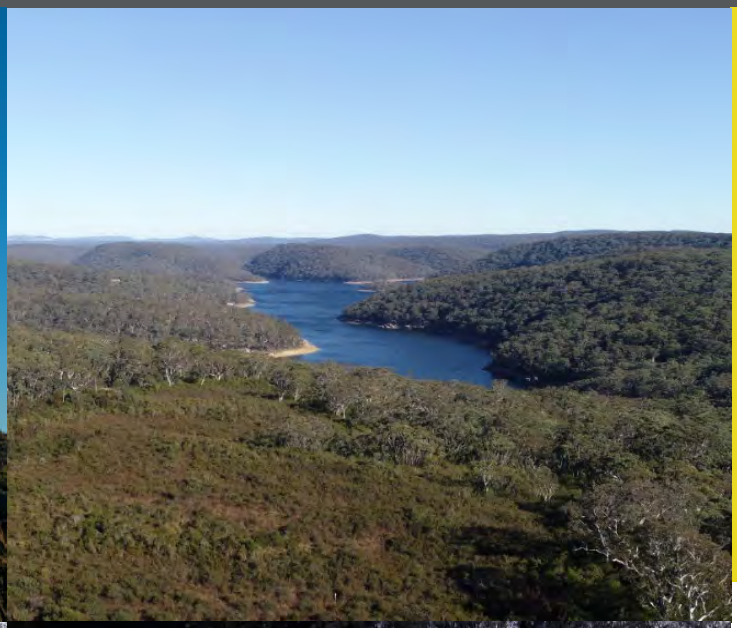
SOUTH32 Illawarra Metallurgical Coal



APPIN MINE
ANNUAL REVIEW FY23

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Figures

Tables

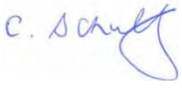
Table 1: Annual Review Title Block	
Name of operation	Appin Mine
Name of operator	South32 Illawarra Metallurgical Coal (IMC)
Project approval #	08_0150
Name of holder of development consent / project approval	Illawarra Coal Holdings Pty Ltd
Mining lease #	CCL 767, CCL 724, CL 388, CL 381, ML 1382, ML 1433, ML 1574, ML 1678, ML 1698, ML 1473, MPL 200, MPL 201
Name of holder of mining lease	Illawarra Coal Holdings Pty Ltd, Endeavour Coal Pty Ltd
Water approvals #	10WA117285, 10WA117999, 10WA103794, 10WA118778, 10WA118766
Name of holder of water approvals	Endeavour Coal Pty Ltd
RMP start date	3 July 2022
RMP end date	30 June 2025
Annual Review start date	1 July 2022
Annual Review end date	30 June 2023

I, Chris Schultz certify that this audit report is a true and accurate record of the compliance status of South32 – Illawarra Metallurgical Coal – Appin Mine for the period 1 July 2022 – 30 June 2023 and that I am authorised to make this statement on behalf of Illawarra Coal Holdings Pty Ltd and Endeavour Coal Pty Ltd.

Note.

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

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

Name of authorised reporting officer	Chris Schultz
Title of authorised reporting officer	Superintendent Environment (under Power of Attorney executed 17 March 2023)
Signature of authorised reporting officer	
Date	29 September 2023

1. STATEMENT OF COMPLIANCE

Table 2: Statement of Compliance

Approval	Purpose	Compliant?
08_0150	Project Approval under Section 75J of the *EP&A Act 1979*.[1]	No
EPBC 2010/5350	BSO Project Approval under Sections 130(1) and 133 of the *EPBC Act 1999*.	Yes
EPBC 2010/5722	Appin Mine Ventilation Shaft 6 Approval under Sections 130(1) and 133 of the *EPBC Act 1999*.	Yes
EPL 2504	Environment Protection Licence (EPL) for Appin Mine	No
WaterNSW Access Consent		
F2020/1545[2]	Special and Controlled Areas access	Yes
Mining Lease / Sub-Lease	**Number**	
Consolidated Coal Lease	724	No
Consolidated Coal Lease	767	No
Coal Lease	381	Yes
Coal Lease	388	Yes
Mining Purposes Lease	200	Yes
Mining Purposes Lease	201	Yes
Mining Lease	1382	Yes
Mining Lease	1433	Yes
Mining Lease	1473	Yes
Mining Lease	1574	Yes
Mining Lease	1678	Yes
Mining Lease	1698	Yes
Mining Lease	1832	Yes
Mining Lease	1847	Yes
Water Approval / Access Licence	**Number**	
Water Approval	10WA117285 - Mountbatten	Yes
Water Approval	10WA117999 – Brennans Creek Dam	Yes
Water Approval	10WA103794 - Brennans Creek Dam Diversion	Yes
Water Approval	10WA118778 – Appin	Yes
Water Approval	10WA118766 – West Cliff	Yes
Groundwater Access Licence	36481 – West Cliff	Yes
Groundwater Access Licence	36477 – Appin	Yes

[1] A notice of Modification under Section 75W of the *Environmental Planning and Assessment Act 1979* dated 28 October 2016 incorporated the Ventilation Shaft 6 Approval requirements into the Project Approval.
[2] Annual Statement of Compliance provided in Appendix 15.

Groundwater Access Licence	37464 – Appin	Yes
Groundwater Access Licence[3]	44376 - Appin	Yes
Surface Water Access Licence	35519 – Brennans Creek Dam	Yes
Surface Water Access Licence	30145 – Mountbatten	Yes

Table 3: Non-compliances

Relevant approval	Condition #	Condition description (summary)	Compliance status	Comment	Where addressed in Annual Review
EPL 2504 PA 08_0150	Condition O1 Condition 12 of Schedule 2	Plant and equipment to be operated/ maintained in a proper and efficient manner	Non-compliant	Pump equipment at AMVA Project site not operated in a proper and efficient manner.	Section 11
EPL 2504 PA 08_0150	Condition L2.4 Condition 15 of Schedule 4	Water discharged to meet EPL water quality concentration limits	Non-compliant	Exceedance of water quality concentration limits at AMVA Project site (LDP 41) and at Appin West (LDP 24).	Section 11
CCL767/724	Clause 16 in Schedule 8A of *Mining Regulation 2016*.	Forward Program to be published to website within 14 days of submission.	Non-compliant	Timeframe for publishing was not met.	Section 11
EPL 2504	*POEO Act*	PIRMP test to be undertaken within one month following an incident.	Non-compliant	PIRMP test was not undertaken within defined period.	Section 11
EPL 2504	*POEO Act*	Monitoring data to be provided in 14-day Report.	Non-compliant	Monitoring data for LDP 41 was not provided on IMC website in 14-day Report.	Section 11
EPL 2504	*POEO Act*	Monitoring data to be accurately reported in 14-day Report.	Non-compliant	Monitoring data for LDP 24 was incorrectly reported in 14-day Report.	Section 11
PA 08_0150	Condition 5(n) of Schedule 3	Seismic Monitoring Program to be prepared and implemented.	Non-compliant	Seismic Report was not included in FY22 Annual Review as required.	Section 11

[3] Issued 8 August 2022.

Compliance status key for Table 3.

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Refer to Section 11 for more detail regarding the non-compliances listed in Table 3.

The predictions and Statement of Commitments from the Bulli Seam Operations (BSO) Project Environmental Assessment (EA) are incorporated into the Appin Mine federal *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) and state *Environmental Planning and Assessment Act 1979* (*EP&A Act*) Project Approval conditions. An assessment of compliance with the conditions of these approvals is considered to be an assessment of compliance against the predictions in the EA. An assessment of compliance with the state and federal conditions is provided in:

- Appendix 1: EPL 2504 Annual Return - 2022/2023
- Appendix 3: Appin Mine Project Approval Condition Compliance Report
- Appendix 4: Independent Environmental Audit Progress - FY23
- Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY23

2. INTRODUCTION

2.1 Background

This Annual Review for Appin Mine details the environment and community performance for the period 1 July 2022 to 30 June 2023, and meets the requirements set out in the *Post approval requirements for State significant mining developments - Annual Review Guideline* (NSW DPE, October 2015).

The Annual Review has been prepared to meet the requirements of Condition 4 of Schedule 6 of the BSO Project Approval 08_0150 (the Project Approval).

A copy of the report is publicly available via the IMC website under Bulli Seam Operations Project - Annual Reviews at link.

2.2 Overview of Operations

The NSW Government granted approval for the BSO Project in December 2011. The BSO Project combined the Appin Mine and West Cliff Colliery mining operations and provided for the continuation of coal mining operations to 31 December 2041. Appin Mine underground longwall mining operations have transitioned wholly to the Appin Area 9 (AA9) and Appin Area 7 (AA7) mining domains following completion of longwall mining activities at West Cliff in early 2016. Mining operations in AA9 were completed in FY23. The locations of underground mining domains and surface facilities associated with Appin Mine are illustrated in Plan 1 and Plan 2 respectively.

Appin Mine, Cordeaux Colliery and Dendrobium Mine (and associated facilities) collectively operate as South32 Illawarra Metallurgical Coal (IMC).

Appin Mine consists of the merged Appin and Tower Collieries. Appin Mine is owned and operated by Endeavour Coal Pty Ltd, a subsidiary company of Illawarra Coal Holdings Pty Ltd (ICHPL) which is 100% owned by South32 Limited. Appin Colliery (located at Appin) commenced operations in 1962 and Tower Colliery (located at Douglas Park) commenced operation in 1978. The underground infrastructure, roadways, conveyor and ventilation systems were joined in 2003 to become Appin Mine. The original Appin Colliery (now Appin Colliery – East) is located adjacent to Appin Village, approximately 37 kilometres northwest of Wollongong.

Tower Colliery (now Appin Colliery - West) was officially opened in November 1978. Following the sinking of the access and ventilation shafts, underground development of the mine was undertaken from 1978 through to 1988 when longwall operations were introduced. Tower Colliery completed extraction of 20 longwall blocks between 1988 and September 2002. The mine was redeveloped underground to establish mining operations in the current AA7 and AA9 mining domains.

Key areas associated with the current Appin operations include the Appin Colliery - East (Appin East) Pit Top site (Plan 3), the Appin Colliery - West (Appin West) Pit Top site (Plan 4), the Appin East Ventilation Shaft 1 and 2 site (Plan 5), the Appin East Ventilation Shaft 3 site (Plan 6), the Appin West Ventilation Shaft 6 site and Douglas North Sub-station site (Plan 7) and the Appin Mine Ventilation and Access (AMVA) Project (Ventilation Shafts 7 and 8) site (Plan 8)[4].

Appin Colliery – North[5] (Appin North) and the West Cliff Coal Preparation Plant (WCCPP) is located approximately 26 km northwest of Wollongong, NSW.

[4] Currently under construction.
[5] Formerly West Cliff Colliery.

IMC has conducted underground coal mining operations at Appin North since 1997. Prior to this, Appin North was operated by Kembla Coal and Coke Pty Limited. Longwall mining at Appin North concluded in early 2016. The last mining area, Area 5, was completed in February 2016 and consists of part of Consolidated Coal Lease (CCL) 767 and Coal Lease 381, which were both transferred from Appin Colliery to Appin North in 1997. Appin North merged with Appin Mine in February 2016.

Key areas of the Appin North site include the Pit Top (Plan 9 and Plan 10), the Coal Wash Emplacement Area (CWEA) (Plan 9) and WCCPP (Plan 11) and the redundant North Cliff Mine site which is surrounded by the Dharawal National Park (Plan 12).

2.3 Mine Contacts

The site contacts for Appin Mine are provided in Table 4.

Table 4: Mine Contacts

Position	Name	Number
General Manager Appin Mine	Andy Hyslop	(02) 4629 4752
Specialist Environment – Appin West and East	Hubert Mhangami	0466 981 434
Specialist Environment – Appin North and WCCPP	Polly Barlow	0401 808 711
Superintendent Environment - IMC	Chris Schultz	(02) 4286 3384

3. APPROVALS

Table 5, Table 6 and Table 7 describe the Project Approvals, Mining Leases, Licences and Exploration Leases associated with Appin Mine.

Table 5: Project Approvals associated with Appin Mine

Document	Issue Date	Expiry date
Appin Gas Drainage Project – Initial	Oct 2009	
Appin Gas Drainage Project – 2010	Dec 2010	
Appin Gas Drainage Project – 2012	Feb 2012	
Project Approval (NSW Government)	22 Dec 2011	31 Dec 2041
Project Approval – MOD 1	2 Apr 2015	31 Dec 2041
Project Approval – MOD 2	28 Oct 2016	31 Dec 2041
Project Approval – MOD 3	12 Apr 2022	31 Dec 2041
Project Approval *(EPBC Act)*	15 May 2012	15 May 2042
Ventilation Shaft 6 (NSW Government)	4 May 2011	Consolidated into Project Approval
Ventilation Shaft 6 (*EPBC Act*)	1 Apr 2011	1 Apr 2041

Table 6: Mining Leases and Licences associated with Appin Mine

Mining Lease / Sub-Lease	Number	Issue Date	Expiry Date
Consolidated Coal Lease	724	4 Jul 1991	18 Dec 2031
Consolidated Coal Lease	767	29 Oct 1991	8 Jul 2029
Coal Lease	381	24 Oct 1991	24 Oct 2033
Coal Lease	388	22 Jan 1992	22 Jan 2034
Mining Purposes Lease	200	13 Jan 1982	13 Jan 2024
Mining Purposes Lease	201	13 Jan 1982	13 Jan 2024
Mining Lease	1382	20 Dec 1995	20 Dec 2037
Mining Lease	1433	24 Jul 1998	20 Dec 2037
Mining Lease	1473	20 Nov 2000	19 Nov 2042
Mining Lease	1574	9 Jul 2008	30 Dec 2023
Mining Lease	1678	27 Sep 2012	26 Sep 2033
Mining Lease	1698	26 Jun 2014	25 Jun 2035
Mining Lease	1832	9 Aug 2022	9 Aug 2043
Mining Lease	1847	28 Feb 2023	28 Feb 2044
Environment Protection Licence	2504	14 Feb 2001	No expiry
Water Approvals	10WA117999 10WA103794 10WA118778 10WA118766 10WA117285	15 Nov 2012 1 Jul 2011 1 Jul 2013 1 Jul 2013 15 Nov 2011	14 Nov 2027 30 Jun 2024 18 Feb 2028 24 Jun 2028 14 Nov 2026
Groundwater Access Licence	36481 – West Cliff	N/A	
Groundwater Access Licence	36477 - Appin	N/A	
Groundwater Access Licence	37464 – Appin	N/A	
Groundwater Access Licence	44376 – Appin	N/A	
Surface Water Access Licence	35519 – Brennans Creek Dam	N/A	
Surface Water Access Licence	30145 – Mountbatten	N/A	
Radiation Licence	5061052 – WCCPP/Appin East	26 Jul 2023	26 July 2024
WaterNSW Access Consent	F2020/1545	29 Jun 2023	13 Mar 2025

Table 7: Exploration Licences/Authorisations associated with Appin Mine			
Exploration Licence/Authorisation	**Site**	**Issue Date**	**Expiry Date**
AUTH 199	West Cliff	27 Jun 1980	27 Jun 2024
AUTH 201	Appin	27 Jun 1980	27 Jun 2024
AUTH 248	Appin	13 May 1981	13 May 2026
AUTH 306	West Cliff	19 Jul 1983	19 Jul 2025
AUTH 312	Appin	10 Aug 1983	10 Aug 2025
AUTH 370	Appin	8 May 1986	8 May 2025
AUTH 395	Appin	23 Nov 1987	23 Nov 2025
AUTH 396	Appin/West Cliff	28 Jun 1988	27 Jun 2024
AUTH 397	West Cliff	4 Aug 1987	27 Jun 2024
AUTH 432	West Cliff	12 Feb 1991	12 Feb 2025
EL 4470	Appin	5 Jan 1993	5 Jan 2026
EL 8972	Appin	29 Apr 2020	29 Apr 2026

4. OPERATIONS SUMMARY

4.1 Mining

4.1.1 Longwall Status

Appin Mine underground longwall mining operations transitioned wholly to AA7 and AA9 following completion of longwall mining activities at Appin North (West Cliff Area 5) in early 2016. In FY23 AA9 operations were completed, and operations have transitioned wholly to AA7. Appin Mine extracts coal from the Bulli Seam within the Southern Coalfield. Appin Mine underground longwall mining operations are accessed from three surface locations: Appin North, Appin West and Appin East.

Longwall (LW) 709 commenced on 22 February 2022 and as of the end of the reporting period had retreated approximately 2034 m with an estimated completion in September 2023 (Plan 19).

Extraction of LW905 commenced on 25 September 2022 and was completed on 28 February 2023.

The start and finish dates for longwalls in the current Appin mining domain are provided in Table 8 and Table 9.

Table 8: Area 7 Longwall Start and Finish Dates		
Longwall Number	**Start Date**	**Finish Date**
701	27 Oct 2007	9 May 2008
702	18 Sep 2008	20 Apr 2009
703	22 Oct 2009	3 Mar 2011
704	7 May 2011	29 Jul 2012
705	7 Sep 2012	27 Mar 2014
706	23 Apr 2014	28 Nov 2015
707A	7 Jan 2016	16 Aug 2016
707B	26 Sep 2016	19 Jun 2018
708A	2 Apr 2019	20 Oct 2019
708B	24 Apr 2020	3 Jan 2022
709	22 Feb 2022	Estimated Sep 2023

Table 9: Area 9 Longwall Start and Finish Dates		
Longwall Number	**Start Date**	**Finish Date**
901	19 Jan 2016	8 Aug 2017
902	12 May 2018	3 Apr 2019
903	1 Nov 2019	7 Apr 2021
904	20 May 2021	9 Aug 2022
905	25 Sep 2022	28 Feb 2023

4.1.2 Longwall Production

Appin Mine extracted 3.797 million tonnes of Run of Mine (RoM) coal via roadway development and longwall extraction methods for the reporting period. The ROM production levels from FY09 through to the current reporting period are provided in Figure 1.

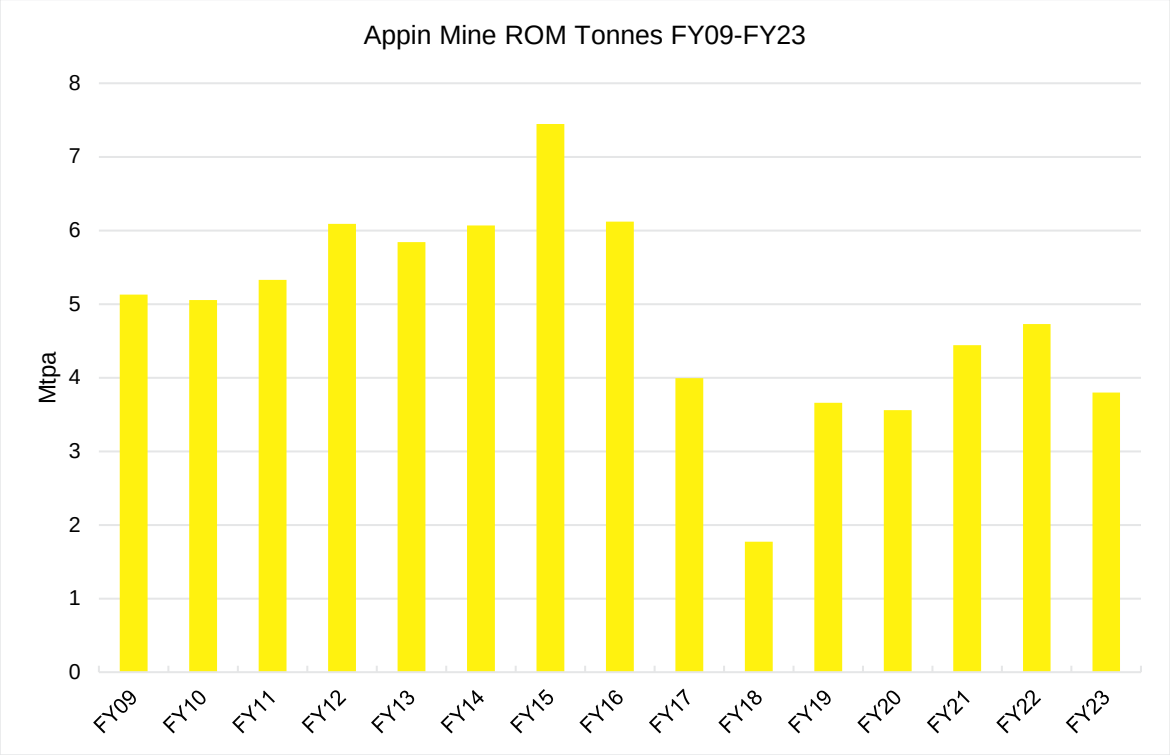


Figure 1: RoM production – Appin Mine (in million tonnes per annum [Mtpa])

The average yield for the reporting period was 84%. The production and waste summary for the reporting period is provided in Table 10.

Table 10: Production Summary

	Approval Limit	Previous Reporting Period	This Reporting Period	Next Reporting Period [6]
Waste rock/ Overburden	N/A	N/A	N/A	N/A
RoM Coal/Ore (Mt)	10.5	4.729	3.797	3.891
Coarse Reject (Coal Wash Mt) [7]	N/A	0.839	0.623	0.644
Saleable Product (Mt)	9.3 [8]	3.900	3.165	3.260

[6] Estimate.
[7] Total processing waste produced at WCCPP for Annual Review period only – does not include coal wash produced at Dendrobium CPP.
[8] Transport Limit.

4.2 Mineral Processing

Mineral processing facilities include the WCCPP, the CWEA and the Dendrobium Coal Preparation Plant (DCPP) (located at the Port Kembla Steelworks). The majority of RoM coal from Appin Mine is directed to the WCCPP for processing. The CWEA is used to emplace coal wash from the WCCPP and DCPP (if beneficial reuse options are not available). RoM coal is transported to the WCCPP by:

- coal trucks from the Appin East site, along Appin and Wedderburn Roads; and
- bulk coal winder at Appin North, transported underground from AA7 and AA9.

RoM coal from Appin Mine may also be transported to the DCPP via Mt Ousley on an 'as required' basis to maintain work continuity and maintain reduced stockpile sizes at the Appin sites. No coal was transported directly to the DCPP during the reporting period.

Clean coal from the WCCPP is trucked to BlueScope Steel (Port Kembla Steelworks) coal handling facilities or to the Port Kembla Coal Terminal (PKCT) for distribution.

Daily road haulage volumes associated with both the Appin and WCCPP sites is available on the IMC website using this link.

4.3 Ore and Product Stockpiles

No coal is stockpiled at Appin West. RoM coal is transported underground to Appin East or the WCCPP. The Appin West coal storage bins are currently under care and maintenance.

Appin East has a total raw coal stockpiling capacity of up to 50,000 tonnes. The stockpile is recovered with front-end loaders and transferred directly into the coal haulage trucks for transport by road to either the WCCPP or DCPP.

Appin North operates six primary coal stockpiles for both clean coal and raw coal. The stockpile capacities at Appin North are outlined in Table 11.

Table 11: Capacity of Appin North Stockpiles

Area	Capacities
No. 1 Stockpile	350,000 t nominal capacity – 300,000 t coking coal, 50,000 t Middlings coal
No. 2 Stockpile	150,000 t nominal capacity – generally coking coal
No. 3 Stockpile	400,000 t nominal capacity – generally coking coal
No. 4 Stockpile	450,000 t nominal capacity – generally Appin RoM coal
No. 5 Stockpile	70,000 t nominal capacity – generally Appin RoM coal
No. 6 Stockpile	30,000 t nominal capacity – generally Appin RoM coal

A Stockpile and Slope Stability Principal Hazard Management Plan is in place to manage the stockpile operations. The plan is a framework where the operational risks and controls are documented. Risks associated with the stockpile operations are also detailed in the WCCPP Risk Register, which is reviewed regularly by the site management team to test the effectiveness of controls.

Monitoring and management reviews indicate that the current plan effectively controls all potential stockpile management issues effectively.

4.4 Construction

The following construction activities were undertaken during the FY23 reporting period.

4.4.1 Appin West Muster Shed

IMC demolished an old engineering building to construct a muster shed that is now used for pre-shift briefings and any other operational training/communications for the workforce.

4.4.2 Appin West Warehouse and Workshop Upgrades

As part of an ongoing initiative to improve environmental standards with respect to chemical and hazardous goods handling and storage, IMC installed weatherproof covers on portable bunds dedicated to hydrocarbon storage in May 2023 (see Plate 1). IMC also upgraded the bulk solcenic refilling bund with a new concrete foundation (see Plate 2).

Plate 1: Weatherproof covers on storage bunds

Plate 2: Upgrade of bulk solcenic refilling area with a concrete foundation

4.4.3 Water Treatment Plants (WTPs)

4.4.3.1 Appin North Temporary WTP

In FY20 IMC committed to the construction of a WTP at Appin North to provide for the treatment of groundwater pumped to the surface from Area 5, in addition to water from the CWEA underdrainage, with the treated water to be directly discharged to Brennans Creek as permeate[9] via Licence Discharge Point (LDP) 40.

A temporary WTP was commissioned in FY21. Construction details are provided in the FY21 Annual Review. The temporary WTP operated over the reporting period, with over 290 ML of permeate being produced and discharged to Brennans Creek through LDP 40 until it was turned off in December 2022. The temporary plant has now been decommissioned.

4.4.3.2 Appin North WTP

Construction of the WTP began in FY21. There were significant delays to construction and commissioning due to COVID restrictions, labour shortages, equipment availability, supply chain issues and significant wet weather in FY21/FY22/FY23. Applications to vary the date for completion

[9] Treated water from the reverse osmosis units.

of the WTP in EPL 2504 were submitted to and approved by the Environment Protection Authority (EPA) over this period.

In January 2023, water feed to the temporary WTP was diverted to the Appin North WTP to fill feed tanks and enable the commencement of wet commissioning of the WTP with mine water. Permeate from the WTP was directed to Brennans Creek Dam (BCD) during January until a consistent quality of water was verified.

Process proving commenced on 6 February 2023. Water was discharged directly to Brennans Creek through LDP 40 over this period.

The WTP was deemed to be operational in March 2023. The final cost of the WTP was approximately $30 million.

Volumes of permeate discharged to Brennans Creek were 25.8 ML in February, 27.6 ML in March, 44.4 ML in April, 46.4 ML in May and 28.7 ML in June. The EPL 2504 proposed limit for a minimum discharge limit of 1.5 ML/day was achieved in April and May. Algae issues in feed water resulted in lower volumes of water discharged in June, due to increased membrane cleans and slower production to enable consistent operation between cleans.

The WTP layout is shown in Plate 3.

Plate 3: Appin North WTP

4.4.3.3 Appin West WTP upgrades

A chlorine dioxide refilling bund was implemented in February 2023 to improve handing and storage of chlorine dioxide on site (see Plate 4).

Plate 4: AW WTP Chlorine dioxide refilling bund

4.4.4 Appin Mine Ventilation and Access (AMVA) Project

In April 2022, a modification of the Project Approval (MOD 3) was granted (pursuant to Section 4.55(2) of the *EP&A Act*, following an EA process, to allow for the construction and operation of two ventilation shafts, mine access infrastructure and improved site access at 345 Menangle Road, Menangle NSW, referred to as the AMVA Project.

Early Works (as defined by the Project Approval) commenced in July 2022. Early works included:

- *Electrical Infrastructure Works*: Relocation of the existing 11 kV overhead line at the property development site, installation and testing of the 11 kV switching station, installation and testing of a 11 kV High Voltage connection point. This activity was completed during the reporting period.
- *Intersection Upgrades*: Upgrade of the site access with Menangle Road (i.e. construction of acceleration and deceleration lanes and signage). This activity was completed during the reporting period.
- *Civil and Bulk Earthworks*: General cut and fill activities to create the construction hardstand, landscaping, surface water management (e.g. sediment pond and diversion drain construction), commissioning of temporary tanks and pumps, site establishment works required to support the construction phase (e.g. demarcating disturbance footprint/no go areas, install temporary amenities/facilities, security fencing/gates, connection of services and utilities [phone, power, water], vegetation clearing and topsoil stripping, demolition of existing structures, decommissioning of farm dam, installation of environmental control/management measures, monitoring equipment, erosion and sediment control structures). These activities were completed during the reporting period.

- *Shaft Pre-Sinking*: Pre-sinking of the shaft to required depth, construction of a shaft collar (required to hold the temporary headframe and winder), construction of the headframe and winder and any associated noise mitigation required for 24-hour shaft sinking to occur. This activity commenced in the reporting period however will be ongoing in FY24.

Progress at the AMVA Project site at the end of June 2023 is shown in Plate 5.

Plate 5: AMVA Project site

4.4.5 Minor Improvement Projects

The 14-day Report was transitioned from an Excel workbook to the on-line Environmental Quality Information System (EQuIS) during the reporting period. Previously the 14-day Report was uploaded on a nominal fortnightly basis to the IMC website. With the transition, as data is uploaded to the database and checked, it can then be made available to the public. This reduces the possibility of data entry errors, allows for data to be published as it is received and also provides improved functionality for external stakeholders to review the data.

4.4.5.1 Appin North

The following improvement projects were implemented or progressed at Appin North during the reporting period.

- Planning for the upgrade of the Appin North bulk coal winder was ongoing from FY21. Installation was completed in FY23 and commissioning is underway. Close out of the project is expected in January 2024.
- A revised engineering design was submitted over FY23 for an upgrade of the haul road system between the CWEA and the WCCPP. Construction is planned to commence in FY24.
- A secondary haul road through the current Stage 3 CWEA was completed.
- A drainage channel connecting the drill mud ponds to the CWEA was constructed in FY23 to increase drainage capabilities of the current drill mud ponds, extending their lifespan. It was identified that additional design work was required for the relocation of the drill mud slurry ponds. It is planned for them to be relocated in FY24.

- The BCD discharge valve AV03 was replaced.
- The BCD flow meter FT04 and transmitter head unit was replaced after damage from water ingress.
- The reclaim sump pump at BCD was commissioned during the reporting period, with water from the reclaim sump now being pumped back into BCD and no longer discharging via Point 10.
- The review of the design plan for the structural review of the 8000 tonne WCCCP product bins to reinstate designed capacity continued during the reporting period. Works are planned to commence in late FY24 and completion is expected in FY27.
- The installation of a pump station to run water from Point 16 to the WTP was commissioned in FY23. The majority of water from the CWEA is now flowing through this pipe and is no longer entering the pond system via the Point 16 flow meter. Water that is not transferred to the WTP for processing still enters the pond system via a discharge valve that opens directly to Emplacement Pond (EP) 2.
- Eight nest boxes were installed in the CWEA rehabilitation area. Refer to Section 8.1 for more information.
- Nine artificial bee habitats were installed in the Appin North site boundary, particularly around known *Persoonia hirsuta* populations and rehabilitation areas. Refer to Section 6.5.2.2 for more information.
- Dust abatement water sprays were installed on both the Coarse Coal Bins and conveyors at Appin North to reduce dust emissions. These sprays source water from the process waters from the plant.
- Installation of redirection pump to transfer water to the AN WTP at the Appin North Point 16 underdrainage (in lieu of installation of new flow meter).
- Remote sensing was used to obtain more frequent data across the CWEA rehabilitation areas and used to obtain more accurate quarterly reporting figures. Frequent LiDAR flights have also commenced over the CWEA which can be used to achieve more accurate landform and volume assessments.
- Appin North fire systems upgrades over FY23 included replacing the current pipeline to comply with the relevant legislation, mine standards and Australian standards. Work will continue into FY24 with pumps planned to be replaced.

4.4.5.2 Appin West

The following improvement projects were implemented or progressed at Appin West during the reporting period.

- Repairs to the sprinkler system on the unsealed access road were completed. This has resulted in improved dust control.
- The surface water dam perlite filter system was serviced.
- Ongoing repairs of all sealed areas and roads across the pit top.
- Old steel structures and components were recycled via a licensed waste contractor.
- Planning commenced on the Diesel Backup Fan upgrade at Ventilation Shaft 6.

4.4.5.3 Appin East

The following improvement projects were implemented or progressed at Appin East during the reporting period.

- The first flush system and settling pond clean out was undertaken as silt build up was observed within these areas.
- Old steel structures and components in the laydown area were recycled via a licensed waste contractor.
- The Appin East Pit Top fire line was upgraded.
- The switch room auxiliary transformer at the Appin East drift winder house was replaced with a new one that operates with vegetable oil.

4.5 Land Preparation

4.5.1 Emplacement Operations

The following works were undertaken during the reporting period at the CWEA:

- establishing growth medium for ~1 ha;
- vegetation clearing of ~0.7 ha; and
- continued deposition of coal wash.

The rehabilitated emplacement areas were inspected regularly to assess the progress and effectiveness of the rehabilitation. The monitoring program consists of quarterly inspections undertaken by an IMC Environmental representative, that are supplemented by an extensive annual monitoring program. The annual monitoring program was undertaken in Spring FY23. The report is provided in Appendix 7.

4.5.2 AMVA Project

During the reporting period, bulk earthworks were undertaken by the principal contractor which included clearing of vegetation on the site, excavation, scrape and fill, stockpiling and hydromulching of batters and stockpiles.

4.6 Exploration

During the reporting period, twenty-seven (27) boreholes were drilled in the Appin area, including:

- three surface to inseam (STIS) holes for fault and dyke pick-up close to planned workings (one was in-progress at the time of Annual Review preparation);
- one hydrological hole to monitor groundwater parameters proximal to mine workings;
- twenty standard coal exploration boreholes; and
- three wedges drilled from the parent exploration borehole.

In relation to the exploration boreholes:

- three were drilled in EL 8972;
- six were drilled in EL 4470;
- eight were drilled in AUTH 396 (inclusive of three wedges);
- four were drilled in AUTH 248; and

- two were drilled in AUTH 370 (and an additional three boreholes that were captured as in-progress in last year's report were also finalised).

The hydrological hole and two completed STIS holes were drilled within AUTH 396 and CCL 767, but as they were drilled for mining purposes they fall under mining lease CCL 767 for reporting purposes. The in-progress STIS hole is located within AUTH 248. CCL 767 does not extend to the location of this STIS site, and therefore approval for the hole was sought under the Authority.

Plan 21 shows the location of boreholes drilled in the Appin Mine area during the reporting period.

All exploration borehole sites were subject to a Review of Environmental Factors (REF), with the exception of some of the mining related holes conducted under the mining lease. Landholder negotiations and access agreements were established prior to any exploration activity occurring. Objectives are agreed with the landowner prior to works commencing. They are guided by the stipulations in the REF document and associated activity approvals prepared for each exploration campaign.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Activities identified by IMC in the FY22 Annual Review to be completed in the FY23 reporting period are listed in Table 12.

No actions were identified by regulatory agencies relating to the FY22 Annual Review.

Table 12: Actions from Previous Annual Review

Action Required	Requested by	Where covered in this Annual Review
1. Completion of the Appin North WTP.	IMC	Section 4.4.3.2
2. Construction phase of the AMVA major works.	IMC	Section 4.4.4 and Section 12.3.5
3. Completion of the upgrades to Appin North bulk coal winder including updates to the electrical system, hoist monitoring and control systems.	IMC	Section 4.4.5.1
4. Commission of the Appin East surface water automated dosing system.	IMC	Section 12.3.3
5. Switchyard upgrades at Ventilation Shaft 2 Appin North, Appin East and Appin West to replace old infrastructure.	IMC	Section 12.3.6
6. Installation of a new flow meter at the Appin North Point 16 underdrainage.	IMC	Section 4.4.5.1
7. Installation of the pump on the reclaim sump at BCD.	IMC	Section 4.4.5.1
8. Relocation of drill mud slurry ponds at Appin North.	IMC	Section 4.4.5.1
9. Engineering for the lifting and upgrade of Wedderburn Road.	IMC	Section 12.3.1
10. Installation of dust abatement water sprays on both Coarse Coal Bins and conveyors at Appin North.	IMC	Section 4.4.5.1
11. Engineering designs developed for the construction of EP4 to increase the capacity of the current tailings dam as the CWEA approaches EP2.	IMC	Section 12.3.1
12. Feasibility study for the WCCPP coal bins in FY23, with construction planned for FY24 to extend the life of the bins.	IMC	Section 12.3.1
13. Upgrades to the Sewage Treatment System at Appin North.	IMC	Section 12.3.1

14. Appin North and Appin East fire systems upgrades, including new fire pipes and pumps to be installed on the surface.	IMC	Section 4.4.5.1 and Section 4.4.5.3.
15. Removal/ emplacement of coal wash that had been stored at Appin North pending approval for an OPD or beneficial reuse.	IMC	Section 6.19.3
16. Continue monitoring under the Georges River Aquatic Health Program.	IMC	Section 6.3.3.3
17. Continue monitoring of the *Persoonia hirsuta* translocation trials (1-3).	IMC	Section 6.5.2.2
18. Progress approvals, planning and environmental assessments required to undertake the work described in the Georges River Rehabilitation Plan (GRRP).	IMC	Section 6.14.3
19. Continue to progress the current phase of the decarbonisation program.	IMC	Section 6.17.4
20. Conduct further investigations and consultation and progress preliminary approvals for rehabilitation of the North Cliff site.	IMC	Section 6.20.8
21. Initiate monitoring plan of habitat in the CWEA for the Broad-headed Snake.	IMC	Section 6.5.2.1
22. Explore uses of remote sensing to supplement the CWEA rehabilitation monitoring program.	IMC	Section 4.4.5.1
23. Install Native Bee habitat in the CWEA.	IMC	Section 6.5.2.2
24. Publishing of the 14-day Report from EQuIS.	IMC	Section 4.4.5
25. Design of a bushfire trial in established rehabilitation in the CWEA to progress closure requirements.	IMC	Section 8.2.2

6. ENVIRONMENTAL PERFORMANCE

6.1 Air Pollution

6.1.1 Environmental Management

Air quality is managed in accordance with the Appin Mine Air Quality, Greenhouse Gas and Energy Management Plan (AQMP), which details the air quality and emissions control measures for the project, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes.

The AQMP has been prepared to comply with the intent and requirements of Condition 12 of Schedule 4 of the Project Approval.

The AQMP incorporates:

- Use of real-time air quality monitors: fixed and portable Optical Photometers.
- Visual inspections and audits.

Details of continuous air quality monitoring locations for Appin Mine are provided in Table 13.

Table 13: Appin Mine Air Quality Monitoring Sites and their Function

Site ID	Location	Parameter	Measurement Method	Function
AE-PF1	NE corner of pit top property boundary – coal stockpile vehicle entry/exit point	Particulate Matter: PM_{10}	Real-time Photometer (fixed)	Real-time monitoring of dust emissions at the coal stockpile area truck entry/exit point onto public roads. Real-time Operational Control – stockpile, internal roads and public road dust control measures performance reference monitor.
AE-PF3	Adjacent to Appin East helipad between stockpile and nearest residential receivers	Particulate Matter: PM_1, $PM_{2.5}$, PM_4, PM_{10}	Real-time Photometer (fixed)	Site dust control/Amenity goal reference (noting that monitor is located within premises boundary). Real-time Operational Control.
W-PF1	Appin North southern property boundary at the Wedderburn and Appin Road intersection	Particulate Matter: PM_{10}	Real-time Photometer (fixed)	Fixed monitor for real-time monitoring of dust emissions at the Wedderburn Road and Appin Road intersection. Real-time Operational Control – Roadway dust emissions.

Table 13: Appin Mine Air Quality Monitoring Sites and their Function

Site ID	Location	Parameter	Measurement Method	Function
VS6-PF1	Ventilation Shaft 6	Particulate Matter: PM_1, $PM_{2.5}$, PM_4, PM_{10}	Real-time Photometer (fixed)	Fixed monitor for real-time monitoring of particulate matter at the Ventilation Shaft 6 site (from the ventilation shaft, Hume Highway and other ambient sources). Long term trends and general amenity. Not used for assessment of compliance.
FINNS	Western site boundary near the intersection of Finns and Menangle Road	Particulate Matter: $PM_{2.5}$, PM_{10}	Real-time Photometer (fixed)	Fixed monitor for real-time monitoring of dust emissions at the western boundary near the intersection of Finns and Menangle Road for real-time operational control. Close to most of the residences near the site.
TED	Northern end of site adjacent to a site office	Particulate Matter: $PM_{2.5}$, PM_{10}	Real-time Photometer (fixed)	Fixed monitor for real-time monitoring of dust emissions at the northern boundary of the site for real-time operational control. Adjacent to site office to incorporate dust emissions from the site and office.
FOCK	South-eastern boundary adjacent to Foot Onslow Creek	Particulate Matter: $PM_{2.5}$, PM_{10}	Real-time Photometer (fixed)	Fixed monitor for real-time monitoring of dust emissions at the eastern boundary of the site for real-time operational control.

6.1.2 Environmental Performance

Results of air quality monitoring for the DustTrak units[10] are reported in the 14-day Report, in accordance with Section 66 (6) of the *Protection of the Environment Operations (POEO) Act*, and Condition 11 of Schedule 6 of the Project Approval; and on an annual basis to the EPA via the EPA Annual Return (Appendix 1) and in the Annual Review. The 14-day Report is available on the IMC website using this link.

A comprehensive summary of all air monitoring results for Appin Mine is provided in this section. Graphs of long-term trends are provided in Appendix 6.

IMC use the monitoring results from the optical photometers for comparison with health and amenity criteria. The photometers provide real-time monitoring results which can be easily correlated with site operations and wind direction.

[10] AE-PF1, AE-PF3, W-PF1 and VS6-PF1.

6.1.2.1 ***Real-time Monitoring***

The fixed optical photometer (AE-PF3) located at the Appin East Pit Top adjacent to the helipad is used to provide an indication of compliance against both the long-term criteria and short-term criteria for particulate matter (as listed in Table 14 and Table 15).

The optical photometers AE-PF1 (located at the coal haulage exit at Appin East), W-PF1 (located adjacent to Wedderburn Road), VS6-PF1 (located next to Ventilation Shaft 6) are used to inform operational activities and are not used for assessment of compliance.

As described in the AQMP, alerts from these monitors are sent by text-message to the Specialist Environment and Operational Personnel when levels ≥ 40 µg/m^3 (greater than 80% of the PM_{10} criteria) are recorded, to enable the mobilisation of water trucks or road sweepers as required.

The monitors at the AMVA Project site: FINNS (located on the western side boundary), TED (located on the northern end) and FOCK (located on the south-eastern boundary) are also used to inform operational activities and are not used for assessment of compliance. These are SiteHive units.

The additional air quality criteria for the AMVA Project site are provided in Table 16.

The locations of the optical photometers are shown on Plan 3, Plan 8 and Plan 9.

Table 14: Particulate Matter long-term criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter <10 µg (PM_{10})	Annual	30 µg/m^3

Table 15: Particulate Matter short-term criteria

Pollutant	Averaging Period	Criterion
Particulate matter <10 µg (PM_{10})	24-hour	50 µg/m^3

Table 16: Particulate Matter criteria for AMVA Project

Pollutant	Averaging Period	Criterion
Particulate matter <10 µg (PM_{10})	Annual	25 µg/m^3
Particulate matter <2.5 µg ($PM_{2.5}$)	Annual	8 µg/m^3
Particulate matter <2.5 µg (PM_{10})	24-hour	25 µg/m^3

Two exceedances against the short-term criteria were observed at AE-PF3 at Appin East on 16 and 17 March 2023. The elevated 24-hour results (above 50 µg/m^3) were caused by regional air quality influences around the Sydney South-west region. Elevated results were also observed at AE-PF1

at Appin East, W-PF1 at Appin North and VS6-PF1 at Ventilation Shaft 6 on these dates. Results from the optical photometers are presented in Figure 2, Figure 3, Figure 4 and Figure 5 respectively.

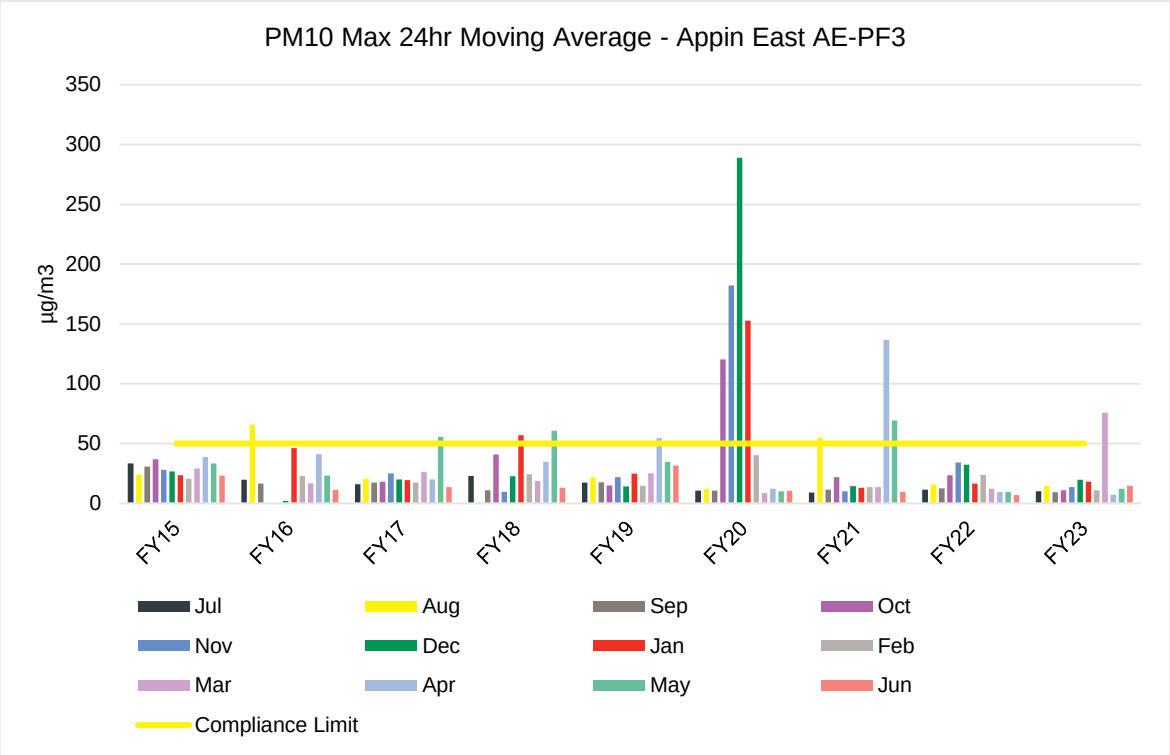


Figure 2: PM_{10} Maximum 24-hour Moving Average at Appin East AE-PF3

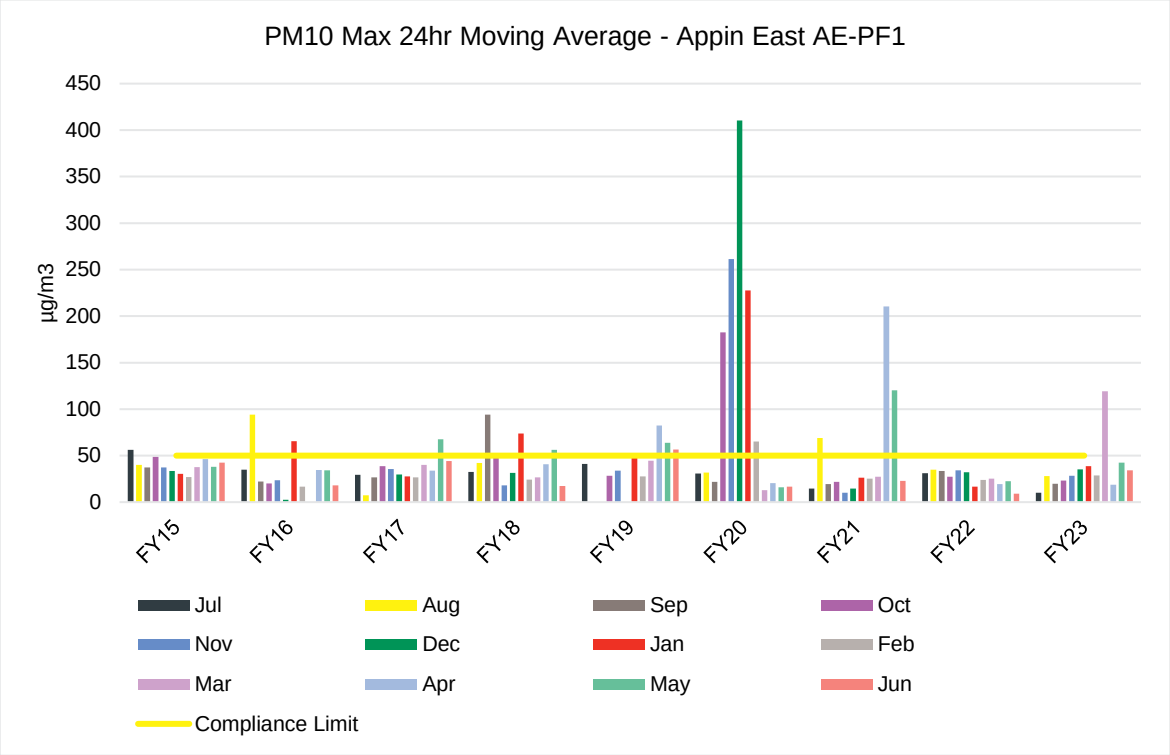


Figure 3: PM_{10} Maximum 24-hour Moving Average at Appin East AE-PF1

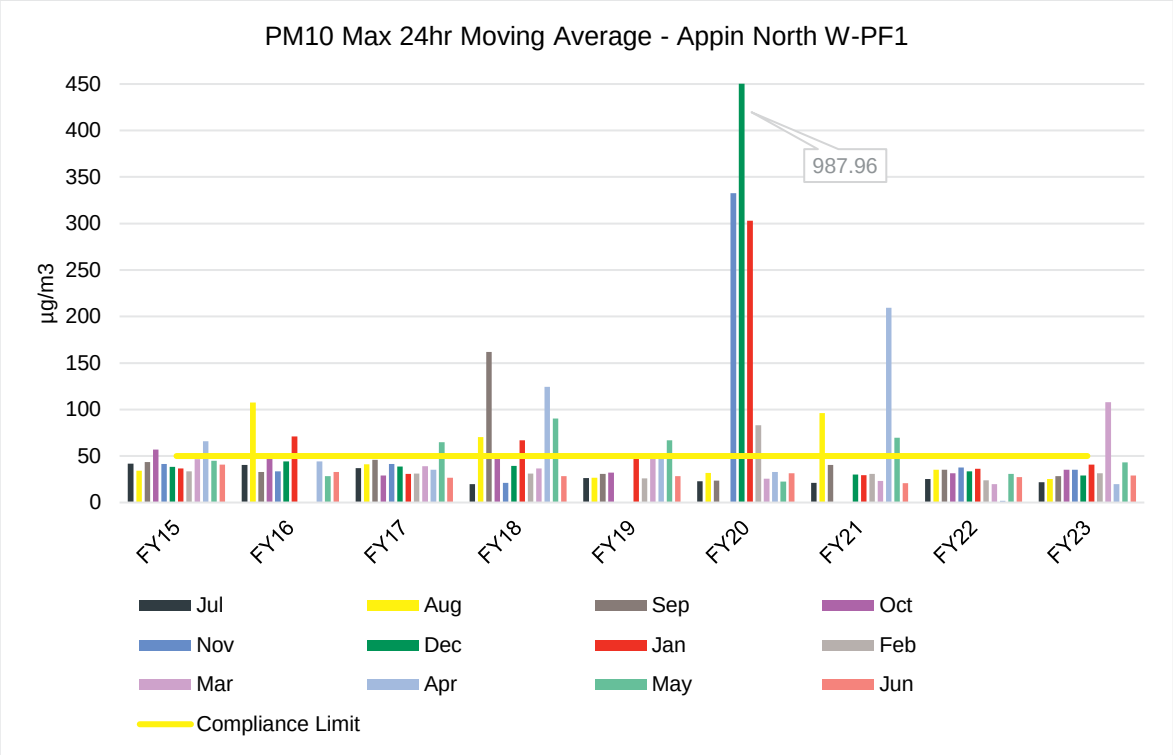


Figure 4: PM_{10} Maximum 24-hour Moving Average at Appin North W-PF1

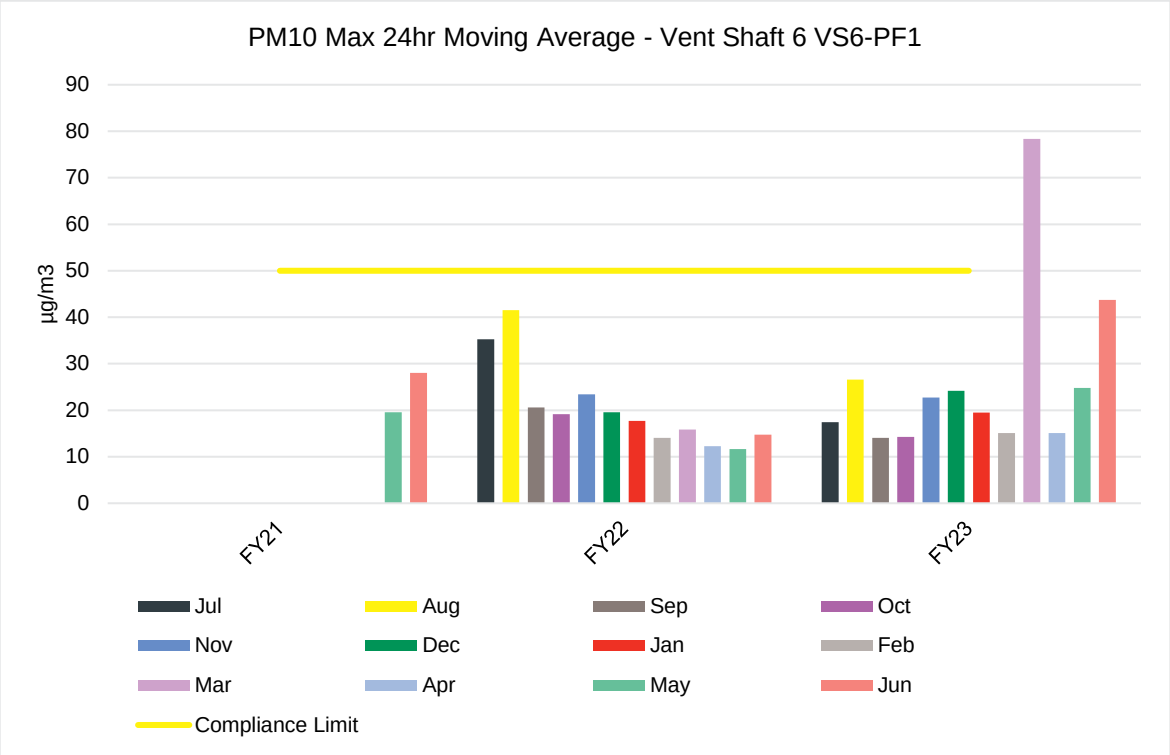


Figure 5: PM_{10} Maximum 24-hour Moving Average at Vent Shaft 6 VS-PF1

As noted, the SiteHive air quality monitors located at the AMVA Project site are used to inform operational activities, which may include implementing controls such as increasing water cart usage,

ceasing or relocating activities in accordance with the Air Quality Trigger Action Response Plan (TARP) and Construction Environmental Management Plan (CEMP).[11]

If elevated particulate matter levels are noted, IMC will review the site data imagery taken at monitoring locations and site logs and local and regional air quality data to determine the potential cause of the elevated particulate matter levels, suitability of existing controls and any opportunities to improve air quality management.

In the event of a complaint, IMC will review real time data, site information and local and regional air quality data to determine the cause. If it is determined that construction activities may be contributing to the elevated particulate matter levels, IMC will undertake attended or targeted monitoring to confirm ongoing performance of the activity.

Average 24 hour moving average PM_{10} and $PM_{2.5}$ data for the AMVA Project is presented in Figure 6 and Figure 7 respectively.

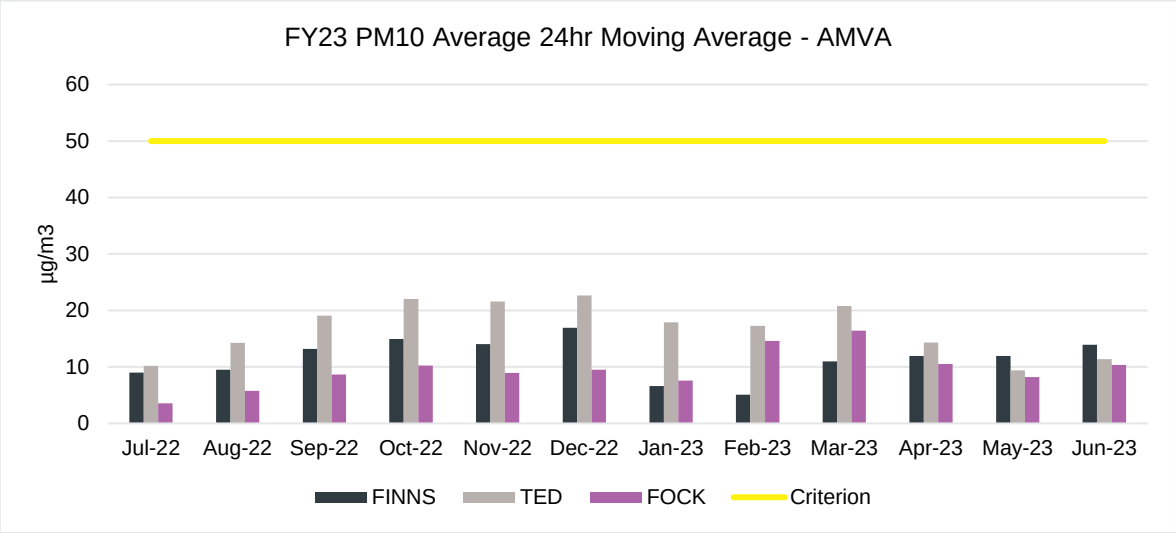


Figure 6: Average PM_{10} 24 hour moving average data - AMVA Project[12]

[11] The SiteHive monitors are located within the site boundary and are not used for a determination of compliance with air quality criteria.
[12] Data considered to be invalid has been removed from the calculation. The SiteHive monitors have experienced significant issues with condensation and high humidity affecting the accuracy of results and equipment was also periodically operating erratically. The dust sensor is light-based, therefore when water droplets form on the sensor the light is refracted in a way that causes a spike in readings.

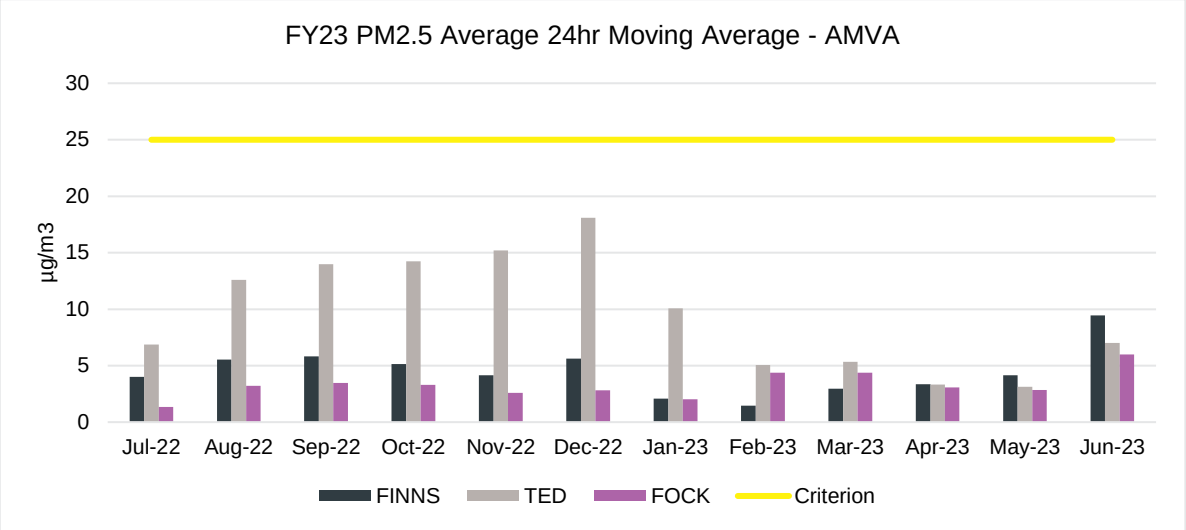


Figure 7: Average $PM_{2.5}$ 24 hour moving average data - AMVA Project

Elevated levels of dust were recorded at the AMVA Project site as a result of a storm front that moved through the site in the late afternoon on 18 February 2023. This event was recorded as a spike by the on-site air quality monitors. Water carts had been working on site at all times during working hours in the lead up to the event, consistent with the commitments in the CEMP. Activities were not being undertaken on the site at the time of the event.

6.2 Erosion and Sediment

6.2.1 Environmental Management

Most activities at the Appin East, Appin West and Appin North Pit Top sites are undertaken on relatively flat areas. Highly trafficked areas are generally sealed. There are minimal unsealed areas at the pit tops. Internal unsealed roads are maintained to prevent dust, primarily through dust suppression sprays and water cart application. Sediment fences are installed where required to filter sediment from drainage and/or seepage points.

Sediment is controlled by multiple techniques across the three sites, however, the common practices include gravimetric separation using a series of dams and water treatment facilities. Water treatment techniques include use of flocculation and coagulation to increase the rate that particles settle out of suspension. Discharged water is monitored for suspended solids in accordance with EPL 2504.

The water management system across Appin Mine is regularly inspected by the site environmental representatives to check that each system is operating as efficiently as possible.

Construction activities commenced at the AMVA Project site in FY23. A range of erosion and sediment control measures were implemented that are described in Section 6.2.1.5

6.2.1.1 ***Appin West***

A fixed sprinkler system and mobile road sweepers have been used as required during the reporting period to minimise dust emissions.

Operational areas at the Appin West Pit Top are contained within the catchment of the surface water dams, which are designed to capture and treat a 1:10 year, 72-hour rainfall event. The surface water dam includes a spillway designed for up to a 1:100-year rainfall event to maintain the engineering integrity of the structure and reduce the risk of erosion and sediment release (through LDP 25). Prior to the release of surface water from the surface water dam (via LDP 23 into Sandy Gully), water

passes through a perlite filter (StormFilter®) unit which is designed to remove suspended solids and insoluble oil and grease.

6.2.1.2 ***Ventilation Shaft 6***

The majority of the Ventilation Shaft 6 site is either vegetated or sealed, therefore surface runoff no longer requires treatment under normal operating conditions.

6.2.1.3 ***Appin East***

Appin East Pit Top utilises a series of surface water ponds capable of holding up to 22 ML of surface water. The surface water management is split into two dams. These dams are used to capture, treat and recycle surface and stormwater runoff from the pit top.

Due to particle suspension of on-site dust and coal fines, surface and stormwater generated from pit-top runoff requires treatment prior to capture and storage in the surface dams. Surface water is dosed with a coagulant and flocculant prior to gravimetric separation, before passing through an overflow pipe into the main surface dam. Water from the main dam is used for dust suppression. Water can also be pumped into the sediment dam where it is drawn through the secondary-treatment system, the Dynasand filter, for discharge into the Georges River through LDP 19.

6.2.1.4 ***Appin North***

The potential for erosion at the CWEA is managed in accordance with the CWEA Management Plan. The following activities are undertaken to minimise the likelihood of erosion within the CWEA:

- compaction of emplaced material;
- profiling of finished areas to designed gradients; and
- revegetation of the CWEA (once material is emplaced to meet design criteria).

Sediment is controlled by a series of sediment ponds, which have a combined capacity of ~200 ML. Water is treated at several locations across the site prior to transfer into BCD to comply with the water quality limits in EPL 2504.

6.2.1.5 AMVA Project

Construction activities on the site over the reporting period are noted in Section 4.4.4. Erosion and sediment control measures implemented at the site during these construction activities included the establishment and use of clean water diversion drains, catch drains for dirty water, temporary controls e.g. sediment fences and construction and use of sediment ponds. The sediment pond has a capacity of 24 ML.

6.2.2 Environmental Performance

Routine water quality monitoring of Total Suspended Solids (TSS) across Appin Mine has not identified any issues associated with erosion and sedimentation. The Appin West, Appin East and Appin North sites are operating within the licence limits for TSS.

Non-compliances were recorded with discharge from the sediment pond at the AMVA Project site during the reporting period. Details of these non-compliances are reported in Section 11.

6.3 Surface Water

6.3.1 Environmental Management

Surface water management across Appin Mine is undertaken in accordance with EPL 2504 and the approved Appin Mine Water Management Plan (WMP). The WMP details the control measures, compliance procedures, monitoring programs, evaluation protocols, notification and communication processes for water management at Appin Mine. The plan has been prepared to satisfy Condition 16 of Schedule 4 of the Project Approval.

The site water management systems are provided in the WMP which is available on the IMC website at link.

6.3.2 Environmental Improvements

6.3.2.1 Appin West

The filter modules at LDP 23 are planned to undergo routine maintenance annually or greater if required, including replacement of the filters and screens. These filter modules were changed out once in FY23.

LDP 23, LDP 24 and LDP 38 water meters were inspected and tested by an external water equipment specialist during FY23.

All oily water separators undergo quarterly routine servicing, including complete cleaning and change out of the coalescing and baffle plates (passive separators) if damaged, and annual servicing and sleeve replacement of the centrifugal (active) separator.

6.3.2.2 Appin East

Appin East utilises a coagulant and flocculant dosing system to treat surface water runoff entering the pit top dams prior to controlled discharge to the environment. Upgrades to the system to allow for automated and variable dosing rates to accommodate fluctuations in surface water flow rate and changes in water quality continued in FY23 and are to be completed in FY24. The upgrades have been delayed due to air supply, silt buildup issues and other significant upgrades required to the system such as a corroded dosing chamber.

The silt trap/dosing pit associated with the main surface water dam underwent routine maintenance during this reporting period, including silt removal.

The first flush system has undergone routine maintenance and cleaning during the reporting period.

The Dynasands filtration system was inspected and required no servicing.

The LDP 19 water meter was inspected and tested by an external water equipment specialist during FY23.

All oily water separators undergo quarterly routine servicing, including complete cleaning and change out of the coalescing and baffle plates (passive separators) if damaged.

Two condensate cleaners for the compressor condensate were serviced during the reporting period.

6.3.2.3 Appin North

Inspections of BCD are conducted regularly by IMC. Surveillance reports are prepared every five years by the consultant geotechnical engineer. The latest report was submitted to the Dams Safety Committee in June 2023. A safety review commenced in FY23 and is scheduled for completion early in FY24.

The temporary WTP was commissioned in FY21 and was decommissioned in FY23 when the Appin North WTP was commissioned. The operation of the WTPs has resulted in improvements in the overall water quality entering Brennans Creek as detailed in Section 4.4.3.

Further improvements at Appin North under the Georges River Aquatic Health Monitoring Program (GRAHMP) are discussed in Section 6.3.3.3.

Surface run-off associated with the CWEA is managed as detailed in the approved CWEA Management Plan which is available on the IMC website using this link.

6.3.3 Environmental Performance

Results of surface water monitoring are reported in the 14-day Report as per the requirements of Section 66(6) of the *POEO Act* and Condition 11 of Schedule 6 of the Project Approval; and on an annual basis to the EPA via the Annual Return (see Appendix 1) and in the Annual Review. The online report is accessible on the IMC website using this link.

A summary of results from the Appin Mine monitoring program is included in Table 17.

6.3.3.1 Water Quality

Two new LDPs were included on EPL 2504 for the AMVA Project site in FY23.

There were two non-compliances recorded over the reporting period.

- The TSS water quality concentration limit was exceeded at LDP 41 on 19 April 2023.
- The Total Nitrogen 50 percentile water quality concentration limit at LDP 24 was exceeded on six occasions over the reporting period, however when the 50 percentile was calculated for FY23, compliance with the limit was achieved. However, the calculation for the EPA Annual Return period (1 February 2022 to 31 January 2023) indicated non-compliance and this was reported in the Annual Return.

The trends for discharge water quality remain relatively consistent over the life of the operation.

6.3.3.2 Water Discharge

There were no non-compliances with the EPL 2504 discharge volume limits over the reporting period.

The overall trends for discharge volumes are relatively consistent over the life of the operation, taking into account the influence of rainfall. Discharge volumes are shown in Table 18.

Graphs of long-term trends for water quality and discharge are provided in Appendix 6.

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

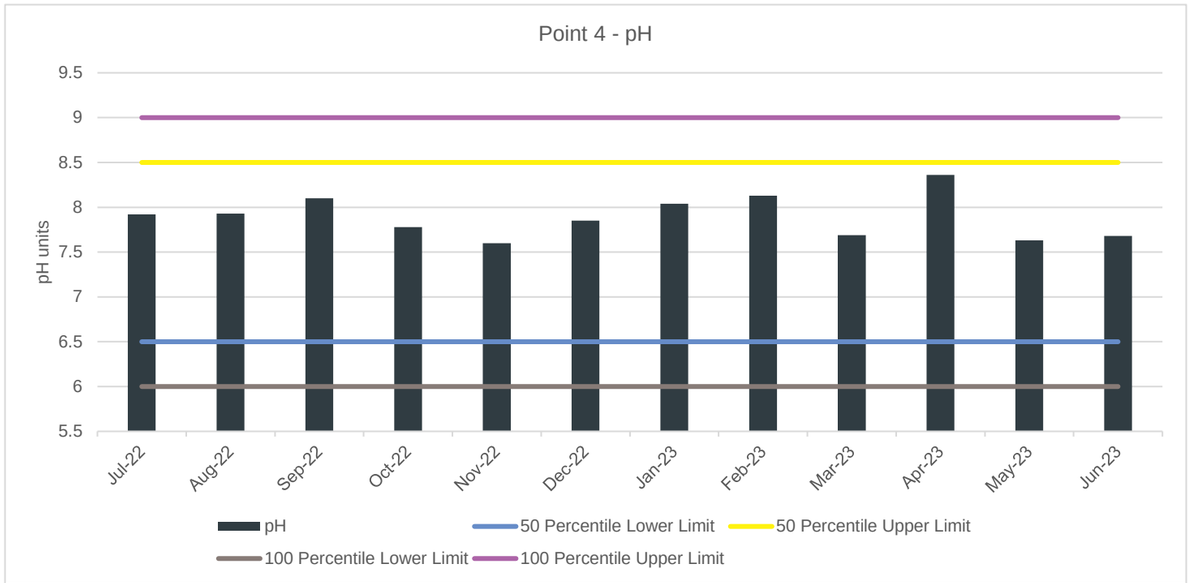
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 3/4	Yes	**Biochemical Oxygen Demand (BOD)** No exceedances of the BOD 50 or 100 percentile water quality criteria of 30 and 50 mg/L respectively were recorded during the reporting period. The average BOD for all samples for FY23 was 5.33 mg/L. This is a slight improvement on last year's performance (5.82 mg/L). **pH** All samples returned a pH result within the 50 and 100 percentile limit for FY23. The average pH was 7.89. This is only slightly below the previous year's result of 7.92 pH.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

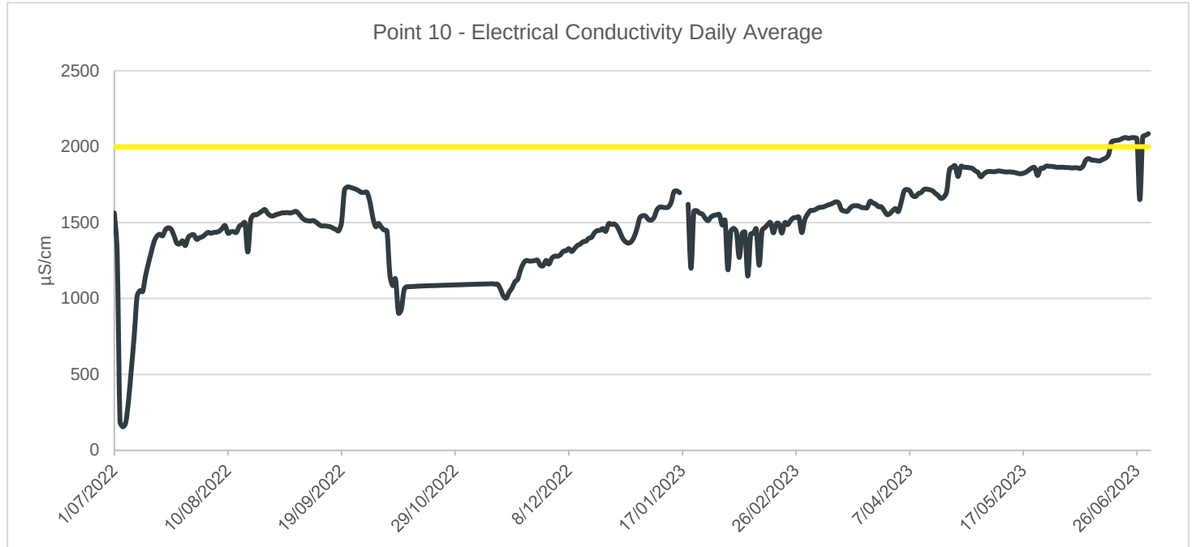
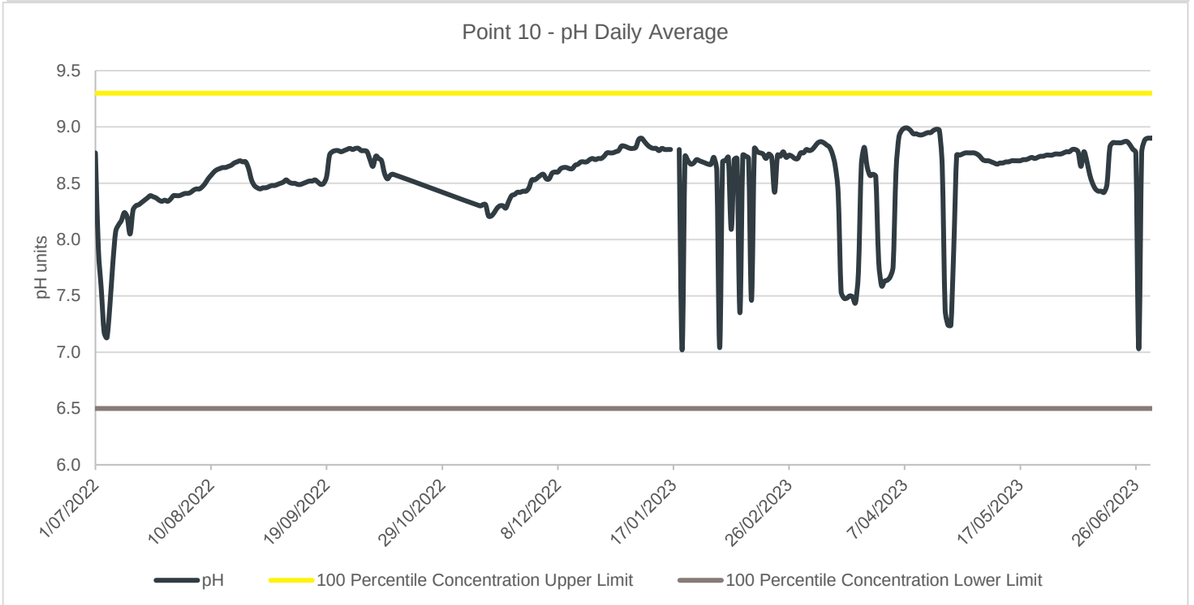
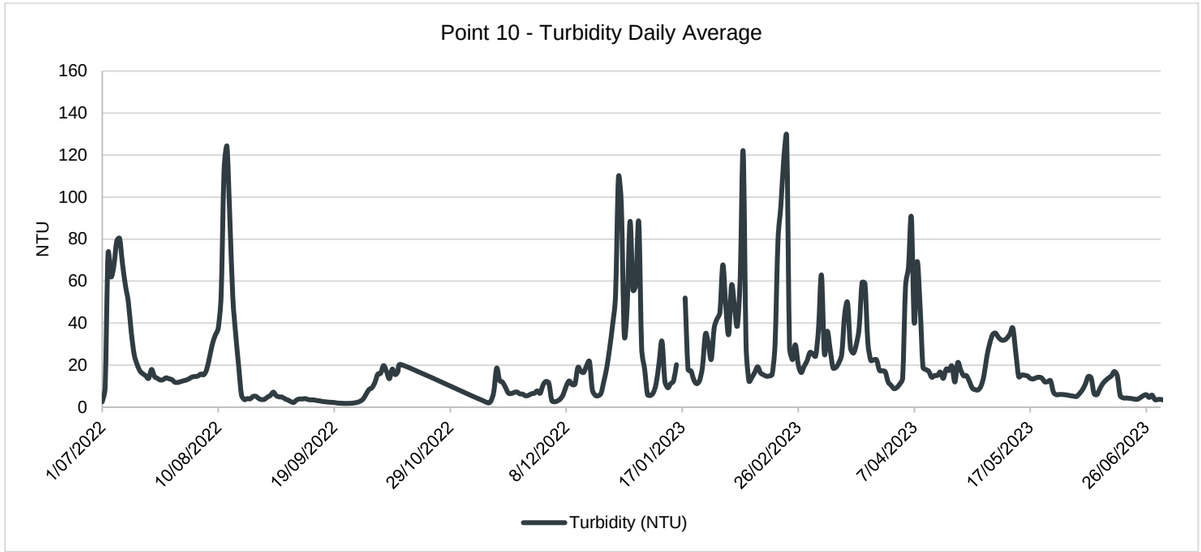
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 10	Yes	Point 10 electrical conductivity (EC), pH and turbidity is monitored via an online continuous monitoring system and results are shown in the associated graphs. Toward the end of the reporting period, EC temporarily exceeded the 80 percentile concentration limit of 2000 µS/cm. However, this is not considered a non-compliance as the Drought Condition detailed in EPL 2504 allows for discharge of water above the 80 percentile concentration limit during Sydney Water Restrictions if required. Troughs in EC correlate with high rainfall events throughout FY23. The gradual increase in EC is likely a result of less rainfall events and overall drier conditions from January 2023 onwards. There were no instances where average daily pH exceeded the licence limits. There is no licence limit for turbidity. Peaks in turbidity are generally attributed to high rainfall events, causing large catchment inflows to BCD. Monthly samples for TSS and Total Dissolved Solids (TDS) were within the compliance limits. There were no exceedances of alkalinity (as calcium carbonate), aluminium, arsenic, bicarbonate alkalinity, cadmium, cobalt, copper, lead, manganese, nickel, nitrogen (total), oxidised nitrogen, zinc or chemical oxygen demand.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data



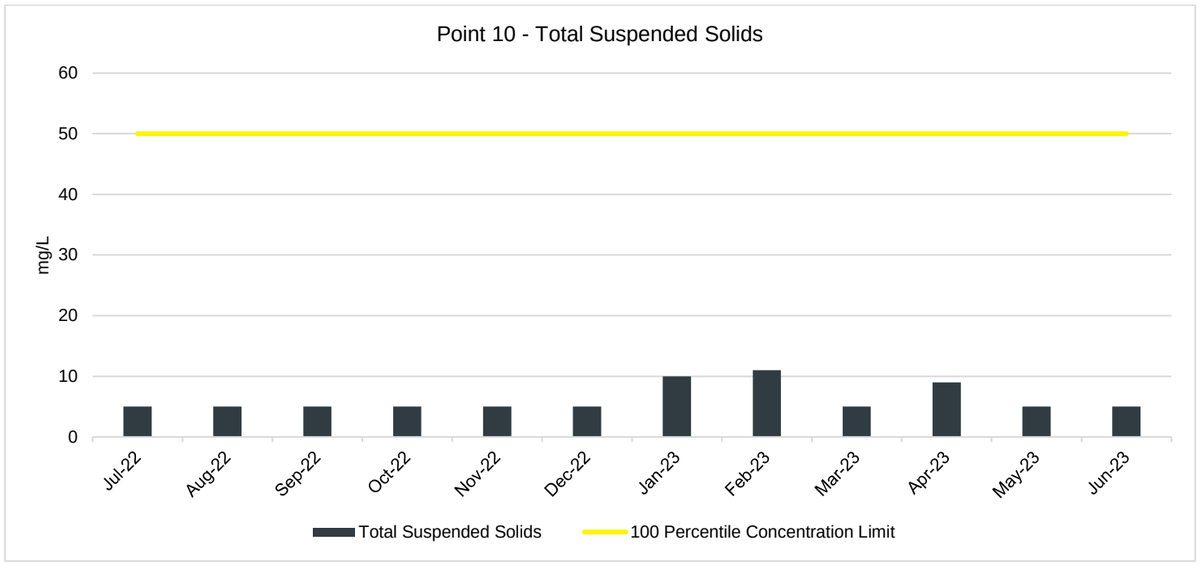


Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

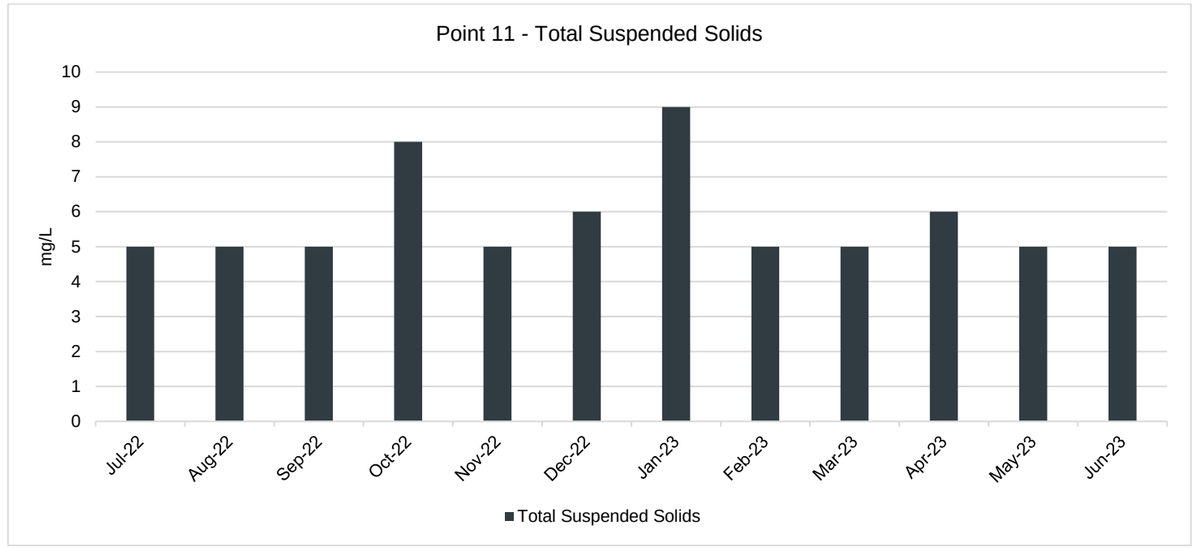
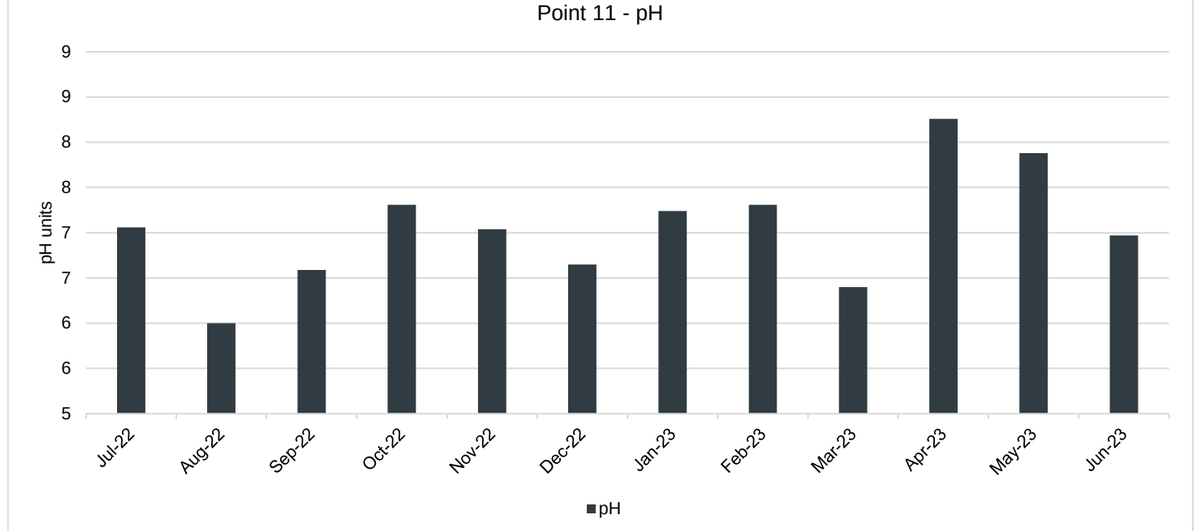
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 11	N/A	**TSS, pH and EC** There are no licence limits for Point 11. Point 11 is within the Georges River, upstream from the confluence of Brennans Creek and downstream from LDP 19. Monthly TSS, pH and EC are illustrated in these graphs. Elevated TSS during October and January sampling events are likely correlated with rainfall events for both months. In the October sampling period, samples were taken following the highest rainfall period for that month (88 mm), likely resulting in turbid water flowing throughout the catchment. January 2023 was relatively dry leading up to the sampling period, with highest rainfall of the month occurring on the sampling day (29 mm). This would correlate to high TSS in the pool due to flushing of previously stagnant waters from upstream pools. Lower EC levels detected prior to April 2023 were likely due to consistent rainfall within the Georges River catchment for the beginning of the financial year. Sampling in April took place during minimal rainfall resulting in lower freshwater flows within the catchment. Additionally, water released from Appin East (LDP 19) was of higher EC in April (1300 µS/cm) which would have added to overall increased EC within the pool during sampling. This is also the case for pH, which was higher overall for the month of April due to relatively high pH (8.26 pH) being released from LDP 19 (see Table 18 - Point 19 EPL Water Quality) and minimal additional flows in the catchment.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

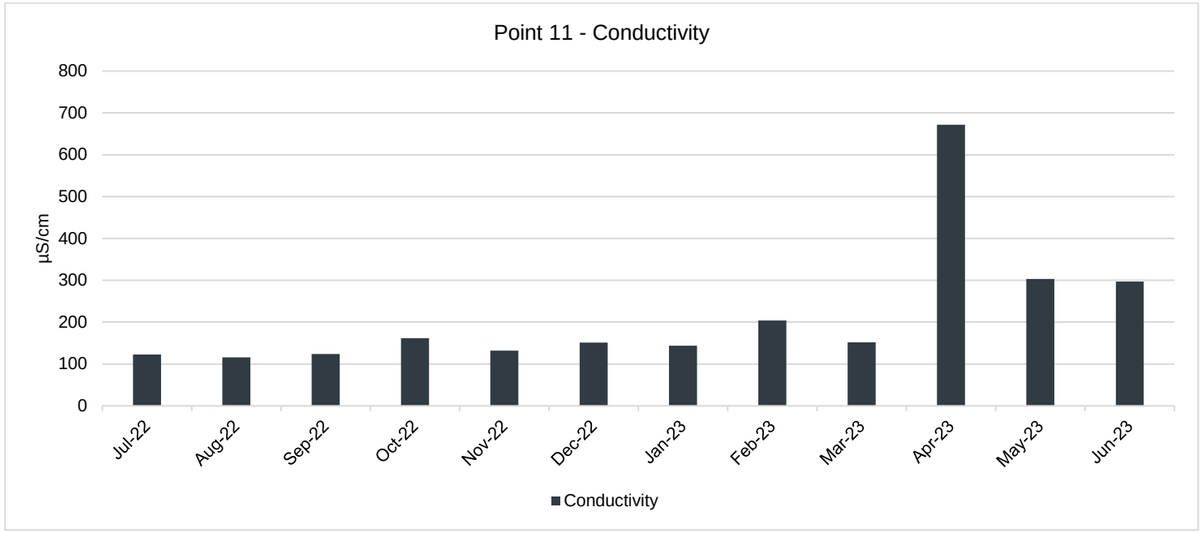
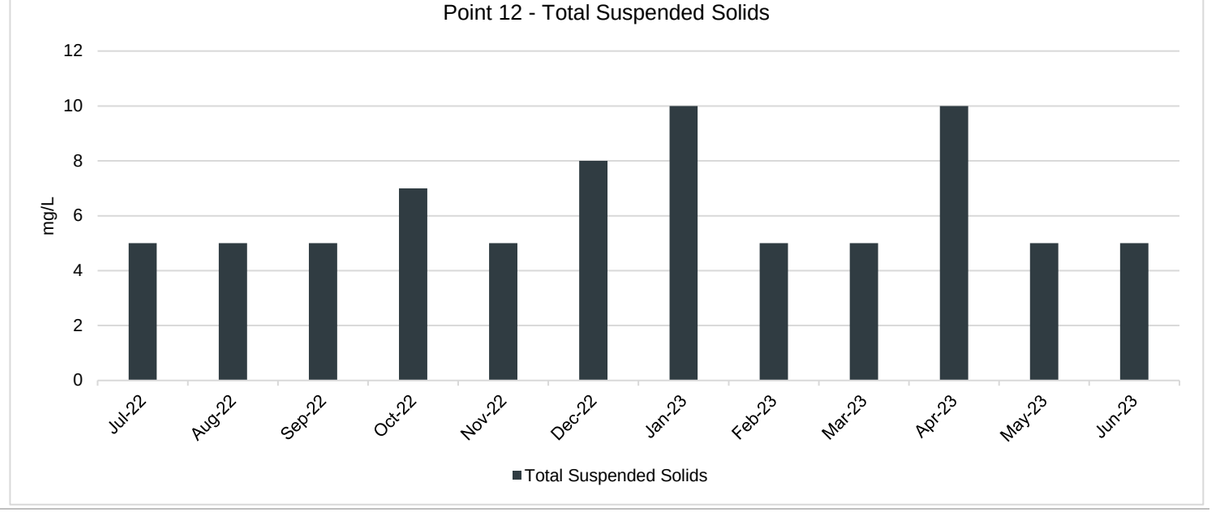
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 12	N/A	**TSS, pH and EC** There are no licence limits for Point 12. Point 12 is situated downstream of the confluence of Brennans Creek. Monthly TSS, pH and EC are illustrated in these graphs. Water quality at Point 12 is generally consistent with the discharge chemistry at Point 10/40. pH, EC and TSS overall are lower than the previous FY, showing a general improvement to water quality closer to baseline values upstream. This is likely attributed to contributing flows from the Appin North WTP (LDP 40) throughout the financial year. EC is generally influenced by discharge and response to high rainfall events flushing pools from upstream flows in the Georges River. This can be seen in the months of July – September 22, December 22, February 23, and April – May 23 where dry conditions were leading up to sampling events, correlating with higher EC and pH in the pool due to less freshwater flows in the catchment.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

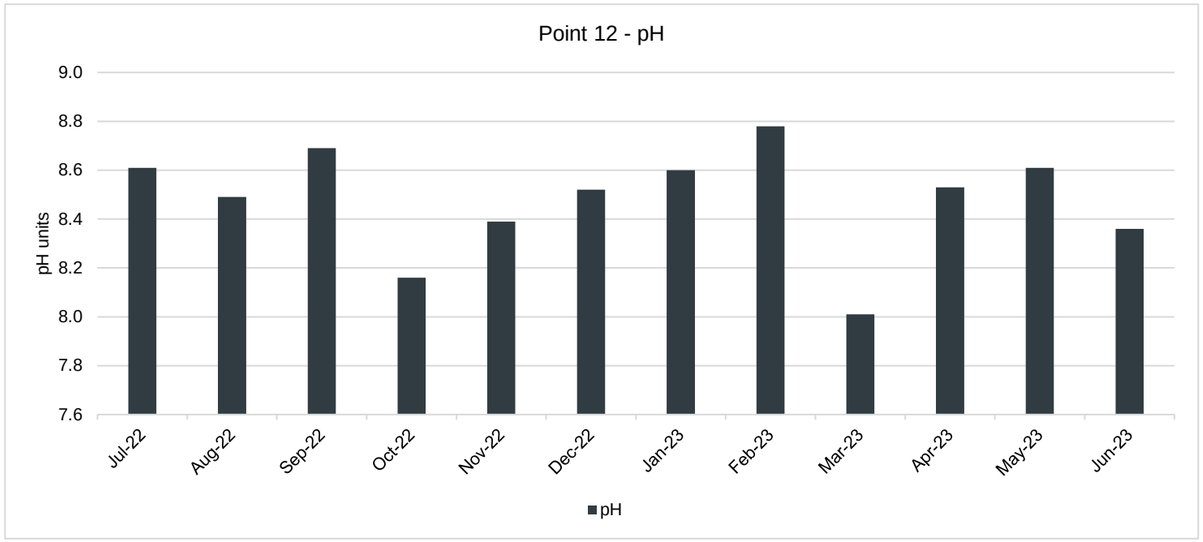
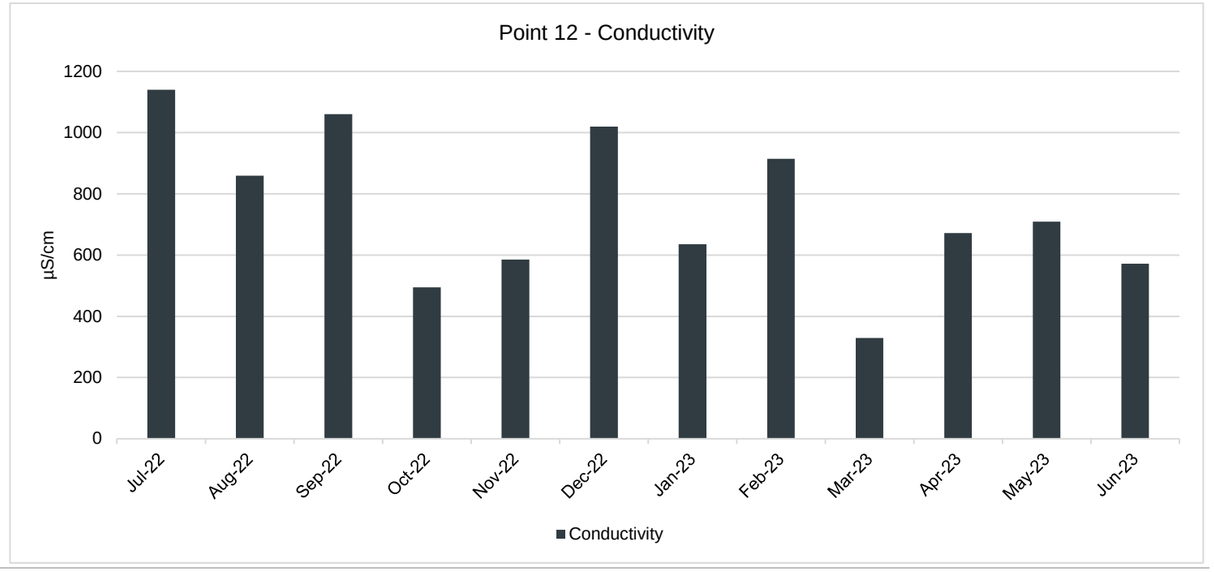
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
			
			
Point 18	Yes	IMC did not discharge from this point during the reporting period.	

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

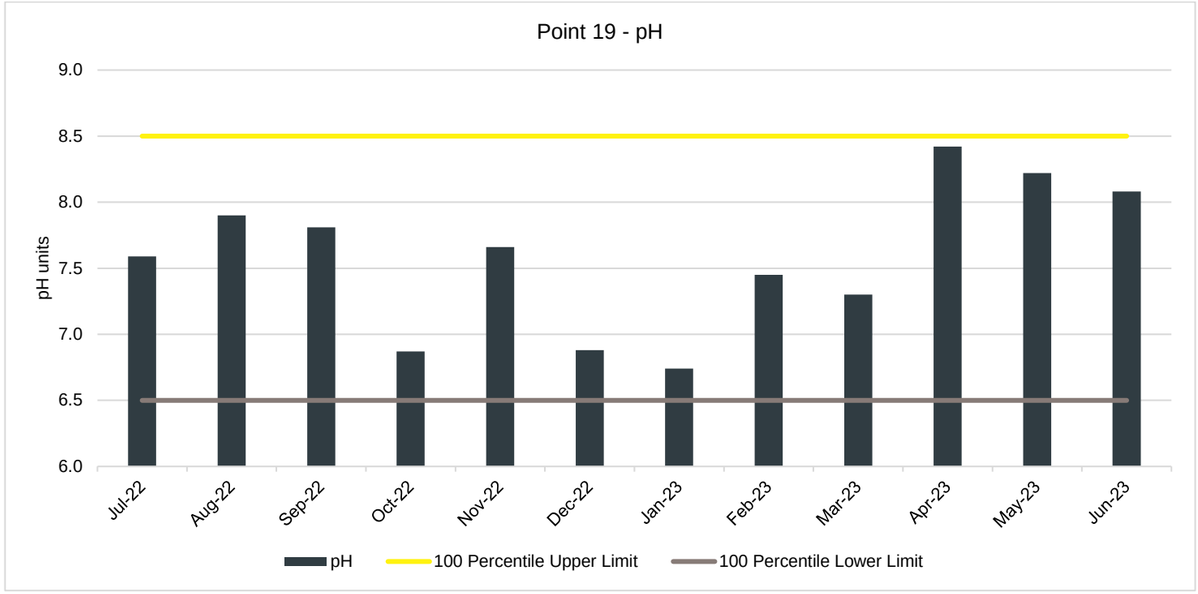
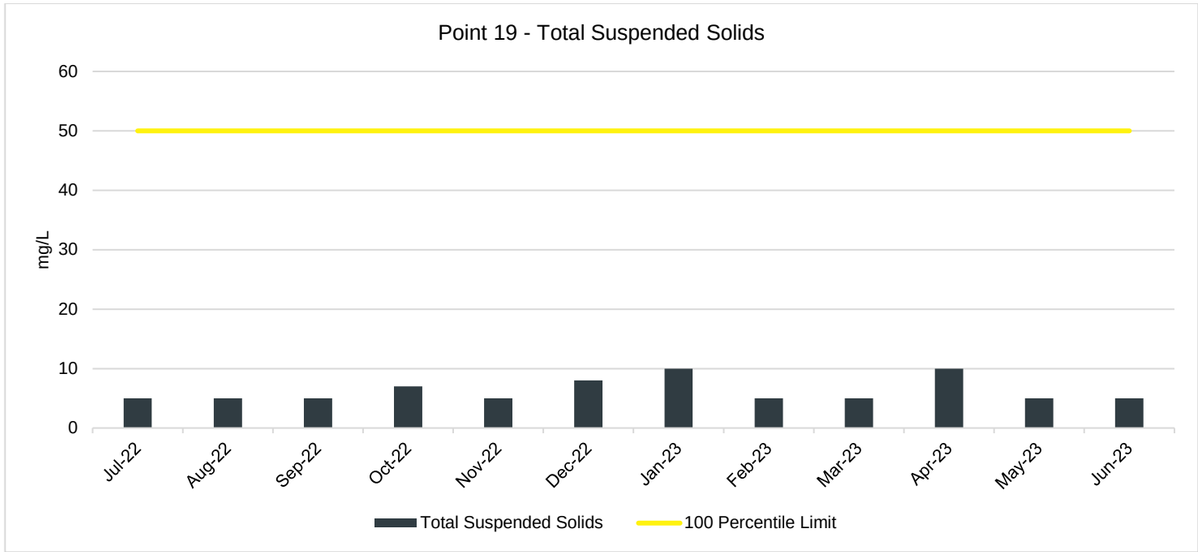
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 19	Yes	**pH** FY23 displayed typical and expected compliance against pH criteria. pH units remained steady in-line with long-term trends influenced by rainfall and temperature. Typically, higher rainfall months see increased pH, with lesser impact from flocculant and coagulant dosing chemicals. Suspected overflow of the treated underground water tank into the main surface water dam resulted in increases in pH for April, May and June 23. However, with the added control of in-line pH probes acting as interlocks for the discharge pumps, the likelihood of an exceedance is low. **TSS** FY23 TSS concentration followed the long-term trends of being well below the EPL 2504 100 percentile concentration limit. Historically, IMC has never exceeded this water quality criteria, with the highest recorded TSS concentration at <50% of the 100 percentile limit.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

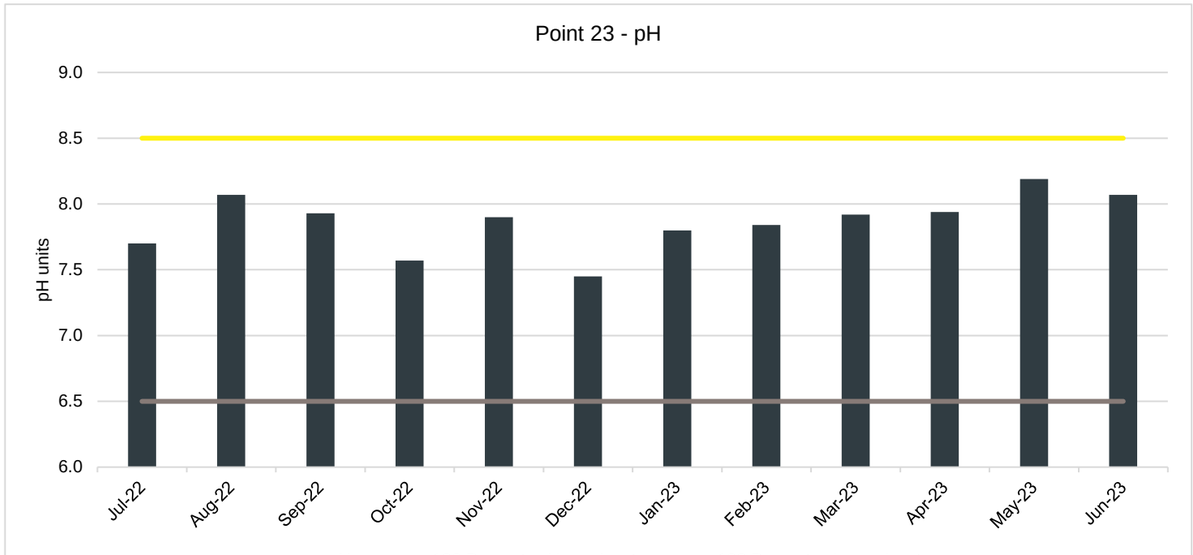
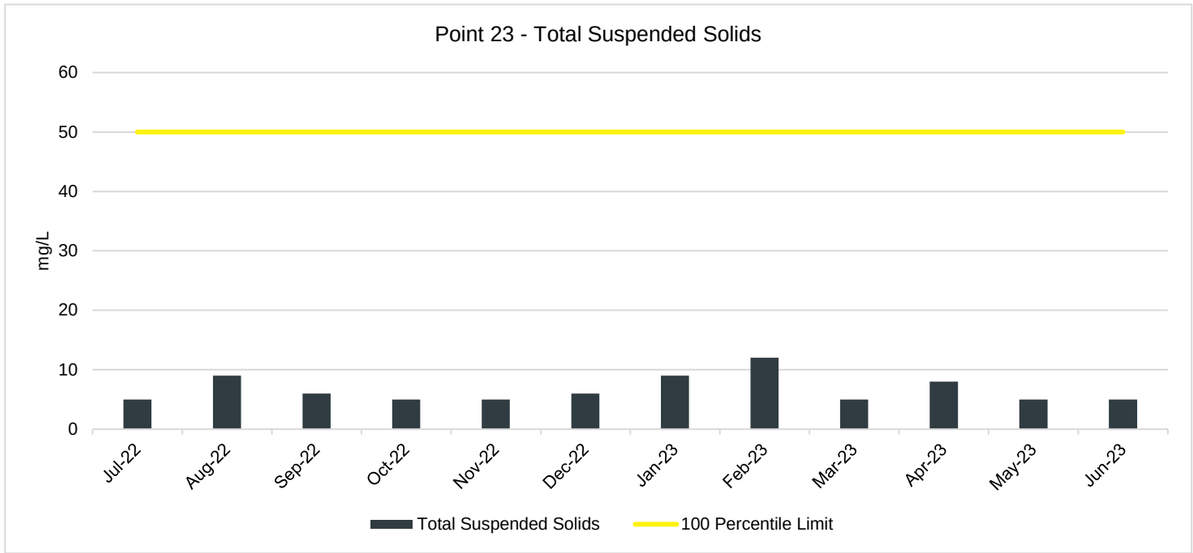
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 23	Yes	**pH** FY23 displayed typical and expected compliance against pH. pH units remained steady in-line with long-term trends dictated by rainfall and temperature. In-situ monitoring was carried out with a portable water quality meter prior to any given discharge during the reporting period. Historically, IMC has only seen two exceedances of the pH criteria at this location since February 2014. **TSS** FY23 TSS concentration followed the long-term trends of being well below the EPL 2504 100 percentile concentration limit. This performance is achieved through discharge control with the higher concentrations linked to periods of intense rainfall. Long-term trends indicate that the perlite filters installed as part of the treatment for this LDP must be monitored and replaced annually or after large rainfall events, to ensure TSS limits are not exceeded. Annual service of the perlite filters was completed during FY23.	 

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

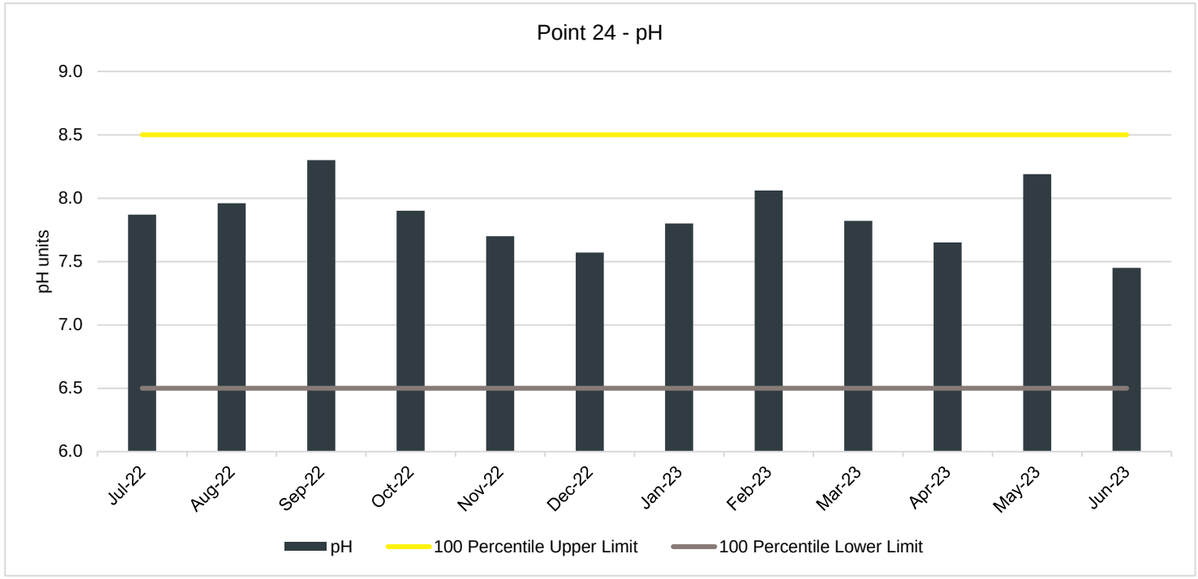
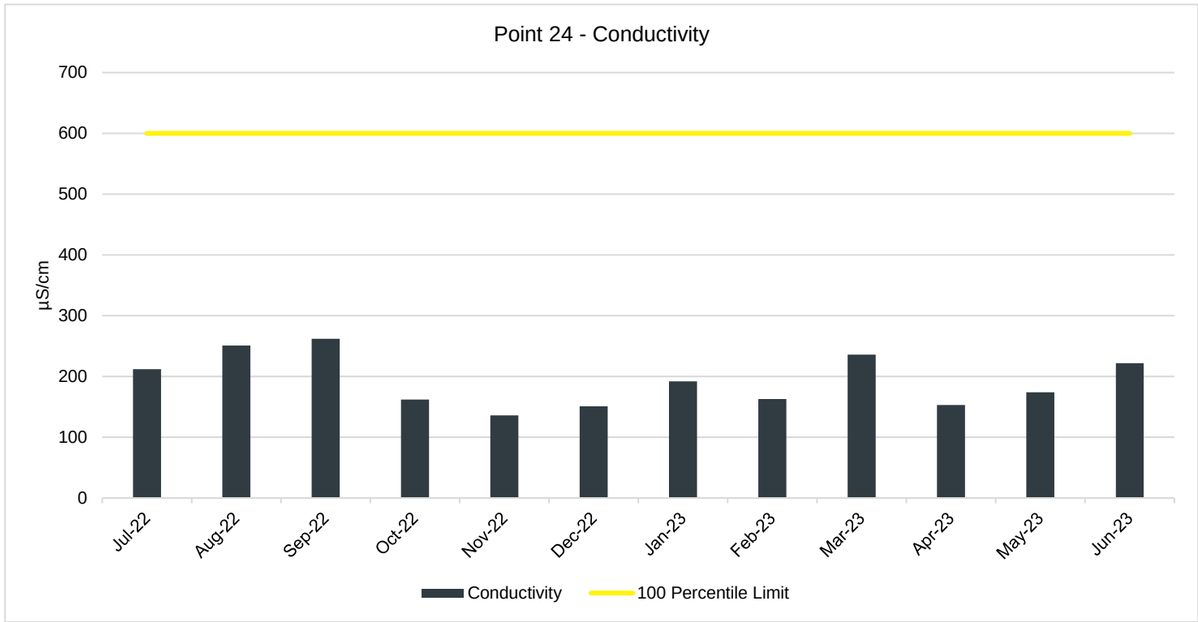
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 24	Yes	**pH** FY23 displayed typical and expected compliance against pH. pH units fluctuated in-line with feed plant parameters and the changing chemistry of the source water. With the added control of the discharge coming from the WTP where pH correction takes place, the likelihood of an exceedance is reduced and would be related to a larger plant operational failure. Continuous pH monitoring during discharge events continued during the reporting period. Historically, IMC has only seen one exceedance since records began in 2012, most likely due to in-line probe drift.	
	Yes	**EC** FY23 EC levels were well below the EPL 100 percentile concentration limit. This performance is achieved through discharge control. Continuous EC monitoring during discharge events continued during the reporting period.	

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

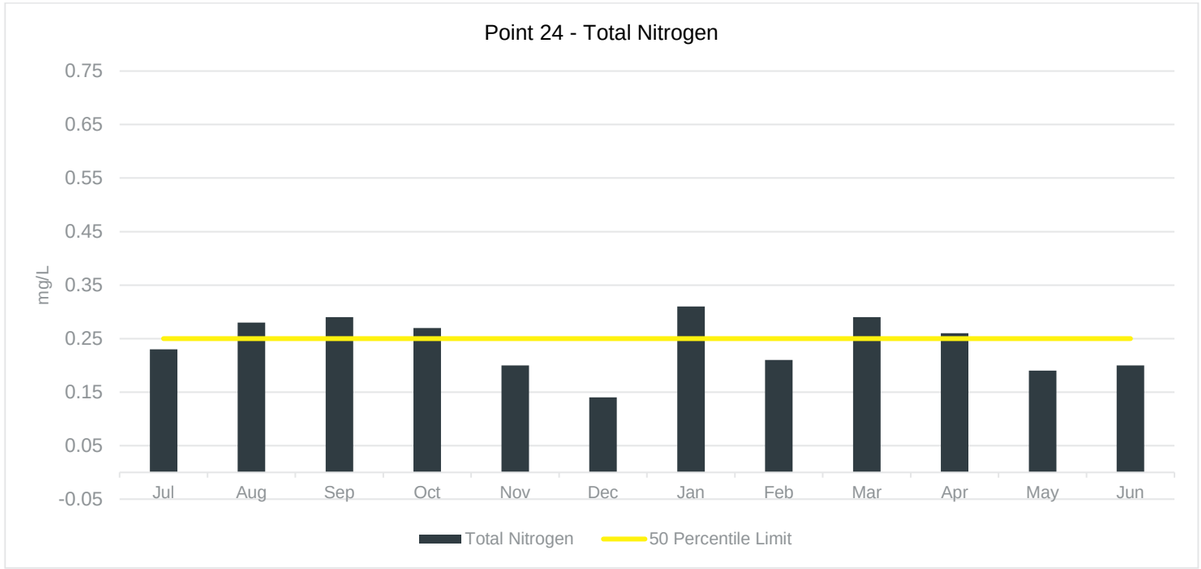
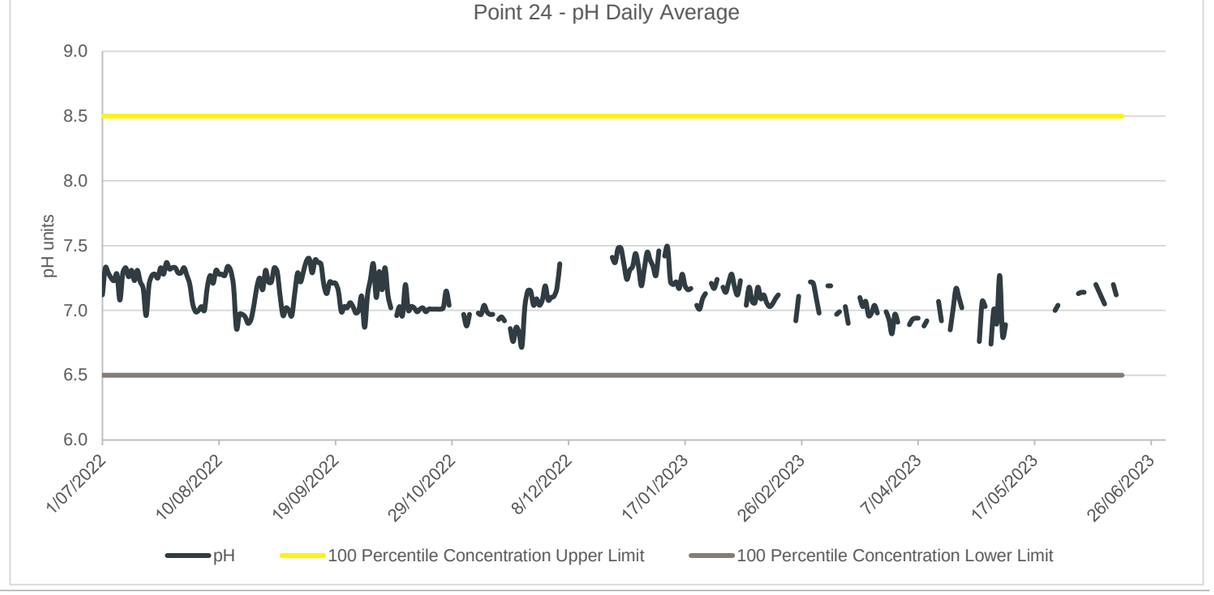
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
	No	**Total Nitrogen** Fifty percent of the Total Nitrogen results during the reporting period exceeded the 50 percentile limit. IMC initiated a study – Nitrogen profiling of the WTP to understand the increased concentrations of Ammonia Nitrogen. Interpretation of the data over this reporting period and historic data has indicated that the current 0.25 mg/L 50 percentile limit is not able to be achieved in the long term. IMC submitted a licence variation for EPL 2504 to increase the limit to a more reasonable limit given the current WTP Total Nitrogen controls. When the 50 percentile was calculated for FY23, compliance with the limit was achieved. However, the calculation for the EPA Annual Return period (1 February 2022 to 31 January 2023) indicated non-compliance and this was reported in the Annual Return.	
	Yes	**pH Continuous Monitoring** Similarly to the grab sample results for the reporting period, typical and expected compliance against pH limits was achieved. pH results fluctuated in line with plant target and focus. Over the second helf of the FY, the treated water from Appin West WTP was required for reuse underground resulting in less discharge to the environment. *N.B. All instances of no data are a function of 'no discharge conducted' periods.*	

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

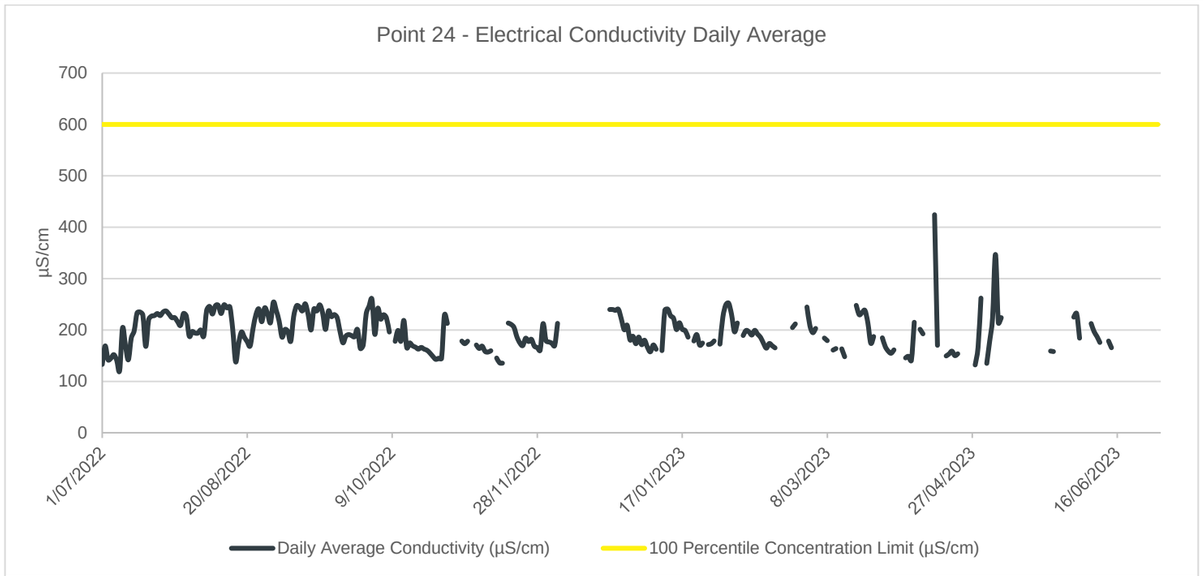
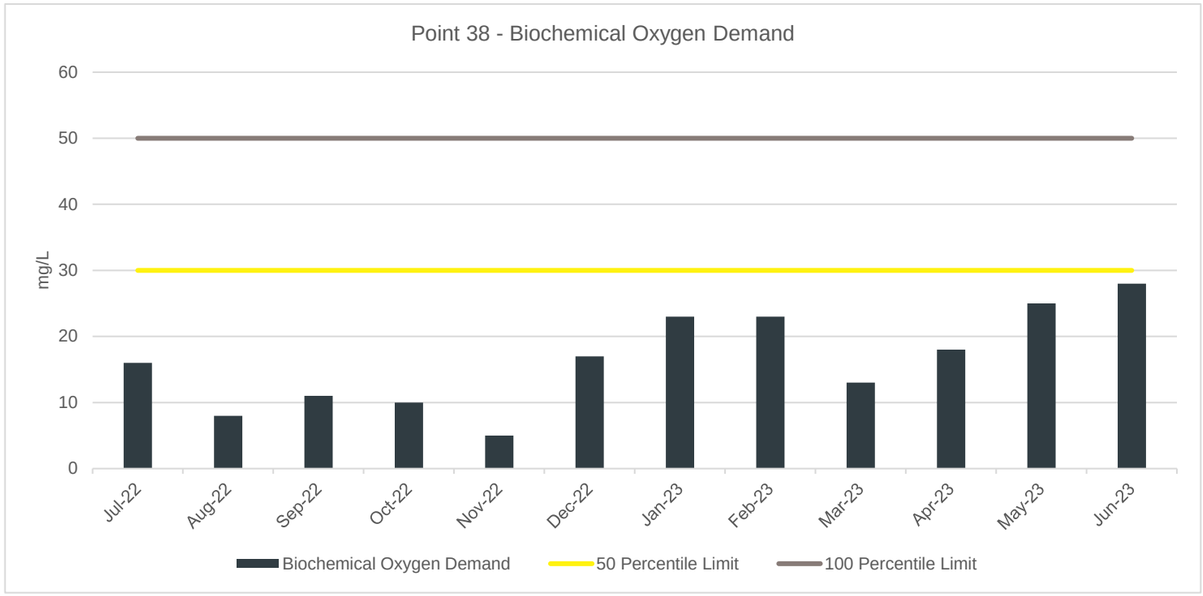
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
	N/A	**EC Continuous Monitoring** The EC data shows plant performance variation over the reporting period. The limit of 600 µS/cm is applicable to the 24-hour moving average, calculated for each hour of the day. Compliance with this limit was achieved over the reporting period. Over the second half of the FY, the treated water from the Appin West WTP was required for reuse underground resulting in less discharge to the environment. When there was no flow the instrumentation would drain, with an initial spike in readings once flow resumed. *N.B. All instances of no data are a function of 'no discharge' periods.*	
Point 38	Yes	**BOD** No exceedances of the BOD 100 percentile water quality criteria of 50 mg/L and the 80 percentile water quality criteria of 30 mg/L were recorded during the reporting period.	

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

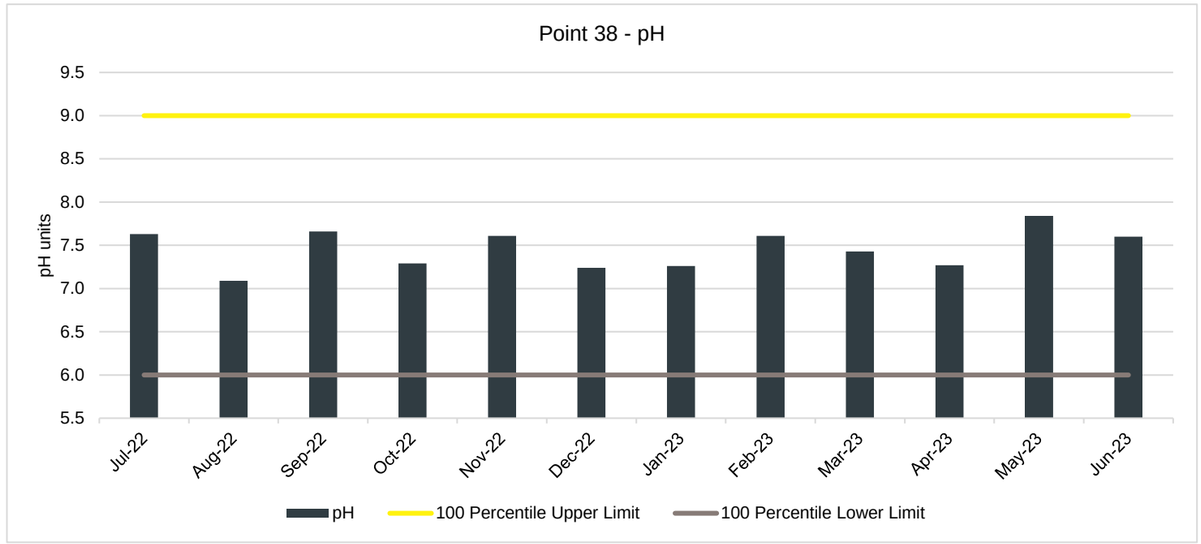
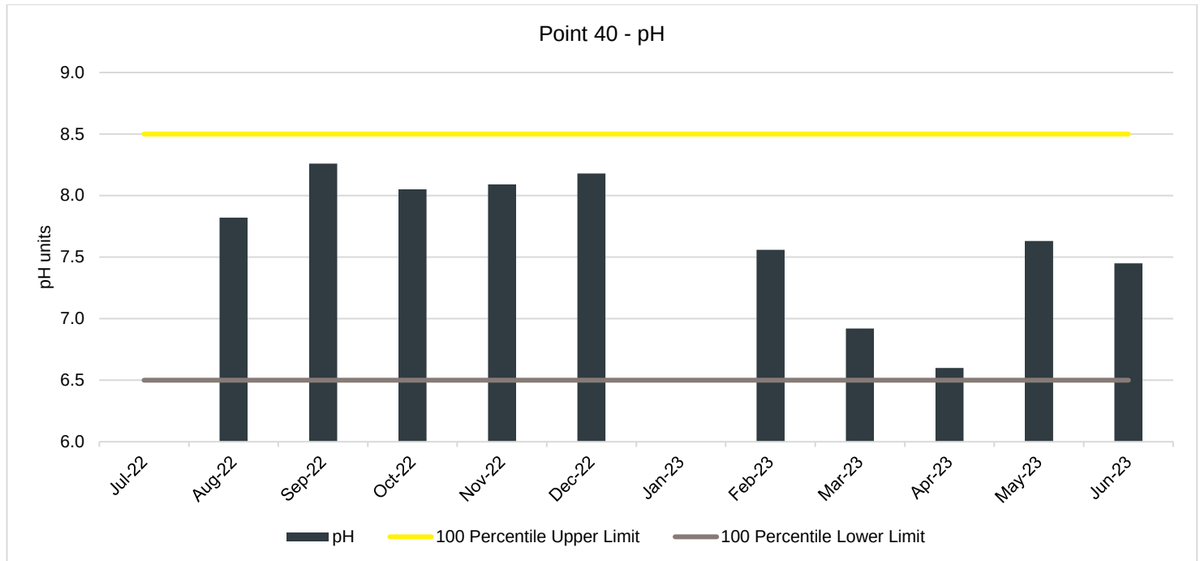
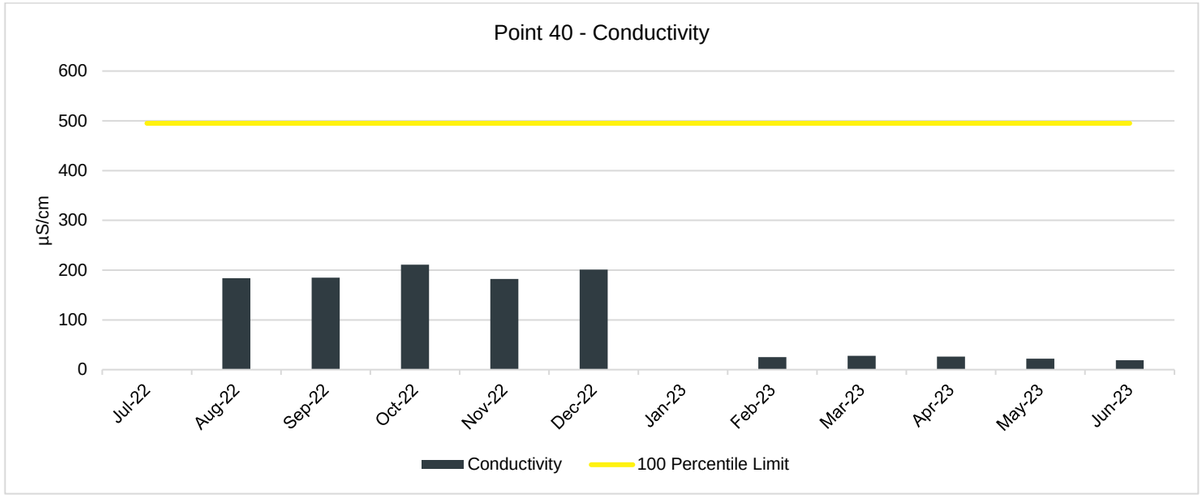
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
	Yes	**pH** FY23 displayed typical and expected compliance against pH. pH units remained steady, in-line with long-term trends dictated by temperature and quality of water from grey water sources on site.	
Point 40	N/A	Point 40 was added to EPL 2504 in March 2021 for the Appin North WTP discharge, which discharges in the vicinity of LDP 10 into Brennans Creek. Following decommissioning of the temporary WTP in December 2022, the Appin North WTP began discharging via Point 40 on 6 February 2023. During January 2023 there was no discharge to the environment due to commissioning of the Appin North WTP (see Section 4.4.3.2), and therefore no sample was taken. The temporary WTP was operating inconsistently over July 2022 (no discharge for 21 days). This resulted in no sample being collected for the month. In-situ water quality from both the temporary WTP and the Appin North WTP, represented in the graphs, were within the EPL water quality concentration limits in FY23. However, improvements in water quality were seen in pH and EC following commissioning of the Appin North WTP. All other parameters: bicarbonate alkalinity, aluminium, cobalt, copper, nickel and zinc also returned results within compliance limits, except for Total Nitrogen which slightly exceeded the EPL criteria on the December 2023 sampling occasion. This exceedance is not considered an exceedance as licence limits will only apply with consistent operation of the Appin North WTP.	

Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

Monitoring Site	EPL Compliant (Yes/No)	Comments	Data



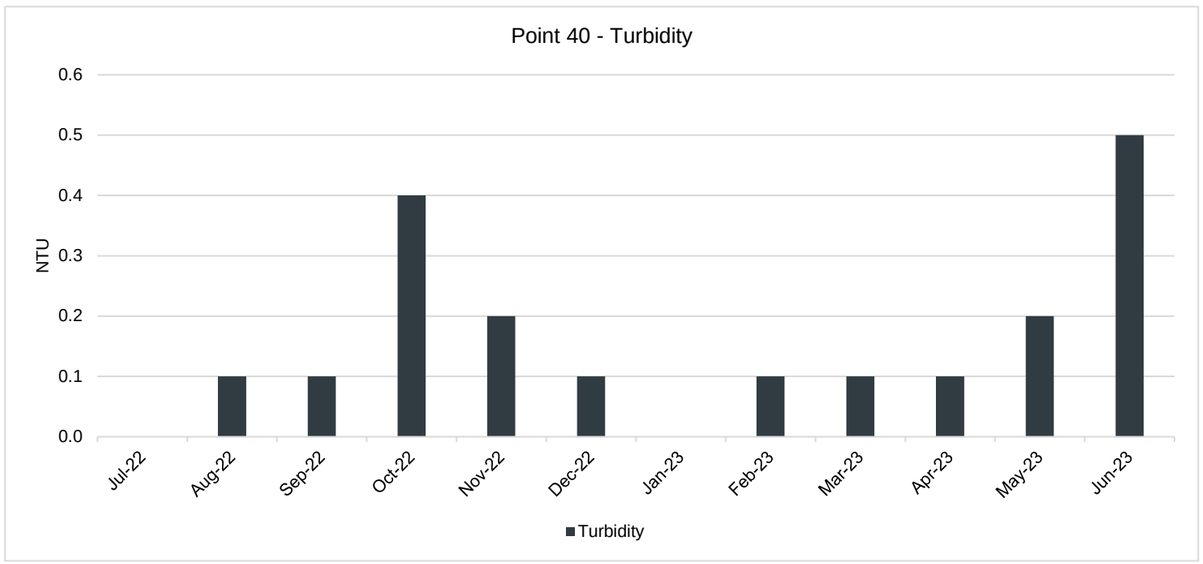


Table 17: Summary of Compliance with EPL Water Quality Limits Across Appin Mine

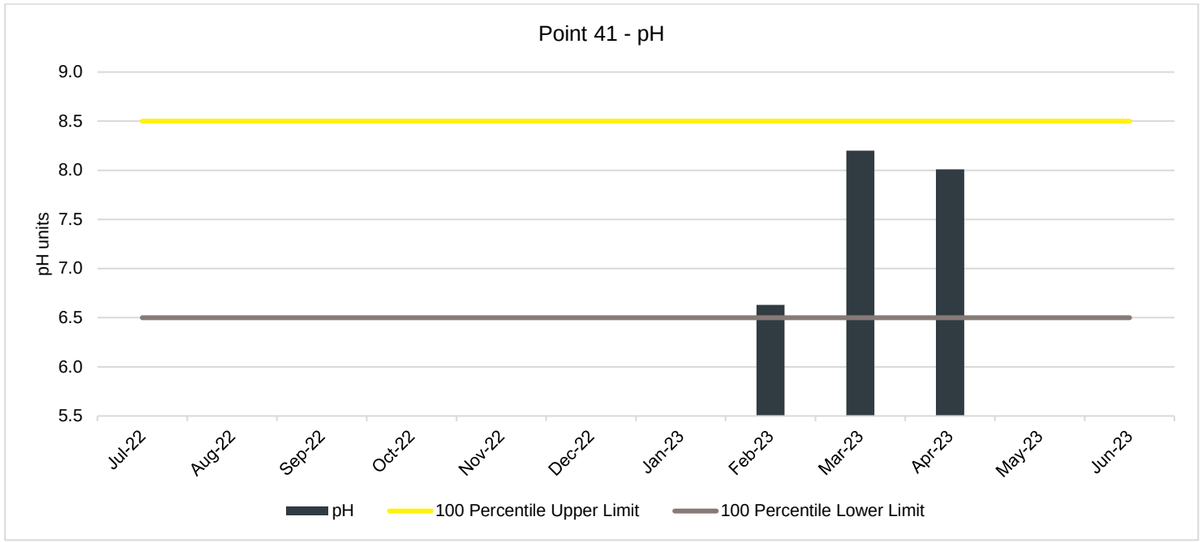
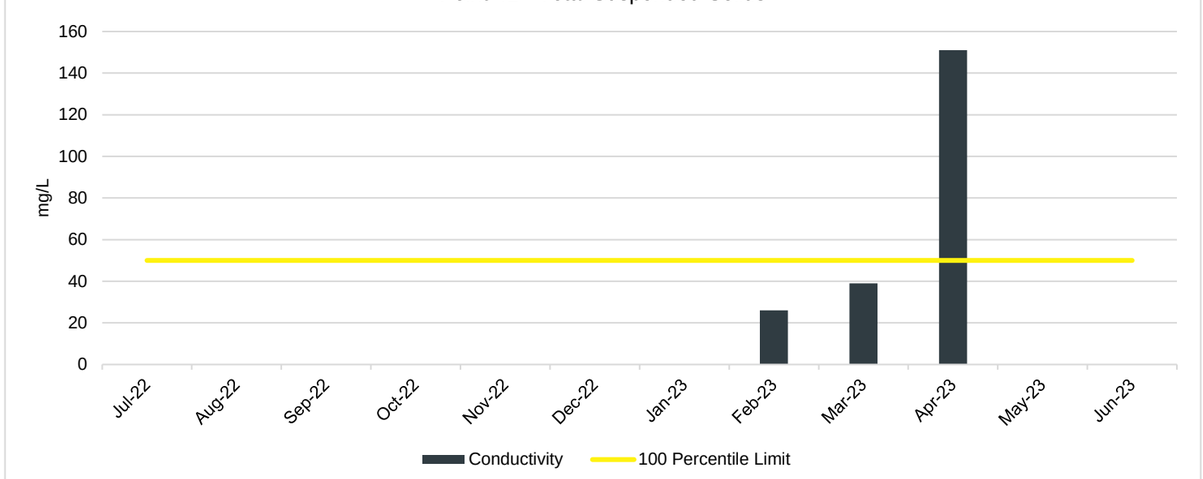
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 41	No	**pH and TSS** pH and TSS are sampled and analysed monthly during discharge via a grab sample. Discharge only occurred during February, March and April 2023. pH was within the 100 percentile upper and lower limits. TSS exceeded the 100 percentile limit in April 2023 when turbid water was discharged into Foot Onslow Creek. More information on this non-compliance is provided in Section 11.	 

Table 18: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine

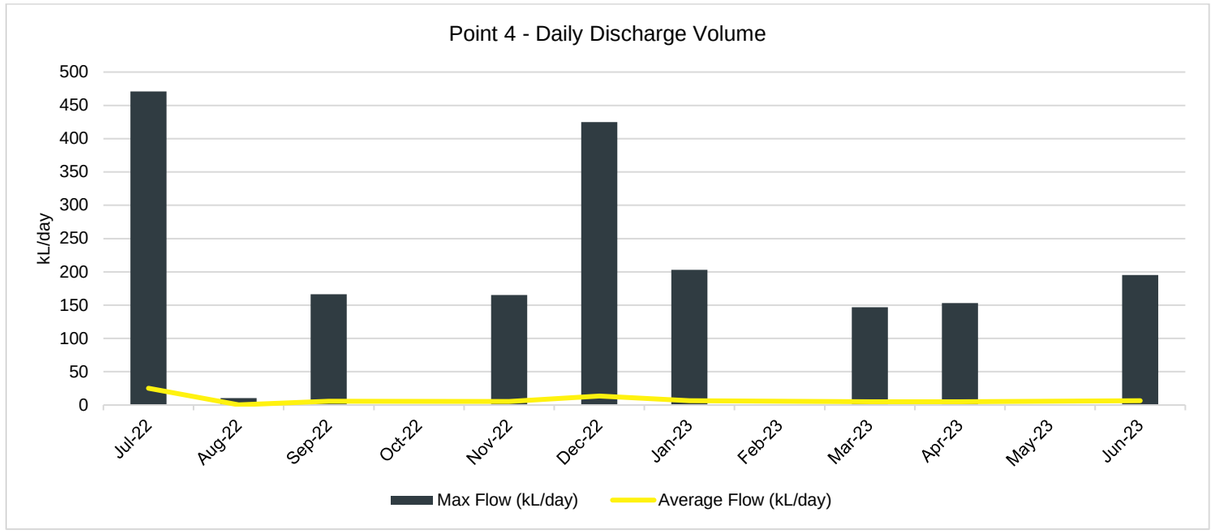
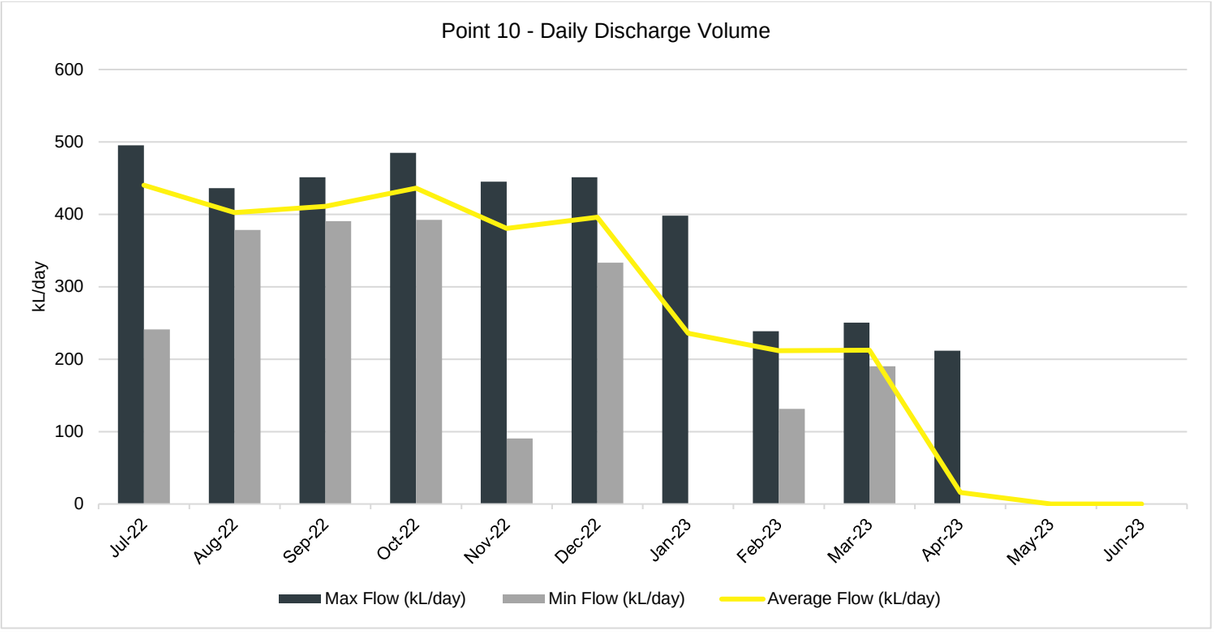
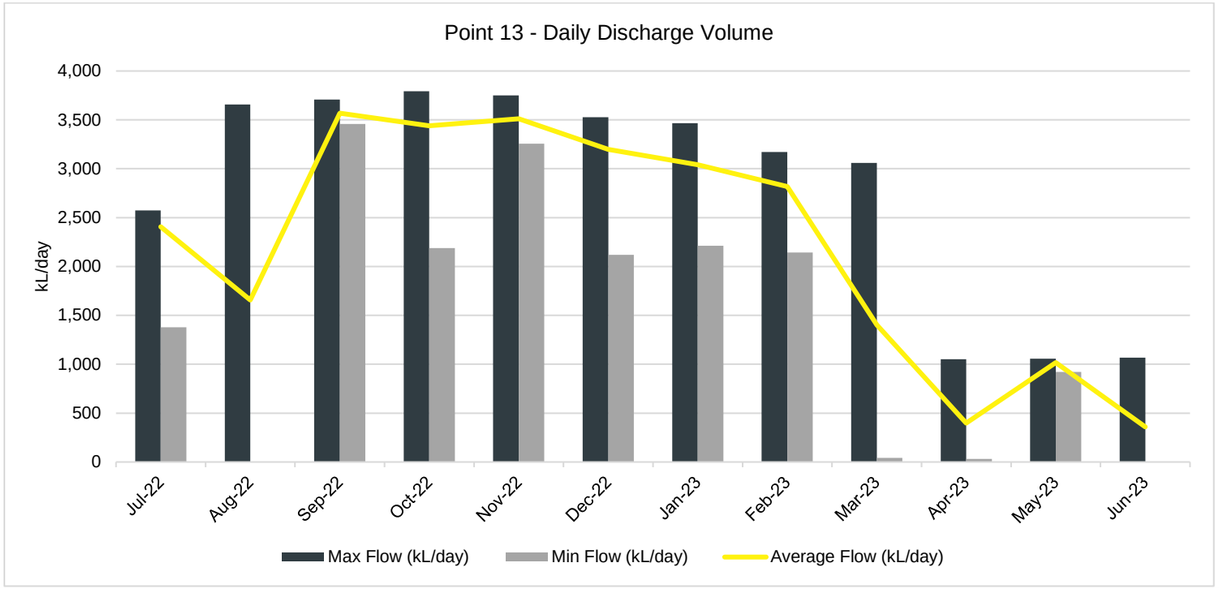
Monitoring Site	EPL Compliant (Yes/No)	Comments	Data
Point 4	Yes	Point 4 discharges fluctuate depending on the demand and use of the bathhouse facilities at Appin North as well as the amount of rainfall received during the month. Irrigation occurs on average one to two times per month for approximately three hours at a time. The Sewage Treatment Plant (STP) operates under a licence issued by Wollondilly Shire Council. Flow data is recorded through a flow meter via telemetry. Zero values indicate that there was no discharge in that month.	
Point 10	Yes	Flows from BCD consist of a gravity feed from the reclaim pond (Point 10, seepage from BCD), spillway overflows (Point 1) and BCD discharge (Point 13) via a floating offtake. Flows do fluctuate with rainfall and dam storage volume. During the reporting period, IMC continued to provide supplementary flows to maintain pool levels downstream in the Georges River. Flows are automated based on BCD water level and operate in accordance with the BCD TARP. On 3 April 2023, reclaim pond waters were no longer being discharged via Point 10 and were pumped back into BCD. A volume of water from the CWEA underdrainage that previously entered the dam system began being pumped to the Appin North WTP for processing, resulting in less water ingress to BCD. This change of process coupled with decreased rainfall events following April 2023 resulted in the BCD level lowering and discharge being reduced to minimal flows. High rainfall resulted in water spilling over the BCD spillway (Point 1) over the months of July, August, November, and December 2022. This was a result of a rainfall event of 502 mm in July followed by consistent rainfall for the rest of 2022, keeping the BCD water level at high capacity. Spills also continued into 2023 for the months of January and February 2023 following an additional rainfall event in January of 102 mm. The EPA and relevant stakeholders were notified of these events accordingly.	

Table 18: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine

Point 13	Yes	See Point 10.
Point 18	Yes	IMC did not discharge from this point during the reporting period.
Point 19	Yes	FY23 discharge volume for LDP 19 is as expected. Daily maximum flow was well below the EPL volume limit. This is due to flow rate constraints with the system set-up. Risk management and compliance against this limit is achieved through engineering. Pump capacities are the limiting factor to achieve compliance. Average flow for the 12-month period and relative to long-term trends, show typical peaks and troughs.



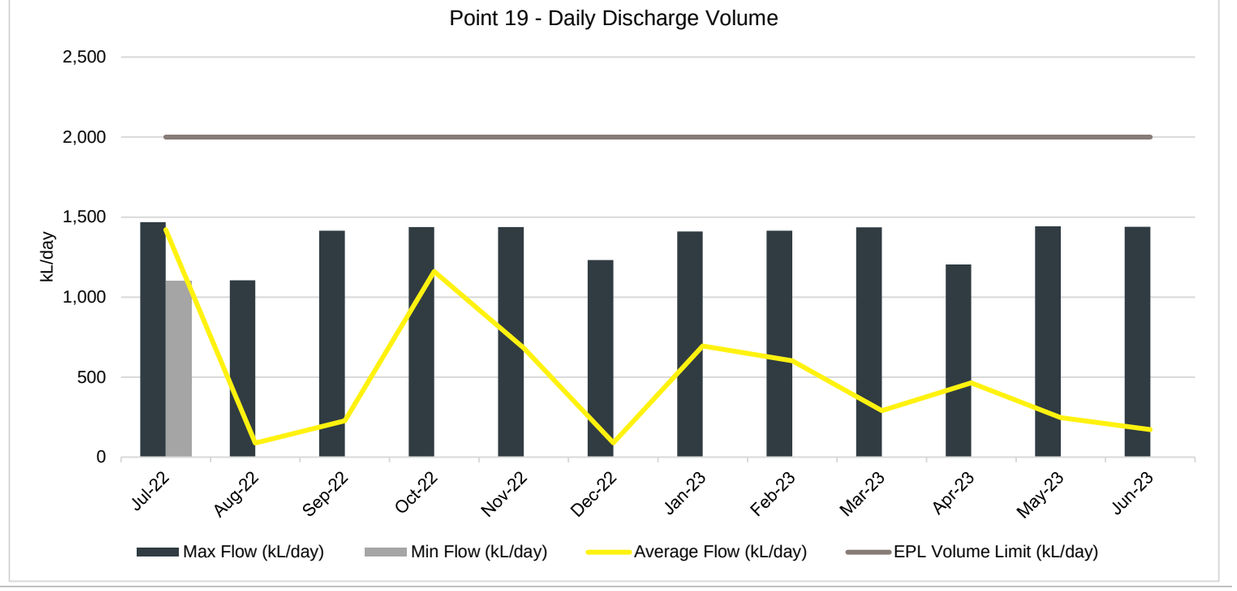
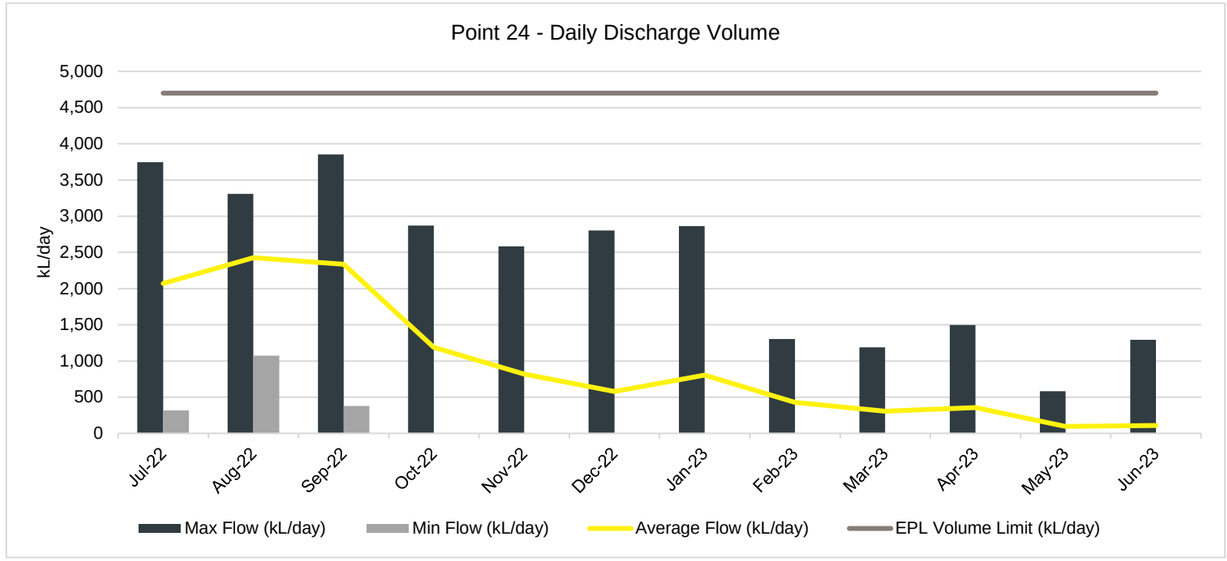


Table 18: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine

Point 24	Yes	Daily maximum discharge volume limits, and monthly cumulative limits were compliant during the reporting period. Daily maximum flows fluctuated in-line with plant target and focus. Over the second half of the reporting period, the treated water from Appin West WTP was required for reuse underground resulting in less discharge to the environment



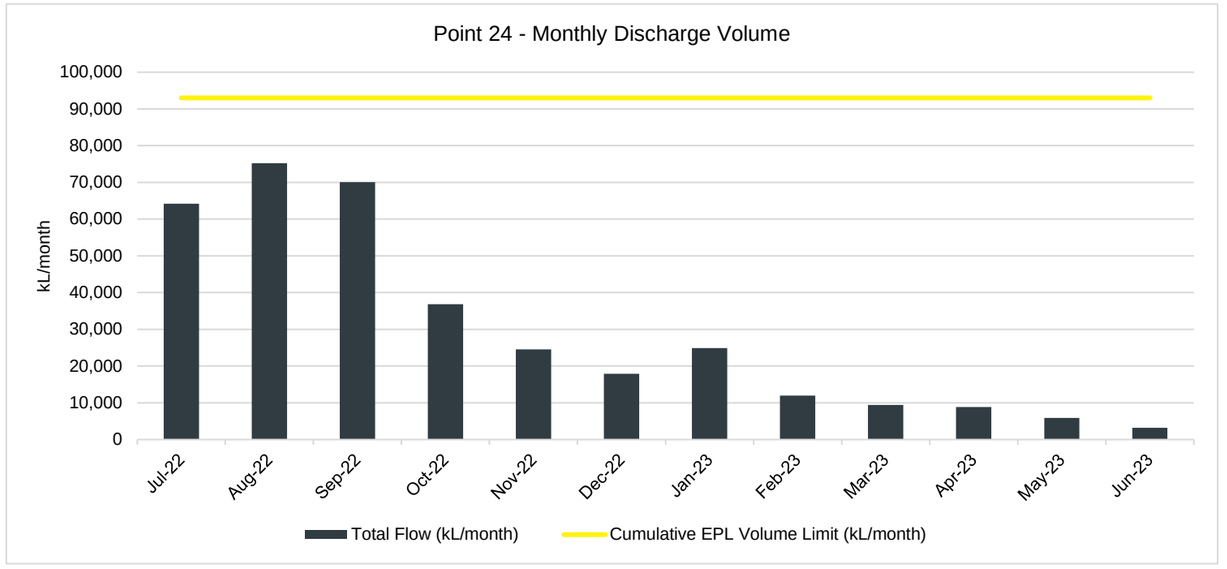
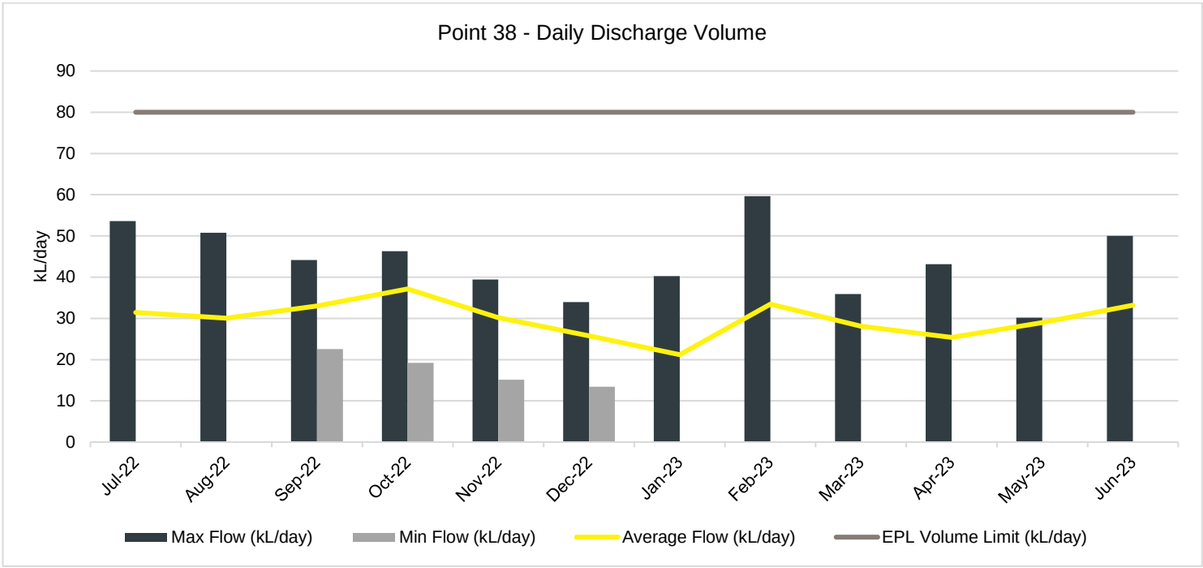
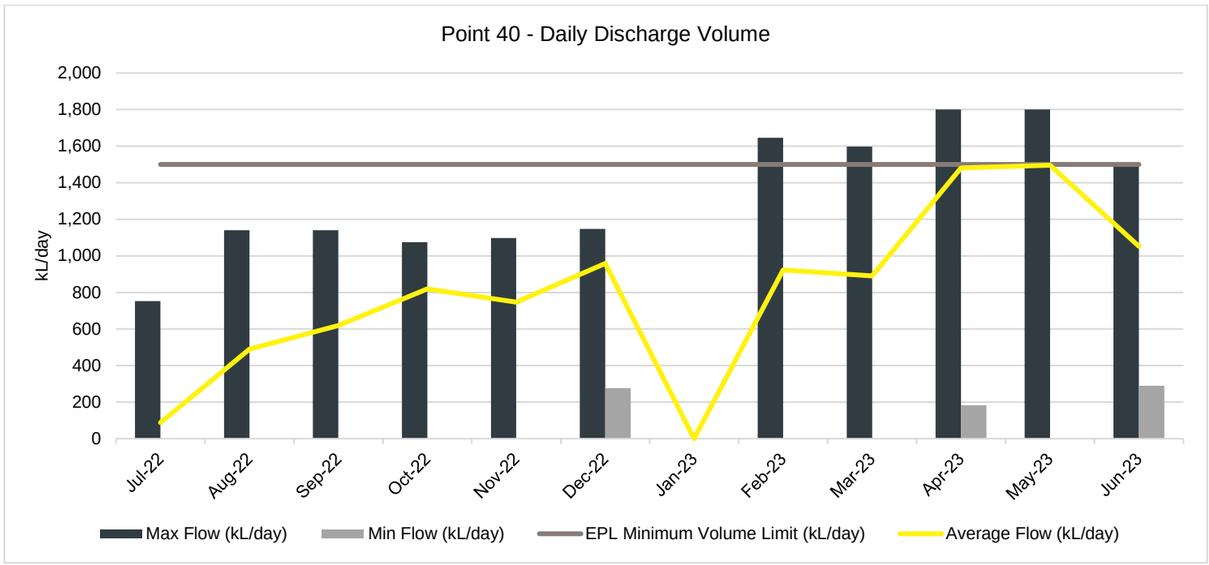


Table 18: Summary of Compliance with EPL Discharge Volume Limits Across Appin Mine

Point 38	Yes	FY23 daily discharge volumes for LDP 38 were compliant during the reporting period. The system is engineered to maintain compliance. Pump and discharge volumes can only be set to three settings; a daily maximum of 70 kL/day, 50 kL/day, or 30 kL/day. With discharge volumes dictated by sewage production and rainfall received on site, long-term trends are sporadic, which can be expected with fluctuations in personnel hours.
Point 40	N/A	Discharge volumes for Point 40 recorded are from the temporary WTP up until December 2022. No flows were recorded in January 2023 during commissioning of the Appin North WTP (see Section 4.4.3.1 and 4.4.3.2). Flows from February 2023 onwards are from the Appin North WTP. Volumes from the temporary WTP varied over FY23 and did not meet the EPA requirement to maintain 1.5 ML/day minimum flow due to plant capacity and operational constraints. The Appin North WTP had greater and more consistent flows resulting in the minimum requirement of 1.5 ML/day being achieved in April and May 2023. Commissioning constraints and limited water availability from underground resulted in the requirement not being met for February and March 2023. Algae issues in feed water resulted in the requirement not being met in June 2023, due to increased membrane cleans and slower production to enable consistent operation between cleans. Minimum discharge requirements that were not met during FY23 are not considered a non-compliance, as the requirement is based on input water availability and actual measured performance of installed equipment when operated in a proper and efficient manner following commissioning.





6.3.3.3 GRAHMP

The GRAHMP, which is based on the previous Pollution Reduction Programs (PRPs) and Environment Improvement Programs (EIPs), was submitted to and approved by the EPA by 30 June 2020 in accordance with Condition E3 of EPL 2504 and revised on 18 May 2021.

The monitoring program incorporates:

- quantitative sampling of macroinvertebrates;
- ecological assessment processes using DNA extracted from sediment;
- ecotoxicity testing;
- in-stream water quality;
- laboratory water quality testing; and
- pool level and flow monitoring.

The aim of the GRAHMP is to verify the changes associated with the construction of the Appin North WTP by:

- comparing water quality in the Georges River before and after commencement of the Appin North WTP;
- assessing any ecotoxicity of discharge waters from the Appin North WTP;
- comparing the in-stream and sediment biota of pools downstream of the discharge with reference sites (located upstream of the Brennans Creek confluence);
- calculating changes over time in the composition of in-stream and sediment biota, particularly downstream of the discharge; and
- assessing the downstream gradient changes in composition of the in-stream and sediment biota.

IMC has held regular meetings with community stakeholders to review progress of projects and monitoring results from previous PRPs and EIPs. Two meetings were held with the Georges River Stakeholder Group over this reporting period; on 20 October 2022 and 20 April 2023. The October 2022 meeting included updates on BCD operation, GRAHMP, Appin WTP Projects and the GRRP. The April 2023 meeting included updates on BCD operation, results from GRAHMP, Appin WTP projects, GRRP and future of the Georges River Stakeholder Group meetings.

These meetings have been held since 2014 and no future meetings are planned following the completion of the Appin North WTP. Details of meetings prior to this reporting period are provided in previous Annual Reviews. The meetings included representatives from the EPA, Biodiversity and Conservation Science Directorate (BCS), Georges Riverkeeper, Wollondilly and Campbelltown local councils, Georges River Environmental Alliance, National Parks Association of NSW, Appin Mine Community Consultative Committee (ACCC) and Western Sydney University.

Monitoring of the Georges River and Brennans Creek was undertaken over FY23 and will continue into FY24 in line with the current GRAHMP. The following items were completed in FY23:

- quarterly ecotoxicity sampling in August, November 2022 and February, May 2023;
- biannual macroinvertebrate monitoring in October 2022 and March 2023;
- annual DNA Metabarcoding Ecological Assessment in October 2022;

- pool level monitoring, which is continuous from the installation date, with data downloaded biannually;
- flow monitoring, assessed biannually, at site GR_UFS; and
- the Aquatic Health Monitoring Report, provided by CSIRO in April 2023.

The next Aquatic Health Monitoring Report will be prepared in March 2024 in line with the GRAHMP monitoring schedule. This report will provide an analysis of the results of the aquatic health monitoring, particularly results from the macroinvertebrate and DNA metabarcoding.

6.3.3.4 *GRAHMP Report (2023) Results*

The 2022 GRAHMP Report identified the following long-term trends (2013 – 2022) in the Georges River monitoring sites:

- Macrobenthic communities from the reference treatment were consistently different to the discharge monitoring treatments. The long-term mean SIGNAL scores for the reference sites (4.6 ± 0.12 S.E.) were greater than the discharge monitoring sites (3.7 ± 0.14 S.E.). In 2022 there was an overall increase in SIGNAL scores for reference sites as well as discharge sites. Sites GR_UFS, Jutts and Pool 32 showed improvements, with GR_UFS and Pool 32 improving in Chessman ranking.
- Although variable between sites, *Leptophlebiidae* abundance increased in downstream sites from the 2021 monitoring period compared to previous years. For 2022, downstream sites Point 10, Jutts, Pool 16 and GRQ18 had higher abundance of *Leptophlebiidae* than previous years.
- An overall improvement for all water chemistry results can be seen across downstream sites, with pH, EC, copper, cobalt, and nickel decreasing over time. With the exception of nickel, these parameters fell within the acceptable ANZG (2018) GV range in 2022 at several discharge monitoring sites. Zinc results were erratic over time, however reduced to below GVs in 2020-2022. Total Nitrogen was below GVs for all sites in recent years (2019-2021) with some spikes observed in 2022.
- Improvements in ecotoxicity for LDP 10 can be seen from 2021 onwards when compared to the long-term ecotoxicity results. Ecotoxicity results for 2022 showed that LDP 10 waters was not toxic to *Melenotaenia splendida* (Rainbow Fish) or *Ceriodaphnia dubia* in the sampling period. There are no long-term results for LDP 40 ecotoxicity, however LDP 40 did show toxicity in 2022, showing toxicity towards *C. dubia* in February, May and November sampling periods, and toxicity to *M. splendida* in November 2022.
- For the eukaryotes and prokaryotes, community composition differed between discharge and reference sites. Diatom communities are also different in the reference sites compared to the discharge monitoring sites. However, diatom genera *Entomoneis* and *Fragilari* responded positively to improved water quality at downstream sites and were more prevalent in 2022 than previous years. Overall microbial communities are responding positively to discharge waters and taxa is shifting particularly for sites Point 10, Point 12 and Jutts.

The 2023 report including the 2022 results is available on the IMC website at link. Previous reports under the PRPs/EIPs are also available.

6.4 Contaminated Land

No significant land pollution events occurred during the reporting period at Appin Mine. A Preliminary Site Investigation (PSI) was undertaken by GHD in FY22. The PSI involved site inspections and a desktop assessment of previously reported areas of actual or potential contamination on site. A

Targeted Site Investigation (TSI) was planned to be undertaken in FY24, however this has been postponed.

6.5 Threatened Fauna and Flora

6.5.1 Environmental Management

Threatened flora and fauna communities at Appin Mine are managed in accordance with the following approved plans:

- CWEA Management Plan;
- Broad-headed Snake and Southern Brown Bandicoot Management Plan;
- *Persoonia hirsuta* Offset Management Plan;
- Biodiversity Management Plan;
- Ventilation Shaft 6 Biodiversity Offset Strategy;
- Shale Sandstone Transition Forest Offset Management Plan; and
- Adaptive Management Plan for Water Sensitive EPBC Listed Species.

These plans include the management and mitigation measures for threatened species or habitats that occur on Appin Mine sites and are available on the IMC website at link.

Persoonia hirsuta is listed as "Endangered" under both the NSW *Biodiversity Conservation Act 2016* (*BC Act*) and the *EPBC Act*. A substantial population of *P. hirsuta* is known to exist on the Appin North site. Several naturally occurring *P. hirsuta* plants are located within operational areas such as high voltage transmission lines on site. During the December 2022 monitoring period additional *P. hirsuta* were identified within the *P. hirsuta* biodiversity offset area as well as along the Appin North Dam Road. In addition to natural recruitment, three translocations have occurred at Appin North in an attempt to better understand and boost baseline populations (see section 6.5.2.2). *P. hirsuta* plants have been identified within the rehabilitating CWEA (Refer to Appendix 7).

Acacia bynoeana is listed as "Endangered" under the *BC Act* and "Vulnerable" under the *EPBC Act*. The species has previously been recorded along roads, tracks and disturbed areas at Appin North.

Pultenaea aristata is listed as "Vulnerable" under the *BC Act* and the *EPBC Act.* The species has been recorded in areas of impeded drainage in woodland adjoining the main access road and in the vicinity of the southern extent of the Stage 3 CWEA.

Flora and fauna aspects associated with mine subsidence are detailed in Section 6.14.

6.5.2 Environmental Performance

6.5.2.1 Broad-headed Snake and Southern Brown Bandicoot

There have been no instances in the reporting period that required the implementation of mitigation measures for Broad-headed Snakes or Southern Brown Bandicoots (as outlined in the approved management plan).

In FY22 four artificial Broad-Headed Snake habitats were placed in the CWEA rehabilitation stages 1-3 to encourage an increase in Broad-headed Snake populations in the area (Refer to FY22 Annual Review for details). Monitoring of these habitats will be included in the FY24 monitoring period.

6.5.2.2 Persoonia hirsuta – *Ongoing Research and Conservation Management*

IMC conducted the tenth round of annual condition monitoring of the *P. hirsuta* population at Appin North during the reporting period. The monitoring was undertaken in accordance with the approved *P. hirsuta* Offset Management Plan, which complies with EPBC Approval Condition 2. The monitoring was completed by one Niche Environment and Heritage (Niche) ecologist and one IMC representative in Summer 2022 during the peak flowering period for the species. The report is included as Appendix 8.

In accordance with Condition 3 of EPBC Approval 2010/5350, IMC has undertaken targeted research on *P. hirsuta* including:

- habitat and demography;
- population genetics;
- seed biology, germination and recruitment and propagation, and
- pollination.

IMC's targeted research on *P. hirsuta* has been outlined in the *P. hirsuta* Research Report, which was submitted to the Department of Agriculture, Water and the Environment (DAWE)[13] in June 2021. The report explores the history of the endangered species; detailing current and past research, particularly the research and conservation efforts conducted to date by IMC. It also outlines what future conservation efforts could be conducted to promote an increase in overall species population in and around the Appin North mining area.

The *P. hirsuta* Research Report is available on the IMC website at link.

There have been three *P. hirsuta* translocations across the Appin North site between 2019 and 2022. (Refer to the FY22 Annual Review for details on each translocation trial). The plants had been propagated by the Mount Annan Australian Botanic Garden, some grown from seed, others from cuttings, collected from different locations. The aim of the translocations was to boost the population within the Offset Area to at least 44 individuals (back to baseline population), develop a translocation procedure that can be applied to this species and to supplement existing populations across the Appin North site. The plants continued to be monitored during FY23. The total Offset Area plant population and health over time is included in Figure 8 and the full report of current populations is provided in Appendix 8. In FY23 additional plant guards were placed around remaining individuals from the 2019 translocation to protect against predation (see Plate 6).

In FY23 IMC installed nine (9) artificial bee habitats (see Plate 7) to help support native pollinator networks around Appin North. Habitats were installed within the *P. hirsuta* Offset Area, *P. hirsuta* translocation sites and around the CWEA rehabilitation area. This was undertaken to enhance pollinator populations around the site and in turn increase pollinator plant interactions. This aims to support outcrossing within the *P. hirsuta* populations and the rehabilitation areas, creating genetic diversity within ecosystems and in turn assist in long term restoration.

[13] Now Department of Climate Change, Energy, the Environment and Water (DCCEEW)

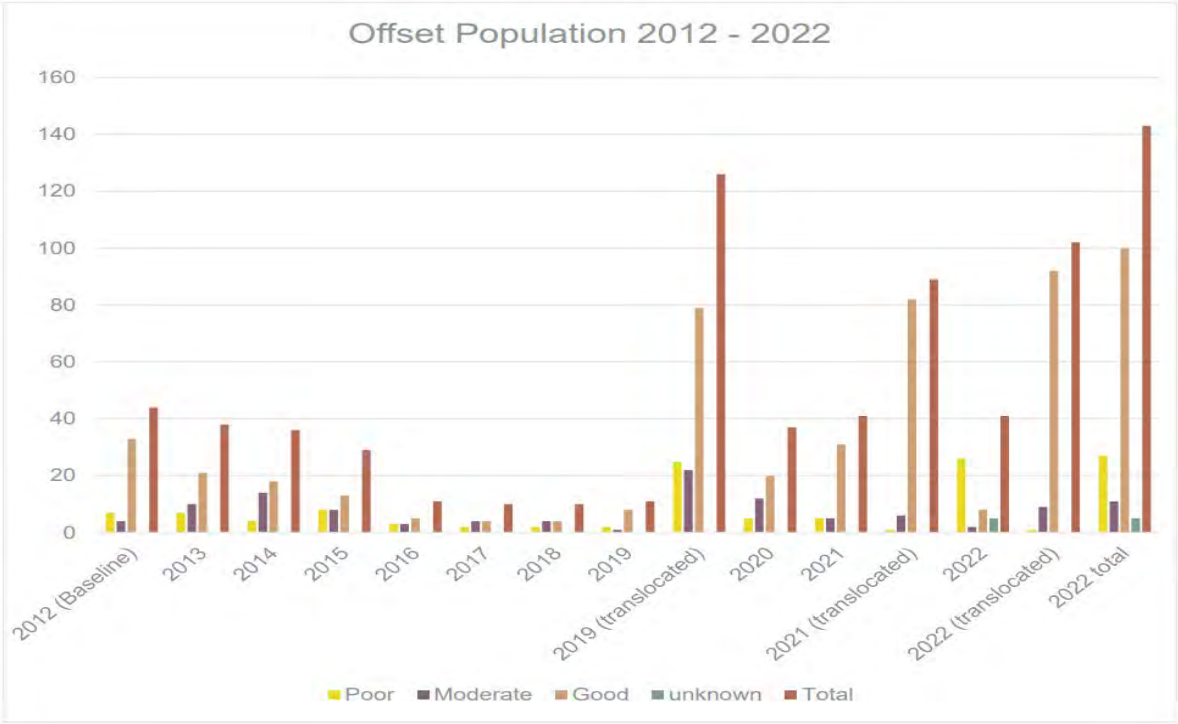


Figure 8: *P. hirsuta* condition and population within the Offset Area during the 2022 Spring monitoring

Plate 6: Flowering *P. hirsuta* plant from the Stage 2 translocation with a native Reed Bee interaction

Plate 7: Artificial Bee Habitat installed in the Stage 2 *P. hirsuta* translocation area

6.5.2.3 Shale Sandstone Transition Forest Offset (SSTF)/BioBank Site

The EPBC Approval conditions for Appin Mine require a biodiversity offset of at least 44.9 ha of SSTF, as well as an Offset Management Plan. In 2012, IMC identified a suitable site in Douglas Park NSW, within the Wollondilly Local Government Area. The land is approximately 86 ha in size which includes bushland, a transmission line easement, a small paddock, and several access tracks. The offset area is comprised of two parcels of land, separated from each other by Douglas Park Drive.

In October 2015, IMC made an application to the NSW Office of Environment and Heritage (OEH) to have the SSTF offset secured via a BioBanking Agreement under Part 7A Division 2 of the *Threatened Species Conservation Act 1995*. The BioBanking Agreement was finalised and executed on 1 February 2017. The offset is now managed in accordance with the BioBanking Agreement, ID Number 215 (BA 215). BA 215 details an annual works program (weed management, tree planting, monitoring etc). These works are carried out by Landcare and are summarised in the 2023 Annual Report provided as Appendix 8.

6.5.2.4 Ventilation Shaft 6 Offset

The Ventilation Shaft 6 Site Project Approval required IMC to secure, manage and monitor an 8.7 hectare offset of Cumberland Plain Woodland (CPW) such that an improve or maintain outcome would be achieved for threatened biodiversity.

The Offset Area (MZ5) is located to the north of the Ventilation Shaft 6 site on the Mountbatten property at Douglas Park NSW (Plan 7). The initial inspection of MZ5 resulted in identification of a population of the threatened plant, *Pimelea spicata* (Spiked Rice-Flower), adding significant conservation value to the Offset Area.

In accepting the offset proposal, the Department of Planning, Industry and Environment (DPIE) and Department of the Environment (DotE) provided approval conditions relating to the preservation, management and monitoring of management actions within MZ5. One of the conditions required IMC to implement a formal monitoring program for both the management of the native vegetation on the site and the extent and health of the *P. spicata* population.

Landcare were engaged to undertake weed management at the site during the reporting period. The works focused on the treatment/removal of African Olive and Blackberry, which are prevalent in the area. This will continue throughout FY24.

Compositionally the 2022 data shows the woodland plots remaining below benchmark values for all growth forms in both MZ5 and MZ6, as was the case since 2014. In 2017 when the data updated to the Biodiversity Assessment Methodology (BAM), the benchmarks are much higher on a state level and may not comprehensively represent the local vegetation quality but the ultimate objective for good quality remnant vegetation. The average native species richness for MZ5 in 2022 was 14, which is a slight decrease from the previous year. The average native species richness for MZ6 was 16 which is a decrease from the previous year.

An assessment of the change in size and distribution of the threatened plant population of *P. spicata* is undertaken every five (5) years and was not required in the FY23 reporting period. The results from the 2021/2022 population census revealed an increase in an estimated 9,702 individuals from the 2017 census. This increase in population demonstrates that site management to date has been beneficial to the species. This report is provided in Appendix 13.

Recommendations in relation to the on-going management of the site include: maintaining integrity of fencing through regular inspections of the site to limit stock incursions; implementing weed management focusing on woody and vine weed removal in better condition areas, beneath driplines of large trees and adjacent to regenerating overstory plants; targeting herbaceous weeds and introduced grasses in woodland areas; regeneration in cleared areas; targeting Blackberry in MZ5 and MZ6 and removing Chilean Needle Grass and Blackthorn Thicket in the surrounding woodland to reduce Bell Bird populations. Additional recommendations are to make bush regeneration staff familiar with *P. spicata* to enable identification and avoidance of individuals during bush regeneration activities, especially weed spraying. Refer to Appendix 12 for the Annual Monitoring Report.

6.5.2.5 Nepean River Biodiversity Stewardship Site

Niche was commissioned in 2016 by IMC to conduct a BioBanking assessment of an offset site along Menangle Road at Douglas Park NSW, which is now referred to as the Nepean River BioBank Site. BioBanking Agreement 382 (BA 382) was made on 8 May 2018. The site provides in-perpetuity management and security for 67.41 ha of woodland and forest communities, including two critically endangered ecological communities, as well as habitat that supports the threatened Cumberland Plain Land Snail.

BA 382 details an annual works program, including weed management, tree planting and monitoring. These works are carried out by Landcare and are summarised in the 2022 Annual Report, provided as Appendix 10.

In February 2023 three endangered Swift Parrots were observed in the Nepean Stewardship site feeding on Eucalypts.

6.5.2.6 Cataract River BioBank Site

A BioBanking Agreement (BA 345) for the Cataract River BioBank Site was finalised on 6 February 2019. The site provides in-perpetuity management of approximately 8.53 ha (Lot 1, DP 572548). The property contains a critically endangered ecological community. IMC is required to undertake passive monitoring of the site until the BioBanking Trust Fund Deposit has reached 80 percent of the Total Fund Deposit. Once reached, IMC must commence all active management actions.

Three (3) areas from which asbestos was removed were rehabilitated in 2020 with 500 seedlings of local grass, shrub species and 50 seedlings representing canopy species local to the area. The most recent 2023 monitoring observed a high success rate of seedlings on the previously disturbed site.

No stock or evidence of grazing was observed over the 2023 reporting period. There was a noticeable increase in the native vegetation and (to a lesser extent) weed growth across the site, which is likely attributed to La Niña wet weather events during the reporting period and the installation of the exclusion fencing in 2021. An example of this notable increase in vegetation can be observed in the comparison photos below in Plate 8 and Plate 9, which shows an image of photo point 3 from FY20 compared to FY23 respectively.

Plate 8: Vegetation growth from photo point 3 at the Cataract River Biobank Site (FY20)

Plate 9: Vegetation growth from photo point 3 at the Cataract River Biobank Site (FY23)

The Annual Report for BA 345 is provided as Appendix 11.

6.6 Weeds

6.6.1 Environmental Management and Performance

Weed control activities were carried out as required by a licensed contractor based on feedback received from inspections and hazard identification activities throughout the reporting period.

6.6.1.1 Appin East and Appin West

Environmental inspections (which include weed identification) are undertaken at the Appin East and Appin West sites. When noxious weeds are identified they are removed and treated. During the reporting period active weed management included:

- regular spraying of weed zones by licenced contractors; and
- regular inspections that review the effectiveness of weed management activities.

6.6.1.2 Appin North

Ongoing grounds maintenance is undertaken by a contractor who has a regular schedule of work. The annual CWEA rehabilitation monitoring program includes the identification of weeds present and proposed management strategies to control weed growth within the CWEA. Targeted weed control within the CWEA was undertaken by a contractor during the reporting period which included slashing of perennial grasses and weed spraying.

Additional weed spraying occurred throughout the reporting period around Appin North and WCCPP by site-based contractors, with particular focus on Crofton Weed and Pampas Grass removal.

6.7 Blasting

No surface blasting activities were undertaken at Appin Mine during the reporting period. Minor blasting activities underground are undertaken in accordance with approved management plans.

6.8 Operational Noise

6.8.1 Environmental Management

Noise across Appin Mine is managed in accordance with the approved Noise Management Plan (NMP). The plan was prepared to satisfy Condition 5 of Schedule 4 of the Project Approval and details the relevant noise criteria, compliance procedures and controls relating to the mining operations.

A copy of the NMP is available on the IMC website using this link.

6.8.1.1 Monitoring Program

A noise monitoring program has been developed to comply with Condition 5(f) of Schedule 4 of the Project Approval.

Assessment criteria have been established for each monitoring location, as outlined in the NMP. The criteria enable an assessment of compliance to be made against the noise levels outlined in the Project Approval. The site-specific assessment criteria were developed using the following methodology:

- adoption of the relevant noise criteria as outlined in the Project Approval; and
- where relevant, adjusting the noise levels (to take into account monitoring location versus receivers) using the noise contours from the Noise Impact Assessment.

The program consists of attended monitoring using handheld portable monitors and real time noise monitoring. The attended monitoring is undertaken at the nominated monitoring locations to confirm compliance.

6.8.1.2 Additional Measurements at Appin West

During the reporting period, additional monitoring was completed on the Energy Developments Limited (EDL) site southwestern boundary fence. The purpose of the monitoring was to evaluate the variability in noise emission from Appin West in the vicinity of the EDL power plant. The real time monitoring results confirmed the following:

- Steady continuous noise level emission from the site typically varied between a 5 dBA range.
- The site emission range was consistent with the measurements and observations made at the AW-NS4 quarterly compliance location.
- The highest noise level recorded at AW-NS4 during temperature inversion enhancement, also corresponded with higher levels of continuous noise level emission from the site.

6.8.2 Environmental Performance

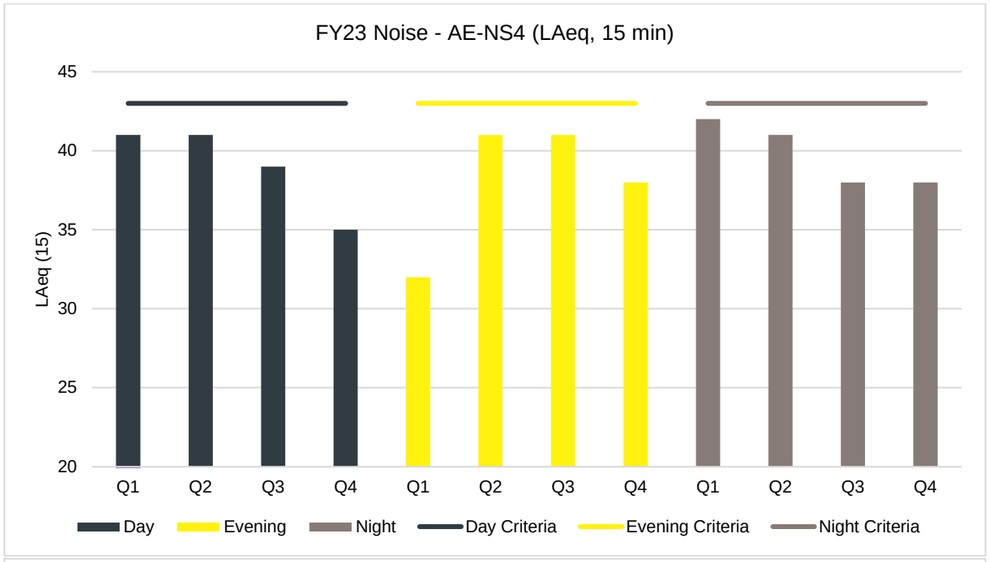
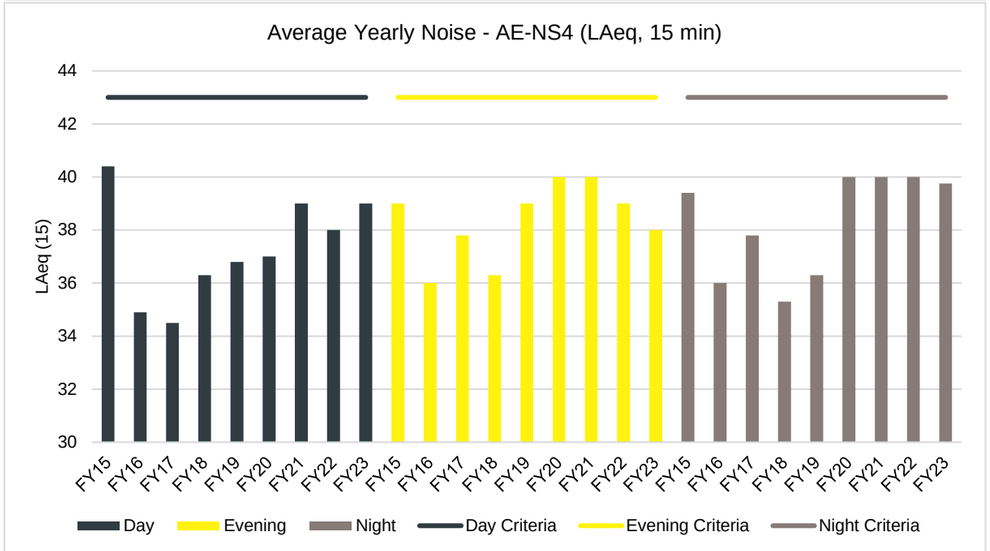
Quarterly attended monitoring was conducted in accordance with the approved monitoring program for the reporting period. Results of the monitoring are reported online and summarised in Table 19.

No exceedances of noise impact assessment criteria were recorded over the reporting period.

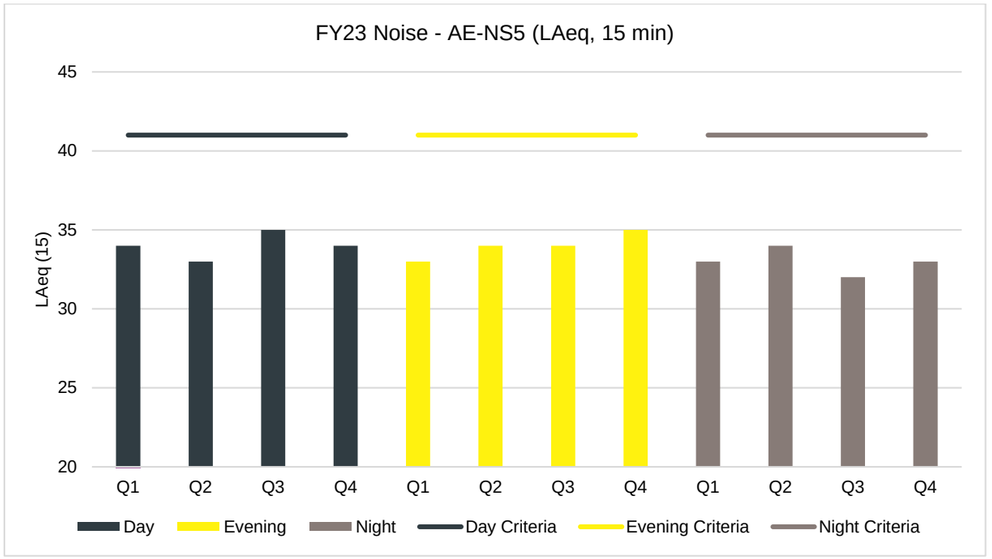
Graphs of long-term noise monitoring trends are provided in Appendix 6.

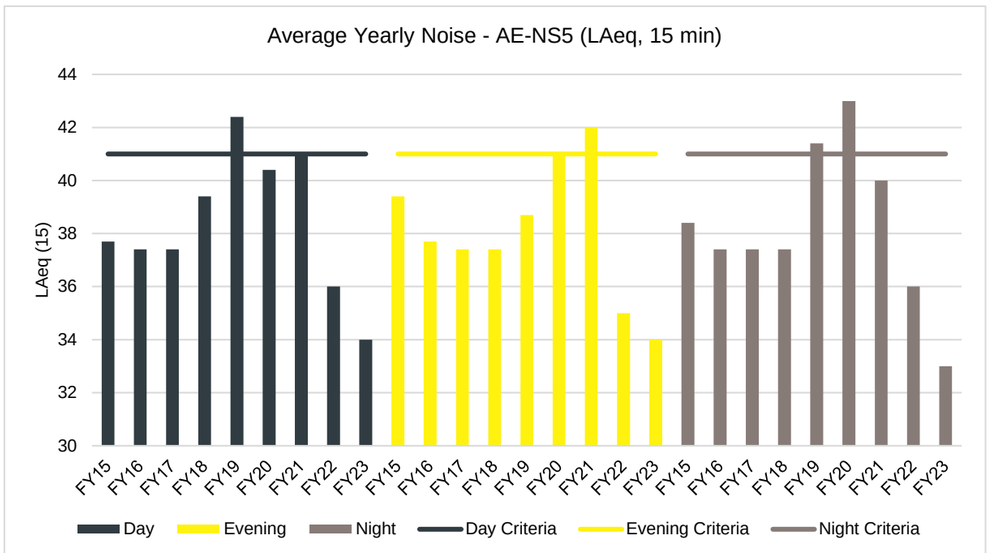
Unattended noise monitoring is undertaken at three locations at the AMVA Project site. The results are used to inform operational management at the site in accordance with the Noise TARP and CEMP. Results are able to be viewed in real time to inform management actions that may include using alternative equipment to undertake an activity, relocating the equipment or ceasing the activity. The results are also evaluated weekly to identify trends. A predictive noise model is in place that is used to estimate noise levels at sensitive receivers in the vicinity of the site.

Table 19: Noise Survey Points and Results

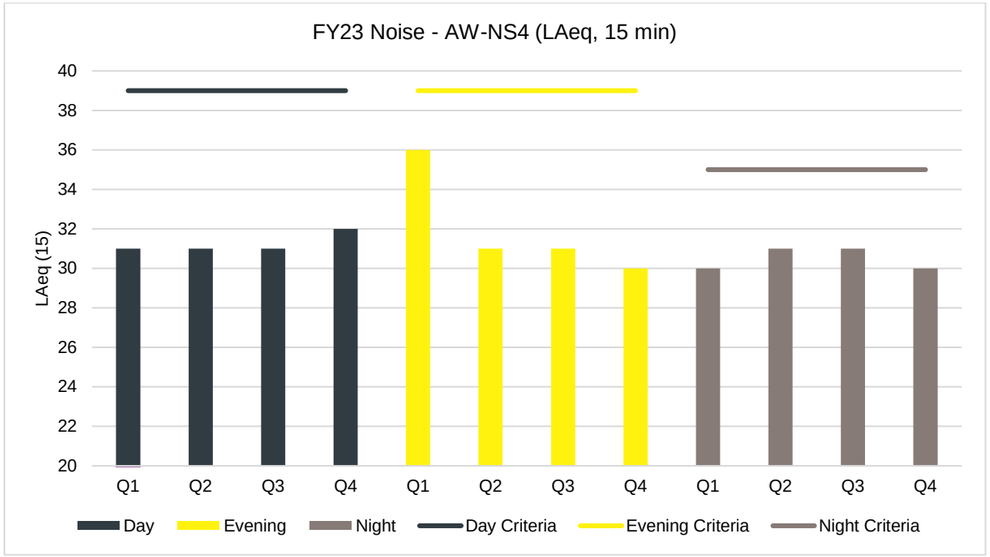
Survey Point ID	Type	Receivers	Assessment Criteria $LA_{eq\ (15\ min)}$	Assessment Criteria $LA_{1\ (1\ min)}$	Locality	Function	Data Summary	Comments
AE-NS4	Attended	Appin township	43 (day, evening and night)	52 (night)	Located in paddock between Illawarra and Toggarai St North of Pit Top behind receiver 137.	Noise from AE Pit Top.	 	**Compliant** FY23 exhibited compliance with the assessment criteria. Noise generated from site was audible at the monitoring location. Appin Road still dominates as the overriding noise source.

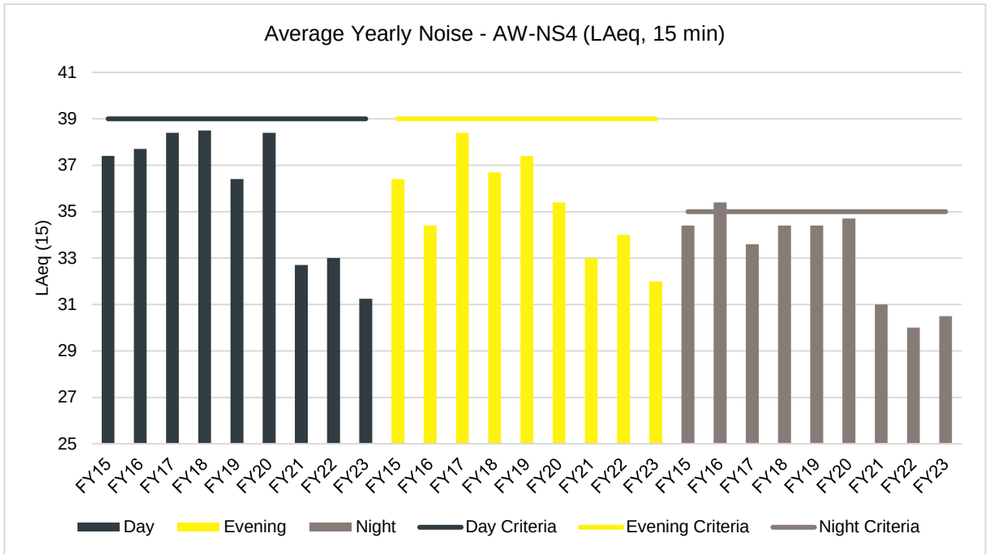
AE-NS5	Attended	Appin Ventilation Shaft 1 and 2 receivers.	41 (day, evening and night)	50 (night)	Northamptondale Road between Ventilation Shaft 2 Site and power plant project and the nearest residential receivers in the South to East quadrant from site.	Noise levels between Shaft Site and the nearest residential receivers to the south-east.	**Compliant** FY23 exhibited compliance with the assessment criteria. Noise generated from site was audible at the monitoring location.





AW-NS4	Attended	Appin West receivers south-west of Appin West Pit Top.	39 (day and evening) 35 (night)	49 (night)	Ashwood Road, South-west of Appin West Pit Top.	Noise level for Appin West Receivers south-west of Appin West Pit Top; and Appin West Receivers near Hume Highway.



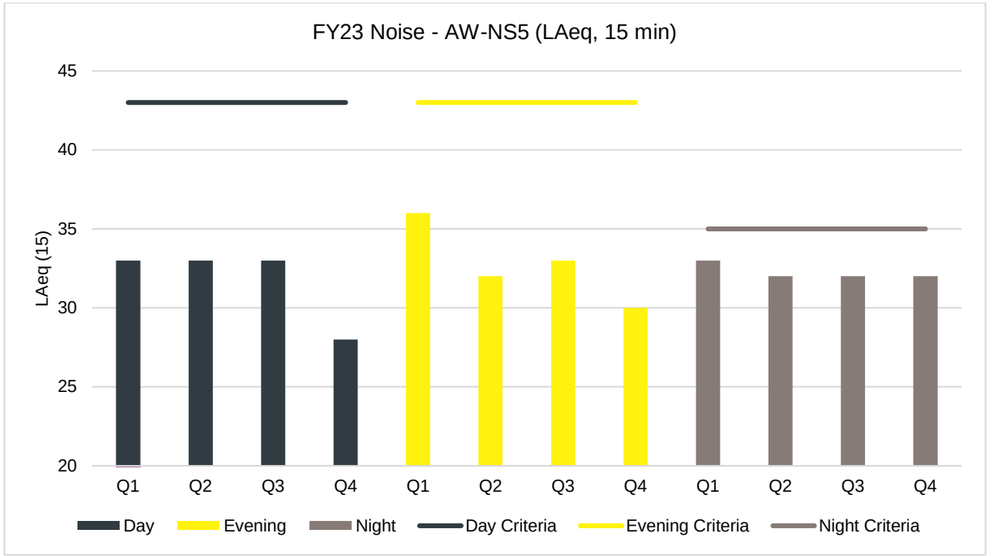


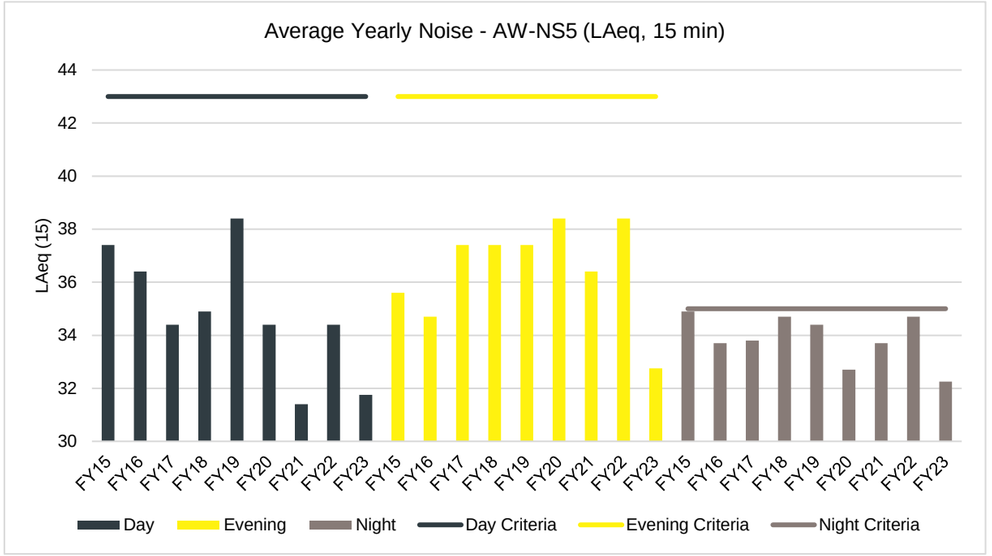
Compliant

FY23 exhibited compliance with the assessment criteria.

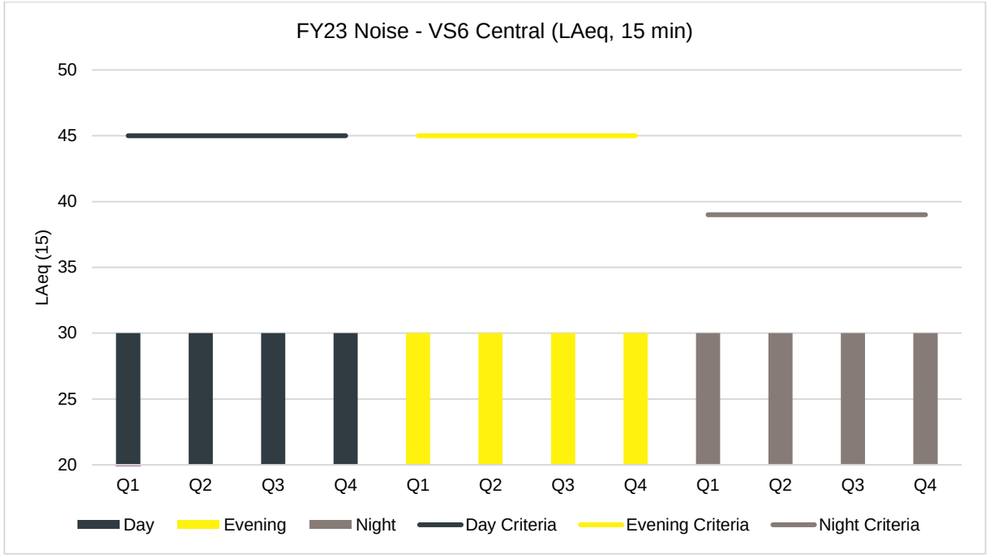
Long-term results showing a steady reduction in noise at this location.

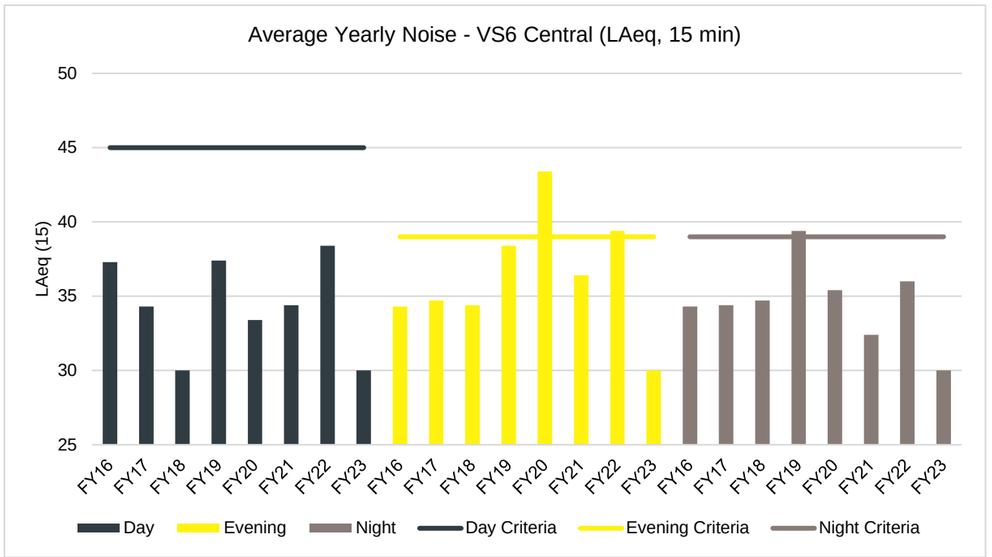
AW-NS5	Attended	All other Appin West receivers.	43 (day and evening) 35 (night)	53 (night)	Between nearest residential receivers on Douglas Park Drive and the Appin West Pit Top.	Noise level at Appin West property boundary. Noise levels between Appin West and nearest residential receivers on Douglas Park Drive.	**Compliant** FY23 exhibited compliance with the assessment criteria. Monitoring still showing regular peaks and troughs associated with long-term trends.





VS6 Central	Attended	Douglas Park Township and Receivers.	45 day and evening) 39 (night)	49 (night)	Duggan Street behind Douglas Park Public School.	Noise level between Ventilation Shaft 6 and the nearest residential receivers to the West of site.



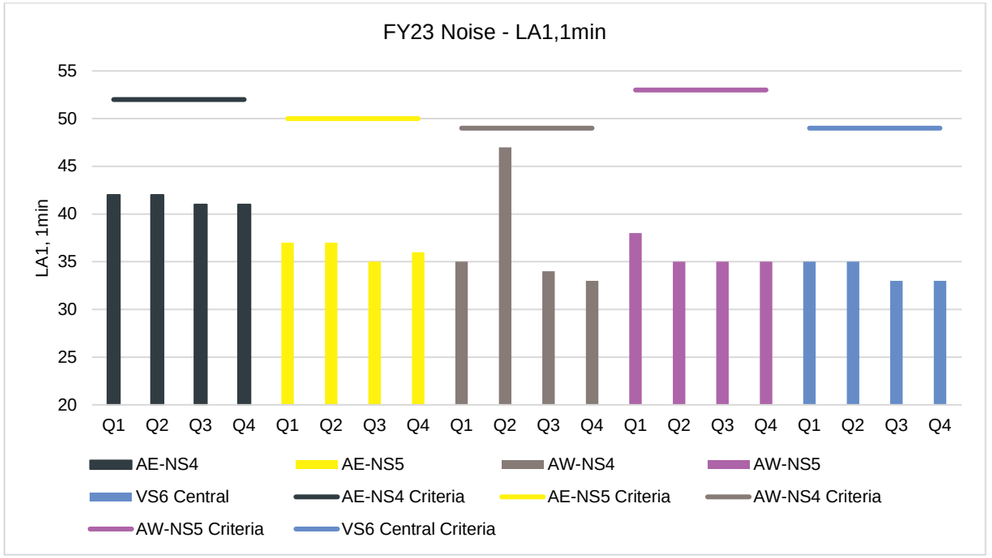


Compliant:

Site noise was not audible and the dominant noise source was the Hume Highway, with other sources such as local traffic and fauna across each sampling period.

Long term trend analysis shows the FY23 average typically within historic trends.

$LA_{1(1\ min)}$ AE-NS4, AE-NS5, AW-NS4, AW-NS5, VS6 Central	Attended	Various (see above).	N/A	49 to 53 (see graph).	Various (see above).	Various (see above) .



Compliant:

Noise levels measured were below the assessment criteria for $LA_{1,1min}$ across all monitoring sites for FY23.

For AW-NS4 Q2 night ($LA_{1,1min}$), noise from Appin West was occasionally audible, but at such low levels and for such short duration that noise from Appin West could not be reliably estimated from the measured data.

Long-term graphs are provided in Appendix 6.

6.9 Visual and Stray Light

The Appin West Pit Top is not directly visible by nearby residential receivers. Lighting located on the personnel and materials winder is partially visible from some residences at Wilton however, it has not been raised by the community as an issue. At Appin East, operations are not directly visible from nearby residential receiver locations. Lighting located at the top of the coal storage bins is partially visible from some residences however, it has not been raised by the community as an issue.

Due to the relatively remote location of Appin North, there are no significant lighting issues.

There were no lighting impacts from construction activities undertaken during the reporting period.

To minimise the visual disturbance from the Ventilation Shaft 6 site, exposed areas have been revegetated. The most significant feature for minimising visibility of the site is the earthen noise barrier. This bund has also been revegetated.

No changes to lighting or other structures were undertaken in FY23 across Appin sites that would enhance visibility or light intrusiveness to the nearby sensitive receptors.

Native tree screen planting was undertaken in late 2021 at the AMVA Project site consistent with a conceptual road alignment. During detailed design of both the road and electrical infrastructure there were minor changes to alignments based on feedback from key stakeholders involved in the design process (Transport for NSW (TfNSW) and Wollondilly Shire Council (WSC) for road design and Endeavour Energy for electrical infrastructure).

As a result of the change to the road alignment, there was also a requirement to remove some of the native screening planting undertaken in 2021 to facilitate works. It is anticipated that the tree screening plantings will be reinstated in FY24.

6.10 Aboriginal Heritage

Aboriginal and natural heritage at Appin North is managed in accordance with the approved CWEA Management Plan. The plan outlines the management/mitigation measures relating specifically to each heritage site located within or in close proximity to the CWEA. A copy of the plan is available on the IMC website using this link. The location of known heritage sites at the CWEA are shown on Plan 14.

Aboriginal aspects associated with subsidence from the underground mining activities are detailed in Section 6.14.

There is one registered Aboriginal Heritage site located within the AMVA Project Area. The AMVA Project site is subject to an Aboriginal Cultural Heritage Management Plan. Relocation of the artefacts within the active AMVA Project area occurred prior to any works commencing on-site and a smoking ceremony was conducted. A Welcome to Country was provided by Auntie Glenda Chalker, which is shown in Plate 10.

Plate 10: Welcome to Country - AMVA Project

6.11 Natural Heritage

Natural heritage aspects associated with subsidence from the underground mining activities are detailed in Section 6.14.

6.12 Spontaneous Combustion

No incidence of spontaneous combustion occurred within this reporting period.

Bulli Seam coal has a very low propensity to spontaneous combustion. Sampling programs (at Appin Mine) are in place to detect any changes in coal quality that could potentially lead to spontaneous combustion occurring in coal stockpiles or the CWEA.

Routine and statutory inspections are used to identify any heating or spontaneous combustion events. In addition, a real-time carbon monoxide (CO) monitoring system exists underground, and all mine officials carry CO handheld monitors.

6.13 Bushfire

The risk of bushfire across Appin Mine is managed by a combination of preventative and ready response activities. Bushfire management on all sites is achieved through the formation of fire breaks, Asset Protection Zones (APZs), and the establishment of a firefighting water pipeline around most sites (with booster pump facilities). Appropriate site personnel are trained in emergency response and firefighting and have a supply of readily available firefighting equipment on the sites.

APZs are maintained on an annual basis at a minimum or as required.

There was one bushfire incident near Appin East in the reporting period. A private plane crashed due to mechanical failure near the eastern boundary of Appin East and next to the Georges River on 26 December 2022. Isolated spot fires were observed within the Appin East boundary because of the fire associated with the plane crash. The site emergency response team responded to the small, isolated fires and the main plane crash fire. There was minimal impact to site.

As highlighted in the FY21 report, IMC engaged a contractor to complete a risk assessment of the bushfire landscape at Appin Mine and provide a broad overview of the potential bushfire risks within and around the mine land holdings and indicate a range of bushfire protection measures that could be investigated and/or implemented to afford a greater level of bushfire resilience at these locations. The risk assessment was used to develop a Bushfire Management Plan for the Appin Operations, which was finalised in FY22. The Bushfire Management Plan was reviewed in FY23 following the plane crash incident and set inspection plans for sensitive areas assigned to the relevant site personnel at a recurring annual frequency.

6.14 Mine Subsidence

6.14.1 Approvals

6.14.1.1 ***AA7 and AA9***

The Subsidence Management Plan (SMP) for AA7 LW705 to LW710 was approved by the Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS) on 28 February 2012 (for LW705 and LW706) and 28 September 2012 (for LW707 to LW710). On 17 April 2020, the SMP submitted to DPIE on 1 July 2008, and its subsequent amendments, was granted a new approval from the Resources Regulator until 31 December 2024. A variation to the finishing end of LW708B (extending the panel by 94 m) was granted on 23 November 2020. Withdrawal of the Appin Area 7 SMP was approved by the Resources Regulator 23 June 2023.

The LW709 to LW711 and LW905 Extraction Plan (EP) was approved by the Secretary on 29 July 2022. This approval replaces the SMP Approval for LW709 and LW710. However, management plans approved under the SMP are current for LW705 to LW708.

Appin LW709 is divided in to two sections – A and B, to step around a geological feature, as was the case for LW708. LW709A has been extracted. LW709B is scheduled for completion in September 2023.

The EP for AA9 LW901 – LW904 was approved by DPIE on 10 September 2014. The LW901 – LW904 EP is supported by management plans addressing social, cultural, environmental and infrastructure aspects of the mining area.

IMC applied to DPIE to vary the EP Approval for LW901 – LW904 on 24 March 2015 to shorten the commencing end of LW901 by 418 m. DPIE approved the variation on 29 April 2015. A variation to LW903 and LW904 was approved on 21 March 2019. The last variation, to extend the finishing end of LW904 by 61 m, was approved on 18 December 2020.

Extraction of LW904 and LW905 was completed in August 2022 and February 2023 respectively, concluding mining in AA9.

The LW709 to LW711 and LW905 EP is the governing EP for current operations which have wholly transitioned to AA7.

6.14.1.2 Appin (West Cliff) Area 5 LW37 – LW38

The Area 5 EP for LW37 and LW38 was approved by DPIE on 24 March 2014. Approval was granted by DTIRIS on 28 March 2014. The EP is supported by management plans addressing cultural, environmental and infrastructure aspects of the mining area.

LW38 was completed on 1 February 2016. The area has undergone post-mining monitoring in the reporting period as part of the approved monitoring program. Rehabilitation to Georges River pools and rockbars affected by Area 5 subsidence is scheduled to begin in FY24. Refer to Section 8.1.4 for more information.

6.14.2 AA7 and AA9 Monitoring and Management Programs

Surface features in the vicinity of mining and refence locations during the reporting period include:

- Nepean River and associated tributaries;
- Harris Creek and associated tributaries;
- Navigation Creek;
- Foot Onslow Creek;
- Racecourse Creek;
- cliffs, rocky outcrops and steep slopes;
- Aboriginal and European Heritage; and
- buildings and infrastructure.

Monitoring activities within the EP/SMP area includes:

- water flow, pool water levels and water quality monitoring;
- photographic and observational monitoring to identify mining-induced fractures, strata gas releases, iron staining and rock falls;
- aquatic ecology monitoring;
- Aboriginal and European Heritage items; and
- built features.

The results of these monitoring programs are provided in this section.

6.14.2.1 *Landscape Features*

During the reporting period, monitoring of environmental features was carried out in accordance with the Appin LW709 to LW711 and LW905 and LW901 to LW904 EPs. Monitoring was conducted within the zone of influence during baseline, mining and post-mining periods (where applicable).

No new AA7 gas release zones were identified on the Nepean River during the reporting period. Two previously reported gas zones were active at some point during the reporting period with just one gas zone observed to be active during the May 2023 inspection.

No new AA9 gas release zones were identified on the Nepean River during the reporting period. Twenty previously reported gas zones were observed to be active at some point during the reporting period. As of the May 2023 inspection, there were nine active gas release zones observed.

Each gas zone had an estimated emission rate of less than 3000 L/min and triggered a TARP Level 1 response under the Water Management Plan.

For all observed impacts, the appropriate TARPs were applied, actions implemented, and key stakeholders notified as required by the approved SMP and EP. Table 20 includes the Nepean River gas release zones observed during the reporting period.

The LW905 End of Panel (EoP) Report was submitted in June 2023. The full report, including specialist assessments, can be accessed via the IMC website using this link.

6.14.2.2 Surface Water

Inspections of the Nepean River and tributaries around AA7 and AA9 are undertaken by the IMC Environmental Field Team (IMCEFT). Monitoring includes water quality and water level as well as visual inspections for any iron staining and gas releases. Gas release zones on the Nepean River are reported in Section 6.14.2.1.

No areas of iron staining were identified during the reporting period.

During FY23, flood events occurred throughout the Nepean catchment leading to water quality and water level fluctuations along the Nepean River, corresponding to heavy rainfall and changing flow conditions. Deviations in water quality results away from the baseline range were recorded downstream from the mining area however these were temporary, with similar changes recorded at the reference site, upstream from mining. No changes in water quality were attributed to mining activities and in general, water quality has improved over recent years due to higher rainfall.

Table 20 provides a summary of the predicted and observed impacts for surface waters during the reporting period. Further analysis of surface waters is included in the LW904 and LW905 EoP Reports.

Table 20: Predicted vs Observed Impacts for Landscape Features for Area 7 and Area 9

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Surface waters	Unlikely for any significant change in water level along the Nepean River	No impacts observed	N/A
	Potential for surface water flow diversion is very low	Monitoring site NR0 shows an apparent decline in water level of ~0.5 m relative to the baseline range. The change does not appear to be related to a change in flow, and previous reviews identified similar water level changes at the upstream control site NR110. This suggests the changes are unrelated to mining and may be related to changes in riverbed morphology during floods.	N/A
	Potential for surface water diversion directly above or adjacent the mining area	No impacts observed	N/A
	Low likelihood of ferruginous springs. Significant impacts on Nepean River pH, iron and dissolved oxygen not predicted	No impacts observed	N/A
Gas releases	Likely that strata gas emissions could occur in the Nepean River with some associated reduction in dissolved oxygen possible	Existing gas release zones observed for AA7 and AA9 during the reporting period. No new gas zones were identified in AA7 or AA9.	• Continued monitoring program • Reported in the LW905 EoP Report • Summary included in Annual Review
Iron staining	Minor iron flocs are expected to occur in the Nepean River. No change in water quality is predicted	No impacts observed	N/A
Fracturing	Minor fracturing may occur in the bed of the Nepean River	No impacts observed	N/A

Table 20: Predicted vs Observed Impacts for Landscape Features for Area 7 and Area 9			
Creeks	Possible for localised increase in ponding, flooding or scouring	No impacts observed	N/A
Cliffs	Possible minor isolated rock falls. Unlikely that any large cliff instabilities would occur	No impacts observed	N/A
Steep Slopes	Unlikely that there would be any significant impacts to steep slopes	No impacts observed	N/A

6.14.2.3 Groundwater

Piezometer and bore monitoring data have been used to determine pre-mining groundwater levels and quality. Groundwater data is collected prior to, during and following the mining period, then analysed and interpreted for reporting in the EoP Report as outlined in the relevant SMP and EP.

6.14.2.3.1 AA7

No longwall in Area 7 was completed in FY23 therefore no EoP Report was produced during the reporting period. LW709 commenced in February 2022 and will be completed in FY24. By the end of June 2023, the longwall had progressed approximately 2034 m (refer to Plan 19).

Borehole AP-A7 (S2315) is located approximately 600 m north-west of the start of LW709. Pressures in the Hawkesbury Sandstone (HBSS) have been monitored by three piezometers installed in the bore. At the end of the reporting period, the recorded water levels/pressures in all three piezometers were higher than average in the baseline period.

Borehole EAW5 (S1913) is located approximately 840 m north to north-west of LW709. Pressures in the HBSS have been monitored by three piezometers. At the end of the reporting period, the recorded water levels/pressures in the two lower piezometers were higher than the average in the baseline period. The pressure in the piezometer located at 65 m was 1.75 m below the baseline records.

No groundwater level reduction triggers were exceeded during the extraction of LW709 in FY23.

A comprehensive groundwater assessment will be included in the LW709 EoP Report.

6.14.2.3.2 AA9

LW904 commenced in May 2021 and was completed in August 2022. Extraction of LW905 commenced in September 2022 and was completed in February 2023 (refer to Plan 19).

Groundwater levels are monitored at fifteen bores within and surrounding AA7 and AA9 as part of a much wider groundwater monitoring network covering the Appin, West Cliff and Dendrobium mining areas. In general, groundwater levels in the HBSS were slightly higher during FY23 compared with the previous 12 months due to the relatively high rainfall during 2022. No groundwater level TARPs were triggered during the review period.

An increase in dissolved and total iron was recorded at one borehole. The concentration of other metals (copper, manganese, nickel, zinc, and aluminium) from the sample were at similar concentrations to previous inspections, including the pre-mining sample. There was also no reported increase in iron staining or colouration during sampling. Elevated iron is not uncommon in bore water and is not necessarily a mining effect. Bore water EC and pH have increased slightly following the passage of LW902. Groundwater inflow to the mine is calculated from the daily mine water balance. The 20-day moving average mine inflow during the extraction of LW905 was below the TARP Level 1 trigger of 2.7 ML/day.

Further groundwater information can be found in the LW905 EoP Report.

6.14.2.4 Aquatic Ecology

Within the AA7 and AA9 mining domains, significant aquatic habitat is limited to the Nepean River and its larger tributaries. Four species of aquatic macrophytes and five species of native fish were identified in baseline assessments for AA7 and AA9. No threatened fish or invertebrate species were

identified during field surveys. The area is potentially within the range of two threatened species (Macquarie Perch and Sydney Hawk Dragonfly) listed under the *BC Act*.

The latest round of aquatic ecology monitoring for AA7, undertaken in December 2022, included post-extraction monitoring for LW705, LW706, LW707A, LW707B, LW708A and LW708B, during extraction monitoring for LW709 and pre-extraction monitoring for LW710 and LW711.

The latest round of monitoring for AA9 was undertaken in December 2022 and provided the second year of post-extraction monitoring for LW902, the first year of post extraction monitoring for LW903 and during extraction monitoring of LW904. Data collected up to and including the proposed survey also provided baseline data for LW905. Monitoring of LW701 to LW704 ceased in 2014, following the collection of at least two years of post-extraction data for each longwall. The next round of ecological monitoring is scheduled in late 2023 and results will be included in the Appin Mine FY24 Annual Review. Results presented in this section include specialist monitoring as well as latest observations from the IMCEFT.

Monitoring undertaken by IMC and other specialist consultants during extraction of AA7 and AA9 longwalls identified gas releases in the Nepean River. No fracturing, changes in water levels or flow have been attributed to mining. Some minor and short-term changes in water quality in the Nepean River in AA9 have been observed however these have not been attributed to mining.

There continues to be no observed impacts to indicators of aquatic ecology (number of taxa and biotic indices derived from macroinvertebrate sampling) attributed to extraction of AA7 and AA9 longwalls. This is expected given that there was no more than minor gas releases and no change in water quality in the Nepean River associated with mining. No changes in water quality were observed due to gas releases, neither were any changes in water levels or diversions of flow.

Similarly, there was no evidence of any changes to fish and aquatic macrophytes attributable to mining. The fish assemblage sampled in the Nepean River following the commencement of extraction of these longwalls was comparable with that sampled prior to extraction and no fish kills or any other observations that may suggest an impact due to mining have been observed.

A summary of predicted and observed impacts on aquatic ecology for the reporting period for AA7 and AA9 is provided in Table 21 and Table 22 respectively. Further detailed information on aquatic ecology monitoring can be found in the EoP reports for LW904 and LW905.

Table 21: Predicted vs Observed Impacts for Aquatic Ecology for AA7			
Aspect	**Predicted Impacts**	**Observed Impacts**	**Completed Actions**
Aquatic Ecology	Exposure of wetted substrata in some limited shallow areas of the river, potentially arising due to minor reductions in water depth caused by net uplift of the riverbed.	No reported change in water level apart from the normal fluctuations associated with rainfall and WaterNSW releases. No exposed wetted substrata observed.	N/A
	Potential water loss or reduced flow due to fracturing of the riverbed. However, this was not expected to result in significant water loss or reduced flow due to the flooded nature of this reach.	No fracturing observed in the Nepean River and no water loss observed.	N/A
	Components of aquatic ecology such as flow characteristics, connectivity and water quality should not be impacted by any predicted subsidence.	No reported surface water flow diversions, impacts on water quality or connectivity of aquatic plant components.	N/A
	Alterations to the composition of macrophyte beds due to small reductions in water depth. However, this is not expected to have a significant impact on the overall habitat in the survey area.	No mining induced dieback has been observed though changes to bank and riverbed morphology due to recent flood events appears to have resulted in substantial localised changes in the coverage of macrophytes, independent of mining.	N/A
	Possible that gas emissions may have impacts on water quality.	No evidence of significant impacts on water quality due to gas releases.	N/A
	Potential impacts on fish and macroinvertebrates due to mine subsidence are considered unlikely.	No evidence of mining induced impact on either fish or macroinvertebrates.	N/A

Table 22: Predicted vs Observed Impacts for Aquatic Ecology for AA9

Location	Attribute	Predicted Impacts	Observed Impacts	Completed Actions
Nepean River	Ponding, flooding and scouring of stream banks.	There are unlikely to be any measurable impacts on the availability or connectivity of aquatic habitats in the downstream reach of the Nepean River due to its flooded nature and very low gradient.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021. No impacts observed by IMCEFT as part of routine monitoring through the reporting period.	N/A
	Fracturing of bedrock and diversion of surface flows.	It is considered unlikely that there would be any net loss of water from the catchment. No significant changes in the quantity or quality of permanent aquatic habitat.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021 or during IMCEFT inspections throughout the reporting period.	N/A
	Gas releases.	Minor gas releases, associated iron precipitate and reductions in concentrations of dissolved oxygen are likely to occur due to extraction.	None identified during observations of aquatic macroinvertebrates, fish and aquatic macrophytes at aquatic ecology monitoring sites in 2021. Gas releases observed however not associated with any reduction in dissolved oxygen.	N/A
Drainage Lines	Fracturing of bedrock and diversion of surface flows.	Effects to aquatic habitat and biota due to any diversion of flows and draining of pools in drainage lines would be minimal, due to the limited aquatic habitat provided by these areas.	No fracturing observed in drainage lines.	N/A

6.14.2.5 *Terrestrial Ecology*

Assessments of significance have been completed for an endangered community and threatened flora and fauna species in the mining area. The assessments focused on flora and fauna that could potentially be impacted by subsidence. The following aspects were assessed:

- native vegetation communities;
- threatened flora; and
- threatened fauna and fauna habitat.

Plant communities, fauna habitats, threatened species, populations and ecological communities have not been significantly impacted by subsidence during the reporting period as outlined in Table 23.

Table 23: Predicted vs Observed Impacts for Terrestrial Ecology for AA7 and AA9

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Vegetation communities and fauna habitat	Minor impacts to riparian habitats on the Nepean River through changes in water levels, desiccation, gas release and minor fracturing.	No impacts observed.	N/A
	Minor impacts to vegetation due to rock falls, an increase in ponding, flooding or cracking to drainage lines and creeks.	No impacts observed.	N/A
Threatened flora	Unlikely that any threatened flora would be significantly impacted.	No impacts observed.	N/A
Threatened fauna	Unlikely that threatened fauna or habitats will be significantly impacted.	No impacts observed.	N/A

6.14.2.6 *Cultural Heritage*

No impacts to historical sites or Aboriginal Heritage sites were recorded during the reporting period.

6.14.2.7 *Surface Infrastructure*

Surface infrastructure located within or near the mining areas includes the following:

- Optical fibre cables (Telstra, Optus, NextGen and Powertel).
- Main Southern Railway and associated infrastructure.
- HW2 Hume Highway and associated infrastructure.
- Local roads and drainage culverts.
- Power infrastructure.
- Copper telecommunications cables.
- Potable water and sewerage networks.
- Building structures, pools, water tanks and farm dams.
- Groundwater bores.

- Heritage structures.
- Nepean Twin Bridges at Douglas Park.
- Pumps in the Nepean River.
- Upper Canal, Cataract Tunnel and associated infrastructure.
- Survey Control Marks.

A summary of the observed surface infrastructure impacts during the reporting period for AA7 is provided in Table 24. Surface infrastructure impacts attributed to AA9 are summarised in Table 25.

6.14.2.8 Seismic Monitoring

The Seismology Research Centre (SRC) prepares a seismic monitoring network report for IMC on an annual basis. The last report was for the 11 February 2022 – 10 February 2023 reporting period.

The IMC seismic monitoring network installed for IMC by SRC comprises of eight seismic monitoring stations. For the most part, the IMC network continued to work effectively over the reporting period with the full network operating, providing consistent and precise data that contributed to reducing location uncertainty.

A total of 449 events were detected (a notable decrease of 237 events from the last annual report). The majority of these events ranged in magnitude from MLv -0.1 to MLv 1.1 [14] which falls within the range similarly observed for microseismic events at longwall coal mines. This reporting period saw 56 events (12.5% of total) that were at Richter magnitude MLv 1.0 or above; the largest being a magnitude MLv 2.5 seismic event recorded on 5 May 2022, which was felt by residents in the local area. There were eight recorded background seismic events located in the immediate vicinity. The largest seismic detection associated with IMC activity was a magnitude MLv 1.3 event. An upgrade to the Netcomm modems at five South32 stations installed in 2013/2014 will be required following the shutdown of the Telstra 3G network.

6.14.3 Area 5 Monitoring and Management Programs

LW38 ceased extraction on 1 February 2016. Monitoring of the Georges River continues, providing pre-remediation data for the GRRP. Monitoring activities currently include:

- photographic and observational monitoring including the Georges River and its tributaries, cliff lines and landscape features;
- water flow, pool water levels and water quality monitoring; and
- shallow groundwater level monitoring.

Monthly monitoring is undertaken by the IMCEFT with fortnightly targeted inspections of Georges River pools that are observed to be below baseline level. Below baseline water levels were recorded during the FY23 reporting period. All pools that exhibited below baseline water levels have previously been reported. Below baseline pool levels are assessed in detail in the GRRP.

Remediation options for impacted sections of the Georges River as a result of LW32 to LW38 have been proposed in the GRRP. The GRRP incorporates findings from a pre-remediation study. This involved the cessation of discharge from BCD and the monitoring of water recession in pools, as well as incorporating the results from the Georges River Catchment Modelling. Pre-remediation data

[14] MLv (magnitude, local, using vertical displacement)

continued to be collected through the reporting period. This included pool water levels and quality, and surface flows.

The GRRP was approved by the Resources Regulator on 24 April 2020. It updated the proposed rehabilitation of the Georges River, following the completion of extraction of Area 5. An updated version of the GRRP was provided to the Resources Regulator in August 2023. Rehabilitation has been delayed due to landholder access issues and is scheduled to begin in early FY24. Rehabilitation activities in the Georges River are discussed in Section 8.1.4.

6.14.3.1 Landscape Features

Post-mining monitoring includes regular inspections of the Georges River as well as riparian features and cliffs. There were no new impacts identified as subsidence in Area 5 has ceased (see Table 26).

6.14.3.2 Surface Water

The monitoring program provides a basis for the comparison of flow, pool level and water quality in the area before, during and after mining as outlined in the Area 5 LW37 to LW38 EP.

During the reporting period field water quality in the Georges River and tributary sites generally remained within the baseline range, with no significant change in trend or adverse changes being observed. No TARP trigger levels were recorded for pH. The levels of nickel and zinc in the Georges River maintained similar pre-LW38 variability, with no significant change to the observed ranges as a result of extraction of LW38. An upward trend in dissolved manganese was observed during FY22 however results have returned to baseline levels during FY23.

A summary of the observed surface water impacts for LW38 is provided in Table 27.

Table 24: Predicted vs Observed Impacts for Surface Infrastructure for AA7

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall.	No reported impacts.	N/A
Hume Highway	No impacts on the safety or serviceability of the highway after the implementation of the management strategies.	Minor crazing noted in pavement. Humps developed on both carriage ways and Partridge VC truck stop. No impact to safety or serviceability.	Remediation by re-shaping of the pavement occurred.
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies.	No reported impacts.	N/A
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP.	No reported impacts.	N/A
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP.	No reported impacts.	N/A
Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required.	No reported impacts.	N/A
Copper telecommunications cables	Impacts unlikely.	No reported impacts.	N/A
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including	No reported impacts.	N/A

Table 24: Predicted vs Observed Impacts for Surface Infrastructure for AA7

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
	Optical Time Domain Reflectometer monitoring and mitigation.		
Building structures	A low frequency of minor impacts and very low frequency of more significant impacts were predicted.	Minor damage to some residential homes and sheds.	Claims that have been lodged are being managed by SA NSW through the relevant legislation.
Pools	In ground pools could be more susceptible to ground strains.	Some pools out of level.	N/A
Water tanks	Impacts unlikely.	No reported impacts	Claims that have been lodged are being managed by SA NSW through the relevant legislation.
Farm dams	Potential for minor cracking or leakage.	No impacts attributed to mine subsidence	Claims that have been lodged are being managed by SA NSW through the relevant legislation.
Heritage structures	Impacts unlikely.	No reported impacts	N/A
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores.	One bore has suffered a significant impact to yield	N/A
Pumps in the Nepean River	Impacts unlikely	No reported impacts.	N/A
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely	No reported impacts.	N/A

Table 24: Predicted vs Observed Impacts for Surface Infrastructure for AA7

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Survey control marks	Marks are likely to be exposed to the full range of mining induced subsidence movements.	Marks have been exposed to the full range of mining induced subsidence movements.	Following the completion of subsidence in the area a network of survey marks will be re-established to the satisfaction of NSW Spatial Services.

Table 25: Predicted vs Observed Impacts for Surface Infrastructure for AA9

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Local Road	Minor cracking and localised heaving of the road surface in some locations above the longwall.	Minor damage to Menangle Road due to a localised compressive strain.	Design for milling and resurfacing to Council's satisfaction progressed. Works imminent.
Main Southern Railway	No impacts on the safety or serviceability of the railway after the implementation of the management strategies.	No reported impacts.	N/A
Douglas Park Twin Bridges	Impacts unlikely after the implementation of the TARP.	No reported impacts.	N/A
Moreton Park Road Bridge (south)	Impacts unlikely after the detailed investigation, analysis and implementation of the TARP.	No reported impacts.	N/A

Power Infrastructure	Impacts unlikely, but minor mitigation measures may be required.	No reported impacts.	N/A
Copper telecommunications cables	Impacts unlikely.	No reported impacts.	N/A
Optical fibre cables	Impacts unlikely with the implementation of the management strategies including OTDR monitoring and mitigation.	No reported impacts.	N/A
Potable water network	Impacts unlikely, but minor mitigation measures may be required.	No reported impacts.	N/A
Sewerage network	Impacts unlikely, but minor mitigation measures may be required.	No reported impacts.	N/A
Building structures	A low frequency of minor impacts and very low frequency of more significant impacts were predicted.	Minor damage to some residential homes and sheds.	Claims that have been lodged are being managed by Subsidence Advisory NSW (SA NSW) through the relevant legislation.
Pools	In ground pools could be more susceptible to ground strains.	Some pools out of level.	Claims that have been lodged are being managed by SA NSW through the relevant legislation.
Water tanks	Impacts unlikely.	No reported impacts.	Claims that have been lodged are being managed by SA NSW through the relevant legislation.
Farm dams	Potential for minor cracking or leakage.	No reported impacts.	Claims that have been lodged are being managed by SA NSW through the relevant legislation.

Heritage structures	Impacts unlikely.	No reported impacts.	N/A
Groundwater bores	Potential for blockage or reduction in the capacity of the groundwater bores.	No reported impacts.	N/A
Pumps in the Nepean River	Impacts unlikely.	No reported impacts.	N/A
The Upper Canal, Cataract Tunnel and associated infrastructure	Impacts unlikely.	No reported impacts.	N/A
Survey control marks	Marks are likely to be exposed to the full range of mining induced subsidence movements. Marks within the area of influence have been noted as 'disturbed' in the Survey Control Information Management System (SCIMS) database.	Marks have been exposed to the full range of mining induced subsidence movements. No reported damage to the survey control marks.	Following the completion of subsidence in the area a network of survey marks will be re-established to the satisfaction of NSW Spatial Services.

Table 26: Predicted vs Observed Impacts for Landscape Features for Area 5

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River and tributaries	Negligible environmental consequences including: • negligible diversion of flows or changes in the natural drainage behaviour of pools; • negligible gas releases and iron staining; and • negligible increase in water cloudiness over at least 80% of the stream length subject to vertical subsidence >20 mm. No subsidence impact or environmental consequence greater than minor.	No new impacts observed.	N/A
Cliffs	Cliffs of "special significance": Negligible impact (that is occasional rock falls displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 0. 5% of the total face area of such cliffs) within any longwall mining domain. Other cliffs: Minor impacts (that is occasional rock falls, displacement or dislodgement of boulders or slabs, or fracturing, that in total do not impact more than 3% of the total face area of such cliffs within any longwall mining domain).	No impacts observed.	N/A
Access Track	Minor impacts.	No impacts observed.	N/A

Table 27: Predicted vs Observed Impacts for Surface Water for Area 5

Aspect	Predicted Impacts	Observed Impacts	Completed Actions
Georges River	Negligible environmental consequences including: • negligible diversion of flows or changes in the natural drainage behaviour of pools; • negligible gas releases and iron staining; and • negligible increase in water cloudiness over at least 80% of the stream length subject to vertical subsidence >20mm. No subsidence impact or environmental consequence greater than minor.	Based on analysis of the long-term water quality records for designated upstream and downstream sites of LW38, no significant water quality impacts were observed or measured within the Georges River. Fracturing and diversion of flow with lower pool levels. Pool water levels respond to releases from BCD.	• Monitoring program continued. • Reported to key stakeholders. • Reported in EoP Report and Annual Review. • Monitoring program reviewed. • Impacts reviewed against Performance Measures. • Technical specialist notified and advice on Corrective Management Actions (CMAs) sought. • Impacts to Georges River included in GRRP, which was approved at the end of FY20. Rehabilitation works scheduled to begin in FY24.

6.14.3.3 Groundwater

Post mining monitoring of groundwater in the HBSS in Area 5 has continued as outlined in the LW 37-38 EP.

No adverse interconnection of aquifers and aquitards has been observed within 20 m of the plateau surface and no increased rate of groundwater recharge into the plateau has been observed in the post-mining period.

No TARP trigger levels related to aquifer or aquitard interconnection or changes in recharge have been observed in the post-mining period.

6.14.3.4 Aquatic Ecology

No specialist aquatic ecology monitoring was undertaken during the reporting period as the post-mining period of this program is complete. Results from specialist aquatic ecology monitoring have been included in previous Annual Reviews.

Observations of aquatic ecology habitat is captured as part of monthly inspections undertaken by the IMCEFT. Apart from low water levels observed in some pools during the reporting period, no specific impacts to aquatic ecology were evident.

Specialist aquatic ecology monitoring will continue following the implementation of the GRRP.

A summary of predicted and observed impacts on aquatic ecology is provided in Table 28.

6.14.3.5 Terrestrial Ecology

A baseline Terrestrial Flora and Fauna Assessment (Biosphere, 2009) was undertaken in support of the BSO Project EA. The Study Area for the EA included LW37 and LW38. Supplementary field surveys for terrestrial biodiversity were undertaken by Niche (2013), for the purposes of the LW37 and LW38 EP.

Subsidence effects are unlikely to have a significant impact on any threatened flora or fauna species (Niche, 2013). However, impacts may lead to the alteration of habitat and the alteration of the natural flow regimes of rivers, stream, floodplains and wetlands following longwall mining (Niche, 2013).

Visual inspections of vegetation communities within the LW37 and LW38 Study Area are undertaken as a part of routine landscape and water monitoring programs. Post-mining monitoring focuses on detecting changes to vegetation communities and fauna habitat.

No impacts to vegetation have been observed in the post-mining period as shown in Table 29.

Table 28: Predicted vs Observed Impacts for Aquatic Ecology for Area 5			
Aspect	**Predicted Impacts**	**Observed Impacts**	**Completed Actions**
Aquatic Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	No specialist monitoring undertaken in the reporting period. Observational monitoring continues with no impacts evident in the reporting period.	N/A

Table 29: Predicted vs Observed Impacts for Terrestrial Ecology for Area 5			
Aspect	**Predicted Impacts**	**Observed Impacts**	**Completed Actions**
Terrestrial Ecology	Threatened species, threatened populations, or endangered ecological communities: - negligible environmental consequences	No impacts observed.	N/A

6.14.3.6 Cultural Heritage

No historical sites were located above LW38.

There were no post mining impacts identified as a result of longwall extraction in the reporting period. Impacts have previously been noted to Aboriginal shelter sites Georges River No. 2 (AHIMS # 52-2-2243) and Georges River No. 3 (AHIMS # 52-2-2243). These impacts were a result of subsidence movements from LW35 and LW36. Refer to the relevant EoP Reports for further information.

6.14.3.7 Surface Infrastructure

Subsidence monitoring programmes are developed in consultation with key stakeholders and ensure that all key infrastructure and other surface features located above the extraction areas are closely monitored to assess subsidence movements and impacts.

Active mining concluded in Area 5 with the completion of LW38 on 1 February 2016. The area has undergone post mining monitoring as part of the approved monitoring program and no survey monitoring has been undertaken in FY23. There were no reported impacts to any built features or subsidence claims in FY23 in Area 5.

6.15 Hydrocarbon Contamination

Refer to Section 6.4.

6.16 Hazardous Material Management

6.16.1 Storage

Oils are stored in purpose-built facilities with appropriate bunding and firefighting provisions available. A licenced contractor is engaged to remove and recycle and/or dispose of used oil and grease products through appropriately licenced facilities.

Diesel fuel is brought to the Appin Pit Tops by road tanker and stored in above ground bunded tanks, from where it is transferred to diesel pods for underground use or direct to machinery.

Appin has two chlorine dioxide dosing plants in use; one at the Appin West Pit Top, and the other at BCD.

Details of the bulk chemical storage locations and manifest quantities associated with the Appin West and Appin North operations are provided in Table 30 and Table 31. No dangerous goods stored at Appin East are at manifest quantities.

As a result of a ferric chloride spill occurring at Appin East coagulant and flocculant dosing station during FY22, a bund audit was undertaken to determine the compliance of chemical and hydrocarbon storage facilities across the Appin Mine operations. The audit improvement opportunities were identified, leading to corrective actions being progressively implemented to rectify the issues identified. A follow up audit was completed during FY23.

Table 30: Summary of Dangerous Goods Storage at manifest quantities - Appin West

Storage Area ID	Proper Shipping Name	UN No.	Class / Division	PG[15]	Type	Design Capacity	Typical Quantity
ABT 01	Hydrochloric Acid 33%	1789	8	II	AGT[16]	23,000 L	23,000 L
ABT 02	Sodium Hydroxide 35%	1824	8	III	AGT	9,000 L	9,000 L
ABT 03	Sodium Hypochlorite 12.5%	1791	8	III	AGT	6,000 L	6,000 L
ABT 04	Hydrochloric Acid 9%	1789	8	III	AGT	3,000 L	3,000 L
ABT 05	Sodium Chlorite 7.5%	1908	8	III	AGT	3,000 L	3,000 L
ABT 06	Sodium Chlorite 7.5%	1908	8	III	AGT	2,000 L	2,000 L
ABT 07	Sodium Hydroxide 35%	1824	8	III	AGT	2,000 L	2,000 L
ABT 08	Citric Acid		N/A		AGT	2,100 L	2,100 L
ABT 09	Aluminium Chlorohydrate 100%		N/A		AGT	1,500 L	1,500 L
ABT 10	Aluminium Chlorohydrate 50%		N/A		AGT	1,500 L	1,500 L
ABT 11	Antiscalant Memguard		N/A		AGT	2,000 L	2,000 L
ABT 12	Permatreat Antiscalant		N/A		AGT	1,500 L	1,500 L

Table 31: Summary of Dangerous Goods Storage at manifest quantities - Appin North

Storage Area ID	Proper Shipping Name	UN No.	Class / Division	PG	Type	Design Capacity	Typical Quantity
ABT 01	Sodium Chlorite 7.5%	1908	8	III	AGT	4,000 L	3,000 L
ABT 02	Hydrochloric Acid 9%	1789	8	III	AGT	4,000 L	3,000 L
ABT 03	Sodium Hydroxide 25%		8		AGT	12,000 L	12,000 L
ABT 04	Sodium Hydroxide 46%		8		AGT	200 L	200 L
ABT 05	Sulfuric Acid 70%		8		AGT	10,000 L	10,000 L
ABT 06	Citric Acid		N/A		AGT	200 L	200 L

[15] PG – Packaging Group
[16] AGT – Above Ground Tank

ABT 07	Biocide RO 1032	N/A	AGT	200 L	200 L
ABT 08	Memguard 102	N/A	AGT	200 L	200 L
ABT 09	Memguard 44 & 61	N/A	AGT	16 x 20 L	16 x 20 L

6.16.2 Explosives

Explosives/detonators for the Appin operations are currently stored at both the Appin East and Appin West explosives storage facilities. IMC renewed the licenses for Appin East and Appin West magazines in January 2023. Storage facility capacity information for Appin East and Appin West is provided in Table 32 and Table 33 respectively.

Table 32: Explosives and Detonator Storage – Appin East

Site	Type	Capacity
Appin East	1.1D Explosive	550 kg
	1.1B Detonators	5,000 detonators

Table 33: Explosives and Detonator Storage – Appin West

Site	Type	Capacity
Appin West	1.1D Explosive	1,500 kg
	1.1B Detonators	5,000 detonators

6.16.3 Radiation Gauges

There is one monitoring gauge (moisture scanner) at the Appin East Surface Elevator Belt that contains low emission radioactive isotopes. This gauge is licenced and maintained as per the legal requirements. The gauge is housed in an appropriate container and is inspected and tested in accordance with legislative requirements.

There are several monitoring gauges (moisture scanners) in the WCCPP that contain low emission radioactive isotopes. These gauges are licenced and maintained as per legal requirements. All gauges are housed in appropriate containers and are inspected and tested in accordance with legislative requirements.

6.17 Methane Management

The in-seam gas content of the Appin mining areas was approximately 23 Nm^3 of methane per tonne of in-situ coal in FY23. A comprehensive underground methane drainage program is maintained, which includes a network of drill holes and pipes to recover a large proportion of this gas by in-seam and cross-measure drainage. Methane drainage is necessary to provide a safe, compliant and productive underground mining environment.

Methane gas extraction, utilisation and venting rates are summarised and reported monthly for greenhouse gas (GHG) accounting. During this period the Appin Mine monitoring systems, procedures and data were audited (reasonable assurance) as required by statutory and internal requirements.

Results of the GHG accounting for FY23 are summarised in Table 34 and Figure 9.[17] Long-term results for FY15 to FY23 are shown in Figure 10.

Table 34: Summary of Greenhouse Emissions - Appin Mine

Emission Type	Unit	FY22 Total	FY23 Total
Scope 1	kt $CO_{2\text{-}e}$	1590	1864
Scope 2	kt $CO_{2\text{-}e}$	216	180

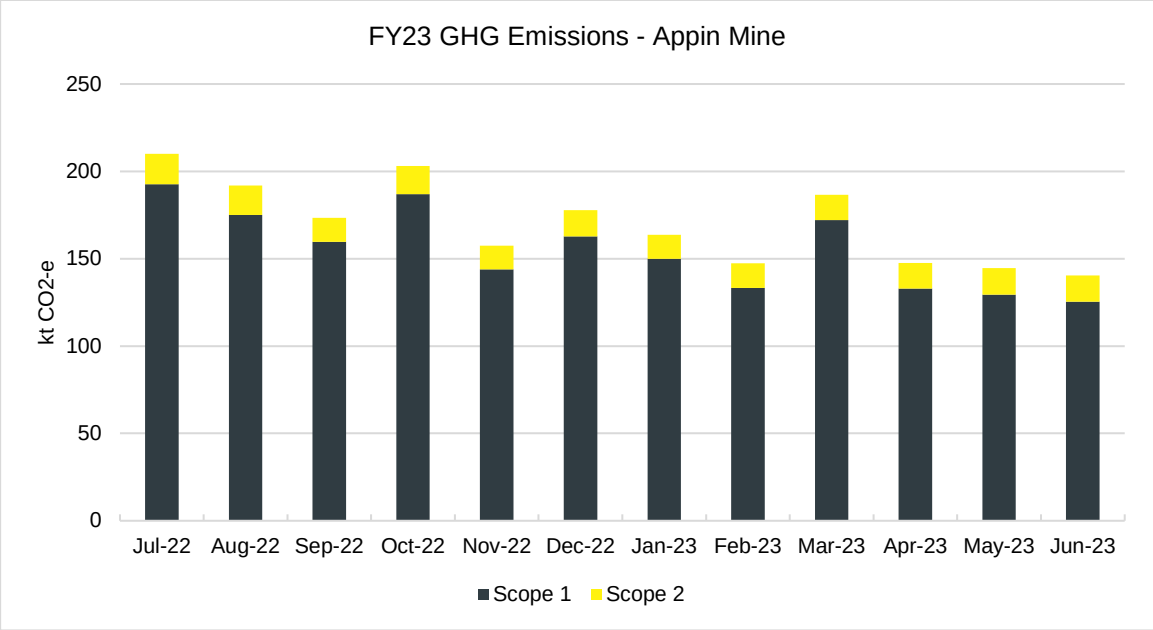


Figure 9: FY23 GHG Emissions - Appin Mine

[17] Figures are for NGER (National Greenhouse and Energy Reporting) Facility WCF01 and APN01.

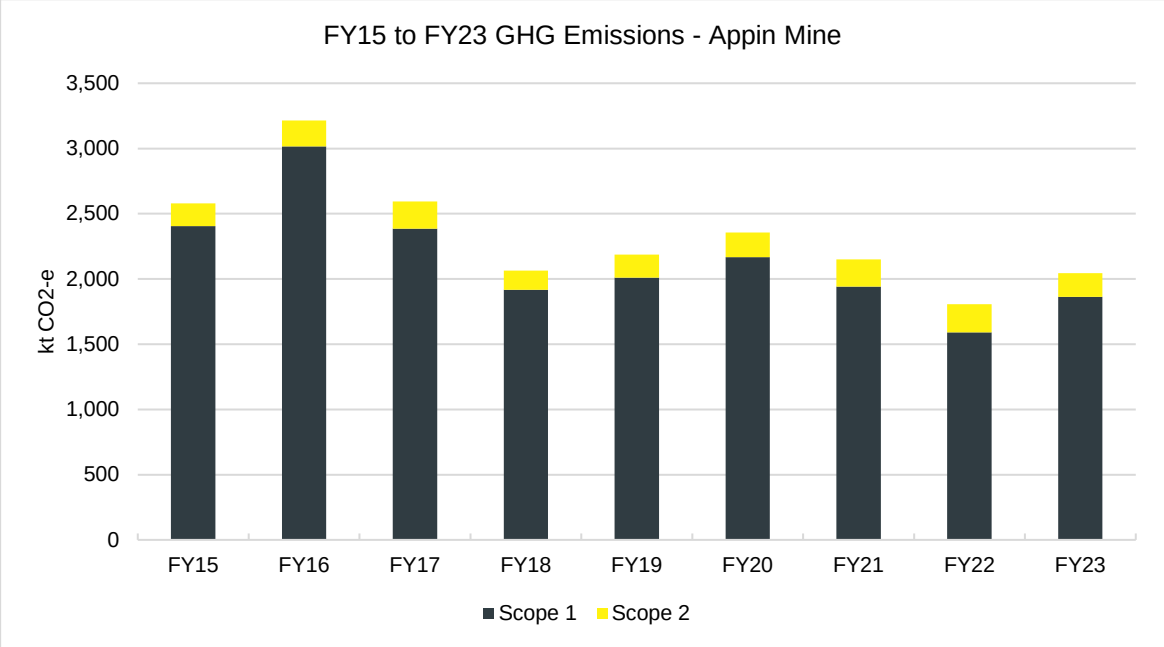


Figure 10: FY15 to FY23 GHG Emissions - Appin Mine

The current methodology for the calculation of GHG emissions and reporting at IMC is consistent with approved guidelines from the Clean Energy Regulator for Continuous Emissions Monitoring (CEM). The potential to convert from the current methodology to Periodic Emissions Monitoring (PEM) and whether such shift in methodology would result in more accurate and consistent monitoring is currently being investigated. Following conclusion of the investigations, any material changes to reported GHG emissions at IMC will be updated accordingly.

6.17.1 Mine Safety Gas Drainage

In AA7 and AA9, gas drainage is now entirely undertaken by the underground gas drainage network before being piped to the surface and utilised by the EDL Plants (West and East). When there is more gas available from the mine than can be utilised by EDL, the flaring systems are initiated to abate the methane content of the gas.

The flares at the Appin West Gas Drainage Plant were utilised intermittently during FY23 due to programmable logic controller (PLC) issues. The flares at the Appin East Gas Drainage Plant were used during the reporting period, however only on an as required basis when the EDL power station was non-operational, and gas could not be redirected to Appin West. Drained methane has been utilised at EDL for power generation, with some minor venting during plant changes and transitions.

6.17.2 Mine Methane Extraction

The methane gas extracted from the coal seam by the underground gas extraction network is directed to the surface, via the gas drainage plants, from where it is piped to the electricity generation plants and used to generate electricity. Total methane recovery that was transferred to the EDL power station resulted in 3,225 kt CO_2-e of abatement.

6.17.3 Mine Ventilation Fans

During the reporting period, approximately 1647 kt CO_2-e was emitted to atmosphere from the Appin Mine Ventilation System, an increase of 35% when compared to FY23 (1237 kt CO_2-e). The average CH_4 concentration was 0.29% (up from 0.24% in FY22) and the average CO_2 concentration was 0.20% (down from 0.21% in FY22).

6.17.4 Decarbonisation Program

South32 has established greenhouse gas emission targets. Since setting these, IMC has supported achievement of the short-term target of maintaining Scope 1 emissions at FY15 levels through to the end of FY21. IMC is now working to progressively reduce emissions, supporting South32's Group-wide medium-term target (to halve operational GHG emissions by 2035 compared to the FY21 baseline) and long-term goal (net zero operational and Scope 3 GHG emissions by 2050), noting South32's Group-wide decarbonisation strategy to meet the medium-term target and long-term goal has been developed at a whole-of portfolio and guidance level. The goal of net zero operational GHG emissions by 2050 aligns South32 with the Paris Agreement, as well as the NSW aspirational target for 2050.

During FY19, IMC completed a concept level study that proposed a phased roadmap of projects with the aim of delivering the goal of net zero by 2050 through a combination of increased gas capture, treatment of ventilation air methane (VAM), and offsetting. During FY20, work towards delivering key projects associated with the roadmap began. In FY23, this work has focussed primarily on increasing the proportion of fugitive emissions generated by longwall production at Appin Mine that are captured by the gas drainage system and reticulated to abatement facilities (either power generation or flaring). This is measured by the post drainage capture efficiency (PDCE) metric.

Increases in longwall gas capture have been achieved with additional underground drilling programmes that began in FY20 and were continued into FY23. This includes directionally drilled holes targeting gas bearing strata below the longwall and into zones where it is thought gas can be extracted from the longwall goaf (the void formed by longwall extraction). Although the long-term target of an average PDCE of 67% has not yet been achieved, consistent increases in PDCE have been delivered. Average PDCE increased to approximately 56%, 60%, and then 63% in FY20, FY21, and FY22 respectively. In FY23, PDCE has been further increased to 66%. During South32's base year (FY15), PDCE was 51.4%. On several occasions during the previous three years, PDCE has reached 65-67% for periods of time, indicating the 67% annual target is achievable.

In FY23 South32 progressed its partnership with CSIRO in developing commercial scale ventilation air methane (VAM) abatement technology. South32 and CSIRO aim to develop and field demonstrate a full scale next generation Thermal Flow Reversal Reactor (TFRR – known as thermal ventilation air methane mitigation (VAMMIT)) and a safe ducting system at IMC's Appin Ventilation Shaft No 2. This demonstration facility will process approximately 17 Nm^3/s ventilation air and run in a self-sustaining state at the low methane concentrations that are present in mine exhaust air (0.3 to 1% by volume).

The safe ducting system will provide critical safety features, such as fast responding laser type methane detectors, flame arrestor etc. to provide an intrinsically safe connection between an operating coal mine and the thermal VAMMIT unit that aims to oxidise >96% VAM. The average achievable methane emissions reduction from the trial unit is estimated at approximately 30 kt CO_2-e per year, based on Appin Mine's current exhaust average methane concentration. If the trial is successful and able to be scaled up to take all exhaust mine ventilation air, the achievable reduction in methane emissions is expected to exceed 2,000 kt CO_2-e/yr.

6.18 Public Safety

One incident involving the general public occurred during the reporting period. On 26 May 2023 a member of the public collided with the rear of a truck transporting coal from Appin North to PKCT. The incident occurred on an incline on the M1 Princes Motorway.

Complaints received over the reporting period are discussed in Section 9.1. Public safety risks associated with the site activities are addressed and controlled as listed in Table 35.

Site safety is managed under a Health and Safety Management System.

Table 35: Safety Risks and Control Mechanisms

Potential Safety Risk	Control Mechanism
Safety on Site	Workers are required to undertake a site induction which outlines the accountabilities and responsibilities relating to safety whilst working on site, which enables them to gain access to site via the swipe card system using boom gates and turnstiles. Prior to visitors entering the Pit Top areas they are required to contact the Illawarra Access Controller (IAC) at the turnstile or their site contact to gain access to the site. From this point the visitor is accompanied by their site contact. Once on-site additional safety information is shared via: • safety training and awareness sessions are held for all personnel working on site which allow for two-way communication between management and the workforce; • pre-shift safety discussions and Toolbox Talks; • posters, and TV screens presenting safety information located around the site; • periodic business updates including email and newsletter material distributed to workers; and • various meeting forums include safety as an agenda item in addition to a dedicated site HSE Committee meeting. There is no access to operational sites for members of the public unless approved. Access to North Cliff is restricted with locked gates.
Road Safety	A Drivers' Code of Conduct is in place to encourage appropriate driver behaviour by personnel who drive through Douglas Park and to the AMVA Project site including employees, contractors and truck transports. The Code of Conduct is communicated to employees and contractors. Routine daily inspections of public roads are conducted for evidence of coal spilled from trucks with the use of road sweepers as required. All trucks leaving Appin North and Appin East sites must pass through the truck wash and cover loads prior to exiting the site. In vehicle monitoring is reviewed periodically or in response to complaints to identify inappropriate driving behaviours.

6.19 Waste Management

6.19.1 General Waste

General waste is segregated on all sites to maximise reuse and recycling opportunities in accordance with the Appin Mine Waste Management Plan. Solid waste volumes generated at Appin Mine (including Appin West, Appin East, Appin North and WCCPP) for the reporting period are specified in Table 36. Waste generated from exploration activities (drilling muds) and by the Appin West WTP for FY23 are also included in Table 36.

Table 36: Main waste quantities for Appin Mine

Waste Stream	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
General Waste (tonnes)	1323	1080	782	1023	335	347	299	323
General Waste (ResourceCo) (tonnes)	-	-	-	424	1255	808	1054	1244
Industrial filters (tonnes)	380	268	243	352	754	836	815	832
Timber (tonnes)	225	147	62	75	5	5	22	21
Metal (tonnes)	1344	935	936	967	1062	900	960	1221
Cardboard (tonnes)	20	21	15	22	29	23	25	28
Commingle (tonnes)	17	14	7	17	388	14	12	7
Concrete, bricks (tonnes)							19	49
Oil (tonnes)							152	81
Oily water/sludge (tonnes)							107	192
Solcenic Oil (tonnes)							88	12
Effluent Wate (tonnes)							232	170
Various Chemicals (tonnes)							1.5	0.5
Silent Seal (tonnes)							0.4	7
WAC (ML)					4.5	5.9	5.5	4.9
Brine (ML)					123	139	117.1	183
Biosolids (ML)					0.5	0.7	0.7	1.98
Drilling Muds (ML)					5	8.4	2.35	4.02
Electronic Waste (tonnes)					0.03[18]	0.2[19]	1.9[20]	2.3[21]

6.19.2 Waste Reduction and Recycling

Based on FY23 waste figures from Appin Mine as highlighted in Table 36, a slight increase to FY22 in recycling is evident. Redirecting this waste to the recycling facility is an alternative end-of-life treatment and final disposal of products opportunity. Appin Mine initiated a housekeeping improvement project across the laydown areas during the FY, to recycle old steel structures and components.

A comparison of volumes from FY19 – FY23 diverted from and disposed of in landfill is provided in Figure 11.

[18] Recorded e-waste disposed at the Regional Operations Centre (ROC) via the University of Wollongong (UoW) e-waste bin. E-waste is recycled by an external recycling vendor.
[19] 68kg was disposed at the Regional Operations Centre (ROC) via the University of Wollongong (UoW) e-waste bin. 136kg was disposed via Certified Environmental Disposal services provided by DXC.
[20] Volume across IMC. All electronic waste is processed (recycled or disposed of) by ACT Logistics.
[21] Volume across IMC. All electronic waste is processed (recycled or disposed of) by ACT Logistics

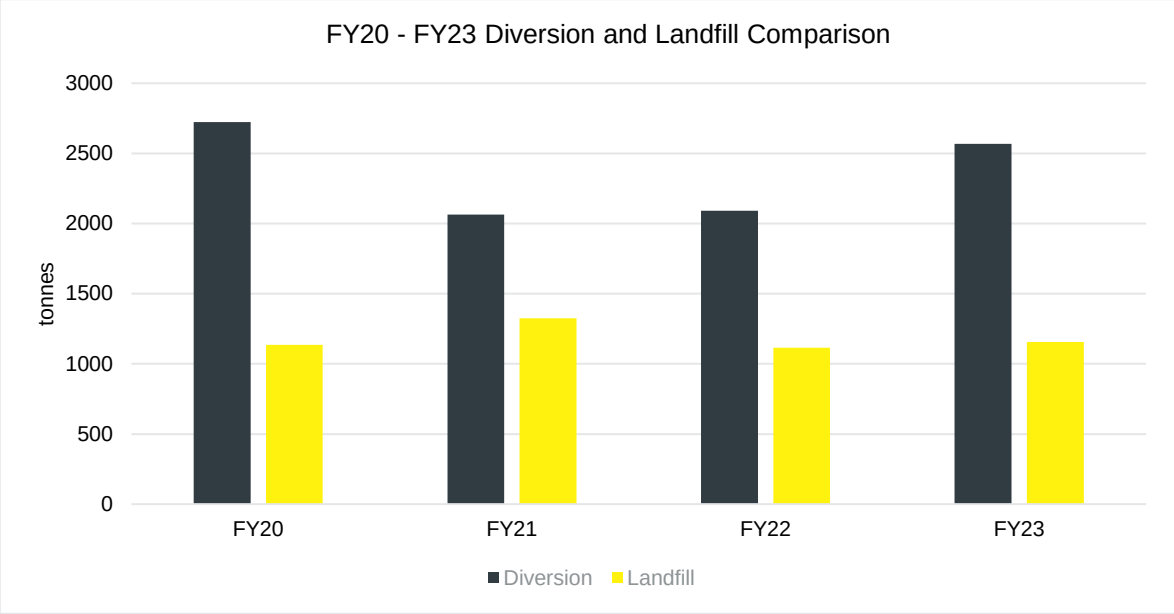


Figure 11: FY20 – FY23 Diversion and Landfill Comparison [22]

6.19.2.1 Diesel Exhaust Emission Management – Long Life Diesel Particulate Filters

As noted in the FY22 Annual Review, IMC undertook a change from cellulose and paper-based filters to a glass fibre filter across the diesel fleet (over 90 powered underground vehicles for travel and haulage purposes). IMC used a simple but inclusive approach which included filter analysis across three primary phases, consisting of interviews with machine operators to establish filter usage and performance, usage analysis using information from SAP and engine hours and a trial done on a high utilisation Coal Tram machine. Implementation on the Eimco, grader and dozer long life filter was completed.

Ongoing benefits include:

- Decreased transport cost to site and warehousing footprint.
- Improved machine maintenance and availability.
- Decreased filter waste and disposal.
- Increased efficiency (>90%).
- Increased temperature and pressure rating.
- Less exposure to diesel particulate for site personnel.

6.19.3 Coal Wash

Coal wash is a by-product of processing RoM coal. During FY23, a total of 1.08 Mt of coal wash was emplaced at the CWEA. This was comprised of 0.62 Mt of coal wash from the WCCPP and 0.2 Mt from the DCPP, and 0.25 Mt of stockpiled DCPP material from previous years.

[22] FY20 - FY23 Diversion and Landfill Comparison graph (Figure 11) only includes the top eight main waste streams from the Main waste quantities for Appin Mine table (Table 36)

The current approved design of Stage 3 CWEA provides 29.3 Mt of coal wash emplacement with an expected emplacement life of approximately ten years as of June 2023 (based on projected coal wash volumes). A review of the design is anticipated to be included in the next revision of the CWEA Management Plan. The concept design for the Stage 4 CWEA will provide an additional 26 Mt of coal wash emplacement.

Table 37 outlines the capacity and status of each of the coal wash emplacement areas.

Table 37: CWEA – Capacity and Status

Emplacement Stage	Estimated Capacity (Mt)	Emplacement Status
1	4.6	Complete
2	20.8	Complete
3	29.3	Current
4	26.0	Not Yet Commenced

During the reporting period, IMC diverted approximately 0.42 Mt of coal wash from the DCPP for beneficial uses (i.e. as an engineered fill in housing developments and for the development of arterial and agricultural roads, and a further 0.08 Mt under Operational Purpose Deductions (OPDs) for engineering works development, with approximately 7.5 Mt diverted since 2009. IMC has agreements with property developers that should continue to see large volumes of coal wash diverted for beneficial uses. Coal wash was utilised at the Spring Farm Parkway in FY23, and this will continue in FY24. IMC continues to develop a pipeline of major projects that will require engineered fill for the next five years.

Coal wash from the DCPP had been stored at Appin North in various stockpiles since 2019 pending approval for use in OPDs or for beneficial reuse. In FY23, an audit of coal wash management was completed by the EPA. The EPA required waste levy monthly reports to be amended and submitted to reflect the volume of stockpiled material that had been stored for greater than two years on site, and an outstanding levy contribution was paid. Emplacement of the stockpiled material continued in FY23.

The IMC Coal Wash Road Base Project planning continued during the reporting period.

Considerable work continues to be carried out on the alternative uses of coal wash, including ongoing monitoring of potential contaminants when coal wash is used for landfill or emplacement. This work has been reported in previous Annual Reviews.

IMC will continue to be involved in research, the development of, and implementation of alternative uses for coal wash in order to minimise the volume of coal wash emplaced at the CWEA in the future.

Approximately 225 kt of reprocessed coal wash was transported to PKCT for export during FY23 as a low-grade thermal coal. The product is used for power generation and the production of cement after blending with high calorific value thermal coal. Anticipated sales in FY24 are estimated at 245 kt.

During the reporting period IMC continued to support Australian Coal Industry Research Program (ACARP) Research Project C29016 Southern Coalfield Coal Washery Reject Characterisation and Classification, including management strategies for applications in Civil Engineering. The final report was published in June 2023 and is available for download on the ACARP web site (https://www.acarp.com.au/).

6.19.4 Sewage

During the reporting period, ongoing monitoring and inspections were conducted on the two Appin Mine STPs.

Both STPs are 'Smith and Loveless' units, located at the Appin West and Appin North sites, that discharge into maturation ponds. The treated effluent is irrigated on site via LDP 38 (Appin West) and LDP 4 (Appin North). A licensed wastewater maintenance contractor is engaged every quarter and as required to review operational performance and assist with the operational aspects of the Appin West and Appin North STPs to minimise the likelihood of any issues occurring.

The WSC completed one planned inspection for both STPs during the reporting period. No immediate actions were raised, with the operation of STPs by IMC deemed satisfactory.

In order to meet the land capability and irrigation management requirements of the utilisation area at Appin West, there is a predicted overflow of the storage dams up to 2.5 times per year. This is under the assumption that a minimum of 3.8 ha of irrigation area is available; and wet-weather storage is triggered following >5 mm of rain.

As a result, overflow of treated effluent from the storage dam is permitted via LDP 39.

Monitoring of the STP effluent at both sites is completed monthly in accordance with EPL 2504. Monitoring results are reported annually via the Annual Return and are made available to the public via the 14-day Report, available on the IMC website.

6.19.5 Weak Acid Cation (WAC) Disposal

WAC, a waste stream from the Appin West WTP, is transported off-site to a licenced waste management facility. The total volume of WAC transported off-site during the reporting period was 4.9 ML, a decrease of 0.6 ML compared to the previous reporting period. This was due to reduced throughput of the Appin West WTP.

6.19.6 WTP Biological Sludge

The Appin West backwash treatment plant was commissioned in April 2009. One of the by-products of the backwash treatment process is an organic sludge. The total volume of sludge transferred to the CWEA in the reporting period was approximately 900 kL.

As part of the Appin North temporary WTP, a sludge waste was generated and transported offsite via a licenced contractor for disposal. 620 kL of sludge was generated from the temporary WTP up until commissioning of the Appin North WTP in January 2023. The Appin North WTP does not produce sludge as part of the water treatment process. However, it does produce a back wash product that is currently being sprayed onto the CWEA as dust suppression and is filtered through the CWEA. Post commissioning in February 2023 the Appin North WTP produced 464 kL of backwash during the reporting period.

6.19.7 Brine Disposal

Brine is a by-product of the WTP process. Approximately 121 ML was generated in FY23 from the Appin West WTP, 30.3 ML from the Appin North temporary WTP and 31.7 from the Appin North WTP. The total brine generated from the Appin North WTPs was 62 ML. The brine is transported by truck to LDP 5, located at Marley Place, Unanderra and discharged under EPL 3241. The brine is discharged into the same location as the dewatering discharge from Dendrobium Mine, which provides dilution for the brine as it is released into Allans Creek.

The Allans Creek monitoring program continued over the reporting period to meet the requirements of Condition E1 of EPL 3241. The purpose of the program is to determine the effect of the increased discharge of brine from the Appin Mine WTPs on Allans Creek, following the commissioning of the WTP at Appin North. The results from the monitoring will be compared to the predictions in the modelling undertaken. The monitoring is undertaken at five sites along Allans Creek (including LDP 5).

The results of the monitoring and the comparison to the modelling results commenced in FY23 and will be completed in FY24.

6.20 North Cliff

The North Cliff Mine Site and access road is located between O'Hares Creek and Stokes Creek and is located in the Dharawal National Park. The majority of the site is gently sloping in a northerly direction towards O'Hares Creek. The mine site covers an area of approximately 10.3 ha of which approximately 6.5 ha is undisturbed by mining activities. The North Cliff site is shown in Plan 12.

Access to the site is along Fire Trails 10B and 10C from an intersection on the Bulli/Appin Road, 6 km northwest of Bulli Pass.

6.20.1 Land Ownership and Approvals

The North Cliff Mine Site and access road is covered by CCL 724, which includes the surface and land below to an unlimited depth over the mine site and to a depth of 15 m over the access road. Consent to establish the mine was granted in 1981 by the Minister for Planning and Environment under Section 101 of the *EP&A Act* and subsequently amended under Section 102 of the Act.

6.20.2 History

Mining operations commenced at the site in 1983, restricted to a single unit continuous miner. The RoM product was brought to the surface through the No. 4 shaft and into a 400-tonne surge bin, from which the product was loaded into trucks and transported to the WCCPP for processing.

Mining operations ceased at North Cliff in 1990 at which time all underground equipment was removed from the site. The two shafts were temporarily sealed with concrete caps with additional security fencing and associated signage installed to prevent unauthorised access. A number of the buildings and associated structures, and various other pieces of equipment were also removed from site. Periodic inspections are undertaken by the Specialist Environment.

6.20.3 Site Security

The North Cliff Site is enclosed with a 1.8-metre-high fence with two locked entry gates. The site security fencing is inspected on a regular basis.

6.20.4 Water Management

Surface drainage mainly flows in open channels to the site pond located at the northwest corner of the site. The pond is a permeable structure that filters the water that passes through the wall. Water that overflows via the dam spillway in wet weather events or passes through the wall flows through open sedge-land before entering an unnamed creek and into O'Hares Creek. There is no environmental impact associated with these discharge events on the receiving environment. No significant issues were identified with the site drainage system during the reporting period. No hydrocarbons or chemicals are stored at the site.

6.20.5 Air Quality

The generation of windblown dust from the North Cliff site is unlikely to cause any adverse impacts on air quality in the community or the surrounding vegetation due to the remote location and non-operational status of the site. A large proportion of the disturbed areas is compacted, further reducing the likelihood of generating significant emissions of wind-blown dust.

6.20.6 Noxious Weeds

The management measures to monitor and control the growth of noxious weeds on the site include the use of a weed control specialist to inspect the site as required.

No spot spraying for weeds occurred at the North Cliff site over FY23, however hand removal of noxious weeds including Crofton Weed and Pampas Grass was undertaken. Spot spraying of Pampas Grass occurred in July 2023.

6.20.7 Archaeological Sites

Archaeological surveys were carried out in 1977 and 1983. The studies identified one Aboriginal Heritage site, a single axe groove on an exposed rock shelf; located within the fenced mine site area. No damage occurred to this site during the development or operation of the mine. No damage was identified at this site during the reporting period. A Preliminary Historical Heritage Assessment was completed in FY22.

6.20.8 Site Rehabilitation

The North Cliff Rehabilitation Execution Plan (NCREP) was developed in FY23. The NCREP was distributed to external stakeholders, including the Appin Mine Community Consultative Committee (ACCC), Tharawal Local Aboriginal Land Council (TLALC) and regulatory agencies for review. Site inspections were held with the regulatory agencies and TLALC, and feedback from the site inspections and on the NCREP was incorporated into the documents and planning process.

The following studies were completed in FY23:

- Aboriginal Objects Due Diligence Assessment.
- Biodiversity Assessment.

Discussions have also occurred with the National Parks and Wildlife Service regarding the removal of redundant powerlines between North Cliff and Appin North in the Dharawal National Park.

The infrastructure present at North Cliff to be decommissioned or demolished and removed includes:

- Two mine shafts to be fully backfilled and sealed per MDG6001 Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams.
- Disconnection of in-ground services.
- Steel winder frames above shafts, concrete footings, slabs, and water tanks.
- Minor miscellaneous debris.
- Filter dam.
- Powerlines.
- Perimeter fencing.

Following completion of decommissioning works, surface rehabilitation works proposed include:

- Re-grading of disturbed areas to achieve a stable final landform.
- Formalise and stabilise surface water drainage paths.
- Preparation of growth medium for revegetation.
- Revegetation of disturbed areas.
- Maintenance of revegetation until ecosystem function has been established.
- Rehabilitation completion (sign-off) and Lease Relinquishment.

The rehabilitation works shall commence once all relevant statutory and IMC internal approvals have been obtained, and stakeholders informed. The order of rehabilitation works is envisaged to occur as follows:

1. Receipt of all approvals to commence work.

2. Decommissioning of remaining infrastructure including:
   a. Access works and mobilisation.
   b. Shaft sealing.
   c. Demolition and other decommissioning tasks.
3. Final landform establishment.
4. Revegetation establishment.
5. Revegetation maintenance and ecosystem development until ecosystem function has been restored.

It is envisaged that the decommissioning and final landform re-shaping will take less than two (2) years to complete. Vegetation establishment is expected to take up to five (5) years post planting. During this stage maintenance works will be undertaken periodically until revegetation becomes established and then would cease once ecosystem function has been restored to satisfactory levels. IMC envisages that this process to establish ecosystem function could take a minimum of 5-7 years (and potentially more) to achieve.

Four analogue sites were established at North Cliff over the reporting period. A baseline assessment of all four analogue sites (two for each plant community type on the site) was undertaken and baseline data collected for future comparison and to enable the identification of suitable species for use in rehabilitation (seed and tube stock). Soil chemistry, soil microbial activity and soil health attributes from each of the analogue sites was also assessed. Further, observations of erosion, slope instability or other landscape attributes that may influence the sites rehabilitation success were also collected while on site.

6.20.9 Environmental Inspections

Quarterly environmental inspections of the North Cliff site were completed during the reporting period. The inspections cover multiple aspects including, but not limited to, site security and safety, surface drainage, erosion, weed and dust management.

7. WATER MANAGEMENT

7.1 Water Licences

The water take for Appin Mine over the reporting period is provided in Table 38.

Note: 1 unit = 1 ML.

Table 38: Water Take – Appin Mine

Water Licence Ref No.	Water Sharing Plan, Source and Management Zone	Entitlement (units)	Total (ML)
10AL117284	Greater Metropolitan Region Unregulated River Water Sources Hawkesbury and Lower Nepean Rivers Water Source Menangle Weir Management Zone	53	1.56
10AL117998	Greater Metropolitan Region Unregulated River Water Sources Southern Sydney Rivers Water Source Georges River Catchment Management Zone	2750	706
10AL118765	Greater Metropolitan Region Groundwater Sources Sydney Basin Central Groundwater Source	274	213
10AL124671[23]	Greater Metropolitan Region Groundwater Sources Sydney Basin Central Groundwater Source	98	
10AL118777	Greater Metropolitan Region Groundwater Sources Sydney Basin Nepean Groundwater Source Nepean Management Zone 2	303	437
10AL119248	Greater Metropolitan Region Groundwater Sources Sydney Basin Nepean Groundwater Source Nepean Management Zone 2	300	

7.2 Compensatory Water

Under relevant provisions of the Project Approval (Condition 14 of Schedule 4), IMC shall provide a compensatory water supply to any owner of privately-owned land whose water supply is adversely impacted (other than an impact that is negligible) as a result of the project, in accordance with the approved WMP. IMC is currently supplying compensatory water as detailed in Table 39.

[23] Issued 8 August 2022

Table 39: Compensatory Water – Groundwater Bores

Bore	Mining Location	Impact	Current Status	Actions / Agreements	Water Supply Rate
GW108312 (Partridge VC Rest Area)	AA7 LW707B	Pre-emptively grouted to avoid gas release in high traffic area. Rest area amenities water supply impacted.	Ongoing consultation with TfNSW on permanent arrangement.	Currently TfNSW organising water deliveries as required, with reimbursement sought from IMC. Discussions regarding long-term replacement on-going with TfNSW.	As required, due to significant seasonal fluctuations in water demand.
Initially Unregistered Licence: 10WA121956	AA9 LW901/ 902 chain pillar	Reduced yield due to initial reduction in SWL in shallow 20 m groundwater bore.	New bore has been drilled to 150 m.	Installation of power and pumping systems in planning. Cartage of water to continue until finalised.	2 x 15 kL loads per week.
GW105388	AA7 LW709	Reduced yield.	Determination and various amendments issued by the Secretary of DPE.	Owner continues to deny access for bore investigation and installation of monitoring, despite this being a requirement of the Secretary's Determination. Cartage of water continues.	28 x 15 kL loads per week.

7.3 Groundwater

7.3.1 Appin West

During the reporting period, groundwater from the Appin underground operations was pumped to the surface at Appin West for treatment via the Appin West WTP. The treated water is piped underground for reuse, and/or discharged to the environment via LDP 24. The WTP has the capability to blend the treated water if required for reuse underground or to discharge to the environment. Discharge volumes at LDP 24 are made available to the public via the 14-day Report, published on the IMC website. Refer to Table 18 for discharge volumes.

7.3.2 Appin East

During the reporting period, groundwater from the Appin Mine White Panel storage area was pumped to the surface and stored in a 1,400 L tank at Appin East. The water is dosed with sodium hypochlorite to inhibit microbiological growth, before being re-used underground for fire suppression, and mine-services uses (hose-down of mobile and stationary assets, belt maintenance, etc.).

7.3.3 Appin North

Water for underground use is transferred from BCD to the underground operations via a gravity fed pipeline. Water make resulting from strata water inflow is collected in pits and low points in the underground workings where it is mixed with water delivered underground from surface storage. This strata water is brought to the surface either as moisture contained within the coal or as surplus underground water. Groundwater and surplus mine water can be pumped to the surface from Area 5 if required which can be treated at the Appin North WTP (previously temporary WTP prior to January 2023). During the reporting period approximately[24] 207.5 ML of water was transferred underground from BCD with 400.8 ML of surplus underground water pumped to the surface to be processed in the Appin North WTPs. The remaining ~508 ML[25] of BCD water was used in the WCCPP, for dust suppression (watercarts), washdown and the truck wash. Excess water in Pond 3 and Pond 4a was periodically used for dust suppression on the active CWEA with the water being filtered through the CWEA before entering the emplacement underdrainage system. Overflow water from P4a entered the emplacement pond system via the overflow pipe to EP2.

The Appin North temporary WTP was decommissioned and replaced with the Appin North WTP in January/February 2023. Both plants treated groundwater pumped to the surface from Area 5. The treated groundwater that meets required limits is then discharged directly to Brennans Creek as permeate via LDP 40. Non-conforming water is discharged into a drainage line that feeds BCD. Discharge volumes and water quality at LDP 40 is made available to the public via the 14-day Report, available on the IMC website. Refer to Table 18 for discharge volumes.

The Appin North WTP is able to treat water currently stored in Area 5, as well as underdrainage from the CWEA water management system. It is also planned for the backwash water to be treated following the implementation of Appin North backwash trial.

There were no incidents of groundwater pollution within the report period.

7.4 Water Supply and Use

7.4.1 Appin West

Mine water is processed at the WTP, which has two trains (Integrated Membrane System (IMS) 1 and 2) to produce treated water (permeate). This treated water is supplied to the Appin Mine underground mining operations. Any shortfall in underground supply is supplemented by potable water provided by Sydney Water. Excess permeate is blended with backwash water and discharged to the environment via LDP 24. Potable water is used for site administration buildings, workshops, the bathhouse, fire emergency services, Appin West Gas Extraction Plant, and as a back-up for underground operations.

Table 40 provides an overview of the potable water usage associated with the Appin West site for the reporting period.

[24] BCD underground usage is calculated using the BCD to Surface flow meter. There are two flow meters that record flow leaving BCD, one is the total flow from BCD to the Surface and Underground, and the other is BCD to the Surface only. Therefore, the flow of BCD water to UG needs to be calculated by subtracting the BCD to Surface flow from the BCD to Surface and UG flow.
[25] Figure is an approximation as it contains estimates (see footnote above).

Table 40: Potable Water Usage for Appin West				
Area	**Usage FY22 (ML)**	**Usage FY23 (ML)**	**Variance (ML)**	**Comments**
Appin West	85	67	-18	Likely due to reduced use of potable water underground.

7.4.2 Appin East

Potable water is supplied by Sydney Water to the Appin East site via a 600 kL surface tank. This tank provides potable water for the bathhouse, workshops, administration buildings, fire emergency services, Ventilation Shaft 2 site, EDL Appin East Power Plant, and nearby mine-owned cottages.

Surface water runoff from rainfall is captured in the main surface dam and is reused as supply for the dust suppression on haulage roads and stockpiles, along with the dirty equipment hose down.

Table 41 provides an overview of the potable water usage associated with the Appin East site for the reporting period.

Table 41: Potable Water Usage for Appin East				
Area	**Usage FY22 (ML)**	**Usage FY23 (ML)**	**Variance (ML)**	**Comments**
Appin East	345	312	-33	Underground water supply issues reported in FY22 were resolved.

7.4.3 Appin North

The Appin North site is primarily reliant on water from BCD. Some potable water is trucked to site and stored in a surface tank for use in the bathhouse and office facilities. Most water is sourced from BCD from where it is pumped, following chlorine dioxide treatment, for use in the following areas:

- underground areas for dust suppression;
- WCCPP and associated infrastructure; and
- Appin North Pit Top.

A summary of the water usage for the reporting period, compared to the previous reporting period, is provided in Table 42.

Table 42: Water Usage Comparison – Appin North				
Type	**Usage FY22 (ML)**	**Usage FY23 (ML)**	**Variance (ML)**	**Comment**
Potable Water	4.62	5.49	+0.87	Increase in staff on site due to additional projects over FY23.
Recycled (BCD) Water	681	706	+25	Greater water usage from the WCCPP and for dust suppression during drier conditions.

7.5 Rainfall

Figure 12 displays rainfall data for FY23 at Menangle (Menangle Bridge), NSW.

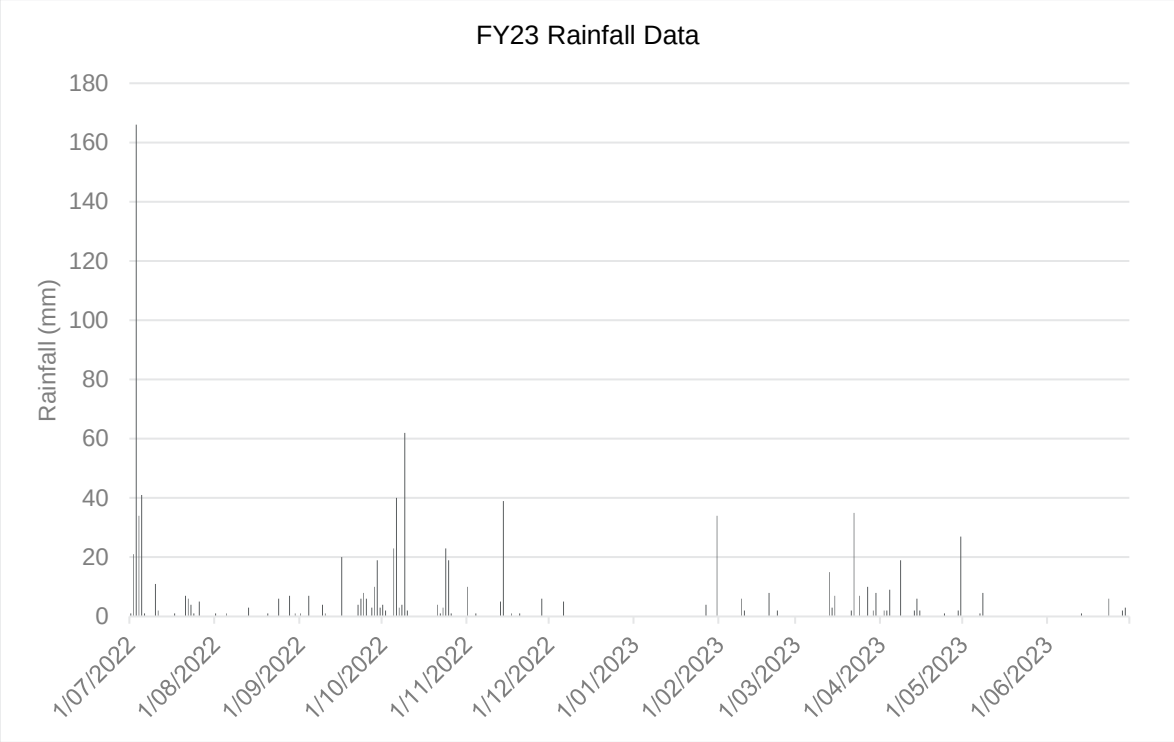


Figure 12: FY23 rainfall data - Menangle (BoM site #68216)

Figure 13 shows the annual rainfall for the region since FY15 from the Appin East DustTrak unit.

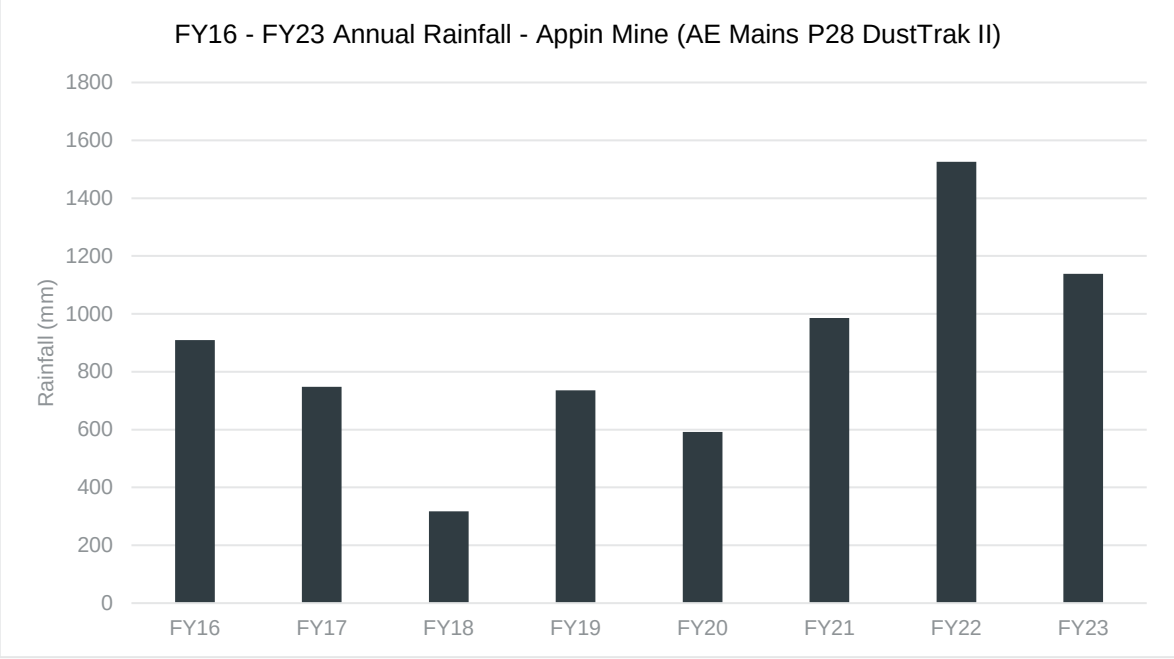


Figure 13: FY16 - FY23 Annual Rainfall - Appin East (AE Mains P28 DustTrak II)

Figure 14 displays the annual rainfall for the region since FY12 from the Bureau of Meteorology (BoM) station located at Menangle Bridge.

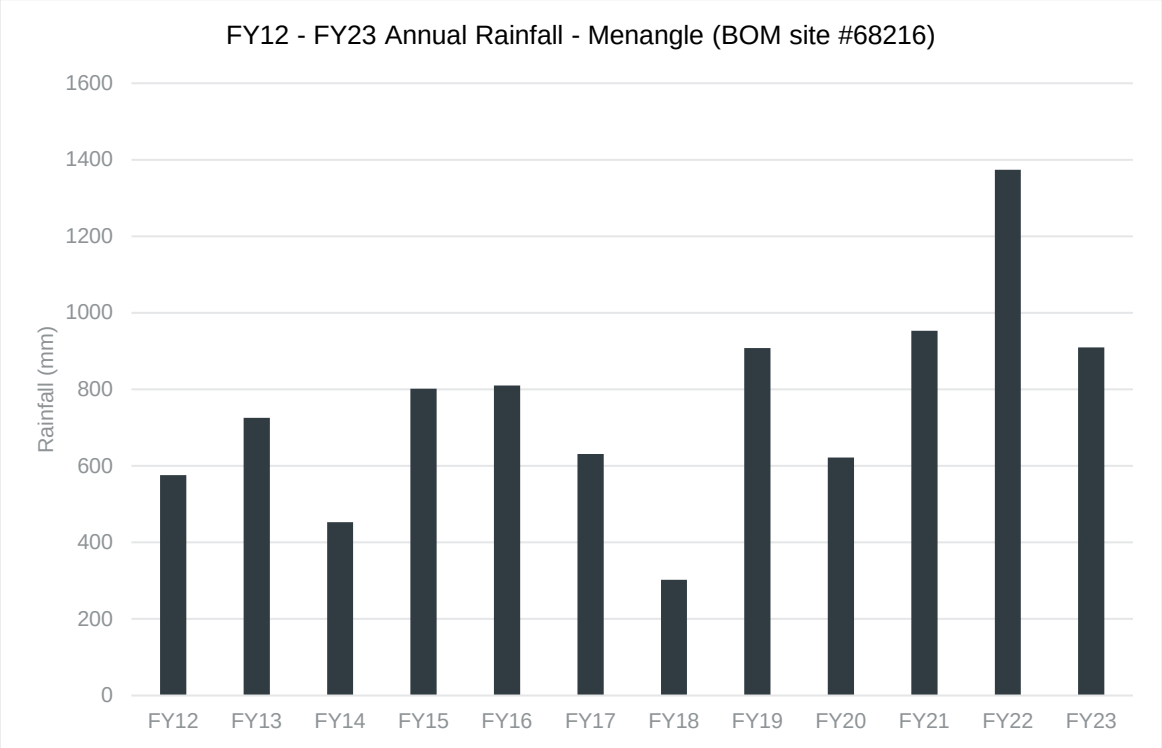


Figure 14: FY12 - FY23 Annual Rainfall - Menangle (BoM site #68216)

8. REHABILITATION

8.1 Rehabilitation for the Reporting Period

8.1.1 Buildings

The Appin West Engineering Building was demolished during the reporting period. It was replaced with a new Muster Shed. One redundant chemicals storage bund adjacent to the Appin East stockpile area was demolished during the reporting period. No rehabilitation of buildings associated with the sites was undertaken during the reporting period.

8.1.2 Rehabilitation of Disturbed Land

Progressive rehabilitation of the CWEA has been undertaken during the reporting period in accordance with the approved CWEA Management Plan.

During the reporting period there was growth medium establishment for ~0.7 ha.

The success of the rehabilitation in Stage 2 is shown in Plate 11. Progress of rehabilitation in the CWEA is detailed in the Annual CWEA Monitoring Report (See Appendix 7).

Plate 11: Stage 2 emplacement rehabilitation FY23 (Seeded in 2007)

An Annual Rehabilitation Report is required to be submitted to the Resources Regulator in accordance with Clauses 9 and 13 of Schedule 8A of the *Mining Regulation 2016*. A copy of this report is provided as Appendix 16.

Monitoring of revegetation at the BioBanking and offset sites was undertaken during the reporting period. For more detail, refer to Section 6.5.2 and the following annual reports included as appendices to this report:

- Appendix 8: Annual *Persoonia hirsuta* Condition Monitoring Report.
- Appendix 9: Appin West BioBank Site Annual Report – 2022/2023.
- Appendix 10: Nepean River BioBank Site Annual Report – 2022/2023.
- Appendix 11: Cataract River BioBank Site Passive Management Annual Report - 2023.
- Appendix 12: Ventilation Shaft 6 Offset Annual Monitoring Report - 2022/2023.
- Appendix 13: Ventilation Shaft 6 Bush Regeneration Report - 2022/2023.

Eight timber nest box habitats were installed in the CWEA rehabilitation during the reporting period. The nest boxes were placed at various heights (5 – 10 m) depending on type and were attached to existing mature trees. Individual habitats will provide shelter for Small Parrots, Large Owls/Cockatoos, Barn Owls, Brushtail/Ringtail Possums and Micro Bats. The nest box shown in Plate 12 is for a Small Parrot.

Plate 12: Small Parrot nest box installed in a Eucalypt in the Stage 1 Rehabilitation Area

8.1.3 Legacy Sites and Rehabilitation Program

The Legacy Sites and Rehabilitation Program consisted predominantly of site investigations and approvals planning in the reporting period.

Studies continued in FY23 to inform the closure planning process. These studies included:

- Stage 2 of the heritage building assessment, assessing existing infrastructure for current and future heritage value; and
- an historic operations liability assessment.

A site inspection occurred at the Bulli Shafts during the reporting period with representatives from WaterNSW and the Resources Regulator. Constraints associated with rehabilitation of these sites was discussed.

Rehabilitation planning activities progressed at North Cliff during the reporting period are discussed in Section 6.20.8.

8.1.4 GRRP

During the reporting period land access agreements to undertake the approved GRRP were progressed. A preferred contractor was onboarded to undertake the works.

Results from the WC21 rehabilitation trial at Dendrobium Mine will confirm the specific methodology to be used in Georges River. The WC21 rehabilitation trial was completed in FY23 following significant delays due to rainfall and catchment access limitations. The outcomes of the trial will be monitored for at least six months, pending rainfall to assess the effectiveness of the trial.

8.1.5 Exploration

At the cessation of drilling, exploration site rehabilitation takes place progressively. Sites across Appin Mine tenements are typically located on agricultural or residential land, and rehabilitation methodologies are reflective of this. Standard exploration borehole rehabilitation includes the cutting of casing to over 1 m below ground level, removing any added crushed sandstone used to build up the drilling pad and access tracks where applied, and finalising the site with topsoil, seeding and/or grass spray as required. Sites are watered and monitored until fully re-established. All rehabilitation is conducted in accordance with objectives agreed to in landholder access arrangements. For example, on a couple of sites, crushed sandstone was left in place at the request of the landholders.

All completed FY23 exploration boreholes have been rehabilitated with the exception of four boreholes, all located on a single property. They will be rehabilitated when all drilling has been completed on this landholder's property. Some sites also have groundwater monitoring instrumentation installed and these sites will be fully remediated at the completion of the monitoring program.

Landholder approval of IMC rehabilitation activities (via the ESF2 form) is sought for all exploration occurring across the wider Appin exploration domain.

8.2 Research

8.2.1 Persoonia hirsuta

Details of the ongoing *Persoonia hirsuta* translocation trial are provided in Section 6.5.2.2. The research report required under Condition 3 of EPBC Approval 2010/5350 was submitted to DAWE on 29 June 2021. A copy of the research report is available on the IMC website using this link.

In FY23 IMC supported the writing of an honours dissertation through Mount Annan Botanic Gardens and University of Technology Sydney around pollination ecology and pollinator networks. This research project commenced in July 2022 and was submitted in May 2023. The dissertation included an investigation into the pollinator community in the rehabilitation areas in the CWEA compared to remnant reference bushland in the surrounding area. This research is deemed beneficial to the *P. hirsuta* population translocated within the rehabilitation area given its preference for outcrossing. The research may also serve as a novel means to determine how the pollinator community returns to a rehabilitation area, which may be of value to rehabilitation outcomes in terms of ecosystem recovery and sustainable plant diversity.

8.2.2 Bushfire

A Bushfire Research and Trial literature review was undertaken in FY21, and coal wash sampling in the CWEA was undertaken in FY22. The results of the sampling were incorporated into the literature review, with the report being provided to IMC in April 2023.

The conclusions/recommendations in the literature review were as follows:

- Vegetation rehabilitation on the Appin North CWEA can withstand a bushfire (bushfire resilience indicator) and that germination and evidence of recovery would be observed after a burn.
- Subterranean coal wash material is unlikely to be exposed to a radiant heat intensity and duration that would have potential to ignite the coal wash reject material.
- Bushfire on the CWEA rehabilitation has a low (inconsequential) risk of ignition of the coal wash combustibles and the existing surrounding landscape would offer containment of a fire and prevent potential spread from the rehabilitation area.

This work indicates that there is limited and manageable risk associated with bushfire on the CWEA.

As a result of the literature review, it was determined that a trial burn was not required.

8.3 Further Development of the Final Rehabilitation Plan

A Rehabilitation Management Plan (RMP) was developed in FY22 to meet the requirements of the Form and Way documents published by the Resources Regulator. Rehabilitation objectives, a final landform and rehabilitation plan and a Forward Plan were submitted to the Resources Regulator Portal. The rehabilitation objectives and final landform and rehabilitation plan were not accepted by the Resources Regulator in May 2023 and were resubmitted in June 2023.[26] Rehabilitation criteria will be submitted in FY24.

The Rehabilitation Cost Estimate (RCE) for Appin Mine was reviewed in FY23. Additional costs were incorporated based on discussions with the Resources Regulator regarding final land uses and increased costs at the AMVA Project site as a result of construction activities over the reporting period. The latest RCE is attached[27] as Appendix 2.

[26] Rehabilitation objectives were approved in September 2023.
[27] The RCE is Commercial in Confidence and is only provided to the Resources Regulator.

9. COMMUNITY

The closest township to Appin West surface operations is the village of Douglas Park, which is located approximately 4 km to the northwest of the surface operations. The current underground mining operations (i.e. AA7 and AA9) are located to the north of Douglas Park village towards Menangle.

The closest township to Appin North surface operations is the village of Appin, which is located approximately 4 km to the northwest of the operations.

Appin East Pit Top is located on the outskirts of the village of Appin.

At the completion of this reporting period, Appin Mine employed approximately 2000 people.

9.1 Complaints

IMC operates a 24-hour Community Call Line (free call 1800 102 210) and a general email address illawarracommunity@south32.net. The call line and email address enable the community to request and provide feedback about operational activities and lodge any complaints on any aspect of the Appin Mine operations. The call line number and email address have been advertised throughout the reporting period in correspondence distributed to the community, IMC website, and community portal www.community.south32.net.

A complaint received by IMC in any format will be investigated and resolved with assistance from the relevant operational personnel. Feedback is provided by the Community Team to the complainant during the investigation and regarding the outcome of the complaint. Community complaints must be responded to within 24 hours of the complaint being received. Some complaints require ongoing investigation and remedial action to address the nature of the complaint.

Complaint information is provided publicly on the IMC website and to the ACCC, Menangle Advisory Panel (MAP), IMC management, and government agencies on a regular basis.

Appin Mine operations received 12 complaints during this reporting period (including Pit Tops and exploration work). As shown in Figure 15, the concerns received during this period are related to:

- 67% traffic;
- 17% noise;
- 8% environment; and
- 8% other.

This was an increase in complaints from the previous reporting period in which five complaints were received (see Figure 16). This was primarily due to traffic complaints during the upgrade of Menangle Road required for the AMVA Project (eight of the 12 complaints received). Details of the complaints received, and the actions taken are provided in Appendix 5.

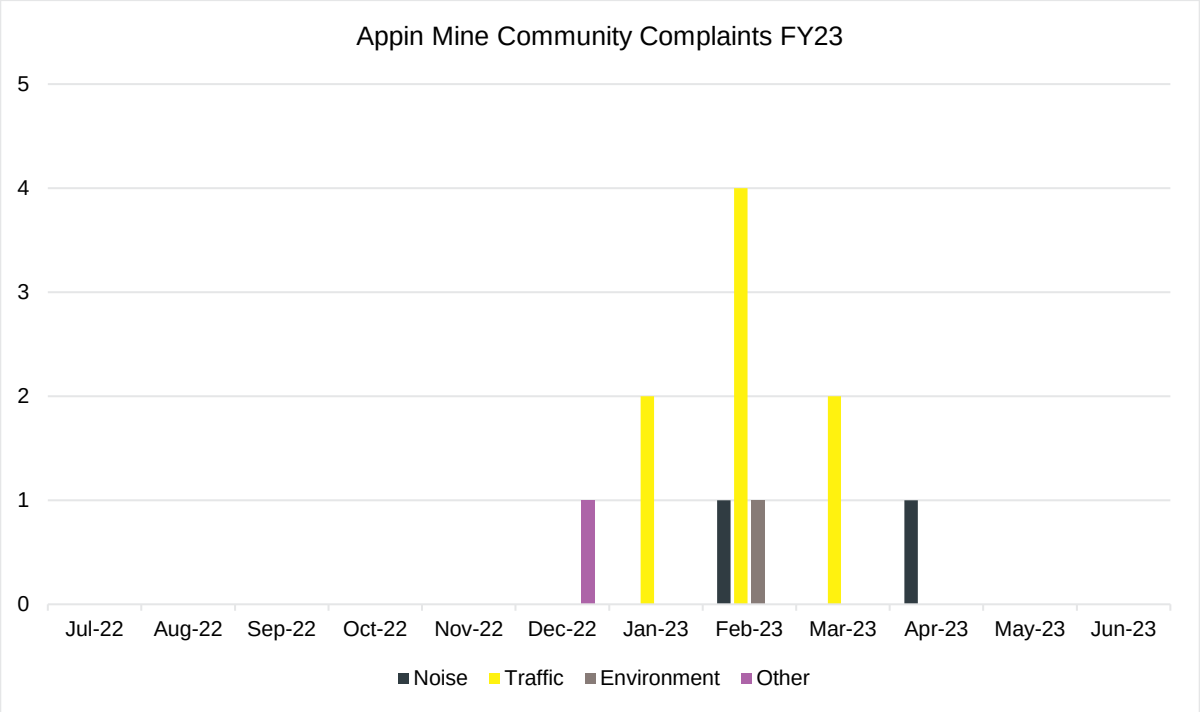


Figure 15: FY23 Community Complaints for Appin Mine

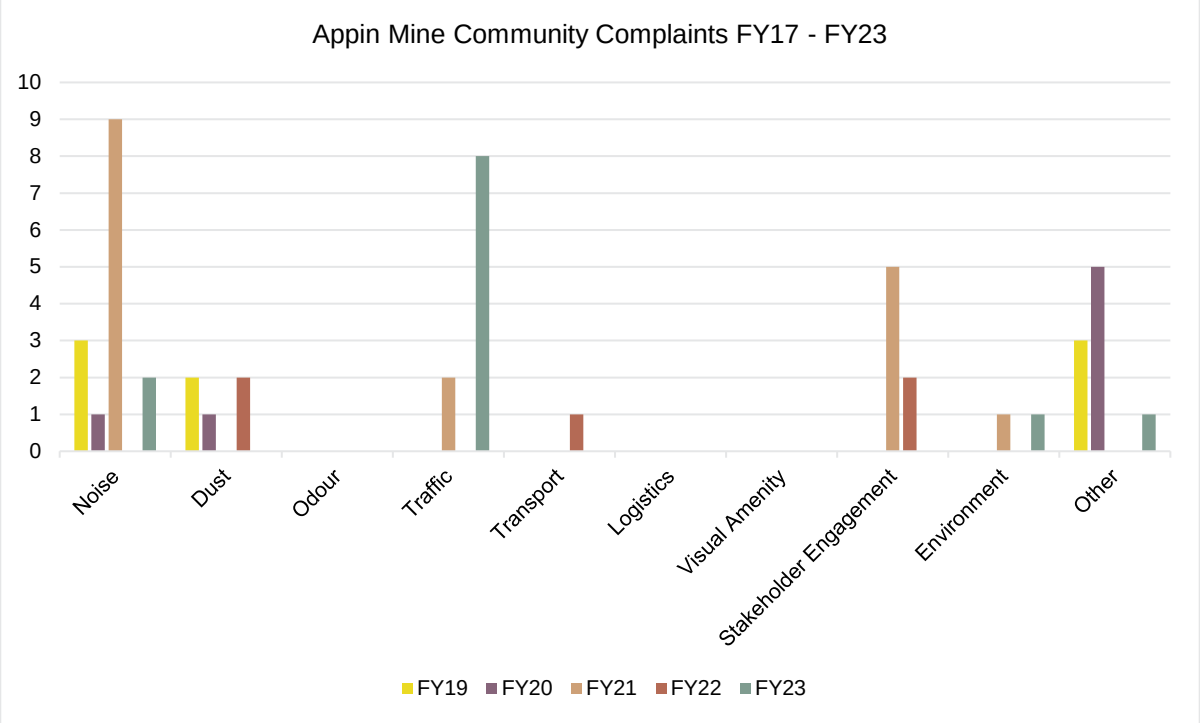


Figure 16: Community complaints from FY19 – FY23 for Appin Mine

9.2 Community Engagement

IMC's Corporate Affairs team manages regular community engagement activities as per the IMC Stakeholder Engagement Management Plan, with the support of operational and functional team members as appropriate. The plan identifies key stakeholders and appropriate communication and engagement methods.

Key regional stakeholders include:

- communities surrounding the Appin Mine operations;
- local government;
- State government agencies and authorities including DPE, WaterNSW, EPA, Resources Regulator, SA NSW and others;
- employees and contractors;
- community and special interest groups;
- the indigenous community – TLALC and others;
- local schools and volunteer groups; and
- the broader regional community.

Community information is provided in accordance with the IMC Stakeholder Engagement Management Plan. Communication methods include:

- community newsletters via letter box drops;
- door knocks;
- community notice boards;
- community perception surveys;
- media releases and other media activities;
- IMC website, IMC Facebook page, and Community Portal webpage (www.community.south32.net); and
- stakeholder group presentations and information sessions.

IMC directly manages the following Appin Mine stakeholder committees and working groups:

- ACCC;
- MAP; and
- IMC Community Partnerships Program Board.

The Douglas Park Advisory Panel (DPAP) was wound up in December 2022 as it had completed its function relating to the construction and initial operation of Ventilation Shaft 6.

9.2.1 ACCC

In accordance with Condition 6 of Schedule 6 of the Project Approval, IMC has established and operates the ACCC. The ACCC is operated in accordance with the Community Consultative Committee Guideline for State Significant Projects and has been operating since September 2012[28].

The ACCC provides a forum that enables regular two-way communication between IMC and the community/stakeholders and promotes open discussion on IMC's Appin Mine operations. The basis of discussion includes information on mining operations, environmental performance of the mine, community relations activities, and issues/outcomes as they arise during mining activity. Topics discussed in the meeting generally reflect community concerns and interests at the time.

The ACCC nominally comprises 11 members including representatives of IMC, WSC, local community and other key stakeholders who have an interest in IMC's operations and the potential impacts of mining in the area. The committee is chaired by an independent chairperson who is appointed by the Planning Secretary of DPE. Formal meetings are generally held every two months. A membership review was undertaken in the reporting period (typically occurring every three years) with the addition of two new community representatives.

A summary of information presented to the ACCC during the reporting period includes but is not limited to:

- operational updates;
- Mountbatten House and Stable works;
- the GRRP implementation;
- personnel changes at IMC;
- gas release and infrastructure impacts updates;
- BCD and tailings management;
- updates on the AMVA Project;
- EoP reports;
- VAMMIT Project;
- Nepean River Biobanking Site;
- Dendrobium Mine Extension Project updates;
- Appin North WTP progress;
- management plan approvals;
- future Appin extraction and exploration updates;
- community complaints/enquiries;
- community investment updates; and
- general environmental and community issues.

[28] The terms of reference for the ACCC was reviewed following the completion of the membership term in September 2021. Following this, a formal name change from the Illawarra Coal CCC to the Appin Mine CCC was endorsed.

Meetings are held locally, with some being held online during FY23 due to COVID-19 restrictions. The minutes of community meetings are made available to the public on the IMC webpage using this link.

9.2.2 DPAP

A purpose-formed community representative group, DPAP was established by IMC in April 2010 to provide input to the preparation of the Ventilation Shaft 6 EA.

DPAP was wound up in December 2022 as its original purpose was fulfilled, with any ongoing concerns about the site to be discussed at the ACCC.

9.2.3 MAP

The MAP is a community representative group that was established by IMC in March 2021 to support community engagement on the AVMA Project. It enables regular two-way communication between representatives of the local community and IMC on the project.

The MAP operates under an agreed Terms of Reference and is facilitated by an independent chairperson. Nominally, it is comprised of eight Menangle community representatives and two IMC representatives. However, the number of community representatives was increased to 11 in May 2023 due to the resignation of several long-standing members and increased interest in the project. The community representatives include landholders nearby to the project location.

A summary of information discussed with the MAP during the reporting period includes:

- planning and approvals progress updates;
- concept design updates and project layout;
- community engagement and consultation;
- assessment report overviews (noise, traffic, air quality, geotechnical etc.);
- amenity impacts and mitigation;
- consultation on the construction environment management plan; and
- construction schedule updates.

IMC facilitated an underground tour of Appin Mine for the MAP members on 30 June 2022 to better understand the mining process and ventilation requirements.

The minutes of community meetings are available to the public on the IMC website using this link.

9.3 IMC Community Partnerships Program (CPP)

IMC has an overriding commitment to supporting the communities in which we operate. As part of this commitment, the CPP was established to provide support for community projects and initiatives in the regions surrounding Appin Mine.

Since being established in 2004, the program has provided support to a range of community groups and not-for-profit organisations. The CPP is funded by $0.03 per saleable tonne of coal from Appin Mine. The program is administered by a board of community and IMC representatives, which enables community-based decision making on the allocation of funds.

During the past 12 months the Board has committed over $169,000 for community projects in the local Wollondilly area. Groups that benefitted from program funding in 2022/23 included:

- Menangle Community Hall.
- Wilton Fire Brigade.
- Rotary Club of Picton.
- Douglas Park Hall.
- Wollondilly Rural Fire Service.
- Douglas Park Wilton Athletics.

The CPP continued its support for Life Education with funding to Appin, Douglas Park and Wilton Public Schools to enable children to visit the Life Education mobile learning centre. IMC has supported Life Education in the Wollondilly area since 2008.

Organisations in the local community are encouraged to apply for funding. Applications for funding under the CPP are assessed against a range of selection criteria. The application form and selection criteria can be accessed using this link.

9.4 Other Partnerships

IMC has supported community initiatives and undertaken community engagement in FY23. This includes, but is not limited to, partnerships with University of Wollongong Science Space, the Clontarf Academy, Ride Wollongong, Illawarra Women's Trauma Recovery Centre, Illawarra Local Aboriginal Land Council, and Symbio Wildlife Park (koala conservation).

This partnership between Symbio Wildlife Park and South32 is about making generational changes surrounding awareness and conservation of Koalas and Australian native wildlife, combined with achieving measurable objectives around community and workplace engagement, conservation outcomes and education. Starting with the Macarthur and Illawarra Regions, the ultimate goal is to make a national, and even international impact, and contribute to saving Australian native species from extinction.

10. INDEPENDENT AUDIT

10.1 Environmental Audits

During this reporting period the performance of Appin's Environmental Management System was assessed in a comprehensive series of audits (refer to Table 43). A Governance Review process is in place as a part of the ISO 14001 certification. This process involves reviewing relevant environmental management plans in accordance with the schedule and incorporates both a desktop review and in-field verification. If non-conformances are identified during audits, they are recorded and tracked via the action tracking system utilised by IMC.

Table 43: Environmental Audits undertaken during reporting period

Date	Type	Internal	External	Comments
November 2022	IEA		X	Undertaken by ERM.
June 2023	Annual ISO 14001		X	Surveillance audit. Undertaken by SAI Global.
June 2023	Self-Assessment	X		Self-assessment of compliance with the South32 Environment and Climate Change Standard.
April - Sept 2023	Reasonable Assurance Audit	X	X	Review of externally reported GHG and water data.
Ongoing	Management plan Governance Review	X		Conducted internally as a part of ISO 14001 certification.

10.1.1 Independent Environmental Audit (IEA)

An IEA of Appin Mine is undertaken every three years. The most recent IEA was conducted in November 2022, with the report submitted in December 2022. The IEA identified 20 non-compliances (of which 18 had been reported in previous Annual Reviews) and zero observations.

An action plan to address the non-compliances was developed and submitted to DPE and DCCEEW. The action plan and progress update is provided in Appendix 4.

The next triennial IEA is scheduled to be undertaken in 2025.

10.1.2 ISO 14001

The IMC Environmental Management System has been certified to the International Standard (ISO) 14001 since May 2003. ISO 14001:2015 Certification for Appin Mine operations (including Appin East, Appin West, Appin North and the WCCPP) was maintained following an external audit during June 2023. No non-conformances were identified.

The auditing process requires demonstration of adequacy of systems to manage environmental aspects and impacts related to site activities. The systems audited include legal compliance, document control, records, corrective action, monitoring and control, training and management of risks.

10.1.3 Environment and Climate Change Standard (ECCS)

An updated version of the ECCS was released in December 2022.

The Self Assessment for the South32 ECCS for this reporting period was conducted by IMC personnel. It was assessed that the requirements of the ECCS are largely in place.

Improvement opportunities identified in the 2nd Line Assurance Health Check in May 2022 were addressed in FY23.

10.1.4 KPMG Reasonable Assurance Audit

KPMG undertook a reasonable assurance audit for NGER and water data for the reporting period. This audit commenced in April and is expected to be completed in September 2023.

10.1.5 Governance Reviews

The following Governance Reviews were conducted for Appin Mine during the reporting period:

- Waste Management Plan.
- Water Management Plan.
- Traffic Management Plan.
- *Persoonia hirsuta* Offset Management Plan.
- Heritage Management Plan.
- Air Quality and Greenhouse Gas Management Plan.
- Pollution Incident Response Management Plan (PIRMP) - EPL 2504.
- Shale Sandstone Transition Forest Offset Management Plan.
- Surface Activities Management Plan.
- Gas Drainage Management Plan.
- Ventilation Shaft 6 Biodiversity Offset Strategy.
- Biodiversity Management Plan.

From these, the majority of corrective actions raised were administrative. All corrective actions were raised in the action tracking system utilised by IMC and closed out as required. Changes required to the respective management plan as a result of the Governance Review are recorded in the Management Plan Review Log for incorporation into the relevant management plan during the next review.

10.2 Environmental Risk Register

Environmental risks associated with the site operations are recorded in the Environmental Aspects and Impacts Register. The Environmental Aspects and Impacts Register is reviewed regularly and is the basis of the Environmental Improvement Plan.

11. INCIDENTS, NON-COMPLIANCES AND EXCEEDANCES DURING THE REPORTING PERIOD

Non-compliances recorded during the reporting period are detailed in Table 44, details of exceedances with criteria are provided in Table 45 and regulatory actions in the reporting period are provided in Table 46. Progress against non-compliances identified in the 2022 IEA is provided in Appendix 4.

Table 44: Non-compliances during the reporting period

NC1	
Non-compliance	Discharge of turbid water into Foot Onslow Creek.
Date	19 April 2023.
Details of non-compliance	Turbid water was discharged to Foot Onslow Creek from the AMVA Project sediment pond. It is estimated that less than 5000 L of turbid water was discharged. Turbid water was observed in approximately 40 metres of the creek. The creek consists of a series of pools and reed beds, that slowed migration of the turbid water downstream and largely contained it to a discrete section of the creek. The creek was not flowing at the time. Apart from suspended solids, there were no other contaminants in the water discharged. The water in the sediment pond was runoff from the construction area. A Penalty Notice was issued by the EPA to the Principal Contractor. A Formal Warning Letter was issued to Endeavour Coal Pty Ltd. It was acknowledged that the Principal Contractor had been responsible for the management and supervision of discharge, noting that as the licensee, Endeavour Coal Pty Ltd had overall responsibility for activities on the site. This incident was a non-compliance with Condition O1 of EPL 2504 and Condition 12 of Schedule 2 of the Project Approval.
Location	AMVA Project, located near Menangle.
Cause of non-compliance	Water was being discharged from the sediment pond to facilitate the final stages of excavation of the pond to its design capacity. As the water level in the sediment pond decreased, the intake pipe for the pump reached the base of the sediment pond and began pumping out turbid water into Foot Onslow Creek. The discharge was not being adequately supervised by the Principal Contractor.
Actions taken to mitigate adverse effects of non-compliance	Clean up activities commenced immediately after identification of the discharge. Sediment on the bank was scraped back and removed, a pump was installed in the creek to pump the turbid water back into the sediment pond, and sediment within the creek was removed by hand. A

	silt boom was installed to prevent migration of the turbid water further down the creek.
Actions taken to prevent reoccurrence	A review was undertaken of the management of the sediment pond. Procedures were revised and have been communicated to the new Principal Contractor on the site. The design of the water discharge system, including consideration of floating offtakes, in-line turbidity monitoring and level sensors is underway.
NC2	
Non-compliance	Data for Total Nitrogen was incorrectly entered into the 14-day Report.
Date	February and March 2022, identified 30 September 2022.
Details of non-compliance	Incorrect data entry was identified for Total Nitrogen at LDP 24. Results were reported as 38 and 28 µg/L for February and March 2022 respectively and should have been reported as 380 and 280 µg/L respectively. This was identified following submission of the FY22 Annual Review. This was a non-compliance with Part 3.5 Condition 66(7) of the *POEO Act*, noting that the incorrect reporting of data was an error, unintentional and not material.
Location	LDP 24, located at Appin West.
Cause of non-compliance	The units of the data entered were incorrectly identified.
Actions taken to mitigate adverse effects of non-compliance	The incorrect reporting of data was reported to the EPA. Data in the 14-day Report was updated immediately.
Actions taken to prevent reoccurrence	Additional checks of data are undertaken when entered into EQuIS.
NC3	
Non-compliance	Forward Program was not uploaded to IMC website within allocated timeframes.
Date	2 December 2022.
Details of non-compliance	Clause 16 in Schedule 8A of the *Mining Regulation* requires the lease holder to publish the Forward Program on its website. The Resources Regulator identified during an audit that the Forward Program was not

	available. It is required to be published within 14 days following submission.
Location	N/A
Cause of non-compliance	The requirement for the submission and publishing of a Forward Program is a new process. It was not identified when the Forward Program was submitted that it was also required to be published.
Actions taken to mitigate adverse effects of non-compliance	The Forward Program was published as soon as it was identified that it was not available on the IMC website.
Actions taken to prevent reoccurrence	A review of obligations in the IMC obligation management system was undertaken to prevent reoccurrence.
NC4	
Non-compliance	The TSS water quality concentration limit was exceeded at LDP 41.
Date	3 April 2023.
Details of non-compliance	The TSS limit for LDP 41 in EPL 2504 of 50 mg/L was exceeded on 3 April 2023. The measured water quality concentration was 151 mg/L. LDP 41 is the point the water quality of discharge from the AMVA Project is measured. This is also a non-compliance with Condition 15 of Schedule 4 of the Project Approval.
Location	LDP 41, located at the AMVA Project site.
Cause of non-compliance	The sample taken prior to discharge was not representative of the discharge from the discharge pipe. The sample taken from the discharge pipe indicated that the dosing of the pond had not been effective.
Actions taken to mitigate adverse effects of non-compliance	Discharge had been completed when the water quality results were received. It is not considered that there was any actual or potential for environmental harm.
Actions taken to prevent reoccurrence	Discussions were held with the Principal Contractor. Procedures of sampling prior to discharge were reviewed.
NC5	
Non-compliance	PIRMP test was not undertaken within one month of an incident.
Date	16 June 2023.

Details of non-compliance	A PIRMP test is required to be undertaken within one month of an incident. An incident occurred on 19 April 2023 (see NC1) and it was not identified until 16 June 2023 that a test had not been undertaken.
Location	AMVA Project site, near Menangle.
Cause of non-compliance	The requirement to undertake the test was not identified as the PIRMP had not been activated. An EPA Operations Officer was on site when the incident was identified and reported. The requirement to undertake the test was identified during an internal audit. This was a non-compliance with Part 5.7A Condition 153E of the *POEO Act.*
Actions taken to mitigate adverse effects of non-compliance	The failure to undertake a test was reported to the EPA. A PIRMP test was organised and undertaken.
Actions taken to prevent reoccurrence	A review of the obligation in the obligations management system was undertaken to make this requirement clear.
NC6	
Non-compliance	Monitoring data for LDP 41 was not being reported in the 14-day Report.
Date	30 June 2023.
Details of non-compliance	It was identified that monitoring data for LDP 41 was not being reported in the 14-day Report that is published on the IMC website. This included three (3) months of data (for February, March and April 2023). This is a non-compliance with Part 3.5 Condition 66(6) of the *POEO Act*.
Location	AMVA Project site, near Menangle.
Cause of non-compliance	The inclusion of LDP 41 in EPL 2504 had been completed well in advance of discharge occurring from the sediment pond. As no discharge was occurring, and no data was being obtained, it was not identified that the data was not being reported in the 14-day Report.
Actions taken to mitigate adverse effects of non-compliance	The non-compliance was reported to the EPA. The data was publicly reported on the IMC website on the same day the non-compliance was identified.
Actions taken to prevent reoccurrence	EPL 2504 was reviewed to verify that all other data was being reported.

NC7	
Non-compliance	Annual report of seismic events in the BSO Project Area was not included in the FY22 Annual Review.
Date	19 December 2022.
Details of non-compliance	It was identified that the Annual Report prepared on seismic events by a qualified seismologist was not included in the FY22 Annual Review as required under Section 6.3 of the BSO Regional Seismic Event Monitoring Program. This is a non-compliance with Condition 5(n) of Schedule 3 of the Project Approval. It is noted that the Annual Report had been prepared.
Location	Appin Mine.
Cause of non-compliance	The requirement to include a copy of the Annual Seismic Report in the Annual Review was not identified at the time of preparing the Annual Review.
Actions taken to mitigate adverse effects of non-compliance	N/A.
Actions taken to prevent reoccurrence	The wording in the BSO Regional Seismic Event Monitoring Program was amended to: *The report will summarise the seismic events located during the period and the relationship to mining, based on the analysis. The incidence of seismic activity and the relationship to mining is dependent on the analysis of events over a period of time. It is not expected that a relationship can be determined based on a single event. A summary of the annual report will be included in the Annual Review for BSO.* A summary of the Annual Report has been included in the Appin Mine FY23 Annual Review.

Table 45: Exceedances of criteria during reporting period

EX1	
Exceedance	The 80 percentile water quality concentration limit was exceeded for zinc at LDP 24.
Date	23 August 2022.
Details of exceedance	LDP 24 is the point the water quality discharge from the Appin West WTP is measured. The 80 percentile limit for zinc at LDP 24 in EPL 2504 of 8.0 µg/L was exceeded on 23 August 2022. The measured water quality

	concentration was 8.4 µg/L. The overall calculation for the reporting period did not exceed the 80 percentile water quality concentration limit.
Location	LDP 24, located at Appin West.
Cause of exceedance	The cause of the exceedance is unknown. There have been no further exceedances recorded over the reporting period. Analysis undertaken at a second laboratory for a sample taken in a similar timeframe did not indicate exceedance.
Actions taken to mitigate adverse effects of exceedance	The potential cause of the exceedance was investigated. It is not considered that there was any actual or potential for environmental harm.
Actions taken to prevent reoccurrence	Ongoing monitoring has been undertaken. No additional exceedances have been recorded.
EX2	
Exceedance	The Total Nitrogen 50 percentile limit was exceeded at LDP 24.
Date	23/08/2022, 29/09/2022, 27/10/2022, 30/01/2023, 27/03/2023, 19/04/2023.
Details of exceedance	LDP 24 is the point the water quality discharge from the Appin West WTP is measured. The Total Nitrogen 50 percentile limit for LDP 24 in EPL 2504 of 250 µg/L was exceeded during six sampling events over the reporting period. The 50 percentile concentration was calculated for the reporting period and the result was 245 µg/L, which is below the limit. It is noted that Total Nitrogen concentrations did exceed the 50 percentile concentration limit for the 2022/2023 Annual Return period for EPL 2504 (1 February 2022 – 31 January 2023), and this was reported as a non-compliance.
Location	LDP 24, located at Appin West.
Cause of exceedance	From 2019-2023, extensive studies and trials have been undertaken to optimize nitrogen removal within the plant with limited success. A review of the results showed that an increase in feed water Total Nitrogen (mainly ammonia) was directly related to an increase in discharge Total Nitrogen (ammonia) concentration. It is noted that the WTP was not designed to remove Total Nitrogen or ammonia to the EPL water quality discharge limit and therefore any change in feed concentration in water bodies underground will ultimately result in an increase in permeate concentration. The 50 percentile limit was included in EPL 2504 in August 2021.

Actions taken to mitigate adverse effects of exceedance	Extensive studies have been undertaken to optimize nitrogen removal. It is noted that background water quality in Allens Creek, into which LDP 24 discharges, is 500 – 600 µg/L, which is considerably higher than the discharge water quality concentration limit of 250 µg/L. It is not considered that there was any actual or potential for environmental harm.
Actions taken to prevent reoccurrence	A licence variation has been submitted to the EPA to increase the Total Nitrogen water quality concentration limit to reflect background water qualities.

Table 46: Regulatory actions during reporting period

Regulatory Action	Detail
Official Caution	An Official Caution was issued by the Resources Regulator on 29 June 2023 for the failure to submit the Compliance Report required under EPBC Approval 2010/5350 at the same time as being submitted to DAWE in 2020 as required under Schedule A of CCL 724. This non-compliance had been self-reported to the Resources Regulator and had been listed as a non-compliance in the FY21 Annual Review. The non-compliance was included in the IEA in 2022, which was reviewed by the Enforcement Team of the Resources Regulator.
Warning Letters	A Formal Warning was issued by the EPA on 15 June 2023 in relation to the discharge of turbid water from the AMVA Project site (see NC 1).
Penalty Notices	None issued.
Prosecution Proceedings	None commenced.

Refer to the following reports for specific compliance information:

- Appendix 1: EPL 2504 Annual Return - 2022/2023;
- Appendix 3: Appin Mine Project Approval Condition Compliance Report;
- Appendix 4: Independent Environmental Audit Progress - FY23; and
- Appendix 14: EPBC Approval 2010/5350 Compliance Report - FY23.

12. ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

12.1 Mine Operations

During the next reporting period underground operations will continue in AA7. Development will progress in Simpsons Mains and Razorback Mains to prepare for LW711 and extraction will continue in the currently approved panels of LW709 and beyond to LW710A and 710B subject to all necessary approvals being in place. Future mining areas are shown in Plan 19.

Applications to modify the Project Approval are planned to be submitted in FY24, including an application for the VAMMIT Project.

Construction activities in the next reporting period are detailed in Section 12.3.

12.2 Exploration

The planned FY24 exploration activities across Appin operations are concentrated in the EL 8972, AUTH 248 and EL 4470 tenements, with the following standard exploration boreholes planned in this area:

- Eight boreholes in AA7 (inclusive of two large diameter holes for carbonisation test work);
- Five boreholes in Appin Area 10; and
- One borehole in Appin Area 8.

In addition, one STIS borehole and one groundwater borehole are proposed in AA7.

A seismic campaign comprised of a selection of 2D seismic lines and two 3D seismic surveys is further proposed across several exploration tenements across the Appin domain.

The planned locations of FY24 proposed activities across South32 IMC Appin operations are shown in Plan 22.

12.3 Projects

12.3.1 Appin North

The following projects will be progressed in the next reporting period at Appin North:

- Commissioning of upgrades to the Appin North bulk coal winder.
- Following completion of the structural review of the 8000 tonne WCCCP product bins to reinstate designed capacity in FY23, works are planned to commence in late FY24 with completion expected in FY27.
- Commissioning of the concrete settling tanks, P3 and P4a dosing systems to improve water quality for reuse and discharge.
- Following completion of the proposed engineering design in FY23 for an upgrade of the haul road system between the CWEA and the WCCPP, construction is planned to commence in FY24.
- Relocation of drill mud slurry ponds.
- Engineering for the lifting and upgrade of Wedderburn Road with construction to occur into FY25.
- Continue investigations and design of EP4 as the CWEA approaches EP2. Construction is unlikely to commence until FY25.

- Implement works following investigations in FY23 into upgrading the sewage treatment system. The plan currently includes upgrading the PLC unit, electrical systems, air compressors and pumps with investigations into tank upgrades. This will also include the implementation of a flow switch on the effluent holding pond for automated irrigation.
- Removal/emplacement of remaining coal wash that had been stored at Appin North pending approval of an OPD or beneficial reuse.
- Further upgrades to Appin North Fire Systems including additional pipeline replacement and pump upgrades commencing in FY24.

12.3.2 Appin West

The following projects will be progressed in the next reporting period at Appin West:

- Upgrade of fire system, with new fire pipes and pumps to be installed on the surface.
- Concreting of unsealed areas within the laydown area and unsealed main access to the waste sorting and laydown areas.
- Upgrade of sewage system, including automated irrigation sprinklers and level sensors for the holding and treated effluent dams.

12.3.3 Appin East

The following projects will be progressed in the next reporting period at Appin East:

- Commissioning of the surface water automated dosing system. Delays were experienced in FY23 due to resourcing constraints.
- Upgrade of coal bins and assorted components.
- Construction of two new permanent chemicals bunds.
- Continued investigations and planning for the VAMMIT Project, with implementation planned in FY25 (pending approval).

12.3.4 Ventilation Shaft 6

The following projects will be progressed in the next reporting period at Ventilation Shaft 6:

- Level sensors to be installed at Ventilation Shaft 6 surface water storage tanks.
- Continued investigations and planning for the upgrade of the diesel backup ventilation fan, with implementation planned in FY25.

12.3.5 AMVA Project

Construction of the proposed AVMA major works will commence in FY24. The construction phases include the installation of infrastructure and equipment required for the operation of ventilation shafts and mine access facilities. Shaft sinking will commence, beginning with the Pre-Sink and then the Main-Sink. Shaft sinking will involve drilling and blasting methods and also the concreting of the shaft wall formed and poured in situ.

12.3.6 General

Switchyard upgrades at multiple sites and locations across Appin Mine will be undertaken to replace old infrastructure. The project scope includes Ventilation Shaft 2, Appin North, Appin East and Appin

West. The project will be ongoing with upgrades to additional infrastructure being assessed for completion in FY24.

12.4 Environmental Management

The following activities will be progressed in the next reporting period:

- Continue monitoring under the GRAHMP.
- Continue monitoring of the *Persoonia hirsuta* translocations (1-3).
- Initiate monitoring plan of habitat in the CWEA for the Broad-headed Snake, bee habitat and nest boxes.
- Continue to explore uses of remote sensing to supplement the CWEA rehabilitation monitoring program.
- Improve Appin Mine housekeeping across all pit top areas, including recycling redundant steel structures and components.

12.5 Rehabilitation

The following studies to inform closure are planned in FY24:

- finalisation of the heritage building assessment and liability assessment; and
- materials balance assessment for rehabilitation materials.

Planning for the commencement of demolition activities for the Appin West coal bins and Appin East Ventilation Shaft 3 redundant infrastructure, and rehabilitation of the Personal Emergency Device (PED) aerial cable, will continue in FY24. The PED was part of an emergency response system for Appin Mine personnel that is now redundant.

Remediation of subsidence impacts in the Georges River under the GRRP is planned to commence in early FY24. Access issues have required a revision to the pools initially planned for remediation.

Planning for the removal of the powerline between the North Cliff site and WCCPP will be progressed in FY24.

Planning for shaft sealing will continue at the North Cliff site. Seed collection will also be undertaken in preparation for seeding and/or tubestock establishment for rehabilitation.

A Rehabilitation Options and Feasibility Analysis for decommissioning and rehabilitation of the Bulli Shafts 1, 2 and 3 will be prepared, that is required to be submitted to the Resources Regulator by 30 June 2024. Quarterly progress reports are required to be provided. A review of previously completed rehabilitation work at Bulli Ventilation Shaft 4 and Powerlines to complete any outstanding sign-offs will also be undertaken.

An ESF2 Form is planned to be submitted to the Resources Regulator to seek sign-off on rehabilitation undertaken in Stages 1 and 2 of the CWEA that is considered to have achieved the required rehabilitation criteria.

13. REFERENCES AND ASSOCIATED DOCUMENTS

Bulli Seam Operations Project Approval 08_0150 (as modified)

Bulli Seam Operations EPBC Approval 2010/5350 (as modified)

Biosphere, Bulli Seam Operations, Appendix F- Terrestrial Flora Assessment (2009).

IMC, Appin Mine Air Quality and Greenhouse Gas Management Plan.

IMC, Appin Mine Coal Wash Emplacement Area Management Plan.

IMC, Appin Mine Environmental Management Strategy.

IMC, Appin Mine Noise Management Plan.

IMC, Appin Mine Rehabilitation Management Plan.

IMC, Appin Mine Water Management Plan.

IMC, Appin Mine Waste Management Plan.

IMC, Georges River Rehabilitation Plan.

IMC, Longwall 904 End of Panel Report (2022).

IMC, Longwall 905 End of Panel Report (2023).

IMC, Appin Mine Ventilation and Access Project Construction Environmental Management Plan.

Niche, West Cliff Longwalls 37-38 Extraction Plan Terrestrial Flora and Fauna Assessment (2013).

NSW Department of Planning and Environment (2015). Annual Review Guideline, Post approval requirements for State Significant Developments, October 2015.

NSW EPA (2022), Environment Protection Licence No. 2504.

Seismology Research Centre, Illawarra Metallurgical Coal Earthquake Monitoring Network Report, 2023.

South32 Environment and Climate Change Standard.

13.1 Acronyms used in Annual Review

The acronyms used in the Annual Review are provided in Table 47.

Table 47: Acronyms used in Annual Review

Acronym	Definition	Acronym	Definition
AA7	Appin Area 7 Mining Domain	IMS	Integrated membrane system
AA9	Appin Area 9 Mining Domain	ISO	International Standards Organisation
ACARP	Australian Coal Industry's Research Program	kL	kilolitre
ACCC	Appin Mine Community Consultative Committee	kt	kilotonne

AHIMS	Aboriginal Heritage Information Management System	kV	kilovolt
AMVA	Appin Mine Ventilation and Access Project	LDP	Licence Discharge Point
APZ	Asset Protection Zone	LiDAR	Light Detection and Ranging
AQMP	Air Quality and Greenhouse Gas Management Plan	LW	Longwall
AUTH	Authority	mg	milligram
BA	Biobanking Agreement	µg	microgram
BAM	Biodiversity Assessment Methodology	µS	micro Siemen
BC Act	*Biodiversity Conservation Act*	MAP	Menangle Advisory Panel
BCD	Brennans Creek Dam	ML	Mining Lease/megalitre
BCS	Biodiversity and Conservation Science Directorate (previously OEH)	MLv	Magnitude, local using vertical displacement
BOD	Biochemical oxygen demand	MPL	Mining Purposes Lease
BoM	Bureau of Meteorology	Mtpa	Million tonnes per annum
BSO	Bulli Seam Operations	NCREP	North Cliff Rehabilitation Execution Plan
CCL	Consolidated Coal Lease	NGER	National Greenhouse and Energy Reporting
CEM	Continuous Emissions Monitoring	NMP	Noise Management Plan
CEMP	Construction Environmental Management Plan	NSW	New South Wales
CH_4	Methane	OEH	Office of Environment and Heritage

CMA	Corrective Management Action	OPD	Operational Purpose Deduction
CO	Carbon monoxide	PED	Personal Emergency Device
CO_2-e	Carbon dioxide equivalent	PDCE	Post drainage capture efficiency
CPP	Community Partnerships Program	PEM	Periodic Emissions Monitoring
CPW	Cumberland Plain Woodland	PIRMP	Pollution Incident Response Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation	PKCT	Port Kembla Coal Terminal
CWEA	Coal Wash Emplacement Area	PLC	Programmable logic controller
DAWE	Department of Agriculture, Water and the Environment (previously DoTE)	*POEO Act*	*Protection of the Environment Operations Act*
DCCEEW	Department of Climate Change, Energy, the Environment and Water (previously DAWE)	$PM_{2.5}$	Particulate matter 2.5 microns
DCPP	Dendrobium Coal Preparation Plant	PM_{10}	Particulate matter 10 microns
DotE	Department of the Environment	PRP	Pollution Reduction Program
DPAP	Douglas Park Advisory Panel	PSI	Preliminary Site Investigation
DPE	Department of Planning and Environment (previously DPIE)	RCE	Rehabilitation Cost Estimate

DPIE	Department of Planning, Industry and Environment [29]	REF	Review of Environmental Factors
DNA	Deoxyribonucleic acid	RMP	Rehabilitation Management Plan
DTIRIS	Department of Trade, Investment, Regional Infrastructure and Services	ROC	Regional Operations Centre
EA	Environmental Assessment	RoM	Run of Mine
EC	Electrical conductivity	SA NSW	Subsidence Advisory NSW
ECCS	Environment and Climate Change Standard	SCIMS	Survey Control Information Management System
EDL	Energy Developments Limited	SMP	Subsidence Management Plan
EIP	Environment Improvement Program	SRC	Seismology Research Centre
EL	Exploration Licence	SSTF	Shale Sandstone Transition Forest
EoP	End of Panel	STIS	Surface to In-Seam
EP	Extraction Plan or Emplacement Pond	STP	Sewage Treatment Plant
EPA	Environment Protection Authority	SWL	Standing Water Level
EP&A Act	*Environmental Planning and Assessment Act*	TARP	Trigger Action Response Plan
EPBC	Environment Protection and Biodiversity Conservation	TDS	Total Dissolved Solids
EPL	Environment Protection Licence	TfNSW	Transport for NSW

[29] Previously Department of Planning and Environment, Department of Planning, Department of Urban Affairs and Planning

EQuIS	Environmental Quality and Information System	TFRR	Thermal flow reversal reactor
FY	Financial Year	TLALC	Tharawal Local Aboriginal Land Council
GHG	Greenhouse Gas	TSI	Targeted Site Investigation
GRAHMP	Georges River Aquatic Health Monitoring Program	TSS	Total Suspended Solids
GRRP	Georges River Rehabilitation Plan	UG	Underground
HBSS	Hawkesbury Sandstone	VAM	Ventilation Air Methane
HSE	Health, Safety and Environment	VAMMIT	Ventilation Air Methane Mitigation
IAC	Illawarra Access Controller	WAC	Weak acid cation
ICHPL	Illawarra Coal Holdings Pty Ltd	WCCPP	West Cliff Coal Preparation Plant
ICNG	Interim Construction Noise Guidelines	WEA	Western Exploration Area
IEA	Independent Environmental Audit	WMP	Water Management Plan
IMC	Illawarra Metallurgical Coal	WSC	Wollondilly Shire Council
IMCEFT	IMC Environmental Field Team	WTP	Water Treatment Plant

13.2 Management Plans

Management Plans required by the Project Approval, EPBC Approvals or EPL 2504 are listed in Table 48, including the date approved and date of next review.

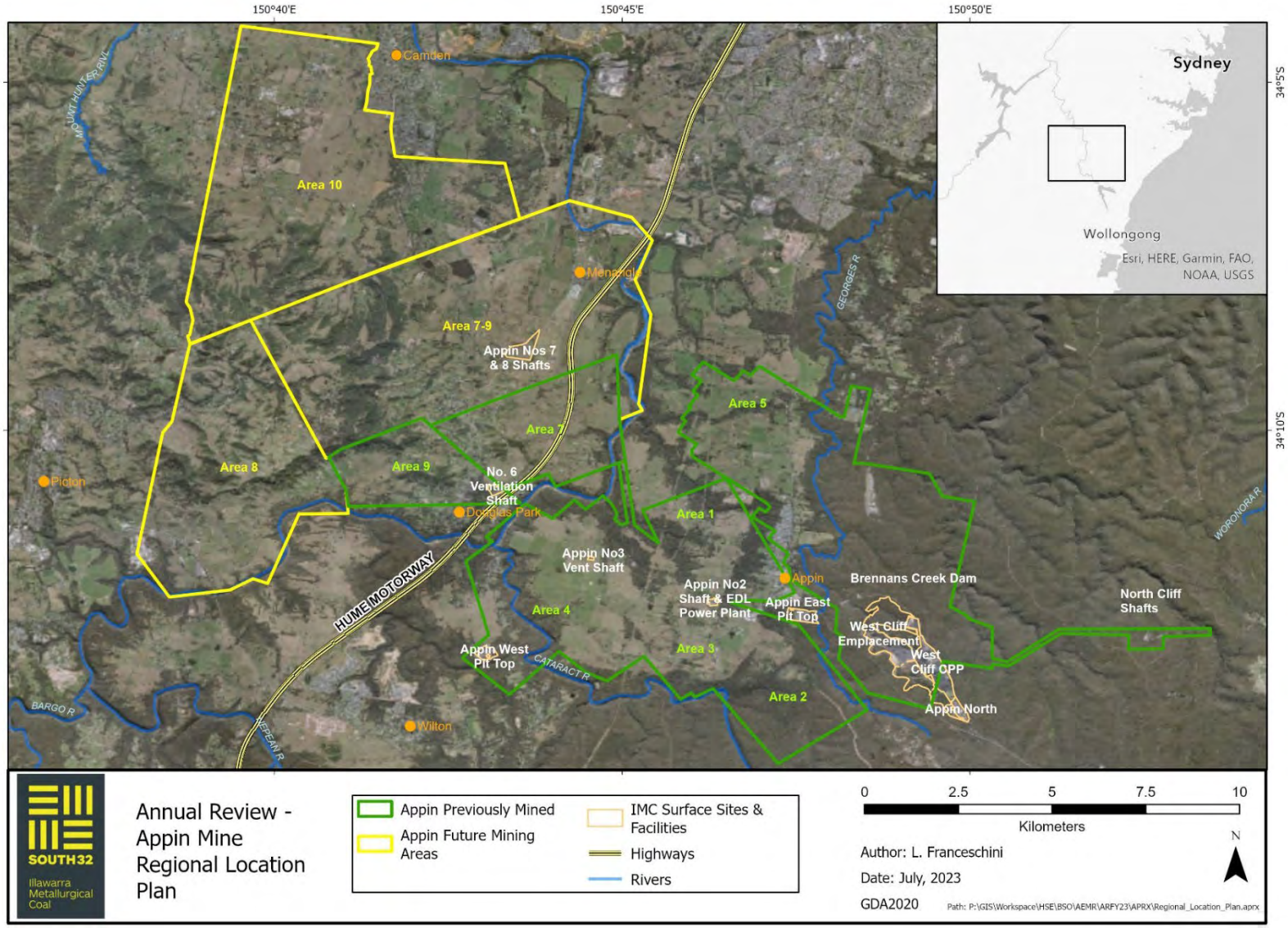
Table 48: Management Plans

Management Plan	Approved Date	Next Review
Adaptive Management Plan for Water Sensitive EPBC Act Listed Species	28/01/2021	31/01/2024
Air Quality & Greenhouse Gas Management Plan	6/02/2023	1/01/2026
AMVA Project Construction Environmental Management Plan – Early Works[30]	17/06/2022	16/06/2023
Biodiversity Management Plan	20/01/2023	1/12/2025
Broad Headed Snake and Southern Brown Bandicoot Management Plan	28/01/2021	23/12/2023
Coal Wash Emplacement Area Management Plan	28/01/2021	16/12/2023
Environmental Management Strategy	15/11/2022	1/11/2025
Gas Drainage Management Plan	7/12/2020	3/12/2023
Heritage Management Plan	15/11/2021	1/11/2024
Noise Management Plan	24/11/2022	1/11/2025
Persoonia hirsuta Offset Management Plan	18/05/2022	27/04/2025
Pollution Incident Response Management Plan EPL 2504	N/A	6/03/2026
Rehabilitation Management Plan	30/06/2023	30/06/2025
Shale Sandstone Transition Forest Offset Management Plan	1/07/2021	1/07/2025
Surface Activities Management Plan	18/01/2023	1/01/2026
Traffic Management Plan	20/03/2023	1/03/2026
Ventilation Shaft 6 Biodiversity Offset Strategy	20/11/2020	1/10/2041
Waste Management Plan	24/11/2022	1/11/2025
Water Management Plan	23/12/2022	1/12/2025

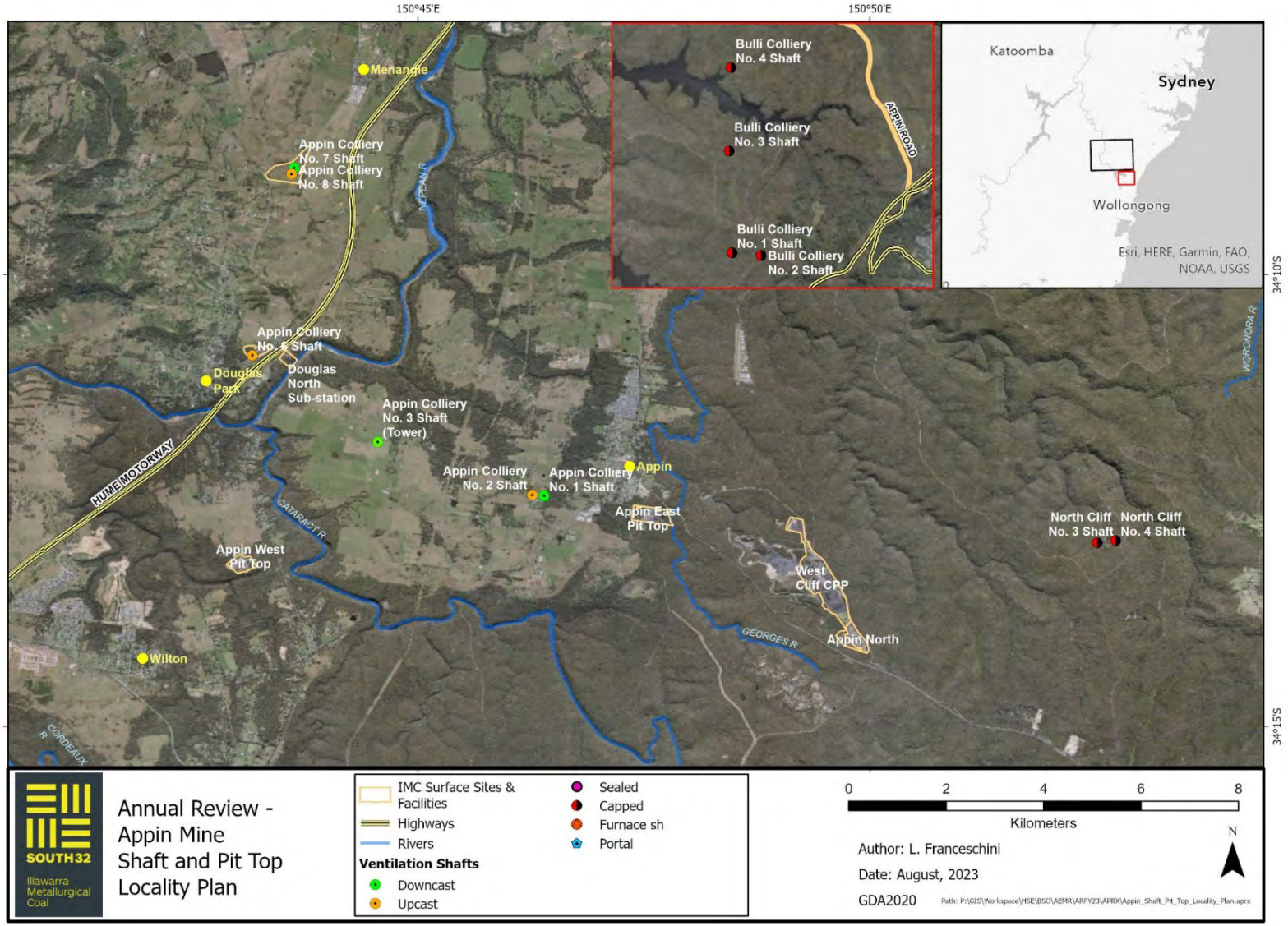
[30] Document became obsolete on 12/07/2023.

14. PLANS

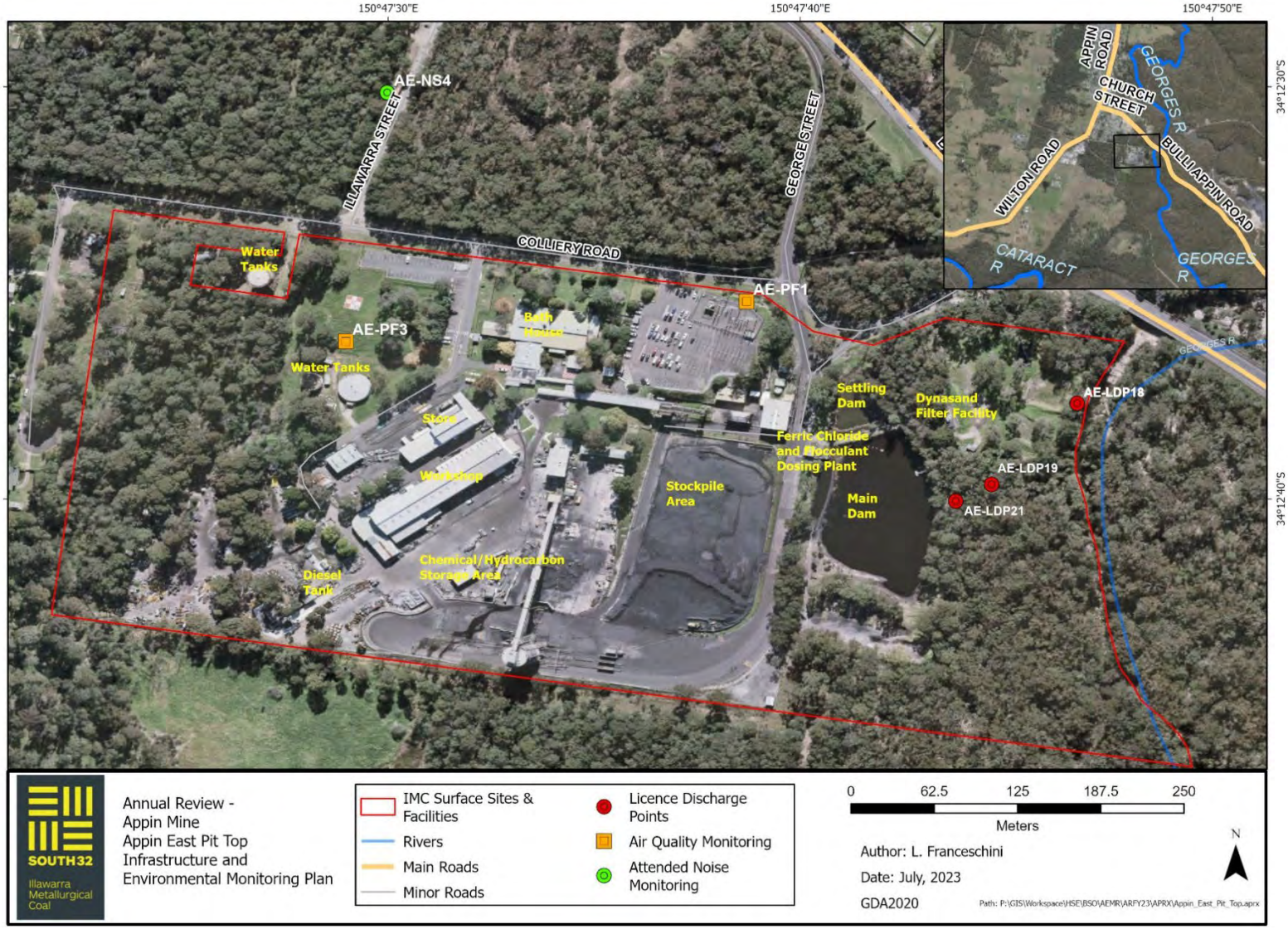
Plan 1: Regional Location Plan showing Mining Domains



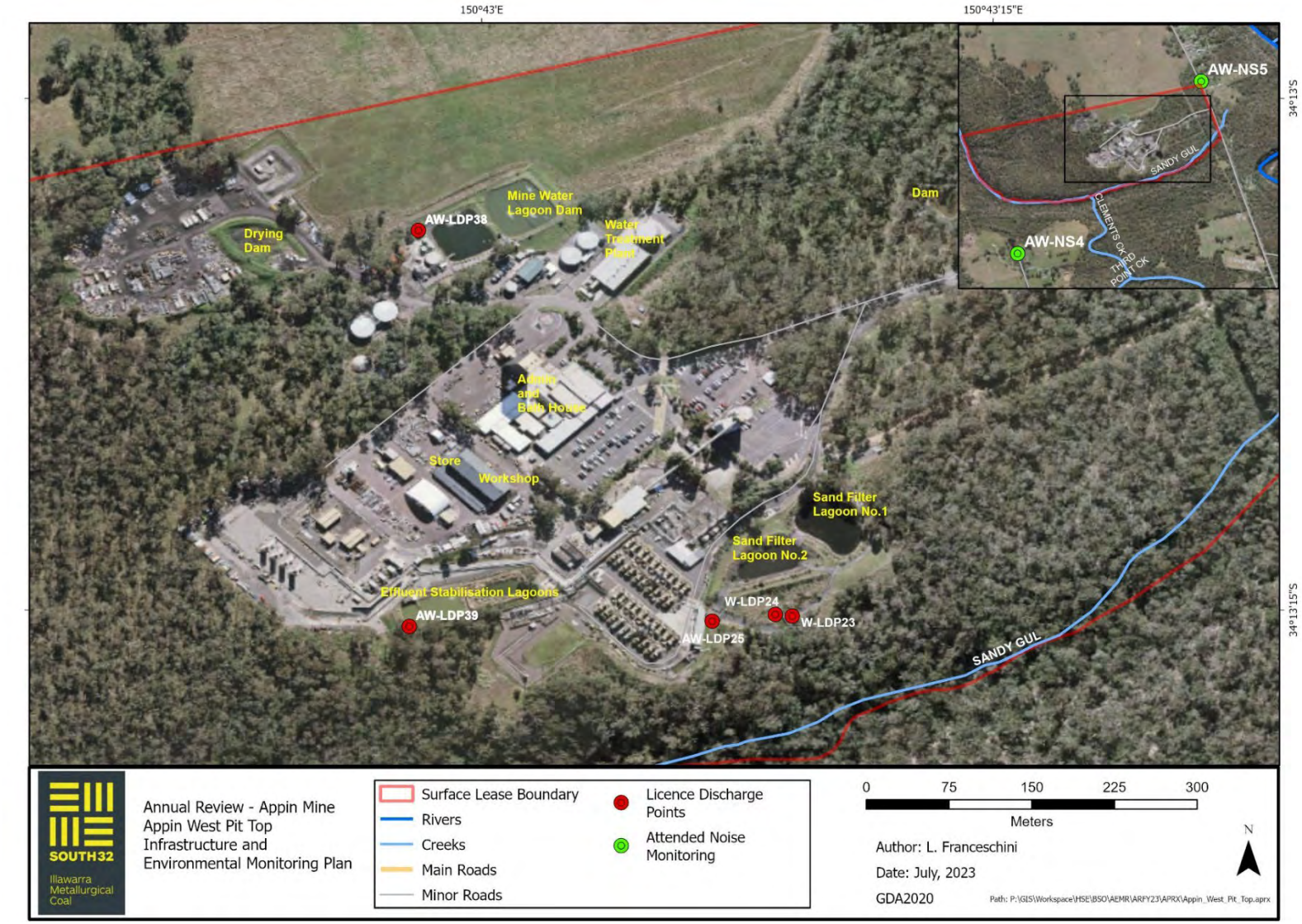
Plan 2: Appin Shaft and Pit Top Locality Plan



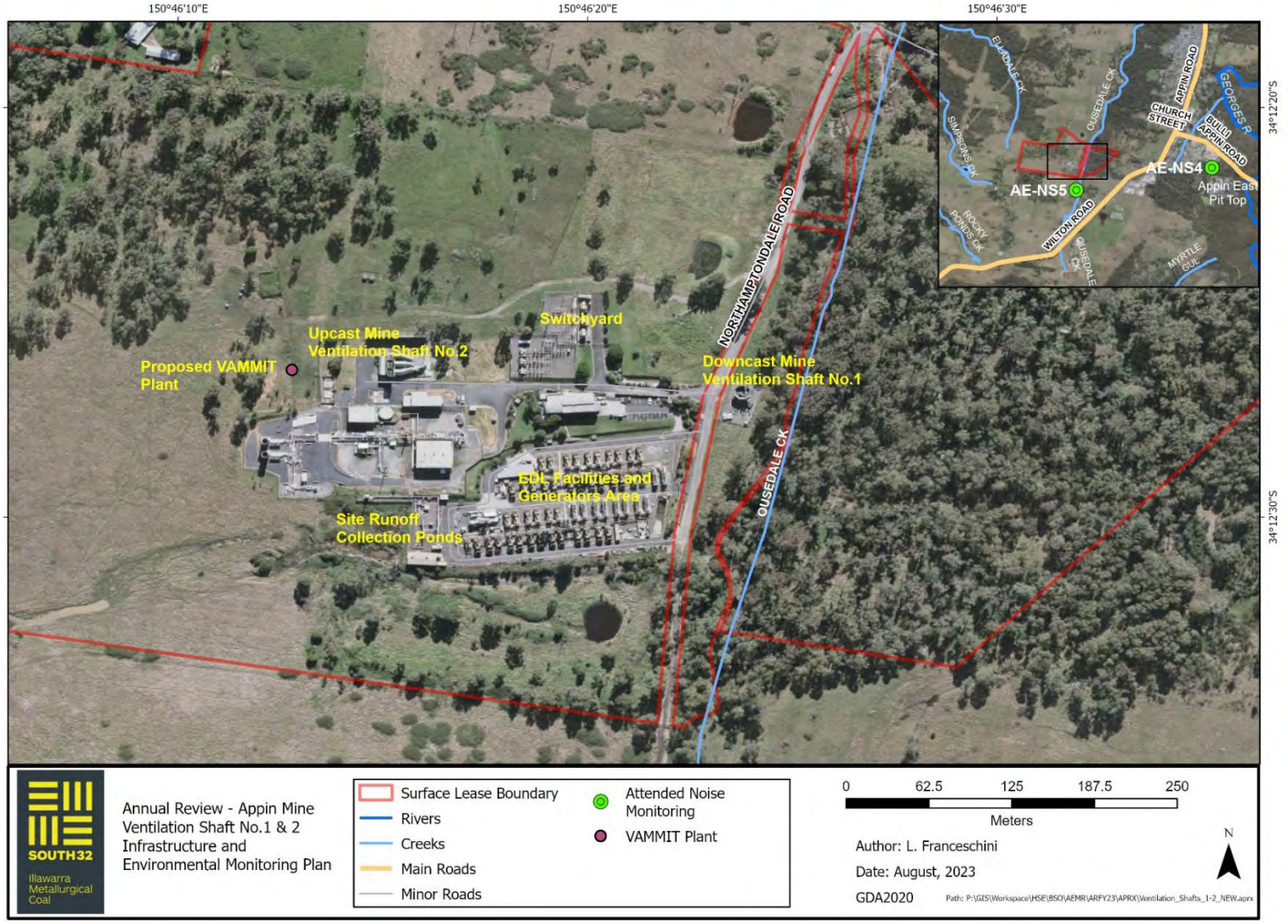
Plan 3: Site Layout and Monitoring Locations - Appin East Pit Top



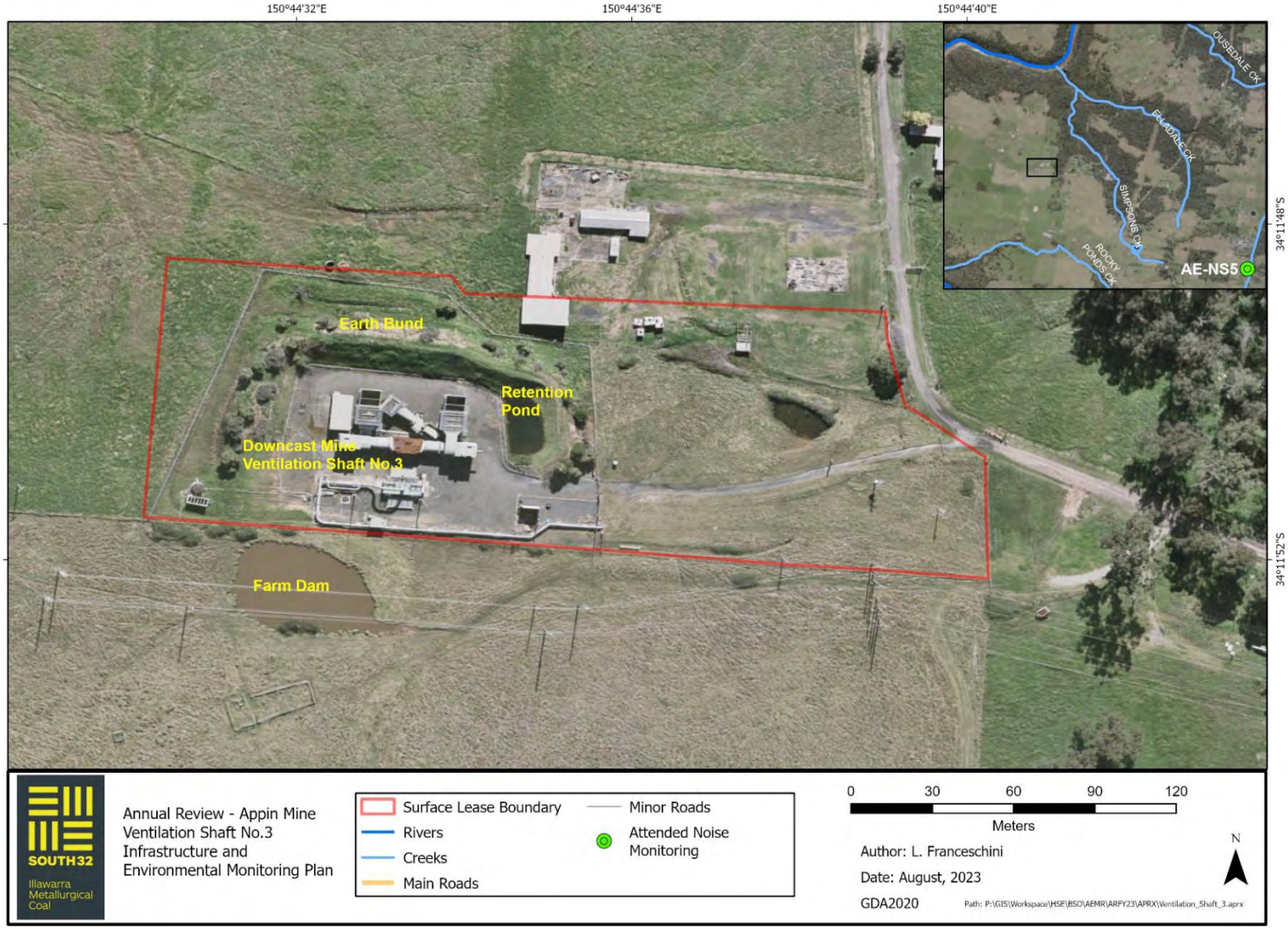
Plan 4: Site Layout and Monitoring Locations - Appin West Pit Top



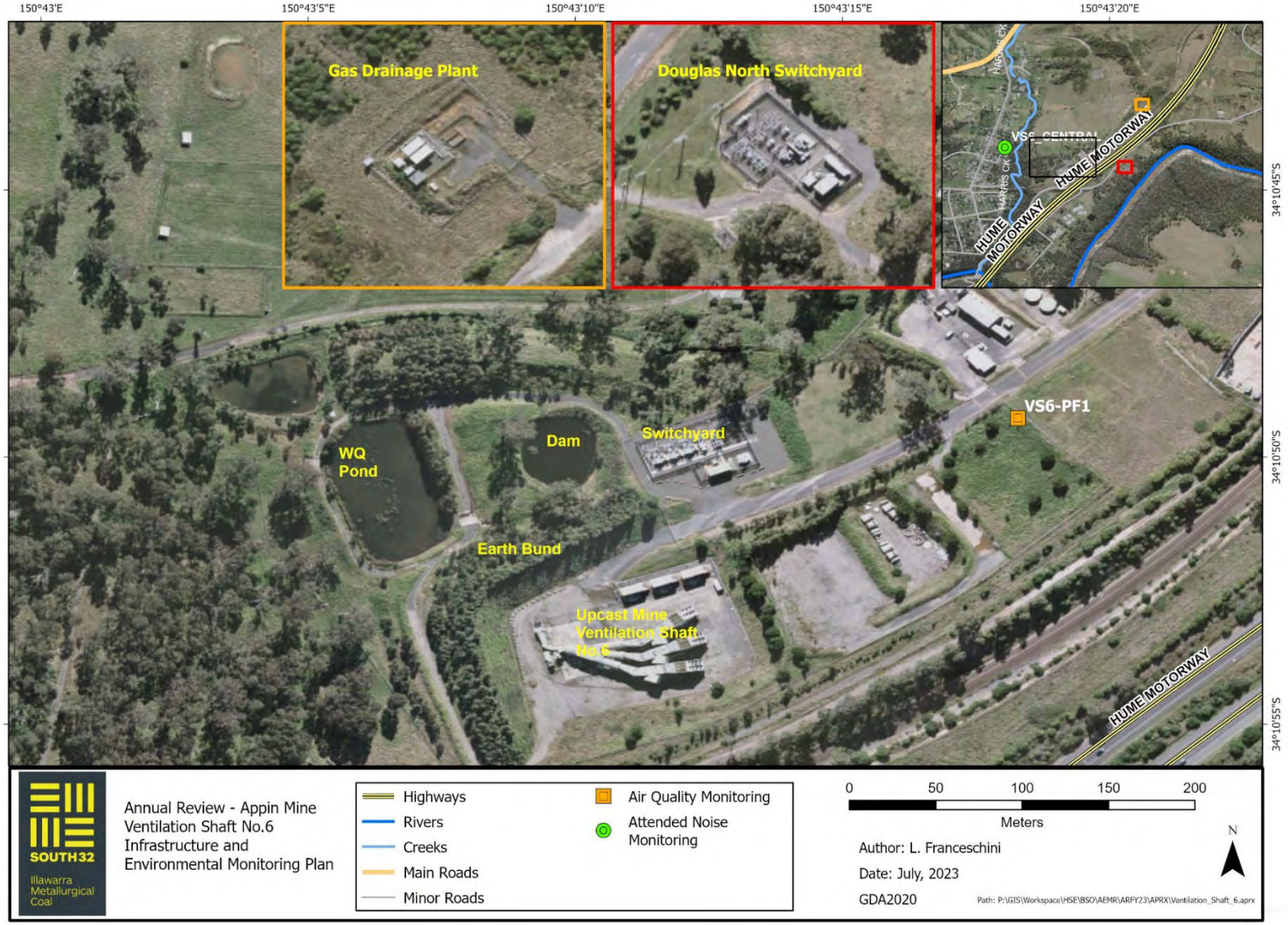
Plan 5: Site Layout - Ventilation Shafts 1 and 2



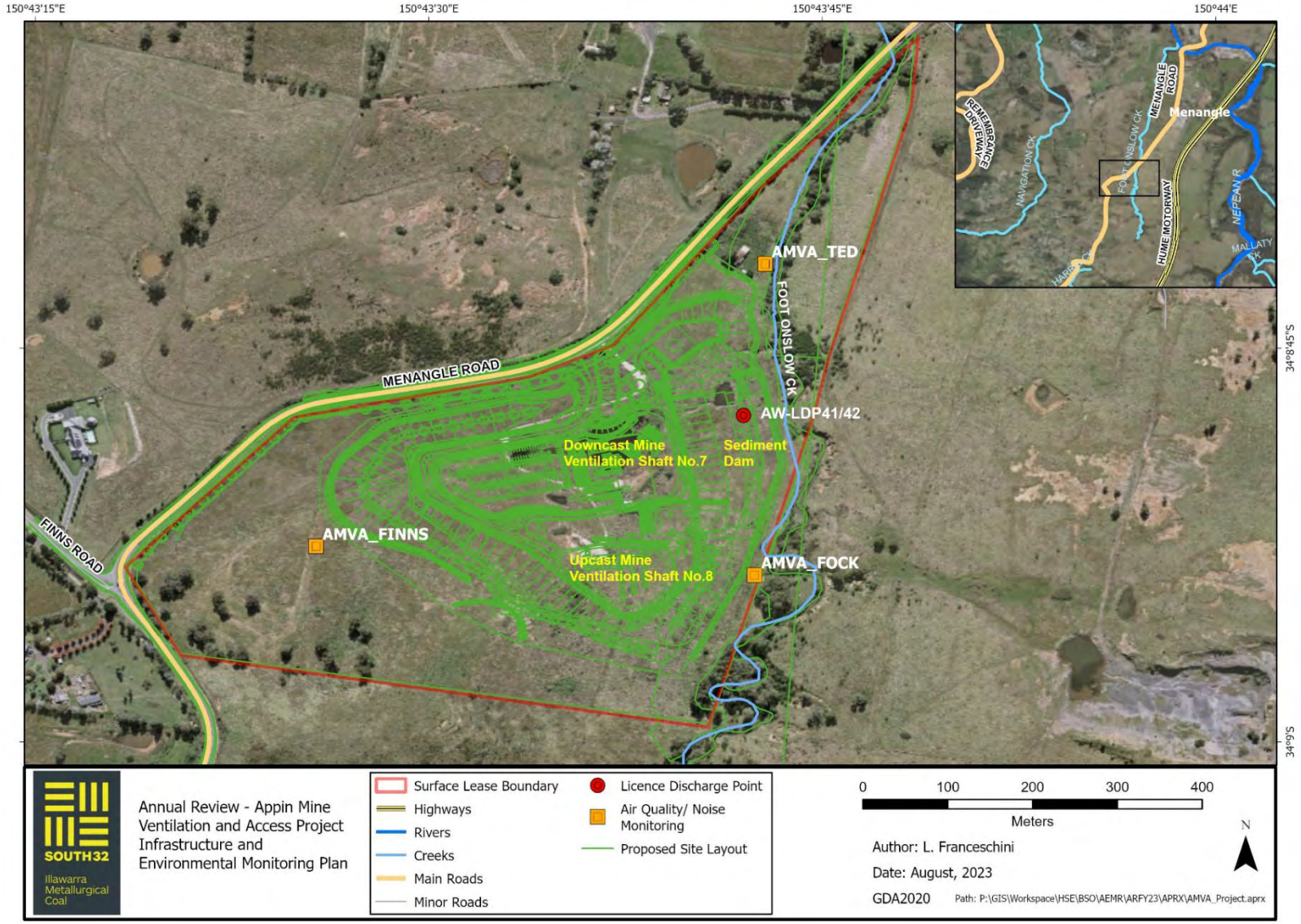
Plan 6: Site Layout - Ventilation Shaft 3



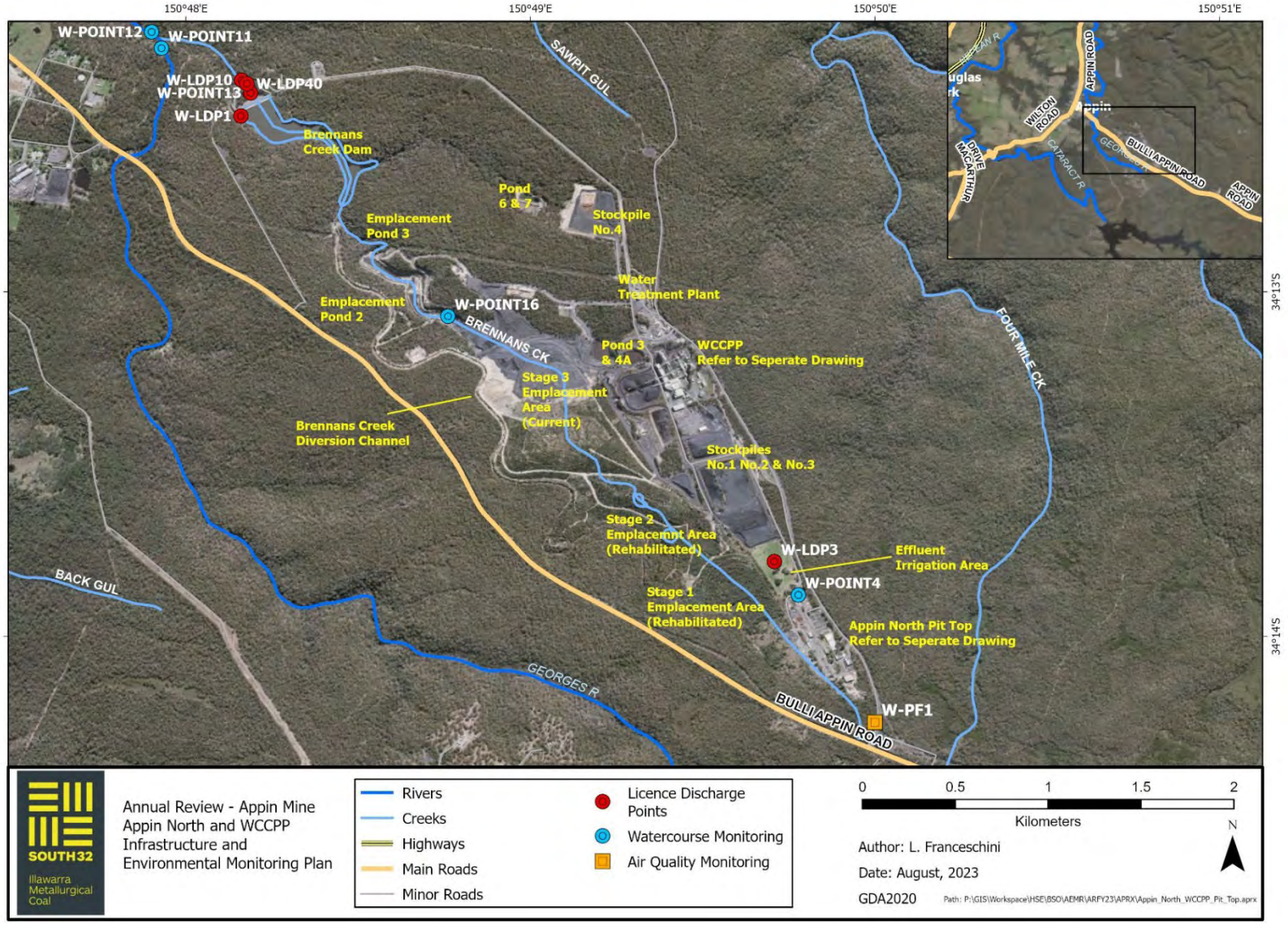
Plan 7: Site Layout and Monitoring Locations - Ventilation Shaft 6



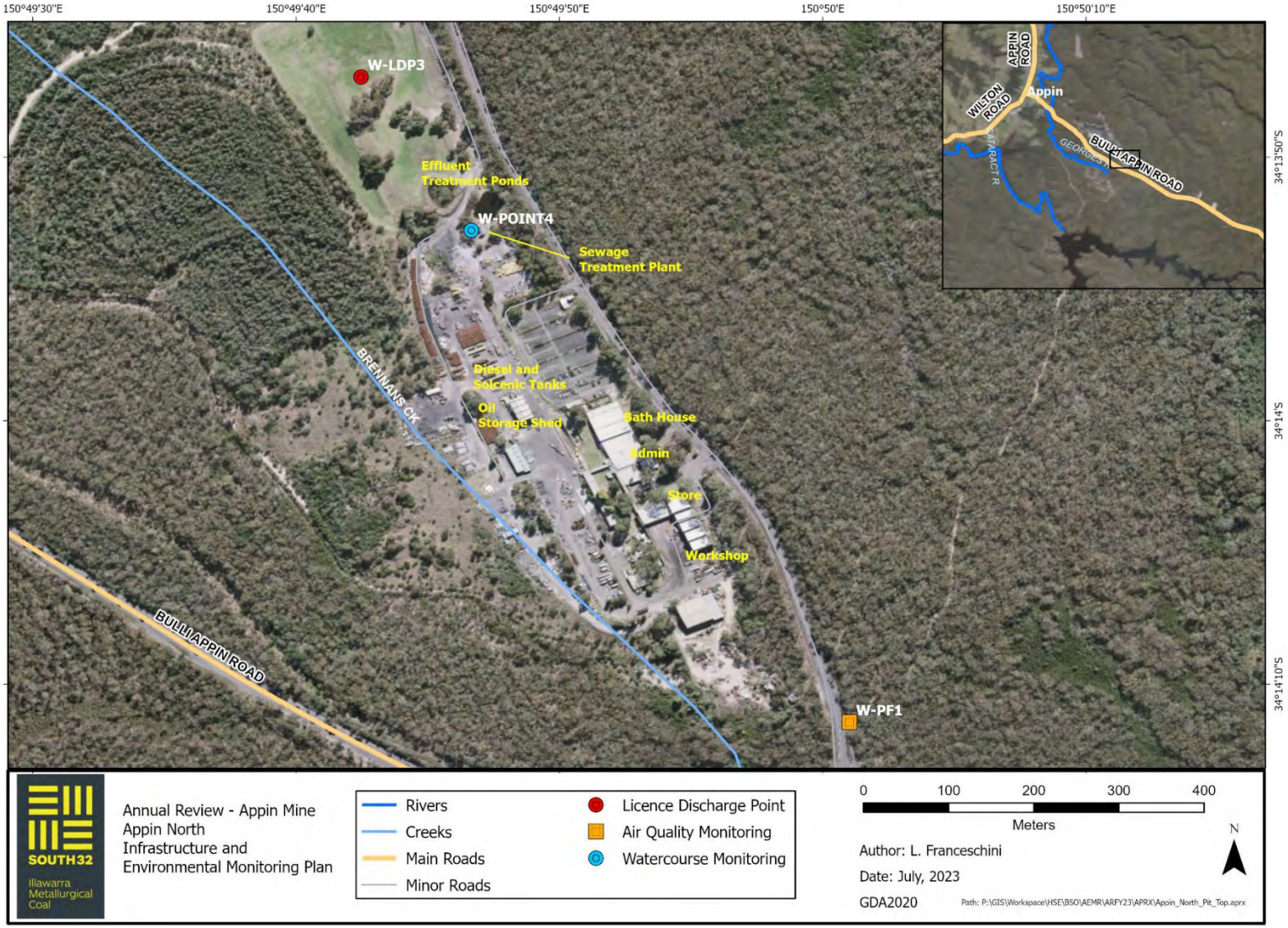
Plan 8: Site Layout and Monitoring Locations - Ventilation Shafts 7 and 8 (AMVA Project)



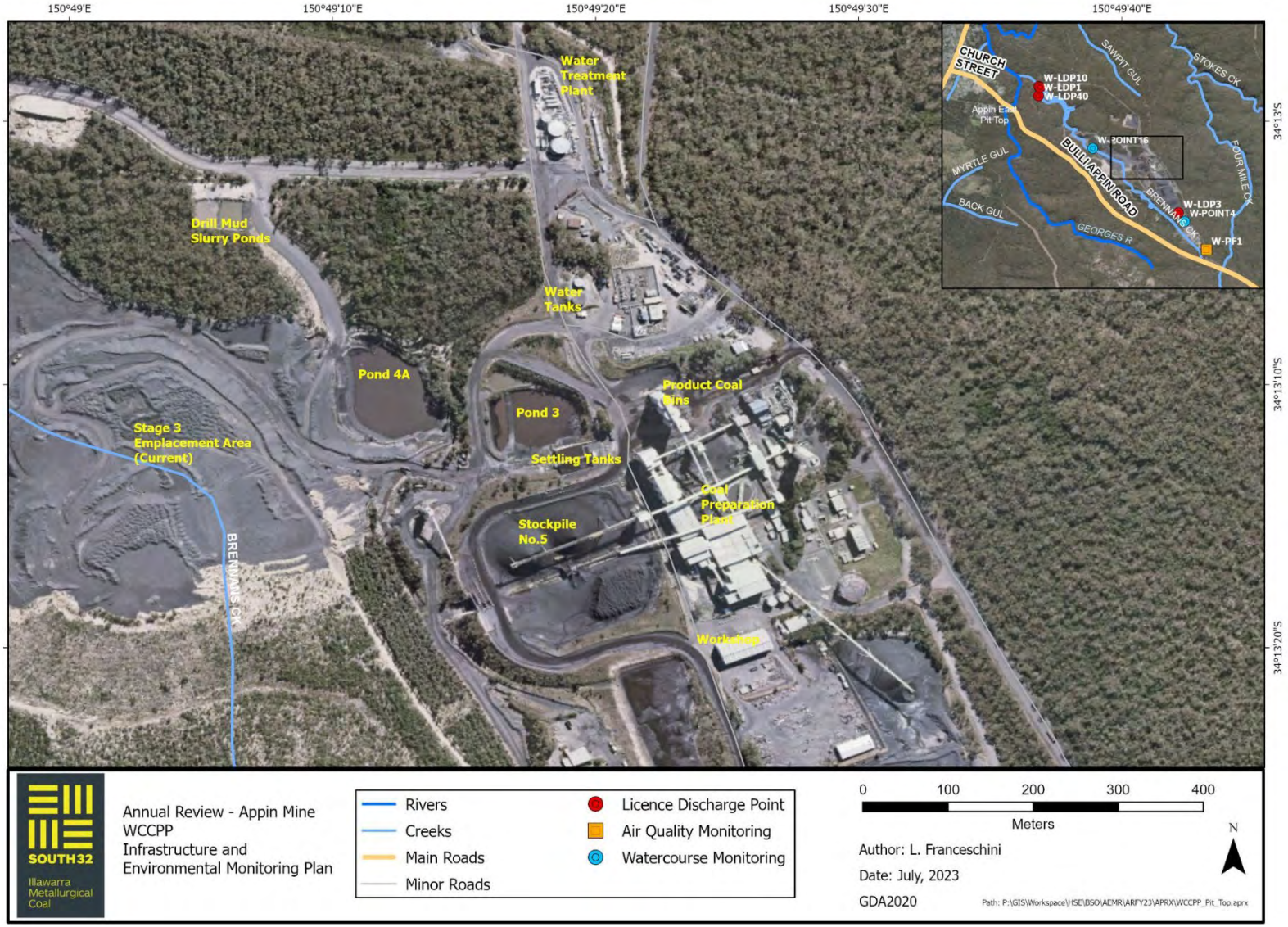
Plan 9: Site Layout and Monitoring Locations - Appin North Pit Top and WCCPP



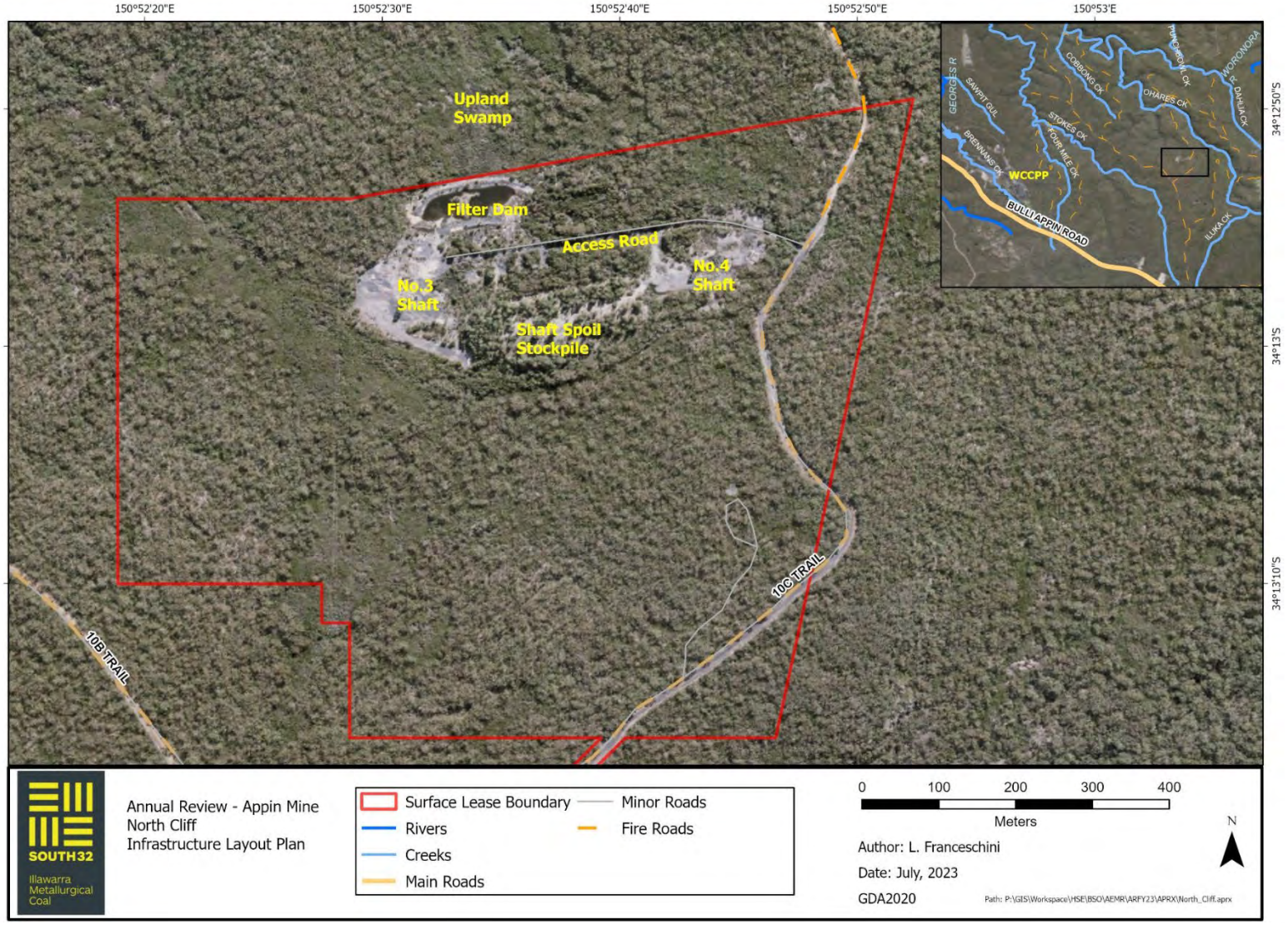
Plan 10: Site Layout and Monitoring Locations - Appin North Pit Top



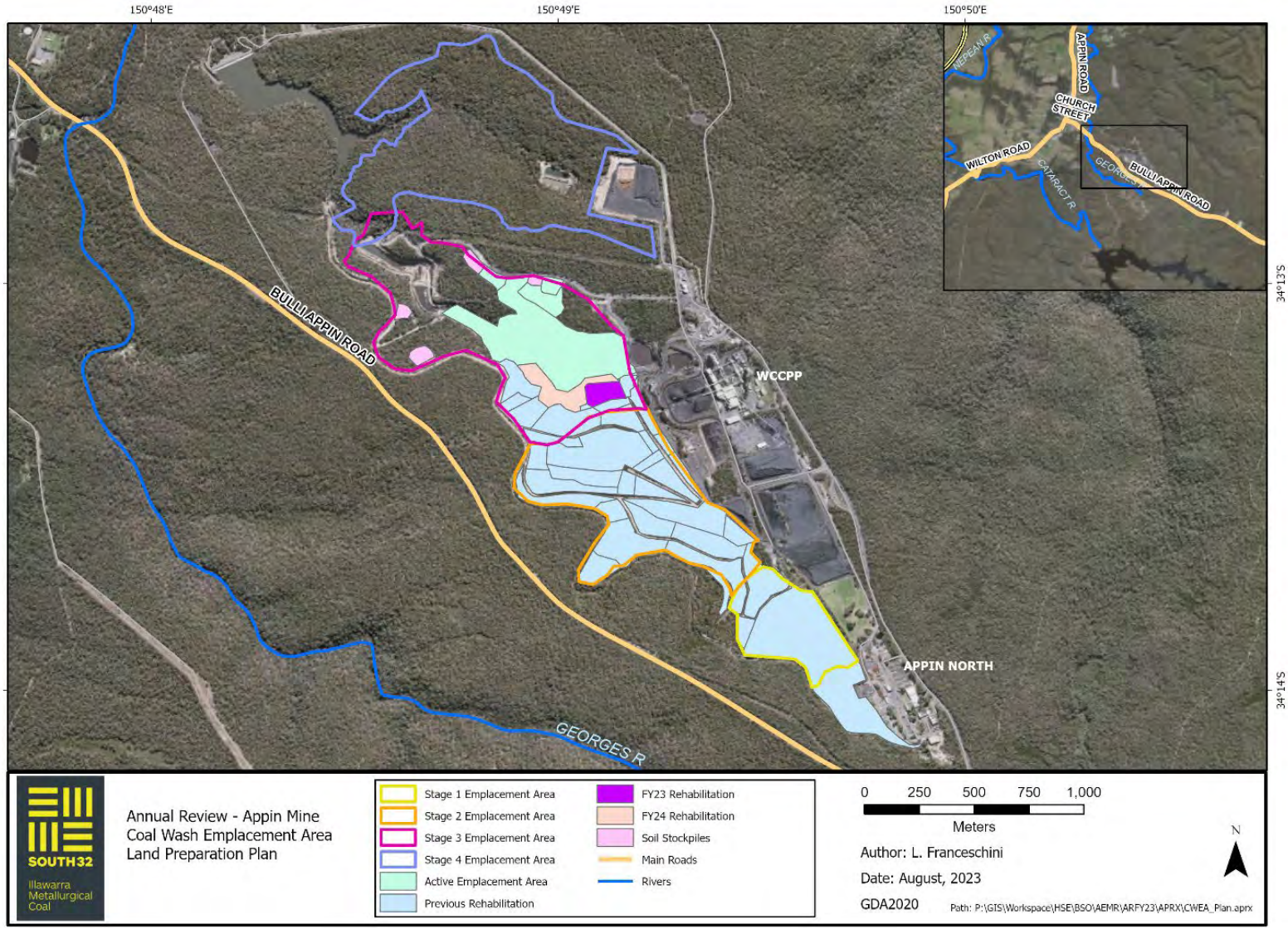
Plan 11: Site Layout and Monitoring Locations - WCCPP



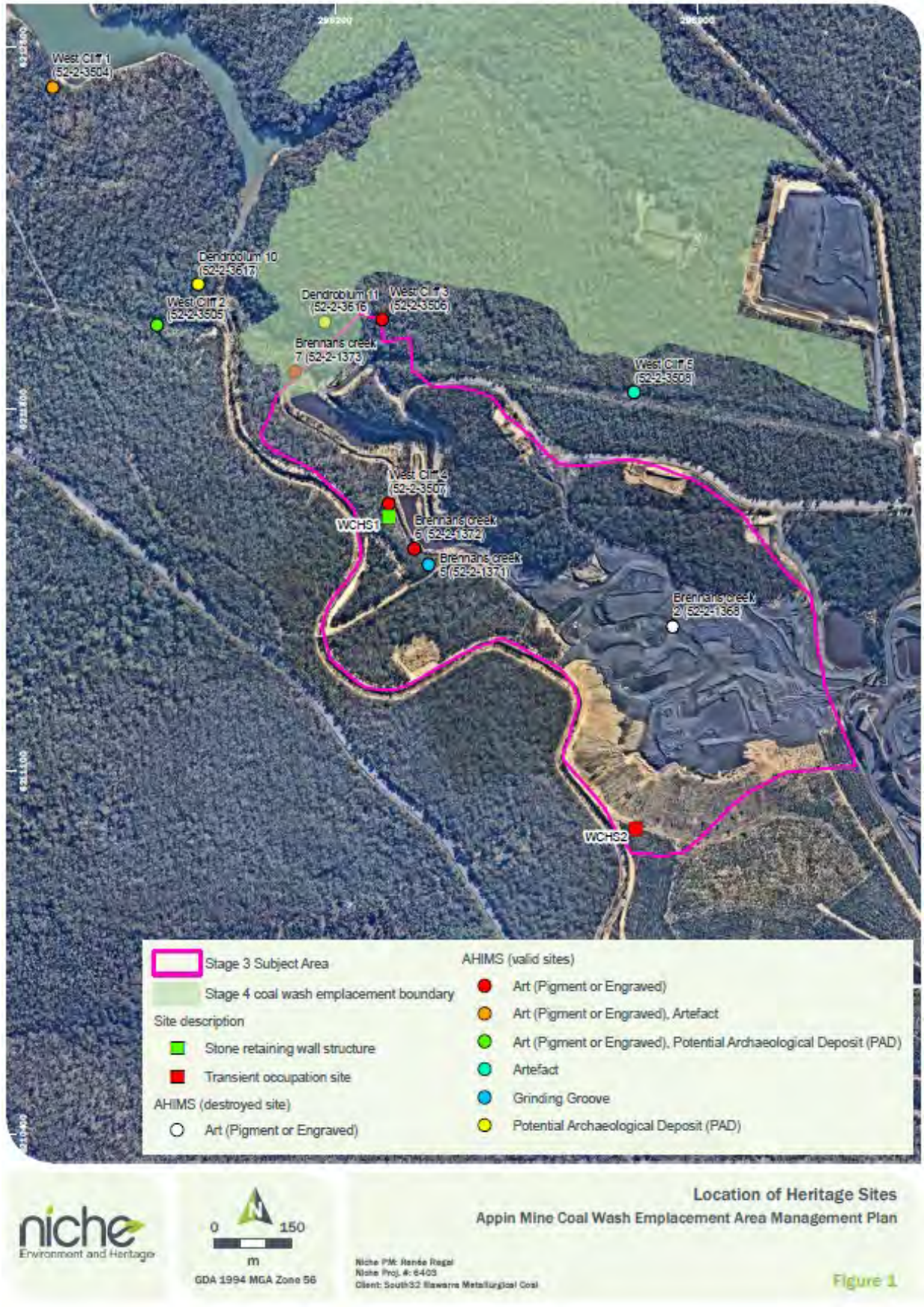
Plan 12: Site Layout - North Cliff Pit Top



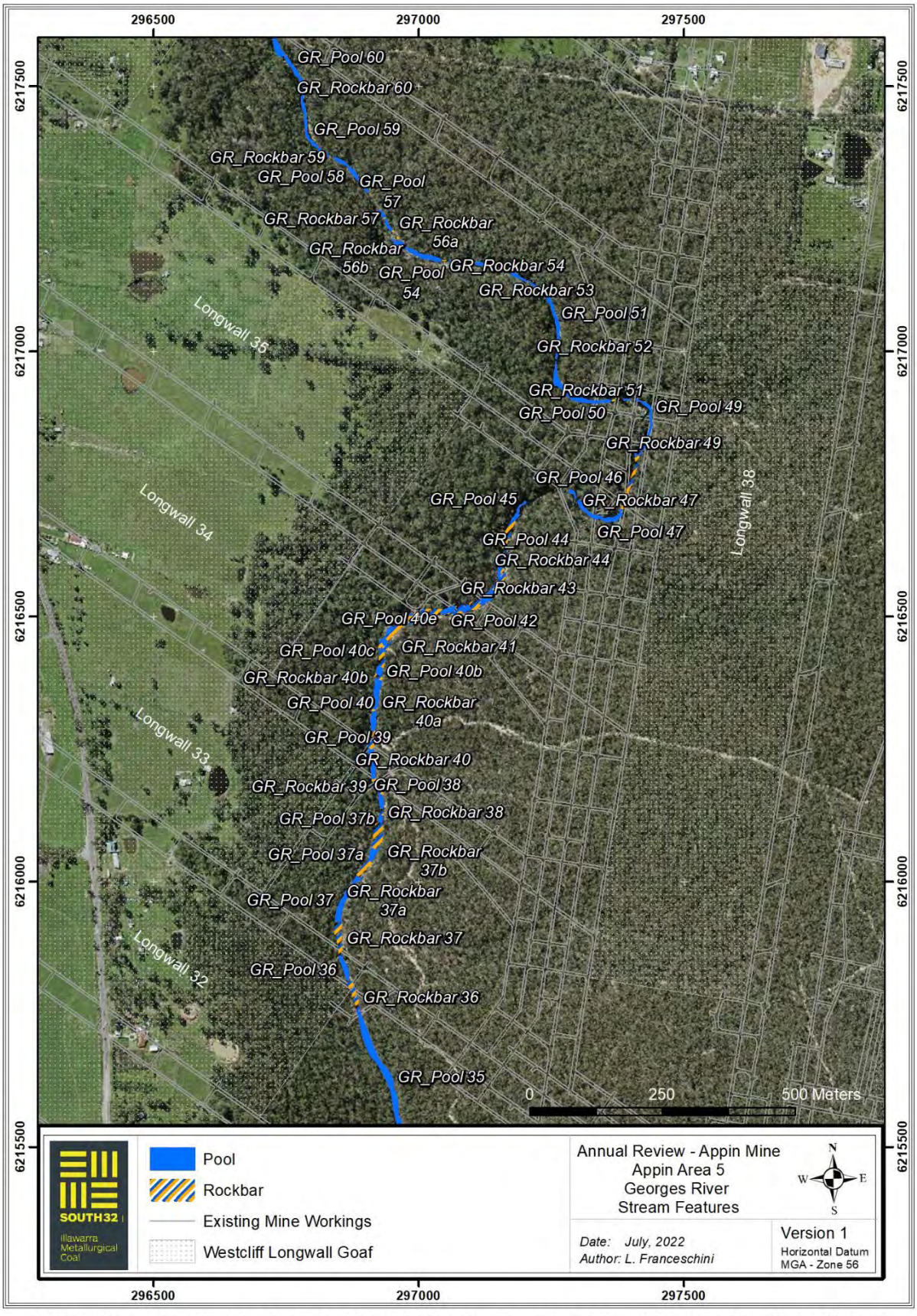
Plan 13: Land Preparation Plan – CWEA



Plan 14: CWEA Cultural Heritage Sites



Plan 15: Georges River Stream Features



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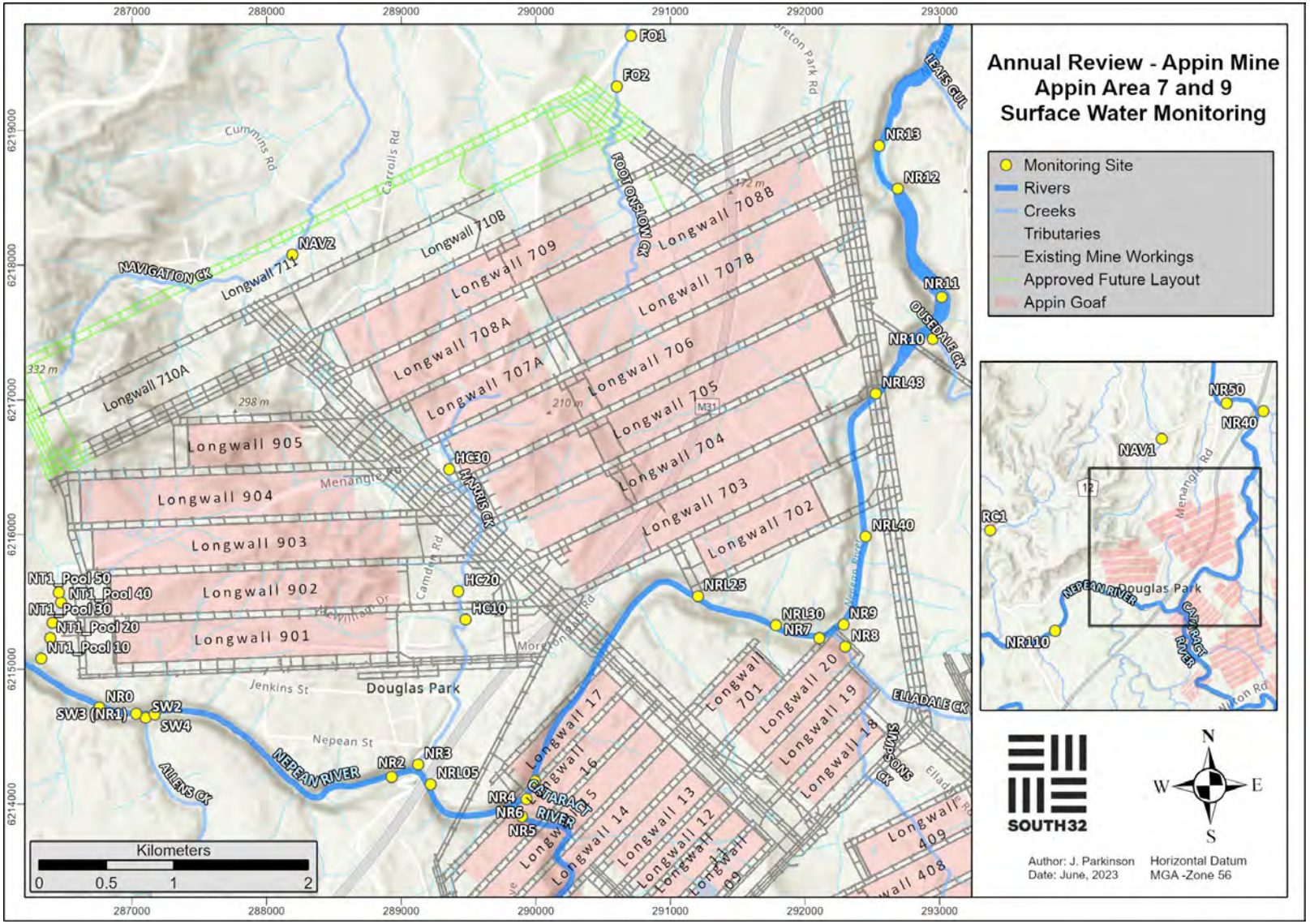
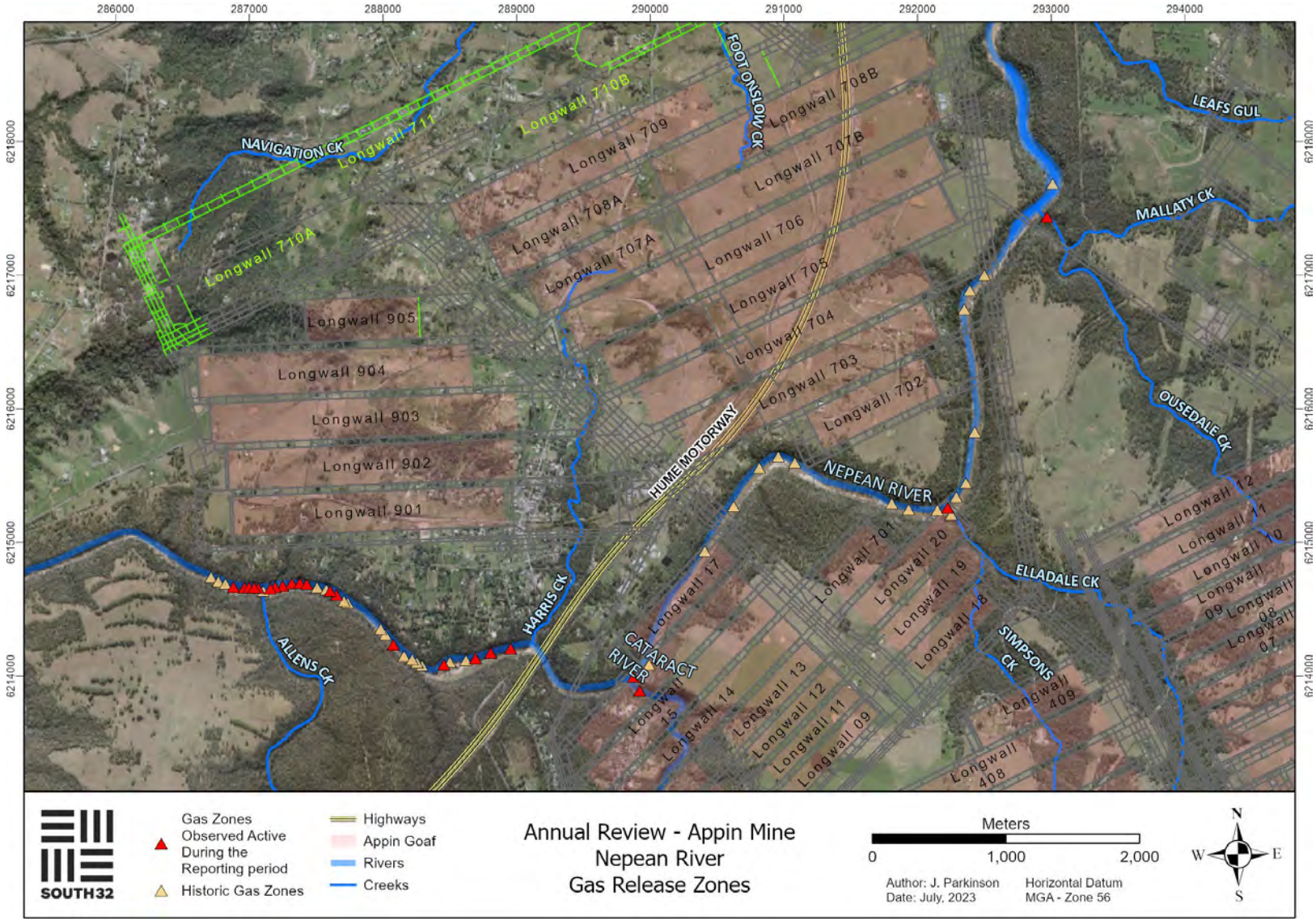
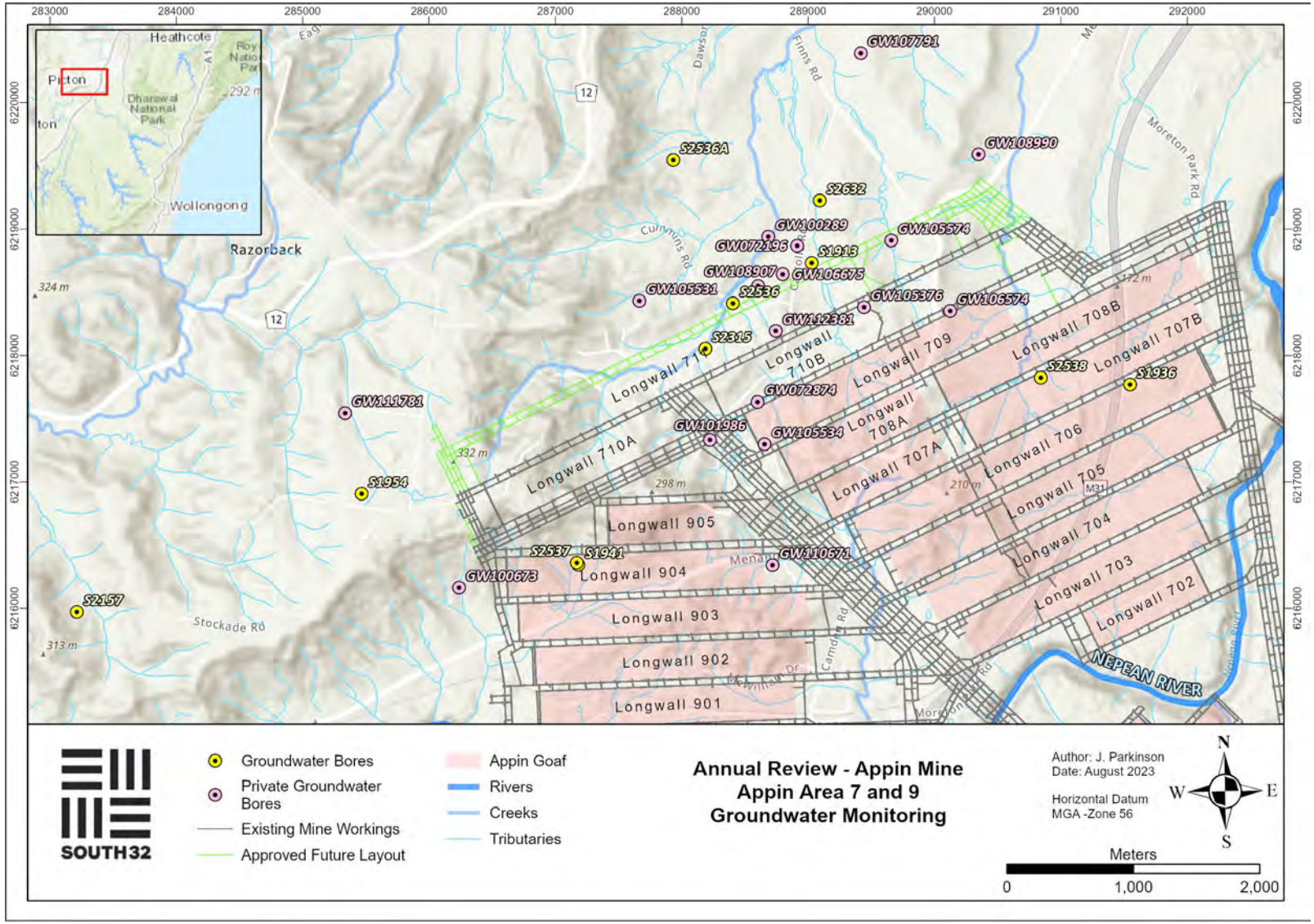
Plan 16: Appin Area 7 and 9 Surface Water Monitoring Locations - FY23



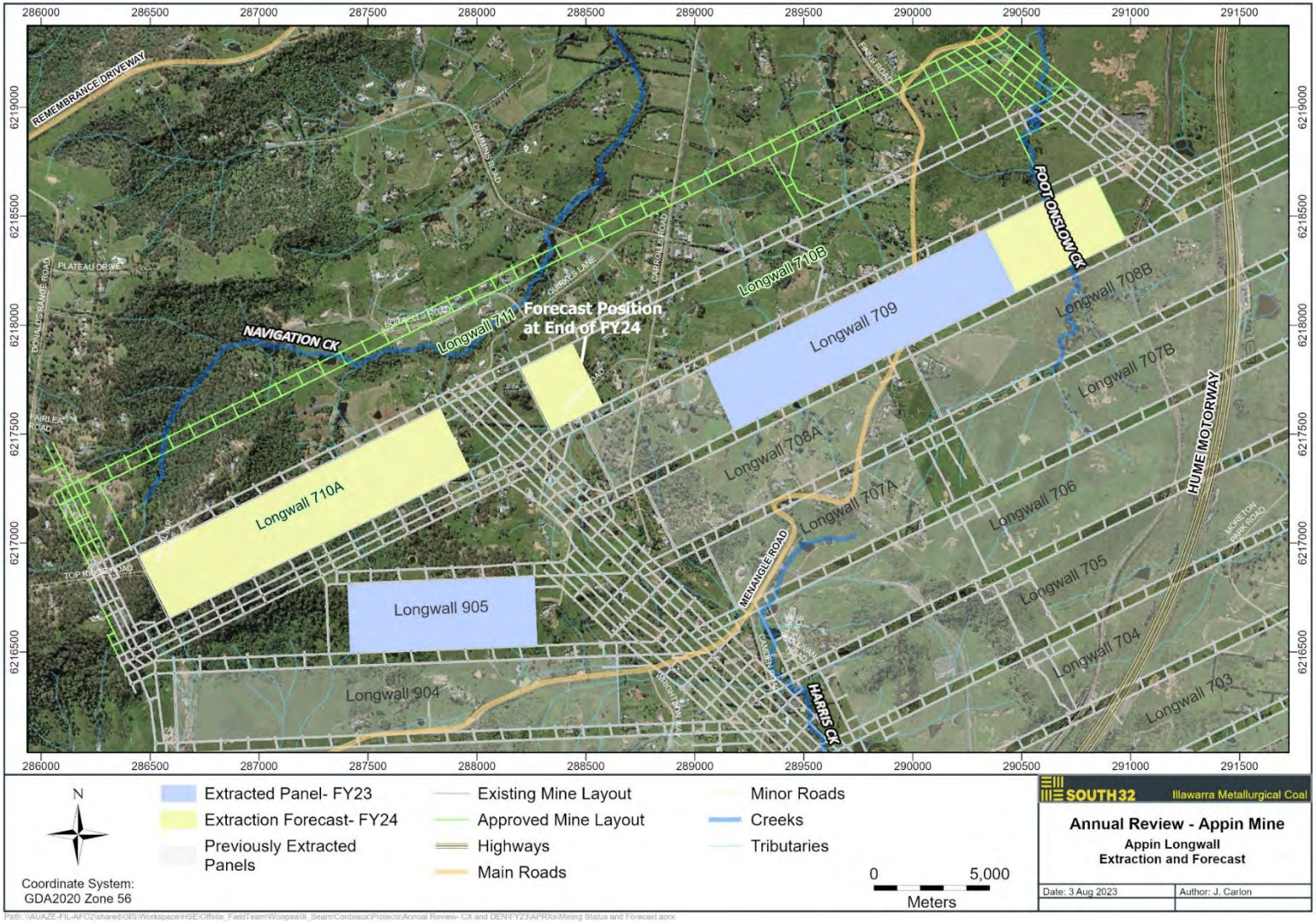
Plan 17: Appin Area 7 and 9 Gas Zones - FY23



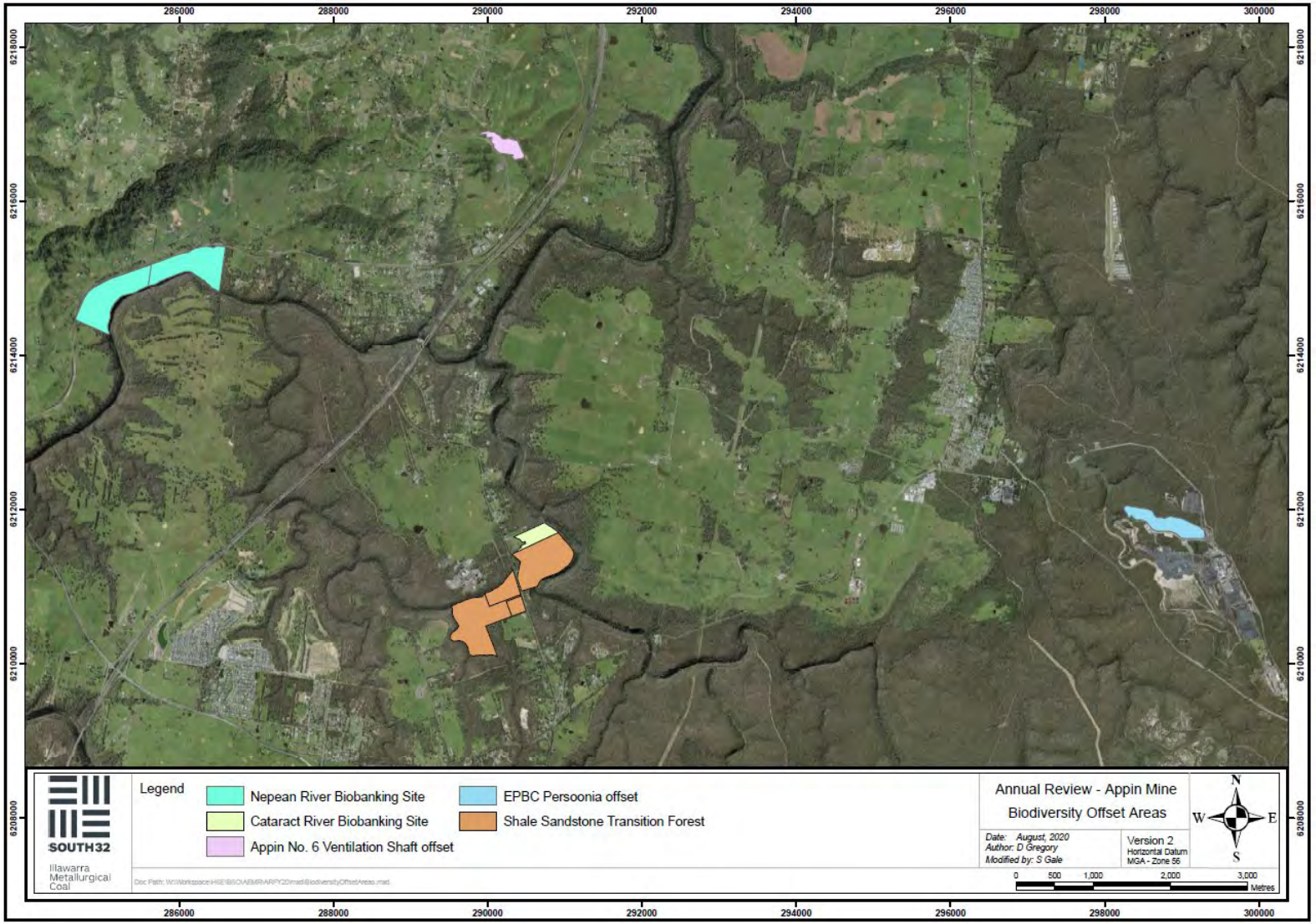
Plan 18: Appin Area 7 and 9 Groundwater Monitoring – FY23



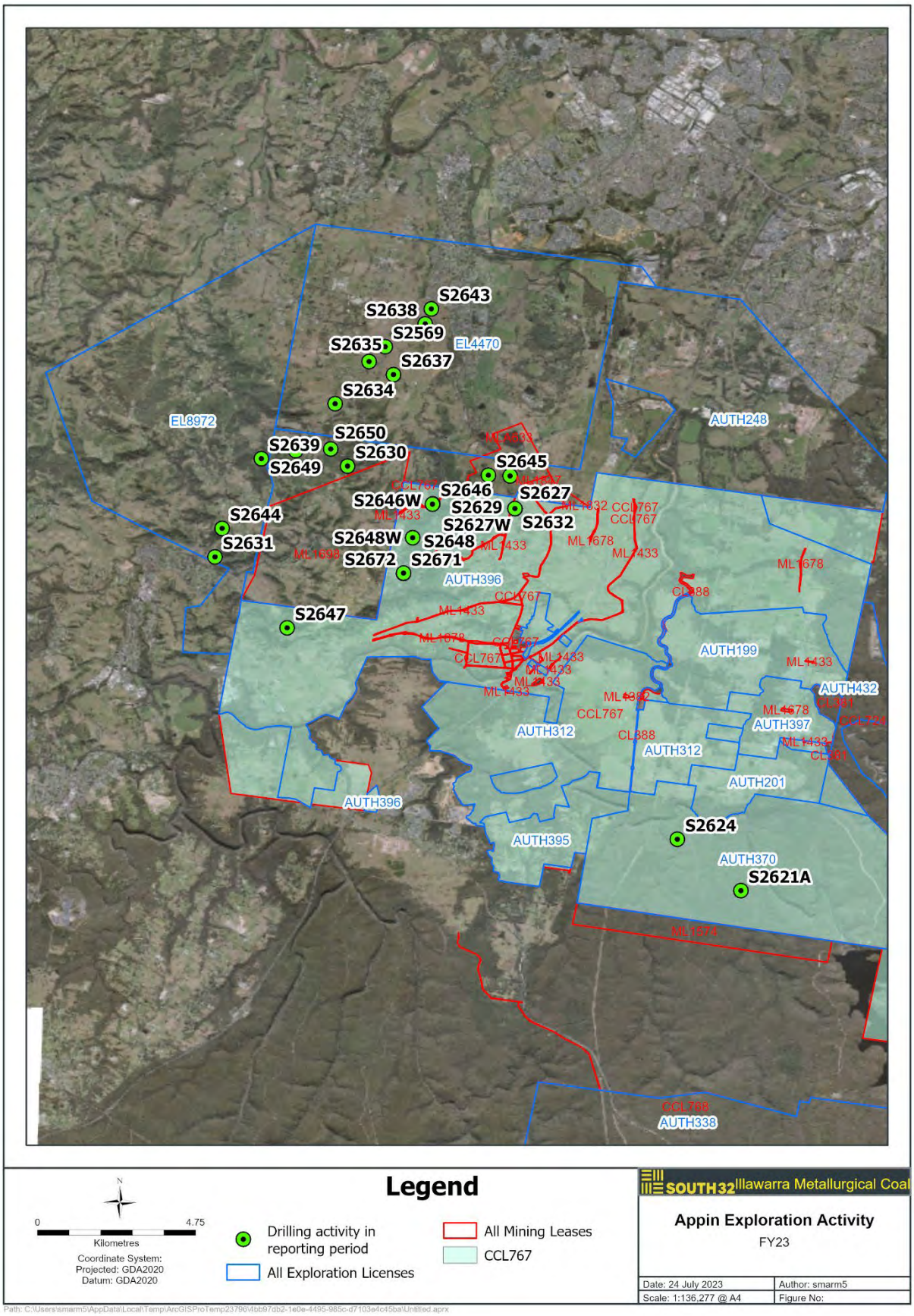
Plan 19: Appin Area 7 and 9 Longwall Extraction - FY23 Actual and FY24 Forecast



Plan 20: Biodiversity Offset Areas



Plan 21: Appin Exploration Activity - FY23



Plan 22: Planned Appin Exploration Activity - FY24