Department of Planning and Environment

Julie McNaughton
Environment & Community Senior Advisor
Austar Coal Mine Pty Ltd
Wonnarua Country
Middle Road
Paxton NSW 2325

Sent by email only: Julie.McNaughton@yancoal.com.au

14/03/2023

Austar Coal (MP08_0111 and DA 29/95) - Annual Review 2022

Dear Ms McNaughton

I refer the Annual Review for the period 1 July 2021 to 30 June 2022, submitted to the Department of Planning and Environment (the department) on 29 September 2022 as required under Schedule 7 Condition 3 of Project Approval 08_0111 as modified and Schedule 5 Condition 5 of development consent DA 29/95 as modified (the consents).

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

Please note that the department's acceptance of this Annual Review is not an endorsement of the compliance status of the project.

Should you wish to discuss the matter further, please contact Jennifer Sage, Senior Compliance Officer on 0400 245 170 or compliance@planning.nsw.gov.au

Yours sincerely

HWatters

Heidi Watters
Team Leader Northern
Compliance

As nominee of the Planning Secretary

YANCOAL
兖煤澳大利亚有限公司

AUSTAR COAL MINE
PART OF THE YANCOAL AUSTRALIA GROUP

Austar Coal Mine Annual Review

July 2021 – June 2022

ANNUAL REVIEW 2022

Name of operation	Austar Coal Mine
Name of operator	Yancoal Mining Services Pty Ltd
Development consent / project approval #	DA 29/95 and PA 08_0111
Name of holder of development consent / project	Austar Coal Mine Pty Ltd
Mining lease #	Refer **Table 3-2**
Name of holder of mining lease	Austar Coal Mine Pty Ltd
Water licence #	Refer **Table 7-1**
Name of holder of water licence	Austar Coal Mine Pty Ltd
RMP start date	29 July 2022
Forward Plan start date	1 August 2022
Forward Plan end date	31 July 2023
Annual Review start date	1 July 2021
Annual Review end date	30 June 2022

I, William Farnworth, certify that this audit report is a true and accurate record of the compliance status of Austar Coal Mine for the period 1 July 2021 to 30 June 2022 and that I am authorised to make this statement on behalf of Austar Coal Mine Pty Ltd.

Note.

a) *The Annual Review is an 'environmental audit' for the purposes of section 9.39(2) of the Environmental Planning and Assessment Act 1979. Section 9.42 provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.*

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

Name of authorised reporting officer	William Farnworth
Title of authorised reporting officer	Mining Engineering Manager
Signature of authorised reporting officer	
Date	26 September 2022

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

TABLE OF PLANS

TABLE OF APPENDICES

1 STATEMENT OF COMPLIANCE

TABLE 1-1 STATEMENT OF COMPLIANCE

Were all the conditions of the relevant approval(s) complied with?	
Development Consent DA 29/95	No
Project Approval PA 08_0111	No
Environment Protection Licence EPL 416	No
CML 2	Yes
CCL 728	Yes
CCL 752	Yes
DSL 89	Yes
ML 1157	Yes
ML 1388	Yes
ML 1364	Yes
ML 1283	Yes
ML 1345	Yes
ML 1550	Yes
ML 1661	Yes
ML 1666	Yes
ML 1677	Yes
MPL 204	Yes
MPL 217	Yes
MPL 23	Yes
MPL 233	Yes
MPL 269	Yes
WAL 19181	Yes
WAL 41504	Yes
EL 6598	Yes

TABLE 1-2 NON-COMPLIANCES

Relevant Approval	Condition #	Condition Description (Summary)	Compliance Status	Comment	Where Addressed in this Annual Review
EPL 416 PA08_0111 DA29/95	L1.1 Schedule 4 Condition 8 Schedule 3 Condition 5	Shall comply with s120 of the POEO Act (pollution of waters) The proponent shall not discharge any water from the site except as may be expressly provided by an EPL, or in accordance with s120 of the POEO Act 1997.	Non-compliant	During the reporting period there were three events that had potential to cause pollution to waterways: Kitchener Surface Infrastructure site sediment basin overflows occurred on 19 February 2022, 23 February 2022 and 4 March 2022. Austar reported the incidents to the EPA and DPE. The incident reports concluded that there was unlikely to have been any material harm caused by the incidents and no further actions were required.	**Section 7.3.4 and Section 11**
PA 08_0111 and DA 29/95	Schedule 5, Condition 4 and Schedule 7, Condition 6	The Proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality impact assessment criteria.	Non-compliant	Missed monitoring at gauge D9 started in July 2021 due to the landowner not allowing access to the property. D9 gauge has been relocated to the Kitchener Public School on 20 September 2021.	**Section 6.3 and Section 11**

TABLE 1-3 COMPLIANCE STATUS KEY FOR TABLE 1-2

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 likely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

2 INTRODUCTION

2.1 Scope

This Annual Review covers the annual reporting period from 1 July 2021 to 30 June 2022 (the reporting period). Austar Coal Mine Pty Limited (Austar) is required to prepare and submit an Annual Review that satisfies the annual reporting requirements under Development Consent DA 29/95, Project Approval PA 08_0111, Mining Leases, Mining Operations Plan (MOP) and management plans required under the various development consents. This Annual Review has been prepared in accordance with the NSW Government *Annual Review Guideline Post-approval requirements for State significant mining developments, October 2015*. Annual water take against water licences is also recorded in this document.

2.2 Background

Austar, a subsidiary of Yancoal Australia Limited (Yancoal), manages the Austar Coal Mine, a soon to be closed underground coal mine located approximately 10 kilometres (km) southwest of Cessnock in the Lower Hunter Valley in NSW. Austar Coal Mine incorporates the former Pelton, Ellalong, Cessnock No. 1 (Kalingo) and Bellbird South Collieries and includes facilities for coal extraction, handling, processing and rail and road transport. Pit top facilities are located on Middle Road, Paxton, and the Coal Handling and Preparation Plant (CHPP) is located at Wollombi Road, Pelton (**Figure 2-1**).

On 26 February 2021, a decision was made by the Yancoal board to transition the Austar Coal Mine from care and maintenance to closure. Austar is currently at the Pre-Feasibility Study (PFS) stage of mine closure, undertaking technical studies and site investigations to address closure knowledge gaps and develop detailed decommissioning and rehabilitation execution plans that will deliver optimal rehabilitation outcomes at the site.

Surface infrastructure at Austar includes:

- Austar Pit Top facilities (including administration buildings, the main access drift (including the dolly cart and drift), coal conveyor bin, store, workshop and laydown facilities);
- the CHPP at Pelton (including CHPP, administration areas, Reverse Osmosis plant, overland conveyor and a number of heritage listed buildings in various states of repair);
- No. 1 shaft (second egress man winder);
- No. 2 shaft (mine dewatering via a pipe line which pumps to Kalingo and Austar Dams to CHPP;
- Kalingo Infrastructure Area (KIA) (ventilation fans and underground services);
- Kitchener Surface Infrastructure Site (SIS) (ventilation shafts and fans, services borehole/drop hole), along with water management dams, pipelines and powerlines; and
- coarse reject emplacement areas (Aberdare Extended Emplacement Area (EEA), and Bellbird Areas 12 and 13).

The location of approved operations is shown in **Figure 2-1**.

No mining was undertaken at Austar Coal Mine during the reporting period.

2.3 Mine Contacts

Table 2-1 outlines the contact details for site personnel responsible for closure, rehabilitation, environment, and community liaison at Austar.

TABLE 2-1 SITE PERSONNEL

Position	Name	Company	Contact Number
Mining Engineering Manager	William Farnworth	Austar	(02) 4993 7356
Environment & Community Superintendent	Carly McCormack	Austar	(02) 4993 7334

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6368000 6367000 6366000 6365000 6364000 6363000 6362000 6361000 6360000 6359000 6358000 6357000 6356000 6355000 6354000 6353000 6352000 6351000 6350000 6349000 6348000 6347000 6346000 6345000

Aberdare Extended Reject Emplacement Area
ML1345
MPL204
ML1157
MPL217
DSL89
Areas 12 & 13
DSL89
MPL23
MPL1364
MPL23
MPL269
MLA521
CHPP
ML1388
Kitchener Surface Infrastructure Site
ML1666
CML2
Austar Dam
Pit Top
Kalingo Dam
Cessnock No.1 Colliery
ML1550
CML2
ML1388
ML1388
No.1 Shaft
CCL728
CML2
Kalingo Infrastructure Area
ML1661
CCL752
CCL728
CCL752
ML1388
CCL728
No.2 Shaft
CESSNOCK LGA
LAKE MACQUARIE LGA

LEGEND

- Project Approval Boundary
- Colliery Holding Boundary
- Mining Lease Application Boundary
- Local Government Area
- UG Mine Workings
- Completed Workings
- Relevant Mining Titles
- Surface Lease
- Sub-surface Lease

0 510 1,020 1,530 2,040 m

Scale: 1:65,000

GDA2020 MGA Zone 56

26/09/2022

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INTEGRATED ENVIRONMENTAL MANAGEMENT AUSTRALIA
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Sheet Size : A3

Austar Coal Annual Review

Locality Plan and Completed Mining Operations

FIGURE 2-1

3 APPROVALS

Austar's operations are regulated through various leases, licences, permits and approvals as set out below.

3.1 Changes to Approvals during the Reporting Period

Approval to undertake mining operations under DA 29/95 lapsed on 14 February 2022. Under Schedule 2 Condition 5, this consent continues to apply in all other respects until rehabilitation of the site is complete to the required standard. Austar continues to undertake rehabilitation activities and relevant monitoring in accordance with DA29/95 and all approved management plans.

On 2 July 2021, the Resources Regulator legislated the *Mining Amendment (Standard Conditions of Mining Leases—Rehabilitation) Regulation 2021* (the Mining Amendment) under the *Mining Act 1992*. The Amendment prescribes new mining lease conditions relating to rehabilitation and sets clear, achievable, and enforceable requirements for rehabilitation. These new rehabilitation conditions will replace existing rehabilitation and environmental management conditions on current leases from 2 July 2022 and will be applicable to future reporting periods.

3.2 Primary Approvals

3.2.1 Project Approvals and Development Consents

Austar operates under two major project approvals: Bellbird South (DA 29/95) and Stage 3 (PA 08_0111), along with numerous development consents issued by Cessnock City Council between 1974 and 2012.

Development Consent DA 29/95 was granted under Section 91 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 14 February 1996 and was most recently modified under Section 75W (repealed) of the EP&A Act on 25 August 2017. DA 29/95 relates primarily to the Bellbird South mining area and operational areas.

Project Approval PA 08_0111 was granted under Section 75J of the EP&A Act on 6 September 2009 and was most recently modified under Section 75W of the EP&A Act in December 2013. PA 08_0111 relates primarily to the Stage 3 mining area. PA 08_0111 was declared State Significant Development (SSD) under Clause 6 of Schedule 2 to the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* via Government Gazette on 15 November 2018.

A summary of Austar's project approvals and development consents is outlined in **Table 3-1**.

TABLE 3-1 DEVELOPMENT CONSENTS HELD BY AUSTAR

Consent Description	Date	Expiry	Approval Authority	Summary of Approved Development
DA 29/95	14 Feb 1996	14 Feb 2022[1]	Minister for Urban Affairs and Planning	Ellalong Colliery Extension into Bellbird South. Extension of underground mining activities into Bellbird South area (CML 2). Mine life of 21 years with a production of 3 million tonnes per annum (Mtpa). Reject emplacement. Construction and operation of a new infrastructure site including new ventilation shaft and fan(s) (No. 2 Shaft) adjacent to Sandy Creek Road. Use of Pelton CHPP for washing and handling of coal. Provision of a maximum raw coal stockpile of 100,000 t. Reopening of disused Cessnock No. 1 Colliery shafts for ventilation and access, or the sinking of new shafts, as required. Construction of various water management devices including sedimentation and clean water dams and drainage systems.
DA 29/95	27 Sep 2006 (MOD 1)	14 Feb 2022	Minister for Planning	Use of longwall top coal caving (LTCC) mining methods in two longwall panels. Installation of a larger capacity fan at the site approved for DA 8/1999/1658. Installation of a new downcast ventilation shaft. Installation of a new 10 MVA substation. Installation of a nitrogen inertisation plant with a 2,000 m^3 capacity.
	8 Jun 2008 (MOD 2)			Increase in the maximum allowable extraction height from 4.5 m to 6.5 m
	28 May 2009 (MOD 3)			To allow longer and wider panels A4 and A5.
	7 Dec 2010 (MOD 4)			Extract one additional Longwall Panel A5a (LW A5a)
	27 Apr 2012 (MOD 5)			Extension of Longwall Panel A5a

[1] DA 29/95 lapsed on 14 February 2022. This consent continues to apply in all respects other than to permit the carrying out of mining operations, until the rehabilitation of the site and those requirements and undertakings have been carried out to the required standard.

Consent Description	Date	Expiry	Approval Authority	Summary of Approved Development
	29 Jan2016 (MOD 6)			Extension to Bellbird South development consent area to include Longwall panels LWB1 to LWB3 Extension of consent to 14 February 2022
	25 Aug 2017 (MOD 7)			Extension to Bellbird South development consent area to include Longwall panels LWB4 to LWB37
Project Approval 08_0111	6 Sep 2009	31 Dec 2030	Minister for Planning	Stage 3 Expansion Project - extension to longwall mining area to east of existing operations. Key features: Longwall production from the Greta coal seam from panels A6 to A17 using LTCC. Construction of a new surface infrastructure site south west of Kitchener including ventilation shafts and fans, winders, bath house facilities, a workshop, electricity substation, store and offices. Construction of a new road and intersection at Quorrobolong Road. Coal will continue to be brought to the surface at Austar's existing surface facilities at Paxton. These facilities will continue to be used to take large mining equipment into and out of the mine. Continued use of Austar's existing water management, coal transport systems, coal preparation plant and rejects emplacement areas.
Project Approval 08_0111 (Modifications)	4 May 2010 (MOD 1)	31 Dec 2030	Delegate for Minister for Planning	Minor change to subsidence impact performance measures to built features in Table 1 of Project Approval. The key performance indicator which was amended in the Project Approval requires the project does not cause built features to go beyond safe, serviceable and repairable criteria, unless the landowner agrees in writing.
	13 Mar 2012 (MOD 2)			Reorientation of the Stage 3 longwalls. Removal of longwall A6, and extraction of coal in longwalls A7 to A19, which are a reorientation of previously approved longwalls A7 to A17 to more closely align with the direction of principal stress. In addition, the chain pillar widths are increased from 45m to 55m to reduce roadway failure risks which in turn further minimises subsidence. The modification will enable more efficient and safer extraction of coal from the Stage 3 area.
	17 Dec 2013 (MOD3)			Extension of Stage 3 longwalls A7 to A10.

Consent Description	Date	Expiry	Approval Authority	Summary of Approved Development
DA 74/75/79	4 Dec 1975	Nil expiry	Cessnock City Council (CCC)	Development Consent for a coal mine at Ellalong including: Approval for underground coal mining. Construction of a new access drift, upcast shaft and ventilation shaft. Expansion of the Pelton CHPP. Conveyance of coal from the Ellalong pit top to the Pelton CHPP Operation for the washing and handling of coal. Water management systems. Upgrade of the Pelton rail loading facility and railway spur. reject emplacement underground, open cut areas adjoining Pelton and other abandoned mine sites.
DA 118/680/93	8 Oct 1980	Nil expiry	CCC	Downcast Ventilation Shaft and Man Access Shaft, Bathhouse and Offices at Ellalong Colliery.
DA 118/691/181	26 Nov 1992	Nil expiry	CCC	Pelton Open Cut Coal Mine. Approval of an open cut coal mine adjoining Pelton Colliery up to 300,000 tonnes of coal and underground mining of approximately 27,000 tonnes of coal from a section of prior workings south of the proposed open cut.
DA 118/691/181	11 Jan 1993	Nil expiry	CCC	Pelton Open Cut Coal Mine – Modification. Extension of open cut mining area. Infrastructure and water management modifications.
DA 118/691/229	7 Jan 1993	Nil expiry	CCC	Pelton Coal Handling Preparation Plant – Raw Coal Handling Facility, Washed Coal Facility and Upgrading of the Water Management System. Upgrade and replacement of coal handling infrastructure such as surge bin, automatic stacking system, reclaim facilities and skyline conveyor. Increase in stockpile capacity. Upgrade to water management system. Extension of the reclaim tunnel. Construction of a mine water transfer pipeline from Ellalong Colliery to Pelton. Provision of underground workings for emergency mine water disposal. Upgrade of lime treatment plant.
DA 118/693/42	26 Nov 1993	Nil expiry	CCC	Extension of Pelton Open Cut Mine. Extension of open cut mining area including emplacement of overburden in previously

Consent Description	Date	Expiry	Approval Authority	Summary of Approved Development
				mined blocks and extension of the mine's water management system.
DA 118/694/120	27 Jun 1994	Nil expiry	CCC	Approves the extraction of longwall panels LW13 and LW14 as a minor extension to the Ellalong Colliery within CML2.
DA 118/694/152	7 Jul 1994	Nil expiry	CCC	Relocatable Office and Temporary Bathhouse at Pelton Colliery.
DA 118/695/22	12 Jul 1995	Nil expiry	CCC	Establishment of an overburden stockpile for the Pelton Open Cut Operations.
DA 118/695/81	12 Jul 1995	Nil expiry	CCC	Additions for Bathhouse, office and car park at Ellalong Colliery. Extension to the bathhouse at the Ellalong drift site. Extension of existing offices or construction of portable offices. Construction of a 4000 square metre car park.
DA 8/1999/1658	18 Feb 2000	Nil expiry	CCC	Relocation of Ventilation Facilities at Bellbird South Underground Mine. Installation of a ventilation shaft and fan house. Upgrading of the existing access track to the site from the Pelton - Ellalong Road.
DA 8/2002/655/1	16 Oct 2002	Nil expiry	CCC	Compressor and Pump Enclosure Buildings at Ellalong Colliery.
DA 118/695/18	21 Feb 1995	Nil expiry	CCC	Relocatable Office at Pelton Colliery.
DA 8/2012/503/1	19 Dec 2012	Nil expiry	CCC	Extension of car parking area associated with Austar Coal Mine

3.2.2 Mining Authorities

Details of the relevant mining authorities are summarised in **Table 3-2**.

TABLE 3-2 MINING AUTHORISATIONS HELD BY AUSTAR

Mining Title (Act)	Date Granted	Expiry Date	Area (ha)	Surface	Depth Restriction
EL 6598 (1992)	13 Jul 2006	16 Jun 2021*	7,370	Yes	Various
Dam Site Lease 89 (1901)	04 Apr 1908	04 Apr 2030	3.961	Yes	Surface to 15.24 metres
Mineral Lease No. 1157 (1906)	8 Jul 1949	08 Jul 2028	10.24	Yes	Surface to 15.24 metres

Mining Title (Act)	Date Granted	Expiry Date	Area (ha)	Surface	Depth Restriction
Mineral Lease No. 1283 (1906)	13 Jul 1961	13 Jul 2022*	1.973	No (sub-surface)	7.62 to 15.24 metres
Mining Purposes Lease No. 23 (1906)	17 May 1909	17 May 2030	2.421	Yes	Surface to 15.24 metres
Mining Purposes Lease No. 204 (1906)	03 Feb 1916	03 Feb 2039	1.2	Yes	Surface to 15.24 metres
Mining Purposes Lease No. 217 (1906)	12 Apr 1916	03 Feb 2039	0.6298	Yes	Surface to 15.24 metres
Mining Purposes Lease No. 233 (1906)	01 Aug 1916	01 Aug 2036	1.973	Yes	Surface to 7.62 metres
Mining Purposes Lease No. 269 (1906)	07 Dec 1917	07 Dec 2018*	2.79	Yes	Surface to 6.1 metres below the level of the rails when laid
Mining Purposes Lease No. 1364 (1906)	28 Oct 1968	28 Oct 2029	0.4527	Yes	Surface to 15.24 metres
Consolidated Coal Lease No. 728 (1973)	10 Oct 1989	30 Dec 2023*	3296.8	Various	Various
Consolidated Coal Lease No. 752 (1973)	23 May 1990	30 Dec 2023*	3802	No (Sub-surface)	Various
Consolidated Mining Lease No. 2 (1992)	24 Mar 1993	06 Jul 2025	ML -3406 ha AMA - 2.528 ha	Various	Various
Mining Lease No. 1345 (1992)	23 Mar 1995	30 Dec 2023*	ML - 41.9 ha AMA - 0.5659 ha	Yes	Surface to 900 metres depth
Mining Lease No. 1388 (1992)	02 Apr 1996	02 Apr 2038	15.12	No (sub-surface)	30.48 metres to unlimited depth
Mining Lease No. 1550 (1992)	24 Jun 2004	23 Jun 2025	14.11	Yes	Surface to 20 metres
Mining Lease No. 1661 (1992)	22 Nov 2011	22 Nov 2032	469.32	No (sub-surface)	20 to 900 metres
Mining Lease No. 1666 (1992)	25 Jan 2012	25 Jan 2033	34.13	No (sub-surface)	30.48 to 900 metres
Mining Lease No. 1677 (1992)	23 Aug 2012	22 Aug 2032	9.16	Yes	Surface to 30.48 metres
Mining Lease Application No. 521 (1992)	Lodged Feb 2016	Pending Approval	115	Yes	Surface to 50 metres

*Renewal sought

3.2.3 Environment Protection Licence

Austar operates in accordance with Environment Protection Licence 416 (EPL 416), issued on 5 April 2000 and last updated on 15 December 2017 by the NSW Environment Protection Authority (EPA), under the authority of the *Protection of the Environment Operations Act 1997*.

3.3 Ancillary Approvals

3.3.1 Extraction Plans

A summary of Extraction Plan / Subsidence Management Plan (SMP) approvals for Bellbird South (LWB1-LWB7) and Stage 3 mining areas held by Austar is outlined in **Table 3-3**. Previous SMP approvals for the Bellbird South Stage 2 area and the Stage 3 mining area are also shown in **Table 3-3**.

TABLE 3-3 SUBSIDENCE MANAGEMENT PLAN / EXTRACTION PLAN APPROVALS HELD BY AUSTAR

Description	Date	Expiry Date	Approval Authority	Approval Summary
Extraction Plan Approval	30 May 2013	31 Dec 2030	Department of Planning, and Environment (DPE)	Extraction Plan approval for Austar Longwalls A7 to A10. The Extraction plan has been modified in accordance with PA08_0111 modifications.
SMP Approval 13/1876	3 Jun 2013	31 May 2020	Division of Resources and Energy (DRE)	Subsidence Management Plan approval for Austar Longwalls A7 to A10. The SMP has been varied twice in accordance with PA08_0111 modifications and variations in start and end positions of longwalls
Extraction Plan LWB1 to LWB3	16 May 2016	Not specified	DPE	Extraction Plan for Bellbird South Longwalls B1 to B3 was approved by DPE on 4 July 2016
Extraction Plan LWB4 to LWB7	1 Feb 2019	Not specified	DPE	Extraction Plan for Bellbird South Longwalls B4 to B7 approved by DPE on 20 September 2017. Updated to include the shortening of LWB4 was approved by DP&E on 18 September 2018 and again on 12 February 2019. Other variations to Longwalls B5-B7 were approved by DPE on 7 August 2019

3.3.2 Mining Operations Plan

Pursuant to the *Mining Act 1992*, during the reporting period, Austar conducted activities in accordance with an approved Mining Operations Plan (MOP). MOP Amendment A was approved on 4 March 2021 and covered the management of the site during care and maintenance, including:

- Changes in site activities during the period of care and maintenance;
- Management of environmental risks during care and maintenance; and

- Inclusion of a schedule of mine closure planning investigations and studies to be carried out before the end of 2022 (see **Section 4.1**).

During the reporting period, Austar prepared a Rehabilitation Management Plan (RMP) and Forward Program to satisfy the relevant conditions of Austar's Mining Leases as introduced in the Mining Amendment (refer **Section 3.1**). These documents replaced the current approved MOP on 2 July 2022.

3.3.3 Environmental Management Plans

In accordance with DA 29/95 and PA 08_0111, Austar has developed and implemented a range of environmental management plans. **Table 3-4** outlines the environmental management plans required by each relevant development consent, the determining authority and their approval status.

Operations during this reporting period were undertaken generally in accordance with the Environmental Management Strategy (EMS) and environmental management plans as listed in **Table 3-4**. Approved environmental management plans are available from the Austar website: www.austarcoalmine.com.au

During the 2020-2021 reporting period, all environmental management plans were reviewed and updated to address the transition to care and maintenance and lodged for approval with DPE. As shown in **Table 3-4**, during the 2021-2022 reporting period Austar received approvals for several updated management plans.

TABLE 3-4 ENVIRONMENTAL MANAGEMENT PLANS

Plan	DA Requirement	Approval Authority	Approval Date
Environmental Management Strategy, May 2021	DA 29/95 – Schedule 5 Condition 1 PA 08_0111 - Schedule 7 Condition 1	DPE	18 Aug 2021
Environmental Monitoring Program, June 2018	DA 29/95 – Schedule 5 Condition 2 PA 08_0111 - Schedule 7 Condition 1	DPE	1 Aug 2018
Landscape Management Plan – Kitchener SIS, April 2021	PA 08_0111 – Schedule 6 Condition 4	DPE	19 Aug 2021
Site Water Management Plan, March 2022	DA 29/95 – Schedule 3 Condition 6-11 PA 08_0111 – Schedule 4 Condition 9	DPE	11 Mar 2022
Noise and Vibration Management Plan, June 2018	DA 29/95 – Schedule 3 Condition 13-16 PA 08_0111 – Schedule 4 Condition 2-3	DPE	1 Aug 2018
Air Quality and Greenhouse Gas Management Plan, October 2021	DA 29/95 – Schedule 3 Condition 17-20 PA 08_0111 – Schedule 4 Condition 6-7	DPE	26 Oct 2021
Aboriginal Cultural Heritage Management Plan, June 2021	PA 08_0111 – Schedule 3 Condition 4 and Schedule 4 Condition 10	DPE	30 Jun 2021
Historic Heritage Management Plan, April 2021	PA 08_0111 – Schedule 4 Condition 11	DPE	30 Jun 2021

4 OPERATIONS SUMMARY

Austar announced closure on 26 February 2021. As such, there were no active underground mining operations during the reporting period. Activities have generally been associated with rehabilitation and closure technical studies and site investigations as well as closure early works and general site operations including mine ventilation, waste and water management.

A summary of the progress of closure planning and execution works is included in **Section 4.1**. General operations are summarised in **Section 4.2**.

4.1 Closure Works

4.1.1 Mine Closure Planning Update

Mine closure planning commitments were made in MOP Amendment A and progress reported in Annual Reviews. **Table 4-1** outlines these commitments and the status of each.

Further detail on closure planning works is provided in **Section 4.1.2**.

TABLE 4-1 MINE CLOSURE PLANNING STRATEGY STATUS UPDATE

#	Aspect	Description	Nominated Timing in MOP Amendment A	Status as at June 2022
Base Case: Final Land Use, Completion Criteria and Rehabilitation Objectives				
1	Final land use assessment	Undertake a final land use assessment, Final land uses are those approved in Austar's various consents, however may be refined prior to mine closure.	Q3, 2021	Consultant engaged to undertake final land use assessment.
2	Mine closure risk assessment	Undertake an Environmental Risk Assessment focused on mine closure preparedness and specifically risks to achieving the final land use, as described in **Section 3.2** NB the risk register will be reviewed following completion of the mine closure risk assessment	Completed	Initial risk assessment completed. Mid-term risk assessment completed.
3	Completion criteria and rehabilitation objectives	Refine the completion criteria and objectives in **Table 16** after final land uses confirmed.	Q3, 2021	Completion criteria will continue to be refined during the closure planning process.

#	Aspect	Description	Nominated Timing in MOP Amendment A	Status as at June 2022
4	Final landform design	Review the final landform designs to ensure it can sustain the nominated final land uses and meet the rehabilitation objectives.	Q4, 2022	Final landform design is dependent upon the findings of the initial mine closure planning studies listed below, in particular #5, 9, 10 and 11. Detailed final landform design will be progressed throughout closure planning to ensure that the final landform is fully informed.
		Prepare detailed slope and drainage designs for the final landform to ensure long-term stability.	Q4, 2022	
Knowledge Base: Gap analysis and initial mine closure planning studies				
5	Rehabilitation resources balance	Establish an inventory of materials available for capping and rehabilitation (in an appropriate spatial format),	End of February 2021	Completed.
		Characterise available materials to confirm suitability for rehabilitation.	Q4, 2022	• Phase 1: ○ Desktop assessment and site inspections completed. • Phase 2: ○ Site investigation plan being developed (volumes, characterisation). ○ Site investigation Sampling and Quality Plan (SAQP) finalised ○ Site investigations programmed commenced June 2022.
		In the case of a material deficit, develop a strategy to investigate and procure alternative sources of materials such as topsoils (and/or substitutes) and other rehabilitation materials such as clays, suitable weathered rock, hard rock, etc.	Q4, 2022	
		The material balance will be reviewed following confirmation of rejects and tailings capping designs prior to decommissioning.	Prior to decommissioning	
6	Historic heritage assessments	Undertake/review heritage assessments for known or potential historic heritage items at Austar Coal Mine to guide retention/demolition decisions	Q4, 2021	Completed.
		Consult with Cessnock City Council heritage advisors and or the NSW Heritage Office (if required) to confirm approach and to seek appropriate heritage approvals prior to demolishing heritage items.	Q4, 2021	Consultation with the Cessnock City Council Heritage officer undertaken 7 June 2022.
7	Derelict / redundant infrastructure decommissioning strategy	Prepare an infrastructure decommissioning strategy for progressive decommissioning of redundant, derelict or hazardous buildings,	Q4, 2021	Hazmat/demolition specialist engaged. Strategy under development. Hazardous Materials Survey completed in February 2022.

#	Aspect	Description	Nominated Timing in MOP Amendment A	Status as at June 2022
		structures, machinery, plant and equipment.		
		Consult with Cessnock City Council heritage advisors and or the NSW Heritage Office (if required) to confirm approach and to seek appropriate heritage approvals prior to demolishing heritage items.	Q4, 2021	Consultation ongoing.
8	Infrastructure retention strategy	Identify infrastructure that could be retained post closure (i.e. internal roads, access tracks, dams, buildings, services), subject to approval, to support the final land use or to retain heritage value.	Q4, 2021	Hazmat/demolition specialist engaged. Strategy under development.
9	Mine water dam decommissioning strategy	Prepare a preliminary strategy for decommissioning of redundant mine water dams.	Q4, 2022	• Phase 1: ○ Desktop assessment, site inspection and workshop completed. • Phase 2: ○ In progress.
		Prepare a strategy, in consultation with Dams Safety NSW, for decommissioning prescribed dams (i.e. Kalingo Dam).	Q4, 2022	
10	Tailings storage facilities and reject emplacement area decommissioning and capping strategy	Prepare strategy for progressive decommissioning of the tailings storage facilities and reject emplacement areas.	Q4, 2022	• Phase 1: ○ Desktop assessment completed. ○ Currently engaging additional specialist input (geochemistry, combustibility). ○ Independent auditor engaged. • Phase 2: ○ In progress.
		Review capping techniques,	Q4, 2022	
11	Water management	Review the existing groundwater information to consider aspects related to closure of the mine.	Q4, 2022	○ Stage 1 Knowledge Gap Assessment complete • Model Plan complete • Forward Works Program complete - monitoring network reviewed with recommendations for long term monitoring requirements
		Review the site water balance and any post closure water management requirements, including management of acid mine drainage.	Q4, 2022	• Phase 1: ○ Surface water desktop assessment and site inspection completed. • Phase 2: ○ Scope being prepared for detailed assessment.
		Review post closure water licensing requirements.	Q4, 2022	
12	Exploration borehole sealing	Undertake desktop and field surveys of borehole sealing status.	Q1, 2021	Completed.

#	Aspect	Description	Nominated Timing in MOP Amendment A	Status as at June 2022
		Prepare and commence implementation of the exploration borehole sealing strategy.	Q1, 2022	Audit and sealing complete. ESF2 applications were submitted for all but three holes, which are waiting on landholder signoff or access for final rehabilitation photos. Further historic boreholes drilled from the 1890's to the 1990s were identified during the audit, with desktop assessments and some site inspection completed in Q1 2022. A borehole sealing strategy will be developed during detailed closure planning.
13	Underground mine sealing	Prepare mine sealing designs for all shafts, portals and operational boreholes.	Prior to decommissioning	• Review of historic and current entries completed. • Specialist engaged; concept sealing designs completed. • Shafts 5 and 6 are capped pending determination of suitable material for backfilling. • No 4 shaft has been sealed to approximately 10m above the Greta Seam • Site geotechnical investigations are in progress.
14	Subsidence remediation works	Prepare a plan for post closure remediation of subsidence-related impacts to natural and built features,	As per approved Extraction Plan.	• Consultant engaged for a subsidence assessment: ○ ID and mapping. ○ Analysis and model development. ○ Monitoring and management.
15	Contaminated land assessments	Undertake a Phase 1 contaminated lands assessment focusing on surface infrastructure areas to identify any remediation requirements.	Q4, 2021	Desktop Assessment (Preliminary Site Investigation - PSI) completed.
		Undertake full Land Quality investigations and prepare a remediation action plan	Prior to mine closure – to be included in final mine closure plan	• Contamination auditor engaged. • Contamination sampling plan commenced development (SAQP). • Detailed site investigation is in progress.
16	Hazardous materials assessment	Undertake assessments of hazardous materials and chemicals and develop registers and management strategies.	Q4, 2021	Hazardous Material survey complete
17	Demolition waste disposal strategy	Identify volumes of waste streams and options to dispose on site or at licenced facilities.	Prior to decommissioning – to be included in final mine closure plan	Commenced.
		Develop strategy to segregate and manage waste streams on site during demolition.	Prior to decommissioning – to be included in	

#	Aspect	Description	Nominated Timing in MOP Amendment A	Status as at June 2022
			final mine closure plan	
18	Environmental Management Plans	Review/ update the environmental management to reflect mine closure activities.	Prior to mine closure – to be included in final mine closure plan	Commenced – initial revisions submitted to DPE. To be updated as required during closure planning and execution.
19	Post-closure Monitoring and Maintenance	Identify post-closure environmental monitoring requirements, including monitoring of rehabilitation, subsidence and water quality.	Prior to mine closure – to be included in final mine closure plan	Commenced – development of execution QA/QC and post closure monitoring is included in scope of all specialist studies.
		Identify post-closure maintenance requirements such as weed and feral animal control, bushfire management and maintenance of safety signage/fencing to control public access.	Prior to mine closure – to be included in final mine closure plan	Commenced – development of execution QA/QC and post closure monitoring is included in scope of all specialist studies.
20	Approvals and mining lease relinquishment strategy	Prepare an approvals and mining lease relinquishment strategy that considers the timing and process for relinquishing approvals following mine closure (e.g. EPL, Project Approval and MLs).	Prior to mine closure – to be included in final mine closure plan	Commenced.
21	Human resources strategy	Prepare a human resources strategy to identify opportunities to stage the release of employees and contractors and to support redeployment where appropriate.	Prior to mine closure – to be included in final mine closure plan	Completed.
22	Community management strategy	Prepare a community management strategy to minimise any adverse socio-economic effects of mine closure.	Q2, 2021	Integrated with Stakeholder Engagement Strategy.
23	Stakeholder engagement strategy	Prepare a stakeholder engagement strategy to guide communication and engagement during mine closure.	Q2, 2021	Completed.

4.1.2 Prefeasibility Technical Study Update

Austar is currently at the PFS stage of mine closure, undertaking technical studies and site investigations to address closure knowledge gaps as detailed in Table 4-1. The PFS is scheduled to be completed during the next reporting period and is generally on track as outlined above.

4.1.3 Detailed Site Investigations

As part of the PFS, Austar has commenced a detailed site investigation program to inform mine rehabilitation and closure. The activities involve shallow soil sampling, test pitting, surface water collections, drilling of boreholes and installation of contamination monitoring bores and groundwater monitoring wells to inform the detailed mine closure plan.

During the reporting period, Austar undertook significant work in the preparation for the site investigations including:

- Detailed site investigation risk assessment;
- Development of site investigation specific environmental controls and procedures;
- Completion of due diligence heritage and ecological assessments;
- Development of Site Investigation Sampling, Analysis and Quality Management Plan (SAQMP)for the site investigations program;
- Tendering and contractor engagement;
- Stakeholder engagement; and
- Completion of internal Ground Disturbance Permit (GDP) and Work Permits.

The detailed site investigation drilling program commenced in June 2022 and is scheduled for completion in the next reporting period. Approximately 306 locations are proposed across the site and surrounding locality and will inform many of closure's feasibility phase studies.

4.1.4 Early Works

A number of 'Early Works' are planned to progress decommissioning while the PFS is completed. Early works include:

- Decommissioning and removal of redundant mining equipment from the site;
- Partial/temporary mine sealing to minimise ongoing mine maintenance requirements prior to permanent sealing activities; and
- Decommissioning of redundant, non-heritage significant mining infrastructure at the Austar Pit Top and CHPP; and
- Possible importation of suitable rehabilitation earthworks materials (such as VENM, rock, and topsoil) from external sources (pending all appropriate approvals have been sought and are in place prior to importation).

Early works are discussed in more detail below and in **Section 4.3** where relevant.

4.1.4.1 Decommissioning Activities

Decommissioning activities have been progressed during the reporting period as follows:

Underground Decommissioning

Underground assets (including the longwall) have been brought to the surface for storage or sale. Development plant, pumps and other infrastructure have been progressively recovered during the reporting period.

Any assets to remain underground have been decommissioned appropriately (i.e. de-oiled, de-gassed, hydrocarbons removed), surveyed and recorded on a plan as part of the site records.

Power has been disconnected at the pit bottom and a reduction in water pumping is allowing the progressive flooding of areas of the underground during mine withdrawal.

Surface Decommissioning

Equipment has been recovered from surface and underground areas. No. 2 Shaft laydown area has been cleaned up and machinery transferred, stored or scrapped.

Decommissioning of equipment at the CHPP has also been progressed including the removal of conveyor belts, pumps and motors from the conveyor systems.

The ventilation fans at No. 5 Shaft were decommissioned on 17 March 2022.

4.1.4.2 Mine Sealing

In March 2022, the No. 5 and No. 6 Shafts at the Kitchener SIS were temporarily sealed. These shafts were sealed at the surface with 140 kPa rated engineered designed steel plates. Permanent sealing of these ventilation shafts will be planned as part of ongoing closure planning and scheduling.

Partial mine sealing is planned for early in the next reporting period at No. 3 and No. 4 Shafts at the Kalingo Infrastructure Area (KIA) and No. 1 Shaft. The Austar drift is also scheduled for sealing in the next reporting period Shaft (refer **Section 4.3**).

Works undertaken during the current reporting period to prepare for mine sealing have included:

- risk assessment;
- completion of due diligence assessments for ecology and heritage impact in accordance with the Austar GDP process;
- assessment of potential noise impacts;
- preparation of Environmental Procedures to manage specific potential impacts including noise, traffic and erosion and sediment controls; and
- stakeholder and near neighbour engagement.
- Underground services decommissioned at Kalingo Site Infrastructure Area – power cut, water isolated and cables removed from service boreholes.

4.1.4.3 Demolition

No demolition was undertaken in the reporting period; however, the following works occurred to prepare for demolition:

- Progression of demolition, HAZMAT and contamination studies;
- Update of the Austar Work Permit process to include assessment of impacts to structures within heritage curtilages;
- Commencement of Early Works Heritage Impact Assessment to accompany an application to relevant consent authority for the removal of non-heritage items at the Austar Pit Top and CHPP; and
- Preparation of demolition scope of works by specialist demolition company.

4.1.4.4 Importation of rehabilitation earthworks materials

Austar acknowledges that there is a potential deficit in suitable materials available for capping and rehabilitation activities at the site. As part of closure planning, Austar is carrying out investigations to review potential sources of fill/capping material both on and off site. The outcomes of these investigations will be reported in future Annual Reviews.

4.2 Mining Operations

4.2.1 Exploration

There were no exploration activities undertaken during the reporting period. An audit on the status of Austar's boreholes has been undertaken. Any boreholes identified as requiring remediation will be sealed in accordance with EDG 01 '*Borehole Sealing Requirements on Land*'.

An annual exploration report for Exploration Licence EL6598 is lodged yearly covering the period 13 July – 12 July. The report describes exploration activities carried out on or within EL6598 and was lodged with DPE on 11 August 2022.

4.2.2 Ventilation

As Austar transitions to closure, major changes to the ventilation system have been made in this reporting period.

The No.3 Upcast Shaft is currently ventilating the underground areas of the mine that have not been sealed off or intentionally flooded. The No.3 Upcast Shaft is planned to be decommissioned and partially sealed in Q3 2022, along with No.1 Shaft and the Pit Top Drift. The ventilation system will be decommissioned at this point. The ventilation quantity for the No.3 Upcast Shaft has varied over the reporting period but averaged 120 m^3s^{-1} with average gas concentrations of 0.11% CO_2 and 0.06% CH_4.

The No.5 Upcast Shaft was temporarily sealed in March 2022. Prior to sealing, it operated at (average) 120m^3s^{-1} with average gas concentrations of 0.06% CO_2 and 0.02% CH_4.

4.2.3 Production Summary

During the reporting period, no coal was mined or transported at Austar or processed at the Austar CHPP. No underground coal mining is planned in the future. When the closure planning phase is

finalised and closure execution activities commence, it is envisaged that material movements will recommence for the purposes of capping and rehabilitating disturbed areas.

During the reporting period operations were undertaken on day shift and afternoon shift during the week, day shift on the weekend, and weekday day shift only at the CHPP, with plans to transition to weekday day shift only. Security personnel are in attendance during non-operational periods.

4.2.4 Waste Management

Waste collected during the reporting period is summarised and compared to the previous reporting periods in **Table 4-2**.

TABLE 4-2 WASTE MANAGEMENT DATA (TONNES)

Year	Paper & Cardboard	Chemical Anchors	Oily Filters	Oily Water	Waste Oil	Timber	Medical & Sanitary	Oily Rags	Mixed Solid Waste	Scrap Metal	Printer Cartridges
2021-22	4.92	-	0.25	23.19	4.6	-	0.11	0.69	71.45	173.03	-
2020-21	3.7	0.09	0.14	4.53	13.44	0.46	0.14	0.17	116.33	289.63	-
2019-20	6.39	1.2	1.05	73.5	24.5	0.62	0.17	0.24	274.36	217.62	0.06
2018-19	7.88	1.35	0.97	32.25	28.8	-	0.2	0.18	249.75	166.89	0.17

Waste generation was generally consistent with previous reporting periods. Scrap metal generation declined approximately 40% following a focus on removing scrap in the 2020-21 reporting period while mixed solid waste continues to decline as Austar transitions to closure.

Waste contractors undertake regular inspections of waste bins, oil storage areas and spill kits and report any issues to Austar staff. If cross-contamination is an ongoing issue, or a waste improvement opportunity is identified, employees and contractors can be educated through toolbox talks and inductions.

Effective waste management will remain a focus throughout closure execution at Austar.

4.3 Planned Activities Next Reporting Period

Activities in the next reporting period will be as detailed in the *Austar Coal Mine Forward Program - Friday 1 July 2022 to Monday 30 June 2025* (Forward Program) prepared in accordance with the requirements of the Mining Amendment (refer **Section 3.1**). Activities will be associated with continued rehabilitation and closure planning, and early works including partial mine sealing, decommissioning and equipment recovery as follows.

4.3.1 Prefeasibility Technical Study

During the next reporting period, the PFS technical studies and site investigations listed in **Section 4.1** will continue to progress to address knowledge gaps and inform the mine closure process. The PFS is anticipated to be completed around August 2023.

4.3.2 Early Works

4.3.2.1 Decommissioning

Progressive decommissioning of redundant infrastructure will continue in the next reporting period at the No. 1 and No. 3 Shafts, the Austar Pit Top, the CHPP and the Kitchener SIS. Activities will include the disconnection and recovery of electrical and mechanical infrastructure such as fans, pumps where no longer required, compressors, services (phone, fibre etc), gearboxes, motors and tanks etc.

Following decommissioning works, the decommissioned infrastructure will be ready for demolition.

4.3.2.2 Mine Sealing

Partial mine sealing is planned for early in the next reporting period at No. 3 Shaft at the Kalingo Infrastructure Area (KIA) and No. 1 Shaft near the Austar Pit Top.

Partial mine sealing will include the following activities:

- Removal of services infrastructure (cables, pipelines) from KIA services boreholes; Installation of lightning protection above steel-lined shafts and boreholes;
- Constructing seal at the base of No 3 and No 1 shaft with rubble and concrete; and
- Capping shafts with temporary steel caps.

The Austar drift will be permanently sealed in the next reporting period from the surface to a depth with 15m competent rock cover using grout in accordance with MDG6001. The final surface caps for all shafts and the drift will not be placed until after the final landform has been completed.

Services boreholes at the KIA will be permanently sealed in accordance with EDG01.

4.3.3 Rehabilitation Maintenance and Monitoring

Rehabilitation monitoring and maintenance, and land management activities including weed management, maintenance of firebreaks, remediation of damage caused by trespassers, and dam desilting will continue as required.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

DPE reviewed the 2021-2022 Annual Review and 'considers it to satisfy the reporting requirements of the approval, the consent, and the Department's *Annual Review Guideline* (October 2015)'. No actions were requested by DPE in their response dated 22 October 2021. Resources Regulator noted receipt of the 2020-2021 Annual Review on 30 September 2021.

Actions committed to by Austar in the 2020-2021 Annual Review are provided in **Table 5-1**.

TABLE 5-1 ACTIONS REQUIRED FROM PREVIOUS REVIEW

Action Required from Previous Annual Review	Requested by	Status	Action taken by Austar
Progress the closure planning actions in accordance with MOP Amendment A	2020-2021 Annual Review / MOP	Progressing	Austar has put significant resources into progressing closure planning actions as outlined in **Section 4**
Implement the recommendations from the Independent Environmental Audit (IEA)	DA 29/95 & PA 08_0111	Progressing	Details of progressing actions from the IEA are summarised in Table 10-1 in **Section 10**.
Continue to review and if necessary, update approved management plans to reflect the transition to closure	2020-2021 Annual Review	Completed	All necessary management plans were updated and lodged with the relevant departments for review and approval during the reporting period as detailed in **Section 3.3.3**.
Enact the recommendations in the Rehabilitation Monitoring Report	2020-2021 Annual Review	Progressing	Weed management has continued during the reporting period as detailed in **Section 6.5** and **Section 8.4**.
Close outstanding actions from Extraction Plans	2020-2021 Annual Review	Progressing	An audit of all actions required to close out the Extraction plans was finalised during the reporting period. While most of the actions have been finalised, there are approximately 25 actions over the three extraction plans to finalise.

6 ENVIRONMENTAL PERFORMANCE

6.1 Environmental Performance Summary

Table 6-1 outlines the key environmental performance or management aspects encountered at Austar and details how they have been addressed, as well as the implementation of any management measures from the reporting period and proposed improvements for the following years.

Where practical, environmental management of the key environmental aspects managed at Austar have been discussed in **Table 6-1**. Where tabulating the information is not practical, further detail is included in the following sections of this report.

TABLE 6-1 ENVIRONMENTAL PERFORMANCE SUMMARY

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
Air Quality (**Section 6.3**)	Refer **Section 6.3** for detail on approval criteria and background levels.	Compliant with DA 29/95 and PA 08_0111. One non-compliance against the Air Quality and Greenhouse Gas Management Plan was recorded, with further information in Section 11.	Austar was compliant with the relevant criteria and monitoring results were generally consistent with previous years.	Air Quality will continue to be managed in accordance with the AQGHGMP.
Biodiversity	Biodiversity monitoring has been undertaken in accordance with the relevant Extraction Plans. Stage 3 Biodiversity Management Plan states that monitoring will continue for two years after subsidence monitoring reveals there is no longer significant ground movement. The Biodiversity Management Plan LWB4-B7 states that monitoring will continue for 12 months after the cessation of mining once subsidence	Compliant with DA 29/95 and PA 08_0111. Minor clearing undertaken (0.05ha) to maintain and repair pipelines. Inspections by appropriately qualified ecologist were undertaken, along with a five-part test to determine impacts.	Mining was completed in the Stage 3 Area in June 2015, with monitoring continuing post mining for approximately 5 years. As there is no further significant ground movement, and there have been no identified impacts over this time, monitoring ceased in 2020. Likewise, monitoring was finalised in the LWB4 – LWB7 area in September 2020. The final report states 'to date, there is no evidence of any impacts on ecological features as a result of longwall mining'.	No monitoring is currently required.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
	monitoring reveals no further significant ground movement.			
Vibration and Blasting	There are no operational vibration criteria provided in DA29/95 or PA08_0111. While vibration generating activities (underground mining and construction at Kitchener SIS) were occurring, vibration was compared to published data on human response and structural damage.	As Austar is in closure, no vibration or blast monitoring is currently required. There are no proposed surface closure and rehabilitation activities planned at this stage that have the potential to cause vibration impacts. Should blasting be determined to be necessary in the future for closure execution activities, the Noise and Vibration Management Plan (NVMP) will be updated to include monitoring requirements.	No vibration events were recorded during the reporting period as a result of mining. Vibration monitors were removed from service on 18 June 2021.	Vibration and blast monitoring at Austar Coal Mine ceased 18 June 2021 in accordance with the approved NVMP.
Noise (**Section 6.4**)	Refer **Section 6.4** for detail on approval criteria.	There were no exceedances of relevant noise criteria at the CHPP, Kitchener SIS or Kalingo Infrastructure Area during the reporting period.	There has been a period of minimal noise impact since March 2020, however Austar is aware that decommissioning activities (particularly in remote infrastructure areas) may have short term impacts on nearby neighbours.	Noise monitoring and management will continue in accordance with the NVMP. Austar will continue to consider noise impacts of specific closure execution activities on nearby neighbours and implement noise controls as applicable.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
Aboriginal Cultural Heritage	The Aboriginal Cultural Heritage Management Plan (ACHMP) provides a consolidated framework and process for managing Aboriginal cultural heritage responsibilities at Austar.	During the reporting period, Austar completed Aboriginal cultural heritage due diligence surveys for several projects including the site investigation, pipeline repair, vibrating wire piezometer installation and mine sealing.	Aboriginal artefacts were not discovered during the surveys except for one location for the site investigation being MB06. Here, a pink silcrete broken flake associated with a recorded scatter AHIMS site #37-6-3075 was identified. To avoid impacts to AHIMS site #37-6-3075 the borehole location and its access were relocated. There were no incidents or complaints regarding cultural heritage during this period.	Continue to assess and undertake operations in accordance with the ACHMP.
Mine Subsidence	All recorded subsidence in Stage 3 and Bellbird South areas were within predicted subsidence documented in the relevant extraction plan subsidence management plans.	Compliant with DA 29/95 and PA 08_0111. In accordance with the LWB4-LWB7 Subsidence Monitoring Program, a final subsidence survey was undertaken in February 2021. Results analysed by Mine Subsidence Engineering Consultants (MSEC) concluded that ground monitoring could be ceased as	Subsidence has been deemed to be substantially complete. There were no subsidence-related mitigation measures undertaken during the reporting period. A number of sink holes were repaired in historically mined areas around Area 12 and 13 during the reporting period. These sink holes are repaired and	No further subsidence monitoring is required under the SMP.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
		the ongoing subsidence effects are expected to be very small and similar to the order of natural ground movements and survey tolerance.	managed predominantly by Subsidence Advisory with assistance provided by Austar as required.	
Water – Surface Water (**Section 7.3**)	Refer **Section 7.3** for detail on approval criteria and background levels.	There were no discharges from LDPs SW1 or SW6 during the reporting period. Water quality monitoring results for the reporting period were within historic ranges at upstream and downstream locations. Three unlicensed discharge events were recorded at the Kitchener SIS on 19 and 23 February, and 4 March 2022. Details of these incidents are presented in Section 7.3.4 and Section 11.	Monitoring of the Investigation Drainage Line at the CHPP continued in accordance with the EPL PRP. Surface water quality trends indicate no adverse mining impacts on the water quality of Quorrobolong and Cony Creeks. There have been no community complaints made to Austar in relation to water quality during the reporting period. No TARPs under the SWMP were triggered.	Surface water monitoring and management will continue in accordance with the SWMP.
Water – Groundwater (**Section 7.4**)	Refer **Section 7.4** for detail on approval criteria and background levels.	Compliant with DA 29/95 and PA 08_0111.	The predictions in groundwater impact assessments from the DA 29/95 MOD6 EA, and the DA 29/95 MOD7 EA have, in general, been validated by measurements.	Groundwater monitoring and management will continue in accordance with the SWMP.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
Erosion and Sediment Control	PA 08_0111 requires an Erosion and Sediment Control Plan as part of the SWMP.	Three unlicensed discharge events from sedimentation dams were reported during the reporting period. Results showed that the suspended solids were comparable in upstream and downstream and dam samples, indicating that the erosion and sediment control was adequate.	Erosion and sediment control is undertaken according to the SWMP. A range of erosion and sediment control measures have been implemented across the mining complex with the aim of preventing soil erosion and the entry of sediments into surrounding water bodies. Monthly environmental inspections are undertaken to monitor the sediment control structures for capacity, structural integrity and effectiveness.	Erosion and sediment controls will continue to be managed in accordance with the SWMP.
Hydrocarbon management	Not applicable.	There were no reportable incidents in relation to hydrocarbon management during the reporting period. The hydrocarbon remediation area was managed to ensure no contamination to nearby areas. Spill kits in all hydrocarbon storage areas are monitored regularly by the waste	Hydrocarbon management systems are designed and installed generally in accordance with Australian Standards and EPA guidelines. Austar operates a hydrocarbon remediation area at the CHPP to manage hydrocarbon contaminated material recovered from the site. The area is signposted and has three bunded cells for	Hydrocarbon management will continue to be undertaken in accordance with internal procedures and general good management practices.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
		contractor and replenished as necessary. Bunded hydrocarbon storage areas are also monitored weekly by the waste contractor and pump out is scheduled as required.	segregation of materials of different ages and source locations. The bunded area was constructed on a disused laydown area and is within the sites mine water catchment. Contaminated materials are periodically turned to allow an adequate supply of oxygen to microbes that use the contaminants as a source of food and energy.	

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
Weed and Feral Animal Management and Control (refer to **Section 6.5**)	Not applicable.	A Weed Action Plan is being executed across Austar lands which implements weed control operations in a systematic manner. The primary targeted weeds which were controlled during the reporting period included Lantana, Mother of Millions and Green Cestrum. Details of weed management are discussed in **Section 6.9**.	Weed infestations are managed according to the Weed Action Plan. During the next reporting period, weeds will continue to be monitored in monthly inspections and controlled as per the Weed Action Plan recommendations. Signs of feral animal infestations are monitored for during monthly inspections. Ad hoc sightings of feral animals are also reported by operational personnel. Feral animal management is undertaken on an as needs basis.	Weeds and feral animals will be treated according to good land management practices and the Weed Action Plan.
Visual Amenity and Lighting	Reject emplacement areas will be constructed to minimise visual impacts upon residents in the vicinity and from roads. Emplacement areas may include bunds and buffer zones to minimise visual impact.	There were no community complaints or non-compliances related to visual impacts or lighting during the reporting period. Unnecessary lighting is turned off as parts of the mine are non-operational at night.	Visual impacts and lighting will continue to be managed according to the EMS, guidelines and internal procedures as appropriate. Most closure work is conducted in daytime only hours.	Visual Amenity and Lighting will continue to be managed consistent with current good practice and commitments made in relevant EIS's.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
	Screening will be used as required. Lighting will be positioned to shine into the Kitchener SIS and light shields will be used where practical.			
European Heritage	Austar implements a Historic Heritage Management Plan (HHMP). The HHMP was updated in April 2021 to reflect the care and maintenance status of Austar and was approved by DPE on 30 June 2021. The HHMP addresses the historical heritage management requirements associated with the Stage 3 Project and other procedural requirements of PA 08_0111 in relation to specified heritage matters outside the project area.	Austar has several buildings, remnant structures and features located within heritage curtilages listed on the Cessnock Local Environment Plan (LEP). Austar is in the process of completing a historic heritage assessment for known heritage items as part of detailed closure planning. The outcomes of this assessment will inform Austar's position on the proposed fate of heritage items post-closure. This assessment will be finalised during the next reporting period.	Cessnock Council must approve a development application to modify any heritage-listed building or structure at Austar. Austar requires development consent to demolish any building or structure within a heritage curtilage. Austar will consult with Cessnock City Council regarding the findings of the Heritage assessment and seek appropriate heritage approvals prior to demolition (if applicable).	Management of historic heritage items will comply with the obligations of the relevant approvals and recommendations received from Cessnock City Council will be considered.

Aspect	Approval Criteria / EIS Prediction	Performance During the Reporting Period	Trend / Key Management Implications	Implemented / Proposed Management Actions
Spontaneous Combustion	Monitoring and response procedures will be used to minimise spontaneous combustion issues.	There were no spontaneous combustion events during the reporting period.	Spontaneous combustion is managed through the reject haulage and emplacement area procedure and routine inspections. Reject emplacement areas continue to be monitored and managed during closure. The ROM and clean coal stockpiles have been cleared and remain empty.	Monitoring for outbreaks of spontaneous combustion will continue and outbreaks will be responded to as required.
Bushfire	Maintain Asset Protection Zones (APZs) and Strategic Fire Advantage Zones (SFAZs) in accordance with Bushfire Management Plan.	Austar continued to monitor and maintain access tracks, APZs and SFAZs around its key operations. Slashing of APZs is undertaken on a routine basis.	Austar continues to maintain the area around its operations, including pit top facilities, CHPP, remote infrastructure areas and emplacement areas.	Austar will continue to implement the actions identified in the Bushfire Management Plan.

6.2 Meteorological Data

In accordance with DA 29/95, PA 08_0111 and EPL 416, Austar operates and maintains a meteorological station located at the CHPP.

Table 6-2 summarises the meteorological data for the 2021-2022 reporting period.

TABLE 6-2 WEATHER SUMMARY 2021-2022

Month	Rainfall (mm)	Rain days (>0.2mm)	Maximum temperature (°C)	Minimum Temperature (°C)	Mean wind speed (m/s)	Max wind speed (m/s)	Dominant wind direction
Jul	22.0	9	23.4	-0.6	1.45	10.69	SW
Aug	72.4	7	25.2	0.9	1.42	12.28	SW
Sep	11.0	5	29.5	2.4	1.54	13.75	SW
Oct	82.4	11	32.3	6.4	1.52	11.89	SW
Nov	224.0	15	28.2	7.6	1.49	8.53	SW
Dec	53.2	11	34.9	11.5	1.52	6.67	SW
Jan	88.6	10	32.5	13.6	1.45	6.83	E
Feb	240.0	22	34.5	12.5	1.39	8.83	SW
Mar	292.0	19	28.4	13.3	1.42	6.67	SW
Apr	105.0	14	27.8	9.1	1.26	8.89	SW
May	77.4	13	24.4	3.3	1.24	8.72	SW
Jun	10.4	4	19.5	0.9	1.38	7.83	SW
Total	**1,278.4**	**140**	**28.3[1]**	**6.7[1]**	**1.42[1]**	**9.30[1]**	**SW**

Note 1: Average value.

The total monthly rainfall, number of rain days and cumulative rainfall during the reporting period is shown in **Table 6-2** and **Figure 6-1**. An annual wind rose is provided in **Figure 6-2.**

A total rainfall of 1278 mm was recorded during the 2021-2022 reporting period. This represents an increase of 188 mm from the previous reporting period and is approximately 75% greater than the annual average rainfall for the Cessnock area (729.4mm) (Bureau of Meteorology Cessnock Airport AWS 1968 - 2020). Eight months reported rainfall above their long-term average being January, February, March, April, May, August, October, and November. March recorded the highest rainfall of any month in the reporting period being 292 mm.

Predominant winds were from the southwest for every month of the reporting period except for January which was from the east.

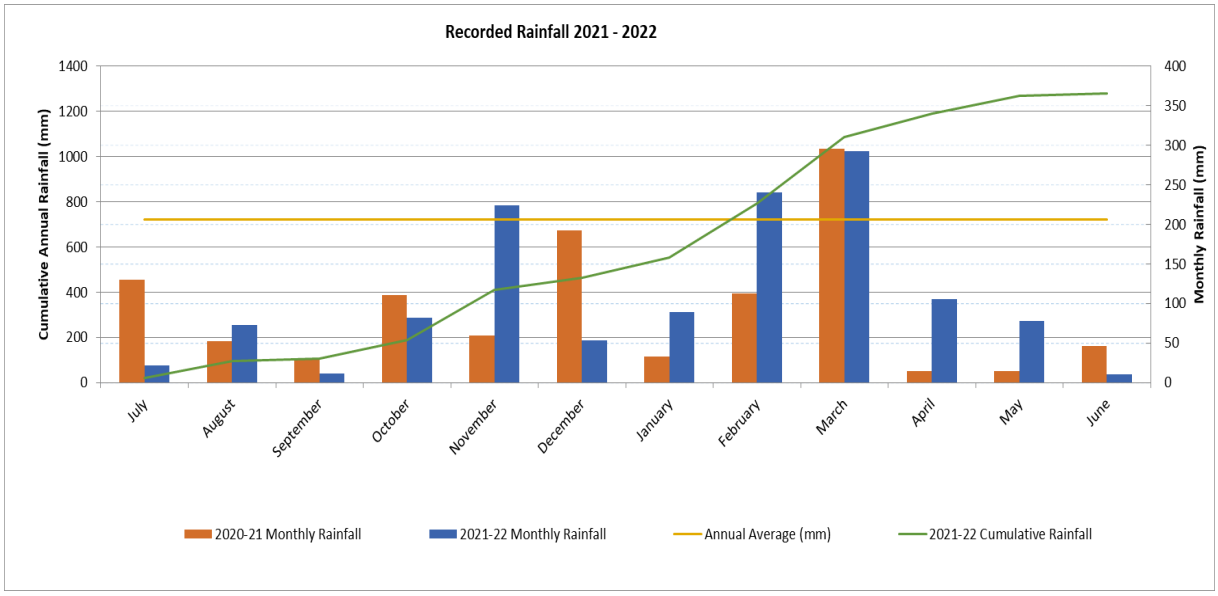


FIGURE 6-1 RECORDED RAINFALL (MM) AT AUSTAR METEOROLOGICAL STATION 2021-2022

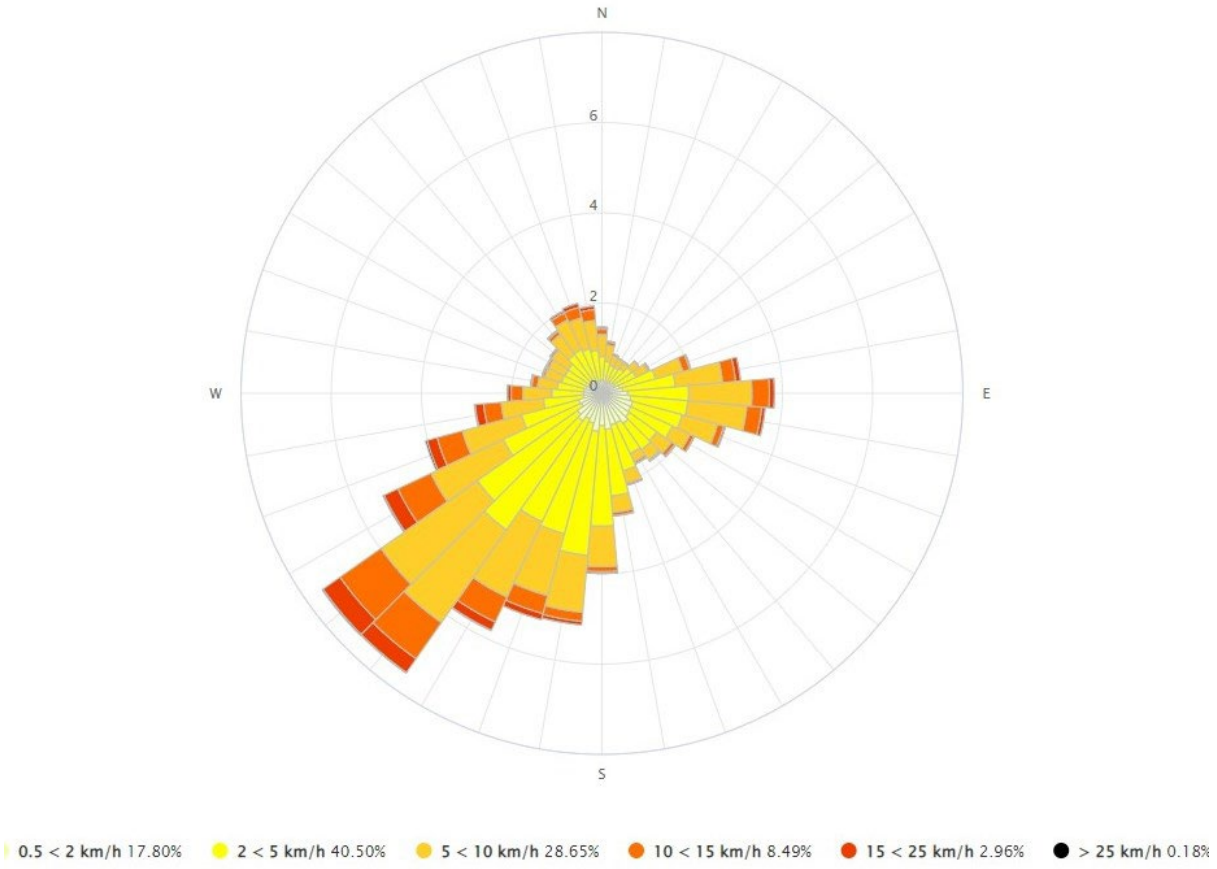


FIGURE 6-2 ANNUAL AVERAGE WIND ROSE 2021-2022

6.3 Air Quality

6.3.1 Environmental Management

Austar implements an Air Quality and Greenhouse Gas Management Plan (AQGHGMP) to meet the requirements of PA 08_0111, DA 29/95 and EPL 416. The AQGHGMP was approved by DPE on 26 October 2021.

Dust generated from traffic around the CHPP, Pit Top, workshop areas, access roads and reject emplacement areas is generally controlled by water cart where required.

The ROM and clean coal stockpile areas have been cleared and the surface compacted to prevent wind and water erosion. Water carts and water sprays will continue to be utilised during closure activities to minimise dust on roads and stockpile areas where required. It has been observed that the stockpile areas seem to have a crust, and visible dust generation is rare.

The AQGHGMP monitoring program utilises eight depositional dust gauges (DDG), three high volume air samplers (HVAS) and one Tapered Element Oscillating Microbalance (TEOM) continuous dust monitor. The HVAS and TEOM measure for particulate matter less than 10 micrometres (10µm), more commonly referred to as PM_{10}. Total Suspended Particulates (TSP) are not directly measured and are calculated per the methodology outlined in the AQGHGMP.

The location of Austar's air quality monitoring equipment is listed in **Table 6-3** and shown in **Figure 6-3**.

TABLE 6-3 LOCATION OF AIR QUALITY MONITORING POINTS

ID	Location	Monitoring Equipment
D1	Pyne Way, Mount View	DDG, HVAS
D2	Ellalong Road, Pelton Village	DDG, HVAS
D3	Bimbadeen Road, Mount View	DDG
D4	Ellalong Village	DDG
D5	South of No 3 shaft upcast ventilation shaft	DDG
D6	Bimbadeen Road, Mount View	TEOM
D7	Pelton Fire Trail, Quorrobolong	DDG
D8	Coney Creek Lane, Quorrobolong	DDG, HVAS
D9	Kitchener Public School*	DDG
Met Station	CHPP site, Pelton	Meteorological Station

** D9 was relocated from privately owned land to Kitchener Public School on 20 September 2021*

338000 339000 340000 341000 342000 343000 344000 345000 346000 347000 348000 349000

6363000 6362000 6361000 6360000 6359000 6358000 6357000 6356000

D6 SW4 NM C3 D3 SW1 D1 NM C1 SW2 SW6 SW5 NM C2 D2 D9 NM K3 NM K2 NM K1 D7 D8 MB01 NM K4 MB02 D5 WBH1 WBH2 WBH3 AQD1073A SW C1 D4 SW Q2 NER 1010 SW Q3 MB04 MB03A SW Q1

MLA521 MLA521

BELLBIRD CREEK BLACK CREEK SOW CREEK SANDY CREEK QUORROBOLONG CREEK QUORROBOLONG CREEK

WERAKATA NATIONAL PARK

WERAKATA STATE CONSERVATION AREA

LWA7 LWA8 LWA9 LWA10 LWA11 LWA12 LWA13 LWA14 LWA15 LWA16 LWA17 LWA18 LWA19 LWB6 LWB5 LWB4 LWB3 LWB2

LEGEND

- Project Approval Boundary
- Colliery Holding Boundary
- Mining Lease Application Boundary
- Relevant Mining Titles
- Mine Plan
- Surrounding Mines
- Creek Lines
- Water Pipeline - Potable
- Bellbird Pipeline 1 and 2
- Water Pipeline
- Austar Coal Mine - Austar Owned Land

Monitoring Locations

- Attended Noise Monitoring
- Dust Gauge
- Dust Gauge and HVAS
- Continuous Dust Monitor (TEOM)
- Creek Monitoring
- Ground Water Monitor
- Surface Water Monitoring
- Meteorological Station

0 240 480 720 960 m

Scale: 1:30,000

GDA 1994 MGA Zone 56

21/09/2022

I:\01_Clients_GIS\YAN - Yancoal\YAN01-016 Austar Annual Review (2022)\YAN01_016_Fig6_3_NetworkMonitoring_02.mxd_04

INTEGRATED ENVIRONMENTAL MANAGEMENT AUSTRALIA www.iema.com.au

Sheet Size : A3

Austar Coal Mine

Environmental Monitoring Network

FIGURE 6-3

6.3.2 Environmental Performance

During the reporting period, all dust samples were collected by trained technicians and analysed by NATA-certified laboratories. Sampling is carried out in accordance with statutory requirements and relevant standards. Monitoring equipment is maintained in accordance with the manufacturer's specifications by qualified specialists. Dust deposition results and PM_{10} monitoring data for the reporting period is provided below, followed by a summary of exceedances and a commentary on results.

6.3.2.1 Dust Deposition

Table 6-4 provides a summary of Austar's deposited dust gauge annual average results for insoluble solids during the reporting period, previous reporting periods and against assessment criteria and environmental assessment predictions.

Depositional dust results during the reporting period were all below the annual average criteria of 4 g/m^2/month for insoluble solids. D2, D4, D8 and D9 had marginally higher annual averages than the 2020-2021 reporting period with the largest increase of 0.3 g/m^2/month at D8 as shown in **Table 6-4**.

TABLE 6-4 DUST GAUGES ANNUAL AVERAGE COMPARED TO PREDICTIONS AND RESULTS OF PREVIOUS YEARS

ID	Location	EA Prediction Background Levels – Annual Average (g/m^2/month)	Assessment Criteria	Annual Average Total Insoluble Solids (g/m^2/month)					Change in Deposited Dust 2020-2021 to 2021-2022 Period (g/m^2/month)
				2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	
D1	Mount View	0.2 – 2.7*	4 g/m^2 /month (maximum total deposited dust)	0.9	1.2	1.4	0.9	0.6	-0.3
D2	Pelton	0.2 – 2.7*		1.1	1.5	1.9	0.9	1.1	+0.2
D3	Mount View	0.2 – 2.7*		0.7	0.8	1.3	0.6	0.5	-0.1
D4	Ellalong	n/a		1.6	1.4	1.6	1.8	2.0	+0.2
D5	Kalingo Infrastructure Area	n/a	2 g/m^2 /month (maximum annual increase in deposited dust)	0.7	1.8	1.3	1.2	1.0	-0.2
D7	Quorrobolong	1.5 – 1.65^		1.2	1.1	1.3	0.8	0.6	-0.2
D8	Quorrobolong	1.5 – 1.63^		0.9	0.7	1.4	0.6	0.9	+0.3
D9**	Kitchener Public School	n/a		1.3	0.9	1.7	0.8	0.9	+0.1

Note: *Deposited Dust is assessed as insoluble solids as defined by Standards Australia, 2003 AS3580.10.1 -2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulates – Deposited Matter – Gravimetric Method.*

** Bellbird South EIS (1995)*

*** D9 was moved from Kitchener Village to Kitchener Public School on 20 September 2021.*

^ Proposed Stage 3 Extension Environmental Assessment (Appendix 17) (Umwelt, October 2008)

Dust results for the reporting period are consistent with 1995 Environmental Impact Statement (EIS) predictions. Section 4.7.2 of the 1995 EIS states that historical dust depositional data since 1991 ranges between 0.2 to 2.7 g/m^2/month.

There were nine instances (five at D4 and one each at D2, D3, D8, and D9) where the monthly dust deposition gauges were contaminated with bird droppings, insects or vegetative matter, and these results were excluded from the annual average calculation.

Dust results could not be collected from D9 starting July 2021 due to the landowner denying access to the land resulting in a non-compliance. To address this, Austar relocated D9 to the Kitchener Public School on 20 September 2021. Further details of this non-compliance are detailed in **Section 11**.

6.3.2.2 Total Suspended Particulates

The annual average total suspended particulates (TSP) results for the reporting period are provided in **Table 6-5**.

TABLE 6-5 TSP HVAS AND TEOM RESULT ANNUAL AVERAGES FOR CURRENT AND PREVIOUS YEARS

ID	Location	Annual Average TSP (µg/m^3)							
		Assessment Criteria	EA Prediction	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
TEOM	Bimbadeen Road, Mount View	90	n/a	25.3	28.5	33.4	56.0	30.8	28.2
HVAS 1	Pyne Way, Mount View		n/a	28.0	32.0	42.8	62.8	20.1	22.6
HVAS 2	Ellalong Road, Pelton Village		n/a	30.0	39.4	47.7	62.0	20.2	23.1
HVAS 3	Coney Creek Lane, Quorrobolong		32.5	24.5	29.5	39.0	53.8	18.6	19.3

The calculated TSP for the reporting period at all monitoring locations is below the annual average criterion of 90µg/m^3. The TSP is calculated by multiplying the PM_{10} result by 2.5 in accordance with the method outlined in the AQGHGMP.

6.3.2.3 Particulate Matter - PM_{10} Results

The HVAS units operated on a six-day cycle during the reporting period with the exception of:

- HVAS1 had water damage on 16 April 2022 and a make-up run was completed on 5 May 2022.
- HVAS2 had a flow issue on 30 October 2021 with a makeup run completed on 8 November 2021. There was an additional flow rate issue on 28 January 2022 with a make-up run completed on 10 February 2022.

- HVAS3 had a hole in the paper on 23 November 2021 and a makeup run was completed on 25 November 2021. HVAS3 ran for a duration less than the required period on 23 March 2022 with a make-up run completed on 24 March 2022.

The annual average PM_{10} and TSP results, as well as 24-hour maximum PM_{10}, for the reporting period are shown in **Table 6-6.**

A TEOM monitor which measures PM_{10} on a real-time continuous basis is located at monitoring site D6 to the northeast of the CHPP. 24 hour maximum results since 1 July 2017 and graphical representation of the 24 hour and annual rolling average PM_{10} results are provided in **Figure 6-4**, **Table 6-6** and **Table 6-7**.

The annual average PM_{10} result for the 2021-2022 reporting period as recorded by the TEOM was 11.3 µg/m^3, well below the PM_{10} Annual Average Criterion of 30 µg/m^3.

TSP and PM_{10} results for the HVAS units were also below the annual average criteria at all monitoring locations.

There were no exceedances of the 24-hour short term impact assessment criteria recorded during the reporting period.

Annual average PM_{10} results are lower than the previous reporting period for all monitoring locations, as shown in **Table 6-7**. This may be attributable to rainfall above the long-term average during the reporting as well as local and regional bushfires during the 2019-2020 reporting period contributing to elevated PM_{10} concentrations. All results remain below the PM_{10} annual average criterion of 30 µg/m^3.

TABLE 6-6 AIR QUALITY CRITERIA FOR PARTICULATE MATTER

Description	Pollutant	Averaging Period	Monitor	Criterion (µg/m³)	Result 2020-2021 (µg/m³)	Result 2021-2022 (µg/m³)
Long Term Impact Assessment Criteria for Particulate Matter	Total Suspended Particulate (TSP) matter	Annual Average	TEOM	90	30.8	28.2
			HVAS1		27.0	22.6
			HVAS2		25.0	22.9
			HVAS3		23.0	19.3
	Particulate Matter <10µm (PM_{10})	Annual Average	TEOM	30	12.3	11.3
			HVAS1		10.8	9.0
			HVAS2		10.0	9.2
			HVAS3		9.2	7.7
Short Term Impact Assessment Criterion for Particulate Matter	Particulate Matter <10µm (PM_{10})	24-hour Maximum	TEOM	50	39.5	29.9
			HVAS1		32.0	40.5
			HVAS2		28.0	24.7
			HVAS3		30.0	21.3

Note: *Methods for sampling and analysis of ambient air as defined by Standards Australia, AS 3580.9.6 -2003: Determination of suspended particulate matter—PM_{10} high volume sampler with size selective inlet—Gravimetric method.*

TABLE 6-7 PM_{10} HVAS AND TEOM ANNUAL AVERAGES FOR CURRENT AND PREVIOUS YEARS

ID	Location	Annual Average PM_{10} (µg/m³)						
		EA Prediction	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
TEOM	Bimbadeen Road, Mount View	n/a	10.1	11.4	13.4	22.4	12.3	11.3
HVAS1	Pyne Way, Mount View	n/a	11.2	12.8	17.1	25.1	10.8	9.0
HVAS2	Ellalong Road, Pelton Village	n/a	12.0	15.8	19.1	24.8	10.0	9.2
HVAS3	Coney Creek Lane, Quorrobolong	42.07	9.8	11.8	15.6	21.5	9.2	7.7

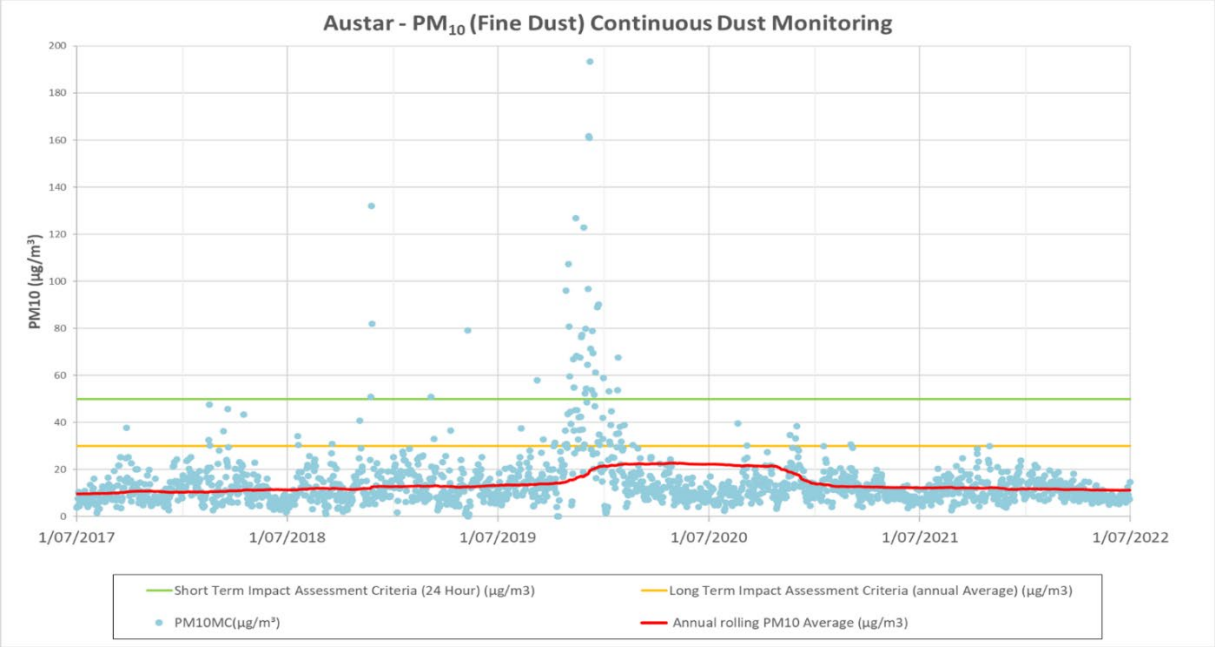


FIGURE 6-4 AUSTAR TEOM PM_{10} CONTINUOUS DUST MONITORING 2017-2022

6.4 Noise

6.4.1 Environmental Management

Austar implements a NVMP prepared in accordance with PA 08_0111, DA 29/95 and EPL 416. The NVMP was updated in June 2018 and approved by DPE on 1 August 2018.

Operational noise impacts are potentially greatest at night when background levels are typically low and the allowable levels are correspondingly low, and this is the period when noise propagation enhancement is most likely. Attended noise monitoring is conducted at night, in accordance with the NVMP.

Periodic noise monitoring is conducted monthly and reported quarterly in accordance with the NVMP by an independent noise consultant. There are seven key monitoring locations representative of surrounding receivers. Monitoring points have been selected as reference locations and form the basis for assessing and evaluating noise emissions from the operation. The locations are listed in **Table 6-8** and presented in **Figure 6-3.** Noise impact assessment criteria for each location are also presented in **Table 6-8**.

CHPP Noise Pollution Reduction Program

Austar has been undertaking a voluntary noise Pollution Reduction Program (PRP) in consultation with the EPA for many years. During previous reporting periods, further sound power testing was undertaken on-site at the CHPP, following recommendations of the sound power review. A noise control options analysis was completed and the CHPP noise model updated. Austar transitioned to

closure before the model could be validated. Therefore the PRP did not progress during the current reporting period.

TABLE 6-8 NOISE IMPACT ASSESSMENT CRITERIA AND GOALS

Receiver	Location	Receiver Description	Criteria/Goal
Nearest Potentially Affected Receivers to CHPP (EPL 416)			
C1	South of Bimbadeen Road, Mt View	West of CHPP	L_{A90} 40 dB
C2	Pelton Village	Southeast of CHPP	L_{A90} 43 dB
C3	Bimbadeen Road, Mt View	North-west of CHPP	L_{A90} 37 dB
Nearest Potentially Affected Receivers to Kitchener Surface Infrastructure Site (PA 08_0111)			
K1	Pelton Road, Quorrobolong	South of SIS	L_{Aeq} 35 dB / L_{A1} 45 dB
K2	Coney Creek Lane, Quorrobolong	East of SIS	L_{Aeq} 35 dB / L_{A1} 45 dB
K3	Richmond Street, Kitchener	North of SIS	L_{Aeq} 35 dB / L_{A1} 45 dB
Nearest Potentially Affected Receivers to Kalingo Infrastructure Area (DA 29/95)			
K4	Nash Lane, Quorrobolong	East of Kalingo Infrastructure Area	L_{Aeq} 35 dB

6.4.2 Environmental Performance

A summary of results from attended noise monitoring undertaken during the 2021-2022 reporting period is provided in **Table 6-9, Table 6-10** and **Table 6-11**. All monitoring results were within compliance criteria during the reporting period.

Since the transition to care and maintenance and closure, the noise monitoring program has continued unchanged and in accordance with the NVMP and EPL Noise PRP requirements.

Noise sources have reduced since mining ceased with the mine coal conveyor system including coal bins and conveyors decommissioned. The CHPP raw and clean coal systems, trains and loading infrastructure, stockpile dozers and reject trucks are also not operational. Works during afternoon and night shift were minimal during the reporting period, and at 30 June, the site is not fully manned during evenings and night times.

The mine ventilation fans at Kitchener SIS ceased operation in March 2022. The ventilation fan at Kalingo Infrastructure Area continues to operate 24 hours per day, 7 days per week.

Austar continues to undertake due diligence noise impact assessments to predict potential noise impacts of closure execution activities and to implement appropriate noise mitigation and management measures. Austar also continues to engage with near neighbours about activities and potential impacts.

TABLE 6-9 NOISE GENERATED BY THE AUSTAR CHPP AGAINST PROJECT CRITERIA

Quarter	Period	Austar CHPP Only $L_{A90\ (15min)}$ (dB)		
		C1	C2	C3
	Noise Criteria	40	43	37
Q3 2021	Night	IA	26	IA
		IA	IA	IA
		IA	<25	IA
Q4 2021	Night	<20	<20	IA
		NM	NM	NM
		IA	IA	IA
Q1 2022	Night	IA	IA	IA
		IA	IA	IA
		IA	IA	IA
Q2 2022	Night	IA	<20	IA
		IA	<25	IA
		IA	<25	IA

NM – Not measurable
IA – Inaudible
These are results for Austar CHPP in the absence of all other noise sources.

TABLE 6-10 NOISE GENERATED BY KITCHENER SIS AGAINST SPECIFIC PROJECT CRITERIA

Quarter	Period	Kitchener SIS Only $L_{Aeq,\ 15\ min}$ (dB)			Kitchener SIS Only, $L_{A1\ (1min)}$		
		K1	K2	K3	K1	K2	K3
	Noise Criteria	35	35	35	45	45	45
Q3 2021	Night	<25	IA	IA	<25	IA	IA
		<25	IA	IA	<25	IA	IA
		IA	<20	IA	IA	<20	IA
Q4 2021	Night	IA	<20	IA	IA	<20	IA
		IA	IA	IA	IA	<20	IA
		IA	IA	IA	IA	IA	IA
Q1 2022	Night	IA	IA	IA	IA	IA	IA
		IA	IA	IA	IA	IA	IA
		IA	IA	IA	IA	IA	IA
Q2 2022	Night	IA	IA	IA	IA	IA	IA
		IA	IA	IA	IA	IA	IA
		IA	IA	IA	IA	IA	IA

NM – Not measurable
IA – Inaudible
These are results for Austar Kitchener SIS in the absence of all other noise sources.

TABLE 6-11 NOISE GENERATED BY KIA AREA AGAINST SPECIFIC PROJECT CRITERIA, SITE K4

Quarter	Period	Austar KIA Only $L_{Aeq, 15\ min}$ (dB)
		Noise Criteria 35
Q3 2021	Night	IA
		31
		IA
Q4 2021	Night	<20
		<25
		<20
Q1 2022	Night	IA
		<25
		<25
Q2 2022	Night	<20
		<25
		26

NM – Not measurable
IA – Inaudible
These are results for Austar Kalingo Infrastructure Area (KIA) in the absence of all other noise sources.

6.5 Weed Management

6.5.1 Environmental Management

A land management consultant conducted weed control works on Austar owned land from July 2021 to June 2022 in accordance with Austar's Weed Action Plan, which identifies environmental weeds found on site, and outlines locations, area covered, a summary of the weed characteristics, recommended actions and optimum season for treatment.

Due to the large areas of land owned by Austar, focus locations are identified in the Weed Action Plan. These locations were typically in areas previously disturbed by site works, rehabilitation areas, known problematic areas, or naturally formed areas such as creek lines that are prone to exotic weed infestations. It was noted during the inspections that large undisturbed areas outside of the designated focus points were typically clear of exotic weed infestations and maintained healthy unobstructed native growth.

6.5.2 Environmental Performance

During the reporting period, over 84 hectares of weeds were treated as shown in **Figures 6-5** to **Figure 6-8** (sourced from Enright Land Management). Species and approximate areas treated included:

- *Acacia saligna (2 ha)*;
- Blackberry (*Rubus Fruticosis*) (>2 ha);
- Camphor Laurel (*Cinnamomum camphora)* (2 ha);
- Castor Oil (*Ricinus Communis) (*<1 ha);
- Green Cestrum (*Cestrum parquai*) (>10 ha);
- Lantana (*Lantana sp*) (>30 ha);
- Mother of Millions (C*hrysanthemoides Monilifera*) (12 ha);
- Oleander (*Nerium oleander*) (<1 ha);
- Pampas Grass (*Cortaderia sp) (*<1 ha);
- Privet (*Ligustrum sp)* (>1 ha);
- Tobacco Bush (*Solanum Mauritianum*) (>17 ha);
- General seasonal weeds (>4 ha); and
- general woody weeds (>1 ha).

Weed treatment was prioritised to address areas where weeds may spread offsite including boundary fences and waterways, and rehabilitation areas where weeds could compromise rehabilitation outcomes.

The Weed Action Plan will continue to be implemented over the coming years, and progress will be reported in future Annual Reviews.

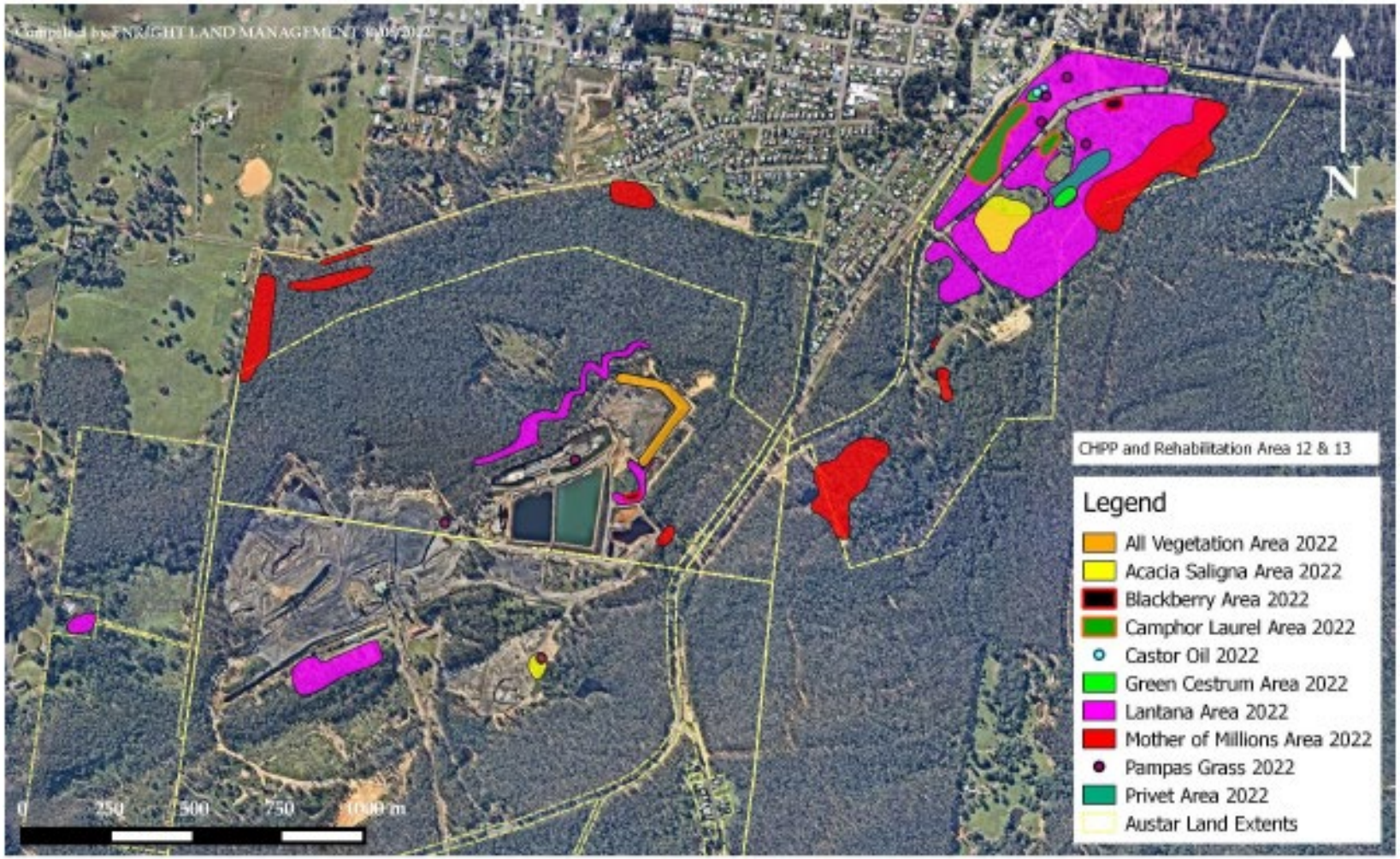


FIGURE 6-5 CHPP AND REHABILITATION AREA 12 & 13 WEED TREATMENT (SOURCE: AUSTAR WEED WORKS COMPLETED JULY 2021 TO JUNE 2022)

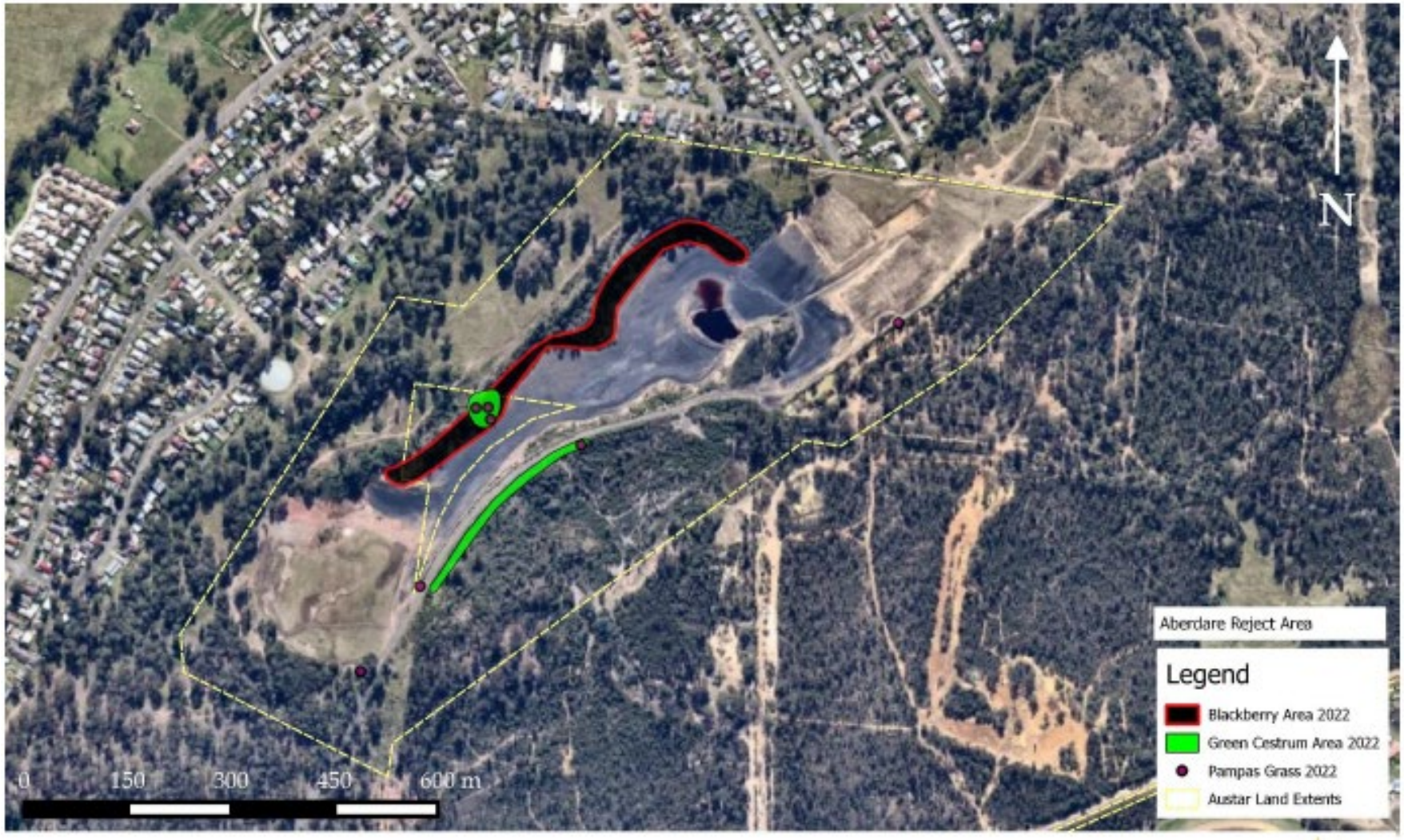


FIGURE 6-6 ABERDARE REJECT AREA WEED TREATMENT (SOURCE: AUSTAR WEED WORKS COMPLETED JULY 2021 TO JUNE 2022)

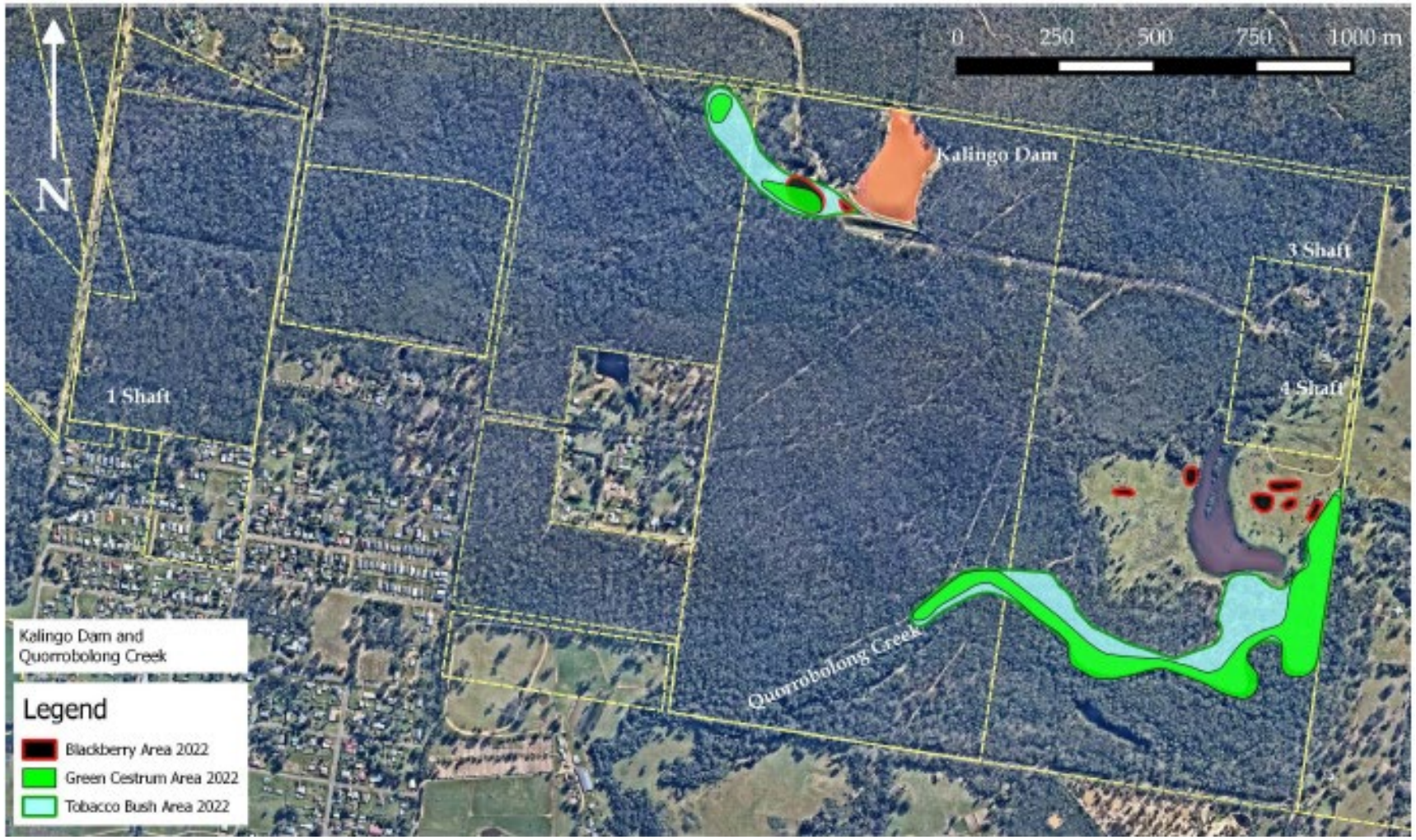


FIGURE 6-7 KALINGO DAM AND QUORROBOLONG CREEK WEED TREATMENT (SOURCE: AUSTAR WEED WORKS COMPLETED JULY 2021 TO JUNE 2022)

FIGURE 6-8 KITCHENER INFRASTRUCTURE SITE WEED TREATMENT (SOURCE: AUSTAR WEED WORKS COMPLETED JULY 2021 TO JUNE 2022)

7 WATER MANAGEMENT

The three main components of the water management system are the:

- Underground mine water management system;
- Pelton CHPP site water management system; and
- Surface water storage and management system.

The Pelton CHPP site water management system historically managed water for use in the CHPP and underground. A Reverse Osmosis (RO) water treatment plant was used to treat water supply for the operations, as well as discharging offsite through a licenced discharge point. The main function of the CHPP site water management system is to manage stormwater runoff and contained mine water. The RO Plant has not operated during the reporting period.

As outlined in the SWMP, there are several underground water storage areas. During the reporting period there was a reduction in dewatering of the underground allowing progressive flooding of the underground during mine withdrawal.

Given the reduction in underground dewatering during the reporting period the primary role of the surface water storage and management system transitioned to management of surface water runoff during rain events. Further information on site water management can be found in the approved SWMP.

7.1 Water Licences

Austar holds water licences for monitoring and dewatering bores across the operation. Austar's current water licences issued under Part 5 of the *Water Act 1912* and the *Water Management Act 2000* are provided in **Table 7-1.**

TABLE 7-1 WATER LICENCES HELD BY AUSTAR

Licence Held	Licence Number	Validity of Licence	Purpose of Licence	Extraction Limit
Bore Licence Certificate	20BL171361	17 May 2007 - Perpetuity	Monitoring Bore (AQD1077)	N/A
Bore Licence Certificate	20BL172524	20 Jul 2010 - Perpetuity	Monitoring Bore (NER1010)	N/A
Bore Licence Certificate	20BL172852	7 Jun 2011 - Perpetuity	Monitoring Bore (WBH1, WBH2, WBH3)	N/A
Bore Licence Certificate	20BL173843	1 Oct 2014 - Perpetuity	Monitoring Bore (BB1, BB2, BB3)	N/A
Bore Licence Certificate	20BL173878	8 Dec 2014 - Perpetuity	Monitoring Bore (MB01)	N/A

Licence Held	Licence Number	Validity of Licence	Purpose of Licence	Extraction Limit
Bore Licence Certificate	20BL173891	19 Mar 2015 - Perpetuity	Monitoring Bore (MB02)	N/A
Water Access Licence	WAL19181 / 20AL210298	Continuing	Unregulated River Water Licence	Hunter Unregulated and Alluvial Water Sources - Upper Wollombi Water Source - Congewai Creek Management Zone. 10 shares
Water Access Licence	WAL41504 / 20AL217003	Continuing	Aquifer - Industrial dewatering 16CT pump station No 2 Shaft No 2 Shaft Borehole	Sydney Basin – North Coast Groundwater Source. North Coast Fractured and Porous Rock Groundwater Sources 2016. Extraction limit of 770ML in any 12-month period commencing 1 July

7.2 Water Take

Water take for the 2021-2022 reporting period is summarised in **Table 7-2**. Due to no pumping, the water balance was recorded as zero.

TABLE 7-2 WATER TAKE 2021-2022

Water Licence #	Water sharing plan, source and management zone (as applicable)	Entitlement	Passive take / inflows (ML)	Active pumping (ML)	TOTAL (ML)
WAL19181 [1]	Hunter Unregulated and Alluvial Water Sources - Upper Wollombi Water Source - Congewai Creek Management Zone.	10 shares	0	0	0
WAL41504	Sydney Basin – North Coast Groundwater Source. North Coast Fractured and Porous Rock Groundwater Sources 2016.	Extraction limit of 770ML in any 12-month period commencing 1 July	0[2]	0	0

1 this WAL is not utilised at present by Austar

2 Pumping ceased from water intakes in May 2021, therefore the site water balance is 0.

7.3 Surface Water

7.3.1 Environmental Management

The Austar SWMP has been prepared in accordance with the requirements of DA 29/95, PA 08_0111 and EPL 416, and includes a surface water monitoring program. The SWMP was revised in March 2022 and approved by DPE on 11 March 2022.

Austar has two licenced discharge points (LDPs). SW1 is an emergency wet weather discharge point, and SW6 is permitted to discharge 5,000 kilolitres (KL) per day (as an annual average) of permeate (treated water from the RO plant).

Austar has engaged an environmental monitoring specialist to undertake routine surface water sampling and analysis in accordance with the SWMP. Austar's surface water monitoring program includes:

- Five EPL monitoring sites (three creek sites and two discharge points); and
- Four creek monitoring sites three sites in Quorrobolong Creek and one site in Cony Creek).

The surface water monitoring locations are presented in **Table 7-3** and shown in **Figure 6-3.**

TABLE 7-3 SURFACE WATER MONITORING LOCATIONS AND EPL CRITERIA

Area	Monitoring Location	Parameters	EPL Limits /Criteria
CHPP – EPL Points	**SW1** – Emergency Dam Spillway, **EPL Point 1**	pH EC Fe TDS TSS Volume	6.5-8.5 N/A 1 mg/L 6,000 mg/L 50 mg/L 2,000 KL/day
	SW2 – Bellbird Creek Pinch Bridge, **EPL Point 2** **SW4** – Bellbird Creek Eastern Boundary Downstream of CHPP, **EPL Point 4** **SW5** – Unnamed Creek Western Boundary Upstream of CHPP, **EPL Point 5**	EC pH Fe TSS	N/A N/A N/A N/A
	SW6 – 1ML tank discharge to Bellbird Creek, **EPL Point 6**	EC pH Fe TSS Volume	600 µS/cm 6.5-8.5 1 mg/L 50 mg/L 5,000 KL/day as annual average
Creeks – Underground Mining Areas	**SWQ1** – Quorrobolong Creek (Sandy Creek Road) **SWQ2** – Quorrobolong Creek (Austar Owned land) **SWQ3** – Quorrobolong Creek (Austar Owned Land) **SWC1** – Cony Creek (Quorrobolong Rd)	EC pH Fe TSS	N/A N/A N/A N/A

7.3.2 Environmental Performance

Only LDPs SW1 and SW6 have water quality limits. Other locations are monitored for baseline data, or to observe any changes in water quality in the Bellbird South and Stage 3 mining areas.

There were no discharge events from SW1 or SW6 during the reporting period. A maintenance regime has been implemented on the RO plant so water treatment and discharge may recommence as required during the transition to closure.

As there was no discharge from SW1 and SW6 during the reporting period no water quality samples were collected from these locations.

Monitoring results at the up-, mid- and downstream CHPP creek monitoring points (SW5, SW2 and SW4, respectively) are summarised as follows:

- pH measured at individual sites remained relatively constant during the reporting period ranging between pH 5.21 (SW2) to pH 7.61 (SW2) which was similar to the 2020-2021 range of pH 5.60 to pH 7.28, and the 2019-2020 range of pH 5.61 to pH 7.78;
- EC ranged between 466 µS/cm (SW2) and 6400 µS/cm (SW5). EC values during the reporting period were generally similar to those of the 2020-2021 and 2019-2020 reporting periods;
- TSS ranged between <5 mg/L at all sites to 115 mg/L (SW4) for the reporting period. This is greater than the 2020-2021 range of <5 mg/L to 28 mg/L (SW2). Past records have shown TSS limits to have reached levels up to 120 mg/L in July 2016 at SW5; and
- Fe (Iron) ranged between 0.09 mg/L (SW2) and 6.02 mg/L (SW4) which is higher than the 2020-2021 range of <0.05 mg/L (SW2) and 4.9 mg/L (SW5) but comparable with historical data.

Bellbird Creek is ephemeral at sampling location SW5 upstream boundary to CHPP. Historically, water sampling at SW5 has been somewhat influenced by a potable water leak in the Hunter Water reservoir just upstream of the sample location.

Samples were collected from SW4 and SW5 during seven sampling events out of twelve (December 2021 to June 2022). Samples were collected from SW2 on eight events (October 2021 and December 2021 to June 2022). Sampling did not occur during months when the creek was dry.

Natural fluctuations in water quality in Quorrobolong and Cony Creeks were observed, with sample points generally reporting results within historical ranges.

For the Quorrobolong and Cony Creek monitoring points (SWQ1, SWQ2, and SWQ3 & SWC1):

- Quorrobolong Creek was generally flowing throughout this reporting period. Twelve samples were collected from SWQ1, eleven samples were collected from SWQ2, and nine samples were collected from SWQ3. It is difficult to compare this reporting period to others in Quorrobolong Creek, as between November 2017 and March 2020 only three samples were collected from SWQ1, SWQ2 and SWQ3, collectively due to drought conditions.
- The sampling location on Cony Creek is in a deep pool, twelve samples were collected from SWC1 during the reporting period.
- pH ranged between pH 6.65 (SWQ2) and pH 7.62 (SWQ1) which is comparable to the 2020-2021 range of pH 6.28 (SWQ2) to pH 8.28 (SWQ1). This generally aligns with results reported

in the previous periods. The high pH level in 2020-2021 was the highest recorded at site in recent history;

- EC results ranged between 260 µS/cm (SWQ1) and 2440 µS/cm (SWQ3). This is comparable with the 2020-2021 results of 130 µS/cm (SWQ2) and 2000 µS/cm (SWQ2) and generally comparable to data from previous reporting periods, such as 2019-20 with a range from 342 – 3350 µS/cm;

- TSS ranged from <5 mg/L at all sites to 88 mg/L (SWQ3) which generally aligns with the range reported in 2020-2021 being <5 mg/L to 84 mg/L;

- Iron results ranged from 0.37 mg/L (SWQ1) to 43.40 mg/L (SWQ1) during the reporting period. This is an increase from the 2020-2021 reporting period which reported results ranging from 0.79 mg/L to 14.5 mg/L. The 43.40 mg/L sample is within recorded background levels, however is the second highest level recorded over the last five years. The highest iron levels were in January 2017 at 63 mg/L. It is noted that SWQ1 is upstream of Austar and therefore largely unimpacted by site activities.

See **Appendix A** for surface water quality graphs.

7.3.3 CHPP Investigation Drainage Line

During routine inspections of clean water drainage lines in 2017, Orange staining/residue was observed in a drainage line at the CHPP (referred to as the Investigation Drainage Line (IDL)). This was reported as an incident to the EPA and has been regularly inspected and monitored since in accordance with conditions added to the EPL in December 2017.

The IDL is ephemeral and while it has been mainly dry since 2017, during the reporting period has commonly had pools of water throughout.

Condition U3.3 requires the submission of an updated monthly report containing the monitoring results required by Condition U3.2. Condition U3.2 requirements include:

- sampling of surface water in the IDL;
- sampling of Groundwater Bore 1 adjacent to the IDL; and
- photos taken at specific locations along the Investigation Drainage Line.

Reports have been submitted each month to the EPA for the reporting period.

Condition E2 requires that the orange staining / residue within the IDL must be fully contained with the premises at all times. Any discharges to waters of this residue must comply with Condition L1.1 of the EPL which states that the licensee must comply with Section 120 of the *Protection of the Environment Operations Act 1997*. A bunded containment area at the downstream extent of the IDL has been installed to assist in the isolation of orange stained water. Water captured is pumped from

this containment area into the CHPP mine water system. Additionally, water below the IDL can be captured within Doyle Street Dam and pumped back to the mine water system as required.

During the reporting period orange staining was observed in the IDL during all monthly inspections with the exception of February 2022.

Monitoring of the IDL will continue in the next reporting period. It should be noted Austar is currently undertaking a Mine Closure Site Investigation Program. The ongoing findings of the sampling and inspection program will be fed into this Mine Closure Site Investigation Program as appropriate as the source of the orange staining in the IDL is investigated further.

Table 7-4 summarises the recommended management actions and implemented controls for orange staining management in the IDL during the reporting period.

TABLE 7-4 MANAGEMENT ACTIONS AND IMPLEMENTED CONTROLS FOR ORANGE STAINING IN THE IDL

Date / Trigger	Action	Key findings	Recommendations	Implemented controls	System response
October 2020 – February 2022 Site inspections, closure planning, preliminary geochemical analysis for closure planning	-	No apparent off-site impacts Orange staining may be iron sourced from oxidising pyrite present in various historic mine features on site and further investigations will be undertaken as part of the closure planning process.	Desilt Precipitate Dam and test sediments	Commenced desilting in July 2021, 85% complete, delayed as unable to dry out base of dam to complete works during this wet season Desilted sediments were sampled on 2 August 2021.	Pending further monitoring and data interpretation
			Dewater the Northwest Tailings Dam to remove seepage source	Sump constructed in late June 2021; pump installed to pump mine water out of NWTD in July 2021.	Pending further monitoring and data interpretation
			Decommission and cap all historic tailings dams as part of the broader mine closure strategy	-	Pending additional investigations as part of Mine Closure
			Decommission the gravity fed pipes draining the NWTD into the unlined natural bowl below the NWTD wall. Mine water from the CHPP area, RoM Pad, product coal storage area, noise bund, and historic tailings in the NWTD should only be directed via existing or new dedicated mine water drainage channels into the Water Pollution Control Ponds.	Pump installed in July 2021 to pump water from NWTD via the CHPP to the stormwater retention cells to minimise water in the mine water drain below the NWTD wall. Existing mine water drains and pipelines are used.	Pending further monitoring and data interpretation
			Consider lining all mine water dams and drains as they are desilted or cleaned out.	This will be contemplated during mine closure	-

Date / Trigger	Action	Key findings	Recommendations	Implemented controls	System response
				planning and final landform designs.	
			Consider additional monitoring including the five Douglas Partners (2018) groundwater bores.	GHD developed an Interim Sampling, Analysis, Quality Management Plan (SAQMP) for the IDL, which was implemented in July 2021. The SAQMP is due for review in August 2022.	Pending further monitoring and data interpretation
			Tailings in NWTD and No 9 dam should be decommissioned and capped as soon as possible. Historic tailings should be relocated from the Stormwater retention dam. Noise bund should be relocated and capped (subject to a material balance and site investigations).	These recommendations are being addressed through the current mine closure planning process. The site investigations program commencing in June 2022 will inform capping studies that form an integral part of current mine closure planning.	
		Findings should be supported by ongoing monitoring until system responses are identified	While not a direct recommendation of the 2022 report, GHD were requested to comment on the adequacy of current monitoring programs.	A SAQMP was developed.	
July 2021 – August 2022	No action.	Recommended improvements to the monitoring program were suggested and implemented as part of the closure planning gap analysis.	The SAQMP should be revised after 12 months of data is gathered.	The SAQMP was finalised and during most of the reporting period, extensive monitoring has been undertaken in and around the Investigation Drainage line area. Results from one	-

Date / Trigger	Action	Key findings	Recommendations	Implemented controls	System response
				year of additional testing will be reviewed during the next reporting period and the SAQMP updated as required.	
May *2022 – EPA site inspection*		Site inspection identified Product Stockpile erosion and large sediment loads in mine water drain.	Fix erosion of Product Stockpile wall and desilt the mine water drain behind the Product Stockpile.	Erosion has been repaired. A new mine water drain has been constructed on the Product stockpile to convey water to the Stormwater Retention Cells and the WPCD at a distance from the IDL. Desilting of the mine water drain was commenced in June 2022.	Pending further monitoring and data interpretation

7.3.4 Kitchener Sediment Dam Discharges

The Kitchener SIS contains established infrastructure including upcast and downcast ventilation fans (temporarily sealed), services borehole/drop hole (fully sealed), pipelines, powerlines and electrical substation, as well as vegetated stockpiles that will be used for the rehabilitation of the site. There are three sediment dams on the site designed to catch sediment laden runoff from disturbed areas. Most disturbed areas have been revegetated.

As outlined in the SWMP, the sediment dams are designed to catch runoff for up to the 90th percentile 5-day rainfall events. Any rainfall event of greater intensity may cause the dams to overflow, with runoff reporting to the headwaters of Black Creek. There were three overflow events during the reporting period, described below.

7.3.4.1 Overflow event, 19 February 2022

Over a three-day period from 17-19 February 2022 the CHPP meteorological station recorded 84.6 mm of rainfall; 62.4 mm of this rainfall occurred on the morning of 19 February between midnight and 7:45 am. This event was greater than the design size for the sediment dams at the Kitchener SIS. Real time monitoring indicates that the Eastern sediment Dam was at (or over) 100% capacity between approximately 1:00 am and 5:45 am. Prior to the commencement of the rainfall event, the Eastern Sediment Dam was at approximately 16% capacity and the Upper Sediment Basin was at 17% capacity indicating adequate storage for design rainfall events.

Austar enacted the Pollution Incident Response Management Plan (PIRMP) and reported the event to the relevant authorities on 22 February 2022. Water samples were collected for analysis on 21 February 2022 from sites that were safe to do so. Pumping of water from the Eastern Sediment Dam to the Upper Sediment Dam occurred during and after the rainfall event ceased. Pumping of water from the water storage dams to Kalingo Dam occurred during and after the rainfall event.

A written incident report was sent to the EPA, DPE and the Resources Regulator on 25 February 2022 with no further actions required to date.

7.3.4.2 Overflow event, 23 February 2022

In the seven days leading up to and including the commencement of overflow, the CHPP EPL meteorological station recorded a total of 119.8 mm of rainfall, and the Kitchener SIS meteorological station recorded 145.2 mm of rain. This rainfall event was greater than the design size for the Lower Water Storage Dam. Real time monitoring indicates that the Lower Water Storage Dam was at (or over) its maximum level from approximately 1:30 pm on 22 February 2022. Visual inspections undertaken at 12:35 pm and 9:45 pm on 22 February 2022 showed the Lower Water Storage Dam was not overflowing.

Visual inspections were undertaken by Austar staff at various times throughout the rainfall event. Discharge rates were observed to be low. Water was moving slowly and water flowing overland was

shallow. The time at which discharge ceased is unknown. A site inspection on 1 March 2022 at 8:00 am indicated the dam was not overflowing and there was visible freeboard.

In accordance with EPL 416 condition R2.1, Austar enacted the PIRMP. Water samples were collected for analysis on 23, 24 and 25 February 2022. Pumping of the Lower Sediment Dam to the Upper Water Storage Dam commenced at the earliest opportunity. Pumping of water from the Upper Sediment Dam to Kalingo Dam occurred throughout the rainfall event. Austar reported the incident to the relevant authorities on 23 February 2022 with no further action required.

7.3.4.1 Overflow event, 4 March 2022

In the three weeks from 17 February to 9 March, the Austar CHPP EPL Meteorological station recorded 314.8mm rainfall and Kitchener SIS meteorological station recorded 363.2mm rainfall. This rainfall event was greater than the design size for the Water Storage Dams.

Real time monitoring indicates that the East Sediment Dam was at (or over) its maximum measurable level at approximately 1:05 pm, which was confirmed by a visual inspection at approximately 1:30 pm. Real time monitoring indicates that the Lower Water Storage Dam was at (or over) its maximum level at approximately 04:15 am on 6 March 2022.

Visual inspections were undertaken by Austar staff at various times throughout the rainfall event. Discharge rates were observed to be low. Water was moving slowly and water flowing overland was shallow. Site inspection confirmed the Eastern sediment basin had ceased overtopping at 09:50 on 10 March 2022. The Lower Sediment Dam continued to overflow until pumps were turned on (when the Upper Sediment Dam had adequate capacity) in the afternoon of 10 March.

In accordance with EPL 416 condition R2.1, Austar enacted the PIRMP. Water samples were collected for analysis on 4-6 March 2022. Pumping of the Lower Sediment Dam to the Upper Water Storage Dam commenced at the earliest opportunity. Pumping of water from the Upper Sediment Dam to Kalingo Dam occurred throughout the rainfall event. Austar reported the incident to the relevant authorities on 4 March 2022 with no further action required.

7.4 Ground Water

7.4.1 Environmental Management

The SWMP has been prepared in accordance with the requirements of development consent DA29/95 and Project Approval PA08_0111 and includes a groundwater water monitoring program. The revised SWMP was approved by the DPE on 1 March 2022.

An environmental monitoring specialist is engaged by Austar to undertake quarterly groundwater monitoring and analysis in accordance with the SWMP, utilising nine piezometers (MB01, MB02, MB03A, MB04, AQD1073a, NER1010, WBH1, WBH2 and WBH3) to assess impacts on groundwater

levels in the Bellbird South, Stage 2 and Stage 3 mining areas. The locations of these monitoring sites are presented in **Figure 6-3**.

Austar's groundwater monitoring program also includes monitoring of underground flows, water quality and pressure for operational purposes. Groundwater level data from EX01H is downloaded quarterly.

Groundwater resources in the vicinity of Austar are detailed in the SWMP.

7.4.2 Environmental Performance

Appendix B illustrates the groundwater monitoring results at Austar during the reporting period. The graphs illustrate groundwater depth, rainfall, pH and conductivity. Trends from the monitoring program are summarised below:

7.4.2.1 Groundwater Level

- Groundwater elevation in Bellbird South sandstone bore NER1010 increased between July 2021 and June 2022, coincident with increased regional rainfall and an increasing cumulative rainfall departure (CRD). Groundwater elevation in NER1010 responds rapidly to significant (i.e., more than 20 mm) rain events. Rapid increases in groundwater elevation were recorded following heavy rainfall throughout the year. Although the total depth of the bore is 102 m, the screened interval spans 82 m in length (20 mbgl – 102 mbgl). It is likely that the shallow depth of the upper part of the screen is allowing rainfall recharge to infiltrate and mix with deeper groundwater. Prolonged, above average rainfall has resulted in historically high groundwater levels being recorded in NER1010 in Q2 2022 (see **Appendix B**). The pressure transducer (PT) in NER1010 was replaced in Q4 2021, after being found to have malfunctioned the previous quarter.
- Groundwater elevations in Stage 2 and Bellbird South alluvial bores (including two WaterNSW bores) (all shown in **Appendix B**) increased slightly during the year (Q3 2021 – Q2 2022). Above average rainfall since January 2020 has continued to recharge alluvial groundwater levels. Pressure Transducer (PT) data indicate groundwater elevations increased rapidly following rainfall, decreasing shortly thereafter. No data was available for WaterNSW bores GW080975 and GW080974 between Q1 and Q2 2022 (**Appendix B**).
- Groundwater elevation in Stage 3 monitoring bore MB01 increased overall during the reporting period (**Appendix B**). Groundwater elevation gradually increased from the beginning of reporting period, before increasing at a greater rate between March and April 2022 following a period of increased rainfall. Groundwater level between Q1 2022 and Q2 2022 remained stable and manual measurements were synchronous with PT readings; however; a lack of natural variation indicates a potential error in the PT device. Should manual measurements not align with the PT in Q3 2022, the PT will be either repositioned higher in the monitoring bore or replaced during the Q3 2022 monitoring round.
- Groundwater elevation in Stage 3 monitoring bore MB02 increased overall during the recent monitoring period (**Appendix B**). Whilst manual measurements show a gradual increase in

groundwater elevation during the year, PT data show a spike in groundwater elevation in April 2022; concurrent with significant rainfall events. The rapid increase in groundwater elevation and response to rainfall recharge recorded in MB02 is unusual given the depth of the screened interval (77 metres below ground level (mbgl) – 140 mbgl). It is possible the rapid increases in groundwater elevation in MB02 are due to surface water infiltrating between the sealed annulus and the borehole wall or PVC casing.

- Pressure head at VWP sensor no.1 (above predicted height of connected subsidence cracking) increased overall during the water year. Pressure head increased from 60 metres Australian height datum (mAHD) to 64 mAHD between late September 2021 and January 2022, stabilising thereafter. VWP sensor no.2 (within predicted height of connected subsidence cracking) recorded stable pressure head throughout the water year, with a small fluctuation in pressure head noted between April 2022 and May 2022 (**Appendix B**).
- VWP sensor no.3 (below predicted height of connected subsidence cracking) piezometric head decreased overall during the recent water year. Piezometric head at VWP sensor no.3 gradually decreased until February 2022. Pressure head declined more rapidly between February and March 2022, decreasing gradually thereafter. Pressure head at VWP sensor no.4 (coal roof seam) decreased overall throughout the year. The data indicate pressure head at this depth decreased around August 2021 and January 2022. Piezometric pressure at VWP sensor no.4 increased between February 2022 and March 2022, declining thereafter (**Appendix B**).
- VWP sensor no.5 (seam centre) piezometric head increased overall during the recent water year, maintaining a gradual increase throughout the monitoring period. Piezometric pressure at VWP sensor no.6 (seam floor) recorded an overall increase, but to a lesser extent than sensor no.5 (**Appendix B**).
- Whilst sensors no. 5 and no. 6 show that the coal seam and its surrounding units have been depressurised, these units appear to be slowly recovering. The head in sensor no.6 is higher than the head in sensor no.5 indicating that the unit underlying the coal seam has not been depressurised to the extent of the coal seam, which is to be expected of a unit that has not been extracted.

7.4.2.2 Water Quality

- Except for AQD1073a and NER1010 in which pH values declined slightly, groundwater pH in Stage 2 and Bellbird South alluvial bores (**Appendix B**) was stable during the 2021-2022 monitoring period. Observed fluctuations in groundwater pH throughout the year were attributed to natural variation.
- Stage 3 monitoring bores MB01 and MB02 recorded an overall decrease in groundwater pH during the reporting period. Groundwater pH at MB01 remained stable until the end of Q4 2021, with pH values increasing during Q1 2022. Values for pH at MB01 then decreased throughout the remainder of the water year to levels below those recorded at the beginning of the year. Groundwater pH at MB02 increased until the end of Q3 2021, steadily declining thereafter (**Appendix B**).

- Groundwater EC in Stage 2 and Bellbird South alluvial monitoring bores decreased or remained stable during the monitoring period. Monitoring bore MB04 recorded a sharp decline in EC in Q4 2021, recording stable EC values for the remainder of the reporting period (see **Appendix B**). The decrease in EC can be attributed to increased rainfall and an increasing CRD during the reporting period.
- Groundwater EC in Stage 3 monitoring bore MB01 remained stable in the reporting period. Monitoring bore MB02 EC steadily decreased during the reporting period (see **Appendix B)**.

There are no new trends in groundwater quality or water levels that indicate impact conditions that require the enactment of the SWMP Response Plan triggers. Monitoring indicates that mining impacts are within EA predictions, and there is no evidence of impacts outside of established predictions.
Trends for 5-year monitoring period are summarised below:

- Groundwater elevation in sandstone bore NER1010 decreased between July 2017 and September 2019, increasing thereafter. NER1010 groundwater elevation correlates strongly with the CRD and rainfall recharge. Latest groundwater elevations are at historically high levels (**Appendix B).**
- Groundwater elevation within alluvial Stage 2 and Bellbird South monitoring bores declined between July 2017 and March 2020. Groundwater elevations increased in response to significant rainfall recharge between 2020 to 2022 (**Appendix B)**.
- Groundwater elevation in Stage 3 monitoring bore MB01 declined between July 2017 and September 2019. PT data recorded between 21 June 2019 and 4 November 2019 was erroneous and has been removed from the dataset. Increased groundwater elevation recorded during this time was due to the PT falling downhole. Data following retrieval of the PT (i.e., after 4 November 2019) is consistent with manual measurements. Groundwater elevation in MB01 has been steadily increasing since September 2019 (see **Appendix B)**.

Groundwater elevation in MB02 was stable between July 2017 and October 2019. The decrease in 2019 is due to airlift development, with the bore recharging rapidly thereafter. Erroneous PT data recorded between July 2020 and December 2020 was the result of increased pressure head on the data logger due to rapid recharge in the bore. The depth of the data logger was adjusted, and PT groundwater elevation data is now synchronous with manual groundwater level measurements. Historically high groundwater elevations were recorded in this bore during Q2 2022 (**Appendix B**).

- Piezometric head at VWP sensor no.1 (above predicted height of connected subsidence cracking), no.2 (within predicted height of connected subsidence cracking) and no.3 (below predicted height of connected subsidence cracking) piezometric heads have been relatively stable since the start of 2018. Sensor no. 4 (coal seam roof) pressure head has fluctuated throughout the five-year monitoring period (**Appendix B**). Sensors no.5 (seam centre) and no.6 (seam floor) piezometric heads have declined since July 2017, with latest data showing a slight increase in pressure head (see **Appendix B**). The monitoring results between July 2017 and June 2022 are consistent with predicted impacts.
- Stage 2 and Bellbird South alluvial pH values have generally remained stable during the five-year period to June 2022 (see **Appendix B**).

- Groundwater pH in sandstone bore NER1010 fluctuated throughout the monitored period (July 2017 to June 2022); ranging from pH 7.08 in March 2022 to pH 11.53 in June 2018. Following airlift development in October 2019, pH values changed from hyper-alkaline to slightly alkaline (**Appendix B**). Elevated pH in NER1010 (and MB02 - see below) pre-airlift development has been attributed to stagnant water in the bore casing.
- Stage 3 monitoring bore MB01 pH was stable during the 5-year monitoring period. MB02 recorded stable, yet elevated, pH values until September 2019, decreasing rapidly following airlift development in the December 2019. Values for pH have increased overall since July 2020 (**Appendix B**).
- Groundwater EC in Stage 2 and Bellbird south alluvium was variable. MB04 and MB03A have recorded a decreasing EC trend in recent times due to significant rainfall recharge. AQD1073a and NER1010 EC fluctuated throughout the monitoring period.
- NER1010 groundwater quality is not representative of the screened formation (Branxton Formation), being comprised of a mixture of surface and deeper groundwater resulting from the extended screen interval on this bore (**Appendix B**).
- AQD1073a recorded a sharp decrease in EC in September 2020, coincident with an increase in CRD. WBH1, WBH2 and WBH3 EC values have been stable during the five-year monitoring period, with slight fluctuations recorded during that time (**Appendix B)**.

Groundwater EC in Stage 3 monitoring bore MB01 has remained stable during the five-year period. MB02 recorded stable EC values until September 2019, increasing rapidly following airlift development in October 2019. EC in MB02 has since been returning to values which are similar to historical data, generally declining each quarter since September 2020 (**Appendix B**).

7.4.2.3 Maintenance Works

Maintenance work was undertaken at monitoring bore NER1010 during the Q4 2021 monitoring round.

It was noted in Q3 2021 that the PT logger stopped collecting data from May 2021 onwards. This was attributed to a fault in the PT logger, which was replaced in the following quarter (Q4). PT data and manual groundwater measurements were synchronous during both Q1 2022 and Q2 2022 monitoring rounds.

PT loggers at MB03A and MB04 were reset during Q4 2021 following deviation between manual and logger-derived groundwater elevation data. The PT logger at MB03A was reset a second time in Q1 2022 following continued deviation between manual and PT logger data. MB01 was reset in Q1 2022 following deviation between manual and PT logger data.

Monitoring bores will continue to be inspected throughout the next reporting period. The bore network is currently considered effective with no further maintenance recommended. Recommendations will continue to be addressed as required in future reporting periods.

8 REHABILITATION

Rehabilitation and land management activities were undertaken in accordance with MOP Amendment A, which was approved by Resources Regulator on 4 March 2021.

Rehabilitation activities during the reporting period focused on the maintenance and enhancement of existing rehabilitation areas and the ongoing preparation of specialist studies to address rehabilitation and closure knowledge gaps and to inform closure execution.

Consistent with the rehabilitation schedule in MOP Amendment A, there were no areas of rehabilitation relinquished or signed off by Resources Regulator during the reporting period.

No new areas of rehabilitation were commenced during the reporting period.

As detailed in **Section 3.2.3**, a Rehabilitation Management Plan (RMP) and Forward Program were prepared during the reporting period and replaced the current MOP on 2 July 2022.

8.1 Rehabilitation Maintenance and Management

During the reporting period rehabilitation maintenance and management activities were undertaken based on the recommendations of the 2021 Rehabilitation Monitoring Program as follows:

- Ongoing weed management of the rehabilitation areas at Aberdare Extended Emplacement Area (EEA), Bellbird Areas 12 and 13; and
- Remediation of vehicle damage caused by trespassers over rehabilitated areas in the Aberdare EEA.

In addition to the annual monitoring program, routine site inspections are conducted monthly by Austar environmental personnel. Operational personnel also conduct inspections of the site which include rehabilitation areas and inspections of subsidence repairs undertaken. If issues are identified during inspections, corrective actions are implemented as required.

8.2 Exploration Borehole Rehabilitation

There were no surface exploration works undertaken during this reporting period. All previous exploration boreholes drilled by Austar in EL6598 have been rehabilitated. Two boreholes are outstanding, pending either final photos or landholder sign off.

During the reporting period, the Resources Regulator visited around 20 rehabilitated exploration drill holes (some signed off and some pending sign off). Action was required at three boreholes (AQD1087, AQD 1101 and AQD 1107), with raised grout to be removed and final rehabilitation undertaken.

Austar commenced due diligence works on historic exploration boreholes drilled in Austar mining leases during the reporting period. This was predominantly a desktop exercise supplemented with

some site inspections to understand the status of exploration boreholes drilled prior to 2006. This due diligence exercise will continue as part of closure planning works.

8.3 Rehabilitation Monitoring

In accordance with MOP Amendment A, rehabilitated areas are to be monitored on an annual basis until they are self-sustaining and no longer require management.

The rehabilitation monitoring program is undertaken annually, with results compared to the completion criteria in the MOP and recommendations provided to progress towards the completion criteria.

Consistent with previous years, key to progression of all monitoring locations is a reduction in weed cover and (except for Kalingo sites) a reduction in human interference (such as rubbish, bike tracks and burnt-out cars).

Results of the monitoring were compared to Performance Criteria for the Ecosystem and Land use Establishment and Sustainability phases and the trigger action response plan (TARP) from MOP Amendment A.

Recommendations arising from the 2022 Annual Rehabilitation Monitoring Report are discussed below, along with proposed actions to address the recommendations:

- **Weed management** – weed infestations require management and control in all rehabilitation areas. Weeds identified include Camphor Laurel, Lantana, Green Cestrum, Purple top, Fireweed and Blue heliotrope. Austar has a Weed Action Plan in place incorporating the rehabilitation areas which is being executed over several years. Weed management in the rehabilitation areas is ongoing, with weed works focussing on rehabilitated areas (along with follow up treatments and creek lines) during the reporting period.
- **Alteration of Seed Mixes** – given current listing as high threat weed by the Biodiversity Conservation Trust, Umwelt recommends that green panic (*Megathrysus maximus* and kikuyu (*Cenchrus clandestinus*)) be removed from any subsequent seeding mixes for pasture areas of vegetation. Prior to extensive rehabilitation occurring, the current seed mix will be reviewed, and this recommendation considered.
- **Remediation of dirt bike paths** - Dirt-bike paths have formed rivets in rehabilitated areas of Aberdare REA, particularly in the north. Remediation of these tracks is recommended so that the subsurface is not exposed. Supplementary planting of these areas may be required following remediation, however given the narrow width, it is likely that ground cover would naturally re-establish along these paths over time. During June 2022 the northern area of the Aberdare EEA was treated with the addition of growth medium and seed to repair the dirt bike damage in this area.
- **Prevention of unauthorised access** – Evidence of unauthorised access (such as 4WD) tracks, motorbike riders and domestic goat access from an adjacent property) were identified in the

Aberdare EEA and Bellbird Areas 12 and 13. Given proximity of these areas to urban areas, such aspects will be difficult to control. An ongoing effort to ensure site security through maintenance of fencing and patrols will continue during closure.

- **Domestic goat control** – The presence of goats via tracks was identified at Areas 12 and 13, however, were not causing any damage to the vegetation present other than grazing of the tips of the abundant grasses. Austar will continue to monitor and if at any stage the goats are seen to be impacting the rehabilitation, actions will be taken to prevent access.
- **Rubbish removal** – Removal of the rubbish in Area 12 should occur. Austar regularly removes old car bodies and other large rubbish from rehabilitation areas. Further clean-up efforts will be undertaken after heritage assessments have been completed.

Performance criteria and monitoring requirements for the site are being reviewed and refined as part of the detailed mine closure planning work currently being undertaken.

TABLE 8-1 MOP PERFORMANCE CRITERIA ASSESSMENT

Phases	Area 12	Area 13	Aberdare EEA	Aberdare EEA North	Kalingo Site 1	Kalingo Site 2
All Phases						
Minor rilling only (less than 30 cm by 30 cm), within areas that landform works have been undertaken	✓	✓	✓	✓	✓	✓
Ecosystem and Land-Use Establishment Phase						
Pasture						
Ground cover comparable to pre-mining environment is re-established following remediation activities.	✓	✓	✓	✓	✓	✓
Remediation areas revegetated with species selected based on the existing land use (i.e. pasture) and surrounding vegetation	X	X	X	✓	X	X
Ecosystem function is rehabilitated to that existing pre-mining and consistent with the surrounding landform	✓	✓	✓	✓	✓	✓
Ecosystem and Land-Use Sustainability Phase						
Pasture						
Revegetation is progressing towards a sustainable ecosystem and only requires maintenance that is consistent with the intended final land use	X	X	✓	X	X	X
For Pasture areas, groundcover targets: - 0-20% canopy	✓	✓	✓	✓	✓	✓
- 70-100% groundcover	X	✓	✓	✓	X	X
Weeds identified on-site are actively controlled and/or removed using appropriate weed control techniques to meet the final land use criteria.	✓	✓	✓	✓	✓	✓
Weeds are absent from canopy and understorey	X	✓	X	X	✓	✓
Weeds comprise no more than 20% of ground cover vegetation	X	X	X	X	X	X

TABLE 8-2 COMPARISON OF MONITORING RESULTS TO TRIGGER, ACTION, RESPONSE PLAN

Trigger (MOP Extract)	Comment	Remediation Action
Hazardous Materials (asbestos) Inappropriately removed during demolition of heritage structures, leading to soil contamination and/or health impact	No hazardous materials identified in rehabilitation areas.	Not required
Landform not in accordance with DRE requirements (i.e. not within criteria identified in the RMP)	Landform is generally in accordance with final landform.	Not required
Erosion / poor water quality from rehabilitation areas. (in excess of target criteria identified in **Table 7-3**).	No erosion identified. However remediation of degradation caused by dirt bike tracks in Aberdare EEA required before depth reaches capping. Water quality not assessed as part of this program of work.	Remediation of dirt bike tracks in Aberdare EEA was undertaken in June 2022.
Lack of vegetation establishment or dieback of rehabilitated areas resulting in inability to meet vegetation criteria targets.	No substantial dieback identified.	Not required
Weed infestation threatening rehabilitation success (weeds in excess of identified criteria level).	Weed infestation threatens each of the REAS and Kalingo.	Weed management actions have been undertaken during the reporting period as outlined in Section 6.5.
Significant damage to rehabilitation areas by feral animals, resulting in inability to meet vegetation criteria targets.	Low levels of goat presence identified in Aberdare EEA but not causing significant damage.	Although no significant damage currently, consider monitoring and, if required management action for goat population.
Acid leachate identified from rehabilitated reject emplacement areas, potentially resulting in offsite water impact and/or dieback of revegetation, resulting in inability to meet vegetation criteria targets.	No evidence of acid leachate identified.	Not required
Spontaneous combustion of rehabilitation area	No evidence of spontaneous combustion observed.	Not required

8.4 Rehabilitation Trials and Research

There are no specific rehabilitation trials proposed or underway; however, Austar is currently at the Pre-Feasibility Study (PFS) stage of mine closure, undertaking numerous technical studies and site investigations to address closure knowledge gaps, as detailed in **Section 8.7.**

During the reporting period, Austar engaged a suitably qualified rehabilitation and ecology specialist to undertake a gap analysis of the rehabilitation and ecological processes relating to mine closure. The gap analysis informed the development of the Rehabilitation Management Plan prepared in accordance with the Mining Amendment (refer **Section 3.1** and **Section 3.3.2**).

The gap analysis will also inform the development of a rehabilitation and revegetation strategy during detailed mine closure planning, aiming toward the relinquishment of the mining leases.

8.5 Rehabilitation Summary

During the reporting period rehabilitation was managed generally in accordance with MOP Amendment A. Mining and rehabilitation status is presented in **Table 8-3.** The site GIS has been reviewed and revised during the preparation of the Rehabilitation Management Plan (RMP) and Forward Program under the Mining Amendment (refer **Section 3.1**). Areas documented for this reported period and the next reporting period are based on the areas revised RMP and Forward Program.

The current rehabilitation and disturbance footprint at Austar is presented in **Plans 1A** as reproduced from the RMP.

TABLE 8-3 REHABILITATION SUMMARY

Mine Area Type	Previous Reporting Period (ha)	This Reporting Period (ha)	Next Reporting Period (ha)
	2020-21	**2021-22** [1]	**2022-23**
Total Mine Footprint	187.9	210.3	210.3
Total Active Disturbance	141.3	172.5	172.5
Land being Prepared for Rehabilitation	0	0	18.5
Land under active Rehabilitation	46.6	37.8	37.8

[1] *variations in measured areas between this reporting period and last reporting period are due to a review and remeasurement of disturbed areas. Data for this reporting period been generated from spatial data uploaded to the Mine Rehabilitation Portal.*

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. As such it is the sum of total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem establishment, ecosystem development and relinquished lands (as defined in DPE-DRG MOP/RMP Guidelines). Please note that subsidence remediation areas are excluded.*

Total active disturbance *includes all areas ultimately requiring rehabilitation such as: on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), and tailings dams (active/unshaped/uncapped).*

Land being prepared for rehabilitation *– includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growth medium development (as defined in DPE-DRG MOP/RMP Guidelines).*
Land under active rehabilitation *- includes areas under rehabilitation and being managed to achieve relinquishment – includes the following rehabilitation phases as described in the DPE-DRG MOP/RMP Guidelines – "ecosystem and land use establishment" (area seeded OR surface developed in accordance with final land use) and "ecosystem and land use sustainability" (revegetation assessed as showing signs of trending towards relinquishment OR infrastructure development).*
Completed rehabilitation *– requires formal sign-off by DPE-DRG that the area has successfully met the rehabilitation land use objectives and completion criteria.*

8.6 Rehabilitation Actions for the Next Reporting Period

Rehabilitation activities in the next reporting period will be as detailed in the *Austar Coal Mine Forward Program - Friday 1 July 2022 to Monday 30 June 2025* prepared in accordance with the requirements of the Mining Amendment.

Based on the Forward Program, the following actions are proposed for the 2022-23 reporting period:

- Completion of the site investigations in each CMA;
- Partial mine sealing of the No. 1, and No. 3 Shafts;
- Permanent sealing of the Austar Drift from the surface to a depth with 15m competent rock cover using a Rocsil seal and grout in accordance with MDG6001;
- Permanent sealing of the services boreholes at the Kalingo Infrastructure Area;
- Disconnection, decommissioning and demolition of some items of surface equipment;
- Maintain existing rehabilitated areas at Aberdare Extended Emplacement Area, and Bellbird Areas 12 and 13; and
- Progress the mine closure planning strategy, and completion of PFS technical studies as documented in the Rehabilitation Management Plan (RMP) and discussed in **Section 4.1**.

9 COMMUNITY RELATIONS

Austar is committed to minimising the impacts of its operations and is an active participant and contributor to community projects that benefit local people.

9.1 Community Support Program

Yancoal's corporate Community Support Program (CSP) is ongoing and supports organisations in the Hunter Valley. The aim of Yancoal's Community Support Program is to invest in community projects and local initiatives, particularly in the areas of Health, Community, Environment and Education and Training, with the potential to make a positive difference.

9.2 Community Sponsorship

In addition to the Community Support Program, Yancoal sponsors local community initiatives. In the 2021-2022 reporting year, the long-term sponsorship of the Cessnock Rugby League Football Club continued. During the next reporting period, Austar will be looking for further community applications to support in the fields of health, environment, arts and culture, education and training. While no longer operating, Austar is still a part of the Cessnock community and will continue to support some long-term partnerships.

9.3 Community Liaison

Yancoal continues to maintain close relationships with neighbouring properties and nearby communities as part of normal business. This is mainly done through individual contacts with neighbours, and the Community Consultative Committee (CCC), as described below.

9.3.1 Community Consultative Committee

The Austar CCC continued to operate during the 2021-2022 reporting period. The CCC is conducted generally in accordance with the DPE's Community Consultative Committee Guideline (January 2019). CCC meetings are held every six months. Current members of the CCC are listed in **Table 9-1**. During the reporting period Austar held two CCC meetings, which occurred on the following dates:

- 22 September 2021; and
- 23 March 2022

Austar coordinates these meetings and provides information on mining progress, community programs and environmental performance. The annual review of the CCC and meeting minutes are located on the Austar coal website: http://www.austarcoalmine.com.au.

The major discussion points from the Austar meetings in 2021-2022 were:

- Mining activities – underground, CHPP, exploration, decommissioning, closure planning activities;
- Environmental monitoring, results and incidents;

- Community complaints; and
- Community support.

TABLE 9-1 AUSTAR COMMUNITY CONSULTATIVE COMMITTEE (CCC) DURING THE REPORTING PERIOD

Organisation/Representative	Name
Independent Chairperson	Ms Margaret MacDonald-Hill
Cessnock Council Representative	Councillor John Moores
Community Representatives	Mr Alan Smith Ms Ashlee Baker Mr John Rayner Mr Peter Sturrock Chief Inspector Michael Gorman
Company Representatives	Mr William Farnworth Ms Carly McCormack Ms Julie McNaughton

9.3.2 Resident Consultation

During the reporting period, Austar consulted with individual residents who live in areas potentially affected by Austar's operations as required. This consultation was often conducted informally, in a manner that allowed the residents to openly discuss issues of importance to them.

On 22 June 2022 stakeholders including landholders and near neighbours at the Aberdare Extended Emplacement Area, No. 1 Shaft, Pit Top and KIA were sent update letters regarding the closure project and potential impacts from the site investigation drilling program and mine sealing activities.

During the next reporting period, there will be further communication with the community regarding closure activities and the potential impacts to persons and/or property.

9.4 Community Complaints

Austar's Environmental Management Strategy (EMS) includes a procedure for receiving, investigating, responding and reporting complaints received from the community. Austar maintains a 24-hour-a-day, 7 days a week, free call number 1800 701 986 to receive environmental complaints and other enquiries.

No community complaints were received during the reporting period.

10 INDEPENDENT ENVIRONMENTAL AUDIT

The most recent Independent Environmental Audit was conducted by SLR Consulting in October 2020. The audit assessed the following key approvals:

- Stage 3 Project Approval (PA 08_0111);
- Bellbird South Development Consent (DA 29/95);
- Environment Protection Licence 416;
- Mining Lease (18 leases assessed); and
- Water Access Licences.

There were twelve actions agreed upon by auditors and Austar personnel, seven of which have been completed. The outstanding actions from the audit are listed in **Table 10-1**.

TABLE 10-1 INDEPENDENT ENVIRONMENTAL AUDIT FINDINGS 2020 – ONGOING ACTIONS

Rec No	Independent Environmental Audit Recommendations	Austar Coal Mine Responses to DPE	Status
2	Consider the status of rehabilitated areas within the Kitchener SIS area. If rehabilitation can be signed off as complete clean water runoff from the rehabilitated areas above the sediment dams may be diverted and the catchment reporting to the dams reduced. This may reduce overtopping during rainfall events.	1. Develop a program to sample clean water runoff from rehabilitated areas of Kitchener SIS, including runoff in drains and regular sampling of sedimentation dams and of Black Creek when flowing. 2. Use the baseline water quality data to develop a plan to allow water flow offsite for consultation with agencies. Consider whether water should be diverted away from sediment dams or allowed to flow through them and be discharged. 3. Undertake consultation	Progressing. There are few occasions when water flows in Black Creek, but this is monitored, and samples taken if practical. With surface disturbance works proposed as part of the closure process, this action may not be appropriate until following final rehabilitation of the site.
IREC 1	With regard to potential leakage from pipelines it is recommended that Austar carry out a risk assessment considering potential failure modes, and the adequacy of current arrangements.	Review surface water risk assessments and procedures and assess the need for further risk assessment or controls in relation to pipeline management and add to SWMP if required.	Progressing. Current risk assessments have been reviewed, along with procedures and inspections. Risk assessments may be revised in the next reporting period following mine sealing.
IREC 2	Continue to negotiate with the EPA regarding appropriate noise limits or goals for the site. It is recommended that consideration be given to setting noise goals for the site based on the noise levels achievable by the site with the implementation of reasonable and feasible noise mitigation measures. Negotiate with EPA regarding suspension of PRP during Care and Maintenance phase.	Austar will continue to negotiate with EPA to suspend the Noise PRP while in care and maintenance; or agree on noise goals for the CHPP that would be achievable when production resumes, based on current PRP reports.	Austar is currently planning for closure. At the end of the prefeasibility studies, Austar will be better placed to understand further noise generation at the CHPP and whether the PRP will be appropriate or not. This action will be considered at the end of PFS studies.

Rec No	Independent Environmental Audit Recommendations	Austar Coal Mine Responses to DPE	Status
IREC 6	With concurrence of EPA develop suitable TARPS for management of staining under the Water Management Plan.	1. Consider the findings of the 2020 orange drainage line study, develop TARPS if feasible and consult with EPA. 2. work with groundwater specialists to consider the addition of TARPs to SWMP and reporting graphs.	During the reporting period, some of the findings of the 2020 investigation drainage line study were implemented, including the implementation of a Sampling, analysis and quality management plan. During the next reporting period, the data from one year of extensive sampling will be revised and any changes to current practice recommended at that point, along with feeding results into closure planning. TARPS are not being considered at this time, as increased rainfall has provided opportunity for extensive sampling and analysis upon which to base management decisions. The EPA visited the drainage line in May 2022 and consultation is ongoing.

The Independent Audit report can be found on the Austar website.

The next Independent Environmental Audit is scheduled to be undertaken during Q4 2023.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

During the reporting period, there were four events reported to the EPA, DPE and Resources Regulator. These are described in **Table 11-1**.

TABLE 11-1 INCIDENT REPORTS 2021-2022

Incident No.	Date	Incident Details	Follow Up Actions
1	13 Jul 2021	No results for Depositional Dust monitoring for July due to Landholder denying access to the property.	The landholder requested that the dust gauge (D9) be collected from the property and not to access the property again. The contractor removed the dust gauge. Austar contacted DPE and reported the non-compliance on 13 August 2021.
2	3 Sep 2021	No results for Depositional Dust monitoring at D9 for August due to Landholder denying access to the property.	In consultation with DPE, Austar continued to report the missed reporting as non-compliances to DPE until D9 was reinstalled and the updated AQGHGMP lodged. Austar reported the non-compliance to DPE on 23 September 2021. The dust gauge was relocated to the Kitchener Public School on 20 September 2021 and a revised AQGHGMP was lodged and approved in October 2021.

Incident No.	Date	Incident Details	Follow Up Actions
3	19 Feb 2022	Kitchener SIS Unlicensed Discharge	The Eastern Sediment Dam overflowed on the 19 February following heavy rainfall. The incident was reported to the relevant authorities in accordance with EPL 416 condition R2.1 and the PIRMP requirements. Water samples were collected on 21 February 2022 from sites that were safe to do so. Water was pumped from the Eastern Sediment Dam to the water storage dams during and after the rainfall event ceased.
4	23 Feb 2022	Kitchener SIS Unlicensed Discharge	Lower Sediment Dam overflowed following heavy rainfall. PIRMP was triggered. Water samples were collected on 23, 24 and 25 February 2022 from sites that were safe to do so. Pumping of the Lower Sediment Dam to the Upper Water Storage Dam commenced at the earliest opportunity. Pumping from the Upper Sediment Dam to Kalingo Dam occurred throughout the rainfall event.
5	4 March 2022	Kitchener SIS Unlicensed Discharge	The Eastern Sediment Dam overtopped on 4 March, followed by the Lower water storage dam. Water samples were collected for analysis on 4-6 March 2022. Pumping of the Lower Sediment Dam to the Upper Water Storage dam commenced at the earliest opportunity. Pumping of water from the Upper Sediment Dam to Kalingo Dam occurred throughout the rainfall event. Austar reported the incident to the relevant authorities on 4 March 2022 with no further action required.

12 ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

During the reporting period, the focus at Austar has been progressing the closure planning actions outlined in MOP Amendment A and the preparation of the RMP and associated rehabilitation documents.

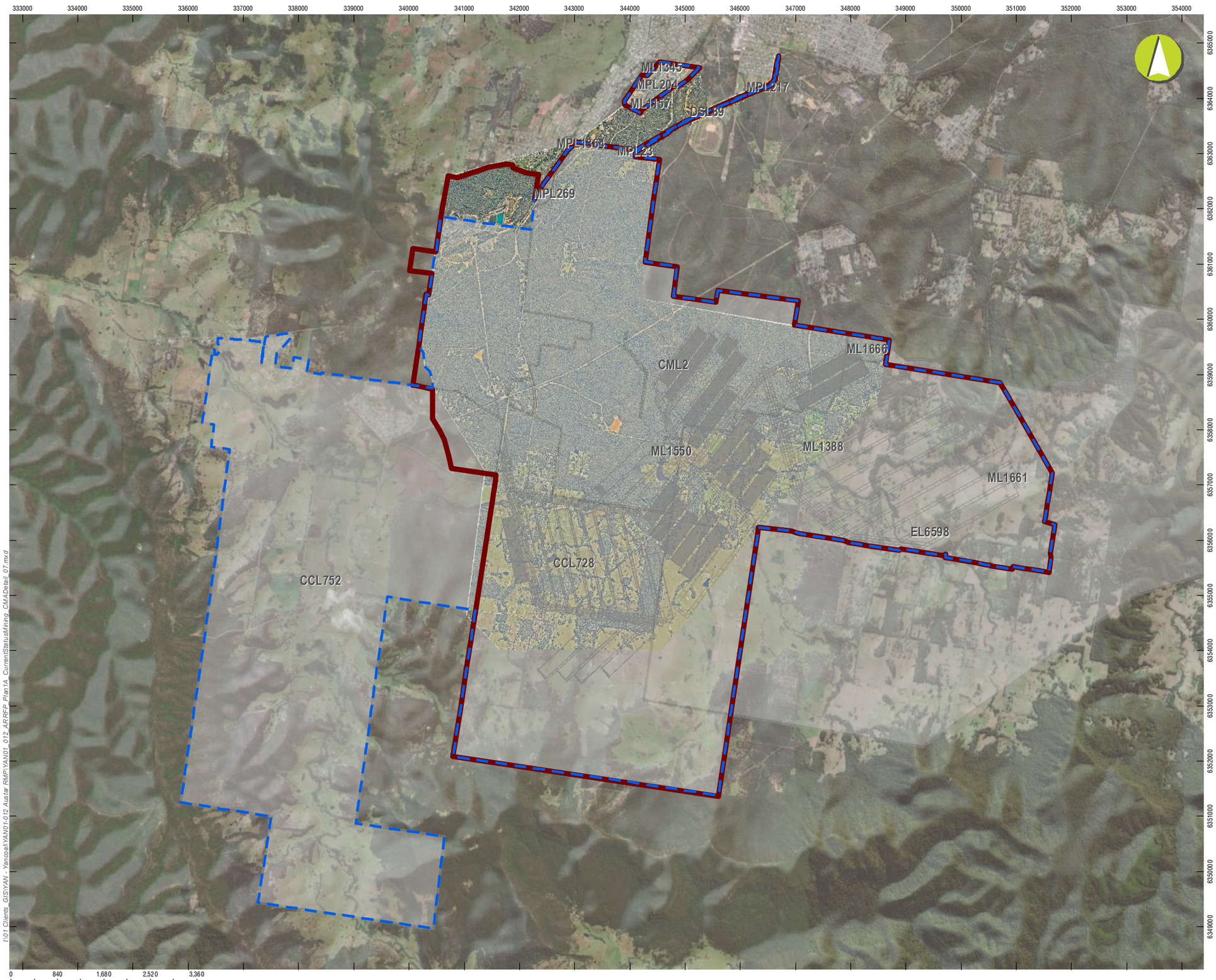
The focus in the next reporting period will be to finalise the PFS for closure, sealing the underground mine and closing out outstanding actions required by Extraction Plans.

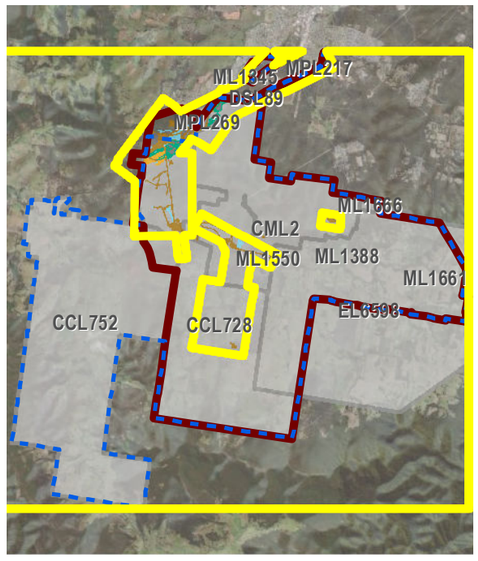
Yancoal endeavours to carry out the activities, in **Table 12-1** during the 2022 - 2023 reporting period.

TABLE 12-1 PROPOSED ACTIVITIES FOR 2022-2023 REPORTING PERIOD

	Activities Proposed in the 2022-23 Reporting Period
1	Progress the mine closure planning strategy as documented in the RMP and **Section 4.1**
2	Continue to partially seal boreholes, No. 1, 3 and 4 Shafts, and the Austar Drift
3	Progress with decommissioning and demolition activities.
4	Continue to implement the recommendations from the IEA (where they are relevant to closure)
5	Enact the recommendations in the Rehabilitation Monitoring report
6	Continue to maintain and enhance existing rehabilitation.
7	Continue to close outstanding actions from Extraction Plans

Plans





Austar Coal ARR 2022

CMA 9 - Other

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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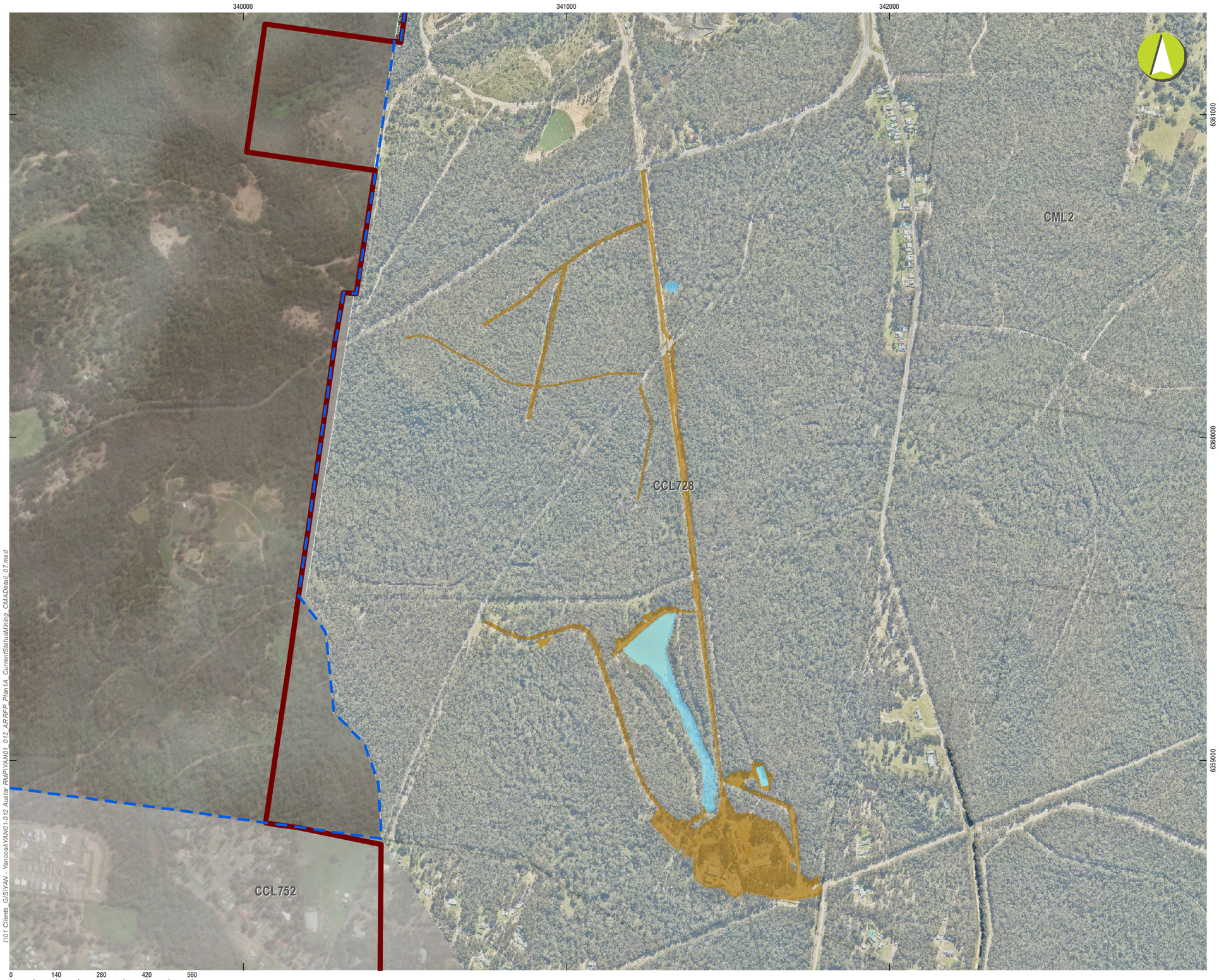

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LEGEND

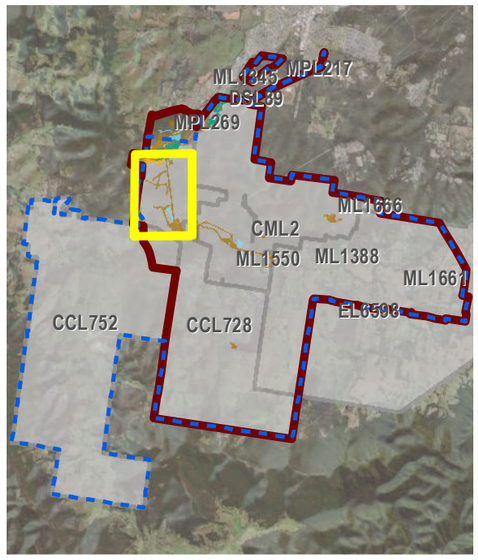
- Project Approval Boundary
- Colliery Holding Boundary
- Austar Mine Plan

Current Authorisations

- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area
- Domain 3: Water Management Area



Austar Coal ARR 2022

CMA 1 - Austar Pit Top Facilities

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

Sheet Size : A3

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LEGEND

- Project Approval Boundary
- Colliery Holding Boundary

Current Authorisations

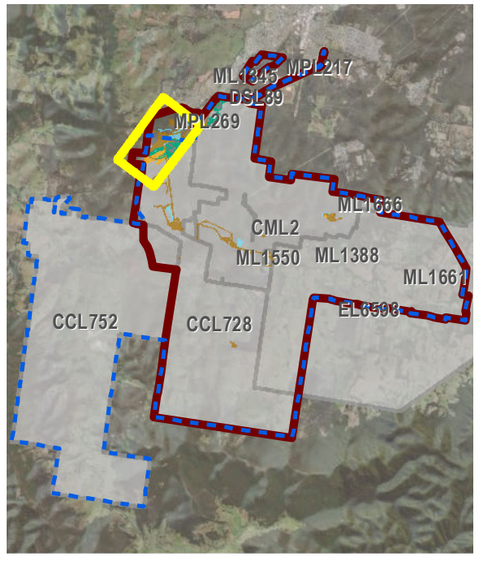
- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area
- Domain 2: Tailings Storage Facility
- Domain 3: Water Management Area
- Domain 4: Overburden Emplacement Area
- Domain 5: Active Mining Area (Open cut void)

Rehabilitation Phase

- Ecosystem and Land Use Establishment



Austar Coal ARR 2022

CMA 2 - Pelton CHPP - Inset 1

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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LEGEND

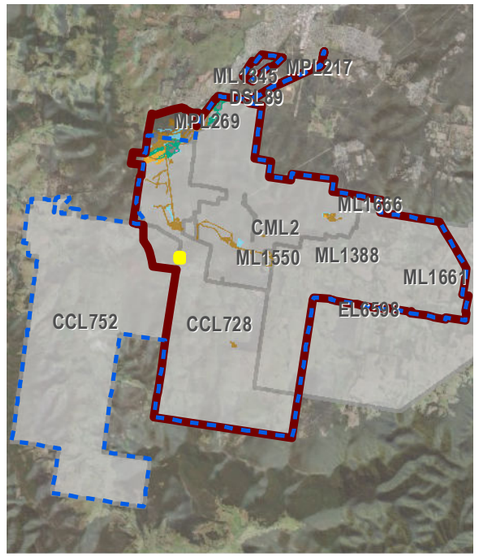
- Project Approval Boundary
- Colliery Holding Boundary
- Austar Mine Plan

Current Authorisations

- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area



Austar Coal ARR 2022

CMA 3 - No.1 Shaft - Inset

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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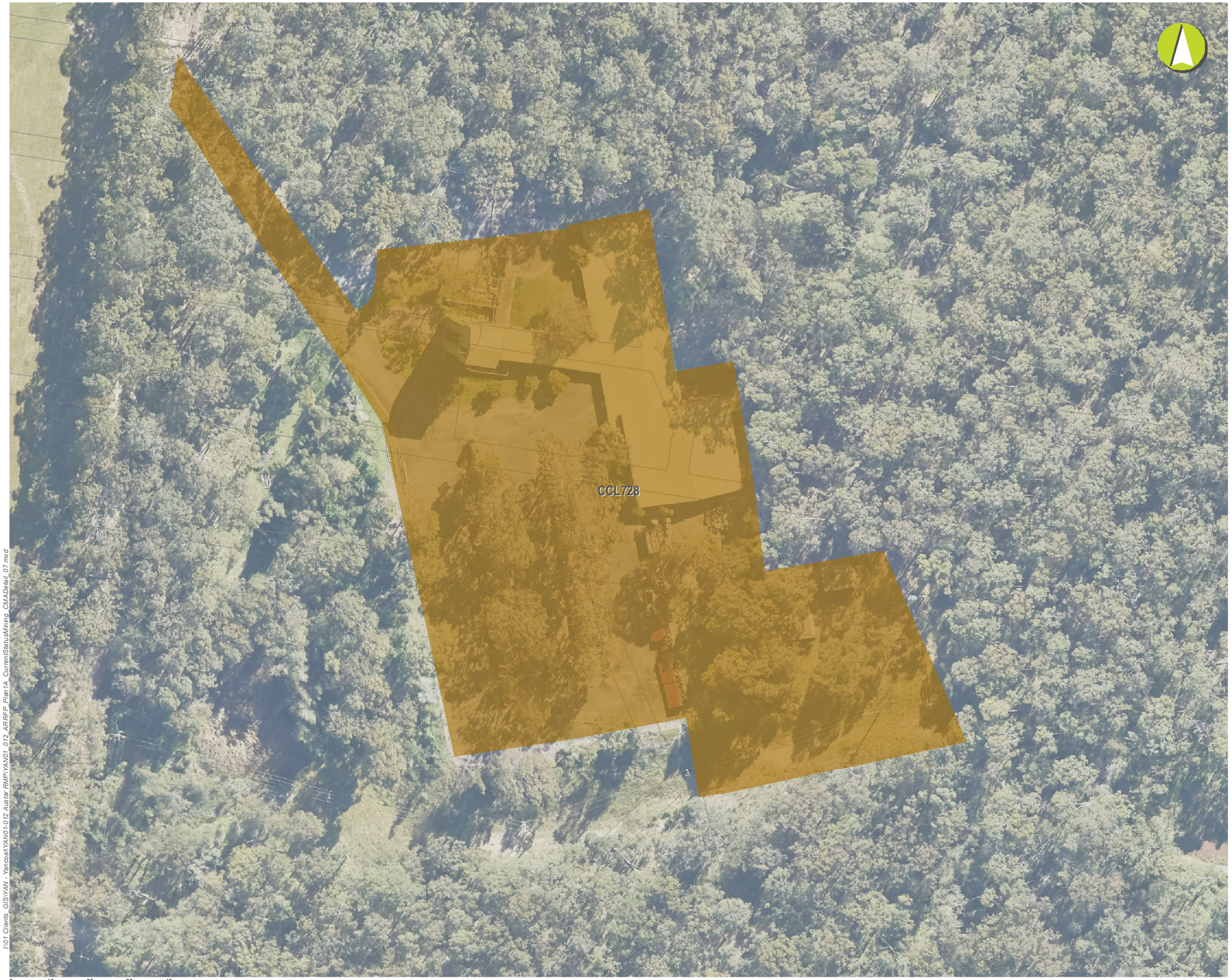


LEGEND

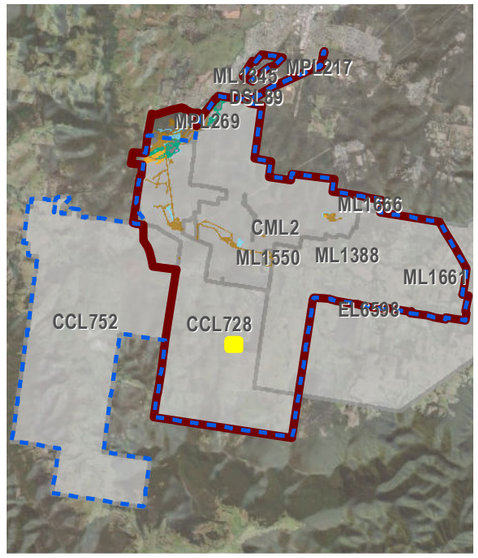
- Project Approval Boundary
- Colliery Holding Boundary
- Austar Mine Plan

Current Authorisations

- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area



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Austar Coal ARR 2022

CMA 4 - No.2 Shaft - Inset

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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ML1550
CCL728
EL6598

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LEGEND

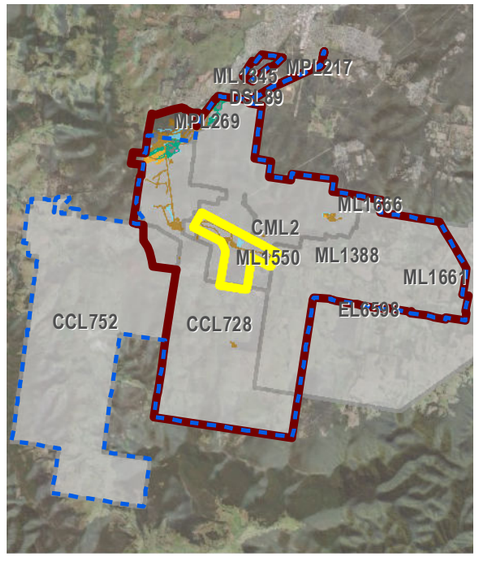
- Project Approval Boundary
- Colliery Holding Boundary
- Austar Mine Plan
- Completed workings

Current Authorisations

- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area
- Domain 3: Water Management Area



Austar Coal ARR 2022

CMA 5 - Cessnock No.1 Colliery / Kalingo Infrastructure Area

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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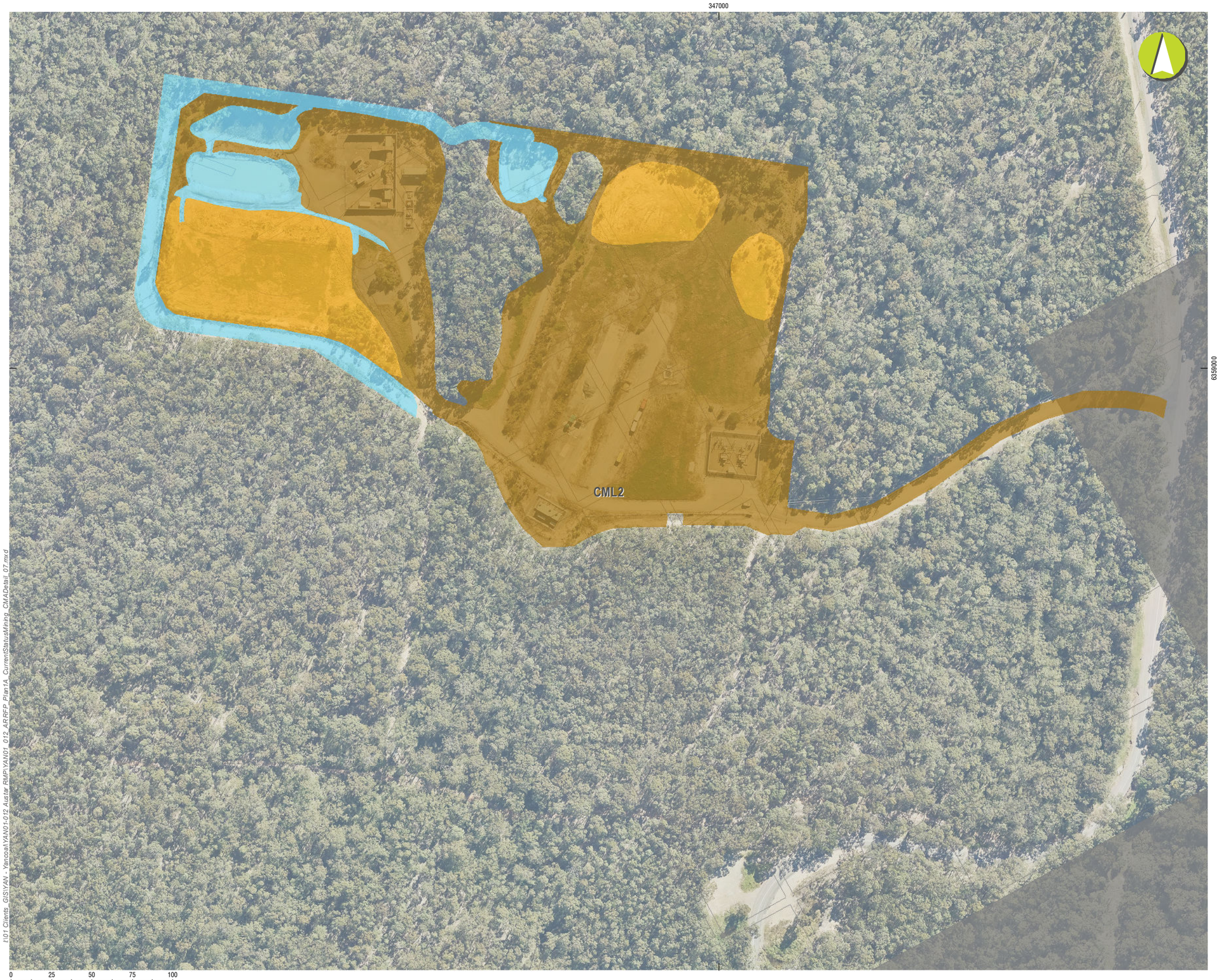

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LEGEND

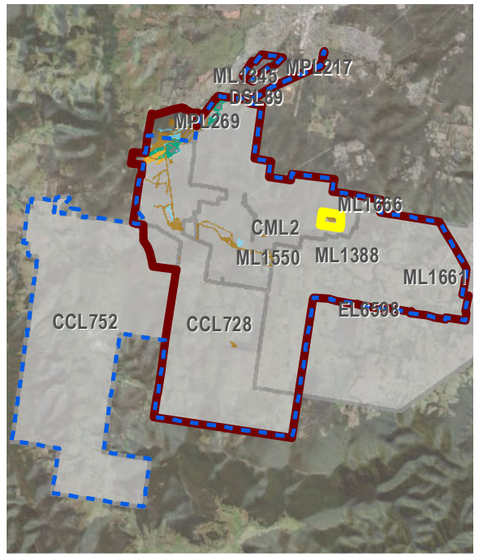
- Project Approval Boundary
- Colliery Holding Boundary
- Austar Mine Plan
- Completed workings

Current Authorisations

- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area
- Domain 3: Water Management Area
- Domain 4: Overburden Emplacement Area



Austar Coal ARR 2022

CMA 6 - Kitchener Surface Infrastructure Site

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

Sheet Size : A3

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Source:

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344000

345000

6384000

ML1345

MPL233

MPL204

ML1283

ML1157

0 50 100 150 200 m

Scale: 1:4,500

I:\01 Clients_GIS\YAN - Yancoal\YAN01-012 Austar RMP\YAN01_012_ARRFP_Plan1A_CurrentStatusMining_CMADetail_07.mxd

LEGEND

Project Approval Boundary

Colliery Holding Boundary

Current Authorisations

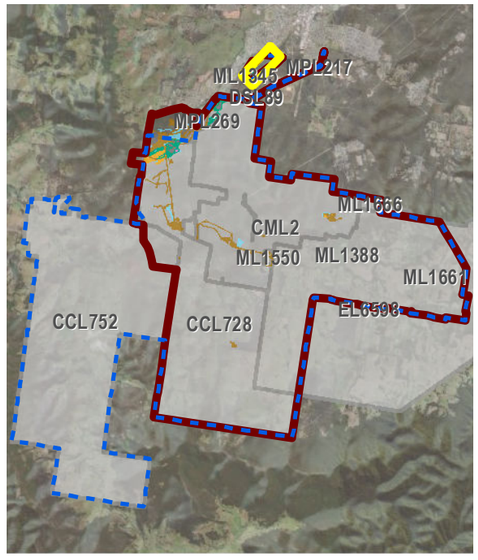
Coal - Current Titles

Mining Domain Type

Domain 2: Tailings Storage Facility

Rehabilitation Phase

Ecosystem and Land Use Establishment



Austar Coal ARR 2022

CMA 7 - Aberdare Extended Emplacement Area

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

INTEGRATED ENVIRONMENTAL MANAGEMENT AUSTRALIA
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Sheet Size : A3

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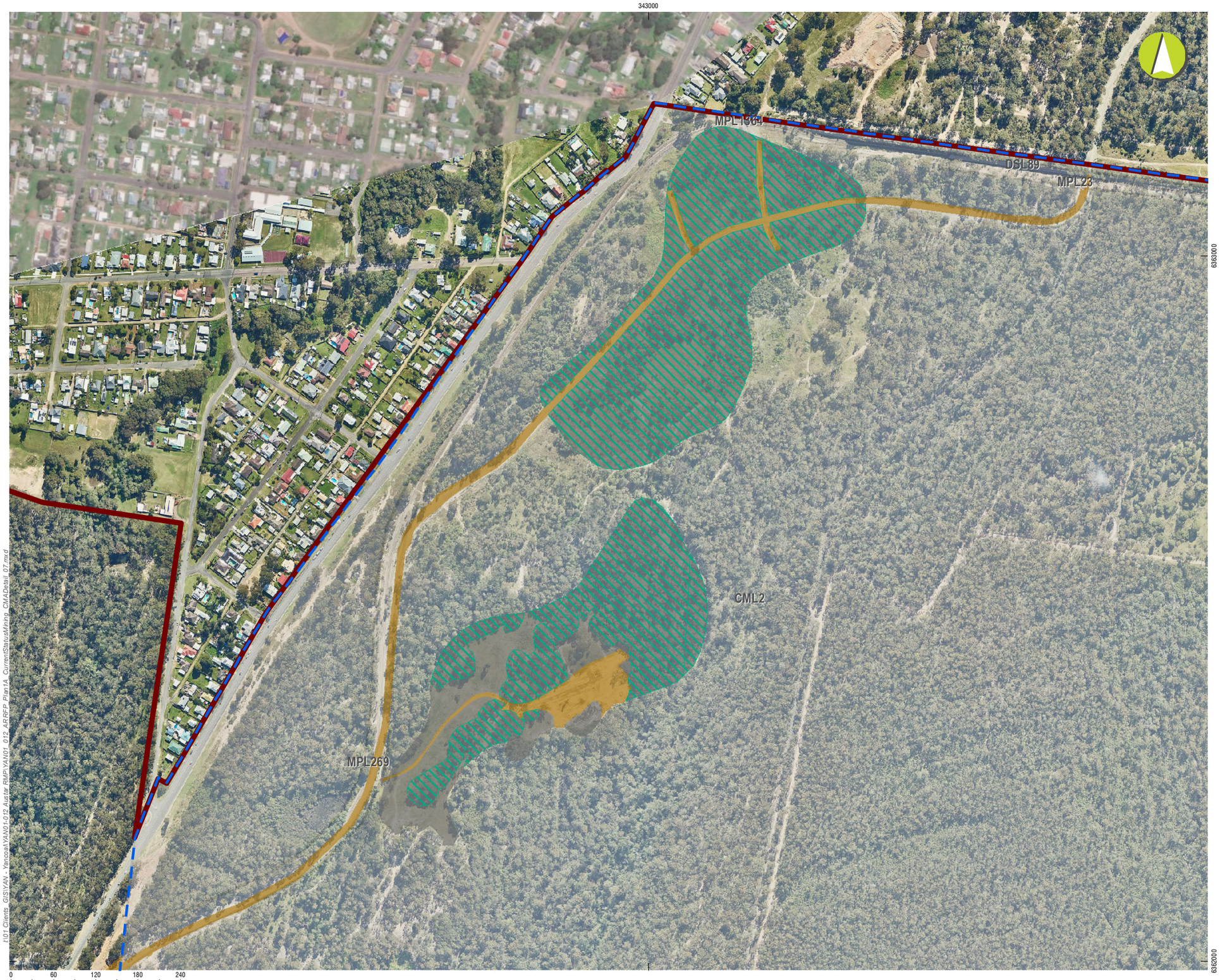


Scale: 1:5,500

LEGEND

- Project Approval Boundary
- Colliery Holding Boundary

Current Authorisations

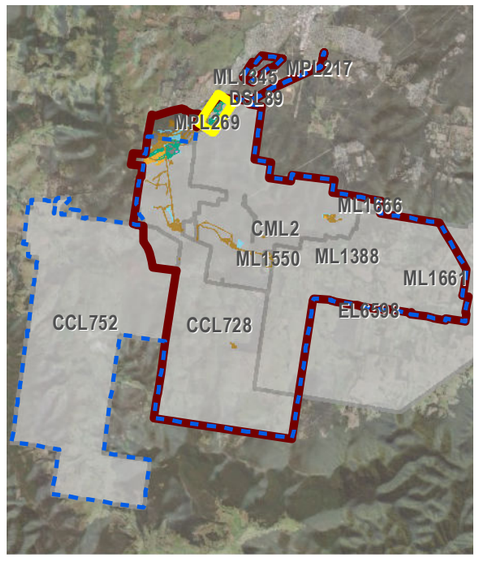
- Coal - Current Titles

Mining Domain Type

- Domain 1: Infrastructure Area
- Domain 2: Tailings Storage Facility

Rehabilitation Phase

- Ecosystem and Land Use Establishment



Austar Coal ARR 2022

CMA 8 - Bellbird Areas 12 and 13 - Inset

Current Status of Mining and Rehabilitation

PLAN 1A

Mine name	Austar Coal Mine
Plan name	Annual Rehabilitation Report 2022
Year of anticipated relinquishment	TBA on final submission
Data theme submission ID No.	2258 / 2133
Spatial Reference	GDA2020 MGA Zone 56
Plan date (date created)	27/09/2022

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Sheet Size : A3

Source:

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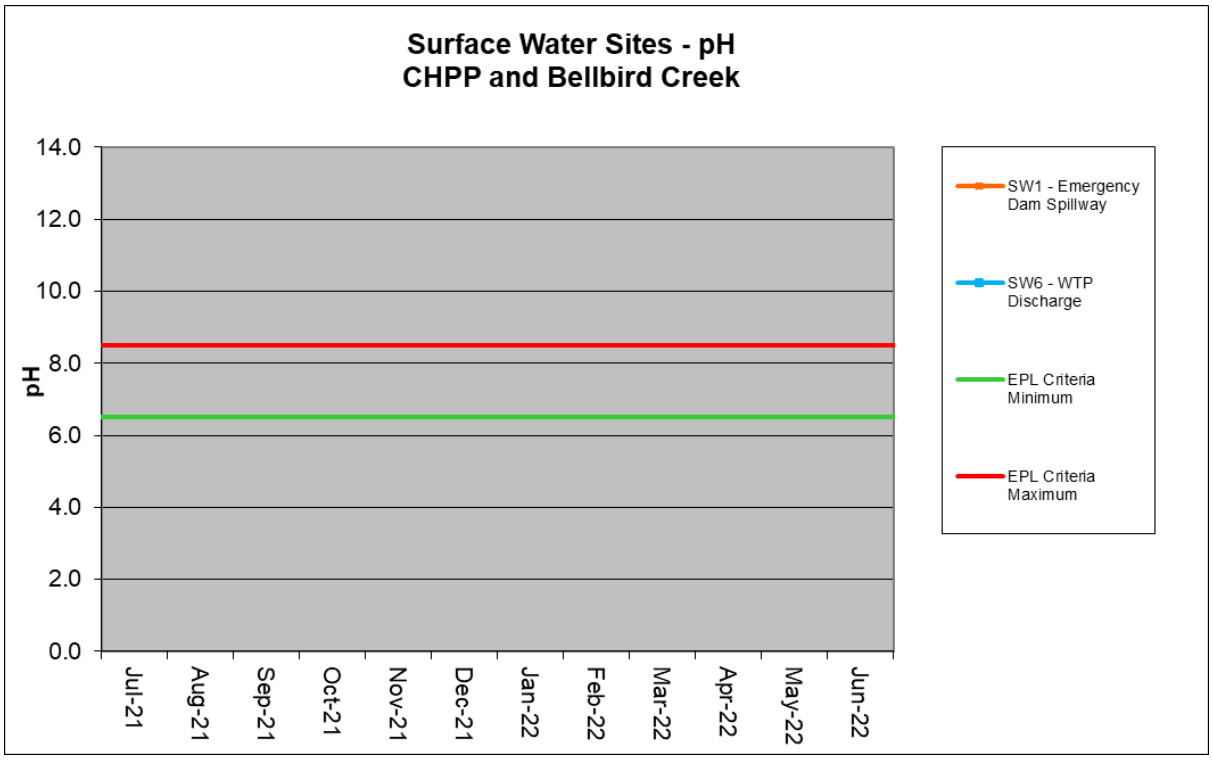
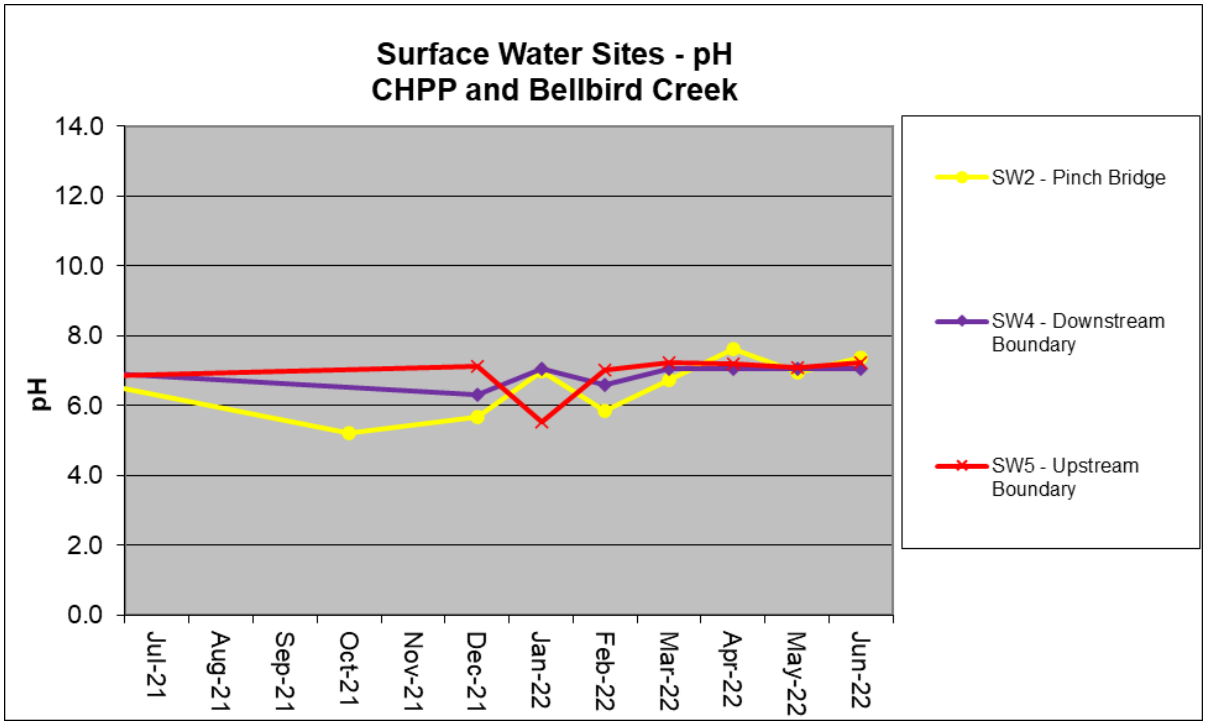
Appendices

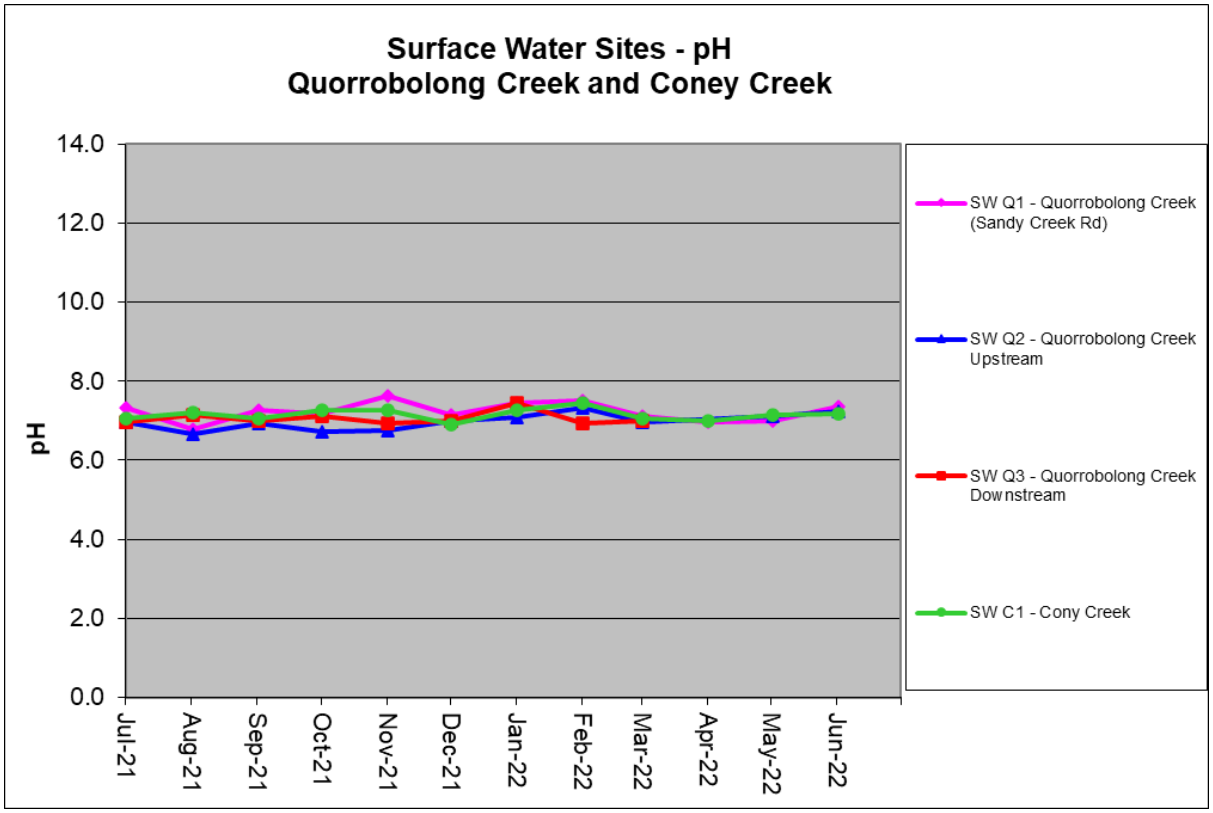
Appendix A

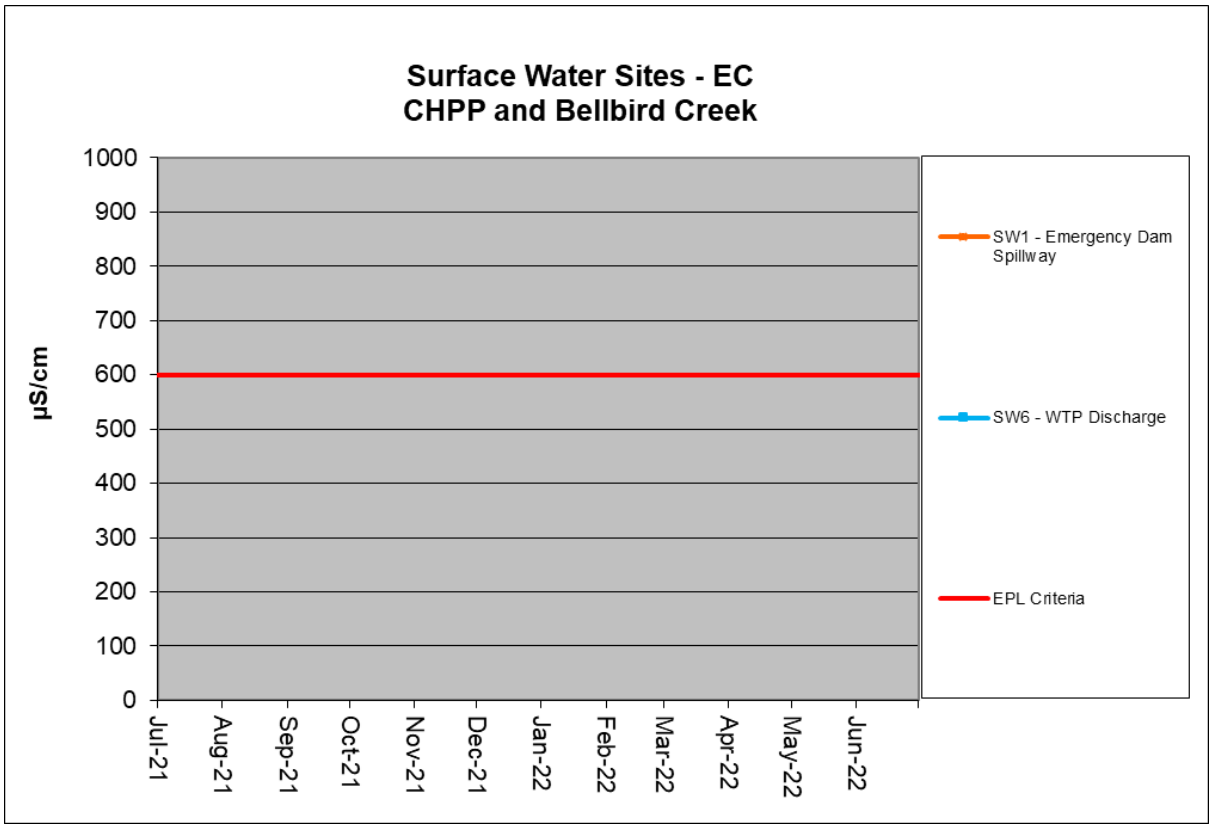
Surface Water Quality Graphs

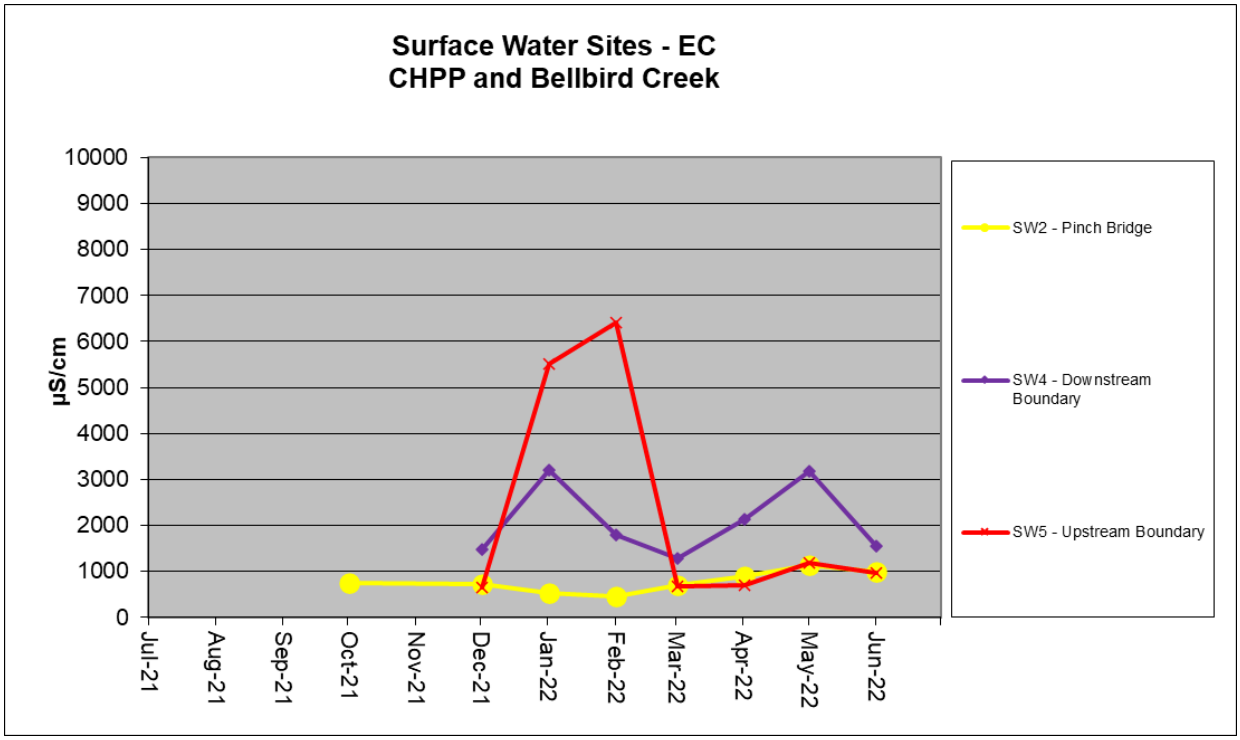
Surface Water Graphs, 2021 – 2022

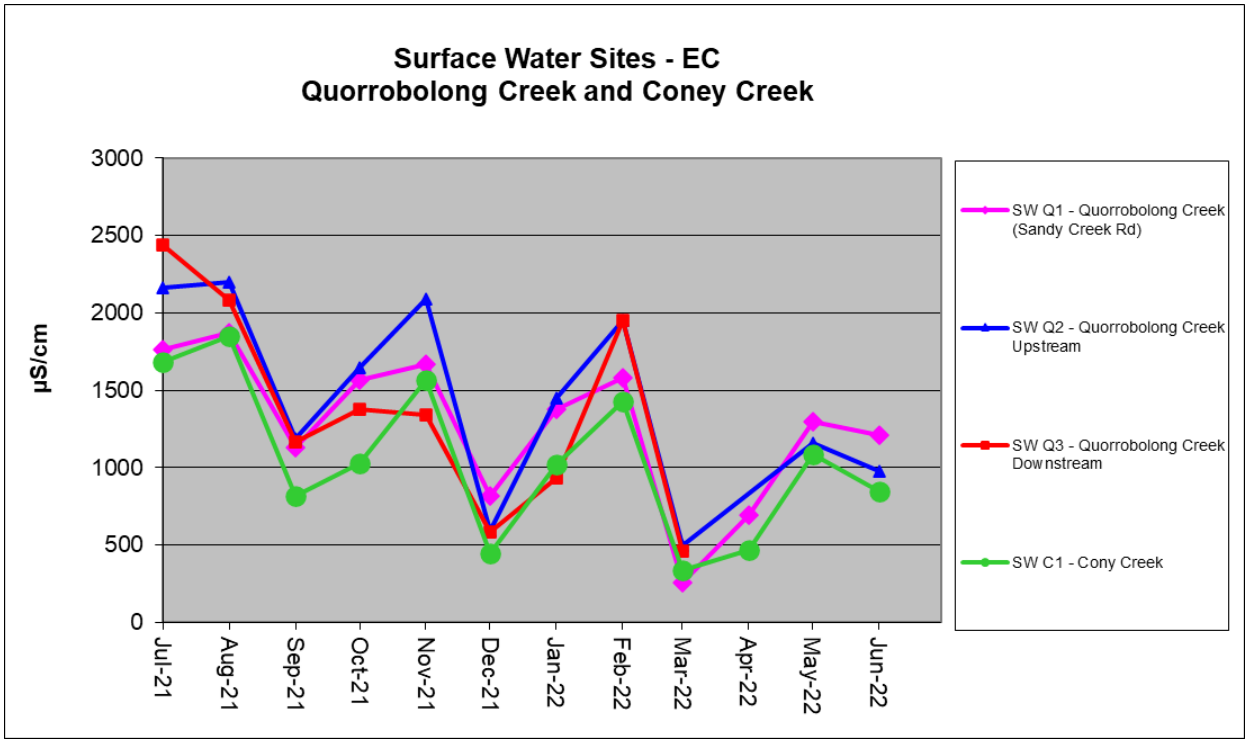


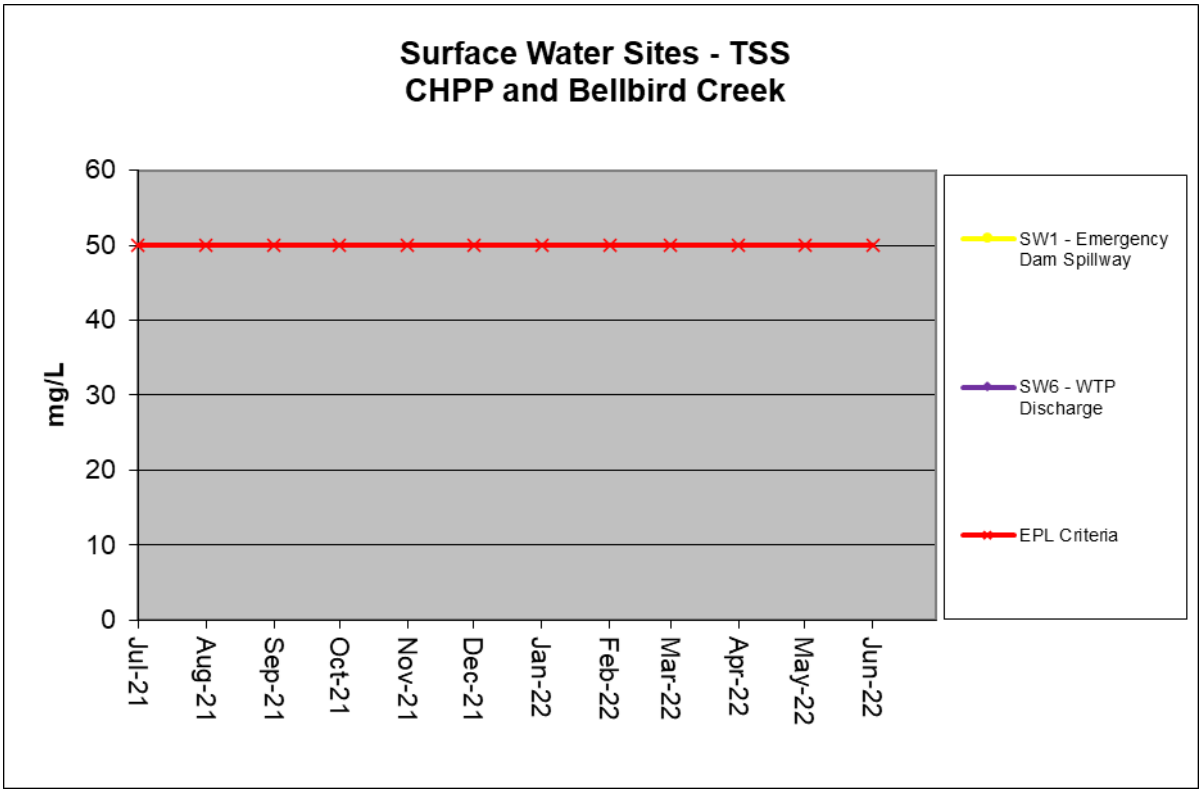


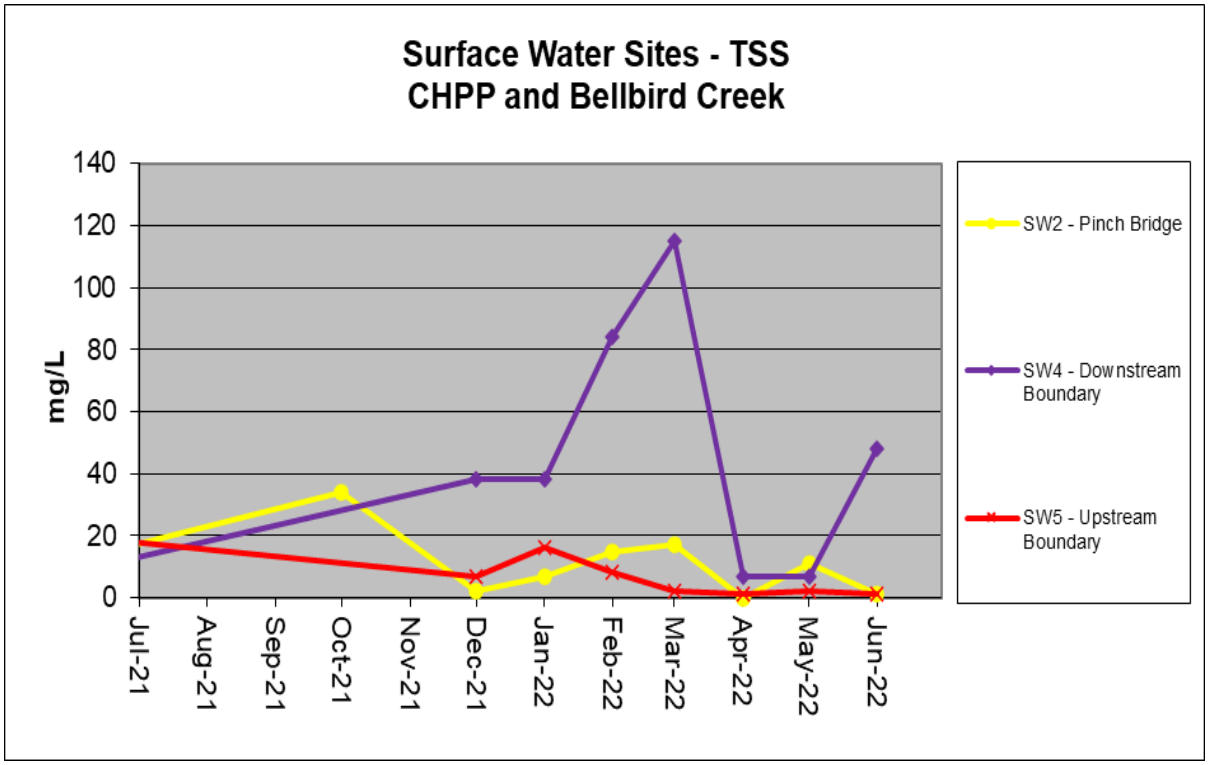

Surface Water Sites - pH
Quorrobolong Creek and Coney Creek
pH
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

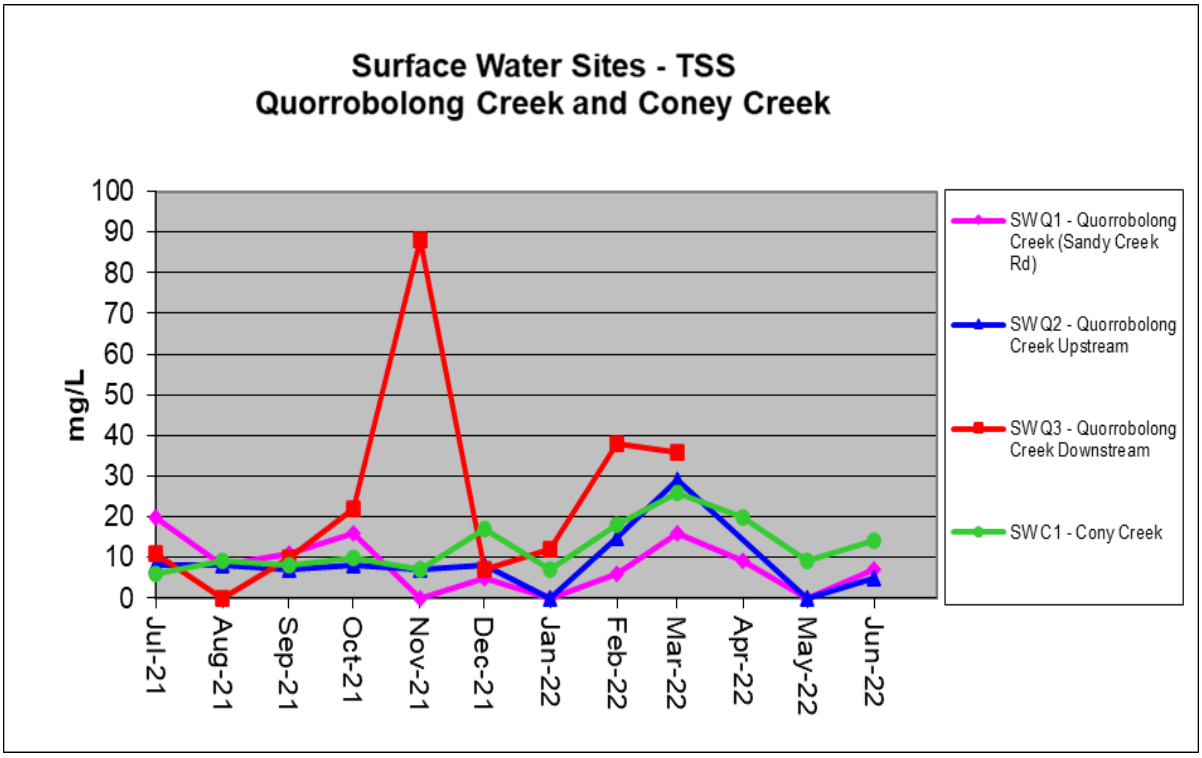

Surface Water Sites - EC
CHPP and Bellbird Creek
µS/cm
1000
900
800
700
600
500
400
300
200
100
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria

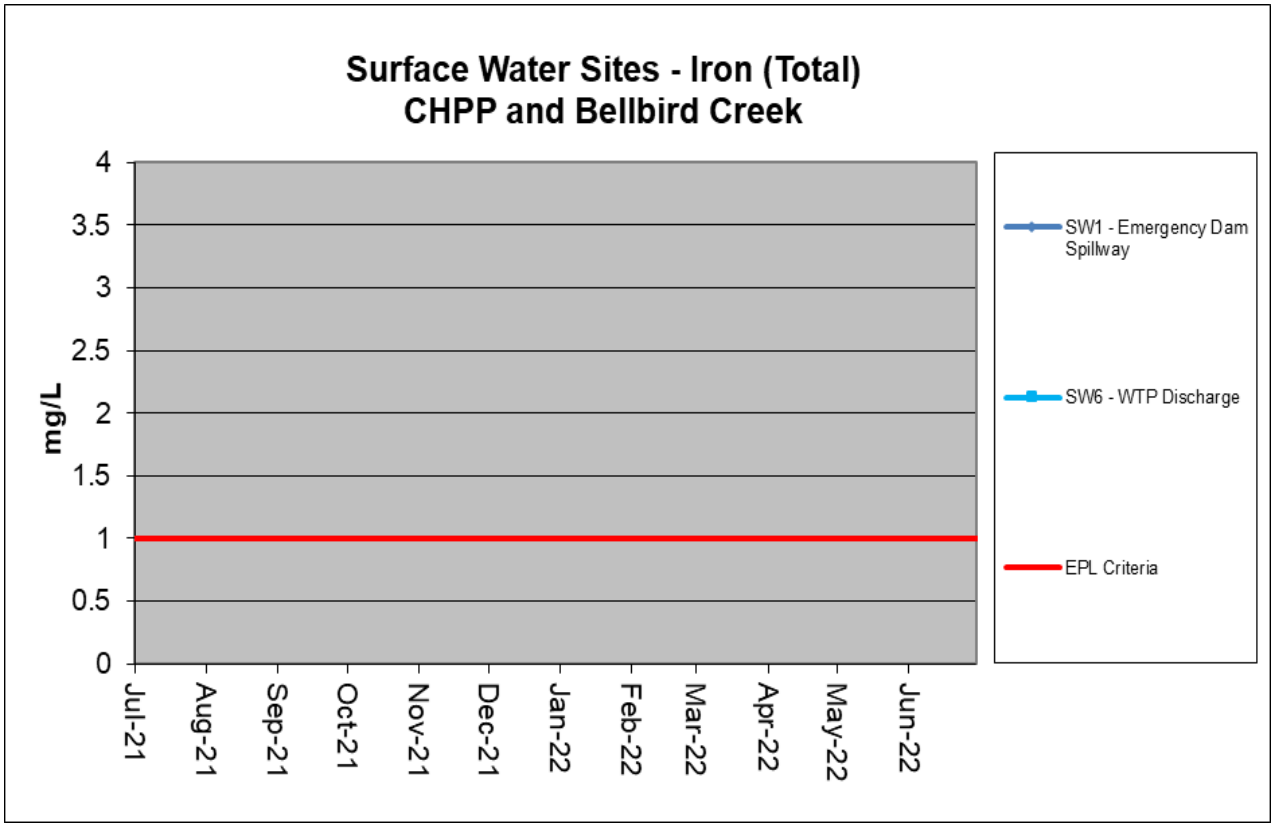

Surface Water Sites - EC
CHPP and Bellbird Creek
µS/cm
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary

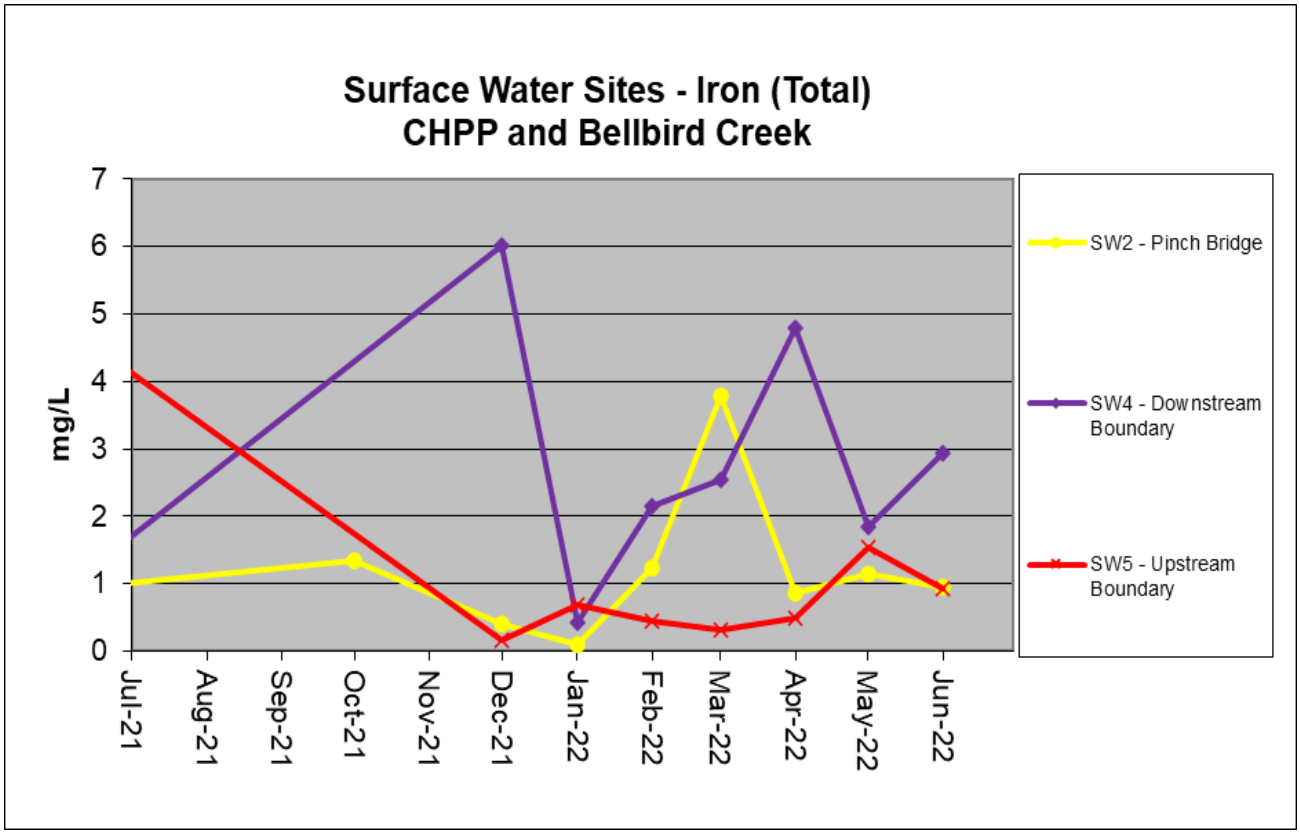

Surface Water Sites - EC
Quorrobolong Creek and Coney Creek
µS/cm
3000
2500
2000
1500
1000
500
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

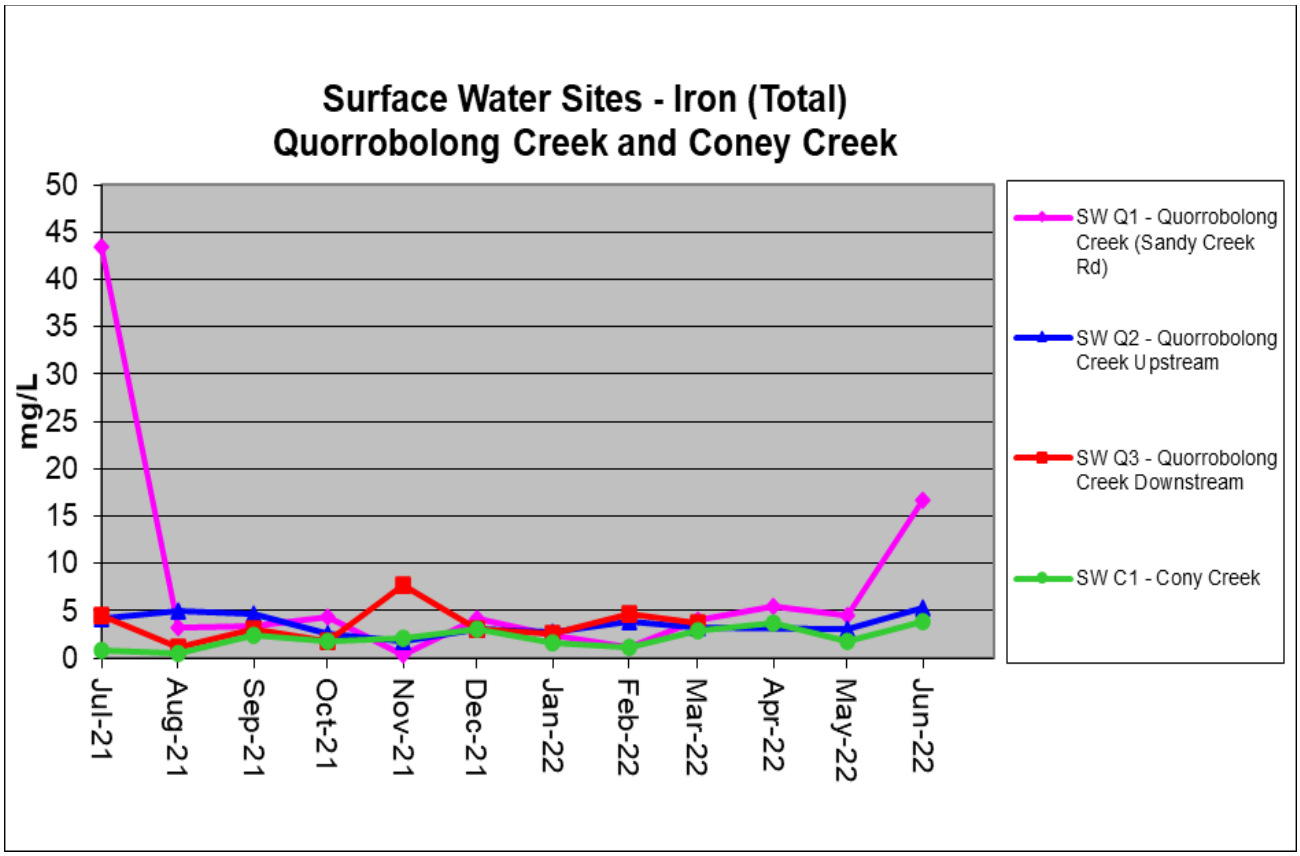

Surface Water Sites - TSS
CHPP and Bellbird Creek
mg/L
60
50
40
30
20
10
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria


Surface Water Sites - TSS
CHPP and Bellbird Creek
mg/L
140
120
100
80
60
40
20
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary

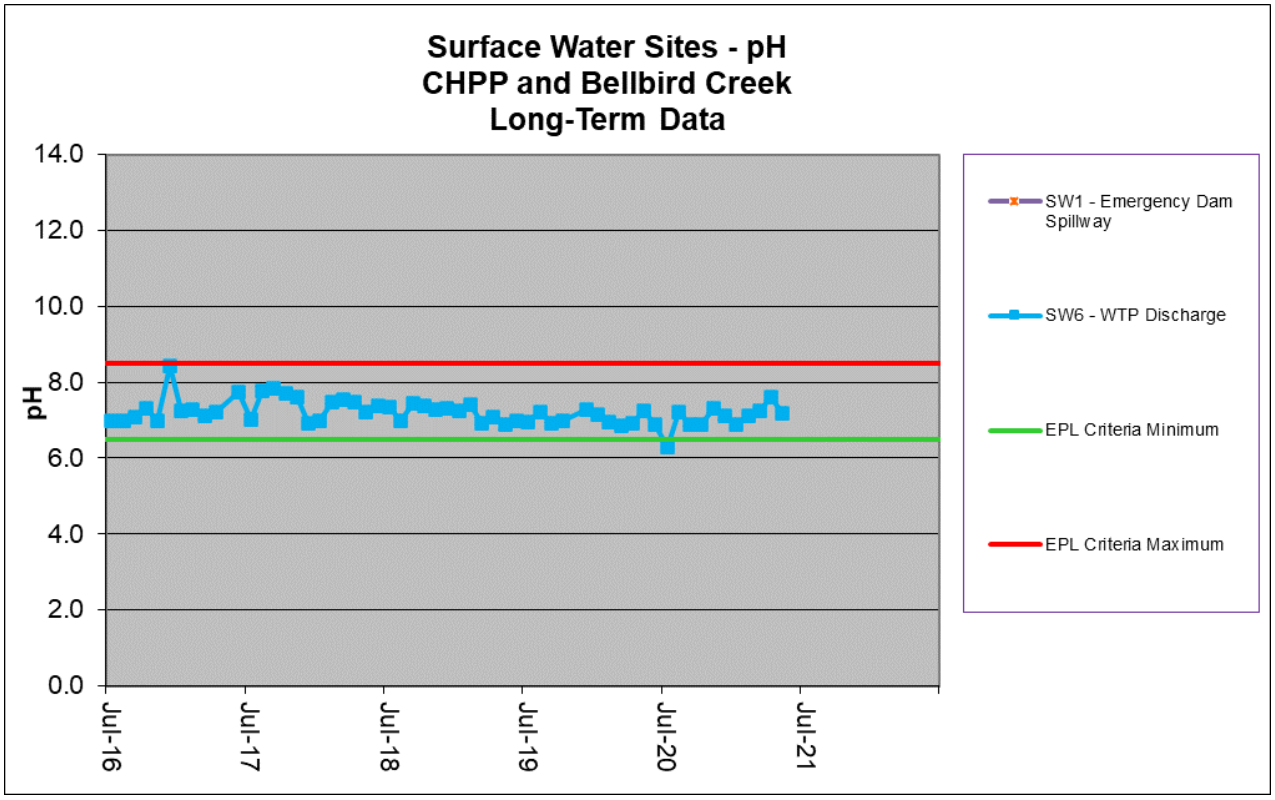

Surface Water Sites - TSS
Quorrobolong Creek and Coney Creek
mg/L
100
90
80
70
60
50
40
30
20
10
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SWQ1 - Quorrobolong Creek (Sandy Creek Rd)
SWQ2 - Quorrobolong Creek Upstream
SWQ3 - Quorrobolong Creek Downstream
SWC1 - Cony Creek

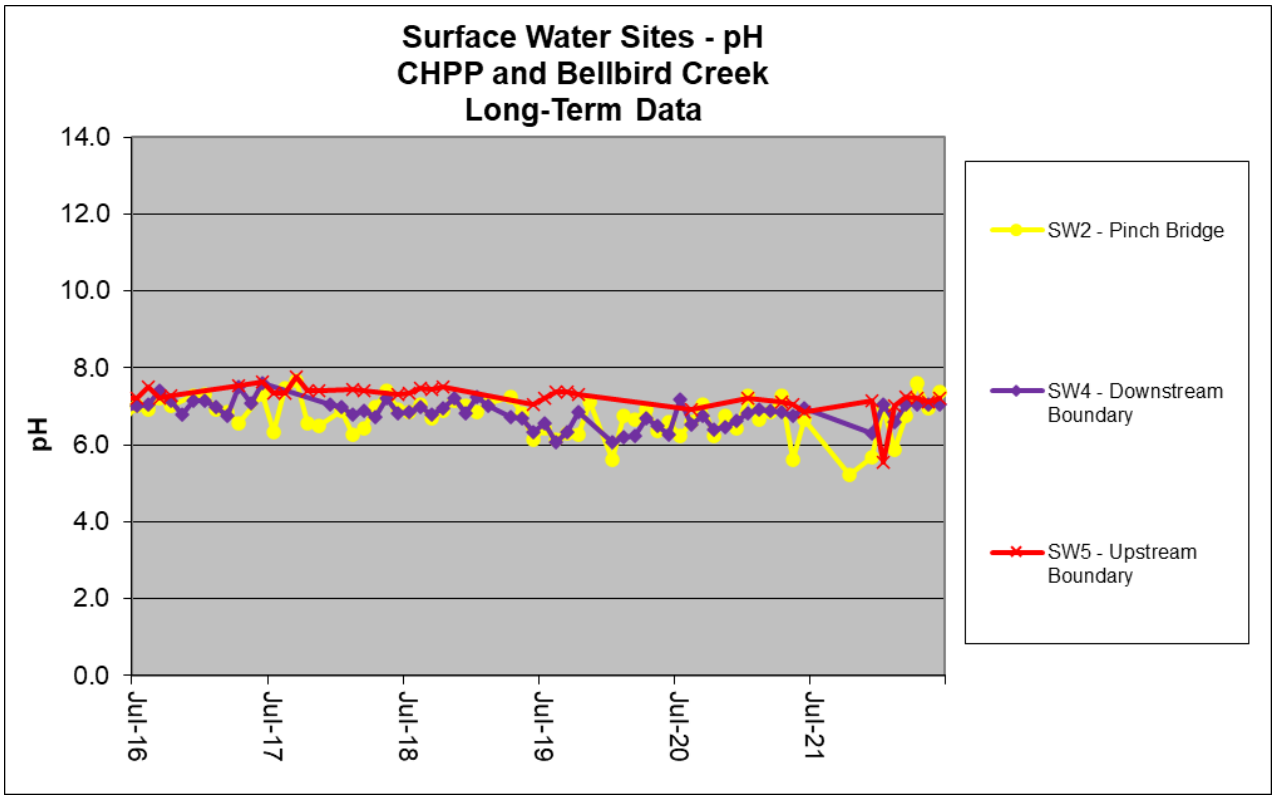

Surface Water Sites - Iron (Total)
CHPP and Bellbird Creek
mg/L
4
3.5
3
2.5
2
1.5
1
0.5
0
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria

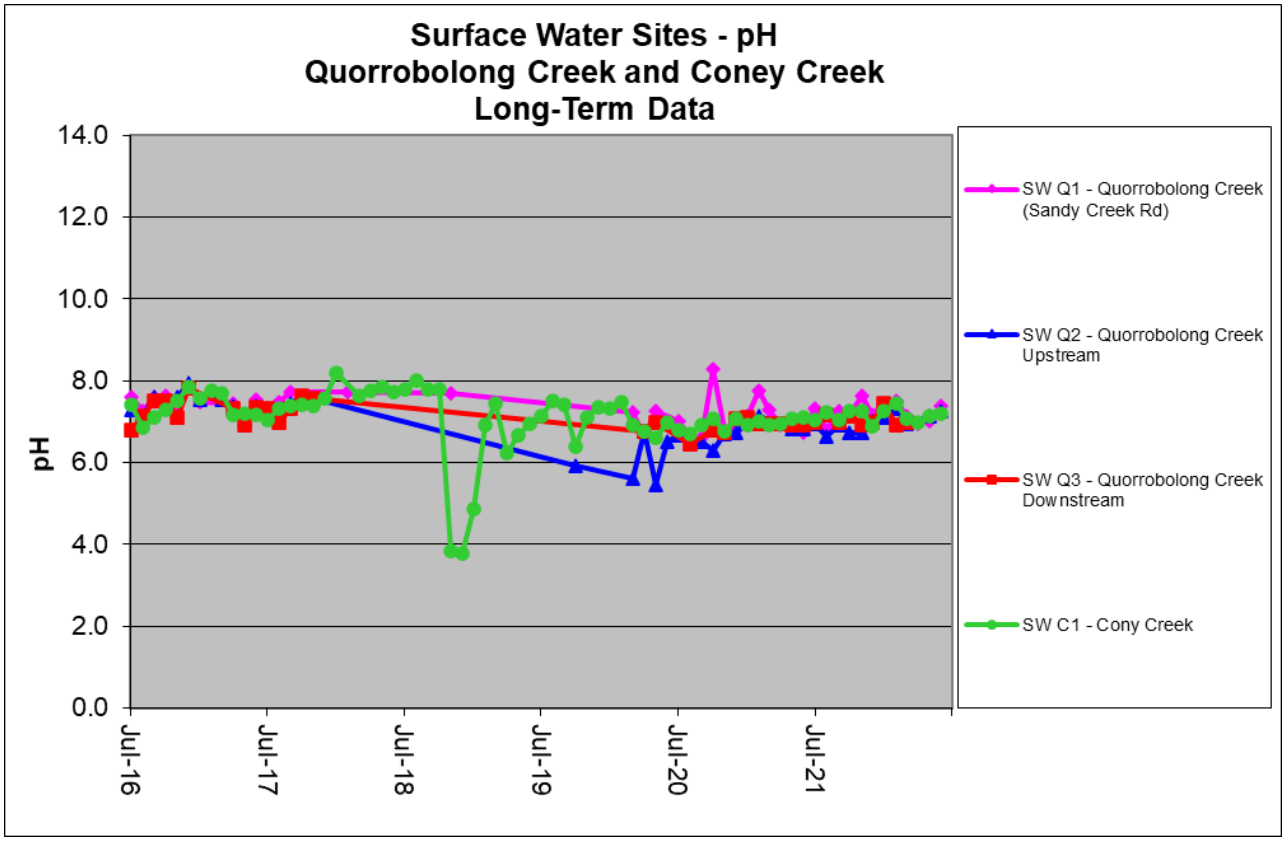

Surface Water Sites - Iron (Total)
CHPP and Bellbird Creek
mg/L
0
1
2
3
4
5
6
7
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary

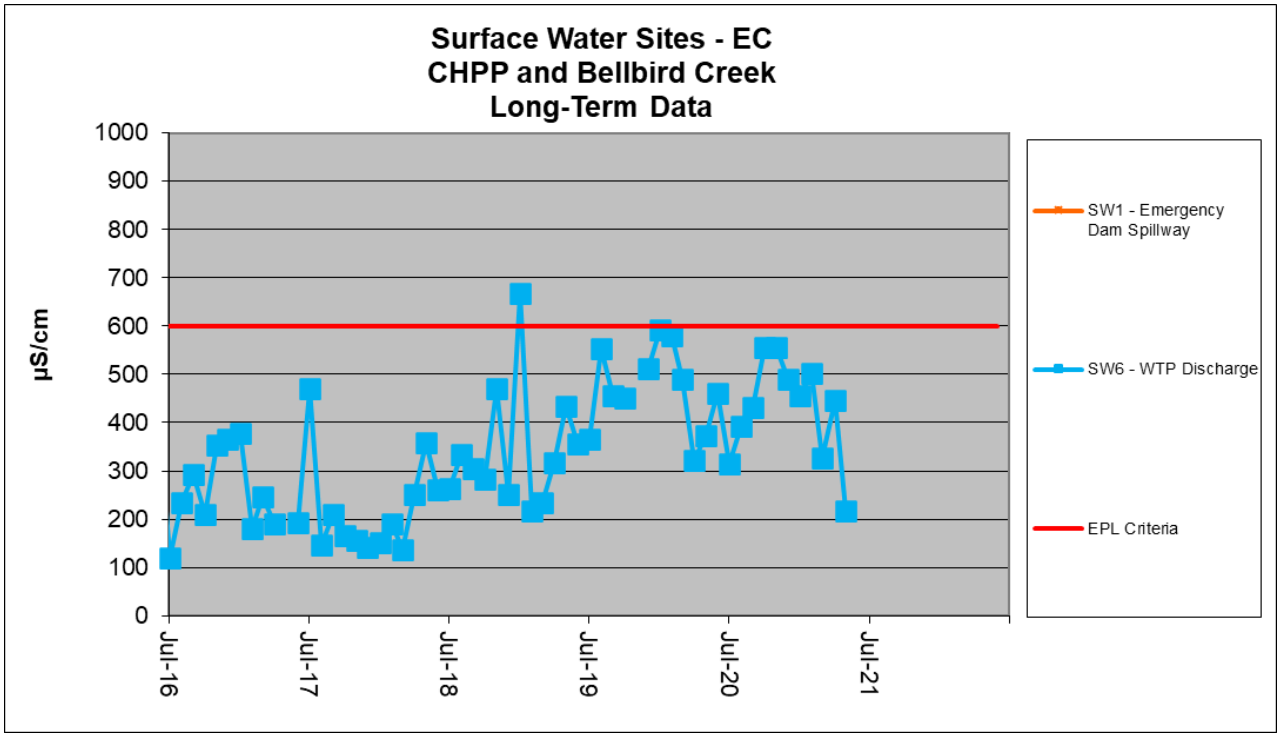

Surface Water Sites - Iron (Total)
Quorrobolong Creek and Coney Creek
mg/L
0
5
10
15
20
25
30
35
40
45
50
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

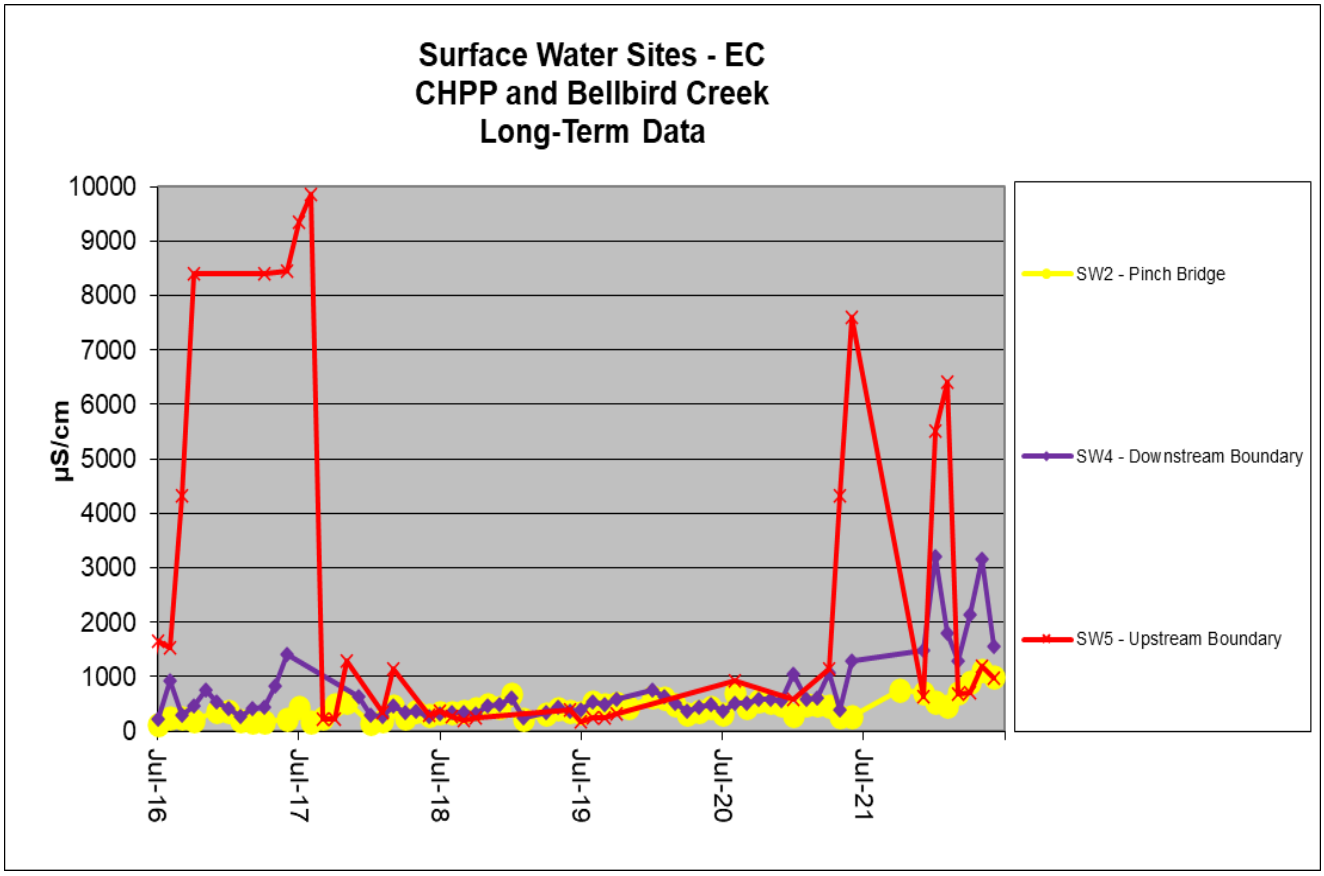
Long Term Surface Water Graphs, 2016-2022

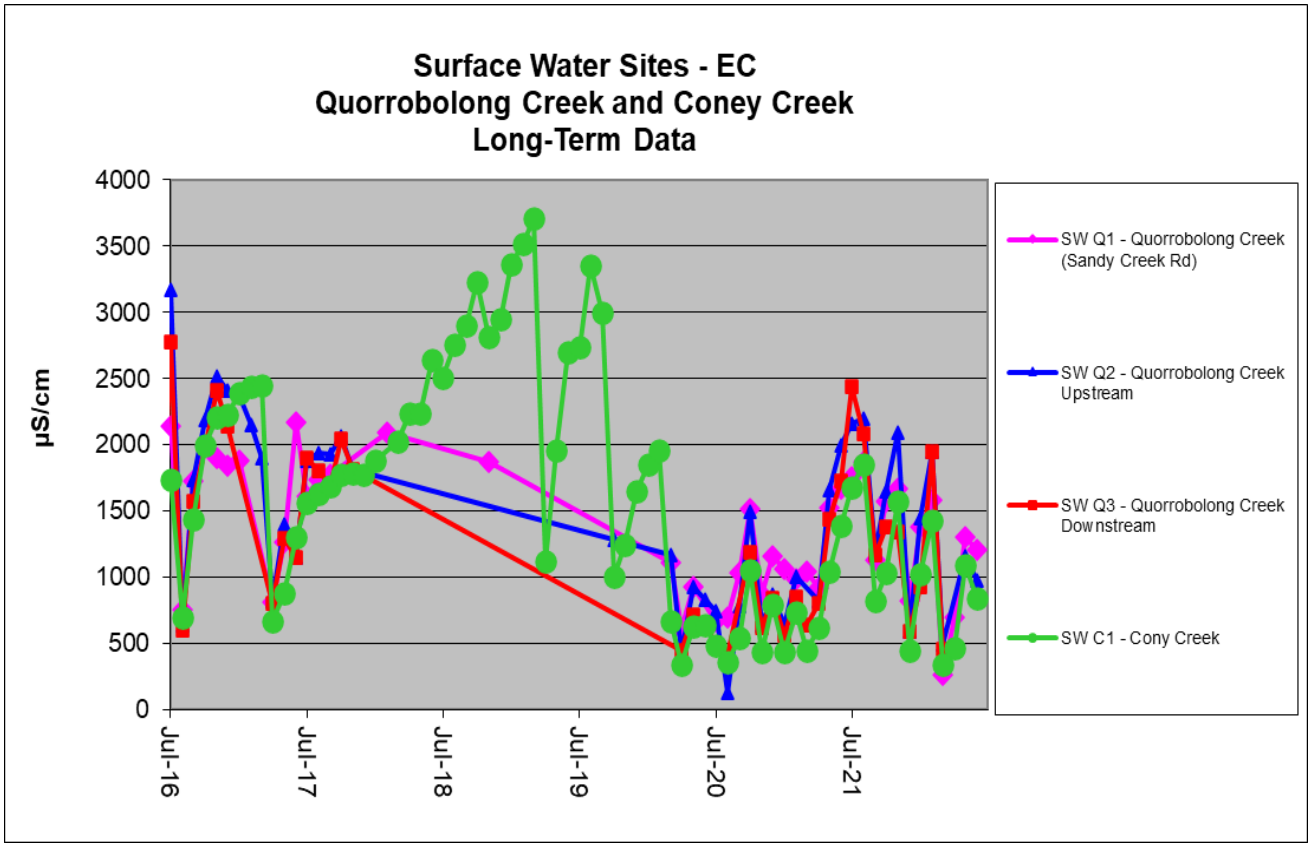


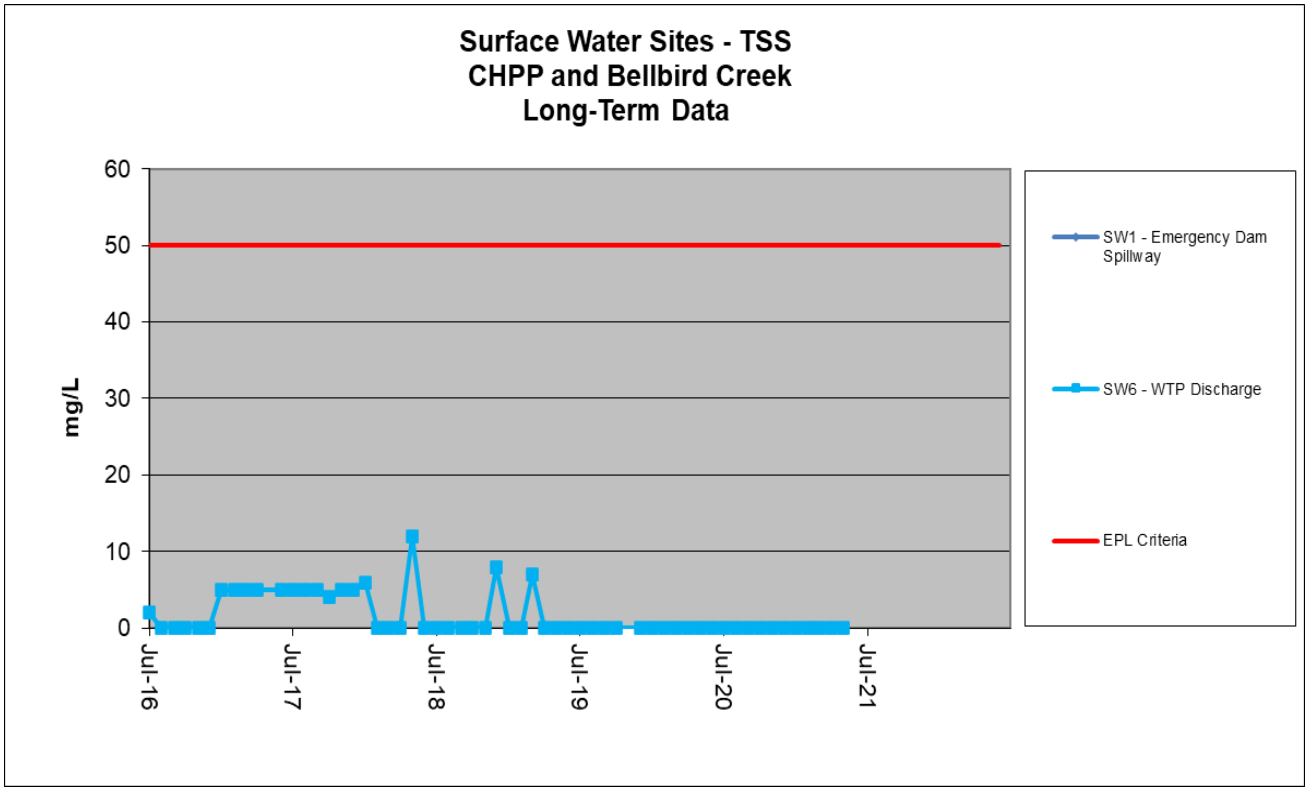


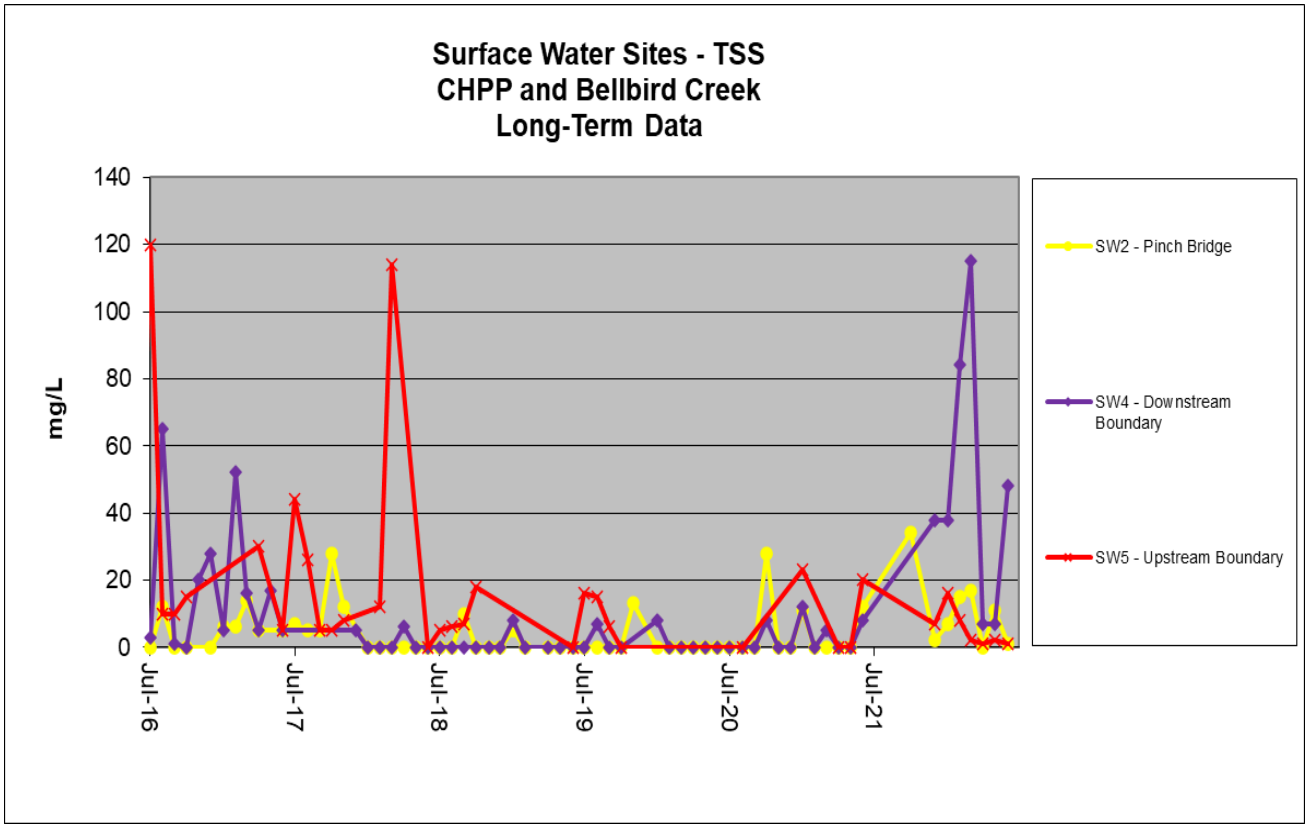

Surface Water Sites - pH
Quorrobolong Creek and Coney Creek
Long-Term Data
pH
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

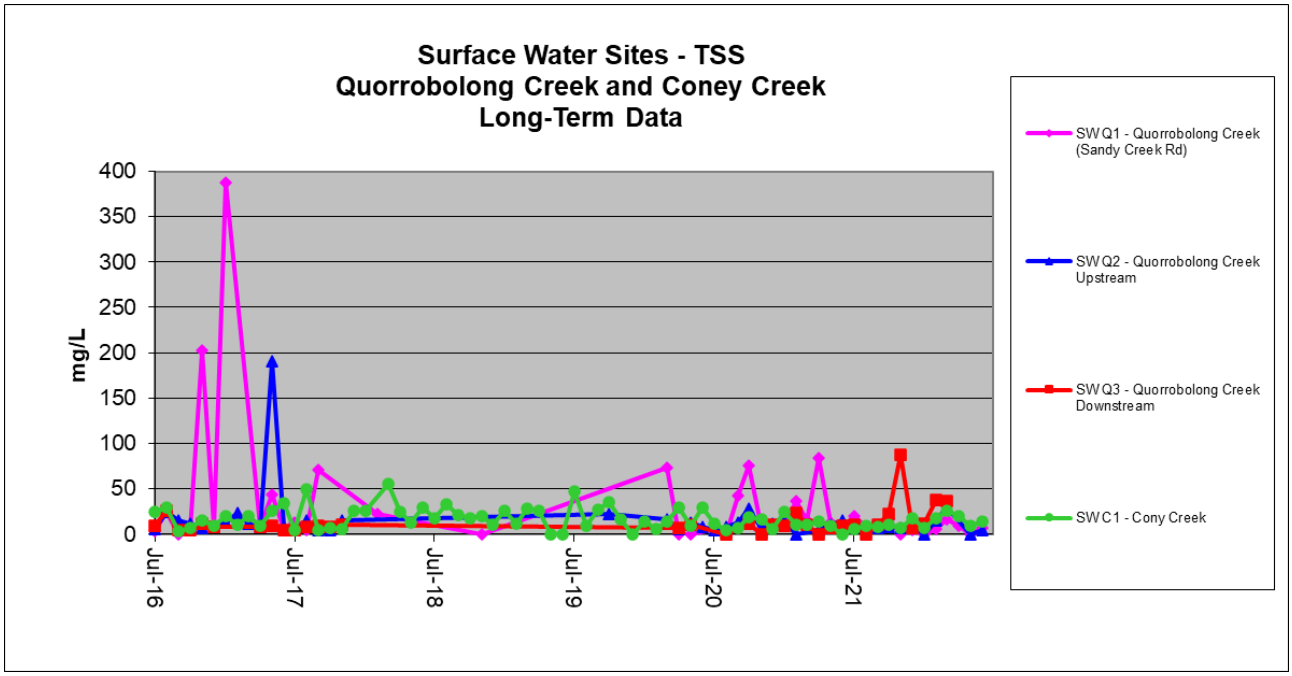

Surface Water Sites - EC
CHPP and Bellbird Creek
Long-Term Data
µS/cm
1000
900
800
700
600
500
400
300
200
100
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria

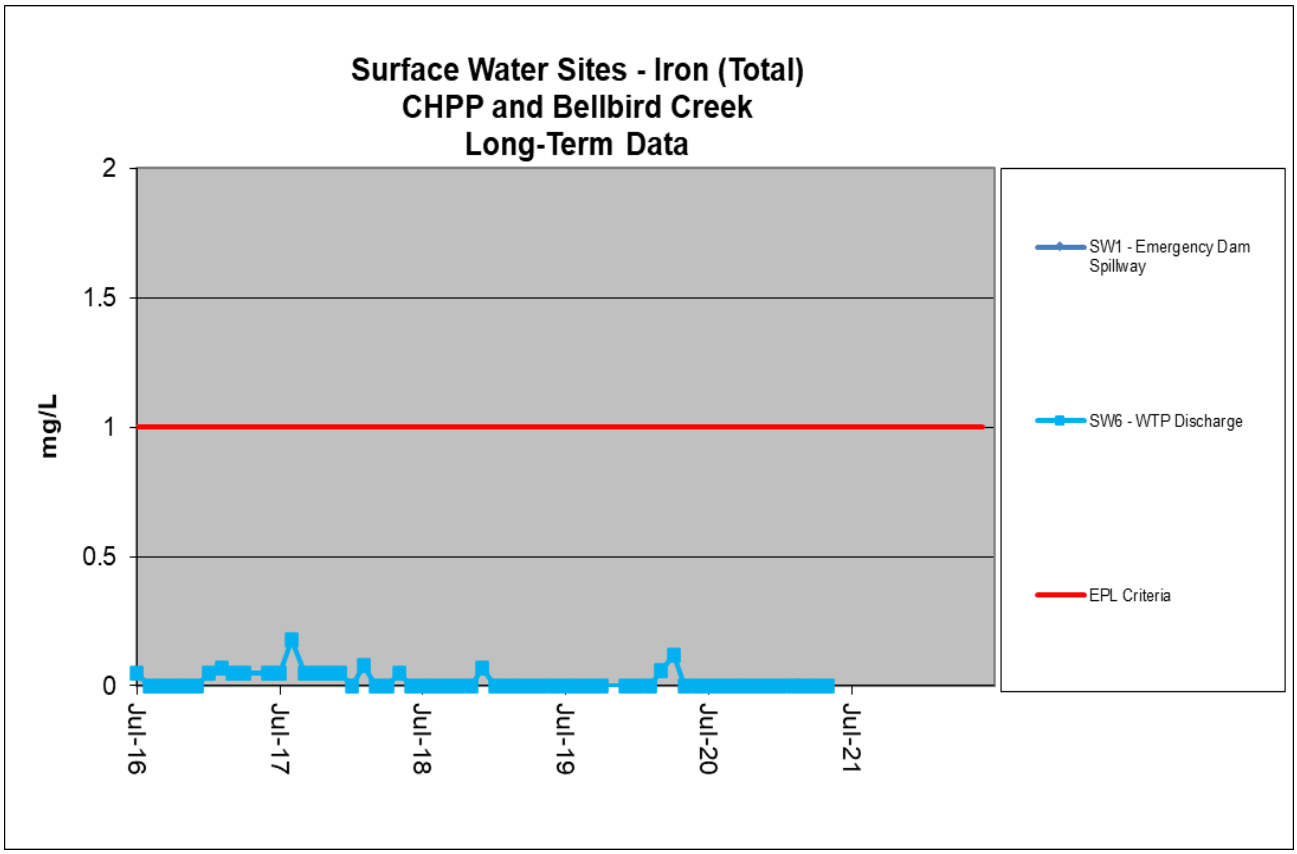

Surface Water Sites - EC
CHPP and Bellbird Creek
Long-Term Data
µS/cm
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary

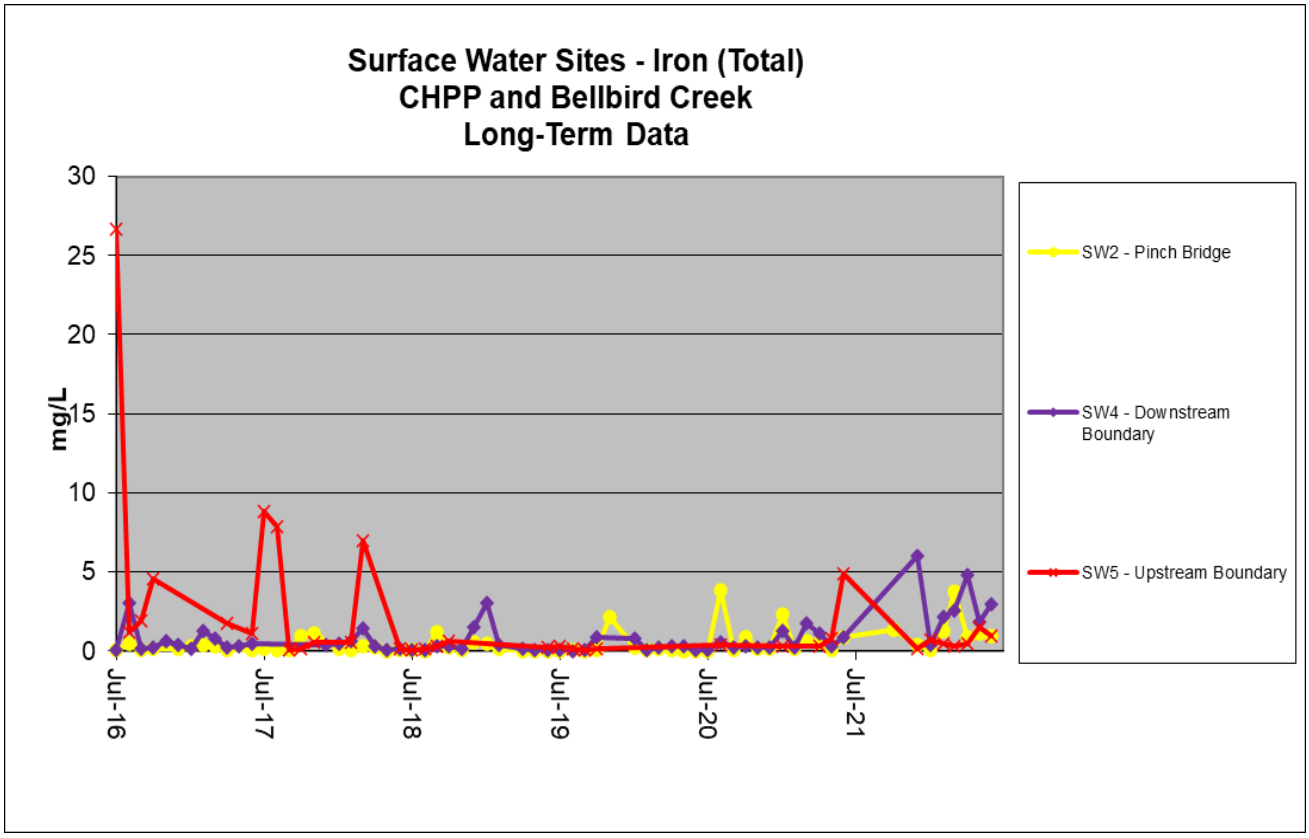

Surface Water Sites - EC
Quorrobolong Creek and Coney Creek
Long-Term Data
µS/cm
4000
3500
3000
2500
2000
1500
1000
500
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

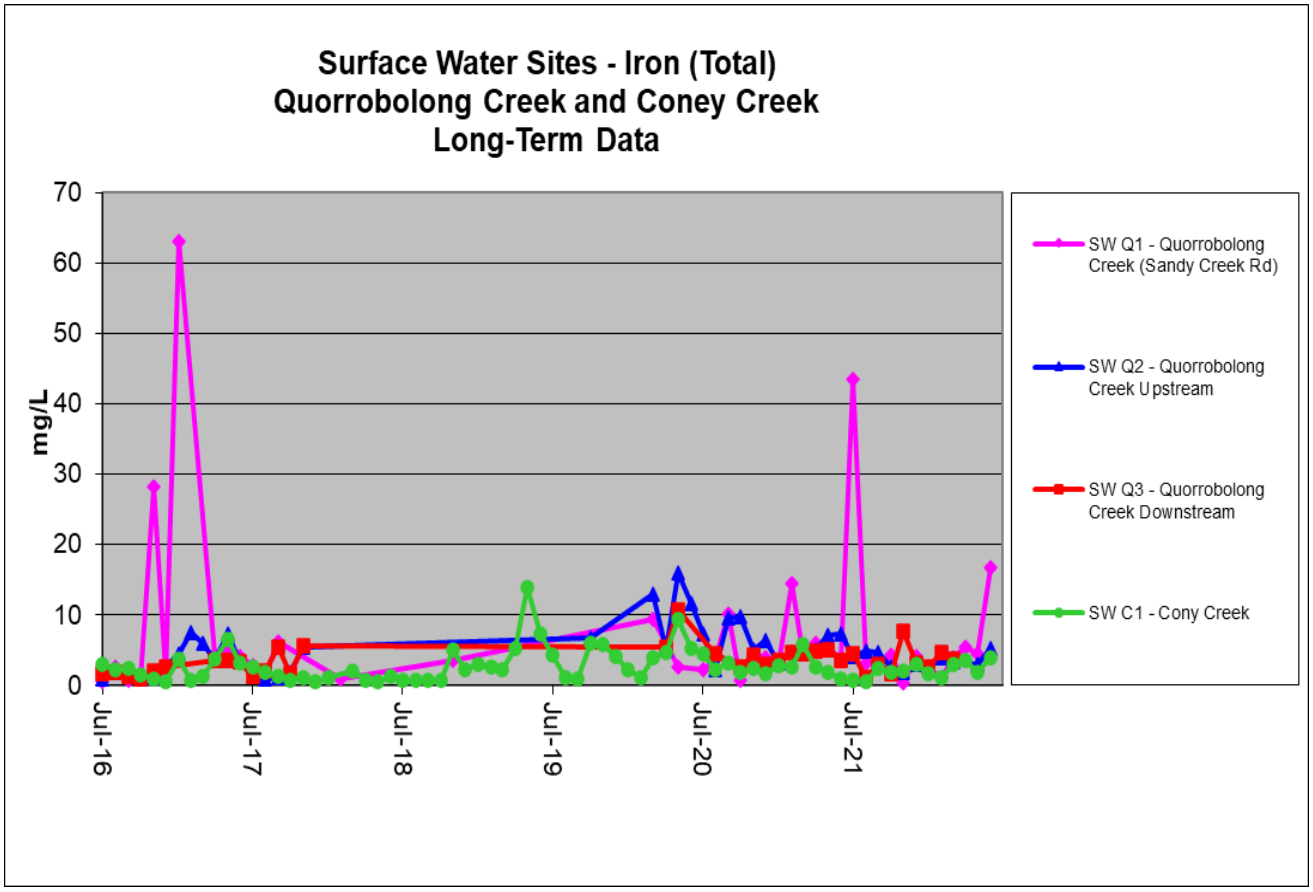

Surface Water Sites - TSS
CHPP and Bellbird Creek
Long-Term Data
mg/L
60
50
40
30
20
10
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria


Surface Water Sites - TSS
CHPP and Bellbird Creek
Long-Term Data
mg/L
140
120
100
80
60
40
20
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary


Surface Water Sites - TSS
Quorrobolong Creek and Coney Creek
Long-Term Data
mg/L
400
350
300
250
200
150
100
50
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SWQ1 - Quorrobolong Creek (Sandy Creek Rd)
SWQ2 - Quorrobolong Creek Upstream
SWQ3 - Quorrobolong Creek Downstream
SWC1 - Cony Creek


Surface Water Sites - Iron (Total)
CHPP and Bellbird Creek
Long-Term Data
mg/L
2
1.5
1
0.5
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW1 - Emergency Dam Spillway
SW6 - WTP Discharge
EPL Criteria


Surface Water Sites - Iron (Total)
CHPP and Bellbird Creek
Long-Term Data
mg/L
30
25
20
15
10
5
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW2 - Pinch Bridge
SW4 - Downstream Boundary
SW5 - Upstream Boundary


Surface Water Sites - Iron (Total)
Quorrobolong Creek and Coney Creek
Long-Term Data
mg/L
70
60
50
40
30
20
10
0
Jul-16
Jul-17
Jul-18
Jul-19
Jul-20
Jul-21
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)
SW Q2 - Quorrobolong Creek Upstream
SW Q3 - Quorrobolong Creek Downstream
SW C1 - Cony Creek

Appendix B

Groundwater Level and Quality Graphs

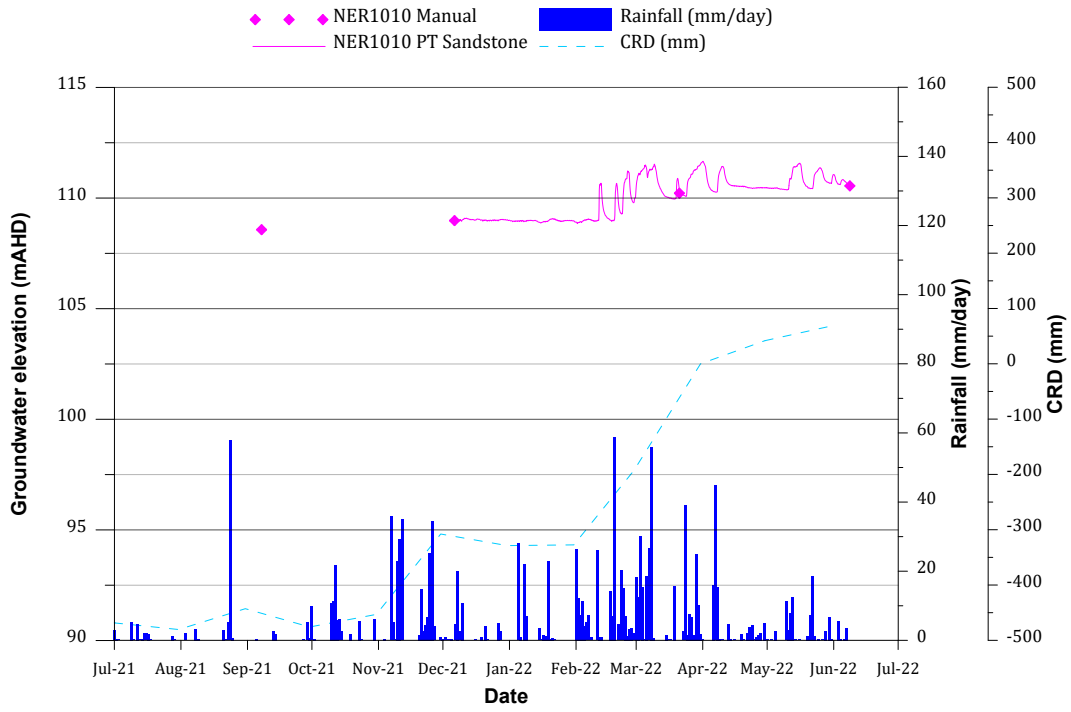


FIGURE 12-1 NER1010 GROUNDWATER LEVEL HYDROGRAPH

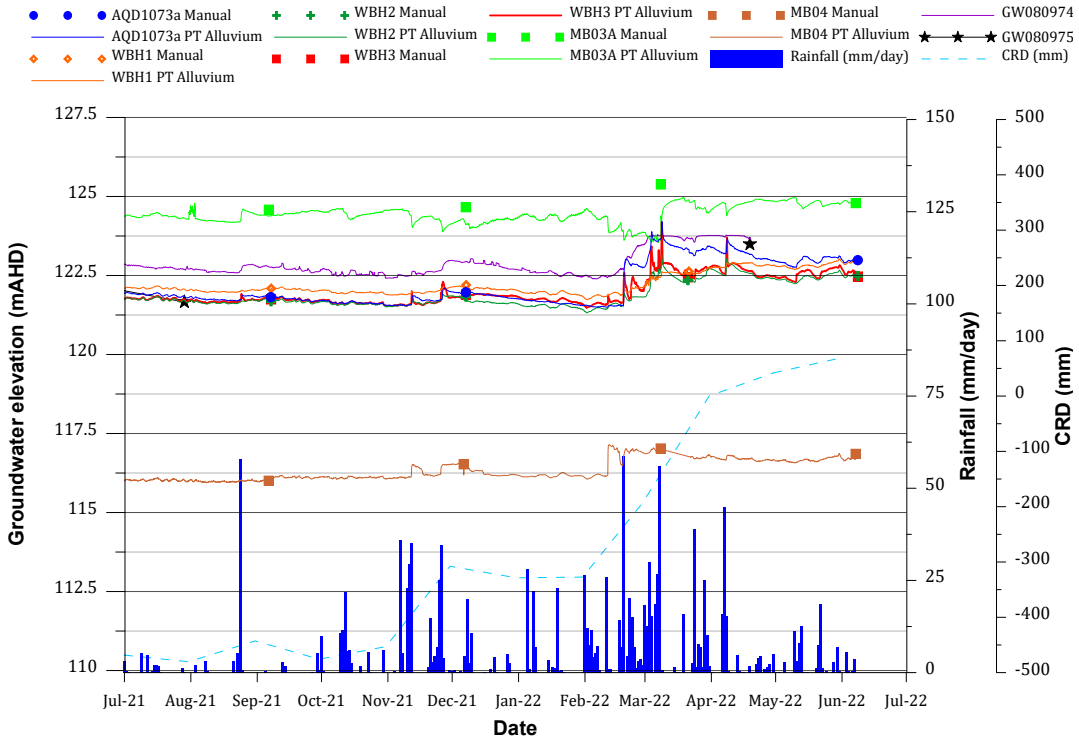


FIGURE 12.2 STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND WATERNSW GROUNDWATER LEVEL HYDROGRAPHS

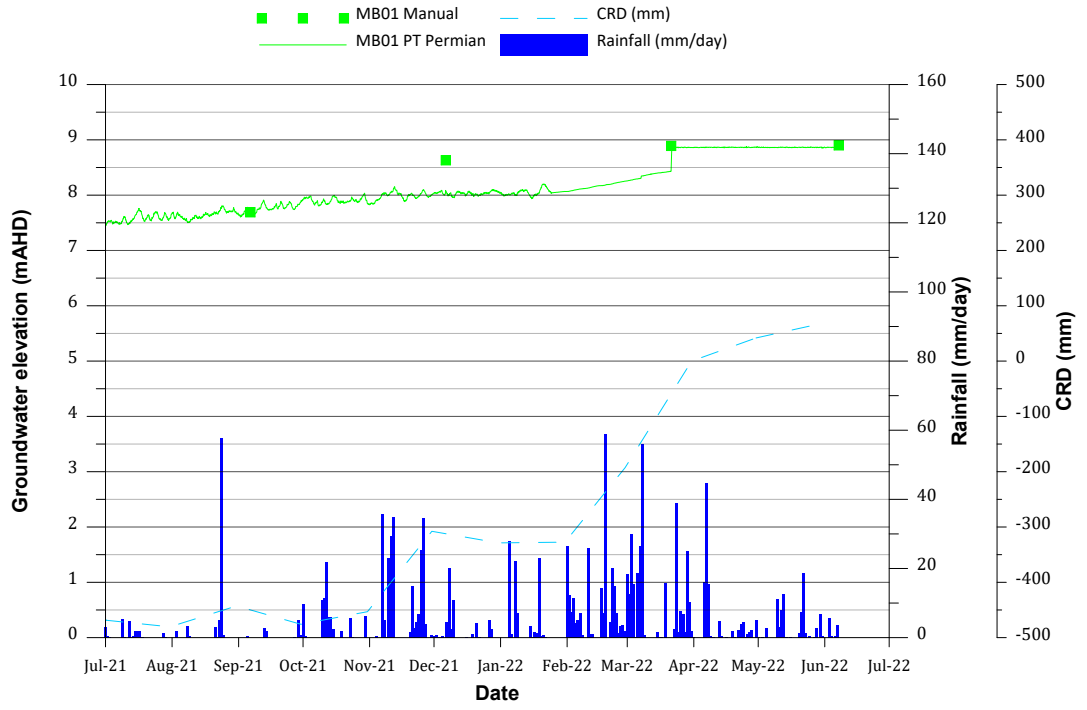


FIGURE 12.3 STAGE 3 MB01 SANDSTONE AQUIFER GROUNDWATER LEVEL HYDROGRAPH

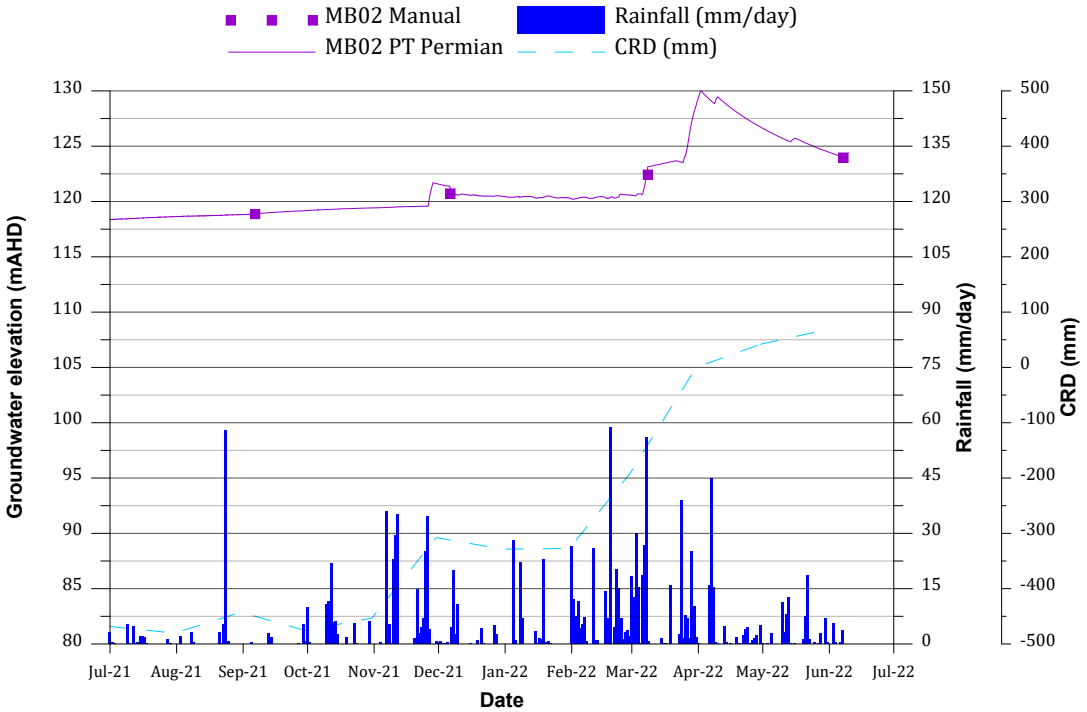


FIGURE 12.4 STAGE 3 MB02 SANDSTONE AQUIFER GROUNDWATER LEVEL HYDROGRAPH

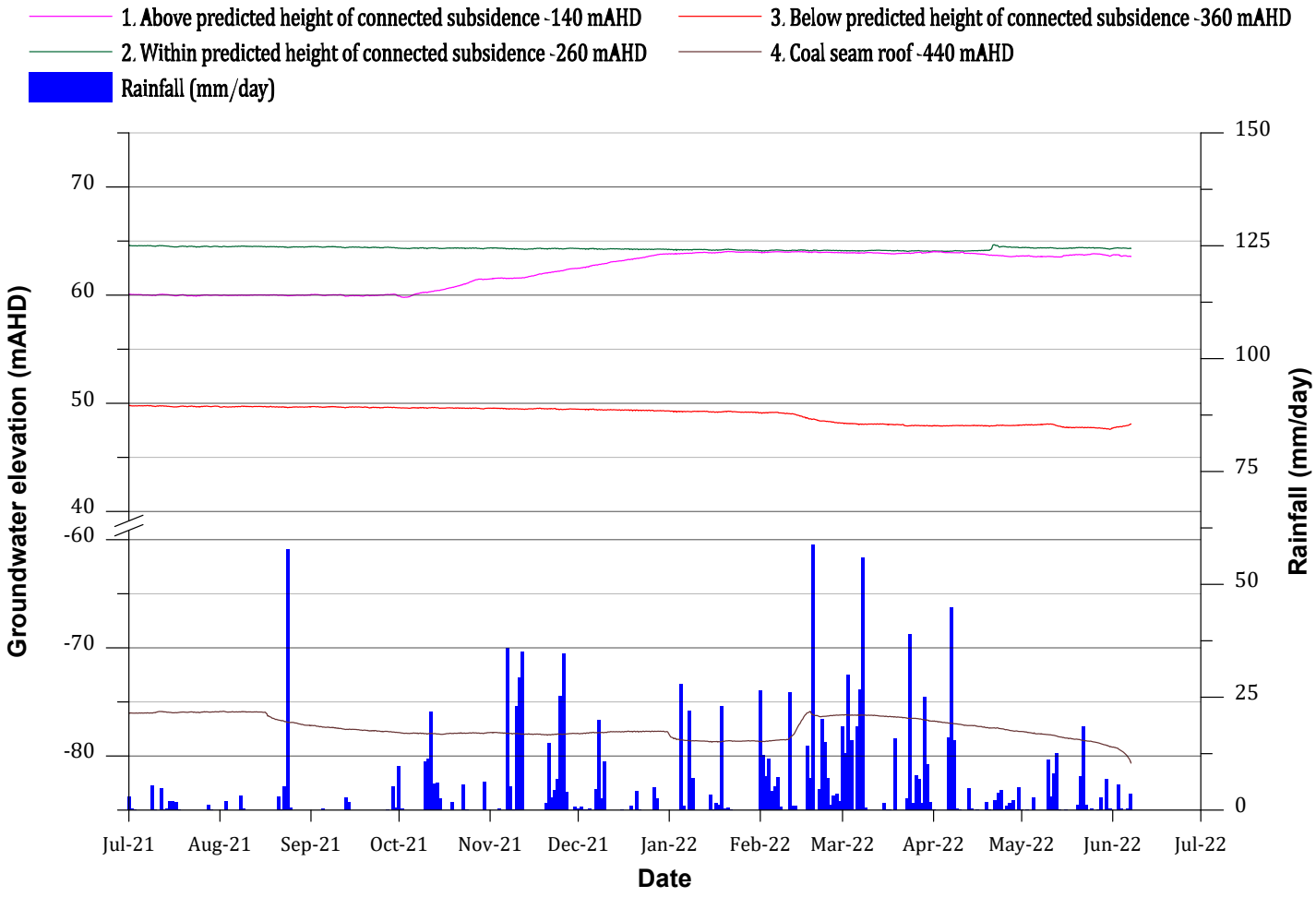


FIGURE 12.5 EX01H PIEZOMETRIC HEAD MEASUREMENTS: SENSORS NO.1 TO NO.4

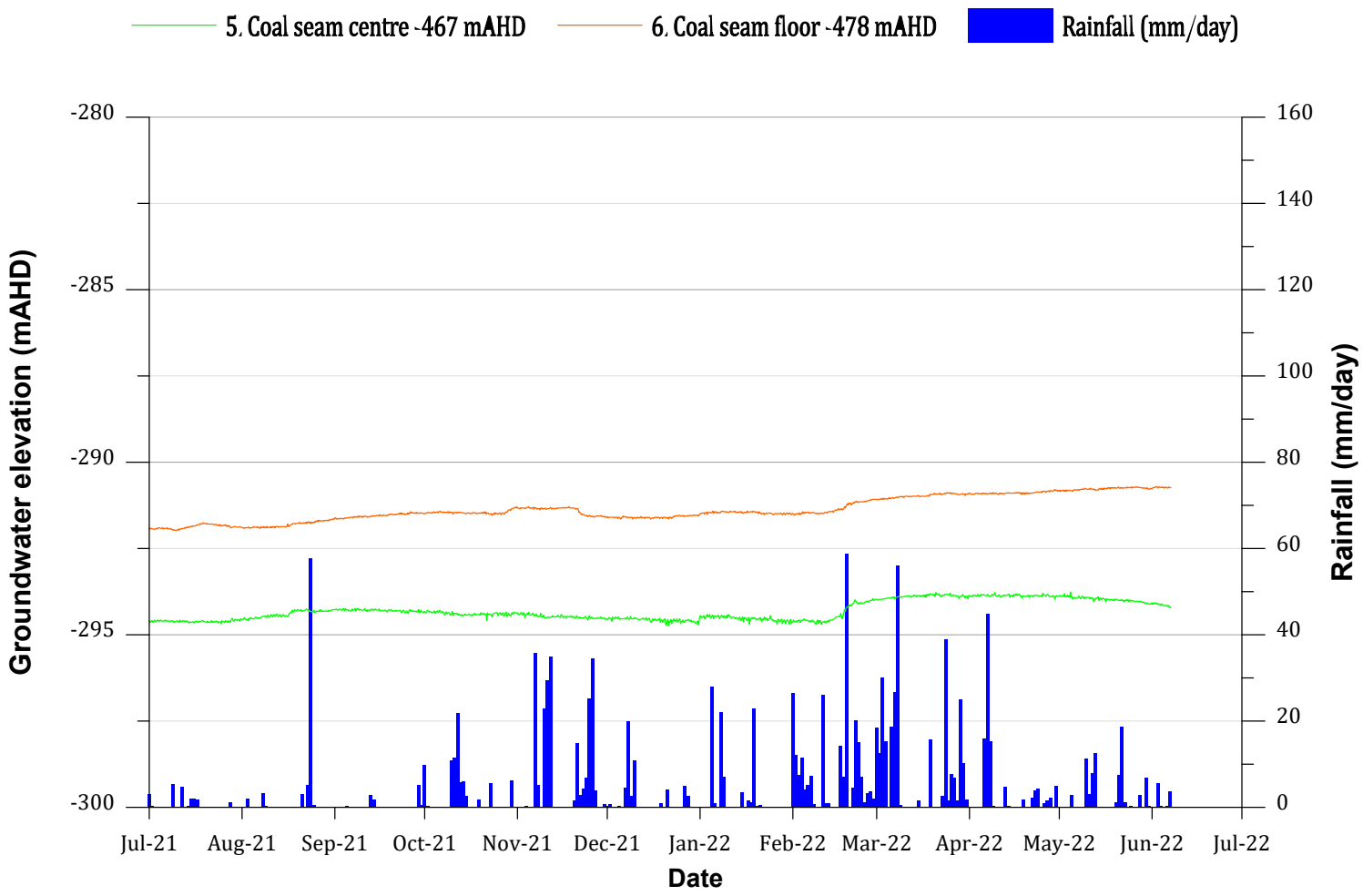


FIGURE 12.6 EX01H PIEZOMETRIC HEAD MEASUREMENTS: SENSORS NO.5 AND NO.6

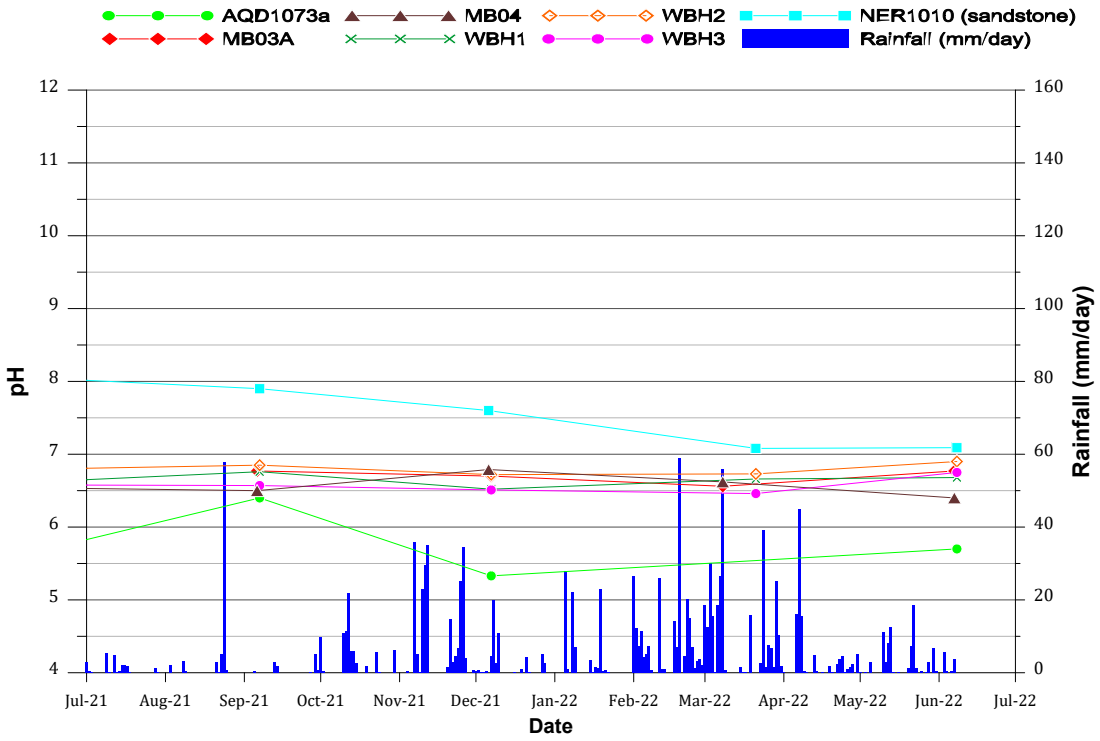


FIGURE 12.7 STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND SANDSTONE AQUIFER PH TRENDS

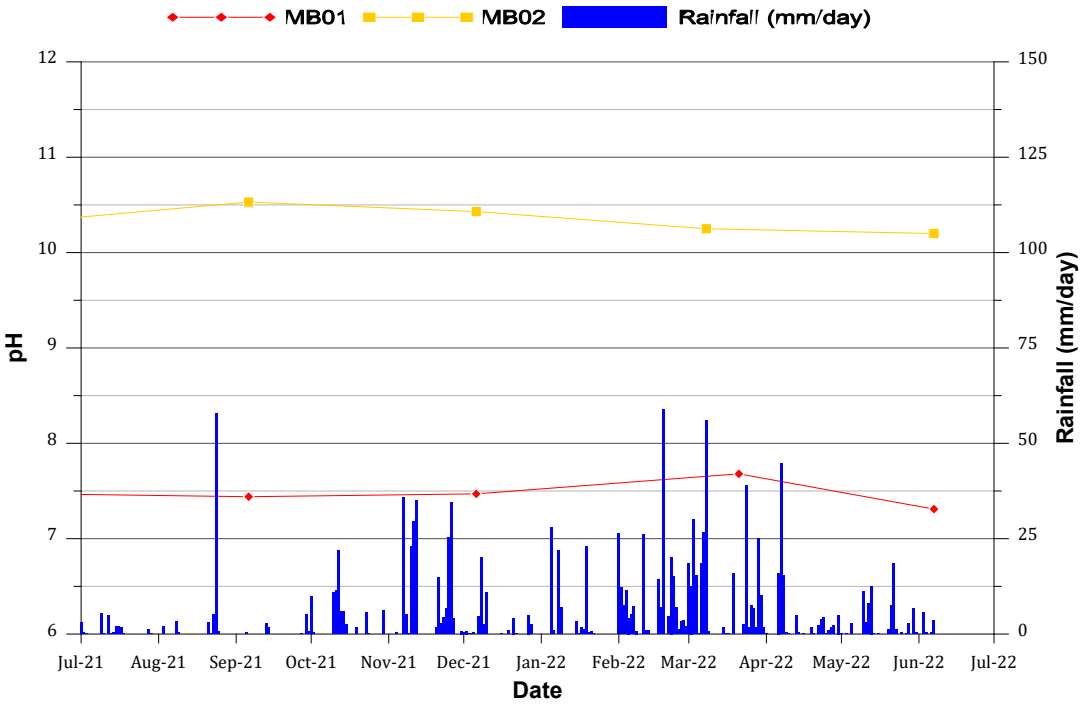


FIGURE 12.8 STAGE 3 SANDSTONE AQUIFER PH TRENDS

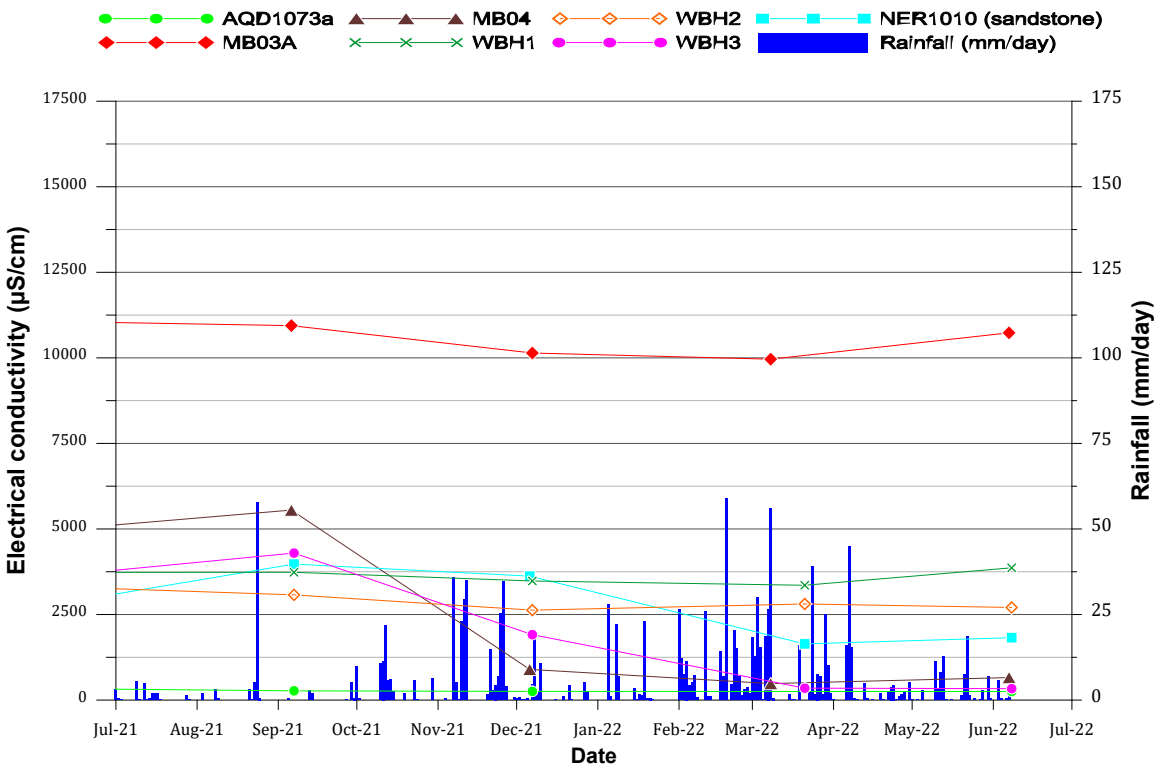


FIGURE 12.9 STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND SANDSTONE AQUIFER EC TRENDS

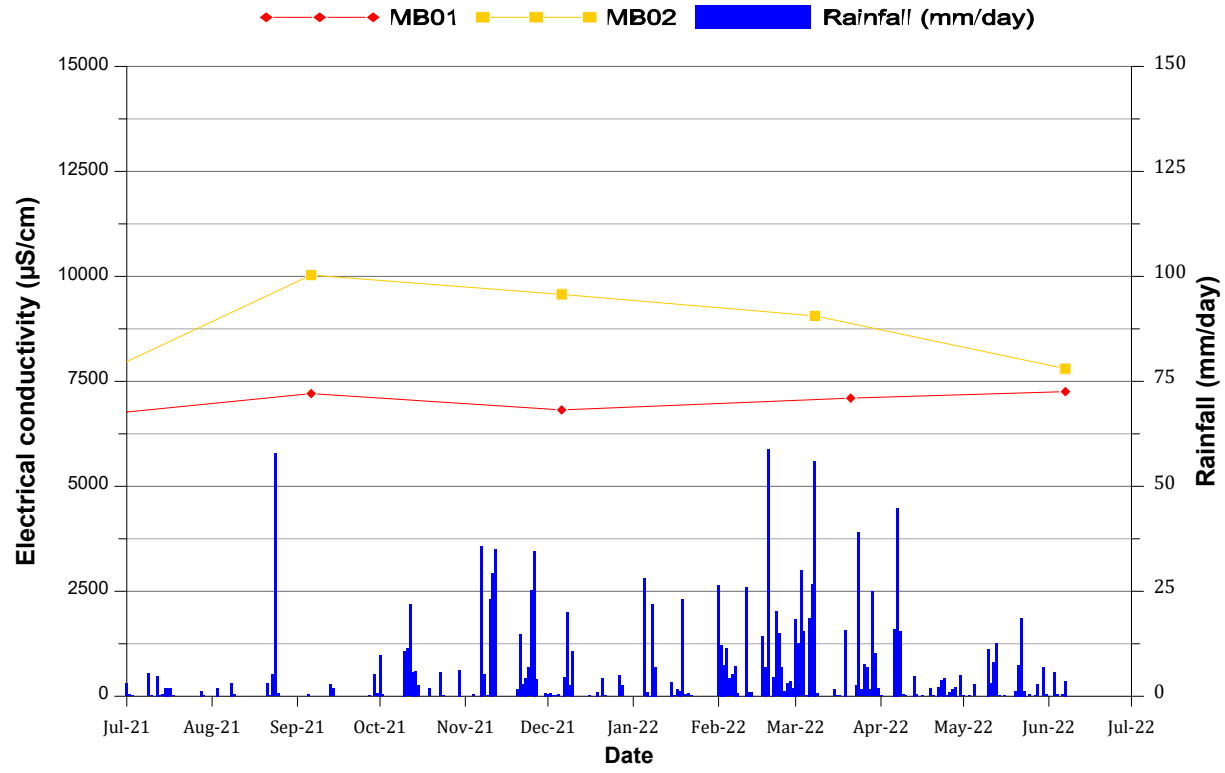


FIGURE 12.10 STAGE 3 SANDSTONE AQUIFER EC TRENDS

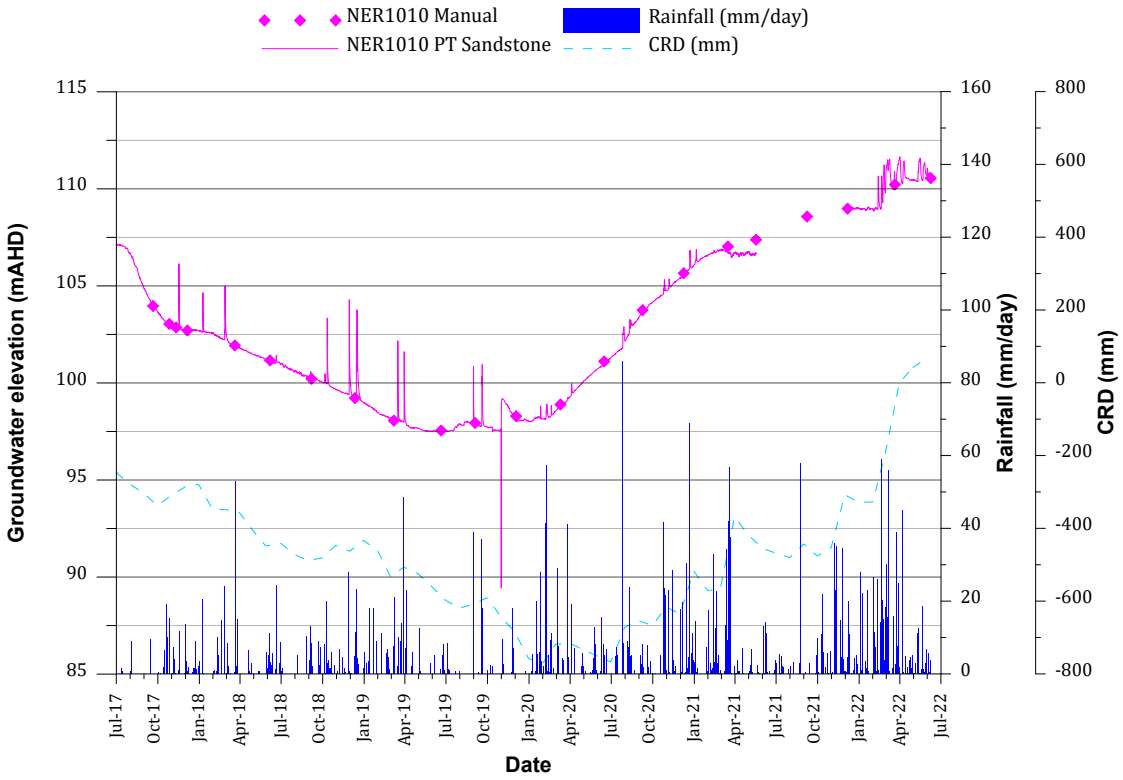


FIGURE 12.11 5-YEAR NER1010 GROUNDWATER LEVEL HYDROGRAPH

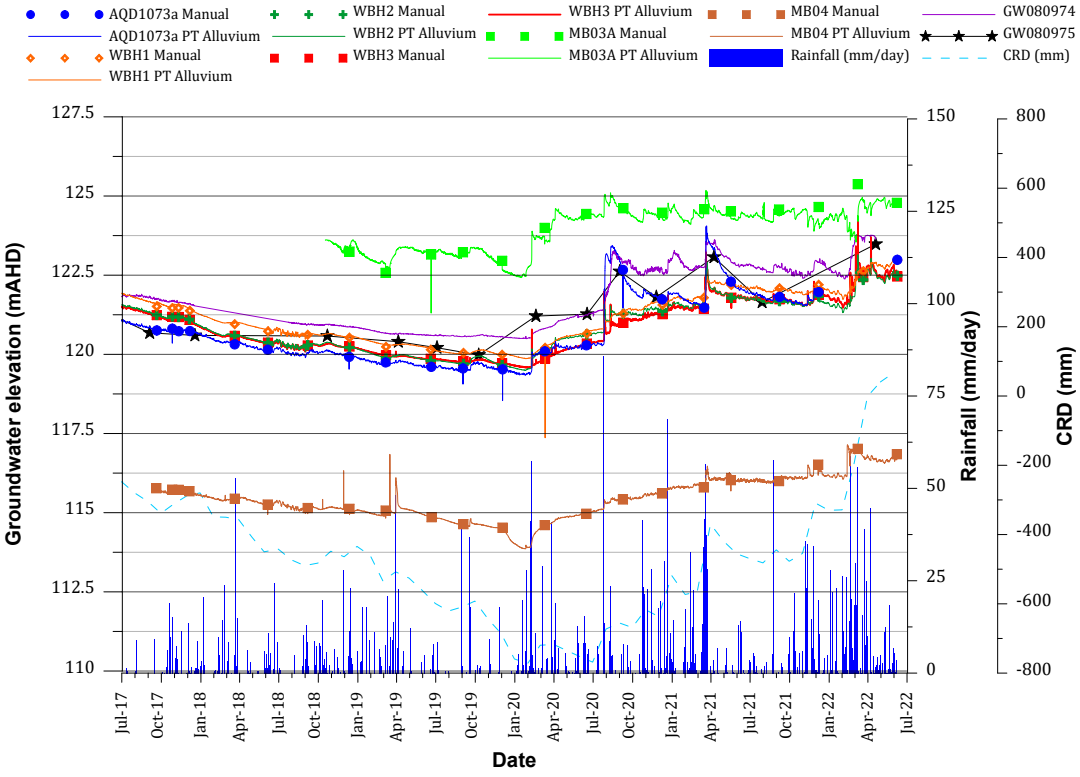


FIGURE 12.12 5-YEAR STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND WATER NSW GROUNDWATER LEVEL HYDROGRAPHS

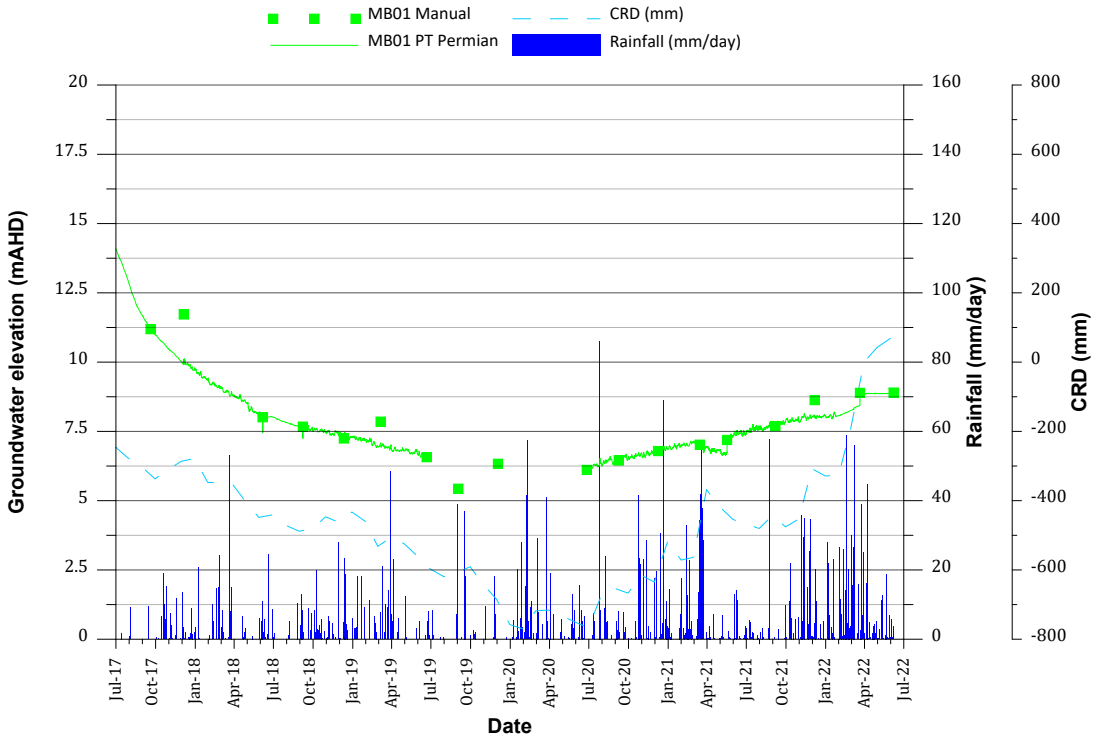


FIGURE 12.13 5-YEAR STAGE 3 MB01 SANDSTONE AQUIFER GROUNDWATER LEVEL HYDROGRAPH

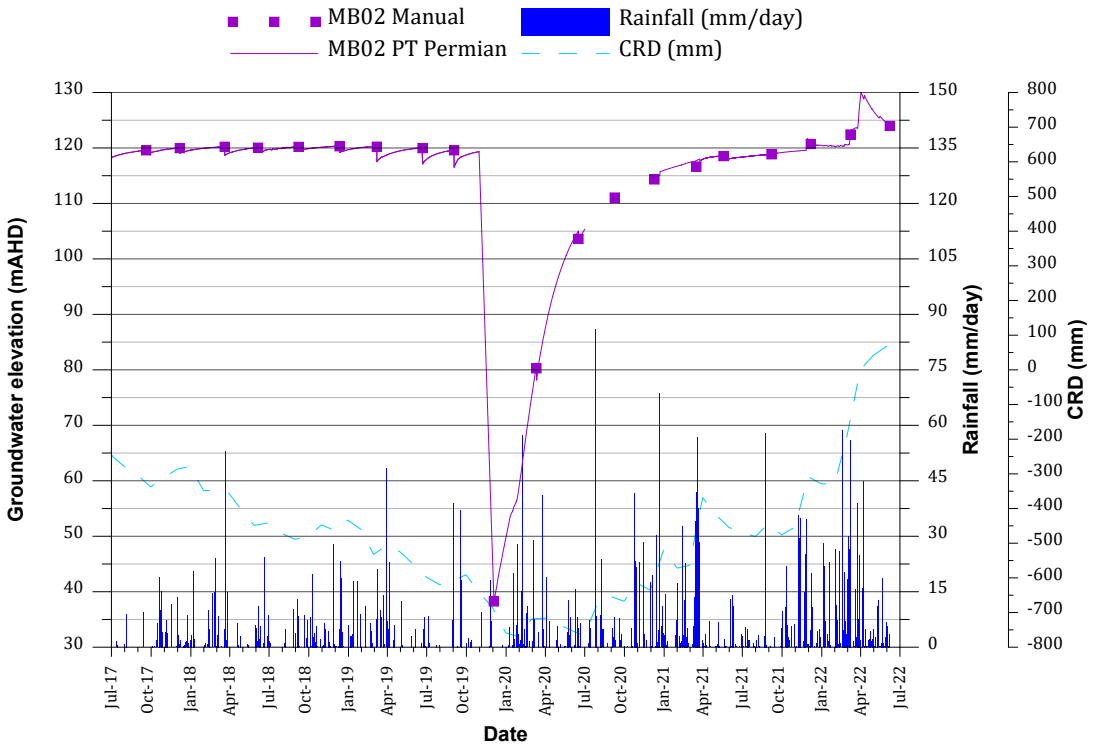


FIGURE 12.14 5-YEAR STAGE 3 MB02 SANDSTONE AQUIFER GROUNDWATER LEVEL HYDROGRAPH

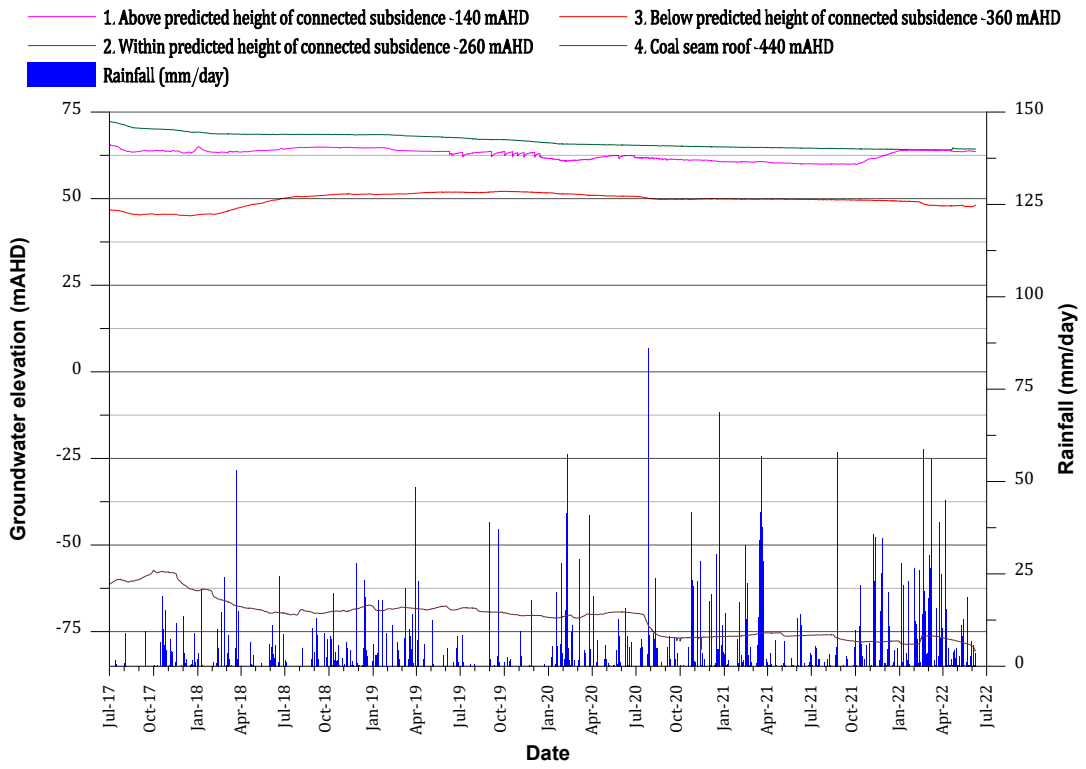


FIGURE 12.15 5-YEAR EX01H PIEZOMETRIC HEAD MEASUREMENTS: SENSORS NO.1 TO NO.4

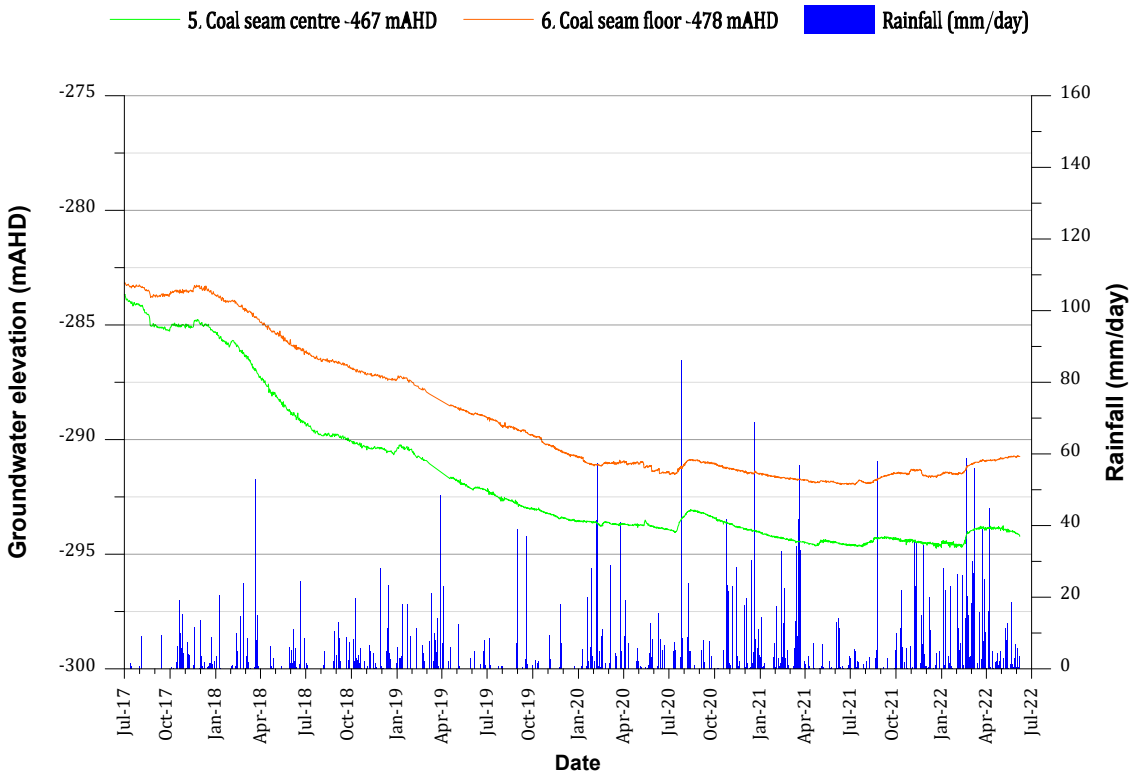


FIGURE 12.16 5-YEAR EX01H PIEZOMETRIC HEAD MEASUREMENTS: SENSORS NO.5 AND NO.6

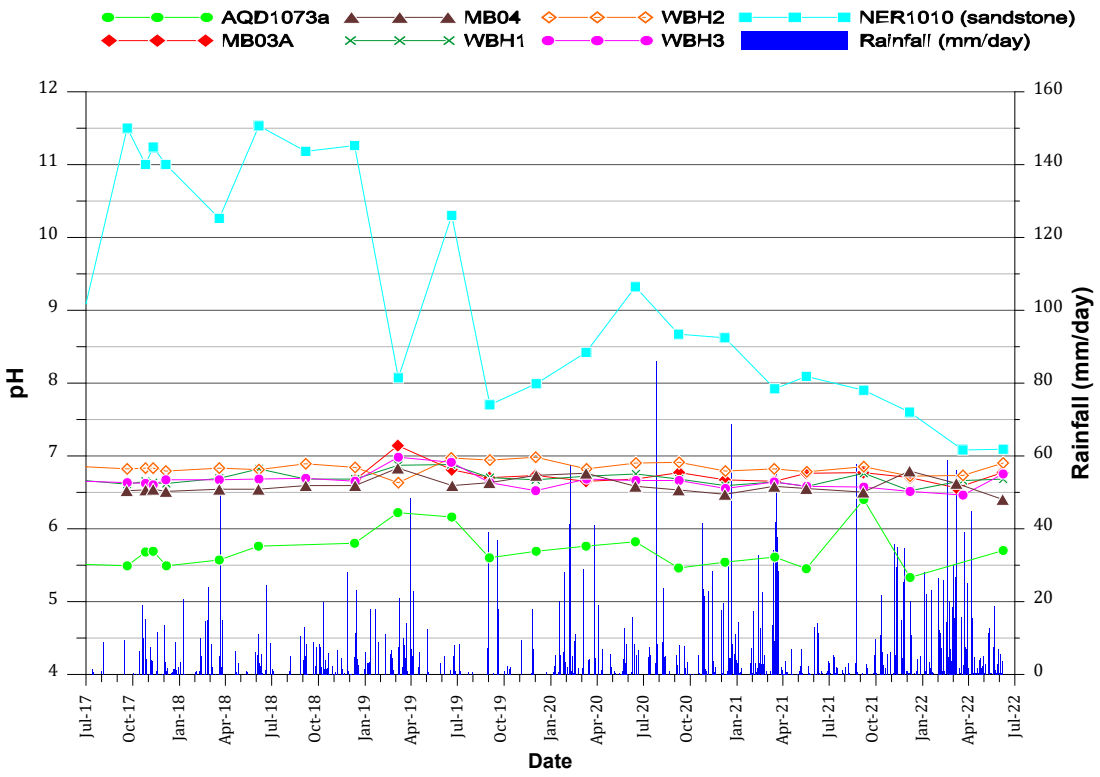


FIGURE 12.17 5-YEAR STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND SANDSTONE AQUIFER PH TRENDS

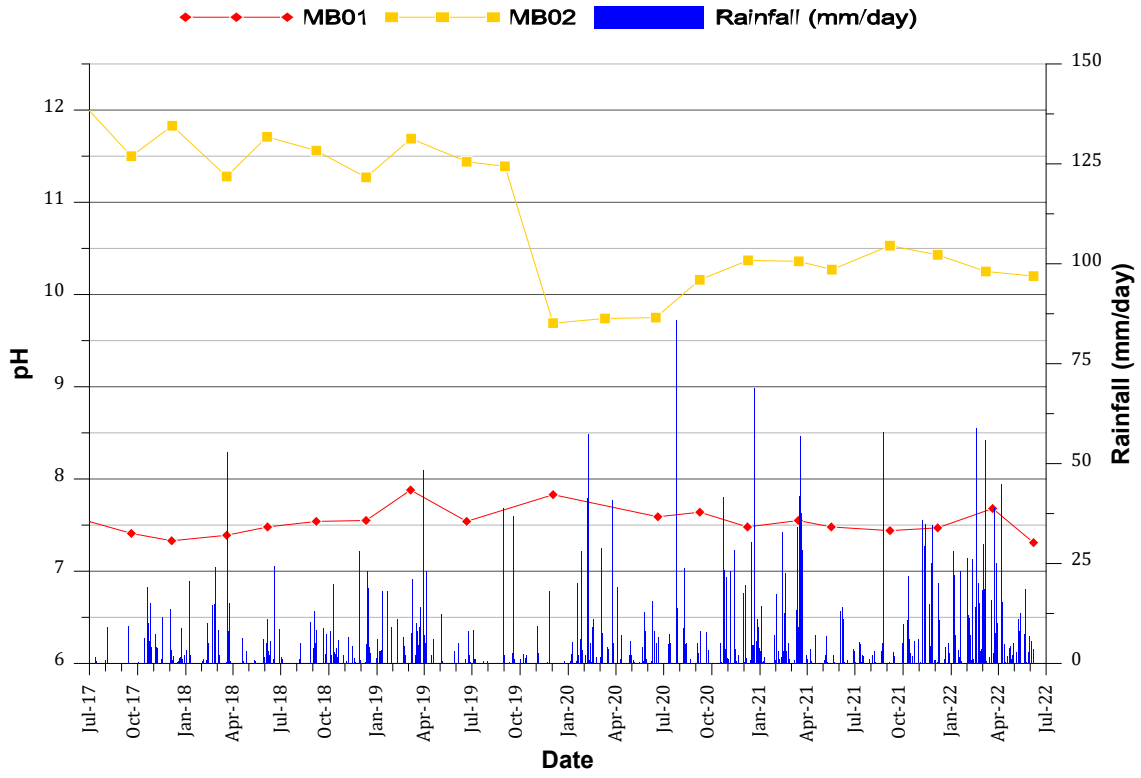


FIGURE 12.18 5-YEAR STAGE 3 SANDSTONE AQUIFER PH TRENDS

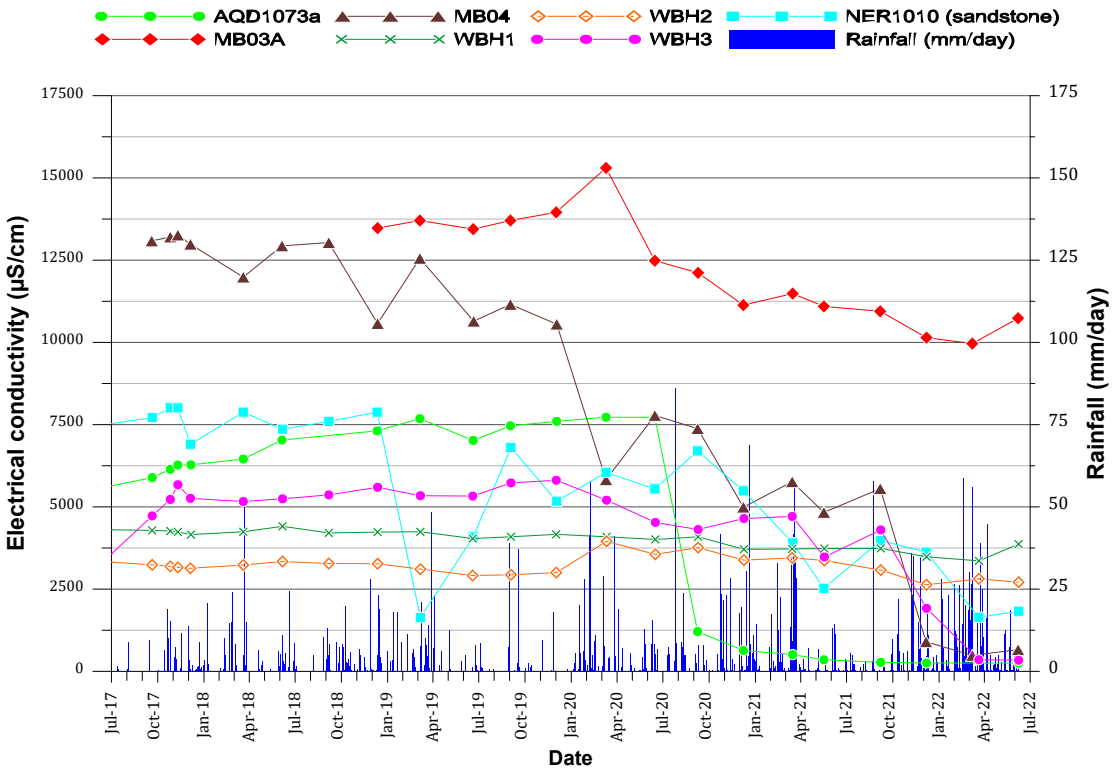


FIGURE 12.19 5-YEAR STAGE 2 AND BELLBIRD SOUTH ALLUVIUM AND SANDSTONE AQUIFER EC TRENDS

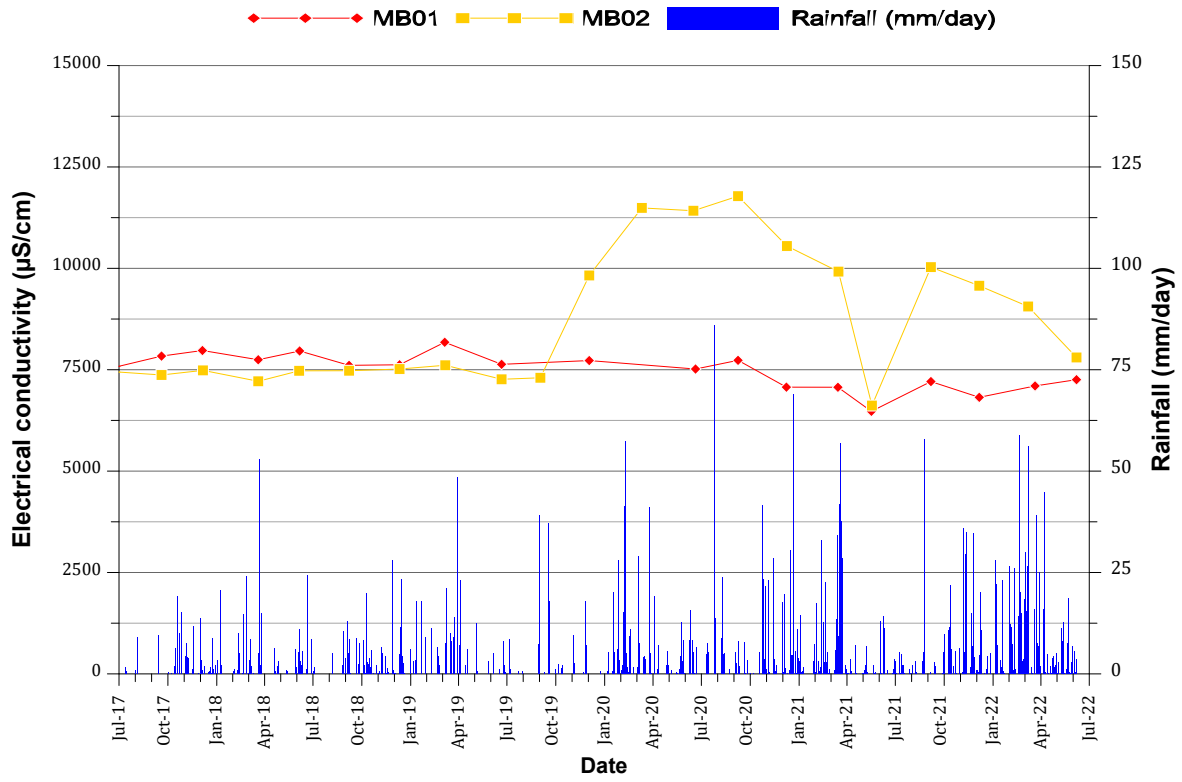


FIGURE 12.20 5-YEAR STAGE 3 SANDSTONE AQUIFER EC TRENDS