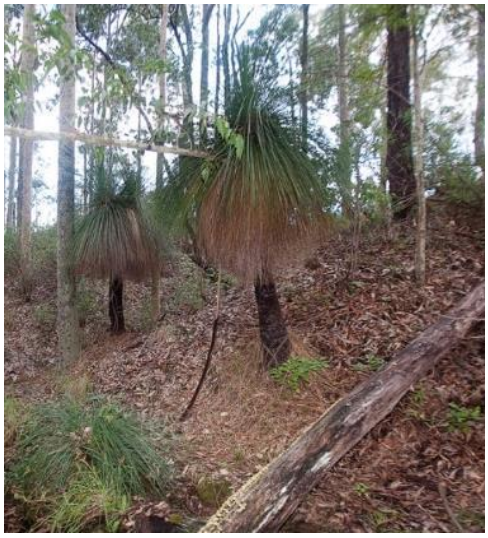

Site Water Management Plan

May 2024

DOCUMENT CONTROL

DOCUMENT DETAILS	Title	Site Water Management Plan
	Reference	ENV-002-01 Site Water Management Plan
	Document Status	Final

APPROVAL DATE	Revision	Revision Details	Prepared	Approved
October 2007	0		Keren Halliday	Matthew Fellowes
March 2009	1		Umwelt	Adrian Moodie
April 2013	2		Gary Mulhearn	Gary Mulhearn
January 2015	3		Gary Mulhearn	Gary Mulhearn
April 2017	4		Gary Mulhearn	Gary Mulhearn
July 2018	5		Carly McCormack	Carly McCormack
March 2022	6		HEC, IEMA	Julie McNaughton
March 2023	7	Review after Lodgement of Annual Review to include transition to closure.	Julie McNaughton	Carly McCormack
January 2024	8	Response to DPHI comments	IEMA	Julie McNaughton
May 2024	9	Response to DPHI comments	GHD and Austar	Julie McNaughton

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APPENDICES

1 INTRODUCTION

1.1 Background

Austar Coal Mine Pty Ltd (Austar), a subsidiary of Yancoal Australia Limited (Yancoal), owns the Austar Coal Mine, a closed underground coal mine located approximately 10 kilometres (km) southwest of Cessnock in the Lower Hunter Valley in NSW (refer to **Figure 1**). The Austar Coal Mine incorporates the former Pelton, Ellalong, Cessnock No. 1 (Kalingo) and Bellbird South Collieries and includes coal extraction, handling, processing and rail and road transport facilities (refer to **Figure 1**).

Mining was approved under two major project approvals: Bellbird South (DA 29/95) and Stage 3 (PA 08_0111), along with numerous development approvals from Cessnock City Council. Bellbird South consent DA 29/95 expired on 14 February 2022[1] whilst the Stage 3 consent PA 08_0111 expires on 31 December 2030. Environment Protection Licence (EPL) 416 also applies to Austar. See section 5.1 for further information on assessment criteria contained in each approval.

In October 2022, the mine was permanently sealed and access to underground workings is no longer possible. Ventilation and compressed air operations ceased, and the mine is gradually flooding. Decommissioning and maintenance works are currently undertaken during day shift only, with caretaking personnel only during night-time hours.

The Austar mining complex includes approximately 10,300 hectares (ha) of sub-surface mining leases and 923 ha of surface leases. It measures approximately 17 km across and 16 km long. As such, for the purposes of closure planning, Yancoal has divided the mining areas at Austar into discrete Closure Management Areas (CMAs), representing key surface areas of the mine site. The CMAs were assigned to principally align with the geographical surface disturbance areas that may be treated as discrete sites through decommissioning and rehabilitation processes.

The CMAs have been adopted for the purpose of this SWMP are shown in **Figure 1** and are as follows:

- CMA 1 – Austar Pit Top Facilities including administration buildings, the main access drift (which was sealed in October 2022), coal conveyor bin, store, workshop, and laydown facilities. This site is currently manned during daytime hours Monday to Friday (with security onsite nights and weekends), unless breakdown repairs or other urgent works are required;
- CMA 2 – Pelton CHPP including CHPP, administration areas, Reverse Osmosis plant, overland conveyor and a number of heritage listed buildings in various states of repair. The CHPP is currently manned during daytime hours Monday to Friday, with security onsite on nights and weekends, unless pumping or breakdowns require addressing during other times.
- CMA 3 – No. 1 Shaft (sealed, was the second egress man winder), generally unmanned unless decommissioning works occur during daylight hours;

[1] Under Schedule 2 Condition 5, DA 29/95 continues to apply in all respects other than to permit the carrying out of mining operations, until the rehabilitation of the site is complete.

- CMA 4 – No. 2 Shaft (decommissioned administrative buildings, laydown areas and mine dewatering via a pipeline that pumps to Kalingo and Austar Dams to CHPP). This site is inspected and maintained;
- CMA 5 – Cessnock No.1 Colliery / Kalingo Infrastructure Area (sealed ventilation shafts and decommissioned underground services). The site is generally unmanned and most infrastructure has been decommissioned, with the exception of water management systems. Daytime works to remove decommissioned infrastructure and associated bunds and pads may occur as part of early works;
- CMA 6 – Kitchener Surface Infrastructure Site (SIS) temporarily sealed ventilation shafts and fan infrastructure, fully sealed services borehole/drop hole, along with water management dams, pipelines, and switchyard, switchroom and powerlines. Pumping from water management dams and general site maintenance occurs as required;
- CMA 7 – Aberdare Extended Emplacement Area (EEA) – coarse reject emplacement area;
- CMA 8 – Bellbird Areas 12 and 13 - coarse reject emplacement area and mine dewatering boreholes; and
- CMA 9 – Other Austar owned lands.

Austar's closure management areas are shown in **Figure 1.**

1.2 Closure Status and Activities

On 30 March 2020, the Austar Coal Mine transitioned to care and maintenance, with cessation of mining and coal processing activities. On 26 February 2021, a decision was made by the Yancoal board to transition the Austar Coal Mine from care and maintenance to closure. In October 2022, the mine was permanently sealed and access is no longer possible. Ventilation and compressed air operations ceased and the mine is gradually flooding.

Austar is currently at closure planning 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. A number of 'Early Works' (including progressive decommissioning of redundant infrastructure) may be undertaken while closure studies are completed.

Standard maintenance activities will continue as per the operational and care and maintenance phase of the mine. This includes but is not limited to:

- road and infrastructure maintenance;
- water management i.e. erosion and sediment control, pumping and dam desilting;
- standard site inspections and light vehicle movements;
- land management activities including weed management, rehabilitation repair, fencing, and site security;
- plant maintenance;
- deliveries and waste management;
- environmental monitoring; and
- general administrative and maintenance tasks.

Specific activities which may be undertaken on site during the closure planning and Early Works phase include:

- detailed site investigations including drilling and test pitting programs to inform technical studies such as contamination, geochemistry, geotechnics and capping and landform designs;
- removal and transport of saleable equipment from the site;
- decommissioning and removal of surface plant and equipment;
- demolition of non-heritage mine infrastructure;
- desilting and decommissioning of mine water dams including erosion and sediment controls;
- sealing and rehabilitation of historic exploration boreholes; and
- rehabilitation trials.

Further details on water- related Early Works can be found in **Section 6.5**.

While specific closure execution requirements and activities have not yet been finalised, it is anticipated that major earthworks will be required. When specific activities are known, appropriate environmental management measures will be identified and implemented and management plans updated accordingly. Management plans will be submitted to the Department of Planning, Housing and Infrastructure (DPHI) for approval prior to the commencement of closure execution activities not currently considered.

1.2.1 Detailed Mine Closure Assessments

Austar is undertaking technical studies and site investigations to address closure knowledge gaps and scope further works required to develop an executable mine closure plan. Austar completed initial closure technical studies in a pre-feasibility project phase during 2023. The findings of the technical studies have informed the preferred go-forward options, including the conceptual landform designs and final land use.

Preliminary closure studies applicable to surface water and groundwater include:

- Closure surface water assessment
- Groundwater assessment (on-going)
- Geochemical / acid mine drainage (AMD) assessment
- Subsidence and land stability

The SWMP will be updated following completion of these assessments and will align with the activities identified in the Rehabilitation Management Plan, Forward Program and Rehabilitation Objectives, such as decommissioning water management infrastructure.

This revision of the SWMP has been prepared to document water management and monitoring activities whilst the site is in the closure planning stage (PFS, FS, Early Works and the development of the Executable Plan, see **Figure 2.**

A revised plan will be required prior to Execution works. It is important to note that this timeline is indicative only. As knowledge gaps are filled, additional time may be required to ensure closure planning and execution are carried out to minimise rework and provide optimal rehabilitation outcomes. The SWMP will likely require review and update prior to Execution works.

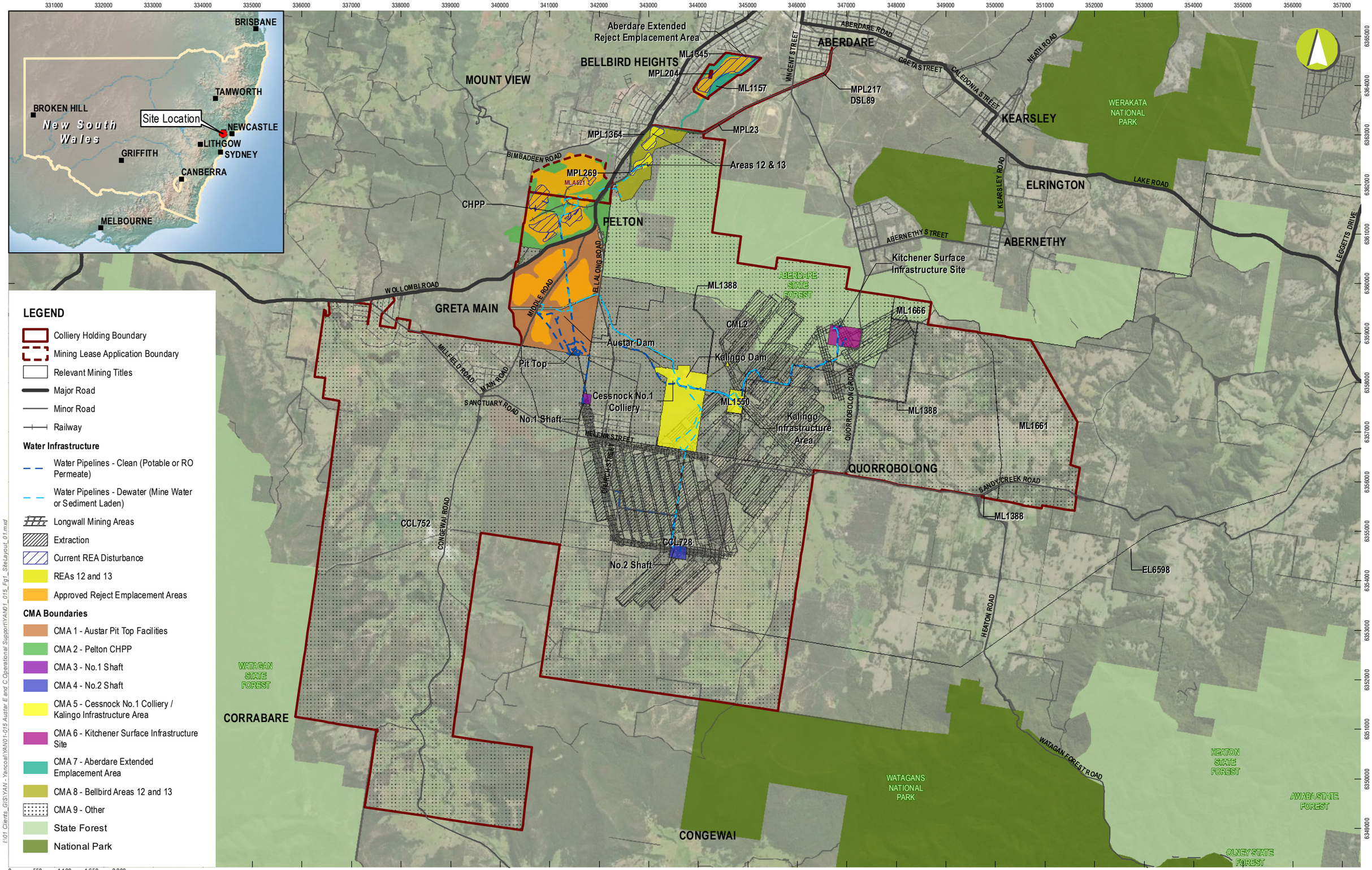
1.3 Purpose and Scope

This SWMP outlines the management measures to be implemented during closure at the Austar Mining Complex to minimise the potential for water related impacts on the local community and the environment.

The purpose of the SWMP is to:

- Consolidate and address the relevant conditions of the Project Approval, Development Consent and Environment Protection Licence (EPL) to manage water at the Austar Mine Complex.
- Define the structures, strategies and procedures to be implemented to ensure that the Austar Mine Complex does not result in unacceptable impacts on surface and groundwater systems, groundwater dependent ecosystems and downstream water users during closure;
- Define a program to monitor and report on the impacts and environmental performance of the Austar Mine Complex, and the effectiveness of any management measures;
- Define a protocol for managing and reporting any incidents, complaints, non-compliances with statutory requirements and exceedances of the impact assessment criteria and/or performance criteria; and
- Describe the review, reporting and continual improvement process.

The SWMP has been prepared in accordance with the relevant conditions of PA 08_0111, DA 29/95 and EPL 416 (refer to **Appendix A** for details of conditions).



LEGEND

- Colliery Holding Boundary
- Mining Lease Application Boundary
- Relevant Mining Titles
- Major Road
- Minor Road
- Railway

Water Infrastructure

- Water Pipelines - Clean (Potable or RO Permeate)
- Water Pipelines - Dewater (Mine Water or Sediment Laden)
- Longwall Mining Areas
- Extraction
- Current REA Disturbance
- REAs 12 and 13
- Approved Reject Emplacement Areas

CMA Boundaries

- CMA 1 - Austar Pit Top Facilities
- CMA 2 - Pelton CHPP
- CMA 3 - No.1 Shaft
- CMA 4 - No.2 Shaft
- CMA 5 - Cessnock No.1 Colliery / Kalingo Infrastructure Area
- CMA 6 - Kitchener Surface Infrastructure Site
- CMA 7 - Aberdare Extended Emplacement Area
- CMA 8 - Bellbird Areas 12 and 13
- CMA 9 - Other
- State Forest
- National Park

0 550 1,100 1,650 2,200 m

Scale: 1:70,000

GDA 1994 MGA Zone 56

25/01/2023

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Austar Coal Mine

Site Layout

FIGURE 1

INTEGRATED ENVIRONMENTAL MANAGEMENT AUSTRALIA
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Source:

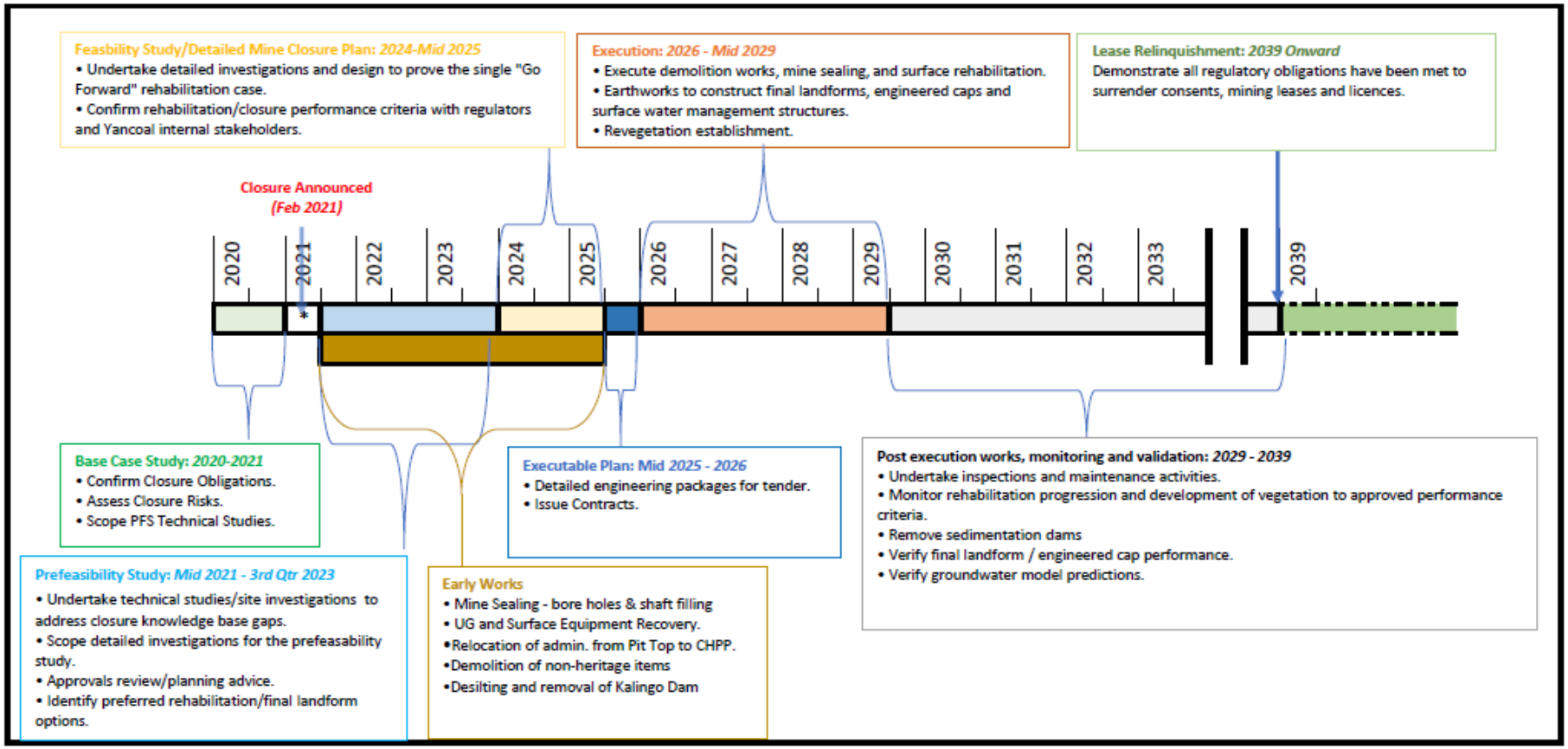


FIGURE 2 CONCEPTUAL MINE CLOSURE TIMELINE

2 STAKEHOLDER CONSULTATION

In accordance with the requirements of PA 08_0111 and DA 29/95, the EPA, DPE – Water (now NSW Department of Climate Change, Energy, the Environment and Water) and the NSW Resources Regulator have been consulted through the Department of Planning, Housing and Infrastructure (DPHI) Major Projects Portal in relation to this update of the SWMP.

The management plan approval letter is provided in **Appendix B**.

Consultation with government agencies occurred during environmental assessment preparation for the Bellbird South LWB4-B7 area (2017), Bellbird South LWB1-B3 area (2015-2016), Bellbird South Stage 2 Extension Project (Longwall A5a, 2010), the Stage 3 Project (2008) and the modifications to the Stage 3 Project (2010, 2012, 2013). Relevantly for the SWMP, predicted impacts and management strategies within the Bellbird South and Stage 3 underground mining areas have been discussed with the DPHI, Resources Regulator, Natural Resource Access Regulator (NRAR) and the EPA. Austar also reports performance against the SWMP in Annual Reviews.

Extensive correspondence was undertaken with DPHI and NRAR during the development of the Austar Coal Mine Groundwater Review and Assessment Report – February 2019 (Austar Coal Mine, 2019) and the Review of 2019 Groundwater Monitoring Results (AGE, 2020). The development of these reports was an iterative process involving ongoing input from the DPHI, DoI-Water and NRAR.

3 BASELINE DATA

3.1 Groundwater Quality Records

A detailed understanding of the water quality has been determined from regular sampling from the underground mine undertaken over several years. A water quality summary from selected sites in the underground workings sampled from 2005 until mine sealing in 2022 is summarised in **Table 1.** Regional groundwater monitoring results from bores around the Quorrobolong valley from 2018 to 2023 are summarised in **Table 2**. Whilst there is some variation between different underground workings, the results of regular testing has found the mine water quality is generally very saline, has low pH and is high in iron, typical of the groundwater quality found in the Greta Coal Measures. Groundwater level has generally varied in accordance with long term rainfall conditions (with an expected delay) and quality has remained within expected parameters.

TABLE 1 UNDERGROUND WATER QUALITY SUMMARY, 2005 - 2022

		Count	Average	Standard Deviation	Minimum	Maximum
1	**West Pelton**					
	pH	36	6.73	0.47	5.20	7.75
	EC(us/cm)	36	9372	1881	6200	16900
	TSS (mg/L)	36	73	50	2	221
	Iron (total) (mg/L)	35	62	138	0	847
2	**East Pelton**					
	pH	38	4.47	0.83	3.10	6.62
	EC(us/cm)	38	13915	3902	6080	23400
	TSS (mg/L)	38	29	48	1	292
	Iron (total) (mg/L)	37	747	258	1	1160
3	**16 cut through**					
	pH	19	2.96	0.37	2.17	4.24
	EC(us/cm)	19	14285	3925	9710	22000
	TSS (mg/L)	19	66	105	6	392
	Iron (total) (mg/L)	19	518	148	256	965
4	**Kalingo**					
	pH	30	5.25	0.69	4.20	6.79
	EC(us/cm)	30	14364	1991	9830	19400
	TSS (mg/L)	30	117	123	8	630
	Iron (total) (mg/L)	29	741	277	0	1180
5	**No 2 Shaft**					
	pH	44	6.03	0.6	3.52	6.73
	EC(us/cm)	44	17246	3266	1300	23000
	TSS (mg/L)	44	93	71	5	310
	Iron (total) (mg/L)	43	376	148	11	1010
6	**SL2 Goaf**					
	pH	42	5.26	0.64	3.56	6.17
	EC(us/cm)	42	17633	2745	12000	26100
	TSS (mg/L)	42	116	55	22	241
	Iron (total) (mg/L)	41	765	401	0	1870

Note: Mine sealing in October 2022 means these sites are now inaccessible

TABLE 2 GROUNDWATER MONITORING PROGRAM RESULTS SUMMARY, 2018 - 2023

	Count	Average	Std Dev	Min	Max	5th Perc	20th Perc	80th Perc	95th Perc
AQD1073									
Level (mAHD)	20	120.56	1.24	118.92	122.72	118.92	119.18	121.80	122.70
pH	20	5.8	0.4	5.3	6.5	5.3	5.6	6.2	6.5
EC (µS/cm)	20	3215	3551	224	7722	224	254	7568	7722
MB01									
Level (mAHDl)	20	6.94	1.05	4.81	8.28	4.84	5.85	7.98	8.28
pH	20	7.7	0.3	7.3	8.4	7.3	7.5	7.9	8.3
EC (µS/cm)	20	7324	444	6474	8177	6476	6967	7707	8166
MB02									
Level (mAHD)	20	112.01	19.78	38.19	123.90	40.29	111.65	120.22	123.82
pH	20	9.8	1.4	7.5	11.7	7.5	7.8	11.1	11.7
EC (µS/cm)	20	7323	3630	1173	11780	1186	2204	10446	11766
MB03a									
Level (mAHD)	20	124.39	0.74	122.80	125.60	122.82	123.45	124.87	125.58
pH	20	6.8	0.2	6.6	7.3	6.6	6.7	6.8	7.3
EC (µS/cm)	20	11791	1660	9292	15300	9325	10144	13654	15233
MB04									
Level (mAHD)	20	115.33	1.13	113.85	117.63	113.85	114.20	116.36	117.60
pH	20	6.7	0.2	6.4	7.0	6.4	6.5	6.8	7.0
EC (µS/cm)	20	5841	3892	428	12550	430	916	10566	12480
NER1010									
Level (mAHD)	20	104.95	5.43	97.10	111.93	97.12	97.96	110.08	111.87
pH	20	8.1	1.1	7.1	11.3	7.1	7.3	8.7	11.2
EC (µS/cm)	20	4040	2239	712	7874	718	1632	6089	7820
WBH1									
Level (mAHD)	20	121.13	1.16	119.49	122.99	119.49	119.71	122.18	122.97
pH	20	6.7	0.1	6.5	7.1	6.5	6.6	6.8	7.1
EC (µS/cm)	20	3933	263	3353	4258	3359	3718	4214	4257
WBH2									
Level (mAHD)	20	120.85	1.01	119.29	122.41	119.29	119.56	121.87	122.39
pH	20	6.9	0.1	6.6	7.2	6.6	6.8	7.0	7.2
EC (µS/cm)	20	3223	365	2626	3946	2630	2911	3569	3936
WBH3									
Level (mAHD)	20	120.74	1.02	119.25	122.30	119.26	119.42	121.76	122.29
pH	20	6.7	0.2	6.5	7.2	6.5	6.6	7.0	7.2
EC (µS/cm)	20	3948	1765	331	5803	332	2152	5332	5799

Std Dev denotes standard deviation, Min denotes minimum value, Max denotes maximum value, Perc denotes percent.

3.2 Groundwater Verification Programme

In 2018, AGEC (2018) conducted a review of the groundwater impacts of the development. The report indicated that the reported groundwater inflow to Bellbird South LWB1-B7 of 0.16 ML/day was below that predicted by Connell Wagner (2007). AGEC (2018) also concluded that "…the groundwater impact assessments undertaken to date for the development, and SWMP and Longwall Extraction Plan and associated Water Management Plan as approved for the development, are generally fit for purpose to manage groundwater issues for the development described and approved by DA29/95 MOD6 and MOD7 for current and future mining. Further, there has been no material departure identified from the groundwater predictions in the DA29/95 MOD6 EA or the MOD7 EA."

Following departmental review of the AGEC report, Austar committed to an increased groundwater quality monitoring regime for one year, to inform any changes to the TARP or Management Plans if necessary. The Review of Groundwater Monitoring Results (AGEC, April 2020) recommended a review of the groundwater monitoring program upon recommencement of mining operations and conducting annual laboratory sampling of basic parameters and major ions, which has been incorporated into the SWMP.

The AGEC (2018) report is available on the Austar website https://www.austarcoalmine.com.au/icms_docs/301751_austar-coal-mine-groundwater-review-and-assessment-report-%E2%80%93-february-2019.pdf.

3.3 Surface Water Baseline Data

Baseline data, including surface water quality, surface drainage and flood modelling, and predicted impacts is available in Bellbird South and Stage 2 Environmental Assessments and Stage 3 Environmental Assessment and will be considered during detailed mine closure planning. Mining commenced at Pelton Colliery (the site of the CHPP) in 1916. Infrastructure on the site pre-dates current environmental and planning legislation, and historic surface water quality results may not reflect current standards of environmental management. Pre-mining data is not available for most water quality monitoring sites.
Table 3 and

Table 4 provides the average, maximum, minimum and standard deviation for water quality samples gathered from 2016 to 2023 at the CHPP and Quorrobolong water quality monitoring sites.

TABLE 3 CHPP WATER QUALITY SUMMARIES, 2016 - 2023

Statistic	pH	EC (µS/cm)	TSS (mg/L)	Fe (mg/L)
SW1 - Emergency Dam Spillway				
Count*	-	-	-	-
Average	-	-	-	-
Standard Deviation	-	-	-	-
Minimum	-	-	-	-
Maximum	-	-	-	-
20th Percentile	-	-	-	-
80th Percentile	-	-	-	-
SW2 - Pinch Bridge				
Count*	83	83	83	83
Average	6.8	508	8	0.75
Standard Deviation	0.5	315	10	1.35
Minimum	5.2	114	1	0.04
Maximum	7.7	1490	63	7.20
20th Percentile	6.4	276	5	0.06
80th Percentile	7.1	653	11	0.99
SW4 - Downstream Boundary				
Count*	72	72	72	72
Average	6.9	1261	12	1.05
Standard Deviation	0.3	2063	19	1.59
Minimum	6.1	219	1	0.05
Maximum	7.6	11200	115	7.62
20th Percentile	6.6	374	5	0.15
80th Percentile	7.1	1328	14	1.48
SW5 - Upstream Boundary				
Count*	54	54	54	54
Average	7.2	3764	18	2.89
Standard Deviation	0.3	3721	31	5.08
Minimum	5.5	179	1	0.08
Maximum	7.8	11200	166	26.70
20th Percentile	7.0	336	5	0.28
80th Percentile	7.4	8410	22	4.43
SW6 - WTP Discharge				
Count*	63	63	63	63
Average	7.2	340	5	0.05
Standard Deviation	0.3	134	2	0.02
Minimum	6.3	120	1	0.01
Maximum	8.4	667	12	0.18
20th Percentile	6.9	211	5	0.05
80th Percentile	7.4	464	5	0.05

* Samples returning a reading lower than the level of reporting have been counted as the identified level of reporting: ie. TSS results <5 have been counted as 5mg/L and Fe results of <0.05mg/L have been counted as 0.05mg/L.

TABLE 4 QUORROBOLONG WATER QUALITY SUMMARIES, 2016 - 2023

Statistic	pH	EC (µS/cm)	TSS (mg/L)	Fe (mg/L)
SWQ1 - Corrobolong Creek (sandy Creek rd)				
Count*	59	59	59	59
Average	7.3	1473	25	5.76
Standard Deviation	0.3	528	57	10.15
Minimum	6.6	260	1	0.37
Maximum	8.3	2560	388	63.00
20th Percentile	7.0	933	5	1.42
80th Percentile	7.6	1930	20	5.41
SW Q2 - Quorrobolong Creek Upstream				
Count*	61	61	61	61
Average	7.0	1525	15	4.43
Standard Deviation	0.5	672	24	3.09
Minimum	5.5	130	1	0.87
Maximum	7.9	3170	191	16.00
20th Percentile	6.7	850	5	1.88
80th Percentile	7.4	2196	15	6.56
SW Q3 - Quorrobolong Creek Downstream				
Count*	46	46	46	46
Average	7.1	1386	13	3.29
Standard Deviation	0.3	665	14	1.91
Minimum	6.5	186	1	0.45
Maximum	7.8	2780	88	10.70
20th Percentile	6.9	636	5	1.68
80th Percentile	7.4	2034	14	4.74
SW C1 - Cony Creek				
Count*	89	89	89	89
Average	7.1	1577	24	2.60
Standard Deviation	0.7	864	63	2.14
Minimum	3.8	338	0	0.44
Maximum	8.2	3710	599	13.90
20th Percentile	6.9	670	7	0.97
80th Percentile	7.5	2390	26	3.86

* Samples returning a reading lower than the level of reporting have been counted as the identified level of reporting: ie. TSS results <5 mg/L have been counted as 5mg/L and Fe results of <0.05mg/L have been counted as 0.05mg/L.

4 STATUTORY REQUIREMENTS

Relevant conditions from PA 08_0111 and DA 29/95, EPL 416, PA 08_0111 Statement of Commitments and where these are addressed in this Plan are provided in **Appendix A**.

4.1 Water Licences and Approvals

Austar currently holds water licences for monitoring and dewatering bores across the operation. A consolidated list of water licences identifying all water licences and approvals, the work they are assigned to, entitlements and purposes are detailed in **Table 5**.

TABLE 5 WATER LICENCES

Licence Held	Licence Number	Validity of Licence	Purpose of Licence	Entitlements / Water Source
Bore Licence Certificate	20BL171361	17 May 2007 - Perpetuity	Monitoring Bore (AQD1077)	N/A
Bore Licence Certificate	20BL172524	20 July 2010 - Perpetuity	Monitoring Bore (NER1010)	N/A
Bore Licence Certificate	20BL172852	7 June 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
Bore Licence Certificate	20BL173891	19 Mar 2015 - Perpetuity	Monitoring Bore (MB02)	N/A
Exempt Monitoring Bore	N/A	N/A	Monitoring Bore (MB03A, MB04)	N/A
Water Access Licence / Associated Works	WAL19181 / Works Approval 20WA210299	Continuing	Unregulated River Water Licence	10 shares Hunter Unregulated and Alluvial Water Sources - Upper Wollombi Water Source - Congewai Creek Management Zone.
Water Access Licence / Associated Works	WAL41504 / 20WA219699	Continuing	Aquifer - Industrial dewatering 16CT pump station (no longer in service) and No 2 Shaft Borehole	770ML Sydney Basin – North Coast Groundwater Source. North Coast Fractured and Porous Rock Groundwater Sources 2016.

The *Water Management Act 2000* sets out additional approval requirements for certain water uses, works or activities. Additional approvals are not required for development approved under MP 08_0111 in accordance with Section 4.41 of the EP&A Act. The *Water Management (General) Regulation 2018* sets out the exemptions. These include (but are not limited to):

- clause 39(1)(c) of the *Water Management (General) Regulation 2018* exempts water monitoring bores required by a development consent from requiring a Water Supply Work Approval under section 90(2) of the *Water Management Act 2000*.
- clause 42/42A, and clause 18 (Schedule 4, Part 2) of the *Water Management (General) Regulation 2018* exempts activities carried out in accordance with a mining lease under the *Mining Act 1992* from requiring a Controlled Activity Approval under section 91(2) of the *Water Management Act 2000*.
- clause 42/42A, and clause 33 (Schedule 4, Part 2) of the *Water Management (General) Regulation 2018* exempts activities carried out to maintain lawful structures constructed within waterfront land from requiring a Controlled Activity Approval under section 91(2) of the *Water Management Act 2000*.

Austar will ensure it secures all necessary approvals under the *Water Management Act 2000*.

5 WATER IMPACT ASSESSMENT CRITERIA

5.1 EPL requirements

Specifications for discharge water quality and quantity pertaining to the EPL 416 are outlined for surface water. Additionally discussion of baseline surface and groundwater data methodology is outlined in sections 5.1.1 and 5.1.2.

5.1.1 Surface Water

Discharge water quality and quantity criteria as specified in EPL 416 are provided in **Table 6**.

TABLE 6 - EPL WATER DISCHARGE CRITERIA

<table>
<tr><th>Licence Number</th><th>Condition</th></tr>
<tr><td>L1</td><td>Pollution of Waters</td></tr>
<tr><td>L1.1</td><td>Except as expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operation Act 1997.</td></tr>
<tr><td>L1.2</td><td>Discharge from Point 1 is permitted only when discharge occurs solely as a result of rainfall at the premises exceeding:
a) a total of 168 millimetres over any consecutive five day period; or
b) 48 millimetres in less than any consecutive 12 hour period.</td></tr>
<tr><td>L2</td><td>Concentration Limits</td></tr>
<tr><td>L2.1</td><td>For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.</td></tr>
<tr><td>L2.2</td><td>Where a pH quality limit is specified in the table the specified percentage of samples must be within the specified ranges.</td></tr>
<tr><td>L2.3</td><td>To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table/s.</td></tr>
<tr><td>L2.4</td><td>Water and/or Land Concentration Limits
Point 1
<table>
<tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration Limit</th><th>100 percentile concentration limit</th></tr>
<tr><td>Iron</td><td>Milligrams per litre</td><td></td><td></td><td></td><td>1</td></tr>
<tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5-8.5</td></tr>
<tr><td>Total dissolved solids</td><td>Milligrams per litre</td><td></td><td></td><td></td><td>6000</td></tr>
<tr><td>Total suspended solids</td><td>Milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr>
</table>
Point 6</td></tr>
</table>

<table>
<tr><th>Licence Number</th><th>Condition</th></tr>
<tr><td></td><td>
<table>
<tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration Limit</th><th>100 percentile concentration limit</th></tr>
<tr><td>Conductivity</td><td>Microsiemens per centimetre</td><td></td><td></td><td></td><td>600</td></tr>
<tr><td>Iron</td><td>Milligrams per litre</td><td></td><td></td><td></td><td>1</td></tr>
<tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5-8.5</td></tr>
<tr><td>Total suspended solids</td><td>Milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr>
</table>
</td></tr>
<tr><td>L3</td><td>Volume and Mass Limits</td></tr>
<tr><td>L3.1</td><td>For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
(a) liquids discharged to water; or
(b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.
<table>
<tr><th>Point</th><th>Unit of Measure</th><th>Volume/Mass Limit</th></tr>
<tr><td>1</td><td>Kilolitres per day</td><td>2000</td></tr>
<tr><td>6</td><td>Measure 1</td><td>5000</td></tr>
</table>
Note: For the purpose of this condition ‘Measure 1’ means KL/day measured as an annual average.</td></tr>
</table>

Note: 3DGM Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples

In addition to surface water compliance monitoring in accordance with EPL 416, other locations are monitored to gather baseline data, and to observe any changes in water quality in comparison to long term trends.

5.1.2 Groundwater

During operations, there were no trends in groundwater quality or water levels that triggered the enactment of the Response Plan in section 9. A review of monitoring data indicates that the mine’s impacts are within EA predictions, and there is no evidence of impacts outside of established predictions.

During the closure planning phase, groundwater monitoring results will continue to be assessed against long term trends and EA predictions. However, given the mine has closed and has been permanently sealed, Austar is now working towards the development of appropriate groundwater completion criteria to demonstrate successful rehabilitation and closure of the site. (Note mine sealing in October 2022 means previously accessible monitoring points within the underground mine are now inaccessible and no longer available).

Groundwater level and quality data derived from long term baseline data is summarised in Table 2 from established shallow (porous rock) and alluvial aquifer groundwater monitoring boreholes above Bellbird South and Stage 3 workings(section 8.2.3).

5.2 Trigger Values

5.2.1 Groundwater trigger values

Trigger values have been derived from baseline data for groundwater quality and level by following a similar methodology to ANZG (2018) for deriving guideline values using reference-site data. Groundwater quality trigger values were based on comparison of the 20th and 80th percentile values (shown in **Table 2**) for physicochemical stressors (pH and EC) and compared them to NSW Water Quality Objectives (WQO) for the Hunter River catchment (DECCW 2006) default trigger values that are sourced from the ANZECC (2000) water quality guidelines. The default trigger value range for pH is 6.5 - 8.5, and for EC, is 125 – 2,200 µS/cm.

The lesser of the low WQO range or the 20th percentile is used for the lower trigger value, whereas the greater of the high WQO range or the 80th percentile is used for the upper trigger value.

Groundwater level trigger values are based on the 5th percentile for the lower trigger value to detect drawdown impacts, and the 95th percentile for the upper trigger value to detect mounding impacts. Groundwater trigger values are provided in **Table 7** and are linked to actions in accordance with the TARPs in **Section 9.**

5.2.2 Surface water trigger values

The derivation of surface water quality triggers follows the same methodology as groundwater quality triggers (see section 5.2.1) with the addition of TSS and iron (total). The TSS default guideline value of 50 mg/L was sourced from ANZECC (2000) for a NSW Lowland River, whereas the iron (total) default guideline value of 0.3 mg/L was sourced from ANZECC (2000) which references use of the Canadian guideline level as an interim working level.

Trigger values were derived from baseline data surface water quality provided in
Table 3 and

Table 4.

TABLE 7 GROUNDWATER TRIGGER VALUES

Parameters	Units	Lower trigger value	Upper trigger value
AQD1073			
Level	m(AHD)	118.92	122.70
pH	pH units	5.6	8.5
EC	µS/cm	125	7568
MB01			
Level	m(AHD)	4.84	8.28
pH	pH units	6.5	8.5
EC	µS/cm	125	7707
MB02			
Level	m(AHD)	111.65*	123.82
pH	pH units	6.5	11.1
EC	µS/cm	125	10446
MBO3a			
Level	m(AHD)	122.82	125.58
pH	pH units	6.5	8.5
EC	µS/cm	125	13654
MB04			
Level	m(bgl)	113.85	117.60
pH	pH units	6.5	8.5
EC	µS/cm	125	10566
NER1010			
Level	m(AHD)	97.12	111.87
pH	pH units	6.5	8.7
EC	µS/cm	125	6089
WBH1			
Level	m(AHD)	119.49	122.97
pH	pH units	6.5	8.5
EC	µS/cm	125	4214
WBH2			
Level	m(AHD)	119.29	122.39
pH	pH units	6.5	8.5
EC	µS/cm	125	3569
WBH3			
Level	m(AHD)	119.26	122.29
pH	pH units	6.5	8.5
EC	µS/cm	125	5332

* Denotes 20th percentile used due to an outlier minimum level value for MB02

TABLE 8 SURFACE WATER QUALITY TRIGGER VALUES

	Units	Lower trigger values	Upper trigger values
SW1 – Emergency Overflow Dam Discharge Point*			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	-	6000
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	1
pH (lab)	pH units	6.4	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	0.99
SW4 - Downstream Boundary			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	1.48
SW5 - Upstream Boundary			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	8410
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	4.43
SW6			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	0.30
SW Q1 - Quorrobolong Creek (Sandy Creek Rd)			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	5.41
SW Q2 - Quorrobolong Creek Upstream			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	6.56
SW Q3 - Quorrobolong Creek Downstream			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2200
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	4.74
SW C1 - Cony Creek			
pH (lab)	pH units	6.5	8.5
EC (lab)	(µS/cm)	125	2390
Total Suspended Solids (TSS)	(mg/L)	-	50
Iron (total)	(mg/L)	-	3.86

*Trigger values for SW1 are the EPL limits, as this site does not discharge regularly enough to have sufficient data for the methodology above to be used.

6 OVERVIEW OF SITE WATER MANAGEMENT

6.1 Site Water Balance

Despite the site no longer being operational, water management continues to be an integral component of the safe management and maintenance of the site. The information provided in the following sections remains relevant while the mine is in closure planning and early works phases as detailed in Section 1.

The site water balance described in this section is progressively being revised as detailed mine closure planning occurs, which includes surface water and groundwater assessments. The site water balance addresses the requirements of PA 08_0111 and DA 29/95 and will be updated as closure planning progresses.

During the current phase of closure, it is likely that some water management changes will occur. Pumping of stormwater around the site will continue to ensure effective water management in disturbed areas. Where water management dams are decommissioned, pipelines will be utilised to pump water to alternate dams in the water management system as outlined in **Figure 3**. Prior to the commencement of bulk earthworks and final rehabilitation activities, the water balance will be updated to address final landform planning and closure.

Austar reports annually against the Water Accounting Framework. **Figure 3** is the water balance schematic and was updated for closure and current activities in February 2024. As the mine progresses in early works and demolition, the water balance will continue to change. A new water balance for closure and final earthworks will be developed as part of the Feasibility Study.

6.2 Water Sources

Water is sourced from the following resources:

- Recycled, treated mine water – mine water stored in underground and above ground water storages may be treated through the reverse osmosis (RO) plant and reused on site.
- Groundwater take – groundwater inflows to the mine may be harvested under water access licence WAL41504 / 20AL217003, treated using the RO plant and used on site.
- Potable water – potable water is provided by Hunter Water for human use onsite and may be used as operational water as required.
- Stormwater runoff in operational areas is collected, treated and used as required. Stormwater take is limited where possible by diverting away from operational areas.

6.3 Water Use Onsite

During closure, water is used for maintenance activities, dust suppression, cleaning and other incidental uses. Water is used in all surface facilities and use is minimised as much as possible to core requirements.

6.4 Site Water Use and Management

The factors that influence the site water balance at Austar are complex and variable. There are a number of geographically separated interrelated systems that are managed as a whole to ensure that the needs of the mine are addressed whilst also meeting EPL requirements. **Figure 3** provides a schematic representation of the components of the water management system.

A database of recorded water transfers is maintained that allows calculation of groundwater inflow estimates on a monthly basis as well as short-term water balance forecasting.

The three major components or systems referred to in this document are:

1. Underground Mine Water Management System;
2. Pelton CHPP Site Water Management System; and
3. Surface Water Storage and Management System, which includes:
    a. CHPP Area Surface Water Management system;
    b. Austar Pit Top Site;
    c. Kalingo Dam; and
    d. Kitchener Surface Infrastructure Site (SIS).

There is infrastructure for water treatment onsite at the CHPP including pH adjustment (lime plant), flocculation and settlement of suspended sediments in addition to the RO plant. This infrastructure is not regularly used during closure, however can be if required.

Potable water (sourced from Hunter Water) is used for human contact purposes, vehicle washbay, as well as a back-up supply for water otherwise sourced from RO plant permeate (refer **Figure 3**).

Discharge of treated water (RO plant permeate) may occur to Bellbird Creek in accordance with EPL416 conditions. In addition, wet weather discharge is permitted under specific rainfall conditions as part of EPL416 from the Emergency Overflow Dam at the CHPP Area.

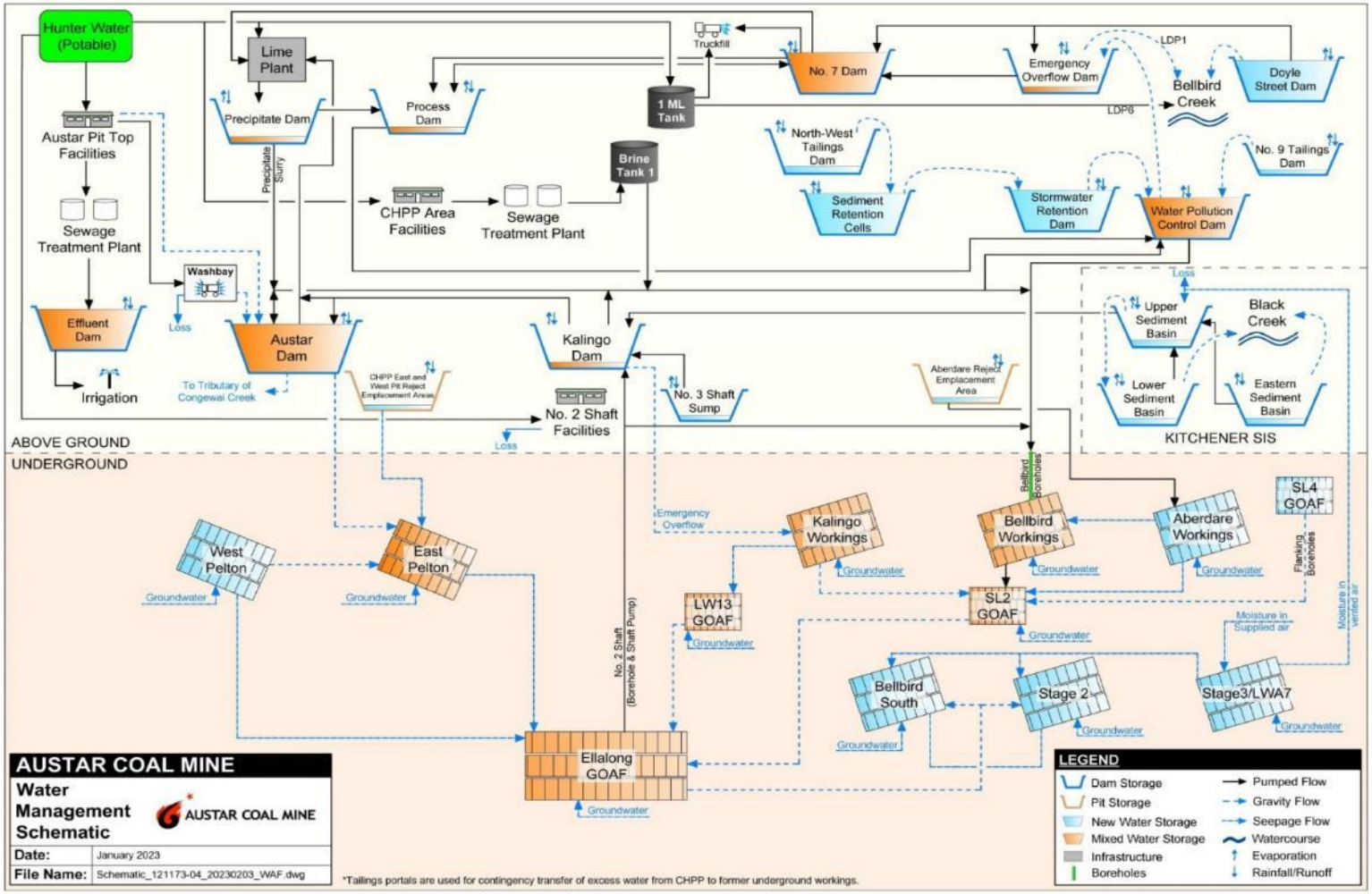


FIGURE 3 - WATER MANAGEMENT SCHEMATIC (UPDATED FOR CLOSURE)

6.4.1 Underground Mine Water Management System

During 2022, the Underground mine has been sealed, and is no longer accessible. Prior to sealing, all infrastructure (including pumps) were either removed, or surveyed, thoroughly cleaned of contaminants and left in-situ. Water level dipping from the surface continues.

The mine has a complex groundwater management system that is heavily influenced by inflow from surrounding historic mine workings. These include the Pelton (East and West), Kalingo, Bellbird and Aberdare workings as indicated on **Figure 3**.

6.4.1.1 Inflow Sources

Inflow water sources into the sealed mine workings can be described as:

- Natural strata inflow (seepage) of groundwater;
- Water from high rainfall periods that enter old mine workings via surface cracks and subsidence;
- Surface water from mine affected areas at the CHPP and other infrastructure areas which is pumped underground into the old mine workings;
- Pit top runoff which is captured and can be sent to underground workings; and
- Brine from the RO plant pumped underground into the old mine workings.

All major inflow sources have been identified and systems put in place to measure the cumulative volumes. Measurements are generally recorded on a monthly basis and results logged in a database that allows analysis of long-term trends and inflows. The main sources of inflow are shown on **Figure 4**.

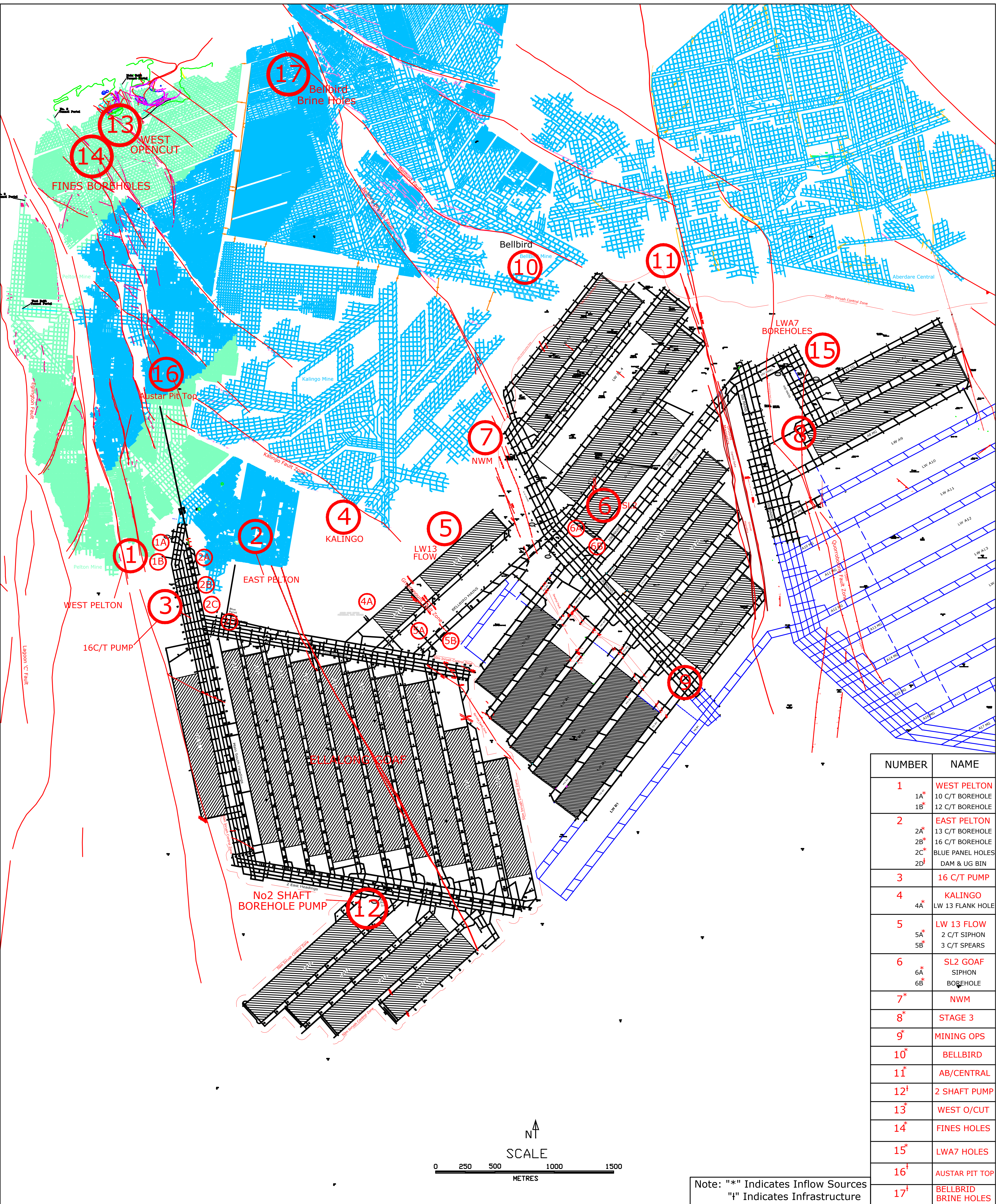
Water levels are also monitored for the old workings of the Bellbird, Kalingo and Aberdare Central Collieries.

6.4.1.2 Underground Water Storages

East Pelton

The old workings of Pelton located adjacent to the East of the Main South Headings and North of 1 East Headings (labelled '2' on **Figure 4**) are connected to Austar Coal Mine and will report to Ellalong Goaf.

Inflow sources are predominantly from mine affected runoff from the CHPP East Open Cut Reject Emplacement Area (REA).



NUMBER		NAME
1		WEST PELTON
	1A*	10 C/T BOREHOLE
	1B*	12 C/T BOREHOLE
2		EAST PELTON
	2A*	13 C/T BOREHOLE
	2B*	16 C/T BOREHOLE
	2C*	BLUE PANEL HOLES
	2D†	DAM & UG BIN
3		16 C/T PUMP
4		KALINGO
	4A*	LW 13 FLANK HOLE
5		LW 13 FLOW
	5A*	2 C/T SIPHON
	5B*	3 C/T SPEARS
6		SL2 GOAF
	6A*	SIPHON
	6B*	BOREHOLE
7*		NWM
8*		STAGE 3
9*		MINING OPS
10*		BELLBIRD
11*		AB/CENTRAL
12†		2 SHAFT PUMP
13*		WEST O/CUT
14*		FINES HOLES
15*		LWA7 HOLES
16†		AUSTAR PIT TOP
17†		BELLBRID BRINE HOLES

Note: "*" Indicates Inflow Sources
"†" Indicates Infrastructure

DRAWN	M. Wright
DATE	24/02/2021
CHECKED	
APPROVED	

AUSTAR COAL MINE

TITLE

INCIDENTAL GROUNDWATER INFRASTRUCTURE LOCATIONS AND INDICATIVE WATER INFLOW SOURCES

SCALE	DRAWING No.	
As Shown	Figure 4	A3

West Pelton

The old workings of Pelton located to the west of the main South Headings (labelled '1' on **Figure 4**) are connected to Austar Coal Mine workings via 2 dewatering boreholes (labelled '1A' and '1B' on **Figure 4**). The boreholes allow drainage from these workings to the Ellalong goaf area.

Inflow sources are typically from mine affected runoff from the CHPP West Open Cut REA. Notwithstanding the above boreholes, it is likely that water would seep from this area along the mine floor down the Main South Headings to the Ellalong goaf area.

Ellalong Goaf (2 East Panel, Longwalls 1-12)

The old workings of Ellalong were utilised as the main underground water storage reservoir for the mine. These workings have an approximate capacity of 3,000ML which is constrained by the level (270 mAHD) where the water would flow into the Bellbird mains, and then 100 mains. Water can be removed via a pump within Number 2 shaft and an adjacent borehole pump providing a combined pumping system capable of approximately 7ML/day. The quantity of water removed is monitored continuously via CITECT. In addition, the water level in the shaft is monitored by CITECT, and by dipping the No. 2 shaft.

Longwall 13

Longwall 13 was mined in 1997. Water from this area would flow to Bellbird Mains as it fills. Inflow to LW13 occurs from the old flooded workings of the neighbouring Kalingo Colliery. The head of water in Kalingo Colliery is measured by dipping the shaft near the Kalingo dam. The water levels for Kalingo Colliery are recorded in a database maintained by the Austar Coal Mine surveyor.

Kalingo workings

The old workings of Kalingo are to the northwest of Longwall 13, with no direct connection to the mine. Water levels indicate that the void is full. Water would seep to LW13, or to SL2 goaf.

SL2 Panel

The sealed SL2 goaf is currently partially flooded and drains via a pipe to 100 Mains. Water flow into this area is predominantly from the old flooded workings of the neighbouring Bellbird and Aberdare Central Collieries. There are three in-seam flanking boreholes adjacent to these workings from SL4 panel that contribute to the water inflow into the SL2 panel. These flanking boreholes were unable to be isolated to prevent this inflow as this area was sealed following the Southland 2004 spontaneous combustion event.

Bellbird/Aberdare Central

The head of water in Aberdare Central Colliery is measured by dipping a shaft near the Kitchener Surface Infrastructure Site. A monitoring bore has been established into the Bellbird workings to enable water levels in these workings to be monitored. A second monitoring hole into Bellbird has also been established further east to monitor the effect of pumping into these old workings on the eastern side of some geological anomalies.

Water levels in the Bellbird/Aberdare Central Colliery areas indicate a recharge response to significant high rainfall events, partly due to surface water ingress into shallow historical workings and related sinkholes. It is estimated that prior to a large storm event in June 2007 (the 'Pasha Bulker' event – 254 mm recorded in 3 days), water levels in the old Bellbird/Aberdare Central workings were approximately -86 mAHD with the workings having a storage capacity of approximately 9,000 ML above this level. During the June 2007 storm event, a sinkhole formed on Black Creek permitting surface water to enter underground workings. As a result of the June 2007 storm event, the water level in these workings rose to approximately -36 mAHD. By January 2009 the water level in these workings had fallen to approximately –30 mAHD. Further water level response to rainfall events have been observed notably for the April 2015 rainfall event (229 mm recorded in 3 days).

6.4.1.3 Seam to Surface Pumping

Austar has two licenced pumping locations that delivered mine water to the surface water management system:

No 16 Cut Through (East Pelton and West Pelton)

The 16 c/t Main South Pump Station (labelled as '3' on **Figure 4**) was designed and installed to pump mine water inflow from the old Pelton (East and West) Mine workings. The pump station was located underground and was decommissioned prior to mine sealing.

Number 2 Shaft (Ellalong)

The old Ellalong Colliery workings (Longwalls 1 to 12) within Austar mine were utilised as the main underground water storage reservoir for the mine. Two large diameter, multistage pumps at the Number 2 shaft site (shown on **Figure 3** and labelled as '12' on **Figure 4**) were able to transfer water from these underground workings to Kalingo Dam via vertical rising mains and connecting polyethylene pipelines. Mine water could be diverted from this pipeline to the Bellbird Boreholes. This system had the capacity to pump up to approximately 7 ML/Day. During February and March 2024 the pumping system at 2 shaft was decommissioned and removed. It is unlikely that pumping will resume from this location in the future.

6.4.1.4 Incidental Groundwater Interception

An important natural groundwater resource in the Newcastle/Cessnock area is found in the alluvial sediments, which cover low-lying areas and, in the Austar mine area, include Quorrobolong Creek and its tributaries Sandy and Cony Creeks (AGEC, 2018). These aquifers are not predicted to have been affected by the Austar mining activities due to the depth of cover (Dundon Consulting, 2017). The low permeability of the Branxton formation (~2.32 X 10^{-10} m/s) and the marine depositional environment generally provides water-bearing zones of poor water quality and low yield. Finally, the Greta Coal Measures (GCM) also have very low permeabilities (<10^{-8} m/s) and it was concluded that "the importance of the coal seams within the GCM as an aquifer is generally minimal due to the poor quality groundwater as well as limited yield potential" (AGEC, 2018). An assessment of the interception of the natural groundwater resources was undertaken for the Bellbird South and Stage 3 mine plans. Inflows were predicted to reach a maximum 2.5 ML/day during Stage 3 mining which was to include 13 longwalls, however only two of these have been mined. Groundwater inflow to Bellbird South LWB1-B7 was assessed as 0.16 ML/day (AGEC, 2018).

The comprehensive water inflow database held at the mine has allowed assessments to be made regarding the magnitude of groundwater inflows while the mine was operational and measurements able to be taken. Following sealing, old mining areas are dipped monthly, however there is little indication on levels in individual areas of the mine.

Water inflow databases prior to mine sealing indicates a groundwater interception volume of 582 ML for the year ending 30 June 2019 (before parts of the underground mine were sealed permanently) which equates to an average rate of 1.6 ML/day for the year. The current water licences allow for incidental groundwater interception of up to 2.1 ML/day.

The measured water percolation through the updip coal barriers intercepted by Austar workings was determined from the following information, and is subject to change after mine sealing.

Measured water Inflow from Kalingo Mine

Water Inflow from Kalingo Mine was measured when the mine was operational:

- LW13 Flankhole = <0.03 ML/day; and
- LW13 Siphon = negligible.

The total average measured water inflow from Kalingo Mine was 0.3 ML/day. Water from Kalingo would also present to SL2 goaf, however these contributions are unable to be measured. While operational, water level in the Kalingo shaft was relatively constant and at the same level as the highest mine workings in Kalingo. This indicates that the old Kalingo mine workings are essentially full. The water level in the Bellbird mine, located to the northeast above the Kalingo mine workings was approximately 100m higher than the water level in the Kalingo workings. Since the water level does not rise in the Kalingo shaft, the migration of water across the barriers is now in equilibrium with the rate of water transfer into the Austar mine workings. The workings at Kalingo are deep at greater than 250m. These are first workings only with no secondary extraction and as such there is no potential for fracturing through to the surface.

Measured water Inflow from Aberdare Central Mine:

The total average measured water inflow from the SL2 Goaf Siphon when Austar Mine was operational was 2 ML/day. This was understood to comprise water ingress from inseam drill holes from SL3 and SL4 panels and the barrier (which was previously sealed).

Recorded underground water levels in the Aberdare Central Mine are plotted in **Figure 5.**

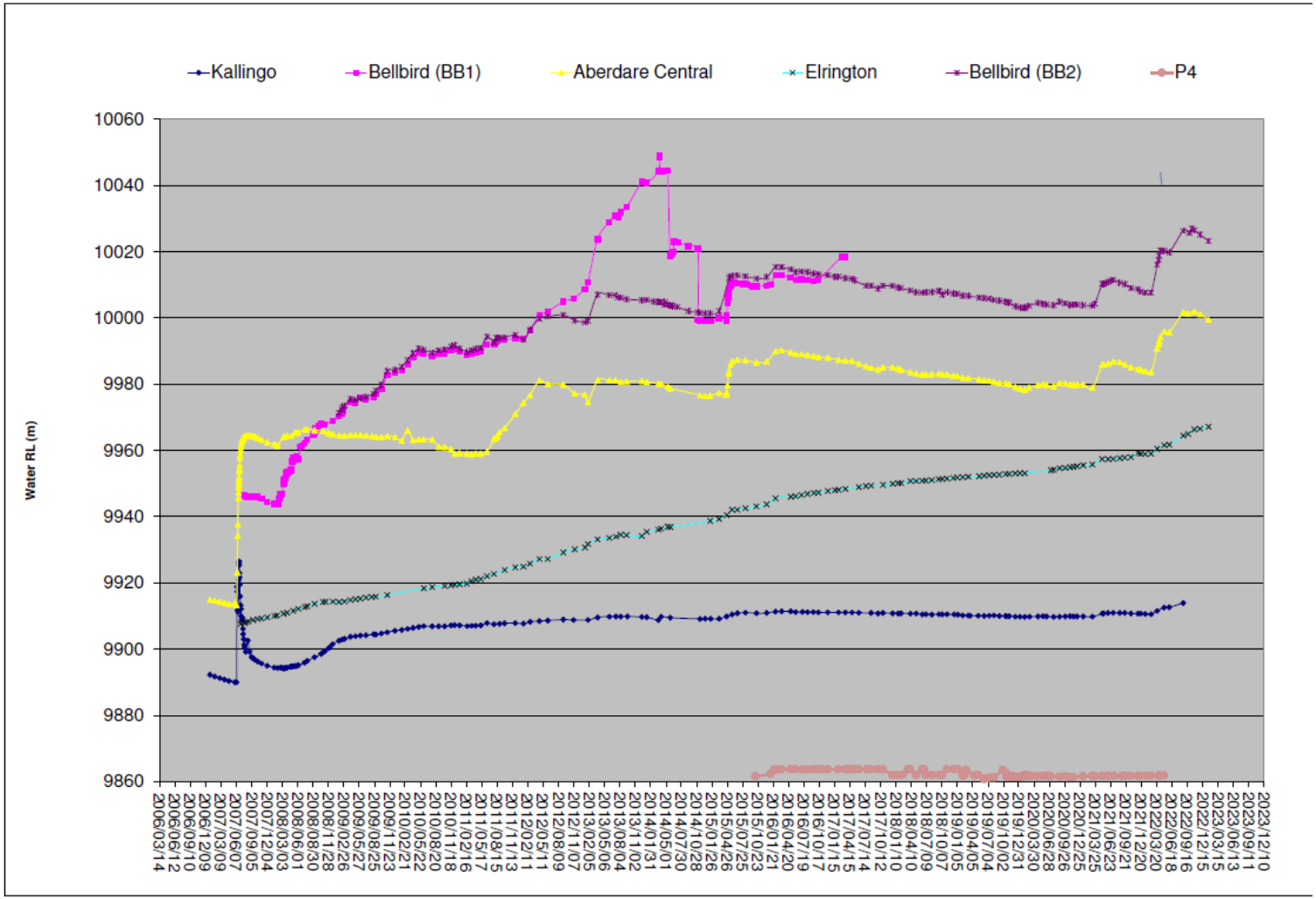


FIGURE 5 - UNDERGROUND WATER LEVELS

From **Figure 5** it can be seen that the water level in Aberdare Central shaft fell at a rate of approximately 4 metres per year up until the June 2007 rainfall event, when a sink hole that formed adjacent to Black Creek delivered approximately 2.5 GL to 3 GL of surface runoff to the underground workings with a major jump in water level of about 50 m immediately following.

Following the June 2007 event, the water level declined slowly, interrupted by a much smaller, less steep rise between February and September 2008, which likely reflects increased rainfall during the first half of 2008. Thereafter water levels steadily declined at a rate similar to that following the June 2007 event. In mid-June 2011, water levels in Aberdare Central commenced rising more steeply than at any time other than the June 2007 event. This is interpreted as reflecting overflow of water from the Bellbird workings into the Aberdare Central workings. From April 2012, the Aberdare Central water levels declined slowly apart from short duration increases caused by high rainfall events in January-March 2013, April 2015 and January 2016. The Aberdare Central trend is influenced by siphoning from the SL2 goaf, as that has a direct connection to Aberdare Central via inseam boreholes (refer **Figure 3**). The rate of siphoning from the SL2 goaf has increased since 2012, resulting in slow drawdown of the Aberdare Central water level.

6.4.1.5 Predicted Future Inflows

Underground water inflow database assessment has estimated an average inflow rate of 1.6 ML/day. This is unlikely to increase during closure as there is no further longwall mining exposing additional areas for groundwater inflow.

6.4.2 Coal Handling and Preparation Plant Water Management System

6.4.2.1 Overview

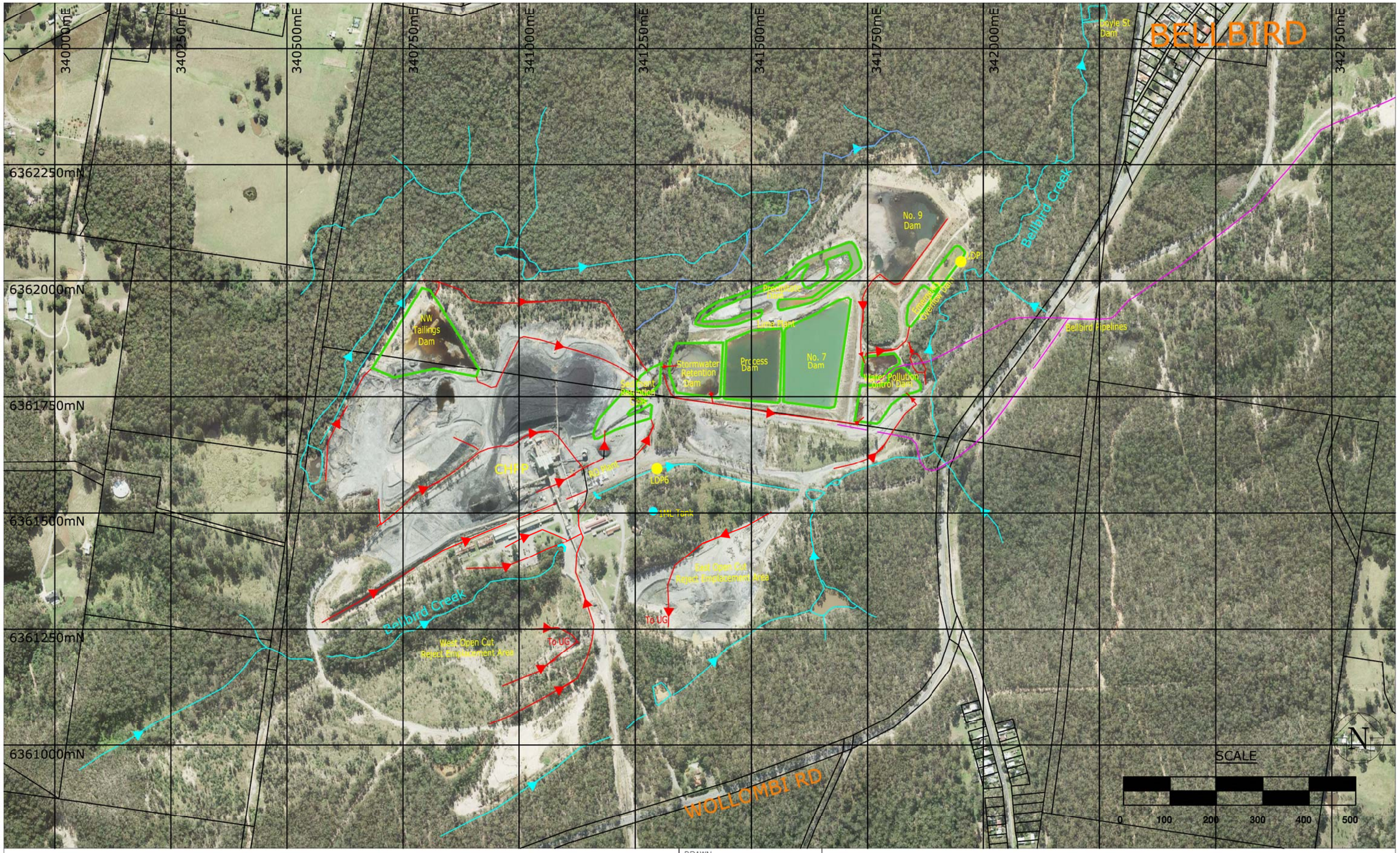
Figure 3 includes a schematic overview of the water management system at the CHPP. The major storages and surface water controls at the CHPP are shown on **Figure 6.**

The two main water management systems at the CHPP during closure are:

- RO Plant water treatment system (not operational in closure unless required); and
- Stormwater runoff and management system.

Water from these systems can be discharged back into the old underground mine workings at Pelton and Bellbird, where settling of sediment occurs prior to the water percolating through coal barriers where it reports to the underground water storages. The location of water pipelines at the CHPP which transfer water to the Bellbird workings are shown in **Figure 6**.

Permeate from the RO plant was used to provide supply to operations. Potable water is supplied from Hunter Water for drinking, bathing and backup operations supply. Any excess permeate that is unable to be utilised on site is discharged into Bellbird Creek in accordance with the conditions of EPL 416 which permits up to an annual average of 5ML/day to be discharged. At the time of writing, there has been no permeate discharge since May 2021.



..... Licensed Discharge Point

..... Clean Water Flow

..... Mine Affected Water Flow

..... Mine Affected Water Dam

.....Pipeline to Bellbird Boreholes

.....Investigation Drainage Line Area

DRAWN	GM (original); HEC (rev)
DATE	10/11/20
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AUSTAR COAL MINE

TITLE

Figure 6: CHPP Surface Water Management

SCALE	DRAWING No.	
As Shown	Environmental/ SWMP_SurfaceWaterManagement_CHPP_2020	A3

6.4.2.2 Reverse Osmosis Water Treatment System

Mine water pumped from underground workings can be pre-treated prior to reaching the RO Plant by an alkaline neutralisation process. Passive oxidation and precipitation occurs in both Kalingo and Austar Dams which receive water pumped directly from underground. Water is then pumped to the Lime Plant where the pH is increased. This reduces water hardness and promotes the removal of iron and other metals. The water is then fed into the Precipitate Dam where the metals precipitate and excess lime are able to settle out. The clarified water then flows to the Process Dam from where it is pumped to the RO Plant.

When operating, the RO Plant can treat up to 6 ML of pre-treated mine water per day. Water pumped from the Process Dam undergoes primary screening filtration followed by secondary filtration through multi-media filters and final tertiary filtration through cartridge and bag filters. Water is then fed to the RO Trains where the process produces permeate and a waste brine stream. The RO system is a two stage process achieving maximum 40-65% recovery of permeate. Generally, RO Trains 1 & 2 operate in parallel, with the brine from both trains combining to feed RO Train 3 as the second stage improving recovery. The waste brine is returned underground via the Bellbird Boreholes. The permeate is pumped to the 1ML tank and used on site, with any excess discharged to Bellbird Creek in accordance with EPL requirements.

The RO plant has been decommissioned. It is not required at this stage of closure where the mine is sealed and there is no need to dewater for operational safety reasons. The plant last operated in May 2021.

6.4.2.3 Storm Water Run-off and Management System

Mine affected runoff from the CHPP area is contained within the mine water management system (refer **Figure 3** and **Figure 6**). Clean water diversion drains are in place to divert upslope runoff around operational and disturbed areas of the site to maintain separation between upslope and mine affected runoff. These diversions form part of drainage lines and first order tributaries to Bellbird Creek, which flows to Black Creek in Cessnock.

Stormwater management at the CHPP aims to contain all stormwater runoff in surface dams up to their capacity. Water levels in the surface dams are monitored and pump status checked regularly. During closure, most mine water dams are maintained as low as practical. The ultimate storages in the CHPP area are the Water Pollution Control Dam (WPCD) and the Emergency Overflow Dam. Water is pumped from the WPCD to the Bellbird boreholes. In addition, there is a licenced discharge point (LDP1) at the overflow weir of the Emergency Overflow Dam. EPL 416 prescribes that discharge from LDP1 must only occur during rainfall events of certain volume and length, not exceed 2 ML/day on an average annual basis as well as prescribing discharge water quality criteria.

In December 2017, Austar and the EPA agreed to a Pollution Study and Reduction Program requiring the investigation and monitoring of “orange staining/residue” in a clean water diversion line to the

north of the CHPP area. This area is noted as the "Investigation Drainage Line" on **Figure 6**. The initial investigation was undertaken and a report submitted to the EPA. Ongoing activities are being undertaken to monitor the surface water flows and quality in this area, including monitoring and reporting in accordance with EPL 416 requirements. There have also been a number of projects undertaken to minimise potential water seepage from operational areas to the Investigation Drainage Line, including desilting the precipitate dam, constructing a drain on the product stockpile, and actively dewatering the Northwest tailings dam and reducing the use of passive drains in the area. Investigations and monitoring and future management actions will continue into closure.

The EPL requires the orange staining residue within the clean water drain to be fully contained within the premises at all times and any discharge to waters of this residue must comply with Condition L1.1 of the EPL.

6.4.2.4 Coal Processing System

When operational, the CHPP required up to 3 ML/day of makeup water. The CHPP makeup water was predominantly supplied from Dam No. 7 or permeate from the 1 ML tank. Approximately 2.3 ML/day of fine tailings (approximately 12-30% solids content) was returned underground.

During the term of this SWMP some components of the coal processing system may be decommissioned, removed, demolished and/or rehabilitated.

6.4.2.5 Surface Water Storages

As shown in **Figure 3** and **Figure 6**, the CHPP water management system includes a number of surface storage dams. The system has been developed over time and is designed to limit the need for off-site discharges to Bellbird Creek whilst also increasing the potential for water reuse on site.

An overview of the purpose of each storage area is provided in the tables below.

Precipitate Dam

Feature	Information
Purpose	Allows residence time for precipitate from pH adjustment in Lime Plant to settle out. During Closure the dam level is maintained as low as practical and is pumped out periodically after rainfall events.
Capacity Operating range	8 ML 0 - 8 ML
Receives water from / rate	Lime plant @ 8.0 ML/Day (max)
Sends water to / rate	Process Water Dam @ 8.0 ML/Day (max), can also send to Water Pollution Control Dam, Bellbird Boreholes or Austar Dam.
Overflow protection system	Overflows into Process Water Dam
Regulatory information	Turkey nest dam. Not on a water course. Used for pollution control as an integral part of the RO plant.

Process Dam

Feature	Information
Purpose	Storage for RO feed water and CHPP process water. Also allows extra residence time for precipitation of solids and scale. During closure, the dam level is maintained as low as practical.
Capacity Operating range	70 ML 17.5 – 63 ML
Receives water from / rate	Precipitation Dam @ 8.0 ML/Day (max), No. 7 Dam and RO Plant permeate
Sends water to / rate	RO Plant (feed) @ 10.0 ML/Day (max), Water Pollution Control Dam @ 10.0 ML/Day (if required). Number 7 Dam
Overflow protection system	Water Pollution Control Dam
Regulatory information	Turkey nest dam. Not on a water course*. Used for pollution control as an integral part of the RO Plant.

* Bellbird Creek (a 3rd order stream) has been diverted around this dam

Number 7 Dam

Feature	Information
Purpose	Water Storage. During closure, this dam is kept moderately full to allow for firefighting or operational water if required.
Capacity Operating range	100 ML 35 – 50 ML
Receives water from / rate	RO Plant @ 4.0 ML/Day (max), Emergency Overflow Dam, Doyle Street Dam, Process Water Dam
Sends water to / rate	CHPP @ 2.5ML/Day (max), Process Water Dam, Lime Plant, Truckfill
Overflow protection system	Water Pollution Control Dam
Regulatory information	Turkey nest dam. Not on a water course*. Used for pollution control as an integral part of the water treatment plant.

* Bellbird Creek (a 3rd order stream) has been diverted around this dam

Sediment Retention Cells

Feature	Information
Purpose	To remove suspended solids in site runoff prior to the Stormwater Retention Dam
Capacity Operating range	8 ML 0 - 8 ML
Receives water from / rate	CHPP and RO Plant surface runoff and washdown, runoff/overflow from old north-west tailings dam area
Sends water to / rate	Stormwater Retention Dam via overflow
Overflow protection system	Stormwater Retention Dam
Regulatory information	Mine water dam on minor stream (drainage line*) within mine affected area of CHPP. Exempt from licencing as an excluded work under Clause 3 of Schedule 1 of *Water Management (General) Regulation 2018*.

* Bellbird Creek (a 3rd order stream) has been diverted around this dam

Storm Water Retention Dam

Feature	Information
Purpose	Retain stormwater flows from CHPP site, RO Plant and stockpile areas
Capacity Operating range	10 ML 0 - 10 ML
Receives water from / rate	Sediment Retention Cells
Sends water to / rate	Water Pollution Control Dam via pipe outlet control
Overflow protection system	Overflow weir to Water Pollution Control Dam
Regulatory information	Mine water dam on minor stream (drainage line*) within mine water area of CHPP. Exempt from licencing as an excluded work under Clause 3 of Schedule 1 of *Water Management (General) Regulation 2018*.

* Bellbird Creek (a 3rd order stream) has been diverted around this dam

Water Pollution Control Dam

Feature	Information
Purpose	Storage of runoff water from site
Capacity Operating range	40 ML 0 - 40 ML
Receives water from / rate	CHPP surface runoff via overflow from other dams
Sends water to / rate	Bellbird Borehole at a rate of up to 10 ML/day normally and up to 13ML/day (if required by addition of diesel pumps – provision of quick access is incorporated in the design)
Overflow protection system	Emergency overflow dam and emergency pumping system
Regulatory information	Mine water dam on minor stream (drainage line*) within mine water area of CHPP. Exempt from licencing as an excluded work under Clause 3 of Schedule 1 of *Water Management (General) Regulation 2018*.

* Bellbird Creek (a 3rd order stream) has been diverted around this dam

Emergency Overflow Dam

Feature	Information
Purpose	Overflow protection for Water Pollution Control Dam, Licensed Discharge Point
Capacity Operating range	40 ML 0 - 40 ML
Receives water from / rate	Overflow from Water Pollution Control Dam
Sends water to / rate	Pump to Dam 7 or Water Pollution Control Dam if required up to 3.0 ML/day
Overflow protection system	Overflow is permitted to Bellbird Creek in accordance with Environment Protection Licence requirements (up to 2 ML/day)
Regulatory information	Mine water dam on minor stream (drainage line) within mine water area of CHPP. Exempt from licencing as an excluded work under Clause 3 of Schedule 1 of *Water Management (General) Regulation 2018*.

Number 9 Tailings Dam

Feature	Information
Purpose	Former tailings storage
Capacity Operating range	Approx. 5 ML 0 ML
Receives water from / rate	Runoff from storage area
Sends water to / rate	Overflow to Water Pollution Control Dam
Overflow protection system	Overflow to Water Pollution Control Dam
Regulatory information	Turkeys nest dam. Not on a water course. Used for pollution control.

Doyle Street Dam

Feature	Information
Purpose	Collection of clean runoff water from clean water channels, and return of clean runoff water to Bellbird Creek. Emergency use for controlling potential pollution incidents to Bellbird Creek.
Capacity Operating range	5 ML 0 -5 ML
Receives water from / rate	Clean water channels and Bellbird Creek on-site
Sends water to / rate	Normal operation returns water to Bellbird Creek without consumptive use. In the event of an emergency, water can be pumped to either the Water Pollution Control Dam, Number 7 Dam, Process Dam or the Emergency Overflow Dam for transfer on to the Process Dam and treatment in the RO plant.
Overflow protection system	Clean water – no overflow protection required
Regulatory information	3rd order stream. In stream dam for emergency use for controlling potential pollution incidents to Bellbird Creek. Licencing status of this dam is under review.

6.4.2.6 Potable Water and Sewage Treatment

Water for human contact and potable use to offices, workshops and bathhouses at the CHPP is supplied by Hunter Water. Sewage treatment is provided by a dedicated sewage treatment plant (STP) in the CHPP area, with treated effluent pumped underground via the brine pipeline.

6.4.3 Surface Water Storage and Pumping System

The Austar surface water management system was designed to match the capacity of the underground dewatering systems with additional provision to store and handle surface runoff during heavy rain events. The main pipelines used to transfer water between storages are shown on **Figure 1** and connections between storages are shown on **Figure 3**. As the underground mine is sealed, the surface water storage system is predominantly used to manage stormwater and surface flows.

Mine water may be pumped to the surface at No 2 Shaft. Once at the surface, the mine water is conveyed from the No 2 Shaft site to Kalingo Dam via two buried HDPE pipelines. Water stored in the Kalingo Dam is then piped to other mine water storages via buried HDPE pipelines. The pipeline

route(s) traverses Austar-owned land, Council road reserves and Crown Land, as generally shown on **Figure 1**. The maintenance regime for this water conveyancing infrastructure requires augmentation and / or replacement pipework to be installed from time to time on an as needed basis. Periodic maintenance of this pipeline infrastructure is undertaken, including excavation to expose sections of the pipeline to test, repair and / or replace the pipe. Approval from Council and State authorities is obtained where required prior to works in Council and Crown Land road reserves.

During the term of this SWMP, there may be opportunity to decommission buried pipelines in the water network. Water lines will be flushed with clean water and checked for any sediment build up. Any sediment in the pipelines will be analysed, and, if inert or easily made inert, pipes will be left in-situ to prevent vegetation disturbance to remove pipelines. If sediment proves to be a potential contaminant, further studies will be undertaken with the aim of inertisation of sediment. If contamination remains a long-term risk, pipelines will be removed following a work permit process.

An overview of the purpose of each storage located outside the CHPP area is provided in the tables below. The Austar Pit Top water management system is shown in **Figure 7**, the Kalingo Dam is shown in **Figure 8** and the Kitchener SIS water management system is shown in **Figure 9**.

AUSTAR DAM

AUSTAR PIT TOP

Scale 0 100 200m

TO AUSTAR DAM

EFFLUENT IRRIGATION AREA

OVERFLOW

DAM: TREATED SEWERAGE

EFFLUENT IRRIGATION AREA

TRANSPIRATION AREA

6358900mN

TRAINING CENTRE

Access to Mulia Rd

RIN

ACCESS ROAD

BOUNDARY FENCE

POWDER MAGAZINE

WINCH ROOM

STORES COMPOUND

DOWLA CREEK

6358750mN

EXISTING CARPARK

AMBULANCE ACCESS

RAMP

WASHDOWN BAY

DIESEL TANK

WORKSHOP

STORE

OIL DRUM STORE

BULK STORE

BOLT'N'NUT STORE

TANK

RO TANK

COMPRESSOR SHED

RESCUE STATION

SUB STATION

6358600mN

341300mE

341450mE

341600mE

N

Scale

0 100m

Legend

..... Clean Water Flow

..... Mine Affected Water Flow

..... Mine Affected Water Dam/Pond

DRAWN	GM	AUSTAR COAL MINE	
DATE	6/3/2018		
CHECKED		TITLE	Figure 7: Austar Pit Top Surface Water Management
APPROVED		SCALE	NTS
		DRAWING No.	Environment\SWMP\ SWMP_SurfaceWaterManagement_PitTop_2018
			A1

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LEGEND

Kalingo Dam Infrastructure

- Building
- Contour
- Culvert
- Dam Wall
- Dewater Pipeline
- Diversion Drain
- Hydroline
- Rip Rap
- Roads / Tracks
- UG 11k Power

0 20 40 60 80 m

Scale: 1:3,000

GDA 1994 MGA Zone 56
1/04/2021

Sheet Size : A3

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Austar Coal Mine

Kalingo Dam
Surface Water Management

FIGURE 8

..... Clean Water Flow

..... Dirty Water Flow

..... Dirty Water/Runoff Dam

.....Pipeline to Kalingo

DRAWN	M.Wright
DATE	24/02/2021
CHECKED	
APPROVED	

AUSTAR COAL MINE

TITLE

Figure 9: Kitchener SIS Surface Water Management

SCALE	DRAWING No.	
As Shown	Environment\SWMP\ SWMP_SurfaceWaterManagement_KitchenerSIS	A3

Kalingo Mine Water Dam

Feature	Information	
Purpose	Receives water from underground via #2 shaft pumping system and pipelines, Kitchener SIS and No. 3 Shaft sump. Used as a staging and storage facility. Assists in the removal of iron and manganese via oxidation. During closure, Kalingo dam predominantly receives water from the KSIS after rainfall events and is maintained empty.	
Capacity Operating range	110 ML 0 - 65 ML	
Receives water from / rate	Normal Operating Capacity - No 2 Shaft @ 7 ML/day Kitchener SIS @ 0.5ML/day No. 3 Shaft Sump @ 0.1 ML/day	
Sends water to / rate	Normal Operating Capacity- Austar Dam or Lime Plant(when RO plant is operational) @ 4.8ML/day	Possible Operating Capacity– 11 ML/Day Can transfer to Kalingo Shaft, Water Pollution Control Dam at CHPP or Bellbird Boreholes @ 6 ML/day
Equipment details	Main Flowserve CPX125/100/250 Centrifugal Pump Suction Boost – Flowserve CPX150/125/250 Centrifugal Pump. This equipment may be varied during closure and decommissioning.	
Monitoring	End of line flow for leak protection, discharge flow, level, pump operation	
Maintenance options	Weekly Mechanical Inspection (when operating)	
Overflow protection system	Direct link and gravity overflow to abandoned Kalingo shaft (up to 6ML/day pumped). Kalingo shaft has 12ML storage capacity.	
Regulatory information	Mine water dam on minor stream (less than 3rd order). Disconnected from clean water catchment (has upslope diversions). Receives water from the underground mine for storage and management. Exempt from licencing as an excluded dam under *Schedule 5 of Water Management (General) Regulation 2011*.Kallingo Dam is a declared dam.	
Decommissioning Information	Kalingo Dam is planned for decommissioning during the term of this SWMP. Further information on the design of the rehabilitated dam and associated sediment dam can be found in Section 6.5.1.Once the mine water dam has been decommissioned, the sediment dam will have a spillway and may overtop if designed rainfall is exceeded.	

Austar Dam

Feature	Information
Purpose	Receives water from Kalingo Dam via a buried 315mm HDPE pipeline and contingency pumping from Precipitate Dam at CHPP. Surface run off from the Austar mine pit top and effluent from the pit top washbay also reports to Austar Dam.
Capacity Operating range	35 ML 15 ML
Receives water from / rate	Kalingo Dam 3 - 7 ML/Day Precipitate Dam 6 ML/Day

Feature	Information	
Sends water to / rate	Normal Operating Capacity Lime Plant at CHPP 3 – 10 ML/Day (when RO Plant operating) No 7 Dam @ CHPP or either Precipitate Dam or Bellbird boreholes if required	Possible Operating Capacity Bellbird Boreholes or Water Pollution Control Dam @ 6 ML/day if required
Equipment details	1 x 125/100 Flowserve CPX200 90kW and 1 x Flowserve CPX100/65/250 55kW Centrifugal Pumps in parallel operation.	
Monitoring	Flow, Level, pump operation, Programmable Logic Controller (PLC) control	
Maintenance options	Weekly Mechanical Inspections (when operating)	
Overflow protection system	Level monitoring linked to PLC control (currently alarms at 80% capacity). All inflow water sources are linked via CITECT and will shut down once level (high) set point is reached. Also if Austar Dam pumps stop, all inflow water sources will stop after a pre-determined time. Discharge end of line flow monitoring for leak protection. Would overflow to a tributary of Congewai Creek.	
Regulatory information	Mine water dam on minor stream (drainage line). Disconnected from clean water catchment. Exempt from licencing as an excluded dam under *Schedule 5 of Water Management (General) Regulation 2011*.	
Decommissioning Information	Austar Dam may be decommissioned during the period of this SWMP. The Feasibility Study Site Investigations Program includes sediment testing and characterisation of Austar Dam sediments. The dam decommissioning would be designed to ensure the dam was fully cleaned of sediment, a sedimentation dam constructed to capture sediment during runoff, and the area rehabilitated to a final landform, consistent with the Rehabilitation Management Plan.	

Kitchener Surface Infrastructure Site Water Storage Dams & Sediment Basins

Feature	Information
Purpose	Receives surface runoff drainage water from rehabilitated areas (stabilised with vegetation) at the Kitchener SIS.
Capacity	Sediment Basins 1.6 ML Upper and Lower Sediment Dams 5 ML (approx.)
Receives water from / rate	Rainfall runoff from disturbed surface area of SIS
Sends water to / rate	Eastern Sediment Basin pumps to Upper Sediment Dam, Lower Sediment Dam pumps to Upper Sediment Dam and Upper Sediment Dam pumps to Kalingo Dam using diesel pumps or electric pumps.
Equipment details	Electric or diesel pumps
Monitoring	Water level in Eastern Sediment Basin and Upper and Lower Sediment Dam 1, pump operation, water quality monitoring during discharge from site

Maintenance options	Weekly Mechanical Inspection
Overflow protection system	Sediment Basins are designed to capture up to: -90th percentile 5-day rainfall event Above this rainfall intensity the dams are designed to discharge. Discharged water would flow to Black Creek.
Regulatory information	Sediment dams on minor stream (drainage line and 2nd order stream). Disconnected from clean water catchment (has upslope diversions). Exempt from licencing as an excluded dam under Clause 1 of Schedule 1 of *Water Management (General) Regulation 2018*.
Decommissioning Information	These dams shall be retained as sediment dams until rehabilitation of the KSIS is complete. They have been recently desilted and will be maintained as required during closure planning and execution phases.

6.4.3.1 Potable Water Management

Water for human contact and potable use at the Austar pit top, No. 2 shaft infrastructure is supplied by Hunter Water. Sewage treatment is provided by a dedicated STP at the pit top, with effluent discharged to a nearby dedicated effluent dam, from which disposal occurs by irrigation over an area near the dam.

6.4.3.2 No. 2 shaft Water Management

Most facilities around No. 2 shaft have been decommissioned, apart from the pumping infrastructure from No. 2 shaft which pumps to Kalingo Dam. In alignment with the new NSW metering policy, new meters will be installed on No. 2 shaft pipelines during 2023 (unless the pipelines are decommissioned).

Potable water has been supplied to the site using an Austar-owned pipeline from Ellalong township to No. 2 shaft infrastructure area. This pipeline has been in place since the 1980's and since that time, a number of local residents have tapped into the pipeline to access town water supply (for which Hunter Water bills the residents directly). This privately owned pipeline is not fit for purpose and is nearing the end of its serviceable life. Residents are aware of the high failure rate of the pipeline and generally have tanks installed as contingency. During closure planning, it is likely that the pipeline will be permanently decommissioned. Appropriate consultation with Hunter Water and affected residents will be undertaken prior to decommissioning works occurring. Tanks may need to be installed at No. 2 shaft if potable water continues to be required at this site.

6.4.4 Monitoring System

The site has a centralised monitoring and communication system (CITECT). The system enables remote control of the major components and communications across the mine site. The real time

monitoring system includes a wide range of parameters including water pressure, flow rates and storage levels and can send alarms to relevant personnel when water storages are high, or leak detect systems detect a potential leak.

An example of the CITECT monitoring system that shows a section of the underground pump out system is shown in **Figure 10.**

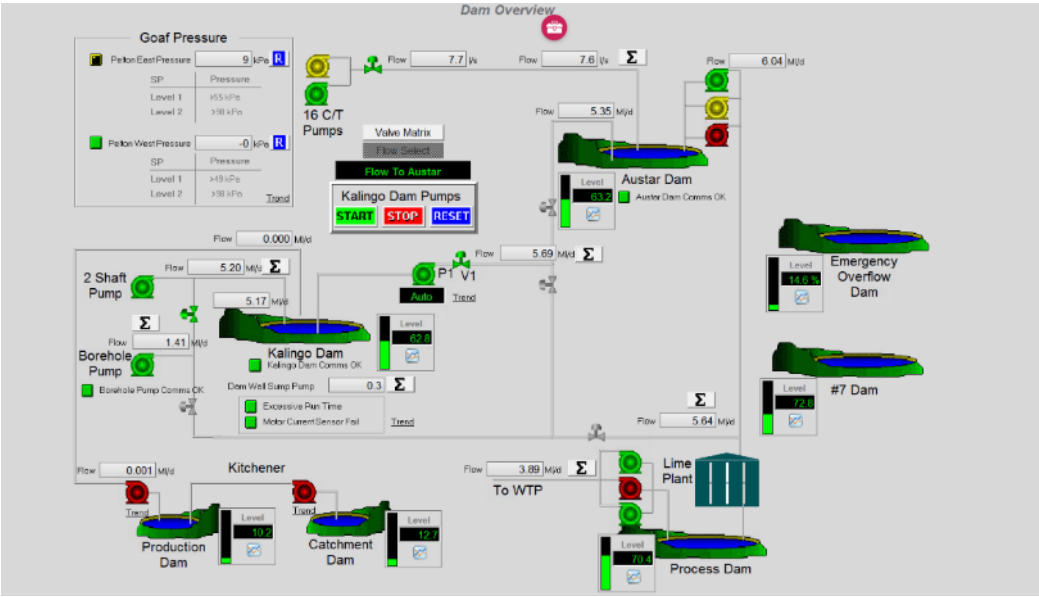


FIGURE 10 - EXAMPLE OF CITECT MONITORING SYSTEM SHOWING SURFACE DAMS,

6.4.5 Offsite Water Transfers or Discharges

There are no offsite water transfers at Austar Coal Mine.

Austar Coal has two licenced discharge points located at the CHPP:

- Emergency Overflow dam (LDP1) - Overflow is permitted to Bellbird Creek in accordance with EPL (LDP1) requirements (up to 2 ML/day); and
- SW6 – Discharge from the 1ML permeate tank – discharge of up to 5ML/day to Bellbird Creek is permitted in accordance with EPL416 requirements.

6.5 Water Management Initiatives, Decommissioning and Closure

During the closure planning phase, as information becomes available, Austar may undertake early decommissioning and closure works. As part of early works, the decommissioning of dams and pipelines may occur.

Dams may be dewatered, dried out and sediments tested. The dams may be desilted, with sediments classified against waste guidelines and disposed of in accordance with a waste management plan, which may include the silt being moved to a reject emplacement area for treatment or capping. If pumping is still required (e.g. Kalingo Dam), a tank may be utilised as a staging reservoir in place of the dam to allow the dam to dry out.

The composition of pipelines and the sediments or build up they contain will be tested for potential contaminants. A risk assessment will be undertaken to assess the risks of leaving the pipelines and sediments in-situ based on the results of contamination testing. Any pipelines with acceptable levels of risk will remain in-situ. Pipelines assessed as having a high risk of in-situ contamination would be further assessed to see if there is an appropriate treatment process available to neutralise contaminants, or whether the pipeline needs to be removed. Many of Austar's pipelines run through high quality bushland and have been in place for up to 30 years. The risk of contamination and the risk of disturbing natural ecosystems will both be assessed when decommissioning each pipeline. Decommissioning records will be retained.

Tailings pipelines are still in situ, and most have been flushed out. All tailings pipelines will be removed and disposed of or recycled. Tailings boreholes will be sealed to the same standard as exploration boreholes (Resources Regulator EDG01 Borehole Sealing on Land: Coal Exploration, 2012).

As part of planning for closure, additional works could be undertaken to close knowledge gaps or plan for site works, including the construction of groundwater monitoring bores, erosion and sediment control structures, additional monitoring points and temporary pipeline installation for water management. Any additional works would be assessed using the work permit system.

6.5.1 Kalingo Dam Decommissioning

Kalingo Dam is a declared dam and has been under-utilised since the mine was sealed. Austar has undertaken a decommissioning options assessment to clean and decommission the dam, deregister the declared dam status and achieve final landform.

As part of the rehabilitation phase of Kalingo Dam, a temporary sediment dam structure will be required to capture any sedimentation from the rehabilitated surface areas. The design intent of the sediment dam has been reviewed in accordance with the Blue Book (Managing Urban Stormwater Guidelines, Volume 1 and 2E) and this SWMP.

Three options were considered, with Option 1, shown below in **Error! Reference source not found.** being preferred for the low impact foot print and low expenditure. This option utilises the existing dam embankment to act as a sediment dam, but with a reduced height of embankment compared to the existing arrangement, and a reduced storage capacity down from 110 ML to 3 ML. A spillway is incorporated into the design.

A hydraulic assessment was performed to assess the capacity and effectiveness of the existing clean water diversion drainage system around the current impoundment considering the 5% annual exceedance probability (AEP) (20yr average recurrence interval (ARI)) and 1% AEP (100yr ARI) storm events. The clean water diversion drain on the western side will be extended as part of the dam re-design.

Once the mine water dam has been decommissioned, the water that will report to the dam will be from runoff of the rehabilitated dam footprint and from water pumped from the Kitchener Surface Infrastructure Site dams (at approximately 0.4 ML per day during rainfall events until the KSIS dams are dewatered). The pump design at Kalingo will be oversized and able to adequately manage dewatering the sediment dam within the 5-day period required by the Blue Book.

The sediment dam will remain in operation until rehabilitation is sufficiently established that erosion and sediment controls are no longer required.

6.6 Monitoring and Maintenance of Surface Water Management

Scheduled inspections of dams, drains and pipelines are undertaken and recorded through Austar Coal Mines work order system or compliance tracking system.

General maintenance of water management structures including dam walls, drains, weirs, erosion and sediment control structures is undertaken as required to ensure effective ongoing water management.

6.7 Reporting Procedures

Reporting of water management, monitoring and review is undertaken via:

- Internal reporting processes; and
- External reporting via:
    - The Annual Review, which presents graphical water results for the year and longer term (the last five years as available) with average or baseline water data shown clearly;
    - EPL reporting (Annual Return and Pollution Reduction Program requirements);
    - Water licence reporting requirements;

- Incident reporting (refer to Section 12.2); and
- Information dissemination to the community including the Community Consultative Committee (refer to Section 12.3).

7 EROSION AND SEDIMENT CONTROL

7.1 Overview

Changes in land use have the potential to disturb soils, alter drainage patterns and affect environmental values both on and off site (Landcom 2004). The site is an existing underground mine with limited potential for erosion and sediment generation. The surface facilities and surface water management system have been developed over time as the mine has developed and the area is well vegetated.

Erosion is mostly a short-term problem that results from the removal of vegetation and ground cover, although there is also potential for erosion as a result of the significantly high rainfall experienced over the past two years. The existing infrastructure areas (Pit Top, CHPP and supporting infrastructure) were constructed many years ago and have become stabilised over time. The potential for erosion and sediment generation is limited as large-scale clearing and ground disturbance is typically not required. Notwithstanding, the majority of the CHPP area drains to sediment retention cells, a stormwater retention dam and a water pollution control dam from which water is recycled to other storages or underground. Runoff from the pit top area is directed to the Austar Dam from which water is pumped to the CHPP area for treatment. The Kitchener SIS has been temporarily stabilised and revegetated or gravelled, with no ongoing active erosion.

Erosion and sediment control measures that were implemented and managed during operations remain largely unchanged during the current stage of closure planning. Any ground disturbance works associated with closure planning activities (such as investigative drilling) will be managed in accordance with existing erosion and sediment control protocols.

It is anticipated this Plan will be updated once closure planning has been completed and prior to execution of closure works.

7.2 Site Activities and Potential for Soil Erosion

The main activities that have potential for erosion and sediment generation include surface activities associated with infrastructure areas and closure planning activities; subsidence and surface changes resulting from longwall mining; and reject emplacement and rehabilitation activities.

7.2.1 Surface Activities

Austar Pit Top and CHPP

The Austar Pit Top facilities are well established and areas that were disturbed during the construction phase have been stabilised. Surface water runoff has the potential to cause erosion and is managed as part of the normal site operations. **Figure 6** shows the surface water management system around the CHPP and **Figure 7** shows the controls around the pit top facility.

Several types of erosion control measures have been implemented with the aim of preventing soil erosion and the entry of sediments into any of the surrounding water bodies.

A system of clean water diversion drains and mine affected collection drains are shown on **Figure 6** and **Figure 7.** Drains are typically constructed with either a parabolic or trapezoidal cross section rather than a V-shape which can be easily eroded. Channels and associated banks have been grassed where possible to assist with stability during water flows and to control sediment movement. Channels are periodically inspected (at least annually) to identify and repair damage caused by scour, sediment deposition, channel obstruction and loss of vegetative cover.

Several small sediment retention cells have been constructed within the water management systems. These are in addition to the main control structures that are designed to manage mine affected water and are described in **Section 0**. The sediment retention cells have been designed and located to contain runoff from currently and previously disturbed areas on site. The primary purpose of these retention cells is to trap sediment by gravity settling from normal rainfall events as well as to reduce flow velocity during high rainfall events.

These structures are regularly maintained and de-silted once the capacity of the structure is deemed to have been reduced significantly. The structures are inspected after major rainfall events (>50mm in 48 hours) and maintenance undertaken as required.

Kitchener Surface Infrastructure Site

Construction activities at the Kitchener SIS commenced in November 2009 and comprised shaft construction and ancillary services (power and pipelines). During closure this infrastructure will be decommissioned, and the shafts sealed. There are three natural catchment areas upstream of the SIS and access road area. These catchment areas continue downstream of the site into the Werakata State Conservation Area. The headwaters of Black Creek bisect the Kitchener SIS. The erosion and sediment controls for the Kitchener SIS have been developed in accordance with the practices detailed in *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) (the Blue Book). The intent of the erosion and sediment controls is to minimise the generation of sediment on site and its transport around and off the site.

The general arrangements and drainage for the Kitchener SIS are shown on **Figure 9**.

Upslope clean water diversion drains have been constructed on both sides of Black Creek to divert upslope runoff away from the SIS area. On the eastern side of Black Creek, a sediment basin and runoff collection drains capture runoff from disturbed parts of the site. The stockpile areas indicated

on the eastern side have been successfully revegetated and further water sampling over the next few years should demonstrate negligible contribution to the sediment basin. On the western side of Black Creek, runoff is directed to two sediment dams via run off collection drains. It is intended that there is no discharge from sediment dams for storm events that are less than the Blue Book design event.

The sediment basins have been sized based on the Blue Book methods. The eastern sediment basin design capacity is based on a catchment area of 3.7 ha and Type F basin, to capture runoff from a 90th percentile five-day rainfall depth of 42.8mm (Cessnock). Assuming a high runoff potential soil, the eastern sediment basin design capacity is approximately 1.1 ML.

The western disturbed catchment area is estimated at 2.4 ha. The two dams in this area, which were previously used for shaft construction purposes in the western catchment area, were repurposed as sediment dams. A spillway connects the two sediment dams. Assuming a high runoff potential soil, the minimum capacity to capture runoff from a 90th percentile, five-day rainfall depth of 42.8mm for the 2.4 ha western catchment is 0.7 ML. The sediment dams have an estimated combined volume of approximately 5 ML, significantly exceeding the minimum capacity requirement.

Pumping facilities dewater the eastern sediment basin and the lower sediment dam to the upper sediment dam. Pumping may be activated during a rainfall event, which in effect provides additional capacity for the Kitchener SIS, in excess of the 90th percentile 5-day rainfall depth.

A water supply and dewatering pipeline (refer **Figure 1** and **Figure 3**) between the KSIS and Kalingo Dam allows water from the upper sediment dam to be pumped to Kalingo Dam for treatment in the mine water treatment system.

When discharge from the sediment dams occurs off site, water quality monitoring is undertaken in the eastern sediment basin, lower sediment dam and upstream and downstream Black Creek. Since 2011, there have been approximately 20 occasions on which discharge has occurred. Discharge events are reported to the EPA and DPHI, as well as being reported in the Annual Review.

The erosion and sediment control strategy at the SIS has been designed to minimise the potential impacts on the surrounding environment and downstream catchment areas, including:

- Minimise erosion potential of the site and sediment transport off site;
- Maintain water quality in downstream watercourses; and
- Protect the existing streamlines and riparian habitat.

The shaft construction activities at the KSIS were substantially complete in 2013-2014 with the KSIS then transitioning to an operational phase. The disturbed working parts of the site for construction have been stabilised with vegetation, and further water sampling over the next few years should demonstrate negligible contribution to sediment load from this site.

7.2.2 Longwall Mining and Subsidence

Bellbird South and Stage 3

Assessments of subsidence impacts from mining in the Bellbird South and Stage 3 areas on surface water have been documented in Environmental Assessments by Umwelt (February 2007a, November 2015, May 2017) and Umwelt (September 2008, September 2011) respectively. The area overlying Bellbird South encompasses the gentle south facing lower slopes of the Broken Back Range and the extensive creek flat of the Quorrobolong Creek system (Umwelt, February 2007b). Cony Creek joins Quorrobolong creek in the east of the Stage 2 area. The area overlying Stage 3 also encompasses the south facing lower slopes of the Broken Back Range and includes the Sandy and Cony Creek systems and associated flats and footslopes. The areas overlying Bellbird South and Stage 3 are mostly used as farmland, with some areas of natural bushland and State Conservation Area in the north of the Bellbird South and Stage 3 areas.

Surface water assessments undertaken by Umwelt for Bellbird South and Stage 3 of the project found:

- No significant changes in stream power and erosive potential were predicted along Quorrobolong, Cony and Sandy Creeks as a result of Bellbird South and Stage 3 mining operations;
- Bellbird South and Stage 3 mining operations were unlikely to significantly alter stream velocities; and
- The potential to increase erosion on the land surface as a result of Bellbird South and Stage 3 mining was also expected to be minimal due to the relatively small predicted changes in landform grades and the high level of ground cover over the area.

The Bellbird South Stage 2 mining area (LW A3 to A5a) was completed in February 2013, where mining occurred beneath private rural landholdings and Quorrobolong Creek. There were no erosion matters identified or reported by members of the community during mining of Stage 2, which confirms the predictions of the Environmental Assessments. Subsidence in this area is substantially complete and no further monitoring is undertaken.

The Bellbird South LWB1-B3 mining area commenced in July 2016. This approved mining area was extended to include LWB4-B7 in August 2017, however only LWB2 to B6 were mined. Mining ceased in February 2020. No surface water issues of concern have been observed. Subsidence in this area is substantially complete and no further monitoring is undertaken.

Mining of LWA8 was completed in June 2015 and subsidence in the Stage 3 area is complete for the panels extracted.

7.2.3 Reject Emplacement Areas

The reject material at Austar can potentially form acid metalliferous drainage due to compounds within the reject. Rehabilitation aims to maximise compaction thus reducing the potential for oxidation that can lead to acid mine water generation. The emplacement areas have been designed so that leachate drains directly to old mine workings located in the base of the open cut voids (refer **Figure 3**).

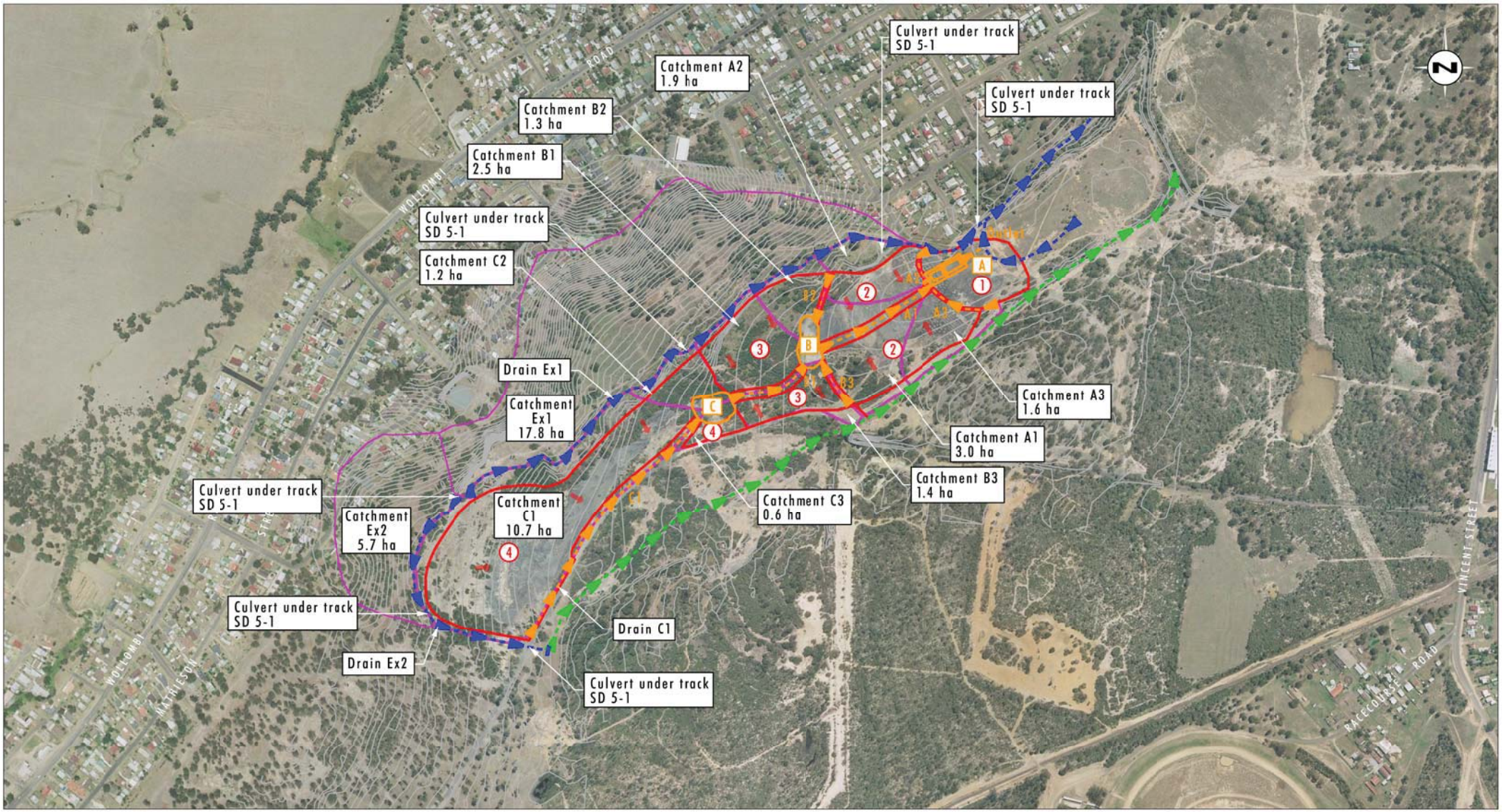
Material deposited in old open cut voids is progressively rehabilitated. The principal objective of the final rehabilitation plan is to form a stable landform consistent with surrounding features which will pose no long-term environmental hazard. The approved methodology involves capping the coarse reject with inert overburden prior to stabilising with vegetation.

The CHPP site reject emplacement areas are integrated into the CHPP surface water management system, including the separation and management of mine affected and clean water flows (refer **Section 6.4.2**).

The Aberdare Extended Emplacement Area drains to Black Creek, therefore specific surface water management and erosion and sediment controls have been developed to protect the ephemeral tributaries of Black Creek from both surface runoff that has been in contact with coarse reject, and potential sediment generated from active rehabilitation areas. Placement of the coarse reject will be to ensure potentially acidic surface water runoff from coarse reject areas drains to old workings at the base of the pit.

Presently, the Aberdare Extended Emplacement Area (refer **Figure 11**) is not connected to the surrounding clean water systems with all water that falls within the open cut pit captured or directed to the base of the pit to drain to old workings. Notwithstanding, an Aberdare Extended Emplacement Area Erosion and Sediment Control Plan (Umwelt, 2010) has been developed which incorporates a combination of clean water diversion drains, collection drains, and sediment basins designed to minimise the mobilisation and exportation of sediment to the downstream receiving environment.

The methods adopted to determine the necessary size of the channels and basins is adapted from the methods outlined in *Managing Urban Stormwater – Soils and Construction Volume 1* (Blue Book) (Landcom, 2004) and *Managing Urban Stormwater – Soils and Construction Volume 2e – Mines and Quarries* (DECC, 2008). The general layout of the ESC measures for Aberdare extended are shown in **Figure 11**.



Source: Google Earth 2010
Note: Contour Interval 1m

0 100 250 500m
1:10 000

Legend
- Sediment Dam
- Existing Drain
- Permanent Clean Drain
- Dirty Drain
- Rehabilitation Stages
- Catchment Boundary

Figure10: Aberdare Extended Emplacement Area Erosion and Sediment Controls, General Layout and Catchment Boundaries

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During closure planning, it is planned to maintain reject emplacement areas where the reject has been compacted but not capped with inert material by monitoring for erosion and implementing remedial measures if required. Rehabilitated rejects emplacement areas will be monitored to check against rehabilitation completion criteria given in the approved Rehabilitation Management Plan.

7.3 Erosion and Sediment Control Initiatives in Closure

Kitchener SIS sediment control dams are designed to capture runoff from a 90th percentile five-day rainfall depth of 42.8mm (Cessnock). During the last few years of uncharacteristically high rainfall, the dams have overtopped relatively frequently.

As part of closure planning and rehabilitation works, Austar may look at options to reduce the catchment of these dams by redirecting water runoff offsite. Studies to demonstrate water quality is clean and suitable for redirection directly to clean water diversion drains bypassing sediment dams would be undertaken, along with an engineered design of the modified drainage system. Further consultation with the EPA and DPHI will occur prior to any changes being implemented.

Decommissioning and demolition works will be subject to Works Permits, including provisions for erosion and sediment controls as required.

7.4 Maintenance of Erosion and Sediment Controls

Regular inspection and maintenance of permanent structures ensures that the water management system, sediment and erosion controls remain effective. At active disturbed areas, regular inspections are undertaken to monitor the condition and effectiveness of controls.

Measures to control erosion and sediment generation include:

- Identification and review of surface activities that may change surface water flows and result in erosion;
- Regular checking of rehabilitated areas;
- Installation of temporary and/or additional permanent controls to manage locations that have been identified as requiring attention;
- Diversion of surface and road runoff away from disturbed areas;
- Inspection and maintenance (if required) of diversion and collection drains and structures following major rainfall events (>50mm in 48 hours) or other activities that may result in damage; and
- Clearing of excessive vegetation and weeds along drainage lines.

8 MONITORING

Monitoring results will be used to assess the effectiveness of the management measures outlined in **Section 0**. Exceedances of the Impact assessment criteria will be investigated as detailed in **Section 12.2**.

8.1 Surface Water Monitoring Program

8.1.1 Onsite Monitoring Requirements

The SWMP takes into consideration the surface water monitoring requirements required under DA 29/95, PA 08_0111 and EPL 416 (**Appendix A**).

8.1.2 Surface Water Monitoring Locations and Frequency

The location and frequency of surface water monitoring required to satisfy the requirements of the EPL are summarised in **Table 9** and are shown on **Figure 12**.

TABLE 9 - EPL SURFACE WATER MONITORING POINTS

EPA ID No.	Site ID No	Type of monitoring point	Type of discharge point	Location	Monitoring Frequency	Comment
1	SW1	Wet weather discharge (quality and volume)	Wet weather discharge (quality and volume)	Spillway of the emergency dam at the Pelton Coal Preparation Plant site	Special Frequency 1 (*)	Licensed Discharge Point No 1
2	SW2	Ambient water quality monitoring	n/a	Bellbird Creek (near Wollombi Road)	Special Frequency 2 (**)	Downstream of CHPP
4	SW4	Ambient water quality monitoring	n/a	Bellbird Creek (northern boundary)	Special Frequency 2 (**)	Downstream of CHPP
5	SW5	Ambient water quality monitoring	n/a	Bellbird Creek (western boundary)	Special Frequency 2 (**)	Upstream of CHPP
6	SW6	Discharge to waters (quality and volume)	Discharge to waters (quality and volume)	Discharge from 1ML permeate tank	Once a month (min. of 4 weeks) during any period of discharge.	Licensed Discharge Point No 6

Notes: *(*) Special Frequency 1 means daily collected at a minimum of twelve hourly intervals when a discharge is occurring.*
(**) Special Frequency 2 means three times per week during any period of discharge from Point 1 at a minimum of 48 hour intervals commencing as soon as practical after discharge has commenced. Once per month during any period of discharge from Point 6 at a minimum of 4 weekly intervals.

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 MLA521 D1 NM C1 MLA521 SW2 SW6 SW5 NM C2 D2

WERAKATA NATIONAL PARK

WERAKATA STATE CONSERVATION AREA

D9 NM K3

BLK3 BLK2 BLK1 LW A7 LW A8 LW A9 NM K1 NM K2 MB01 D8 D7 LW A10 LW A11 LW A12 LW A13 LW A14 LW A15 LW A16 LW A17 LW A18 LW A19

MB02

QC3 QC2 QC1 NM K4 D5 WBH1 WBH2 WBH3 SW C1 D4 AQD1073A SW Q2 SW Q3 NER 1010 MB04 MB03A SW Q1 LW B6 LW B5 LW B4 LW B3 LW B2

LEGEND

- Colliery Holding Boundary
- Mining Lease Application Boundary
- Relevant Mining Titles
- Mine Plan
- Surrounding Mines
- Railway
- 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
- Creek Stability Monitoring

0 240 480 720 960 m

Scale: 1:30,000

GDA 1994 MGA Zone 56

24/01/2024

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Austar Coal Mine SWMP

Environmental Monitoring Network

FIGURE 12

Water quality monitoring is undertaken once a month (minimum of 4 weeks) at Points 2, 4, 5 and 6 when there are discharges occurring under the EPL from Licenced Discharge Point No 6.

Additionally, if a discharge is occurring under the EPL from Licenced Discharge Point No 1, water quality monitoring will be undertaken at Points 2, 4 and 5 three times per week at a minimum of 48 hour intervals commencing as soon as practical after the discharge commenced.

The results of all monitoring undertaken when discharging are included in the Annual Return provided to the EPA under EPL 416, made available on the Austar Coal Website and recorded in the Annual Review.

The water quality samples are taken by grab sample in accordance with the requirements of EPL 416 and monitoring undertaken in accordance with the Approved Methods. In line instrumentation is used for volume monitoring, also in accordance with EPL requirements.

8.1.3 Real time Monitoring System

The CITECT system (refer **Section 6.4**) also includes the major components of the mines water management system. The system enables remote control and communications across the mine site. The real time monitoring system includes a wide range of parameters including flow rates and storage levels of dams.

When operational, monitoring at the RO Plant includes incoming flow rate and discharge to the various locations such as permeate from the 1ML tank supplied to the underground, or licenced discharged offsite to Bellbird Creek. Water quality parameters are also monitored so that water that does not meet the specifications is returned through the system for further treatment.

8.1.4 Other Monitoring

Schedule 3 Condition 9(b) of Development Consent DA29/95 indicates the surface water monitoring program should include Black, Cony and Quorrobolong Creeks.

Schedule 4 Condition 9(b) (iii) of Project Approval PA08_0111 indicates the surface water monitoring program should include the above creeks and Sandy Creek. Sandy Creek is a tributary of Cony Creek that overlies Stage 3 Longwalls A15 to A17. The only longwalls extracted in the Stage 3 area were Longwalls A7 and A8 which are located well north of Sandy Creek and Cony Creek. Therefore, no mining activity has occurred that could impact Sandy Creek and, as a consequence, no monitoring of Sandy Creek has occurred or is proposed during closure.

8.1.4.1 Quorrobolong Creek

Three water quality monitoring sites are located on Quorrobolong Creek: SWQ1, SWQ2 and SWQ3 as shown on **Figure 12**.

The first sample location (SWQ1) is upstream of Austar's Bellbird South mining area, the second location (SWQ2) is on the eastern boundary of Austar's land holding where Quorrobolong Creek enters Austar owned land. The third location is a downstream sample site (SWQ3) on Austar's southern boundary where the creek exits Austar's land holding.

Water quality monitoring frequency and analytes for Quorrobolong Creek are presented in **Table 12**. Flow in Quorrobolong Creek and channel stability is also visually monitored and photographically recorded on an annual basis.

Subsidence surveys taken around one year after mining ceased show that no substantial subsidence impacts are occurring. As there is no substantial subsidence predicted during closure, water quality monitoring in this area will be undertaken quarterly at all three locations and visual monitoring of channel stability will revert to annually at locations SWQ1 and SWQ2.

8.1.4.2 Cony Creek

Water quality monitoring occurs at one location on Cony Creek as shown in **Figure 12**. The sample site (SWC1) is located at the point where Quorrobolong Road crosses Cony Creek, approximately at the downstream limit of Stage 3 subsidence impacts that would have occurred if Longwalls A11 to A17 were extracted. Given that Cony Creek is a tributary of Quorrobolong Creek, monitoring results from this site provide background to results from downstream locations on Quorrobolong Creek.

Water quality monitoring frequency and analytes for Cony Creek are presented in **Table 12**.. Monitoring during closure will be conducted quarterly for water quality and flow estimate. Visual monitoring of channel stability will be undertaken annually.

8.1.4.3 Bellbird Creek/Black Creek

EPL 416 requires water quality sampling (when licensed discharge is occurring) upstream and downstream of the CHPP area in Bellbird Creek. This creek forms part of the Black Creek drainage system and is directly influenced by the quality and quantity of water discharged from the mine.

Monitoring in the upstream sections of the Black Creek drainage system in Bellbird Creek is considered more relevant to the assessment of impacts from Austar's operations than monitoring further downstream in the Black Creek system where water quality may be heavily influenced by non-mining (urban) activities that are beyond the control or influence of Austar's operations. The confluence of the two creeks is over 5 kilometres downstream from the CHPP area on the northern side of Cessnock. At this point the Black Creek system is concrete lined in parts and passes through the urban centre of Cessnock.

The five water quality monitoring sites specified in EPL416 are located as indicated on **Figure 12**. Site SW1 is located at the Emergency Overflow Dam spillway (LDP1) and is monitored when overflow is occurring (it is otherwise dry). The remaining sites are monitored on a monthly basis (unless there is no water at the sites) when the site is discharging from the RO plant. SW2 is located at a site known

as Pinch Bridge and is located upstream of LDP1 but downstream of SW6 (RO Plant permeate discharge) and the majority of the CHPP area. SW4 is located at the northern boundary of Austar's land holding, downstream of SW1 and adjacent to the Doyle St Dam. SW5 is located upstream of the CHPP area. Water quality analysis includes the parameters listed in **Table 12**. Flow in Bellbird Creek at sites SW2, SW4 and SW5 is also visually monitored during monthly monitoring. Monitoring of these sites is planned to continue during closure.

Water quality monitoring also occurs in the upper reach of Black Creek immediately upstream and downstream of the Kitchener SIS during times of discharge from the site sediment dams (refer **Section 8.1**). Monitoring occurs as soon as practical after discharge has commenced and includes analysis of pH, EC and Total Suspended Solids (TSS).

8.1.4.4 Reject Emplacement Area

The reject emplacement area is designed so that leachate from the emplacement area percolates into the old mine workings via existing mine headings in the base of the emplacement areas. Water quality in these workings is poor and reflective of historic mine workings. The emplacement areas are managed to contain surface water runoff to the base of the emplacement areas to ensure surface water drains to the old workings and as a consequence no surface discharges of leachate from the site occur to be monitored. Monitoring of groundwater in old workings is discussed in **Section 8.2**.

Monthly visual checks are undertaken to ensure that the area is maintained and surface water controls are functioning appropriately.

8.1.4.5 Stream Health and Channel Stability

A stream health and channel stability monitoring program has been developed by Austar to assess whether any potential changes to flow regimes during mine closure impact on channel stability and conditions. The monitoring program incorporates site inspections as required of selected creek systems immediately downslope of mine closure works, with a report produced following each inspection to characterise the ongoing conditions of applicable watercourses.
These water courses include:

- Black Creek;
- Quorrobolong Creek

Mining did not progress near Sandy Creek or Cony Creek. Therefore, stream health and channel stability monitoring is not deemed necessary at these locations.

The following procedures are undertaken at each of the monitoring locations:

- Documenting locations and dimensions of significant erosive or depositional features;
- Photographs taken upstream, downstream and on both banks;

- Rating the location with the Rapid Appraisal of Riparian Condition (RARC) protocol developed by Land & Water Australia (Jansen et al., 2005). This assesses the ecological condition of riparian habitats using indicators that reflect functional aspects of the physical, community and landscape features of the riparian zone (a measure of stream health); and
- Rating the location with the Ephemeral Stream Assessment protocol developed by the CSIRO to assess the erosional state of the creek at the monitoring location (a measure of channel stability).

8.1.4.6 Farm Dams

During underground mining, farm dams were identitified and pre and post mining inspections undertaken in consultation with respective landowners to ensure there were no impacts from mine subsidence. As mine subsidence has been substantially completed since 2022 (refer section 9), monitoring of farm dams is no longer conducted.

8.1.4.7 Contamination

As described in **Section 1**, detailed mine closure planning and implementation for the site has commenced and additional surface and groundwater sampling and analysis may be required for surface water and contamination assessments.

8.2 Groundwater Monitoring Program

Monitoring or estimation of groundwater is undertaken for:

- Water pumped underground by events or processes controlled at the CHPP;
- Water inflow (seepage) from inseam drilled boreholes;
- Water inflow estimates from stored water bodies;
- Water piped underground and used for mining operations;
- Water pumped out of the mine;
- Water stored on the surface of the mine; and
- Water levels in parts of the sealed Austar Mine and adjoining underground workings and in shallow and alluvial aquifers.

Measurement of water flow in the underground workings is not possible now the mine has been sealed. Water levels can be measured at a number of groundwater bores into old workings.

8.2.1 Groundwater Monitoring Locations and Frequency

A detailed understanding of the underground mine water quality has been determined from an annual sampling program undertaken since 2006 and water quality sampling continued to be conducted at underground mine locations until 2022 when the mine was sealed.

Since the sealing of the mine in October 2022, it is not possible or feasible to monitor water quality of groundwater seeping into the most recent underground mine workings. Water within these mine workings is approximately 400m below ground level and currently not able to have a water sample collected from the surface. As the mine fills with water, boreholes connected to the old (shallower) workings where water level can be measured will be considered for suitability for water quality sampling.

8.2.2 Groundwater Inflows and Water Levels in Underground Workings

Table 10 summarises the location, frequency and schedule of water flow, quality and pressure monitoring undertaken at Austar Coal Mine until sealing in October 2022. Table 1 shows a summary of results from this monitoring while the underground mine was accessible.

Since pumps were decommissioned and the mine was sealed, water levels have been monitored in the Ellalong Goaf and Stage 3 areas through borehole dipping. Levels can also be monitored in the surrounding old workings of the Ellalong, Pelton, Kalingo, Bellbird, Aberdare Central and Elrington Collieries by dipping shafts or boreholes (**Figure 5**). The water level database for Pelton Colliery, Bellbird Colliery, Aberdare Central Colliery, Kalingo Colliery, Elrington Colliery and Ellalong Goaf is maintained by the Austar Coal Mine surveyor. This will continue during closure for as long as monitoring sites are accessible. Further monitoring points (i.e. boreholes connected to shallower old workings) have been identified that will be considered as the mine workings continue to fill with water.

TABLE 10 - WATER SAMPLING, PRESSURE AND FLOW MONITORING UNDERTAKEN UNTIL 2022

LOCATION	MONITORING FREQUENCY			
	FLOW	PRESSURE	QUALITY	SHAFT/BORE DIP
West Pelton 12c/t Borehole	Monthly	Monthly	Annual *	N/A
East Pelton 16c/t Borehole	Monthly	Monthly	Annual *	N/A
16c/t Pump	CITECT	N/A	N/A	N/A
Blue Panel Boreholes	Monthly	N/A	Annual *	N/A
LW13 Siphon	Monthly	N/A	Annual *	N/A
SL2 Siphon / Borehole	Monthly	Monthly	Annual *	N/A
LWA7 Holes	N/A	N/A	Annual *	N/A
Bellbird Colliery	N/A	N/A	N/A	Monthly
Aberdare Central Colliery	N/A	N/A	N/A	Monthly
Kalingo Colliery	N/A	N/A	N/A	Monthly
Ellalong	N/A	N/A	N/A	Monthly
Pelton	N/A	N/A	N/A	Monthly
Elrington	N/A	N/A	N/A	Monthly
#2 Shaft Pump	CITECT	N/A	Quarterly *	Monthly

* Water quality testing not undertaken if sample location is not running

8.2.3 Shallow (Porous Rock) and Alluvial Aquifers

Alluvium associated with the Quorrobolong/Cony/Sandy Creek system is present over the most recently mined areas. Numerous bores and wells draw water from these sediments, which usually comprise a fine-grained surface layer underlain by sand and gravel deposits, with flows from these mostly ranging from 0.1 L/s to 9 L/s and water quality generally reasonable (AGEC, 2018). However, these aquifers are not predicted to have been affected by the Austar mining activities due to the depth of cover (Dundon Consulting, 2017). While there are no known Groundwater Dependent Ecosystems (GDEs) within the LWB1-B7 Area, riparian vegetation comprising Riparian Swamp Oak Open Forest and Riparian Cabbage Gum Open Forest is at least partially dependent upon shallow alluvial groundwater sources during periods of reduced surface water flow (Umwelt, 2017).

There is evidence to suggest that there may be water bearing zones associated with jointing or fracturing within the Branxton Formation above the mine at a depth of approximately 100m to 170m below the ground surface (referred to as a porous rock aquifer), however, the importance of this water resource is likely to be minimal, since the water quality in these water bearing zones is poor (EC greater than 10,000 µS/cm) and the yield low (less than 1 L/s) (AGEC, 2018).

For underground mines which cause subsidence, the upper limit of the subsidence fractured zone will be reached when the strata above the collapsed zone are sufficiently strong to span the goaf area without significant bending or shear strains being developed. MSEC (2008) estimated that the upper limit of the fracture zone is between 225 metres and 355 metres for Bellbird South and Stage 3 mining. The depth of cover above the longwalls ranges from approximately 450 metres to 740 metres. It is unlikely, therefore, that the fractured zone would extend up to the surface nor to the shallow or alluvial aquifers.

Based on worst case predictions, it is possible that discontinuous fracturing may extend marginally into the shallow water bearing zones within the upper Branxton Formation where depth of cover is less than 455 metres. However, fracturing within this zone will not result in an increase in vertical hydraulic conductivity and will not result in direct hydraulic connection with the goaf, with any changes in this zone only affecting horizontal hydraulic conductivity (Umwelt, September 2017).

Potential subsidence impacts and their likely environmental consequences on hydrological features within the LWB1-B7 mining area are documented in the Extraction Plan Water Management Plan – LWB1-LWB7).

Austar's monitoring program for the Bellbird South and Stage 3 area has been aimed at confirming the above predictions. Austar has six monitoring piezometers within alluvium in the Bellbird South area (AQD1073A, WBH1 to WBH3, MB03 and MB04 shown on **Figure 12**), one piezometer within the shallow porous rock aquifer in the Bellbird South area installed to 100m depth (NER1010 on **Figure 12**), and two piezometers within the shallow porous rock aquifer in the Stage 3 area (MB01, MB02 on **Figure 12**). Monitoring results during Stage 2 mining showed no identifiable impact of mining on the

shallow porous rock or alluvial aquifers. In addition, microsiesmic monitoring undertaken during mining of LWA5 indicated that the height of fracturing likely has not extended above 220 metres – less than the upper limit of fracture zone predicted by MSEC (2008).

Conservatively, water levels in the shallow porous rock aquifers and the alluvium have been monitored on a regular basis during mining. Monitoring has included the following:

- Continuous monitoring of alluvial groundwater levels in monitoring bores AQD1073A, WBH1, WBH2, WBH3, MB03A and MB04 with EC readings taken every three months.
- Continuous monitoring of groundwater levels in bore NER1010 in the Bellbird South area to monitor the porous rock (sandstone) aquifer.
- Daily rainfall in the vicinity of the site to provide context for fluctuations in groundwater level (via the meteorological station located at the CHPP – refer **Figure 12**).
- Review of groundwater levels in DEECW bore GW080975 (30m deep) and the adjacent shallow bore GW080974 (7m deep) (when data is available).
- Monitoring of the Stage 3 porous rock aquifer in bores MB01 and MB02 over the Stage 3 area. Groundwater levels have been monitored continuously and EC is recorded periodically.

For water level monitoring, quarterly dips are taken. Water quality monitoring frequency and analytes for groundwater monitoring bores are presented in **Table 12**.

Monitoring results are reported in the Annual Review.

Monitoring was planned to continue until subsidence surveys show that no on-going subsidence impacts are occurring at or near these sites. A March 2021 report by consulting subsidence engineers MSEC concluded that:

The changes in vertical subsidence and strain in the first year after the completion of mining in the Bellbird South mining area are very small and are unlikely to be sufficient to result in physical impacts, i.e. changes in surface water drainage, surface cracking or fracturing of exposed bedrock. It is understood that Austar has not identified adverse physical impacts to the natural environment due to the mining in the Bellbird South mining area.
The ongoing long-term residual subsidence effects (i.e. after the survey dated 10 February 2021) are expected to be very small and unlikely to result in adverse physical impacts to the natural environment. MSEC therefore considers that ground monitoring could be ceased as the ongoing subsidence effects are expected to be very small and similar to the order of natural ground movements and survey tolerance.

Groundwater monitoring in the mining areas has satisfied the requirements outlined in the Extraction Plan Water Management Plans. Monitoring will continue during closure planning phases; however the frequency of water level monitoring may be reduced to 6 monthly and laboratory analysis of

groundwater monitoring bores reduced from six-monthly to annually, as the likelihood of impacts is constantly reducing with time since subsidence has occurred.

8.2.4 Other Groundwater Related Monitoring

Monitoring was undertaken over Bellbird Stage 2 area to monitor potential effects of subsidence on groundwater dependent ecosystems (River Flat Eucalypt forest). This monitoring program demonstrated no harm occurred which was confirmed by OEH in May 2019.

There were no privately owned bores identified requiring monitoring through the Built Features Management Plans during and after mining in Bellbird South and Stage 3 areas. There have been no privately owned bores monitored.

8.2.5 Groundwater Quality Monitoring Methodology

A summary of the site groundwater monitoring methodology is provided in **Table 11**. Monitoring bore locations are shown in **Figure 12**.

TABLE 11 - GROUNDWATER MONITORING METHODOLOGY

Monitoring Location ID	Groundwater Monitoring Methodology
AQD1073A	Low-flow purging until water quality parameter stabilisation or three-bore volumes. This bore can run dry if purged too quickly. A minimum of three bore volumes are purged from this bore at a low flow rate using a Mega Monsoon Pump.
MB01	Sampled via Hydrasleeve discrete-point sampler.
MB02	Sampled via Hydrasleeve discrete-point sampler.
MB03A – installed to replace MB03	Low-flow purging until water quality parameter stabilisation or three-bore volumes.
MB04	Low-flow purging until water quality parameter stabilisation or three-bore volumes.
NER1010	Sampled via Hydrasleeve discrete-point sampler.
WBH1	Low-flow purging until water quality parameter stabilisation or three-bore volumes.
WBH2	Low-flow purging until water quality parameter stabilisation or three-bore volumes.
WBH3	Low-flow purging until water quality parameter stabilisation or three-bore volumes.

Groundwater monitoring is undertaken in accordance with:

- The Australian / New Zealand Standard Water Quality – “Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples” (AS / NZS 5667.1:1998).

- The Australian / New Zealand Standard Water quality – "Sampling, Part 11: Guidance on sampling of groundwaters" (AS / NZS 5667.11:1998).
- Geoscience Australia, (2009), "Groundwater Sampling and Analysis – A Field Guide".
- Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) Standard operating procedures (SOPs) for groundwater level, groundwater quality sampling and transport, and groundwater level logger download and installation.

Bores with suitable recovery rates and permeability are purged with an electro-submersible pump and purged using standard low-flow technique or until three bore volumes have been abstracted. The sampling pump is equipped with a no-return valve at the pump.

A number of bores have been deemed "no-purge bores" due to their low permeability/slow recovery rates and/or the depth to water, namely MB01, MB02 and NER1010. Their low permeability makes purging problematic and inconsistent between monitoring rounds. In order to monitor these bores in a consistent manner, a Hydrasleeve discrete-point sampler is used to recover a sample at the same depth/screen interval at each monitoring round.

Site monitoring bores are assessed for field parameters on a quarterly basis, with laboratory samples collected annually as part of the monitoring program.

All field parameters are measured using a calibrated water quality meter. The water quality meter is serviced once per year and the measuring elements are replaced regardless of their condition. Calibration solutions are stored as per the SDS/instructions and only small amounts are taken into the field during monitoring campaigns.

Laboratory samples are placed in laboratory supplied pre-prepared sample bottles with appropriate preservative added, stored in chilled insulated containers and despatched for analysis at a NATA certified laboratory.

8.3 Monitoring Program Summary

The relevant monitoring requirements are summarised in **Table 12.** Additional surface monitoring sites and groundwater monitoring bores may be installed to inform surface and groundwater assessments for the mine closure planning program.

TABLE 12 - MONITORING PROGRAM SUMMARY

Routine Environmental Monitoring	Reason	Location(s)	Frequency[1]
General Condition			
Environmental inspection	EMP	Austar Pit Top Pelton CHPP No 1 Shaft No 2 Shaft Kalingo Infrastructure Area (3 shaft) Kitchener Surface Infrastructure Site Rehabilitation areas (Area 12, Area 13) Aberdare Extended Reject Emplacement	Monthly general condition / observations (including erosion and sediment control integrity) Periodic (at least annually) inspection of channels at CHPP and Pit Top. Sediment retention cells – after major rainfall events (>50mm in 48 hours)
Meteorology			
Meteorological station	EPL 416	CHPP (*refer **Figure 12** for location*)	Continuous for air temperature, wind direction, wind speed and sigma theta. Rainfall per 24 hour period.
Water – Surface			
CHPP – EPL points	Consent / EPL 416 / SWMP	SW1 (LDP 1 – Emergency Dam Spillway) SW2 (Bellbird Creek Pinch Bridge) SW4 (Bellbird Creek, Downstream Boundary) SW5 (Unnamed Creek, Upstream Boundary) SW6 (LDP6 – 1ML tank discharge to Bellbird Ck) (*Refer **Figure 12** for locations*)	**Monthly while discharging from SW6** (unless there is no water at the sites): ▪ Quality – SW2, SW4, SW5, SW6 (pH, EC, TSS, Fe) ▪ Volume – SW6 (kL/day) ▪ Qualitative flow estimate – SW2, SW4, SW5 **Twice per year** (unless there is no water at the sites): ▪ Quality – SW2, SW4, SW5, SW6 (EC, pH, TSS, Total Dissolved Solids, redox potential, Major ions and charge balance error, Total Metals) **During discharge at SW1**: ▪ Quality daily – SW1. At a minimum of 12 hourly intervals (pH, EC, TSS, TDS, Fe) ▪ Volume daily – SW1. At a minimum of 12 hourly intervals (kL/day)

Routine Environmental Monitoring	Reason	Location(s)	Frequency[1]
			▪ Quality 3 times per week – SW2, SW4, SW5. At a minimum of 48 hour intervals (pH, EC, TSS, Fe)
Creeks – Bellbird South UG mining area	Consent / SWMP	SW Q1 (Quorrobolong Ck, Sandy Ck Rd) SW Q2 (Quorrobolong Ck Upstream) SW Q3 (Quorrobolong Ck Downstream) SW C1 (Cony Ck) (*Refer Figure 12 for locations*)	**Quarterly** (unless there is no water at the sites): ▪ Quality (pH, EC, TSS, Fe) **Twice per year** (unless there is no water at the sites): ▪ Quality (EC, pH, TSS, Total Dissolved Solids, redox potential, Major ions and charge balance error, Total Metals) **Annual** Visual monitoring of stream health and channel stability (SW Q1, SW Q2 & SW C1 only)
Creeks – Black Creek and Quorrobolong Creek	Consent / Closure Planning	BLK1-3 (Black Creek (downstream of Kitchener SIS)) and QC1-QC3 (Quorrobolong Creek downstream of Kalingo Dam)	**Annual** Channel Stability and stream Health Monitoring (Section 8.1.4.5)
Inspection of sediment and erosion control works, monitoring of sediment basin volume	Consent / SWMP	Kitchener Surface Infrastructure Site, CHPP area, Austar Pit Top, Aberdare Extended Emplacement Area	After major rainfall events (>50mm in 48 hours)
Water – Ground			
Aquifer level logging – Bellbird South and Stage 3	Consent / SWMP	Shallow porous rock and alluvial boreholes - AQD1073A, WBH1, WBH2, WBH3, MB03A and MB04 (alluvial aquifers) NER1010, MB01, MB02 (shallow porous rock aquifer) (*Refer **Figure 12** for locations*)	**Daily** groundwater levels, downloaded quarterly. **Quarterly** field parameters (pH, EC, ORP, temperature). **Annually**(unless there is no water in the bores): Quality – EC, pH, TSS, Total Dissolved Solids, redox potential, Major ions and charge balance error, Total Metals

Routine Environmental Monitoring	Reason	Location(s)	Frequency[1]
UG workings	SWMP / Austar information	Kalingo Colliery (Shaft) Aberdare Central Colliery (Shaft) Pelton Colliery (boreholes P1 and P2)	Monthly level dipping, where available post mine sealing. **Quarterly** field parameters (pH, EC, ORP, temperature). **Annually** (unless there is no water in the bores or water is inaccessible with monitoring equipment): Quality – EC, pH, TSS, Total Dissolved Solids, redox potential, Major ions and charge balance error, Total Metals
		2 shaft 6 shaft **or** Borehole E2 (whichever is accessible and contains water)	**Twice per year** - water level dipping
Investigation Drainage Line	EPL 416 PRP	Investigation Drainage Line Photo points 1 – 26 Groundwater Monitoring Bore Water sampling points 1 - 6	As specified in the EPL, Condition U3.2:

[1] – Unless no water or access is unavailable

9 SURFACE AND GROUNDWATER RESPONSE PLAN

This section sets out the surface and groundwater response plan for Austar Coal Mine. Potential impacts on surface and groundwater, triggers, actions and responsibilities for addressing potential impacts are summarised in **Table 13**.

Following the completion of longwall mining, Austar engaged Mine Subsidence Engineering Consultants (MSEC) to review the latest ground monitoring data and to advise on the likelihood of ongoing subsidence effects and the potential for future physical impacts on the natural environment.

MSEC (2021) concluded: *The ongoing long-term residual subsidence effects (i.e. after the survey dated 10 February 2021) are expected to be very small and unlikely to result in adverse physical impacts to the natural environment. MSEC therefore considers that ground monitoring could be ceased as the ongoing subsidence effects are expected to be very small and similar to the order of natural ground movements and survey tolerance.*

As subsidence impacts have ceased, subsidence related triggers have been removed from the TARP.

Austar is in the process of conducting detailed mine closure studies, including water resource assessments. This will identify potential impacts (including on water resources) from mine closure activities. Where identified, suitable remedial actions will be developed and implemented, including additional monitoring where required. These will be described in a closure specific response plan which will be developed during the closure execution phase, following the completion of closure planning studies.

9.1 Water Quality Exceedance

Notification and investigation of water quality exceedances will be undertaken in accordance with the process set out in **Section 12.2**.

9.2 Unlicenced Discharge

In the event of an unlicensed discharge, Austar will assess the incident against the criteria in the Pollution Incident Response Management Plan (PIRMP) to determine if the incident classifies as a notifiable pollution incident, i.e. has the pollution incident caused or does it threaten material harm to the environment. Where the incident is notifiable, notification procedures in the PIRMP are to be followed.

An investigation report on the unlicenced discharge will be prepared and provided to the EPA and/or other relevant agencies in accordance with licence and consent conditions.

9.3 Creek and Channel Stability

Creek stability is monitored through visual inspections across the site. If signs of instability, washouts or slumps are identified, they will be monitored for change and, if required, a geomorphologist or other appropriate specialist will be engaged to assist in rehabilitation of the location.

9.4 Acid Leachate Management

Acid leachate or acid mine drainage (AMD) will be managed through consideration of final landform design (e.g., capping design, geotechnical and geochemical assessments). These will be refined during detailed mine closure execution planning once all initial studies are completed and knowledge gaps identified.

Potential AMD mitigation and management measures to be investigated through detailed mine closure planning include use of impermeable capping barriers, lined containment cells, application of lime for neutralisation, and permeable reactive barriers (PRBs).

Following closure execution, Austar will implement a monitoring and maintenance program to confirm appropriate landform design and treatment (where relevant) for management of AMD.

During closure planning, the risk of geochemical impacts was assessed at each CMA. Further works are being undertaken to better understand the source-pathway-receptor conceptual site models in order to inform capping design and final landform plans.

Groundwater and surface water monitoring will continue through closure execution and rehabilitation phases. Any unexpected AMD identified through the closure monitoring program will be managed with the assistance of a geochemical specialist. Contingency plans will be developed on a site specific basis taking into account the learnings from the closure planning studies and management of geochemical risks during closure planning and execution.

TABLE 13 - SURFACE AND GROUNDWATER RESPONSE PLAN - TRIGGERS, ACTIONS AND RESPONSIBILITIES

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
Surface water quality impacts	Surface water quality is within or below the values specified in **Table 8**	**Trigger:** Surface water quality is outside or above the values specified in **Table 8** for at least one parameter for two consecutive sampling events. **Action:** Review recent monitoring results for adjacent sites and any relevant operational data (e.g. operational activities, clearing activities, meteorological data). Investigate the source of the exceedance and develop corrective/preventative actions based on outcomes.	**Trigger**: Investigation into Stage 1 trigger identifies that trigger exceedance is due to an operational activity. Community complaint to Yancoal regarding surface water quality. **Action**: Determine if an incident has potentially occurred and investigate the source of the exceedance. Increase monitoring frequency and undertake additional monitoring (e.g. water quality, aquatic ecology) where relevant. Implement corrective/preventative actions, in consultation with relevant agencies, based on the outcomes of the investigation and/or additional monitoring. Prioritise actions based on the risk to the environment and likelihood of further impact. Review the SWMP and related procedures to prevent reoccurrence. Loss of water supply to any adjacent landholders due to	**Stage 1**: Notify Environment and Community Manager immediately. **Stage 2**: Notify relevant agencies in accordance with PIRMP requirements immediately if material harm to the environment has occurred.	Environment and Community Manager	Section 5.2.2 Section 9.1

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
			operational activities will need to be replaced by Yancoal. Appropriate responses to potentially affected stakeholders to remediate and/or compensate affected landowners, including negotiation of an alternate supply of water and infrastructure (for a limited time) to ensure water requirements of the stakeholder are met while an investigation is undertaken.			
Surface water discharge	Surface water discharge is within limits licenced under EPL416	**Trigger:** Water quality concentrations or discharge volumes are equal to EPL416 limits **Action:** Review upstream water quality monitoring data and the water management system (storages and infrastructure) relevant to the discharge and any relevant operational activities. Repeat water quality sampling. Mitigate excess discharge through further water	**Trigger:** Water quality concentrations or discharge volumes exceeds EPL416 limits **Action:** Stop discharge if possible through pumping to relevant dams or storages. Notify DPHI, EPA and any other relevant agency and potentially affected persons (where necessary) as required by the notification requirements of DA 29/95, PA 08_0111 and EPL 416, within the timeframe specified in these approvals. Consider whether the Pollution Incident Response Management Plan should be activated (i.e.	**Stage 1**: Notify Environment and Community Manager immediately. **Stage 2**: Notify relevant agencies in accordance with PIRMP requirements immediately if material harm to the environment has occurred.	Environment and Community Manager	Section 5.1.1 Section 9.1

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
		management activities (pumping)	PIRMP material harm incident trigger). Investigate and prepare report outlining causes, impacts and recommended mitigation measures. Provide investigation report to relevant agencies (EPA within 7 days in case of triggered PIRMP action), and within required timeframes (refer DA 29/95, PA 08_0111 and EPL 416, as appropriate). Implement agreed report recommendations.			

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
Impact on stream health and stability	Watercourse monitoring indicates no significant variation in creek stability or vegetation extent or quality when compared with reference sites and previous monitoring results.	**Trigger:** Monitoring indicates a declining stability or instream vegetation trend. **Action:** Review historical monitoring records. Investigate the factors contributing to the decline, including meteorological data. Include advice from technical specialists where relevant. Implement corrective actions as required as soon as practicable to stabilise the surface and/or watercourses based on the outcomes of the investigation. Increase monitoring frequency and undertake additional monitoring (e.g. water quality, aquatic ecology) where relevant	**Trigger**: Monitoring indicates a declining trend likely caused by site operations. **Action:** Immediately isolate areas of instability and implement corrective actions through consultation with relevant stakeholders to stabilise/improve the surface and/or watercourses. Implement corrective/preventative actions based on the outcomes of the investigation and/or additional monitoring. Prioritise actions based on the risk to the environment and likelihood of further impact. Review WMP and related procedures to prevent reoccurrence.	**Stage 1**: Notify Environment and Community Manager immediately. **Stage 2**: Notify relevant agencies immediately if the change was caused by site operations.	Environment and Community Manager	Section 8.1.4
Orange staining in Investigation Drainage Line	No significant increase in orange staining generally found within the	**Trigger:** Quarterly inspection identifies increase in orange staining in Investigation Drainage Line, OR	**Trigger:** Orange staining migrates off site. **Action:** Commence weekly monitoring of Investigation	**Stage 1**: Notify Environment and Community Manager and CHPP Supervisor immediately.	Environment and Community Manager CHPP Supervisor	Section 6.4

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
	Investigation Drainage Line	Groundwater level in groundwater Bore 1 between 0-2.5m from Top of Casing (RL 112.7 or above) **Action:** Commence monthly monitoring. Check containment points and ensure processes are in place to prevent orange staining leaving site.	Drainage Line and receiving waterways. Consult relevant stakeholders including impacted downstream landholders to develop further mitigation of staining migration. Undertake an investigation into the potential environmental impacts and corrective actions.	**Stage 2**: Notify relevant agencies and landholders immediately for offsite migration of staining.		
Groundwater level	Groundwater level within triggers specified in Table 7	**Trigger:** Groundwater level is outside of triggers specified in Table 7 at one or more monitoring locations. **Action:** Undertake investigation to determine if the change in groundwater level is due to operational activities.	**Trigger:** Investigation into Stage 1 trigger identifies that trigger exceedance was due to operational activities. Community complaint to Yancoal regarding groundwater levels. **Action:** Verify whether monitoring results are consistent with hydrogeological/site water balance model predictions. Update the models as required. If environmental impacts are unacceptable and/or if the beneficial use of the groundwater changes, remediation options will be considered. Loss of water supply to any adjacent landholders due to	**Stage 1**: Notify Environment and Community Manager immediately. **Stage 2**: Notify relevant agencies in accordance with PIRMP requirements immediately if material harm to the environment has occurred.	Environment and Community Manager	Section **Error! R eference source not found.** Section 10

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
			operational activities will need to be replaced by Yancoal. Appropriate responses to potentially affected stakeholders to remediate and/or compensate affected landowners, including negotiation of an alternate supply of water and infrastructure (for a limited time) to ensure water requirements of the stakeholder are met while an investigation is undertaken.			
Groundwater quality	Groundwater quality within or below triggers specified in Table 7	**Trigger:** Groundwater quality is outside or above triggers specified in Table 7 for at least one parameter for two consecutive sampling events. **Action:** Undertake investigation to determine if the change in groundwater quality is due to operational activities.	**Trigger**: Investigation into Stage 1 trigger identifies that trigger exceedance was due to operational activities. Community complaint to Yancoal regarding groundwater quality. **Action**: Undertake investigation to determine if the change in groundwater quality is due to operational activities. If environmental impacts are unacceptable and/or if the beneficial use of the groundwater changes, remediation options will be considered. Loss of water supply to any adjacent landholders due to	Stage 1: Notify Environment and Community Manager immediately. Stage 2: Notify relevant agencies in accordance with PIRMP requirements immediately if material harm to the environment has occurred.	Environment and Community Manager	Section **Error! R eference source not found.** Section 10

Aspect	Normal	Stage 1	Stage 2	Notifications	Responsibility	Further Information
			operational activities will need to be replaced by Yancoal. Appropriate responses to potentially affected stakeholders to remediate and/or compensate affected landowners, including negotiation of an alternate supply of water and infrastructure (for a limited time) to ensure water requirements of the stakeholder are met while an investigation is undertaken.			

10 CONTINGENCY PLAN FOR UNPREDICTED IMPACTS

Should surface water or groundwater impacts, or acid leachate problems eventuate that have not been predicted or contemplated in this SWMP, the following contingency plan will apply:

1. Assess whether impacts constitute a material risk of harm to the environment and trigger the PIRMP and reporting requirements of the EMS if necessary.
2. Investigate the cause of the impact. This may include onsite process owners or external specialists as required.
3. Consult with government agencies regarding the impact if the impact is material and requires additional management strategies.
4. Revise SWMP.

The scale of the impact will inform the level of response required through this process and whether the impact is material enough to require government agency consultation.

11 CONTINUAL IMPROVEMENT AND CLOSURE PLANNING

Austar will implement reasonable and feasible best practice water management measures appropriate for a closed site. The basis for continuous improvement of water management measures will be through the ongoing monitoring of water and the contingency response and adaptive management process outlined in **Section 9.**

Current closure planning studies are assessing surface and groundwater impacts and mitigation measures and will, where reasonable and feasible, consider current best practice water management measures in planned closure activities.

The Rehabilitation Management Plan contains a mine closure planning strategy, including a water management study. The water management study commits to:

- Review the existing groundwater information to consider aspects related to the closure of the mine;
- Review the site water balance and any post closure water management requirements, including management of acid mine drainage; and
- Review post closure water licencing requirements.

The mine closure planning strategy is designed to inform the preparation of a detailed Mine Closure Plan. During the development of the detailed Mine Closure Plan, Austar will liaise with relevant regulators, including DPHI and Resources Regulator. The detailed mine closure plan will consider likely controls required to mitigate risks, and contain relevant objectives for closure in relation to water management.

Any new mitigation measures that are implemented as a result of these investigations will be reported in the Annual Review.

12 COMPLAINTS, INCIDENTS AND REPORTING

12.1 Community Complaints and Independent Review

Community complaints are to be managed in accordance with the requirements of the Environmental Management Strategy.

A complaints register will be published on the Austar Coal Mine website, which will be updated monthly, and a summary of complaints will be provided in the Annual Review.

12.2 Incident Reporting

Schedule 7 Condition 6 of PA 08_0111 and Schedule 5 Condition 4 of DA 29/95 specify the requirements for incident reporting. An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the approval.

There is inconsistency between the wording of the conditions, however the following protocol addresses the requirements of both conditions.

Austar will notify the Department and any other relevant agencies, of any incident associated with the mine complex as soon as practicable after Austar becomes aware of the incident.

Within 7 days of the date of the incident, Austar will provide a detailed report on the incident to the Department and any other relevant agencies. The report will include the following details:

- The date, time and nature of the exceedance/incident;
- Identify the cause (or likely cause) of the exceedance/incident;
- Describe what action has been taken to date; and
- Describe the proposed measures to address the exceedance/incident.

Further investigation may be required beyond the 7 days depending on the nature of the incident.

The EPL should be referred to for notification requirements relating to incidents causing or threatening material harm to the environment.

12.3 Information Dissemination

A summary of monitoring results will be presented at Austar Community Consultative Committee (CCC) meetings.

Information will also be made available on the Austar website in accordance with the requirements of Schedule 7 Condition 9 of PA 08_0111 and Schedule 5 Condition 12 of DA 29/95.

12.3.1 Advice to Black Creek Water Users

Where possible, water users will be advised within the 24 hour period immediately prior to the commencement of any discharge from SW1. Where prior advice is not possible, advice will be given as soon as practicable after discharge commences.

The site will advise water users of the conductivity of water being discharged and conductivity of the waters of Bellbird Creek and the intersection of Black Creek with Lomas Lane will be advised to water users on request.

12.4 Annual Review

In accordance with Schedule 7 Condition 3 of PA 08_0111 and Schedule 5 Condition 5 of DA 29/95, Austar will prepare an Annual Review for submission to the Department.

13 DOCUMENT REVIEW AND REVISION

Schedule 7 Condition 4 of PA 08_0111 and Schedule 5 Condition 8 of DA 29/95 specify the requirements for revision of strategies plans and programs. There is inconsistency between the wording of the conditions, however, both require that within 3 months of:

- The submission of an Annual Review;
- The submission of an incident report;
- The submission of an audit report; or
- The approval of a modification to the conditions of consent;

Austar shall review the strategies, plans and programs required by the approval/consent to the satisfaction of Department.

DA 29/95 requires Austar to notify the Department in writing of any such review being undertaken.

Where a review leads to revision of a document, the revised document must be submitted to the Department for approval. The timing for submission of revised plans differs between the consents, being 4 weeks in PA 08_0111 and 6 weeks in DA 29/95. Given this, the 4 week requirement in PA 08_0111 will prevail.

Any changes made to this Plan or supporting documents as a result of the review will be made in consultation with relevant agencies.

14 REFERENCES

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Appendix A:
Approval Requirements

PROJECT APPROVAL/DEVELOPMENT CONSENT REQUIREMENTS

Relevant conditions from PA 08_0111 and DA 29/95 and where these conditions are addressed in this Plan are listed in the tables below.

PROJECT APPROVAL CONDITIONS (PA 08_0111)

Schedule	Project Approval Condition	Section of this Plan
2	**STRATEGIES, PLANS AND PROGRAMS**	
2	12. With the approval of the Director-General, the Proponent may submit any strategies, plans or programs required by this approval on a progressive basis.	Noted
2	13. With the approval of the Director-General, the Proponent may integrate any strategies, plans, programs, reviews, audits or committees required by this approval with any similar requirement under another development consent or approval relating to the Austar Mine Complex.	SWMP addresses PA 08_0111 and DA 29/95 conditions
3	**SECOND WORKINGS**	
3	**Extraction Plan** 4. The Proponent shall prepare and implement an Extraction Plan for all second workings in the mining area to the satisfaction of the Director-General. This plan must: (a) be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Director-General, and be approved by the Director-General prior to the commencement of any second workings covered by the Extraction Plan; (b) include a detailed plan for the second workings, which has been prepared to the satisfaction of DRE, and provides for adaptive management; (c) include detailed plans of any associated surface construction works; (d) include the following to the satisfaction of DRE: · a coal resource recovery plan that demonstrates effective recovery of the available resource; · revised predictions of the subsidence effects and subsidence impacts of the extraction plan, incorporating any relevant information that has been obtained since this approval; and · a Subsidence Monitoring Program to: o validate the subsidence predictions; and o analyse the relationship between the subsidence effects and subsidence impacts of the Extraction Plan and any ensuing environmental consequences; (e) include a: · Watercourse Management Plan, which has been prepared in consultation with OEH and NOW, to manage the environmental consequences of second workings on watercourses (including flooding and ponding) and alluvial aquifers; · Biodiversity Management Plan, which has been prepared in consultation with OEH, to manage the potential environmental consequences of second workings on aquatic and terrestrial flora and fauna, with a specific focus on threatened species; · Land Management Plan, to manage the potential environmental consequences of second workings on steep slopes and land in general; · Heritage Management Plan, which has been prepared in consultation with OEH and the relevant Aboriginal groups, to manage the potential environmental consequences of second workings on heritage sites or values; · Built Features Management Plan, which has been prepared in consultation with the owner of the relevant feature, to manage the potential environmental consequences of second workings on any built features; and (f) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area.	Extraction Plans in place. Will be closed out when all actions are completed.

Schedule	Project Approval Condition	Section of this Plan
	Notes: *· In accordance with condition 12 of schedule 2, the preparation and implementation of Extraction Plans for second workings may be staged, with each plan covering a defined area of second workings. In addition, these plans are only required to contain management plans that are relevant to the specific second workings that are being carried out.* *· The Watercourse Management Plan must be integrated with all relevant aspects of the Site Water Management Plan required under condition 8 of schedule 4.*	
	5. In addition to the standard requirements for management plans (see condition 2 of schedule 7), the Proponent shall ensure that the management plans required under condition 4(e) above include: (a) a program to collect sufficient baseline data for future Extraction Plans; (b) a revised assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval; (c) a detailed description of the measures that would be implemented to remediate predicted impacts; and (d) a contingency plan that expressly provides for adaptive management.	Extraction Plans in place. Applicability during closure to be determined.
4	**SURFACE AND GROUNDWATER**	
4	Discharge Limits 8. The Proponent shall not discharge any water from the site except as may be expressly provided by an EPL, or in accordance with section 120 of the *Protection of the Environment Operations Act 1997*.	5
4	**Site Water Management Plan**	
4	9. The Proponent shall prepare and implement a Site Water Management Plan for the mine complex to the satisfaction of the Director-General. This plan must: (a) be prepared in consultation with EPA, NOW and DRE, and be submitted to the Director-General for approval prior to the commencement of second workings in Stage 3 and construction of the Surface Infrastructure Site (other than shaft construction referred to in condition 1 above); and	2
4	(b) include, in addition to the standard requirements for management plans (see condition 2 of schedule 7): (i) a Site Water Balance, which details; · sources and security of water supply; · water use and management on site; · any off-site water transfers or discharges; and · measures to minimise water use by the project; (ii) an Erosion and Sediment Control Plan; (iii) a Surface Water Monitoring Program, including programs to monitor: · surface water flows and quality, stream health and channel stability in Black Creek, Cony Creek, Sandy Creek and Quorrobolong Creek; and · impacts on water users and water levels in farm dams; (iv) a Ground Water Monitoring Program, including programs to monitor: · groundwater volumes and quality seeping into the underground mine workings; · impacts on regional aquifers; · impacts on the groundwater supply of potentially affected landowners; · impacts on the alluvial aquifers in Black Creek, Cony Creek, Sandy Creek and Quorrobolong Creek; and · impacts on groundwater dependent ecosystems and riparian vegetation (including the River-flat Eucalypt Forest EEC); and (v) a Surface and Ground Water Response Plan, which describes the measures and/or procedures that would be implemented to: · respond to any exceedances of the relevant performance measures/criteria;	Section 0 7 8.1 8.2 9

Schedule	Project Approval Condition	Section of this Plan
	· compensate landowners of privately-owned land whose water supply is adversely affected by the project; and · mitigate and/or offset any adverse impacts on groundwater dependent ecosystems or riparian vegetation.	
7	**ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING**	
	Management Plan Requirements 2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data;	3
	(b) a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • any relevant limits or performance measures/criteria; the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	4 5
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	This document
	(d) a program to monitor and report on the: • impacts and environmental performance of the project; • effectiveness of any management measures (see (c) above);	8
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	10
	(f) a program to investigate and implement ways to continually improve the environmental performance of the project over time;	11
	(g) a protocol for managing and reporting any: • incidents; • complaints; • non-compliances with statutory requirements; and exceedances of the impact assessment criteria and/or performance criteria; and	12
	(h) a protocol for periodic review of the plan.	13

DEVELOPMENT CONSENT CONDITIONS (DA 29/95)

Schedule	Development Consent Conditions	Section of this Plan
	Site Water Management Plan	
3	6. Prior to mining commencing in panel A3, or other date agreed by the Secretary, the Applicant must revise its Site Water Management Plan for the mine, in consultation with the DPI-Water and the EPA, and to the satisfaction of the Secretary. This plan must be implemented to the satisfaction of the Secretary, and must include: (a) a Site Water Balance; (b) an Erosion and Sediment Control Plan; (c) a Surface Water Monitoring Program; (d) a Ground Water Monitoring Program; and (e) a Surface and Ground Water Response Plan.	 6.1 7 8.1 8.2 9
	Site Water Balance	
3	7. The Site Water Balance must: (a) include details of: · sources of water and water licences; · water use on site; · water management on site; · off-site water transfers or discharges;	 6.1

Schedule	Development Consent Conditions	Section of this Plan
	· reporting procedures; and (b) describe measures to minimise water use by the development.	
	Erosion and Sediment Control	
3	8. The Erosion and Sediment Control Plan must: (a) be consistent with the requirements of Landcom's *Managing Urban Stormwater: Soils and Construction* manual; (b) identify activities that could cause soil erosion and generate sediment; (c) describe measures to minimise soil erosion and the potential for transport of sediment downstream; (d) describe the location, function and capacity of erosion and sediment control structures; and (e) describe what measures would be implemented to maintain the structures over time.	7
	Surface Water Monitoring	
3	9. The Surface Water Monitoring Program must include: (a) surface water assessment criteria; (b) a program to monitor surface water flows and quality (particularly in Black, Cony and Quorrobolong Creeks) and stream health; (c) a program to monitor water levels in farm dams within the subsidence zone and impacts on other water users; (d) a program to monitor channel stability in Quorrobolong and Cony Creeks; (e) reporting procedures; and (f) a protocol for the investigation, notification and mitigation of identified exceedances of the surface water criteria that are related to the development (particularly in respect of acid mine drainage and acid leachate).	8.1
	Groundwater Monitoring	
3	10. The Groundwater Monitoring Program must include: (a) ground water impact assessment criteria; (b) a program to monitor the volume and quality of ground water seeping into the underground mine workings; (b1) a program to monitor impacts to groundwater dependent ecosystems and riparian vegetation; (c) a program to monitor ground water levels and quality; and (d) a protocol for the investigation, notification and mitigation of identified exceedances of the ground water impact assessment criteria.	8.2
	Surface and Ground Water Response Plan	
3	11. The Surface and Ground Water Response Plan must include: (a) the procedures that would be followed in the event of any exceedance of the surface or groundwater impact assessment criteria, or other identified impact on surface or groundwater; (b) measures to mitigate, remediate and/or compensate any identified impacts (including measures to mitigate and/or compensate potentially affected landowners for any loss of surface water flows in local creeks or farm dams); and (c) disposal/neutralisation contingencies in the event that acid leachate problems emerge after the mine closes.	9
5	**ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING**	
5	**Incident Reporting** 4. Within 7 days of detecting an exceedance of the limits/performance criteria in this consent, the Applicant must report the exceedance/incident to the Department (and any relevant agency). The report must: (a) describe the date, time, and nature of the exceedance/incident; (b) identify the cause (or likely cause) of the exceedance/incident; (c) describe what action has been taken to date; and (d) describe the proposed measures to address the exceedance/incident.	12.2
5	**Regular Reporting** 4A. The Applicant must provide regular reporting on the environmental performance of the development on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this consent.	12.3

Schedule	Development Consent Conditions	Section of this Plan
5	**Annual Review** 5. By the end of September each year, unless the Secretary agrees otherwise, the Applicant must submit a review to the Department reviewing the environmental performance of the development to the satisfaction of the Secretary. This review must: (a) describe the development (including any rehabilitation) that was carried out in the previous year to 30 June, and the development that is proposed to be carried out over the current year to 30 June; (b) include a comprehensive review of the monitoring results and complaints records of the development over the previous year to 30 June, which includes a comparison of these results against the: • relevant statutory requirements, limits or performance measures/criteria; • requirements of any plan or program required under this consent; • monitoring results of previous years; and • relevant predictions in the documents listed in condition 2 of Schedule 2; (c) identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance; (d) identify any trends in the monitoring data over the life of the development; (e) identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and (f) describe what measures will be implemented over the next year to improve the environmental performance of the development.	12.4
5	**Updating and Staging of Strategies, Plans or Programs** 8A. To ensure that strategies, plans or programs required under this consent are updated on a regular basis, and that they incorporate any appropriate additional measures to improve the environmental performance of the development, the Applicant may at any time submit revised strategies, plans or programs for the approval of the Secretary. With the agreement of the Secretary, the Applicant may also submit any strategy, plan or program required by this consent on a staged basis. With the agreement of the Secretary, the Applicant may prepare a revision of or a stage of a strategy, plan or program without undertaking consultation with all parties nominated under the applicable condition in this consent. While any strategy, plan or program may be submitted on a staged basis, the Applicant will need to ensure that the operations associated with the development are covered by suitable strategies, plans or programs at all times. If the submission of any strategy, plan or program is to be staged; then the relevant strategy, plan or program must clearly describe the specific stage/s of the development to which the strategy, plan or program applies; the relationship of this stage/s to any future stages; and the trigger for updating the strategy, plan or program.	Noted
5	**Relationship with other consents** 8B. With the agreement of the Secretary, the Applicant may combine any strategy, plan, program, review, audit or committee required by this consent with any similar requirement under another development consent or approval relating to the Austar Mine Complex, including Project Approval 08_0111 for the Stage 3 mining area.	SWMP addresses PA 08_0111 and DA 29/95 conditions
5	**Evidence of Consultation** 8C. Where consultation with any public authority is required by the conditions of this consent, the Applicant must: (a) consult with the relevant public authority prior to submitting the required document to the Secretary for approval; (b) submit evidence of this consultation as part of the relevant document; (c) describe how matters raised by the authority have been addressed and any matters not resolved; and (d) include details of any outstanding issues raised by the authority and an explanation of disagreement between any public authority and the Applicant.	2
5	**Access to Information** 12. The Applicant must: (a) make copies of the following publicly available on its website: • the documents listed in condition 2 of Schedule 2; • all current statutory approvals for the development;	12.3

Schedule	Development Consent Conditions	Section of this Plan
	• approved strategies, plans and programs required under the conditions of this consent; • a comprehensive summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this consent; • a summary of the progress of the development; • contact details to enquire about the development or to make a complaint; • a complaints register, which is to be updated on a monthly basis; • minutes of CCC meetings; • the last five annual reviews; • any independent environmental audit of the development, and the Applicant's response to the recommendations in any audit; • any other matter required by the Secretary; and (b) keep this information up-to-date, to the satisfaction of the Secretary.	

EPL REQUIREMENTS

Relevant conditions from EPL 416 and where these conditions are addressed in this Plan are listed in the table below.

ENVIRONMENT PROTECTION LICENCE 416 (EPL 416)

Section	EPL Conditions	Section of this Plan
3	**LIMIT CONDITIONS**	
3	**L1 Pollution of waters** L1.2 Discharge from Point 1 is permitted only when the discharge occurs solely as a result of rainfall at the premises exceeding: a) a total of 168 millimetres over any consecutive five day period; or b) 48 millimetres in less than any consecutive 12 hour period.	5
3	**L2 Concentration limits** L2.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table. L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges. L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s. L2.4 Water and/or Land Concentration Limits **POINT 1** Pollutant / Units of Measure / 50 percentile concentration limit / 90 percentile concentration limit / 3DGM concentration limit / 100 percentile concentration limit Iron / milligrams per litre / / / / 1 pH / pH / / / / 6.5-8.5	5

<table>
<tr><th>Section</th><th>EPL Conditions</th><th>Section of this Plan</th></tr>
<tr><td></td><td>
<table>
<tr><td>Total dissolved solids</td><td>milligrams per litre</td><td></td><td></td><td></td><td>6000</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr>
</table>
POINT 6
<table>
<tr><th>Pollutant</th><th>Units of Measure</th><th>50 percentile concentration limit</th><th>90 percentile concentration limit</th><th>3DGM concentration limit</th><th>100 percentile concentration limit</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td></td><td></td><td></td><td>600</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td></td><td></td><td></td><td>1</td></tr>
<tr><td>pH</td><td>pH</td><td></td><td></td><td></td><td>6.5 - 8.5</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td></td><td></td><td></td><td>50</td></tr>
</table>
</td><td></td></tr>
<tr><td>3</td><td>
L3 Volume and mass limits

L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:

a) liquids discharged to water; or;

b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.
<table>
<tr><th>Point</th><th>Unit of Measure</th><th>Volume/Mass Limit</th></tr>
<tr><td>1</td><td>kilolitres per day</td><td>2000</td></tr>
<tr><td>6</td><td>Measure 1</td><td>5000</td></tr>
</table>
Note: For the purpose of this condition 'Measure 1' means KL/day measured as an annual average.
</td><td>5</td></tr>
<tr><td>4</td><td>OPERATING CONDITIONS</td><td></td></tr>
<tr><td>4</td><td>
M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:
POINT 1
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Special Frequency 1</td><td>Grab sample</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td>Special Frequency 1</td><td>Grab sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Special Frequency 1</td><td>Grab sample</td></tr>
<tr><td>Total dissolved solids</td><td>milligrams per litre</td><td>Special Frequency 1</td><td>Grab sample</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Special Frequency 1</td><td>Grab sample</td></tr>
</table>
POINT 2
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
</table>
</td><td>8.1.2</td></tr>
</table>

<table>
<tr><th>Section</th><th>EPL Conditions</th><th>Section of this Plan</th></tr>
<tr><td></td><td>
POINT 4
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
</table>
POINT 5
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Special Frequency 2</td><td>Grab sample</td></tr>
</table>
POINT 6
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>Frequency</th><th>Sampling Method</th></tr>
<tr><td>Conductivity</td><td>microsiemens per centimetre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr>
<tr><td>Iron</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr>
<tr><td>pH</td><td>pH</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr>
<tr><td>Total suspended solids</td><td>milligrams per litre</td><td>Once a month (min. of 4 weeks)</td><td>Grab sample</td></tr>
</table>
Note: Special Frequency 1 means daily collected at a minimum of twelve hourly intervals when a discharge is occurring.

Special Frequency 2 means three times per week during any period of discharge from Point 1 at a minimum of 48 hour intervals commencing as soon as practical after discharge has commenced. Once per month during any period of discharge from Point 6 at a minimum of 4 weekly intervals.
</td><td></td></tr>
<tr><td>4</td><td>M3 Testing methods - concentration limits

M3.1 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.</td><td>8.1.2</td></tr>
<tr><td>4</td><td>M7 Requirement to monitor volume or mass

M7.1 For each discharge point or utilisation area specified below, the licensee must monitor:

a) the volume of liquids discharged to water or applied to the area;

b) the mass of solids applied to the area;

c) the mass of pollutants emitted to the air;
at the frequency and using the method and units of measure, specified below.
POINT 1
<table>
<tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr>
<tr><td>Special Frequency 1</td><td>kilolitres per day</td><td>In line instrumentation</td></tr>
</table>
POINT 6
<table>
<tr><th>Frequency</th><th>Unit of Measure</th><th>Sampling Method</th></tr>
<tr><td>Monthly</td><td>kilolitres per day</td><td>In line instrumentation</td></tr>
</table>
Note: Special Frequency 1 means daily collected at a minimum of twelve hourly intervals when a discharge is occurring.</td><td>8.1.2</td></tr>
<tr><td></td><td>POLLUTION STUDIES AND REDUCTION PROGRAMS</td><td></td></tr>
<tr><td>8</td><td>U3 Clean Water Drainage Line Investigation</td><td>6.4.2.3</td></tr>
</table>

Section	EPL Conditions	Section of this Plan
	U3.1 The Licensee must undertake an investigation into the source, cause and environmental impacts of the orange staining/residue within the Austar CHPP Clean Water drain, identified as the '*Investigation Drainage Line*' in Figure 2 CHPP Surface Water Sample locations 25/8/2017, within document titled *'Austar Clean Water Drainage Line Investigation Status Report'* dated 25 August 2017 prepared by Gary Mulhearn, (EPA reference DOC17/440862). The investigation is to be undertaken by a suitably qualified and experienced person or persons. The investigation must as a minimum include but not be limited to; • review historical and site-specific information, • undertake groundwater investigations, • undertake geological investigations, • an assessment of any likely impacts of the orange substance on the environment including groundwater and potential overland flow to waters. An initial scope of works for this investigation is to be provided to the EPA for approval by no later than 5pm Wednesday 31 January 2018. The findings of this investigation are to be submitted in a report to the EPA no later than 5pm Thursday 31 March 2018.	
8	**U3.2 Monitoring** **Surface Water Monitoring** The licensee must undertake monthly water monitoring within the Investigation drainage line at Sample Points 1, 2, 3, 4, 5,6 as per Figure 2, CHPP Surface Water Sample locations 25/8/2017 within document titled *'Austar Clean Water Drainage Line Investigation Status Report'* dated 25 August 2017 prepared by Gary Mulhearn, (EPA reference DOC17/440862). The licensee must monitor (by sampling and obtaining results by analysis) the concentration of pH, EC TSS and Iron. **Ground Water Monitoring** The licensee must undertake monthly monitoring of the Groundwater Bore located near the Investigation Drain as defined in Figure 2, CHPP Surface Water Sample locations 25/8/2017 within document titled *'Austar Clean Water Drainage Line Investigation Status Report'* dated 25 August 2017 prepared by Gary Mulhearn, (EPA reference DOC17/440862). The licensee must monitor (by sampling and obtaining results by analysis) the concentration of pH, EC TSS and Iron, and water level. Water level is to be recorded in level below ground and RL. **Photo Monitoring** The licensee must undertake monthly photo monitoring within the Investigation drainage line at all Photo Points defined in Figure 1 CHPP Surface Water Sample locations 25/8/2017 within document titled *'Austar Clean Water Drainage Line Investigation Status Report'* dated 25 August 2017 prepared by Gary Mulhearn, (EPA reference DOC17/440862). The EPA will review the requirement to continue monitoring as per this condition within three months of the submission of the Investigation Report required by U3.1.	8.3
	U3.3 The Licensee must provide a monthly status report on the CHPP Clean Water drain contamination to the EPA by 5pm the Third Monday of each Month. The first report is to be submitted to the EPA no later than 5pm Monday 15 January 2018. This report removes the requirement for the Licensee to provide fortnightly updates to the EPA as per EPA letter dated 13 July 2017 DOC17/370341. As a minimum the report must include, but not be limited to; • a summary of ongoing actions to identify the source of the orange staining/residue in the clean water drain at the Austar CHPP identified in condition U3.1, • a summary of controls in place to ensure Bellbird Creek downstream is not adversely impacted as a result of water and or aspects associated with the orange staining/residual in the Austar CHPP clean water drain, • results from water monitoring undertaken within the reporting period, in accordance with section M2 of the licence,	6.4.2.3

Section	EPL Conditions	Section of this Plan
	• results from monitoring undertaken in accordance with condition U3.2. The EPA will review the requirement to continue reporting as per this condition within three months of the submission of the Investigation Report required by U3.1.	
9	**SPECIAL CONDITIONS**	
9	**E1 Advice to Black Creek Water Users** E1.1 The licensee must maintain a system acceptable to water users on Black Creek for advising those water users registered with the company of the discharge of waters from discharge point 1. Where possible, water users will be advised within the 24 hour period immediately prior to the commencement of any discharge. Where prior advice is not possible, advice will be given as soon as practicable after discharge commences. The licensee will advise water users of the conductivity of water being discharged. The conductivity of the waters of Bellbird Creek at the intersection of Black Creek with Lomas Lane will be advised to water users on request.	12.3
9	**E2 CHPP Clean Water Drain Orange Staining Containment** E2.1 The orange staining residue within the clean water drain (identifier) must be fully contained within the premises at all times. Any discharges to waters of this residue must comply with condition L1.1 of this EPL	6.4.2.3

STATEMENT OF COMMITMENTS

A list of the Statement of Commitments from PA 08_0111 which are relevant to water management and where these commitments are addressed in this Plan are in the table below.

PROJECT APPROVAL STATEMENT OF COMMITMENTS (PA 08_0111)

Appendix	Statement of Commitments	Section of this Plan
3	**1.6 Surface Water and Drainage**	
3	1.6.1 Austar will develop a detailed Soil and Water Management Plan for the Surface Infrastructure Site prior to commencement of construction.	The Kitchener SIS SCEMP has been retired as construction has finished.
3	1.6.2 Erosion and sediment control measures will be designed and implemented for construction of surface infrastructure to a standard consistent with Managing Urban Stormwater: Soils and Construction (NSW Landcom 2004) (the Blue Book) and Guidelines for Establishing Drainage Lines on Rehabilitated Minesites (Draft) (DLWC, 1999).	7
3	1.6.3 Any subsidence impacts on drainage lines will be effectively remediated where access is granted such that there is no significant impact on downstream water users and environmental flows. Drainage line monitoring and remediation protocols will be developed as part of the EP process, and in consultation with NOW, to guide the management of subsidence impacts and drainage line remediation works on surface water systems. The drainage line monitoring and remediation protocols will include: · detailed monitoring protocols; · a program to complete drainage remediation works in a timely manner, post-subsidence to limit the potential for surface water capture; · details of the design of drainage line remediation works such that the rehabilitated drainage lines maintain a similar channel form and sinuosity to the pre-mining environment, to ensure that the overall erosive power of the creek system is consistent with that existing pre-mining; · assessment of the viability and benefits of applying proactive measures such as the installation of liners or geo-fabrics in drainage lines prior to subsidence; and · the existing Austar Site Water Management Plan will be extended to include the Surface Infrastructure Site and Stage 3 underground mining. The plan will be updated in consultation with NOW and DRE and submitted to the Director-General prior to the commencement of construction of the Surface Infrastructure Site.	7.2.2
3	1.6.4 Surface water monitoring results will be reported annually in the Annual Review.	12.4
3	**1.7 Groundwater**	

Appendix	Statement of Commitments	Section of this Plan
3	1.7.1 A groundwater monitoring program will be implemented for the project as outlined in **Appendix 14**, or as otherwise agreed by the Director-General in consultation with NOW.	8.2
3	1.7.2 The results of groundwater monitoring and a comparison of measured and predicted impacts will be reported annually in the Annual Environmental Management Report.	12.4
3	1.7.3 Impacts on privately-owned bores will be assessed by monitoring where access is granted and in the event that any utilised privately-owned bore is significantly affected, an alternative water supply will be provided by Austar Coal Mine until such time as the bore is re-established or replaced.	No further impacts.
	1.7.4 An annual analysis of surface and groundwater monitoring data will be undertaken and will include: · comparison of groundwater levels with rainfall information; · identification of any changes or long-term trends in groundwater levels; and · visual inspection of creeks and drainage lines	12.4
	1.7.5 The monitoring results and analysis findings will be reported in the Annual Review.	12.4

Appendix B:

Management Plan Approval

Department of Planning, Housing & Infrastructure

Our ref: MP08_0111-PA-63

Carly McCormack
Environment & Community Superintendent
Austar Coal Mine Pty Limited
Darling Park – Tower 2
Level 18, 201 Sussex Street
Sydney, NSW, 2000

04/06/2024

Subject: Austar Coal Mine Site Water Management Plan

Dear Ms McCormack

I refer to the Site Water Management Plan submitted in accordance with the relevant conditions of the development consents for the Austar Coal Mine (Condition 9, Schedule 4 of PA 08_0111 and Condition 6, Schedule 3 of DA 29/95). I also acknowledge your response to the Department's review comments and request for additional information.

The Department has carefully reviewed the document and is satisfied that it meets the requirements of the relevant conditions in PA 08_0111 and DA 29/95. Accordingly, as nominee of the Planning Secretary, I approve the Site Water Management Plan (rev 9, dated May 2024).

You are reminded that if there are any inconsistencies between the Plan and the conditions of consent, the conditions prevail. Please ensure you make the document publicly available on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact James McDonough on (02) 9585 6313.

Yours sincerely

JEvans

Jessie Evans
Director, Resource Assessments
Resource Assessments

As nominee of the Planning Secretary