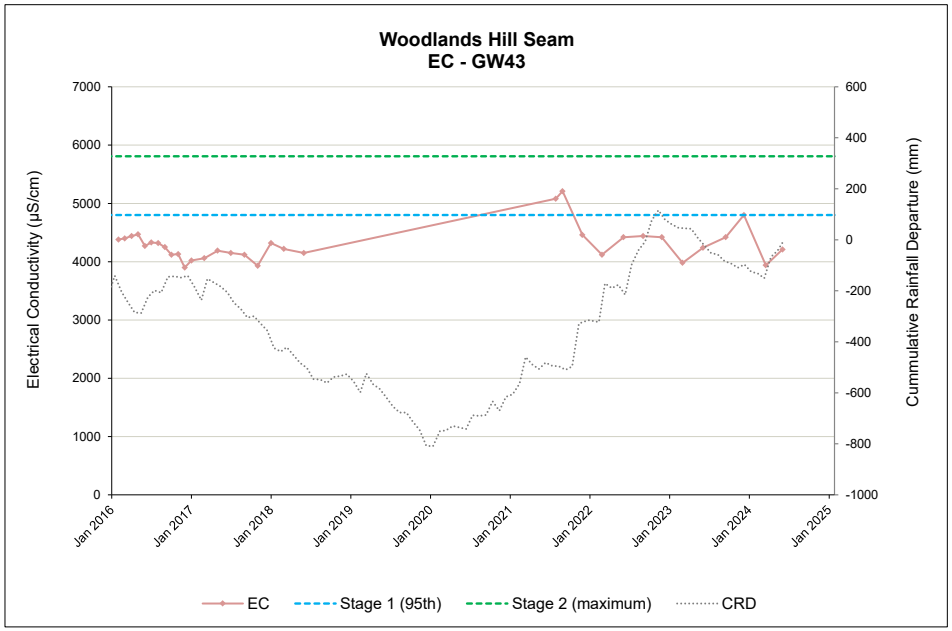

Bowfield Seam
EC - GW48
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD


Glen Munro Seam
EC - X10MB
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD


Glen Munro Seam
EC - X14MB-2D
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD


Warkworth Seam
EC - GW38P
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD


Woodlands Hill Seam
EC - GW2
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD


Woodlands Hill Seam
EC - GW43
Electrical Conductivity (µS/cm)
Cummulative Rainfall Departure (mm)
EC
Stage 1 (95th)
Stage 2 (maximum)
CRD

umwelt
Environmental & Social
Consultants

Umwelt (Australia) Pty Limited

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Appendix 3 Community Complaints

Number	Month	Date	Time	From	Issue	Lodgement type	Investigation and response to caller
1	July	16/07/2023	6.06pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
2		19/07/2023	8.36am	Roxburgh Rd, Muswellbrook	Blast vibration	Community Response Line	Investigation revealed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
3		20/07/2023	7.39pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
4		25/07/2023	6.31pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
5	August	04/08/2023	12:23pm	Roxburgh Rd, Muswellbrook	Other	Community Response Line	Investigation found we were compliant in our notification but would continue to work with residents
6		13/08/2022	7:07am	Roxburgh Rd, Muswellbrook	Dust	Community Response Line	Results at the nearest monitor indicated dust levels were not elevated at the time, and the 24-hour average remained within regulatory criteria. Caller was advised of investigation and monitoring results.
7	September	10/09/2023	5.36pm	Roxburgh Rd, Muswellbrook	Other	Community Response Line	Investigation revealed the server was down for maintenance and the notifications were not able to get through the system. The matter has been resolved.
8		27/09/2023	11.02pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting was adjusted in response to the call.

Number	Month	Date	Time	From	Issue	Lodgement type	Investigation and response to caller
9	October	02/10/23	8:59am	Roxburgh Rd, Muswellbrook	Dust	Community Response Line	Investigation revealed results at the nearest monitor indicated dust levels were elevated at the time, and the 24-hour average for mine incremental contribution remained within regulatory criteria. Operational changes were made in response to conditions, and reasonable and feasible avoidance and mitigation measures regarding particulate matter emissions were in place in accordance with the approved Air Quality Management Plan (AQMP).
10		16/10/23	8:38am	Roxburgh Rd, Muswellbrook	Dust	Community Response Line	Investigation revealed results at the nearest monitor indicated dust levels were elevated at the time, and the 24-hour average for mine incremental contribution remained within regulatory criteria. Operational changes were made in response to conditions, and reasonable and feasible avoidance and mitigation measures regarding particulate matter emissions were in place in accordance with the approved Air Quality Management Plan (AQMP).
11		24/10/23	8:30pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	*Lighting adjusted in response to the call.*
12		30/10/23	8:00pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
13	November	01/11/23	8:00pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
14		03/11/23	10:47pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.

Number	Month	Date	Time	From	Issue	Lodgement type	Investigation and response to caller
15		04/11/23	8:26pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
16		14/11/23	8:59pm	Roxburgh Rd, Muswellbrook	Lighting	Community Response Line	Lighting adjusted in response to the call.
17	January	03/01/24	10:00pm	Roxburgh Road, Muswellbrook	Lighting	In Person	Lighting procedure reviewed.
18		15/01/24	11:39am	Old Bengalla Road, Muswellbrook	Blast Vibration	Community Response	Investigation revealed the blast was within the limits.
19		23/01/24	2:58pm	Denman Road, Muswellbrook	Dust	Community Response	Investigation revealed the blast was within the limits.
20		6/6/2024	10.23am	Balmoral Rd, Muswellbrook	Blasting	Phone Call	Investigation confirmed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
21	June	6/6/2024	10.23am	New England Highway, Muswellbrook	Blasting	Community Response Line	Investigation confirmed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.
22		17/6/2024	11.54am	New England Highway, Muswellbrook	Blasting	Phone Call	Investigation confirmed weather conditions were suitable for blasting at the time. Results indicated overpressure noise and ground vibration levels were within regulatory criteria. Caller was advised of investigation and monitoring results.

Appendix 4 Annual Coal Transport Report FY24

This report has been prepared in accordance with Schedule 3 Condition 46 of Project Approval 09_0062 MOD 1:

Monitoring of Coal Transport

46. The Proponent shall keep records of the:
    (a) amount of coal transported from the site in each financial year;
    (b) number of coal haulage train movements generated by the Mt Arthur mine complex (on a daily basis); and
    (c) make these records available on its website at the end of each financial year.

For the 12-month period ending 30 June 2024:

- 13.949 million tonnes of export product coal was transported by rail to the Port of Newcastle. This is compliant with Schedule 2 Condition 7(a) of Project Approval 09_0062 MOD 1, which restricts Mt Arthur Coal's coal transport on the Antiene rail spur to a maximum of 27 million tonnes of product coal in a financial year;
- 1.616 million tonnes of domestic product coal was transported by rail to the Eraring Power Station and Vales Point Power Station. This is compliant with Schedule 2 Condition 7(a) of Project Approval 09_0062 MOD 1, which restricts Mt Arthur Coal's coal transport on the Antiene rail spur to a maximum of 27 million tonnes of product coal in a financial year;
- The total number of train movements was 3,860; and
- The maximum number of train movements in a single day was 20. This is compliant with Schedule 2 Condition 7(b) of Project Approval 09_0062 MOD 1, which restricts Mt Arthur Coal's coal transport on the Antiene rail spur to a maximum of 30 train movements a day.

Note: Each train entering and exiting the site is classified as two train movements and a day refers to the 24 hours from midnight to midnight the next day.

Table 44. Daily train movements FY24

Date	No. of train movements
1/07/2023	12
2/07/2023	16
3/07/2023	16
4/07/2023	4
5/07/2023	2
6/07/2023	16
7/07/2023	10
8/07/2023	14
9/07/2023	12
10/07/2023	10
11/07/2023	8
12/07/2023	12
13/07/2023	10
14/07/2023	10
15/07/2023	12
16/07/2023	6
17/07/2023	6
18/07/2023	14
19/07/2023	14
20/07/2023	14
21/07/2023	12
22/07/2023	14
23/07/2023	14
24/07/2023	10
25/07/2023	8
26/07/2023	6
27/07/2023	8
28/07/2023	10
29/07/2023	12
30/07/2023	14
31/07/2023	14
1/08/2023	8
2/08/2023	6
3/08/2023	8
4/08/2023	8
5/08/2023	0
6/08/2023	0
7/08/2023	0
8/08/2023	6
9/08/2023	8
10/08/2023	4
11/08/2023	6
12/08/2023	14
13/08/2023	12
14/08/2023	8
15/08/2023	8
16/08/2023	10
17/08/2023	6
18/08/2023	10
19/08/2023	6
20/08/2023	12
21/08/2023	4
22/08/2023	8
23/08/2023	10
24/08/2023	4
25/08/2023	8
26/08/2023	6

Date	No. of train movements
27/08/2023	10
28/08/2023	0
29/08/2023	4
30/08/2023	6
31/08/2023	8
1/09/2023	12
2/09/2023	8
3/09/2023	4
4/09/2023	10
5/09/2023	4
6/09/2023	6
7/09/2023	12
8/09/2023	10
9/09/2023	14
10/09/2023	6
11/09/2023	8
12/09/2023	6
13/09/2023	6
14/09/2023	8
15/09/2023	8
16/09/2023	10
17/09/2023	12
18/09/2023	10
19/09/2023	8
20/09/2023	14
21/09/2023	10
22/09/2023	12
23/09/2023	10
24/09/2023	8

Date	No. of train movements
25/09/2023	10
26/09/2023	12
27/09/2023	16
28/09/2023	8
29/09/2023	12
30/09/2023	16
1/10/2023	12
2/10/2023	20
3/10/2023	6
4/10/2023	0
5/10/2023	0
6/10/2023	0
7/10/2023	6
8/10/2023	16
9/10/2023	16
10/10/2023	14
11/10/2023	12
12/10/2023	8
13/10/2023	16
14/10/2023	16
15/10/2023	18
16/10/2023	12
17/10/2023	14
18/10/2023	16
19/10/2023	12
20/10/2023	14
21/10/2023	10
22/10/2023	18
23/10/2023	10

Date	No. of train movements
24/10/2023	12
25/10/2023	10
26/10/2023	6
27/10/2023	10
28/10/2023	6
29/10/2023	12
30/10/2023	12
31/10/2023	10
1/11/2023	14
2/11/2023	12
3/11/2023	16
4/11/2023	8
5/11/2023	0
6/11/2023	10
7/11/2023	4
8/11/2023	8
9/11/2023	12
10/11/2023	6
11/11/2023	6
12/11/2023	20
13/11/2023	2
14/11/2023	14
15/11/2023	10
16/11/2023	8
17/11/2023	12
18/11/2023	14
19/11/2023	12
20/11/2023	12
21/11/2023	2

Date	No. of train movements
22/11/2023	0
23/11/2023	0
24/11/2023	6
25/11/2023	2
26/11/2023	4
27/11/2023	14
28/11/2023	12
29/11/2023	8
30/11/2023	14
1/12/2023	16
2/12/2023	10
3/12/2023	16
4/12/2023	12
5/12/2023	10
6/12/2023	14
7/12/2023	16
8/12/2023	16
9/12/2023	10
10/12/2023	14
11/12/2023	16
12/12/2023	12
13/12/2023	14
14/12/2023	6
15/12/2023	16
16/12/2023	16
17/12/2023	10
18/12/2023	14
19/12/2023	6
20/12/2023	12

Date	No. of train movements
21/12/2023	18
22/12/2023	16
23/12/2023	16
24/12/2023	14
25/12/2023	0
26/12/2023	0
27/12/2023	14
28/12/2023	18
29/12/2023	16
30/12/2023	14
31/12/2023	18
1/01/2024	18
2/01/2024	16
3/01/2024	14
4/01/2024	14
5/01/2024	14
6/01/2024	16
7/01/2024	16
8/01/2024	10
9/01/2024	12
10/01/2024	12
11/01/2024	8
12/01/2024	16
13/01/2024	14
14/01/2024	8
15/01/2024	14
16/01/2024	10
17/01/2024	10
18/01/2024	10

Date	No. of train movements
19/01/2024	12
20/01/2024	14
21/01/2024	14
22/01/2024	14
23/01/2024	10
24/01/2024	10
25/01/2024	14
26/01/2024	12
27/01/2024	14
28/01/2024	16
29/01/2024	8
30/01/2024	8
31/01/2024	10
1/02/2024	8
2/02/2024	10
3/02/2024	18
4/02/2024	14
5/02/2024	8
6/02/2024	2
7/02/2024	0
8/02/2024	0
9/02/2024	8
10/02/2024	14
11/02/2024	10
12/02/2024	14
13/02/2024	16
14/02/2024	14
15/02/2024	10
16/02/2024	14

Date	No. of train movements
17/02/2024	16
18/02/2024	14
19/02/2024	6
20/02/2024	8
21/02/2024	10
22/02/2024	6
23/02/2024	14
24/02/2024	14
25/02/2024	16
26/02/2024	6
27/02/2024	10
28/02/2024	8
29/02/2024	6
1/03/2024	10
2/03/2024	6
3/03/2024	10
4/03/2024	12
5/03/2024	8
6/03/2024	8
7/03/2024	16
8/03/2024	14
9/03/2024	12
10/03/2024	12
11/03/2024	14
12/03/2024	4
13/03/2024	10
14/03/2024	16
15/03/2024	10
16/03/2024	16

Date	No. of train movements
17/03/2024	6
18/03/2024	14
19/03/2024	14
20/03/2024	10
21/03/2024	14
22/03/2024	12
23/03/2024	12
24/03/2024	10
25/03/2024	8
26/03/2024	8
27/03/2024	14
28/03/2024	8
29/03/2024	12
30/03/2024	12
31/03/2024	16
1/04/2024	16
2/04/2024	12
3/04/2024	2
4/04/2024	0
5/04/2024	0
6/04/2024	6
7/04/2024	6
8/04/2024	12
9/04/2024	12
10/04/2024	14
11/04/2024	12
12/04/2024	16
13/04/2024	12
14/04/2024	16

Date	No. of train movements
15/04/2024	14
16/04/2024	14
17/04/2024	16
18/04/2024	12
19/04/2024	18
20/04/2024	16
21/04/2024	18
22/04/2024	14
23/04/2024	6
24/04/2024	12
25/04/2024	12
26/04/2024	12
27/04/2024	12
28/04/2024	16
29/04/2024	16
30/04/2024	14
1/05/2024	10
2/05/2024	16
3/05/2024	12
4/05/2024	12
5/05/2024	16
6/05/2024	8
7/05/2024	10
8/05/2024	10
9/05/2024	12
10/05/2024	12
11/05/2024	18
12/05/2024	18
13/05/2024	18

Date	No. of train movements
14/05/2024	12
15/05/2024	12
16/05/2024	12
17/05/2024	8
18/05/2024	16
19/05/2024	16
20/05/2024	12
21/05/2024	2
22/05/2024	0
23/05/2024	0
24/05/2024	4
25/05/2024	6
26/05/2024	12
27/05/2024	14
28/05/2024	10
29/05/2024	12
30/05/2024	6
31/05/2024	14
1/06/2024	12
2/06/2024	8
3/06/2024	12
4/06/2024	0
5/06/2024	4
6/06/2024	12
7/06/2024	14
8/06/2024	16
9/06/2024	14
10/06/2024	14
11/06/2024	16

Date	No. of train movements
12/06/2024	18
13/06/2024	14
14/06/2024	12
15/06/2024	14
16/06/2024	10
17/06/2024	12
18/06/2024	8
19/06/2024	6
20/06/2024	4
21/06/2024	4
22/06/2024	10
23/06/2024	10
24/06/2024	4
25/06/2024	6
26/06/2024	4
27/06/2024	6
28/06/2024	10
29/06/2024	4
30/06/2024	6
Total	**3860**
Maximum daily train movements	**20**

Appendix 5 Rehabilitation Plan

ML1757
ML1487
ML1655
EL5965
ML1548
MPL263
CCL744
ML1739
ML1739
CL396
ML1739
ML1548
ML1739
ML1358
ML1593S
EL5965
ML1593
EL5965
EL5965
EL5965

Actual Rehabilitation (June 2024)

Rehabilitation vegetation type

- Rehabilitation Area - Box Gum Woodland
- Rehabilitation Area - Native Woodland
- Rehabilitation Area - Pasture
- FY24 Rehabilitation Areas

Actual Disturbance (June 2024)

- Active Mining Area (Open cut void)
- Overburden Emplacement Area
- Landform Establishment
- Growth Media Development
- Infrastructure Area
- Tailings Storage Facility
- Topsoil Stockpile
- Water Management Area

BHP

Mapping Services Brisbane

0 500 1,000 1,500 2,000 m

Transverse Mercator Projection.
MGA Zone 56. GDA2020 Datum.

MOUNT ARTHUR COAL

Annual Review - Rehabilitation Plan

Drawn: B. Kleinschmidt	Checked: C. McLennan	Date: 29/08/2024	Version: 1	Appen. 5

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