



**CULLEN VALLEY MINE
ANNUAL REVIEW 2024**

1 JANUARY 2024 TO 31 DECEMBER 2024

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Annual Review Title Block

Name of operation:	Cullen Valley Mine
Name of operator:	Castlereagh Coal (Trading name of Shoalhaven Coal Pty Ltd)
Development consent:	DA-200-5-2003 (as modified)
Name of holder of development consent:	Shoalhaven Coal Pty Ltd
Mining leases:	ML 1455, ML 1488, ML 1556, ML 1557
Name of holder of mining leases:	Shoalhaven Coal Pty Ltd
Water license:	80WA706148
Name of holder of water license:	Shoalhaven Coal Pty Ltd
RMP start date:	30 September 2022
RMP end date:	N/A
Annual Review start date:	1 January 2024
Annual Review end date:	31 December 2024
I, Kim Nguyen, certify that this audit report is a true and accurate record of the compliance status of Cullen Valley Mine for the period 1 January 2024 to 31 December 2024, and that I am authorised to make this statement on behalf of Shoalhaven Coal Company Pty Limited. Note. <i>a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, \$1 million and for an individual, \$250,000.</i> <i>a) 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).</i>	
Name of authorised report officer:	Kim Nguyen
Title of authorised report officer:	Chief Executive Officer
Signature of authorised report officer:	
Date:	31/03/2025

1 Statement of Compliance

This Annual Review provides a summary of the Cullen Valley Mine (CVM) operations environmental performance over the period 1 January to 31 December 2024 (referred to hereafter as the reporting period).

Table 1-1 provides a statement of compliance against CVM's relevant approvals. A summary of the non-compliances recorded during the report period are included in **Table 1-3**.

Table 1-1 Statement of Compliance

Relevant approval	All conditions complied with?
Development Approval DA-200-5-2003	No - Refer to Table 1-3
Environmental Protection License EPL 10341	No - Refer to Table 1-3
Mining Lease (ML) 1455	No - Refer to Table 1-3
ML 1488	No - Refer to Table 1-3
ML 1556	No - Refer to Table 1-3
ML 1557	No - Refer to Table 1-3
Water Access License 27898	Yes
Water Supply Work Approval (80WA706148)	Yes

Table 1-2 Compliance Status Key

Risk Level	Colour Code	Description
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non-compliant	Non-compliance with: - 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)

Source: Annual Review Guideline (NSW Government, 2015).

Table 1-3 Non-Compliances During the Reporting Period

Relevant Approval	Condition No.	Description (Summary)	Compliance Status	Comment	Where Addressed in Annual Review
DA-200-5-2003	Schedule 4 Condition 20	Exceedance of air quality assessment criteria for particular matter (PM ₁₀) on two (2) separate occasions.	Non-compliant	On two (2) occasions during the reporting period the CVM High Volume Air Sampler (HVAS) recorded results outside of the assessment criteria: - On the 10 May 2024 the CVM (HVAS recorded a total result of 97.0 µg/m³ for the 24-hour averaging period of PM₁₀. - On the 29 May 2024 the CVM HVAS recorded a total result of 280.0 µg/m³ for the 24-hour averaging period of PM₁₀. Following becoming aware of each event CVM reported the events to the Department of Planning Housing and Infrastructure (DPHI) via the Major Projects Portal for an air quality exceedance against DA 200-5-2003. As required by the Air Quality Management Plan (AQMP 2022) a detailed report was provided to the DPHI and relevant landowners within seven (7) days of becoming aware of each event. Regular air quality reporting is undertaken with monthly and quarterly reporting.	Section 6.3
DA-200-5-2003	Schedule 4 Condition 25	Air Quality Monitoring – HVAS PM ₁₀ & Total Suspended Particulate not monitored	Low Non-compliant	From January 2024 to March 2024 PM₁₀ and Total Suspended Particulates were not monitored. Due to contractual issues, technicians did not attend site to carry out collection and routine filter changes after scheduled runs. A review of contractual obligations and an engagement of new contractors was undertaken to avoid future non compliances.	Section 6.3
DA-200-5-2003 EPL 10341	Schedule 4 Condition 40 L2	Discharge limits exceeded at Discharge Point 4 (LDP004)	Non-compliant	The discharge point from Dam 4 (EPL Point 4) was discharging between January and December 2024 the following exceedances of discharge limits under the license were recorded: Total Suspended Solids (TSS) exceeded 50 mg/L on three (3) occasions: - 6 February 2024 (88 mg/L) - 8 April 2024 (52 mg/L) - 23 December 2024 (94 mg/L)	Section 6.4.1

Relevant Approval	Condition No.	Description (Summary)	Compliance Status	Comment	Where Addressed in Annual Review
DA-200-5-2003 EPL 10341	Schedule 4 Condition 27 L6.1	Nine (9) odour complaints received associated with sub-surface heating areas at CVM.	Non-compliant	Nine (9) odour complaints were received by CVM during the report period (refer to Section 9.2). CVM has implemented a number of management measures and undertaken regular inspections of the area. Each complaint was investigated on-site to assess the condition of the sub-surface heating areas at the time of the complaint. During 2024 compaction works were carried out in the sub-surface heating areas to reduce the effects of spontaneous combustion.	Section 6.5.3 and Section 9.2
EPL 10341	R2 & R3	Unlicensed discharge from North Void	Non-compliant	The CVM North Void was suspected of seepage during the reporting period. The North Void has been dewatered to stop any seepage from site. During an inspection on 8 November 2024 it was confirmed seepage had ceased and there was no water exiting site. CVM are now in the process of engaging a suitably qualified person to determine if contamination has occurred from the North Void seepage point. Castlereagh Coal will consult with the landholder in which the seepage has flowed into (National Parks and Wildlife Service) and will correspond with EPA regarding the outcomes of the contamination investigation.	Section 4

Relevant Approval	Condition No.	Description (Summary)	Compliance Status	Comment	Where Addressed in Annual Review
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 (Compliance Report) Condition 3(1) (AEMR)	Failure to submit an AEMR in the timeframe approved by the Director-General.	Non-Compliant	The Annual Review report was submitted late due to an administrative oversight.	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 3 (Compliance Report) Condition 3(1) (AEMR)	Failure to submit 2024 Forward Program by due date.	Non-Compliant	The 2024 Annual Rehabilitation Report was submitted late due to an administrative oversight	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 Condition 3(1)	Failure to submit 2024 Annual Rehabilitation Report by due date.	Non-Compliant	The 2024 Annual Rehabilitation Report was submitted late due to an administrative oversight	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 Condition 3(1)	Carrying out of ancillary mining activities outside of mining lease.	Non-Compliant	On 3 July 2024 the Resource Regulator notified CVM in writing that an investigation had concluded the unauthorised carrying out of designated ancillary mining activities on land outside a mining area at CVM. Sediment Dam 2 and Dam 3 have long been used at CVM to manage site water and they form part of the sites Water Management Plan. An application has been made to add ancillary activity for the use of Dam 2 and Dam 3.	NA

2 Introduction

Shoalhaven Coal Pty Ltd owns the Cullen Valley Mine (CVM), an open cut coal mine located approximately 30 kilometres (km) north-west of Lithgow in New South Wales (NSW) (refer to **Appendix 1, Figure 1**). Cullen Valley Mine is Operated by Castlereagh Coal a wholly owned subsidiary of Shoalhaven Coal Pty Ltd.

Underground mining commenced at CVM formerly Tyldesley Colliery around 1904 and continued up until the 1960s when the workings were abandoned. Open cut operations were conducted on the site between 1948 and 1953. Modern open cut operations began at CVM after 19 August 1999 when the Lithgow Coal Company was granted Mining Lease (ML) 1455 by the then Minister for Mineral Resources. Mining commenced on site in May 2000 following a four month construction phase.

Following the identification of additional open cut coal reserves, a further Environmental Assessment and Development Application was lodged for an extension of the mine in April 2003 (i.e. DA-200-5-2003). The lease extension area lies along the western side of Tyldesley Hill adjacent to the main western railway line. Approval of the Development Application was granted by the then Department of Planning and Infrastructure (DPI) on 19 August 2004.

CVM has previously supplied coal under contract to the Mount Piper Power Station. However, with the failure of the mine to secure a supply contract in 2007, it was proposed to place the operation on a care and maintenance program until such time as sufficient contracts were awarded that would make the operation of the mine viable once again. Coalpac Pty Ltd purchased the Lithgow Coal Company Pty Ltd, which owned the CVM, in January 2008 and the previous plans to place the mine on care and maintenance were discarded. Recommencement of the open cut mining operations occurred in February 2008. Mining of the available approved area at CVM was completed in early December 2012. Any remaining stockpiled ROM coal was transported to the Invincible Colliery during February 2013 and processed through the Invincible Coal Crushing Plant. The CVM was then placed under care and maintenance.

Shoalhaven Coal purchased the mine from Coalpac's administrators in May 2015. In November 2021 Shoalhaven Coal Pty Ltd was sold via a 100% share transaction to an all-Australian locally based ownership team who continued to operate the Colliery under a care and maintenance arrangements until mining recommenced in May 2022.

2.1 Mine Contacts

The Shoalhaven Coal Chief Executive Officer (CEO) is responsible to the regulatory authorities for all aspects of environmental management and compliance. The CEO's contact details are included in **Table 2-1**.

Table 2-1 Key Personnel Responsible for Environmental Management

Name	Role	Company	Contact details
Kim Nguyen	Chief Executive Officer	Shoalhaven Coal Pty Ltd, trading as Castlereagh Coal	Invincible Colliery Castlereagh Highway Cullen Bullen, NSW 2790 M 0414 335 529
Tim Haig	General Manager	Shoalhaven Coal Pty Ltd, trading as Castlereagh Coal	Invincible Colliery Castlereagh Highway Cullen Bullen, NSW 2790 M 0400 653 241
William Olson	Environmental Superintendent	Castlereagh Coal	Invincible Colliery Castlereagh Highway Cullen Bullen, NSW 2790 M 0477 115 523

2.2 Annual Review Requirements

Condition 5 of Schedule 6 of the CVM Development Approval-200-5-2003 (as modified) requires an Annual Review (AR) to be prepared and submitted to the Director General of the Department of Planning, Infrastructure and Environment (DPIE) and relevant agencies. This report has been prepared in accordance with the *NSW Government Annual Review Guidelines* (NSW Government, 2015) and details the operational and environmental management activities at CVM during the reporting period. The reporting obligations contained in the Development Approval along with an explanation of where each requirement is addressed within this document are provided in **Table 2-2**.

Table 2-2 Development Approval (200-5-2003) Conditions for the Annual Review

Conditions		Addressed in Section
Schedule 6 – Environmental Management, Monitoring, Auditing and Reporting:		
Annual Report		
5.	The Proponent shall submit an AEMR to the Director-General and relevant agencies. This report must:	This document
	a) identify the standards and performance measures that apply to the project;	Relevant sections throughout Section 6.0
	b) include a detailed summary of the complaints received during the past year, and compare this to the complaints received in the previous 5 years;	Section 9.2
	c) include a detailed summary of the monitoring results for the project during the past year;	Relevant sections throughout Section 6.0
	d) include a detailed analysis of these monitoring results against the relevant: • impact assessment criteria/limits; • monitoring results from previous years; and • predictions in the EA;	Relevant sections throughout Section 6.0
	e) identify any trends in the monitoring results over the life of the development;	Relevant sections throughout Section 6.0
	f) identify any non-compliance during the previous year;	Section 1.0, Section 11.0
	g) describe what actions were, or are being, taken to ensure compliance.	Section 6.0, Section 11.0

3 Approvals

3.1 Status of Leases, Licences and Approvals

CVM operates in accordance with the approvals listed in **Error! Reference source not found.**

Table 3-1 Environmental Approvals Held by CVM

Approval	Date Granted	Expiry Date	Status
Development Approval (DA-200-5-2003)	19 August 2004	19 August 2025	Current
Environment Protection License (EPL) 10341	10 December (anniversary date)	Annually	Current
ML 1455	Renewal date - 31 May 2023	19 August 2027	Current
ML 1488	21 June 2001	20 June 2033	Current
ML 1556	20 September 2004	19 September 2032	Current
ML 1557	20 September 2004	19 September 2032	Current
Water Supply Work Approval 80WA706148	16 January 2012	5 July 2025	Current

3.2 Environmental Management Plans

Environmental Management Plans (EMPs) have been prepared and approved for the CVM in accordance with the conditions of DA-200-5-2003. The current versions approved by DPIE are available on the Castlereagh Coal website (<https://ccoal.com.au>).

- Environmental Management Strategy. Approved April 2022.
- Air Quality Management Plan. Approved April 2022.
- Coal Haulage Vehicle Management Plan. Approved April 2022.
- Erosion and Sediment Control Plan. Approved April 2022.
- Fire Management Plan. Approved April 2022.
- Flora and Fauna Management Plan. Approved April 2022.
- Noise Management Plan. Approved April 2022.
- Site Water Management Plan. Approved April 2022.
- Pollution Incident Response Management Plan (revised), December 2024.

3.3 Amendments to Approvals/Licences during the Reporting Period

Table 3-2 lists approvals and amendments that were granted during the reporting period.

Table 3-2 Amendments to Approvals/License

Licence/Approval	Amendment type	Date of amendment
ML 1556	Renewed	September 2024
ML 1557	Renewed	September 2024
EPL 1034	Administrative updates	November 2024 (submission)
ML 1455, ML 1456, ML 1488	Ancillary mining activity	October 2024 (submission)

4 Operations Summary

4.1 Mining Operations

A summary of operations (Production) during the preceding and current period as well as forward forecast for the next reporting period is provided in **Table 4-1**.

Table 4-1 Production Summary

Material	Approved Limit (specify source)	2023 Previous reporting period (Actual)	2024 This reporting period (Actual)	2025 Next reporting period (forecast)
Waste rock/overburden (Mbcm)	Not specified	0.446	0	0.685
Coal works/Coal mining (Mt)	0-2 Mtpa Coalworks (EPL) 0.5-2 Mtpa Mining for Coal (EPL) 1 Mtpa (DA)	0.097	0	0.029
Coarse reject	Not specified	0	0	0
Fine reject	Not specified	0	0	0
Saleable coal (Mt)	Not specified	0.097	0	0.029

No saleable product coal or waste rock/overburden was mined from the CVM during the reporting period.

4.2 Other Operations

During the reporting period, minor works were undertaken including watering of subsurface heating areas, water management, weed spraying and compaction works done of surface clay material in the subsurface heating area.

Additionally, significant dewatering of the CVM North Void was also carried out in response to the Environmental Protection Agency (EPA) inspections noting uncontrolled seepage was occurring from the void.

4.3 Section 240 Notice

During 2024 activities continued to address Notice NTCE0008974 (directing an assessment of rehabilitation materials, quantities, changes in inventories and shortfall projections at completion of mining activities and a report demonstrating how the directions have been met) and Notice NTCE0008975 (directing an assessment of surface water management systems associated with the final landform, including an assessment of the adequacy of the current systems, capacity, construction methods and effectiveness of materials used for rock armouring and a report demonstrating how the directions have been met).

Consultant specialists from Umwelt and Golder were engaged at the end of 2021 to undertake technical investigations and provide advice on longer term recommendations to address the matters associated with the Section 240 Notices. The final report completed in May 2022 recommended a program of works to be implemented to establish long term stability of landforms. Following completion of the Umwelt/Golder report and recommended program of works, Shoalhaven Coal consulted with the NSW Resources Regulator to develop an action plan to address the recommendations.

Detailed desktop and field work was undertaken by specialist consultants in late 2022 to develop long term actions meeting the requirements of the proposed actions and targets identified in the plan developed in consultation with the Resources Regulator. Actions resulting from the recommendations have been ongoing since 2023 and the recommended works continued during the 2024 reporting period. Completed actions will provide CVM the ability to close out the Section 240 notice within the next reporting period.

4.4 *Next Report Period*

Mining at CVM will be undertaken during the next reporting period to extract the remaining remnant coal unable to be recovered during 2024. Shoalhaven Coal are currently working towards an extension to the current life of mine approval. Rehabilitation activities for next reporting period is discussed in Section 8 and addressed in the CVM Mine Forward Program (FWP) on the Castlereagh Coal website.

5 Actions Required from Previous Annual Review

Following submission of the 2023 Annual Review, DPIE advised in correspondence dated 12 June 2024, that the Annual Review was considered to generally satisfy the requirement of the Approval in relation to Annual Reviews. It was also noted that the non-compliances reported with the Consent as outlined in the Annual Review but indicated no further information was required. Additionally, DPIE requested that the Annual Review be made publicly available on the company website. A copy of the 2023 Annual Review is available on the Castlereagh Coal website.

6 Environmental Performance

In accordance with the Annual Review Guidelines (DPE, 2015), this section describes the environmental monitoring and management measures undertaken at CVM during the report period.

A range of environmental monitoring is required to be undertaken by the Development Consent, EPL and CVM management plans. **Appendix 1, Figure 3**, shows the CVM environmental monitoring locations.

6.1 Summary of Performance Against EIS Predictions

CVM has been the subject of two Environmental Impact Statements (EIS) in the last 20 years of operations. The results of environmental monitoring conducted during the reporting period are compared to the predictions of these EIS's.

The Feldmast Coal Project for open cut and underground operations to the north-east and north-west of Cullen Bullen was assessed in the EIS dated February 1997 (International Environmental Consultants, 1997). The CVM Lease Extension Project involved expanded operations further to the north-west of the original mining area adjacent to the Wallerawang-Gwabegar Railway line and was assessed in the EIS dated April 2003 (International Environmental Consultants, 2003).

Environmental monitoring undertaken includes noise, air quality, surface water and groundwater quality, and biodiversity. Below is a summary of predictions from the two EIS's completed for the site. **Table 6.1** provides a summary of CVM environmental performance against the EIS predictions for the reporting period. It is noted that modelling undertaken for the respective EIS's assumed mining operations were being undertaken. As noted previously, CVM was in care and maintenance until May 2022 after which mining operations recommenced.

6.1.1 Noise Predictions

The Feldmast EIS (1997) predicted that with construction of the noise bund, noise from open cut operations was expected to result in an increase in existing background levels measured at the Hillcroft property (Hillcroft) of no more than 5 dB(A). The construction of a private access road between the mine and Mudgee Road to bypass Cullen Bullen was completed during the construction phase and was expected to minimise truck noise. The bypass around Cullen Bullen and noise bund were constructed, significantly reducing traffic and noise impacts on the town and nearby properties.

In the 2003 EIS and approved extension to mining operations, noise exceedances of 2-4 dB(A) were predicted to occur at Red Springs during temperature inversion conditions. Noise exceedances of 4-7 dB(A) were also predicted at Hillcroft during temperature inversion conditions. At Forest Lodge, exceedances of 1 dB(A) (calm), 5dB(A) (south wind) and 5dB(A) (temperature inversion) were predicted in Years 9 and 10 of the extension operations. Exceedances of 3 dB(A) (calm), 10dB(A) (south wind) and 5dB(A) (temperature inversion) were also predicted during years 9 and 10 at the 25 acre allotments to the north of the mine. *NB: These are exceedances of the 35 dB(A) criteria.*

6.1.2 Air Quality Predictions

The Feldmast EIS (1997) predicted annual average TSP concentrations from background levels plus mine emissions to be 48 $\mu\text{g}/\text{m}^3$ at the closest residences to the mine, which is well below the 90 $\mu\text{g}/\text{m}^3$ annual average limit. Predicted PM_{10} concentrations were 24 $\mu\text{g}/\text{m}^3$ (background plus mine emissions) and this is well below the annual average limit of 30 $\mu\text{g}/\text{m}^3$. $\text{PM}_{2.5}$ concentrations from mine emissions were predicted to be 0.5 $\mu\text{g}/\text{m}^3$ at the closest residence.

Modelling of dust deposition in the worst-case scenario predicted that no long-term adverse air quality impacts at the closest residential area as a result of mine operations.

The 2003 EIS predicted that nearby residences and those in Cullen Bullen were unlikely to experience unacceptable long-term impacts on air quality from the mine extension operations. It was predicted that short-term impacts could occur if emissions from the mine extension operations were combined with elevated levels from other sources.

6.1.3 Water Quality Predictions

Given the water management system contains and treats water within storage ponds prior to discharge, the Feldmast EIS (1997) predicted that EPA discharge criteria would be met. All water within the Lithgow Seam was proposed to be drained within the mining area. Groundwater systems below the Lithgow Seam were expected to be unaffected by the project.

The 2003 EIS predicted that the water management system for containment and reuse of all runoff from disturbed areas would ensure that EPA licence criteria for surface water quality would be met. The project was expected to use underground water within the old Tyldesley underground workings which collects subsurface water contained within the coal measures. Groundwater systems below the Lithgow Seam were expected to be unaffected by the project.

6.1.4 Groundwater Predictions

During 2017 a review of the groundwater regime in the vicinity of CVM was undertaken which resulted in the development of a standalone CVM Water Management Plan (Umwelt, 2017b). A new CVM Site Water Management Plan (SWMP) (JBA, 2022c) was developed and approved during 2022 prior to the recommencement of mining. The SWMP adopts the same groundwater trigger levels from the 2017 WMP. For the purposes of this report, the results of the 2024 groundwater monitoring have been compared to the groundwater trigger levels contained in the CVM SWMP (JBA, 2022c).

6.1.5 Biodiversity Predictions

Only one threatened plant species, Capertee Stringybark, was found to occur in the study area during the Feldmast EIS (1997). The EIS predicted that no local population of Capertee Stringybark would be placed at risk of extinction as a result of the proposed mining operations. The 2003 EIS made similar predictions and concluded that there would not be a significant effect on Capertee Stringybark as a result of the expansion.

The 1997 EIS predicted that the mining operations were unlikely to cause a significant impact on threatened fauna species found in the study area. Similarly, the 2003 EIS predicted that the expansion was unlikely to have a significant impact on threatened fauna.

A summary of the environmental performance of CVM during the report period as compared to predictions made in the EIS's is provided in **Table 6-1**.

Table 6-1 Summary of Environmental Performance During 2024

Aspect	Development Approval criteria/ EA prediction	Performance during the report period	Trend/key management implications
Noise	Refer to Section 6.1.1	Noise performance is compliant with Development Approval criteria and conforms to EIS predictions. Refer to Section 6.5 .	No noise exceedance recorded during 2024. Historic trends are shown in Section 6.5 .
Air Quality	Refer to Section 6.1.2	Air Quality monitoring conforms to EIS predictions. Non-compliances for air quality are listed in Table 1-3 . Refer to Section 6.3 .	A comparison to historic trends for air quality are shown in Section 6.3 and Appendix 2 .
Water Quality	Refer to Sections 6.1.3 and 6.1.4	Surface water quality non-compliances with Development Approval criteria and EIS predictions are listed in Section 6.4.1.3 . Groundwater monitoring has been compared to trigger levels developed during 2017 in Section 6.4.2 .	Surface water and Groundwater monitoring was undertaken and is discussed in Sections 6.4.1 and 6.4.2 and Appendix 2 .
Biodiversity	Refer to Section 6.1.5	Conservation areas are generally in healthy stable condition Section 6.6 . Rehabilitation areas are generally progressing towards satisfactory completion Section 8.4 .	The Biodiversity Monitoring Program continued during 2024.

6.2 Meteorological Monitoring

Meteorological monitoring is undertaken at CVM. The CVM weather station (CMET2) is located at the training centre adjacent to the compensatory habitat area (**Appendix 1, Figure 3**). A summary of monthly meteorological monitoring results is provided in **Table 6-3**.

6.2.1 Rainfall

CVM received 675.4 mm of rainfall over 164 rain days during the report period. The highest rainfall occurred during November (112.8 mm), while the lowest rainfall was recorded during October (13.4 mm). A summary of monthly rainfall data is provided in **Table 6-3**.

6.2.2 Temperature

Air temperature is measured at 2 m and 10 m above ground level. The maximum temperature recorded during the report period was in January (22.33°C @ 10m) and the lowest temperatures occurred in September (-4.03°C @ 2m). The minimum and maximum monthly temperature data is provided in **Table 6-3**.

6.2.3 Humidity

The minimum humidity of 38.9% was recorded in September and a maximum humidity of 98.6% was recorded in November and December 2024. The minimum and maximum monthly humidity data is provided in **Table 6-3**.

6.3 Air Quality

6.3.1 Environmental Management Measures

CVM's Environmental Management Plan (JBA, 2022) includes an Air Quality Management Plan (AQMP), which defines mitigation measures and monitoring procedures for the management of dust.

The air quality monitoring network at CVM consists of five dust deposition gauges (i.e. CDD1 to CDD5) and one High Volume Air Sampler (HVAS) measuring particulate matter <10 µm (PM₁₀) (**Appendix 1, Figure 3**).

6.3.2 Performance Criteria

The air quality performance criteria specified in DA 200-5-2003 are reproduced in **Table 6-2**.

Table 6-2 Air Quality Performance Criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual average	90 µg/m ³
Particulate matter <10µm (PM ₁₀)	Annual average	30 µg/m ³
	24-hour average	50 µg/m ³
Deposited dust	Annual average (maximum total)	4 g/m ² /month
	Annual average (maximum increase)	2 g/m ² /month

Table 6-3 CVM Weather Station Summary

	Rainfall	Cumulative	No of	Air temp @ 2m		Air temp @ 10m		Humidity (%)	
Month	(mm)	Rainfall (mm)	rain days	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
January 2024	80.2	80.2	16	8.72	22.29	8.92	22.33	57.6	98.5
February 2024	64.6	144.8	18	11.93	21.52	12.52	22.62	72.9	98
March 2024	43.2	188	13	5.77	20.26	6.95	20.64	72.5	97.7
April 2024	100.6	288.6	13	2.84	14.54	3.21	14.55	76.9	97.7
May 2024	50.4	339	19	-0.98	13.8	-0.46	13.97	61.3	97.7
June 2024	41.6	380.6	17	-3.73	13.06	-3.14	13.05	81.3	98.2
July 2024	36.4	417	16	-2.54	10.62	-1.49	10.69	67.4	97.4
August 2024	27.4	444.4	15	-3.27	16.17	-2.87	16.67	52.4	97.7
September 2024	18.8	463.2	8	-4.03	14.44	-3.43	14.62	38.9	97.4
October 2024	13.4	476.6	8	3.16	16.18	3.62	16.47	56.8	98
November 2024	112.8	589.4	11	1.38	17.52	1.46	18.18	44.3	98.6
December 2024	86	675.4	9	8.97	19.72	9.59	22.42	51.4	98.6
Total	675.4	-	163	-	-	-	-	-	-

6.3.3 Environmental Outcomes

6.3.3.1 Dust Deposition

Deposited dust is monitored on a 30± 2-day cycle. The annual average criterion for deposited dust (4 g/m²/month) was not exceeded at any of the dust deposition gauges during the reporting period. The annual average increase in dust levels for all locations was less than 2 g/m²/month and therefore complied with air quality performance criteria.

The monthly deposited dust monitoring results for 2024 are shown in **Table 6-4** and are compared with historical results in **Appendix 2**.

Table 6-4 Deposited Dust Monitoring Results

Date	Total Insoluble Solids (g/m ² /month)				
	CDD1	CDD2	CDD3	CDD4	CDD5
January 2024	0.3	0.4	0.9	2	0.7
February 2024	1.7	0.1	0.4	0.7	0.1
March 2024	0.6	1.0	1.4	3.1	2.4
April 2024	0.3	0.5	1.3	0.5	0.3
May 2024	0.5	0.2	0.3	0.6	0.3
June 2024	0.2	0.3	0.3	0.5	0.4
July 2024	0.3	0.6	0.4	0.5	0.5
August 2024	0.4	0.6	0.4	0.9	0.2
September 2024	0.7	0.4	0.3	0.9	0.7
October 2024	0.9	0.7	0.5	0.6	1.0
November 2024	2.8	0.6	0.8	1.6	0.9
December 2024	1	0.9	1.4	0.4	0.2
Annual Average 2024	0.82	0.58	1.16	1.08	0.69

* – No results available due to laboratory error

6.3.3.2 Particulate Matter

Monitoring of particulate matter was conducted during 2024. The results of total suspended particulates (TSP) were estimated from the PM₁₀ concentrations during the reporting period as there is currently no HVAS TSP system located on site at CVM. Estimates of TSP have been captured since 2014, and the installation of a new TSP unit is intended to allow a more accurate data capture. The annual average criteria for PM₁₀ (30 µg/m³) and TSP (90 µg/m³) were not exceeded during the report period. The 24 hr averaging period criteria (50 µg/m³) was exceeded on two (2) occasions, refer to **Table 1-3**.

The PM₁₀ and TSP average results for the report period are shown in **Table 6-5**.

Table 6-5 Particulate matter (PM₁₀) and Total Suspended Particulates (TSP) Annual Average Results

Annual Average	PM₁₀ (µg/m³)	TSP (µg/m³)*
Annual Average Criterion	30	90
24 hr Criterion	50	-
Annual Average 2024	14.1	44.0
Average 24 hr 2024	14.1	44.0
Average 24 hr (max.) 2024	280	701
Average 24 hr (min.) 2024	0.1	0.1

** Total suspended particulates were estimated from the PM₁₀ concentrations.*

A graph of the PM₁₀ and TSP monitoring data for 2024, as well as historical data trends, is shown in **Appendix 2**.

6.3.4 Trends in Data

6.3.4.1 Dust Deposition

Table 6-6 presents the dust deposition annual averages from 2020 to 2024. Graphs of the long-term dust deposition levels are included in **Appendix 2**. The annual averages for depositional dust recorded at CVM during 2024 are well below the performance criteria.

Table 6-6 Annual Averages for Dust Deposition 2020-2024

Reporting period	Total Insoluble Solids (g/m ² /month)				
	CDD1	CDD2	CDD3	CDD4	CDD5
Criteria	4	4	4	4	4
2020	0.8	0.9	1.0	1.1	1.9
2021	0.2	0.4	0.3	0.2	0.9
2022	0.4	0.3	0.3	0.8	0.5
2023	0.6	0.5	0.7	1.0	0.6
2024	0.8	0.5	1.1	1.0	0.6

The 2024 annual average dust deposition levels were consistent with the range of averages since 2020. The 2024 annual averages at all monitoring locations are equal to the higher end of the historical range over the previous five years.

6.3.4.2 Particulate Matter

Table 6-7 presents the particulate matter annual averages from 2020 to 2024. The PM₁₀ and TSP 2024 annual averages are within the range of results over the previous five years. The 2024 annual averages for PM₁₀ and TSP are at the highest range of averages over the previous five years. Some HVAS data is unavailable for the reporting period due to not being monitored. Refer to **Table 1-3** for non-compliance details. It is noted that on the 5 December 2024 the PM₁₀ result collected was outside of the assessment criteria. However, with further investigation this was found to be due to a nearby bushfire impacting on the HVAS readings.

Table 6-7 Annual Averages for PM10 and TSP 2020-2024

Annual Average	PM ₁₀ (µg/m ³)	TSP (µg/m ³)*
2020	11.0	27.5
2020^	9.0	22.0
2021	5.6	14.1
2022	4.0	10.0
2023	9.0	22.6
2024	14.1	44.0

* Annual average significantly influenced by bushfire activity (refer 2019 Cullen Valley Annual Review)

^ Excluding results influenced by extraordinary events

6.3.5 Proposed Improvements

Monitoring of air quality will continue to be conducted during 2025 in accordance with the Air Quality Management Plan (AQMP). A TSP unit will be installed at the current HVAS sampling location to allow for more accurate data capture.

6.4 Water Management

The current CVM Site Water Management Plan (SWMP) was approved by DPIE in April 2022. Water management is undertaken at CVM in accordance with the approved SWMP.

6.4.1 Surface Water Quality

6.4.1.1 Environmental Management Measures

The surface water management system at CVM utilises a series of settlement dams. The system is primarily operated as a closed loop system. The CVM Water Management System (WMS) incorporates a range of infrastructure to manage clean water runoff from upslope undisturbed catchments, dirty water runoff from disturbed catchments and mine water (i.e. groundwater extracted from former underground workings or water that has come into contact with coal). Mine water at CVM is predominately utilised for dust suppression. Where mine water is utilised for dust suppression it is captured and managed within the dirty water management system. The fundamental principle of the WMS is to minimise interaction of clean, dirty and mine waters and to capture dirty water for re-use and provide controls to treat captured dirty water to a standard suitable for discharge off-site.

The Tyldesley Mine underground workings are also used to store excess water from the WMS. The primary source of water for site use (when required) is from the abandoned and flooded Tyldesley Mine underground workings via the Tilley's Bore (GW01) in accordance with Water Access Licence WAL27898. When required, water is pumped from the workings via the Tilley's Bore to two 150,000 L tanks at CVM. Site water is transferred between site dams through gravity fed water mains.

CVM operates under EPL 10341. The EPL provides water quality criteria and water quality monitoring requirements for water discharges from the two CVM Licensed Discharge Points (LDP's) being LDP001 and LDP004, refer to **Appendix 1, Figure 3**. Further discussion regarding water management and erosion and sediment control measures is included in **Section 7.0**.

6.4.1.2 Performance Criteria

Water may be discharged from LDP001 and LDP004 at CVM in accordance with EPL and Development Approval requirements. A discharge event is deemed to occur when water leaves the site either through the overflow channel of either Dam 3 (LDP001) or Dam 4 (LDP004), or as a result of actively pumping water. **Table 6-8** presents the EPL discharge criteria for these discharge points.

Table 6-8 Water Quality Concentration Limits for LDP001 and LDP004 During Discharge

Parameter	Concentration Limit
Oil & Grease	10 mg/L
pH	6.5 – 8.5
Total suspended solids	50 mg/L

6.4.1.3 Environmental Outcomes/Trends in Data

There were nil discharge events from LDP001 during the reporting period. Samples were collected on a monthly basis for due diligence purposes only. LDP004 was discharging during all monthly sampling events

during the reporting period. Water samples were collected and analysed weekly from LDP004 during discharge. The majority of results were below the concentration limits for pH, TSS and Oil & Grease with the exception of three (3) exceedances of the TSS limit of 50mg/L (88 mg/L on 6 February, 52mg/L on 8 April and 94 mg/L on the 23 December 2024). On all occasions the TSS limit was below the TSS concentration limit during the following weeks of sampling.

The CVM North Void was suspected of seepage during the reporting period. The North Void has been dewatered to stop any potential seepage from site. CVM are now in the process of engaging a suitably qualified person to determine if contamination has occurred from the North Void seepage point. Castlereagh Coal will consult with the landholder in which the seepage has flowed into (National Parks and Wildlife Service) and will correspond with NSW EPA regarding the outcomes of the contamination investigation.

6.4.1.4 Proposed Improvements

Monitoring water quality at the CVM will continue to be conducted during 2025. CVM will continue to liaise with NSW EPA regarding the North Void.

6.4.2 Groundwater Quality

6.4.2.1 Environmental Management Measures

CVM is located on the western escarpment of the Sydney Basin. Aquifers in this area are typically limited to the Lithgow Seam and the Marangaroo Sandstone which underlies the Lithgow Seam. Despite their proximity, there is little observed movement between these aquifers in the Marangaroo Sandstone and the Lithgow Seam (AGE, 2012).

Past open cut and highwall mining at CVM has targeted the Irondale, Lidsdale and Lithgow seams. Underground mining in the area has been largely limited to the Lithgow seam. The Lithgow Seam can be seen in the highwalls faces at CVM (some of which are now covered by overburden). Outcrop areas north of the open cut workings represent local recharge points for the Lithgow seam.

Figure 4, Appendix 1 shows the general dip in the strata of the Lithgow seam to the east - northeast and the location of underground workings in the Lithgow seam in the area. The open cut workings in the southern parts of the CVM are hydraulically connected to the former Tyldesley Colliery workings which extend to the east of the southern part of CVM. The water in the Tyldesley Colliery workings is sourced from groundwater inflows (i.e. recharge areas) located up-dip, ingress from areas at CVM where the open cut operations are hydraulically connected to the Tyldesley workings, and infiltration through subsidence cracking associated with pillar extraction and pillar failure in the former workings. Water quality in these workings is monitored at GW01 (East Tyldesley Bore) (refer to **Figure 4, Appendix 1**).

As can be seen from **Figure 4, Appendix 1** the CVM is located up-dip of the Lithgow seam groundwater monitoring bores of CP116, CP115 and CP132 and operates as a recharge point for the Lithgow seam in this area. As mining at CVM extended to the base of the Lithgow Seam and as CVM represents an up-dip recharge point of this aquifer, the open cut at CVM do not intercept any natural groundwater aquifers. Therefore, there are limited depressurisation impacts associated with the CVM open cut pits and any impacts would be associated with interactions with the recharge regime; these impacts are expected to be limited due to the low recharge rates and the generally benign nature of the overburden emplaced adjacent to the outcropping coal seams (Umwelt, 2017b).

6.4.2.2 Performance Criteria

There are no pollutant concentration limits for groundwater specified in the Development Approval or EPL for CVM. The CVM SWMP (JBA, 2022c) includes trigger values against which groundwater monitoring results are compared. For the purposes of this Annual Review, the groundwater results obtained during the reporting period have been compared to these trigger values.

The CVM 2017 WMP (Umwelt, 2017b) reviewed the location and target seam for each groundwater monitoring bore and considers the CP115, CP116 and GW01 groundwater monitoring bores are suitable to assess any potential offsite groundwater impacts associated with the operation of CVM. These bores are located down dip of CVM and are also located within appropriate seams. **Table 6-9** shows the trigger level/range for key groundwater monitoring parameters that are specific to bores CP115, CP116 and GW01. Results outside of these ranges are triggers for further investigation. The results of CP115, CP116 and GW01 are also compared to reference bores which are bores that are considered to be representative of background groundwater quality (refer to **Section 6.4.2.4**).

Table 6-9 Groundwater Quality and Level Triggers

Bore	Groundwater Level (mAHD) Trigger Range	Analyte			
		pH	EC (us/cm)	Sulphate (mg/L)	Hardness (mg of CaCO ₃ /L)
CP115	892 - 896	Range 6.26 - 7.3	Upper limit 970	Upper limit 380	Upper limit 376
CP116	890 - 894	Range 5.82 - 7.2	Upper limit 840	Upper limit 140	Upper limit 210
GW01 ¹	N/A as bore is located in workings	Range 6.14 - 6.82	Upper limit 939	Upper limit 338	Total Alkalinity ² Upper limit 100 mg of CaCO ₃

¹ Baseline data was collected for GW01 over 11 monitoring events in 2016-17 and it is expected trigger level ranges will be reviewed in future to be consistent with those adopted for other bores.

² Total Alkalinity is used as a trigger for this bore until sufficient baseline data for hardness has been collected.

Baseline groundwater monitoring programs and associated trigger levels when developed in accordance with ANZECC recommendations require the utilisation of 24 contiguous monthly samples (ANZECC, 2000). The trigger levels for groundwater monitoring at CVM have been developed utilising the groundwater data set which is a limited data set of between nine and eleven annual groundwater samples at each location between the period 2011 – 2017.

Monitoring results outside of the values presented in **Table 6-9** will be used for further investigation by CVM personnel. It is noted that monitoring results outside of these values do not necessarily reflect an environmental impact associated with CVM operations, as variations within these bores may be influenced by other factors not associated with site activities. These trigger levels will be reviewed on an annual basis as further monitoring data is collected for each bore.

6.4.2.3 Environmental Outcomes

During the reporting period, groundwater monitoring was conducted on two occasions.

Groundwater monitoring was disrupted by various issues associated with access to bore sites. CP115 was unable to be accessed during November 2024 due to fallen trees and CP116 was unable to be accessed during the May and November 2024 monitoring rounds. CP116 is located in the National Park (NP) and heavy rainfall damaging multiple tracks and a lack of maintenance has rendered the site inaccessible. CVM personnel have liaised with NP personnel regarding reinstatement of tracks. CVM personnel will continue to liaise with NP regarding this issue. CP131 was damaged by fire in 2019 hence no sample has been collected from this bore since. Damage to CP131 bore is being investigated by site personnel toward reestablishment where practical, noting that CP131 was dry from 2015 prior to damage.

6.4.2.4 Trends in Data

The groundwater monitoring program at CVM consists of:

- Impact bores – bores with the potential to identify potential groundwater impact from CVM, specifically CP115, CP116 and GW01; and
- Reference bores – bores that are considered to be representative of background groundwater quality (i.e. are unlikely to be impacted by CVM operations), specifically CP114, CP131, CP132. These bores provide a baseline for comparison with the impact bores.

6.4.2.4.1 Standing Water Level

The standing water level in the impact bore CP115 during the report period are within the trigger level range, as shown in **Table 6-10**.

Table 6-10 Impact Bores Standing Water Levels and Triggers

Bore	Groundwater Level (mAHD) Trigger Range	May 2024 Groundwater Level (mAHD)	November 2024 Groundwater Level (mAHD)	Complied with Trigger Level?
CP115	892 - 896	894.61	NR	Yes
CP116	890 - 894	NR	NR	NR
GW01	N/A as bore is located in workings	N/A	N/A	N/A

NR = No access to CP115 and CP116 in 2024 fallen tree.

The long-term standing water level trend in both impact bores (CP116 and CP115) has shown little variation since monitoring commenced in February 2012. Since February 2012, the standing water level has gradually increased until November 2016 after which time it has gradually declined and has increased slightly since May 2019, as shown graphically in **Appendix 2**. The reference bores CP132 and CP131 show slightly greater variability in the long-term standing water level trends, as shown graphically in **Appendix 2**.

6.4.2.4.2 pH

The pH results for impact bore CP115 and GW01 were below the trigger level range during May and November 2024 respectively. The result for CP115 in May 2024 was within the historical range and was equal to the pH value recorded during November 2023. The pH result for GW01 during November 2024 was the lowest recorded result since monitoring began at this sample location. Further details as shown in **Table 6-11**

In November 2019, pH levels generally decreased at CP116, CP115 and GW01. The pH levels of all reference bores also decreased during this period. Available data shows pH has slightly increased at reference bores CP114 and CP132 throughout 2021 to 2023, remaining relatively stable in 2024, as demonstrated in **Appendix 2**. The pH levels at CP115 and GW01 have shown slight decreases throughout 2023 to 2024, however it is noted that no transfer of surface water into GW01 occurred during the reporting period therefore it is unlikely that the pH fluctuations at GW01 are attributed to CVM operations. Fluctuations of pH levels are reflective of past wider regional trends and are not considered the result of CVM activities.

The pH trend across both impact and reference bores is generally consistent over time, with isolated spikes and declines observed for individual sampling dates shown graphically in **Appendix 2**.

Table 6-11 Impact Bores pH Levels and Triggers

Bore	pH Trigger Range	May 2024 pH Level	November 2024 pH Level	Complied with Trigger Level?
CP115	6.26 – 7.3	6.1	NR	No
CP116	5.82 – 7.2	NR	NR	N/A
GW01	6.14 – 6.82	6.3	5.8	No

NR = No Result. No access to CP115 and CP116 due to fallen tree.

6.4.2.4.3 Electrical Conductivity

The electrical conductivity (EC) results for the impact bores during the reporting period are below the trigger level, as shown in **Table 6-12**.

Table 6-12 Impact Bores Electrical Conductivity Levels and Triggers

Bore	Electrical Conductivity ($\mu\text{S/cm}$) Trigger Level	May 2024 EC Level ($\mu\text{S/cm}$)	November 2024 EC Level ($\mu\text{S/cm}$)	Complied with Trigger Level?
CP115	Upper limit 970	785	NR	Yes
CP116	Upper limit 840	NR	NR	N/A
GW01	Upper limit 939	874	880	Yes

NR = No Result. No access to CP115 and CP116 in due to fallen tree.

The long-term trend in EC values across the reference bores is mixed, as shown graphically in **Appendix 2**:

- CP114 has shown some slight variability with results during the reporting period similar to historical results.
- CP132 was able to be sampled for the first time since May 2022, results for May and November 2024 were consistent with historical ranges.
- CP131 was destroyed by bushfire activity in 2019 and was unable to be sampled. It is noted that dry conditions have been observed at this location since 2015.

The long term trend in EC values in the impact bores shows greater variability than reference bores, as shown graphically in **Appendix 2**:

- CP116 monitoring results continued to increase from April 2014 to 2021. However, due to access issues results have not been collected since October 2022.
- CP115 monitoring results exhibit greater variability. The results since February 2011 have ranged from 370 $\mu\text{S/cm}$ (August 2011) to 970 $\mu\text{S/cm}$ (April 2014). EC level collected in May 2024 was consistent with historical results and below the trigger level.
- GW01 EC levels in May and November 2024 have increased since the previous reporting period and results remain below groundwater trigger levels.

6.4.2.4.4 Sulphate

The sulphate levels in CP115 were below the trigger level during the reporting period, however GW01 sulphate levels were above triggers during both monitoring rounds in 2024, as shown in **Table 6-13**

Table 6-13 Impact Bores Sulphate Levels and Triggers

Bore	Sulphate (mg/L) Trigger Level	May 2024 Sulphate Level (mg/L)	November 2024 Sulphate Level (mg/L)	Complied with Trigger Level?
CP115	Upper limit 380	350	NR	Yes
CP116	Upper limit 140	NR	NR	N/A
GW01	Upper limit 338	370	420	No

NR = No Result. No access to CP115 and CP116 in due to fallen tree.

The long-term sulphate values for the reference bores ranges from 10 mg/L (CP114) to 145 mg/L (CP132). There is a variability of up to 70 mg/L between consecutive samples, as shown graphically in **Appendix 2**.

As discussed within the groundwater study completed for CVM in 2017 (Umwelt, 2017e), the recorded sulphate levels are all well within the ANZECC criteria for drinking water for domestic stock which provide:

No adverse effects to stock are expected if the concentration of sulphate in drinking water does not exceed 1000 mg/L. Adverse effects may occur at sulphate concentrations between 1000 and 2000 mg/L, especially in young or lactating animals or in dry, hot weather when water intake is high. These effects may be temporary and may cease once stock become accustomed to the water. Levels of sulphate greater than 2000 mg/L may cause chronic or acute health problems in stock.

As the sulphate results from CP115 are relatively stable and within ANZECC guidelines, there is no indication of any environmental harm associated with these results. The long-term sulphate values for impact bore CP115 range from 78 mg/L to 396 mg/L. The CP115 May 2024 sulphate result (350 mg/L) was within the historical range. In accordance with the CVM SWMP (JBA, 2022c) CVM will continue to monitor sulphate levels, however no specific investigation of sulphate levels is required to be undertaken.

The long-term sulphate values for impact bores range from 20 mg/L to 140 mg/L at CP116 and <1 to 315 mg/L at GW01. The GW01 May and November 2024 sulphate results (370 mg/L and 420 mg/L) increased significantly from the 2023 period and were above the trigger level and historical range, shown in **Appendix 2**.

6.4.2.4.5 Hardness

The hardness level in impact bore CP115 during the reporting period is slightly above the trigger level (**Table 6-14**). An analysis of water licenses in the region completed during May 2017 identified that there were no bore users in the area down-dip of CVM and therefore there are no groundwater bores which would be impacted by increased hardness levels if it were to occur.

Table 6-14 Impact Bores Hardness Levels and Triggers

Bore	Hardness (mg/L) Trigger Level	May 2022 Hardness Level (mg/L)	November 20212 Hardness Level (mg/L)	Complied with Trigger Level?
CP115	Upper limit 376	355	368	Yes
CP116	Upper limit 210	NR	NR	N/A
GW01	Total Alkalinity Upper limit 100 mg of CaCO ₃	238*	61*	Yes

NR = No Result. No access to CP115 and CP116 due to fallen trees.

* GW01 has not been monitored for Hardness as part of groundwater quality baseline monitoring. Total Alkalinity has been used as a proxy for Hardness and will be used as a trigger for this bore until sufficient baseline data for hardness has been obtained for this bore to develop a trigger value.

The long-term trend in hardness values for the reference bores is mixed, as shown graphically in **Appendix 2**:

- CP114 shows small variability around 100 mg/L before a result of 350 mg/L in December 2017. Since this time, monitoring results have returned to levels that are typical of the pre-December 2017 spike with a result of 98 mg/L and 110 mg/L observed for May and November 2024 respectively.
- CP132 initially was consistent around a level of 150 mg/L (April 14 to Nov 15), before spiking at 200 mg/L on November 2016 and declining to 46 mg/L in December 2017. Results increased to 210 mg/L in November 2018 with results in November 2019 (213 mg/L) representing a new historical maximum, slightly above the previous maximum of 210 mg/L. The November 2020 monitoring results returned to levels that are more typical of pre-2016 levels, declining to 187 mg/L and remaining at a similar level in November 2021 (180 mg/L). Results in May and November 2024 (160 mg/L and 140 mg/L) were consistent with historical values.

The impact bores also show different long-term trends in hardness as shown in **Appendix 2**:

- CP116 has declined from an initial level of 210 mg/L before stabilising in April 2014 to a range of 98 mg/L to 128 mg/L (2017). Concentrations increased during November 2018 (134mg/L) and 2019 monitoring (176 mg/L) with a decrease observed in November 2020 (146 mg/L). A slight increase was observed in 2021 with results consistent with historical data. No samples have been collected from CP116 since 2021 due to access restrictions.
- CP115 shows an overall increasing trend, from 130 mg/L in August 2011, increasing to 350 mg/L in July 2014 after which the results have remained around 375 mg/L $\pm$ 25 mg/L. During 2018, CP115 decreased in hardness to 338 mg/L in November, before spiking again to 399mg/L in November 2019 which is slightly above the historical maximum. In November 2020, monitoring results returned to pre-2019 levels (368 mg/L). The May 2024 result was consistent with historical data (360 mg/L). Monitoring will continue to be undertaken at this bore to monitor hardness.
- GW01 results for total alkalinity for May and November 2024 (78 mg/L and 61 mg/L) were lower than previously recorded lowest value in November 2023 (165 mg/L). Monitoring will continue to be undertaken at this bore to monitor hardness.

Given the restricted baseline dataset, the values for EC and hardness at GW01 were possibly within the range of likely expected values for the bore and are not necessarily indicative of groundwater impact. An analysis of water licences in the region during May 2017 identified that there were no registered bore users in the area down-dip of CVM and thus there are no users which would be impacted by this result.

6.4.2.4.6 Other Analytes Not Required for Trigger Level Assessment

Nitrate

Results for 2024 monitoring together with the long-term trends show that both impact and reference bores have very low levels of nitrate. The levels of nitrate are typically less than the laboratory detection limit (shown graphically at **Appendix 2**).

Metals

Results of monitoring undertaken during 2024 for dissolved metals within the impact bores are highly variable. Metals are usually analysed for trends as a group (or groups of metals) rather than on an individual metal basis. This is usually completed where sufficient baseline information is available to analyse potential trends. Given the restricted available dataset, the ability to meaningfully analyse metal results obtained during 2024 and trends in data is therefore limited.

6.4.2.5 *Proposed Improvements*

The CVM will continue groundwater monitoring during 2025. CVM personnel will continue to liaise with National Park and personnel and other relevant parties regarding reinstating access to bores that have been inaccessible. CVM personnel will continue to liaise with monitoring contractors regarding sample analysis requirements. An investigation will be conducted to collect more information and potential causes of changes in pH at CP115.

6.5 Noise

6.5.1 Environmental Management Measures

CVM's Noise Management Plan (NMP) details mitigation measures and monitoring procedures for noise management. Quarterly attended noise monitoring was conducted at five locations around CVM in accordance with the CVM NMP. Noise controls and mitigation measures are implemented to ensure compliance with noise impact assessment criteria.

6.5.2 Performance Criteria

Noise criteria is specified in the Development Approval and EPL 10341. **Table 6-15** and **Table 6-16** summarises the criteria across the Development Approval and EPL 10341.

Table 6-15 Noise Criteria in DA 200-5-2003

Location	Day – LAeq (15 minute) (dB)	Evening – LAeq (15 minute) (dB)	Night – LAeq (15 minute) (dB)	Night - LA1 (1 minute) (dB)
Red Springs (east of rail line)	37	35	35	45
Red Springs (west of rail line)	43	38	35	45
Hillcroft (east of rail line)	35	35	35	45
Hillcroft (west of rail line)	43	38	35	45
Forest Lodge	40	40	38	45
Doble Gate	43	38	35	45
Tilley	43	38	35	45

Table 6-16 Noise Criteria in EPL 10341

Location	Day – LAeq (15 minute) (dB)	Evening – LAeq (15 minute) (dB)	Night – LAeq (15 minute) (dB)	Night - LA1 (1 minute) (dB)
Red Springs (east of rail line)	35	35	35	45
Red Springs (west of rail line)	43	38	35	45
Hillcroft (east of rail line)	35	35	35	45
Hillcroft (west of rail line)	43	38	35	45
Forest Lodge	40	40	40	45
Doble Gate	43	38	35	45
Tilley	43	38	35	45

6.5.3 Environmental Outcomes

There were no exceedances of the Development Approval or EPL criteria during the report period as shown in **Table 6-17**. On all monitoring occasions, the noise from CVM was inaudible. There was one complaint received regarding noise during the reporting period. The complaint was regarding a noisy car entering site prior to the start of morning schedule.

Table 6-17 2024 Quarterly Noise Monitoring Results

Location	Consent Criterion (dB)	EPL Criterion (dB)	Quarter 1 ^(L_{Aeq} 15min) (dB)	Quarter 2 ^(L_{Aeq} 15min) (dB)	Quarter 3 ^(L_{Aeq} 15min) (dB)	Quarter 4 ^(L_{Aeq} 15min) (dB)
Red Springs (N07)	37	35	IA	IA	IA	IA
Hillcroft (N08)	35	35	IA	IA	IA	IA
Forest Lodge (N10)	40	40	IA	IA	IA	IA
Doble Gate (N09)	43	43	IA	IA	IA	IA
Tilley (N06)	43	43	IA	IA	IA	IA

IA – noise from CVM was inaudible

6.5.4 Trends in Data

The quarterly noise monitoring results for the period 2020 – 2024 are summarised in **Appendix 2**. The results show CVM has largely been inaudible at each noise monitoring location since CVM entered care and maintenance and continued to be inaudible during 2024.

6.5.5 Proposed Improvements

Current management measures will continue to be undertaken for care and maintenance activities. Noise monitoring will continue to be undertaken quarterly.

6.6 Biodiversity

6.6.1 Environmental Management Measures

Biodiversity monitoring commenced at CVM in 2012. The 2024 Biodiversity Monitoring was undertaken in accordance with the approved CVM Environmental Monitoring Program (EMP) (JBA, 2022), and the CVM Flora and Fauna Management Plan (FFMP) (JBA, 2022b).

Existing vegetation communities and fauna habitat have been previously characterised during the Ecological Impact Assessment (Cumberland Ecology, 2014). Ongoing monitoring aims to document the condition of vegetation and habitats throughout the CVM Compensatory Habitat Areas and Rehabilitation Zones.

6.6.2 Monitoring

The 2024 biodiversity monitoring was undertaken at the CVM Compensatory Habitat Areas and Rehabilitation Zone monitoring sites as shown on **Figure 5, Appendix 1**, refer to **Section 8.4** for Rehabilitation Zone monitoring results. The biodiversity monitoring for CVM was undertaken in accordance with the CVM RMP and FFMP. A summary and comparison of the 2024 to the 2023 observations of flora observations are shown in **Table 6-18**.

6.6.3 Environmental Outcomes/Trends in Data

6.6.3.1 CVM Compensatory Habitat Areas Flora Monitoring Observations

Previous monitoring in the CVM CHA has not been in accordance with Biodiversity Assessment Method (BAM). However, the Flora and Fauna and Species Monitoring Plan (James Bailey & Associates, 2022) specified that monitoring in this location is conducted in accordance with BAM. For consistency throughout this area, all plots in the CVM CHA were surveyed according to the BAM in 2024 and this will be the methodology used in future years.

At each plot, approximately 45 to 60 minutes were spent searching for all vascular flora species present within a 20 x 20 m plot. Searches of each 20 x 20 m plot were generally undertaken through parallel transects from one side of the plot to another.

For each flora species recorded in the plot, the following data was collected in accordance with the BAM:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 x 20 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 x 20 m plot;
- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 x 50 m plot, including:
 - Count of number of large trees;
 - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
 - Regeneration based on the presence of living trees with stems <5 cm DBH;
 - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 x 1 m plots evenly spread within the 20 x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 x 50 m plot.

There are a total of eight (8) monitoring plots across the CVM CHA and a total of three (3) previously described native vegetation communities, as seen below:

- Tablelands Dry Woodland;
- Sandstone Dry Ridgetop Woodland; and
- Tablelands Sheltered Valley Forest.

As per the BMP, the required BAM methodology uses Plant Community Types (PCTs) to describe the vegetation communities present within the compensatory habitat area as follows:

- PCT 3037 – Sydney Basin Warm Temperate Rainforest
- PCT 3110 – Greater Sydney Enriched Grey Myrtle Dry Rainforest
- PCT 3369 – Central Tableland Ranges Peppermint-Gum Grassy Forest
- PCT 3510 – Capertee Slopes Stringybark-Box Forest
- PCT 3732 – Capertee Uplands Enriched Stringybark Forest
- PCT 3747 – Southern Tableland Western Hills Scribbly Gum Forest
- PCT 3749 – Western Blue Mountains Scribbly Gum Forest

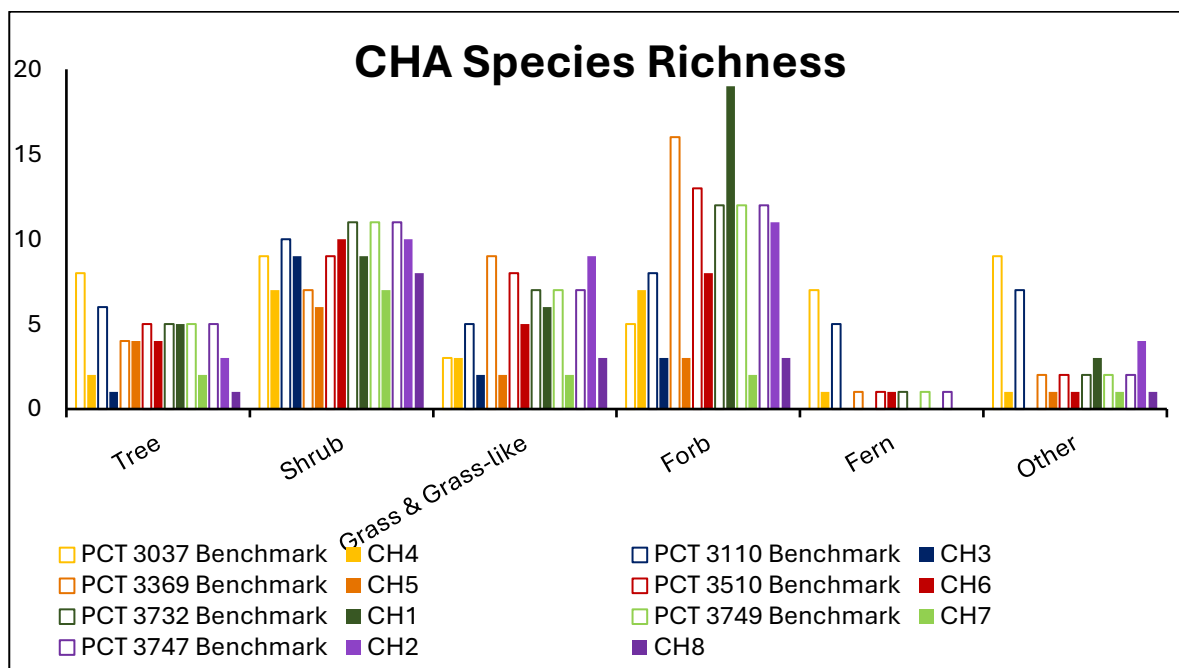
Table 6-18 Summary of 2024 flora monitoring observations against 2023

Monitoring Site	Vegetation Community	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech 2024)
CH1	Tablelands Dry Woodland PCT 3732	• Good quality open woodland. • Low shrub cover. • Low to moderate weed incidence including juvenile Blackberry, as well as Hawthorn and Cotoneaster. • Hawthorn bushes abundant in the vicinity of the plot. • Regeneration of eucalypts. • Abundant and diverse ground covers.	• Good quality, healthy overstorey species. • Low midstorey species cover. • Low weed cover within plot. Including; St. Johns Wort, African boxthorn and Blackberry. • Various Eucalypt species regeneration was observed. • Low level of bare areas. Diverse ground covers including; grass, grasslike, leaf litter, fallen branches and bark.
	Tablelands Dry Woodland PCT 3747	• Good quality open woodland dominated by a tall canopy of <i>Eucalyptus sparsifolia</i>. • Some dieback noted and quite a number of dead juvenile (5 – 14 cm dbh) eucalypts. • Sparse shrub layer. • Regeneration of shrubs occurring. • Five <i>Pterostylis</i> sp. (Green Hood Orchid) were recorded in the plot. • Very low incidence of weeds – <i>Hypochaeris radicata</i>.	• Healthy overstorey composition. Dominated by <i>Eucalyptus sparsifolia</i>. • Strong Eucalypt regeneration present in various species. • Low midstorey species cover. • No bare ground observed. High levels of leaf litter, grass species and woody debris. • Groundcover species dominated by <i>Rytidosperma racemosum</i>. • Presence of Catsear is very low, consistent with previous monitoring round.
	Tablelands Dry Woodland PCT 3110	• Healthy vegetation throughout all stratus, no die back. • Mature native canopy. • Open understorey of small shrubs, grasses and groundcovers. • Lots of leaf litter and logs. No weeds recorded	• Healthy, dense overstorey composition. Dominated by <i>Eucalyptus sieberi</i>. • Very low midstorey and groundcover species cover. • Dense leaf litter, supported by woody debris. • No weed species were observed.
	Tablelands Sheltered Valley Forest PCT 3037	• Good native canopy, shrub and ground cover. Healthy vegetation throughout. • Diverse number of species. • Minimal weeds – a few occurrences of Blackberry. • Open forest floor with leaf litter and logs. • Lots of Eucalypt, shrub and groundcover regeneration in plots.	• Good overstorey cover. Dominated by <i>Eucalyptus blaxlandii</i>. • Good midstorey species richness. • High levels of tree and shrub regeneration present. • Dense leaf litter and woody debris. • No weed species were observed.

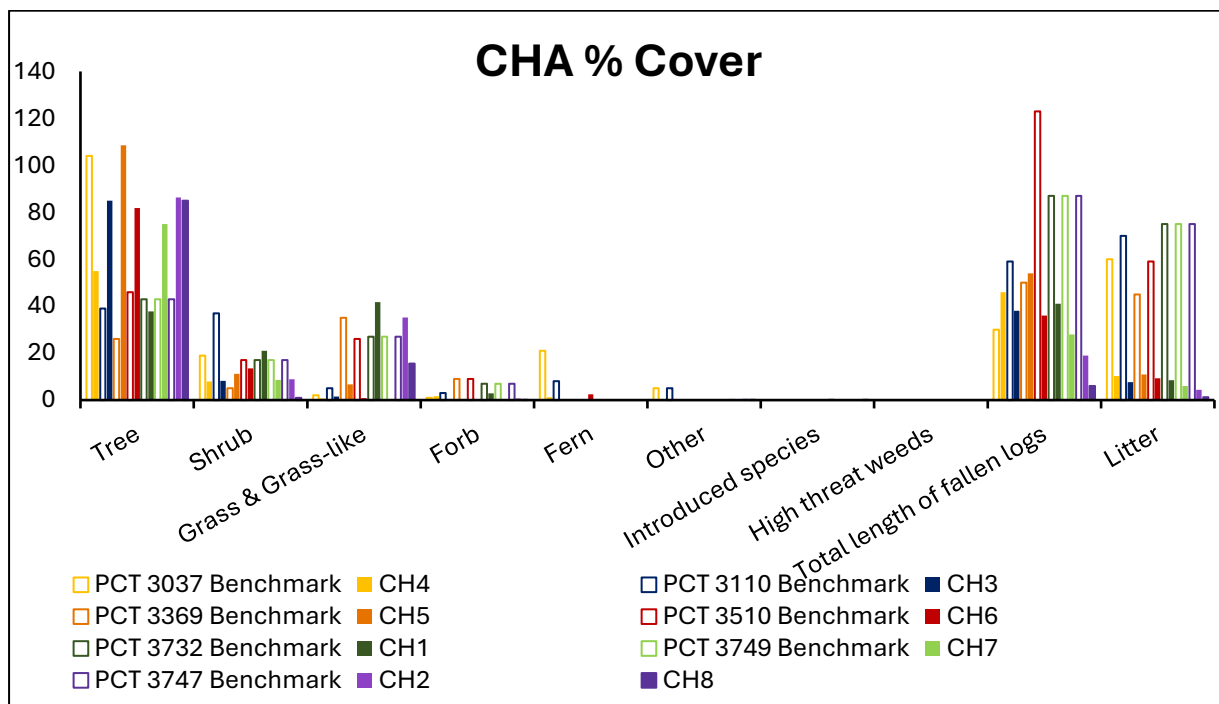
Monitoring Site	Vegetation Community	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech 2024)
CH5	Tablelands Dry Woodland PCT 3369	- Vegetation was healthy through all strata, no dieback. - Good canopy cover of Eucalypts. - Minimal shrub layer, open woodland. - Sparse ground layer. - No weeds evident. - High resilience and integrity seen.	- High levels of overstorey cover. Dominated by <i>Eucalyptus blaxlandii</i>. - Germination rates low, but strong. - Low levels of midstorey cover. Healthy mature species and regeneration of midstorey were observed. - Very low abundance of groundcover species recorded. - High levels of leaf litter and woody debris present, with few bare areas observed. - No weed species observed.
	Tablelands Dry Woodland PCT 3510	- Good native canopy and eucalypt regeneration. - Abundant shrub layer - Sparse ground layer – quite shaded. - No incidence of weeds. - High resilience. - Regeneration occurring in all layers. - Good quality open woodland with numerous logs and a high amount of leaf litter.	- High levels of overstorey species cover. Dominated by <i>Eucalyptus blaxlandii</i>. - Moderate midstorey cover. Good species diversity. - High levels of leaf litter and woody debris throughout plot. - Sparse groundcover species present throughout. - Very low abundance of Catsear observed.
	Sandstone Dry Ridgetop Woodland PCT 3749	- Good quality open rocky woodland. - No incidence of weeds. - Small amount of shrub regeneration occurring.	- High levels of overstorey species cover. Comprised of <i>Eucalyptus sieberi</i> and <i>Eucalyptus sparsifolia</i>. - Moderate midstorey cover. Good midstorey diversity. - Overstorey and midstorey species regeneration present. - High leaf litter, large rocks and woody debris comprising ground cover. - Few groundcover species observed, in low abundance.

Monitoring Site	Vegetation Community	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech 2024)
CH8	Tablelands Dry Woodland PCT 3747	- Some dieback was evident in the canopy that was dominated by <i>Eucalyptus rossii</i>. - Open understorey dominated by Snowgrass (<i>Poa sieberiana</i>) and Parrot-pea (<i>Dillwynia phyllicoides</i>) - Very minimal weeds detected – just a few Catsear (<i>Hypochaeris radicata</i>). <i>E. rossii</i> seedlings / regeneration. - Broken glass in and around the plot. - A few piles of rubbish (each pile approximately 3 m x 3 m) containing an assortment of rubbish (tubing etc.) in the vicinity of the plot.	- Very high overstorey species cover. Dominated by <i>Eucalyptus rossii</i>. - Previous observed dieback is regenerating. - Open midstorey. Only juveniles observed. - Ground cover is very high in leaf litter. - Dominant groundcover species observed was <i>Rytidosperma pallidum</i>. <i>Poa sieberiana</i> and <i>Lomandra filiformis</i> also present in low abundance. - Very low abundance of Catsear was observed.

Species richness and percentage foliage cover for each CHA monitoring plot, as measured using BAM, were compared to their respective PCT benchmarks. These comparisons are presented **Graph 1** in and **Graph 2**.



Graph 1 CHA Species Richness



Graph 2 Species Percentage Cover

6.6.3.2 CVM Compensatory Habitat Areas Fauna Monitoring Observations

The 2024 monitoring recorded a decrease in overall species diversity throughout the Cullen Valley Mine Compensatory Habitat Area relative to the last few years' monitoring results, with a total of 13 species recorded, compared to 64 species recorded during the 2023 monitoring and 82 species in 2022. Within the CVM Compensatory Habitat Area 12 of the fauna species observed were birds, the remaining species was a mammal Squirrel Glider (*Petarurus norfolcensis*). There were two threatened species recorded in January and February in the CVM Compensatory Habitat Area during the 2024 monitoring period. The threatened species included the Yellow-Tailed Black Cockatoo (*Calyptorhynchus funereus*), and the Squirrel Glider (*Petarurus norfolcensis*) listed as Vulnerable under the Biodiversity Conservation (BC) Act.

The House Sparrow (*Passer domesticus*), a pest fauna species was recorded within the CVM Compensatory Habitat Area. The House Sparrow which did not appear to be in high abundance and no control measure were recommended at this time.

6.6.3.3 Nest Box Monitoring

Nest boxes are installed in two (2) clusters across CVM. Monitoring areas including one cluster in the Compensatory Habitat Area (six nest boxes), one cluster in the Cullen Valley Rehabilitation Area (six nest boxes).

Nest Box 19 was occupied by a Squirrel Glider (*Petarurus norfolcensis*), listed as Vulnerable under the NSW Biodiversity Conservation (BC) Act. Other nest boxes contained nesting material. The nest boxes in this cluster are all in good condition, apart from Nest Box 22, which had a slanting pole.

6.6.3.4 Clandulla geebung Monitoring

The Clandulla Geebung (*Persoonia marginata*) survey was undertaken in January 2025. A total of 93 Clandulla Geebung plants were identified within a 20 m radius of both monitoring points.

Within the CHA plot, 91 individuals were identified. More were observed beyond the plot area (approximately within 25 m of the plot boundary). However, only the plants within the plot area were measured. Four (4) Of

the 91 plants within the plot were bearing fruit, indicating healthy reproductive material and only two were flowering during the survey recorded. The community was observed to be generally healthy, with some larger individuals showing signs of stress. The distribution of plants within the monitoring area was observed to be dense in the north-eastern portion of the plot.

6.7 *Blasting*

There was no blasting conducted at CVM during the report period.

6.8 *Waste Management*

During the report period only minimal oil and greases were stored on site. Any maintenance works required on machinery and equipment is undertaken within existing bunded areas.

Waste oils and grease are collected by a licensed waste recycling contractor on an as needs basis. All paper and general wastes from workshop areas is disposed of in garbage bins located adjacent to the workshop areas, which are collected by a licensed contractor on an as needs basis.

Sewage from the workshop areas are directed to a septic system which is pumped out by a licensed waste collection and disposal contractor on an as-needs basis.

6.9 *Hazardous Material Management*

Hazardous material kept on site include oils, grease and degreasers contained in storage tanks. Storage tanks are collected by an appropriately licenced contractor.

Up to 35,000L of diesel may be stored in the facility in an above ground self-bunded diesel tank (Transtank) if diesel is required for environmental works on site. Two EPA registered radionuclide fixed radiation gauges (No. RR20215 and RR21832) have been decommissioned and are stored onsite.

6.10 *Heritage*

6.10.1 *Indigenous Heritage*

Previous archaeological surveys did not locate any Aboriginal artefacts or sites within the approved open cut mining area. However, two sites of significance were recorded in close proximity to the approved mining area. A campsite-stone artefact scatter (C-OS-1) and a rock shelter site (C-S-1). A further two sites were identified in surveys undertaken during 2011 and include 45-1-2542 and RSC-OS-1. These sites are located outside of the existing mining area. No new sites were discovered in 2024.

6.10.2 *Non-Indigenous Heritage*

No mining activities were undertaken in proximity of locations of European heritage significance during the report period.

6.11 Greenhouse Gas Emissions

CVM Scope 1 and Scope 2 emissions calculated for the 2024 National Greenhouse and Energy Reporting (NGERS) year was 1780 t CO₂-e as shown in **Table 6-19**.

Table 6-19 CVM GHG Emissions 2024

	2024
Scope 1	1770
Scope 2	10
Total GHS Emissions (tCO ₂ -e)	1780

6.12 Bushfire

A CVM Fire Management Plan (2022) has been developed and includes a number of measures to minimise bushfire risk. These measures include:

- Regular inspections and maintenance of vegetation adjacent to site infrastructure, access roads and existing fire trails, as appropriate;
- Ensuring firefighting equipment is available on mobile equipment (including water carts) for the initial response to fire events on site, or to assist emergency services, if required;
- Ensuring all on site water storages are available for firefighting purposes to CVM personnel and the RFS, if required. The locations of current water management infrastructure on site are shown in Figure 2;
- All infrastructure areas, mobile and stationary plant and equipment at CVM having access to fire extinguishers;
- All infrastructure areas are regularly maintained to reduce the potential for fire occurrence or spread. Site equipment will be maintained in good working order to prevent incidents that could potentially result in a fire; and
- Ensuring that no additional impediment is caused by Castlereagh Coal to existing access tracks in the adjacent Ben Bullen State Forest which may be used for firefighting purposes by the RFS and Forests NSW.

6.13 Mine Subsidence

There have been no subsidence management measures required to be implemented by CVM during the report period.

6.14 Public Safety

Access to working areas of the CVM open cut are controlled by locked gates. Access to CVM by members of the public is via contact at the mine office where visitors or contractors can only be escorted by site personnel around the site.

7 Water Usage

7.1 Water Management System

The water management system at CVM is described within the CVM SWMP (JBA, 2022c) and also within **Section 6.4** of this document.

7.2 Water Take

Licence and water take information is summarised in **Table 7-1**. During the report period, there was 2.385 ML extracted from Tyldesley Bore.

Table 7-1 Water Take During 2024 Reporting Period

Water License No.	Water sharing plan, source and management zone (as applicable)	Entitlement	Estimated Take Previous Period – 2023 (ML)	Estimated Take Current Period – 2024 (ML)	Estimated Take Next Period – 2025 (ML)
80WA706148	Sydney Basin MDB Groundwater Source Water Sharing Plan – NSW Murray Darling Basin porous rock groundwater sources	80 units (ML)	28.117	2.385	12.4

7.3 Erosion and Sediment Control

Erosion and sediment control management at the CVM is described in the CVM Erosion and Sediment Control Plan (JBA, 2022).

7.3.1 Environmental Management Measures

The objective of the CVM water management system is to separate clean water and dirty/mine water. Erosion and sediment control focus on the management of ‘dirty’ water which is runoff from disturbed areas. The erosion and sediment controls (ESC’s) were established during mining and remained in place whilst the operation was under care and maintenance. The ESC’s include dirty water sediment dams, open drainage channels with established vegetation and/or rock armouring and drop structures where required.

7.3.2 Environmental Outcomes and Proposed Improvements

An indication of the effectiveness of the sediment and erosion control structures is obtained through regular visual inspections. These inspections focus on permanent erosion and sediment control structures and areas where the ground has been disturbed and soils are exposed. Recently disturbed sites are most vulnerable to erosion and loss of sediment following periods of heavy rainfall.

James Bailey & Associates (JBA) were commissioned by Castlereagh Coal to complete a review of water management and erosion and sediment control (ESC) structures located within areas of rehabilitation established at CVM. The review was based on a desktop review of related environmental management plans and recent monitoring documents completed for CVM, as well as observations made during subsequent field inspections completed by JBA in December 2022.

The review complements the work undertaken by Umwelt (2022) in response to directives provided to Castlereagh Coal from the NSW Resources Regulator in relation to ESC management within CVM.

A summary of the key observations and recommendations from the ESC review are provided below.

- *“In general, ESC management principles are being implemented in accordance with site approvals and management documentation, with no significant failures identified. However, it is recommended that Castlereagh Coal implement a risk-based process to complete and document regular ESC inspections at both sites. This procedure should include an outline of key monitoring locations to be assessed by Castlereagh Coal personnel during ESC inspections. These inspections should be undertaken at least quarterly, with additional inspections to be completed following significant rainfall events;*
- *Localised erosion issues and deficiencies in drainage and water management structures are present within rehabilitation areas that should be scheduled for maintenance. However, it is noted that constraints exist at both CVM and Invincible that may impact on the ability to access some areas of the rehabilitation and water management systems, primarily due to steep slopes and vegetation communities developing within the rehabilitation. It is recommended that Castlereagh Coal review each area prior to scheduling any physical work to balance these constraints against the need to complete remedial actions;*
- *Legacy issues relating to the design of and materials used for the drop structures in rehabilitation areas at both sites. Contour drains reporting to these structures is showing evidence of scouring, with the rock lining of the drop structures also showing evidence of weathering, which reduces their overall effectiveness in supporting rehabilitation development. It is noted that these structures were initially developed as temporary ESC controls for the rehabilitation establishment and development phase. Removal of these structures will be considered during detailed mine closure planning;*
- *SD3 at Invincible requires maintenance work to ensure that it is desilted, adequately sized and maintained in accordance with Blue Book (Landcom, 2004) requirements;*
- *While vegetation cover is generally present in rehabilitation areas, some areas of limited vegetation cover were identified at both sites. The relatively poor performance of vegetation growth within these areas may impact on the stability of rehabilitation areas in the long term due to a heightened risk of erosion; and*
- *A need to re-establish rehabilitated landform batters, ESC controls and vegetation in areas of CVM where subsurface heating is present, once remediation works have been completed.”*

8 Rehabilitation

Rehabilitation at CVM is undertaken in accordance with the Forward Works Program (FWP) and Rehabilitation Management Plan (RMP). A copy of the current RMP is available on the Castlereagh Coal website.

An Annual Rehabilitation Report and Forward Program (ARRFP) has been prepared and submitted for CVM which provides details of the scheduled surface disturbance and rehabilitation activities at the CVM from 1 January 2024 to 31 December 2026.

A summary and comparison of the 2024 Rehabilitation monitoring against rehabilitation objectives is provided in **Table 8-3**.

8.1 Status of Mining and Rehabilitation

No mining or rehabilitation was undertaken during the reporting period. The Resources Regulator (RR) attended site to complete a revegetation targeted assessment program (TAP) on rehabilitation areas across the CVM site as of the time of writing this report a response from the RR is yet to be received.

A summary of rehabilitation and projected rehabilitation for 2025 is provided in **Table 8-1**.

Table 8-1 CVM Rehabilitation Status

Mine Area Type	Previous reporting period (actual) 2023 (ha)	This reporting period (actual) 2024 (ha)	Next reporting period (forecast) 2025 (ha)
Total Mine Footprint – Surface Disturbance	189	189	189.96
Total Active Disturbance	70.39	70.39	60.41
Rehabilitation – Land Preparation	0	0	10.87
Ecosystem and Land Use Establishment	0	0	0
Ecosystem and Land Use Development	118.69	118.69	118.69
Rehabilitation Completion	0	0	0

An assessment of the status of the existing CVM rehabilitation against the performance indicators and completion criteria is detailed in **Section 8.3**.

CVM has identified areas where further rehabilitation can potentially be undertaken. These areas are associated with:

- land that has been previously rehabilitated but requires supplementary works to improve the quality and quantity of this vegetation in line with the agreed completion criteria objectives
- infrastructure areas (e.g. coal stockpile pad) which is larger than that required for any future mining operational needs
- shaped and topsoiled emplacement dumps which have not been seeded/planted
- land which has been affected by subsurface heating and has been confirmed via further subsurface heating investigations to be completed during the life of mine term to be capable of supporting plant growth and unlikely to be subject to further subsurface heating. The viability of and timing of undertaking the rehabilitation work will in part be informed by ongoing treatment as described in the POW and the

success of the trial irrigation and activities associated with the restart of mining remnant coal at CVM.

Previous rehabilitation at CVM has seen the successful germination and growth of native and local grass, shrub and tree species which are representative of the vegetation community types found in the area. Recent rehabilitation has proved successful with multiple tree species including *Eucalyptus*, *Acacia* and *Allocasuarina* being heavily revegetated.

8.1.1 Subsurface Heating

The effects of sub surfaces heating have been assessed for rehabilitation areas of CVM from 2015 to 2021. These were not monitored in 2022, 2023 and 2024.

8.1.2 Environmental Outcomes and Further Improvements

During 2025, CVM will continue to consult with Resources Regulator on agreed methodologies to undertake subsurface heating treatment measures. Furthermore, consultation will focus on best methods of irrigation, to extinguish the worst affected area, whilst also considering compaction methods where appropriate, and further capping of areas of lower concern with overburden rehabilitation materials existing, and liberated from the remnant mining area.

8.2 Post Rehabilitation Land Uses

The proposed final land use aims to emulate the pre-mining environment and will enhance local and regional ecological linkages across the site and adjacent areas. The primary objective of site revegetation and regeneration is to create a stable final landform with acceptable post-mining land use and suitability. In the long term, rehabilitation areas will become integrated with adjacent native vegetation communities. Rehabilitation areas will continue to be monitored on an annual basis and will be managed until self-sustaining. Final rehabilitation areas will achieve the rehabilitation completion criteria specified in the approved CVM RMP prior to relinquishment.

8.3 Completion Criteria Assessment

The revised rehabilitation objectives and completion criteria for CVM have been submitted to the Resources Regulator (RR) for review and approval as a requirement of the new Rehabilitation Management Plan process. At the time of submission of this report the RR are yet to provide feedback on the revision. The 2024 management outcomes for the CVM Rehabilitation Area are summarised **Table 8-3**. The assessment of rehabilitation areas against rehabilitation objectives (currently under assessment) was undertaken in accordance with the CVM Flora and Fauna Management Plan (FFMP) and Rehabilitation Management Plan (RMP).

8.4 Rehabilitation Activities

Since recommencing operations in May 2022, management and monitoring of rehabilitation areas has been undertaken in accordance with the approved CVM Flora and Fauna Management Plan (April 2022).

There has been no removal of buildings or other infrastructure, and no new rehabilitation areas were established during the 2024 report period.

8.4.1 CVM Rehabilitation Area Flora Monitoring Observations

The Cullen Valley Rehabilitation Area contains 15 monitoring plots located across nine rehabilitation areas defined by the year they were established. A comparison of observations made during the 2023 and 2024 monitoring of each Rehabilitation monitoring plot is presented in **Table 8-2**.

Table 8-2 Observations of 2023 and 2024 Rehabilitation Monitoring

Monitoring Site	Rehabilitation Year	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech)
FP5	2002	• <i>Eucalyptus cannonii</i> identified within plot. • Young regeneration dominated by <i>Acacia decurrens</i> and <i>Cassinia Sifton</i>. • Sparse native canopy of <i>E. cannonii</i> and <i>E. blaxlandii</i>. • Sparse ground layer. • No weeds present. • Lots of gravel/rocks and bare ground. • Low diversity plot. • Some ground, shrub, and canopy regeneration.	• Moderate overstorey species cover. Dominated by <i>Eucalyptus macrorhyncha</i>. • <i>Eucalyptus cannonii</i> identified in various growth stages with Regeneration observed. • Moderate midstorey species cover throughout plot. Dominated by <i>Cassinia sifton</i>. • Groundcover species dominated by <i>Rytidosperma setaceum</i>. • Ground cover comprised of leaf litter, woody debris, grasses and bare ground.
FP6	2005	• <i>Eucalyptus cannonii</i> observed within plot. • Strong regeneration of shrubs: <i>Acacia decurrens</i> and <i>Cassinia Sifton</i>. • Sparse native canopy of <i>Eucalyptus macrorhyncha</i>. • Sparse groundcovers and grasses. • Senescing and dieback of <i>Acacia decurrens</i> – • Low incidence of weeds including one Blackberry seeding.	• Moderate overstorey species cover. Dominated by <i>Acacia decurrens</i>. • Juvenile <i>Eucalyptus cannonii</i> individual identified. • Low midstorey species cover. <i>Cassinia sifton</i> and <i>Cassinia quinquefaria</i> dominant. • Various <i>Acacia</i> species observed in regeneration. • Moderate leaf litter cover, grass stands, large rocks and bare ground comprising ground cover. • Various grass species observed in low abundance. • Very low weed species cover. Catsear and Common Centaury recorded in low abundance.
FP9	2003	• Strong regeneration of <i>Acacias</i> and shrubs. • Native eucalypt canopy is establishing. • Good shrub and ground layer diversity of species. • Large cover of <i>Acacia decurrens</i> dominating plot. • Very minimal weed occurrence. • A lot of dead or senescing <i>Acacias</i> but new recruitment is occurring.	• Moderate overstorey cover. Dominated by <i>Eucalyptus macrorhyncha</i> and <i>Eucalyptus rossii</i>. • <i>Eucalyptus macrorhyncha</i> and <i>Eucalyptus sieberi</i> observed in regeneration. • Midstorey cover is low, comprised of juvenile <i>Acacia deanei</i> and regenerating <i>Cassinia sifton</i>. • Groundcover is comprised of high leaf litter, woody debris, large rocks and bare ground. • Groundcover species in low abundance. • Catsear and Blackberry observed in low abundance.

Monitoring Site	Rehabilitation Year	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech)
FP10	2004	- Plot dominated by <i>Acacia decurrens</i> regeneration, with some senescing and dieback evident. - Sparse native canopy of young Eucalypts. - Plot is regenerating well with little weed cover. A few Blackberry seedlings. - Some bare patches of soil. - Appears to be well used by fauna with several fauna tracks traversing the site.	- High overstorey species cover. Dominated by <i>Acacia decurrens</i>. With Canopy regeneration occurring. Previous evidence of dieback minimal. - Mid storey cover is low and mostly comprised of <i>Acacia deanei</i>. - Ground cover species are low in abundance. Various grass and forb species observed with very low cover. - Ground cover is moderate leaf litter, bare ground and large rocks. - Minor gullies were recorded throughout the plot but appear stable. - Catsear was observed in very low abundance.
	2004	- Understory dense with <i>Acacia</i> spp. (mainly <i>Acacia decurrens</i>). - Ground cover dominated by leaf litter. - Low incidence of weeds - Blackberry juveniles. - Young eucalypt juveniles and saplings present. - Rubbish scattered around plot.	- High overstorey species cover. Dominated by <i>Acacia decurrens</i>. Canopy regeneration observed, previous dieback evident. - Regeneration observed is dominated by <i>Eucalyptus sieberi</i>. - Open midstorey, with various shrub species observed regenerating. - Groundcover dominated by leaf litter, with some bare ground observed. - Groundcover species are very low in abundance. - Some small gullies present but appear stable. - Spear Thistle and Blackberry scattered throughout plot in low abundance.
	2004	- Young regeneration dominated by <i>Acacia decurrens</i> and <i>Acacia spectabilis</i>. - Lack of native canopy cover and ground layer. - Lots of bare ground and compacted soil. - Low incidence of weeds. - Regeneration is slow. - Dense Acacias in sections. - Dieback of grasses and shrubs.	- Low overstorey species cover. Dominated by regenerating <i>Acacia decurrens</i> and <i>Acacia dealbata</i>. - Moderate midstorey cover. Dominated by <i>Acacia deanei</i>. Previous dieback evident. - Groundcover mostly bare ground, with sparse leaf litter and groundcover species. - Large gullies located within transect, high potential for erosion. - Low presence of Fireweed was recorded.

Monitoring Site	Rehabilitation Year	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech)
FP22	2003	- Sparse native canopy. - A few eucalypts showing a little dieback. - Shrub layer is dominated by <i>Acacia</i> spp. - Very low incidence of weeds. - Eucalypt regeneration is low with some juvenile and saplings present.	- High overstorey species cover. High levels of regeneration observed in dominant species; <i>Eucalyptus macrorhyncha</i>, <i>Eucalyptus rossii</i> and <i>Eucalyptus sieberi</i>. - Open midstorey with high regeneration observed for various <i>Acacia</i> species. - Groundcover dominated by leaf litter and <i>Rytidosperma setaceum</i>. - Bare ground present throughout plot. - Catsear was observed in low abundance.
	2012	- Regeneration well with a good diversity of shrubs (<i>Acacia</i> spp. And <i>Cassinia Sifton</i>). - Natural regeneration should be sufficient, - Sparse ground covers and canopy. - Lots of patches of bare ground. - Very minimal weed occurrence.	- Low to moderate overstorey species cover. Dominated by <i>Acacia decurrens</i>. - Midstorey species provide moderate cover. Dominated by <i>Cassinia sifton</i>. Various <i>Acacia</i> and <i>Allocasuarina</i> species observed regenerating. - Groundcover dominated by bare ground, followed by sparse leaf litter. - Low occurrence of groundcover species. - No weeds observed within plot.
	2012	- Shrub regeneration is strong, dominated by <i>Acacia</i> spp. - Lack of native trees regeneration/cover as well as ground covers. - Very low incidence of weeds. - Lots of patches of bare ground. - One orchid recorded in plot <i>Orthoceras strictum</i> (Bird's mouth Orchid). <i>Eucalyptus cannonii</i> identified within plot.	- Low overstorey species cover. <i>Acacia decurrens</i> most occurring. - Juvenile <i>Eucalyptus cannonii</i> observed. - High midstorey species cover. Dominated by <i>Acacia implexa</i> and <i>Cassinia sifton</i>. - Groundcover species in very low abundance and diversity. - Bare ground comprises most of the area, followed by moderate leaf litter. - Small gullies observed within plot. High potential for erosion.
	2010	- Very dense shrubland. Strong regrowth of <i>Acacia</i>, in particular <i>A. longifolia</i>. - Low density of shrubs and groundcovers. - Sparse native canopy trees. - Good leaf litter in plot. - Very low incidence of weeds including one Blackberry seedling.	- Low to moderate overstorey species cover. Dominated by <i>Eucalyptus sieberi</i>. Canopy regeneration observed. Previous dieback evident. - High midstorey species cover. Various <i>Acacia</i> species observed in various growth stages. - Very low occurrence of groundcover species. - Groundcover is mostly comprised of leaf litter, large rocks and some areas of bare ground. - Catsear observed in low abundance.

Monitoring Site	Rehabilitation Year	Observations 2023 (Cumberland Ecology)	Observations 2024 (Atlantech)
2014NE	2014	• Very steep hill so the risk of erosion is high. • Degraded site with lots of bare ground. • Some regeneration of <i>Acacia decurrens</i> is occurring (dominating). • No native canopy cover. • Some shrubs and grasses/groundcovers. • Low incidence of weeds-scattered Blackberry juveniles. • Some Acacia dieback. • Half of plot is vegetated, the other half is quite gravelly/rocky with bare earth.	• Very low overstorey species cover. <i>Eucalyptus rossii</i> and <i>Eucalyptus blakelyi</i> regeneration observed. • Very low midstorey species cover. • Very low ground cover species abundance. • Bare ground dominant. • The plot runs along a very steep incline. Erosion potential is very high. This steep incline could impact the success of species to naturally establish. • Truck tyres in corner of plot.

8.4.2 CVM Rehabilitation Area Fauna Monitoring Observations

The 2024 rehabilitation biodiversity monitoring recorded a decrease in overall species diversity throughout the Cullen Valley Mine Rehabilitation Area with a total of 24 species recorded, compared to 72 species recorded in 2023, and 62 species recorded in 2022.

Within the CVM Rehabilitation Area, 50% fauna diversity is represented by birds with 12 species recorded, and 29% of fauna diversity is represented by mammals with 7 species. The remaining 5 species recorded in 2024 monitoring include one reptile species Common Skink (*Lampropholis guichenoti*), two frog species, and one crustacean Common Yabby (*Cherax destructor*).

No threatened species were recorded in the 2024 monitoring. Seven threatened species have previously been recorded in the CVM Rehabilitation Area including the Dusky Woodswallow (*Artamus cyanopterus*) listed as Vulnerable under the BC Act, the Large-eared Pied Bat (*Chalinolobus dwyeri*), listed as Endangered under the EBPC Act and Vulnerable under the BC Act, Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Southern Myotis (*Myotis macropus*) – Possible ID, Greater Broad Nosed Bat (*Scoteanax rueppellii*), Eastern Cave Bat (*Vespadelus troughtoni*), and the Large Bent-winged Bat (*Miniopterus orianae oceanensis*), all listed as Vulnerable under the BC Act. .

Two feral pest fauna species were recorded within the CVM Rehabilitation Area. These species include the House Sparrow (*Passer domesticus*), and the Brown Hare (*Lepus capensis*). These did not occur in high abundance and no control measures are recommended at this time.

Table 8-3 Assessment of CVM Rehabilitation Against Performance Rehabilitation Objectives

Rehabilitation Objective Category	Rehabilitation Objective	2024 Monitoring Observations
Ecological rehabilitation	The vegetation composition of the rehabilitation contains species that are commensurate with the following native vegetation communities found in the local area (as described in the 2014 EA and RMP): • Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest • Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest • Tableslopes Brittle Gum – Broad-leaved Peppermint Grassy Forest	Canopy richness across CVM Rehabilitation monitoring sites are generally equal to or exceeding their respective benchmark values. Midstory diversity values are lower than benchmark in a majority of sites however the mean across all sites is within 78 % of the benchmark value. The mean cover across all sites exceeded the benchmark value however sites FP11, R5, R7, R8 and 2014NE were well below the benchmark. Ground cover was generally below species richness and cover benchmark values.
Ecological rehabilitation	The vegetation structure of the rehabilitation is similar to that of the following native vegetation communities found in the local area: • Tableland Scribbly Gum – Narrow-leaved Stringybark Shrubby Open Forest • Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest • Tableslopes Brittle Gum – Broad-leaved Peppermint Grassy Forest	Canopy cover across CVM Rehabilitation monitoring sites are generally below benchmark values. However, most sites have high species diversity and are experiencing regeneration. Midstory mean cover across all sites exceeded the benchmark value however sites FP11, R5, R7, R8 and 2014NE were well below the benchmark. Previous dieback was observed at FP11, R5 and R8, all sites currently regenerating. Groundcover species (grasses, forbs, ferns) are generally below benchmark values.
Land contamination	There is no residual soil contamination on the Project area that is incompatible with the final land use or that poses a threat of environmental harm.	Soil was not monitored as part of the 2024 biodiversity monitoring.
Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream / downslope of the site or a safety risk to the public/stock/native fauna.	Landform stability was not monitored as part of the 2024 biodiversity monitoring.
Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	It was not considered that the fuel loads present in any of the monitoring areas would likely exceed regulatory requirements.

Rehabilitation Objective Category	Rehabilitation Objective	2024 Monitoring Observations
Groundwater	Groundwater quality and groundwater regime are within range as predicted in environmental assessment, EPL 1095 and Water Management Plan. The risk to important groundwater assets has been addressed by the rehabilitation.	A groundwater assessment was not assessed as part of the 2024 biodiversity monitoring.

9 Community

9.1 CCC Meetings

Two community consultation meetings were held during the reporting period. The meetings were held in April and October 2024.

The outcomes of the CCC meetings are detailed in the meeting minutes available on the Castlereagh Coal website.

9.2 Complaints

In accordance with Condition M5 of the EPL, Shoalhaven Coal maintains a complaints register to record and respond to complaints received from the community. The register is included in the Castlereagh Coal website. Seventeen (17) complaints were received from the local community during the report period. The number of complaints increased during 2024. The increase in complaints is due to an increase in road truck complaints not directly related to the CVM project operations. However, the road truck complaints have been reported as they were received via the CVM hotline. A comparison of complaints received between 2020 to 2024 is outlined in **Table 9-1**. below. Refer to the Castlereagh website for further details within the complaints register.

Table 9-1 Comparison of Complaints

Complaint Type	2020	2021	2022	2023	2024
Noise	0	0	0	0	0
Air quality	0	0	1	4	0
Blasting	0	0	0	0	0
Traffic	0	0	1	4	6
Water	0	0	1	2	0
Subsurface Heating (odour)	2	1	6	4	9
Other	0	0	4	1	2
Total	2	1	12	15	17

Note: CVM was placed on care and maintenance in December 2012. Remnant mining recommenced in May 2022, continuing until June 2023.

10 Audit Information

An Independent Environmental Audit (IEA) for CVM was completed and submitted on the 14 March 2022.

The IEA identified non-compliances with the EPL, Development Approval and the 2003 Environmental Impact Statement mitigation measure commitments. Non-compliances were found to be of administrative or low risk level.

Further details regarding the status of the non-compliances identified by the IEA are located in **Appendix 3**. A copy of the 2021 IEA is located on the CVM website.

11 Incidents and Non-Compliances During the Report Period

There were no environmental incidents causing or threatening material environmental harm at the Cullen Valley Mine during the reporting period. The CVM Pollution Incident Response Management Plan (PIRMP) was not activated during the reporting period with review of the PIRMP being undertaken in December 2024 (refer to the Castlereagh Coal website). Non-compliances which occurred during the reporting are discussed in **Section 2** and displayed in **Table 11-1**.

Table 11-1 Summary of Non-Compliances During the Reporting Period

Relevant Approval	Condition No.	Description (Summary)	Compliance Status	Where Addressed in Annual Review
DA-200-5-2003	Schedule 4 Condition 20	Exceedance of air quality assessment criteria for particular matter (PM ₁₀) on two (2) separate occasions.	Low Non-compliant	Section Error! Reference source not found.
DA-200-5-2003	Schedule 4 Condition 25	Air Quality Monitoring – HVAS PM10 & TSP not monitored	Low Non-compliant	Section Error! Reference source not found.
DA-200-5-2003 EPL 10341	Schedule 4 Condition 40 L2	Discharge limits exceeded at Discharge Point 4 (LDP004)	Low Non-compliant	Section 6.4.1
DA-200-5-2003 EPL 10341	Schedule 4 Condition 27 L6.1	Nine (9) odour complaints received associated with sub-surface heating areas at CVM.	Low Non-compliant	Section 6.5.3 and Section 9.2
EPL 10341	R2 & R3	Unlicensed discharge from North Void	Low Non-compliant	Section 4

DA-200-5-2003	Schedule 4 Condition 25	Air Quality Monitoring - HVAS PM10 & TSP not monitored	Low Non-compliant	Section Error! Reference source not found.
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 (Compliance Report) Condition 3(1) (AEMR)	Failure to submit an AEMR in the timeframe approved by the Director-General.	Administrative Non-Compliant	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 3 (Compliance Report) Condition 3(1) (AEMR)	Failure to submit 2024 Forward Program by due date.	Administrative Non-Compliant	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 Condition 3(1)	Failure to submit 2024 Annual Rehabilitation Report by due date.	Administrative Non-Compliant	NA
ML 1455, ML 1488, ML 1556, ML 1557	Condition 4 Condition 3(1)	Carrying out of ancillary mining activities outside of mining lease.	Administrative Non-Compliant	NA

12 Activities to be Undertaken in the Next Reporting Period

Proposed mining activities for the next reporting period involve the mining of approximately 689,500 tonnes of overburden waste rock to uncover approximately 29,000 tonnes of remnant coal from within the approved mining area during 2025.

Activities during the 2025 reporting period will include:

- Installation of TSP HVAS monitoring unit.
- Monitoring of subsurface heating and continue treatment of subsurface heating via backfilling surface cracks with cement and capping heating areas.
- Implementation of the actions to address the Section 240 Notices and ongoing consultation outcomes with the Resources Regulator.
- Finalisation of the Biodiversity Stewardship Agreement.
- Completion of annual CCC meetings, as agreed with CCC members.

13 References

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000. (ANZECC, 2000) An Introduction to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Commonwealth Government.
- CARAS (2022). Cullen Valley Mine Independent Environmental Audit. Prepared for Shoalhaven Coal Pty Limited
- Castlereagh Coal (2024). Cullen Valley Mine Pollution Incident Response Management Plan.
- International Environmental Consultants, 1997. Feldmast Coal Project Environmental Impact Statement.
- International Environmental Consultants, 2004. Cullen Valley Mine Open Cut Extension Environmental Impact Statement.
- JBA (2022). Cullen Valley Mine Air Quality Management Plan.
- JBA (2022a). Cullen Valley Mine Environmental Monitoring Program.
- JBA (2022b). Cullen Valley Mine Flora and Fauna Management Plan.
- JBA (2022c). Cullen Valley Mine Site Water Management Plan.
- NSW Government (2015). Annual Review Guideline.
- Rapt Consulting (2024a). Cullen Valley Mine Environmental Noise Monitoring Quarter 1, 2024. Prepared for Castlereagh Coal.
- Rapt Consulting (2024b). Cullen Valley Mine Environmental Noise Monitoring Quarter 2, 2024. Prepared for Castlereagh Coal.
- Rapt Consulting (2024c). Cullen Valley Mine Environmental Noise Monitoring Quarter 3, 2024. Prepared for Castlereagh Coal.
- Rapt Consulting (2024d). Cullen Valley Mine Environmental Noise Monitoring Quarter 4, 2024. Prepared for Castlereagh Coal.
- Atlantech (2025). 2024 Biodiversity Monitoring Report Cullen Valley Mine and Invincible Colliery. Umwelt (2017). Water Management Plan Cullen Valley Mine.

APPENDIX 1 - Figures

Cullen Valley Mine

Site Locality



 Cullen Valley Project Approval Boundary (DA-200-5-2003)

0 0.33 0.65 1.3
 Kilometers

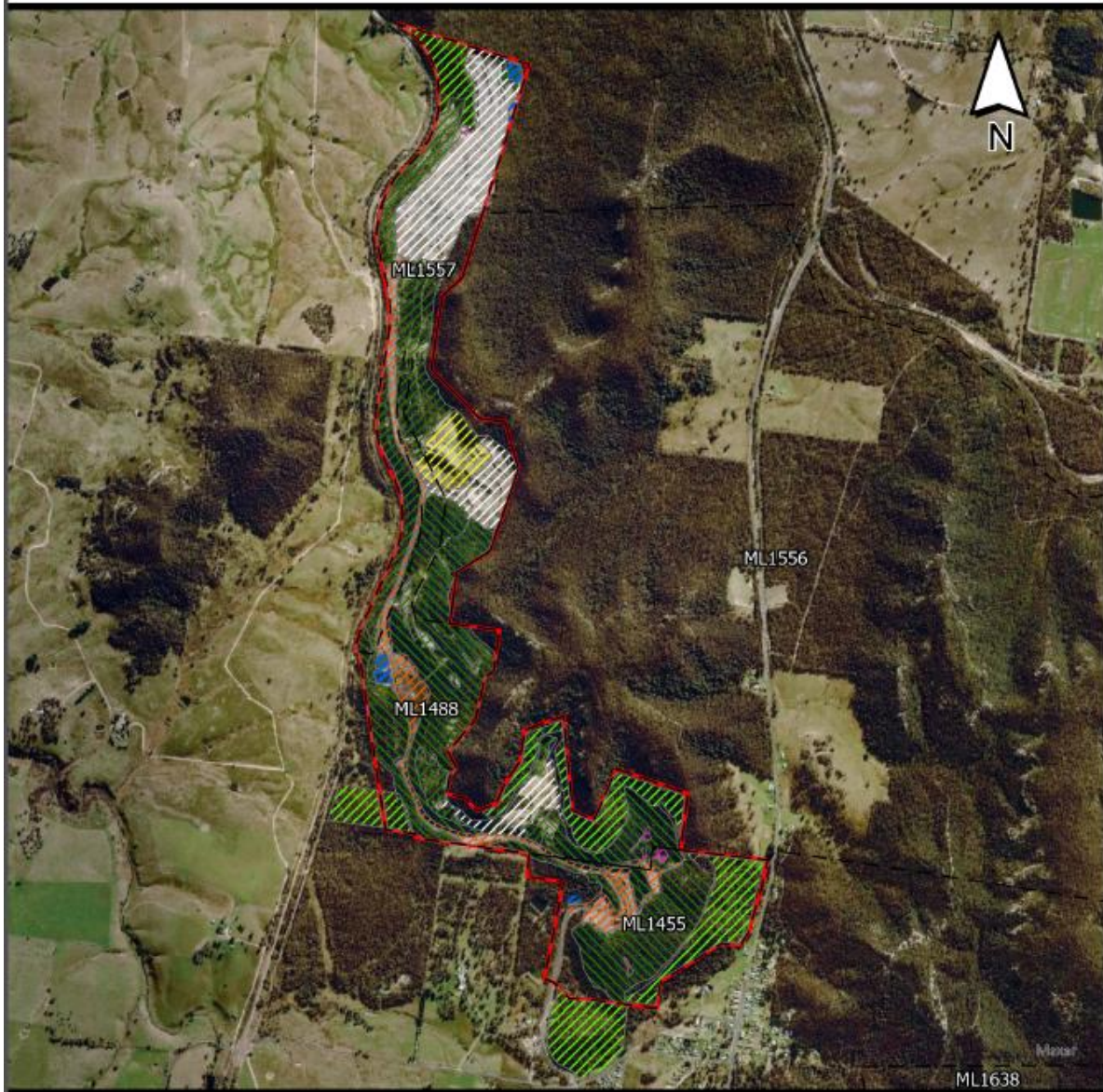
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Map Reference: ATLGIS25-002_A4-5

Figure 1



Cullen Valley Mine

2024 Mining & Rehabilitation Areas



- Cullen Valley Project Approval Boundary (DA-200-5-2003)
- Mining Lease Boundaries

- Active Mining Area (Open Cut Void)
- Established Rehabilitation
- Infrastructure Area
- Rehabilitation Area
- Stockpile Area
- Unshaped Emplacement Area
- Water Management Area
- Conservation & Compensatory Habitat Area

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Kilometers

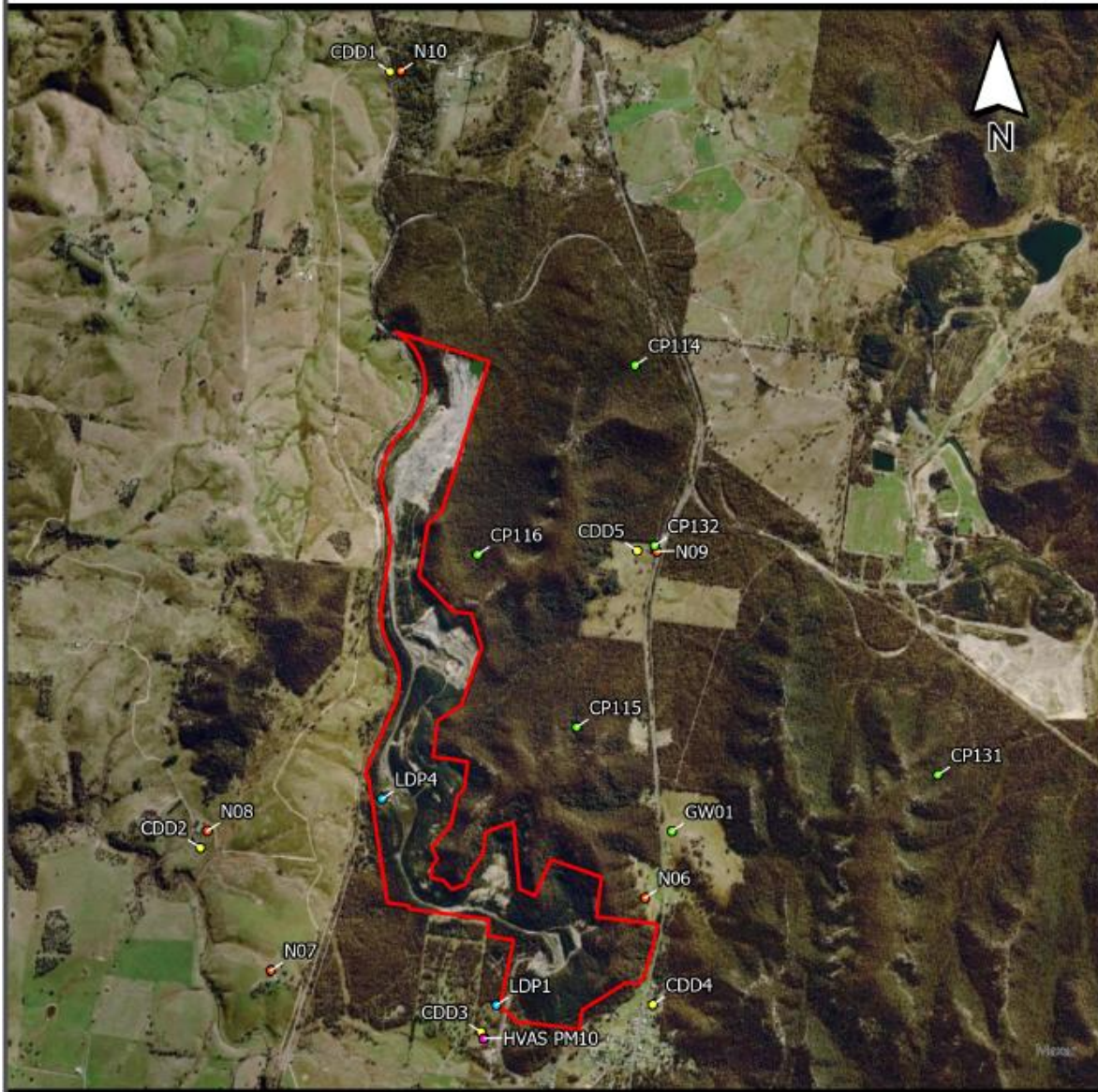
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Figure 2



Cullen Valley Mine

Environmental Monitoring Locations



- ▭ Cullen Valley Project Approval Boundary (DA-200-5-2003)
- Air Quality Monitoring Locations
- Weather Station
- Surface Water Monitoring Locations
- Groundwater Monitoring Locations
- Noise Monitoring Locations

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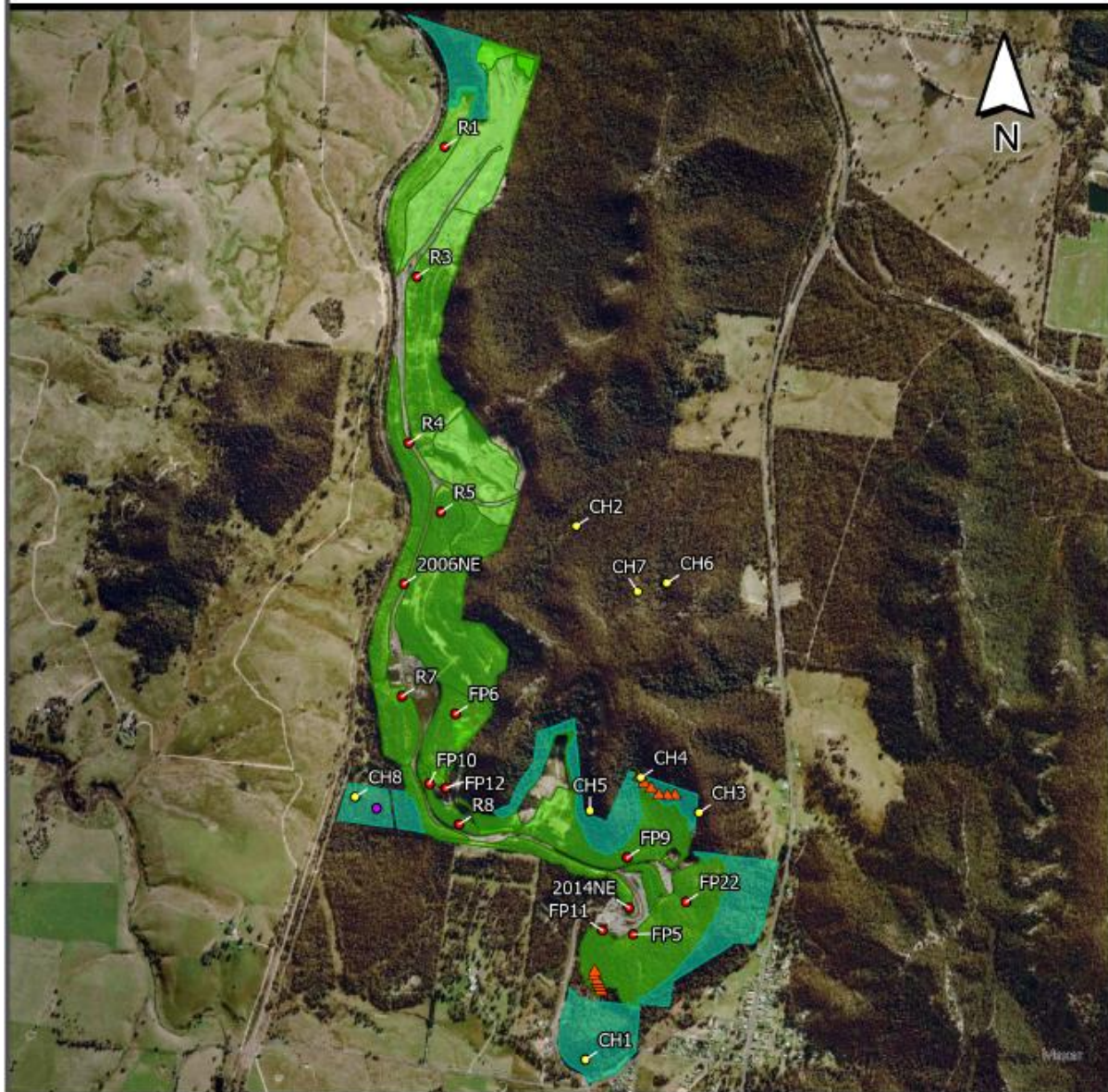
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Figure 3



Cullen Valley Mine

Ecological Monitoring Sites



- | | |
|--|--|
| Rehabilitation Area | Nest Box Locations |
| Conservation & Compensatory Habitat Area | Rehabilitation Monitoring Locations |
| | Clandula Geebung Monitoring Locations |
| | Compensatory Habitat Area Monitoring Locations |

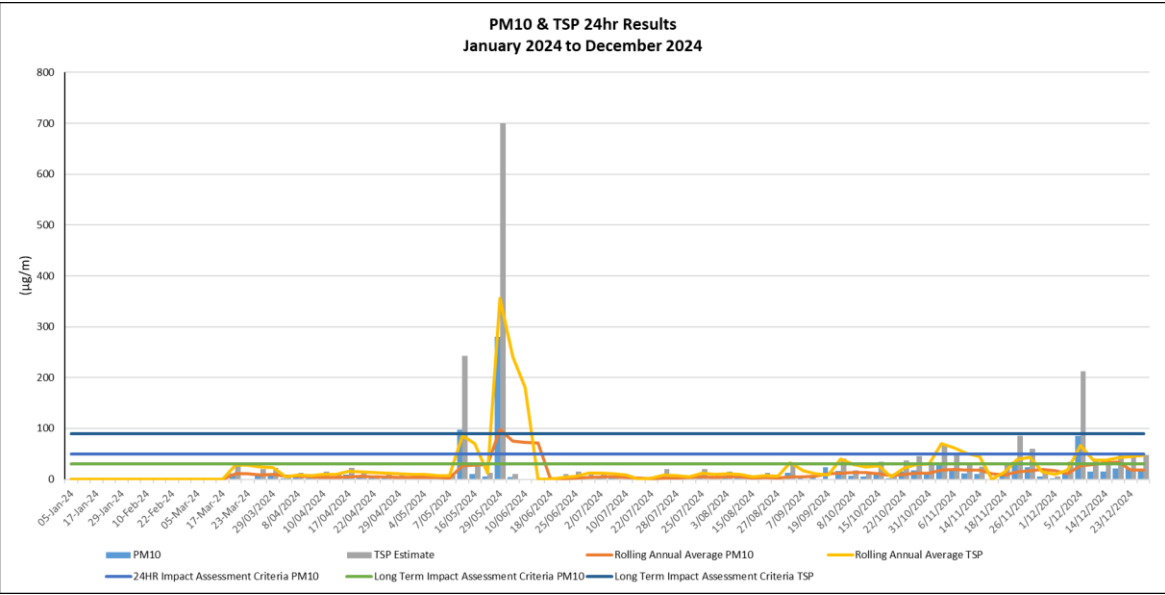
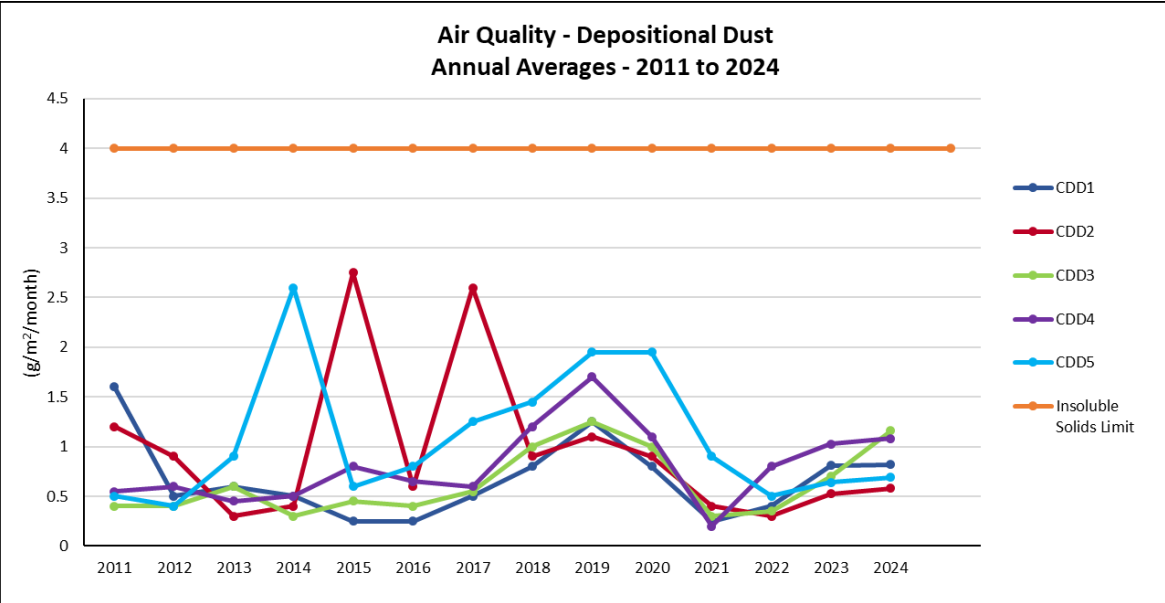
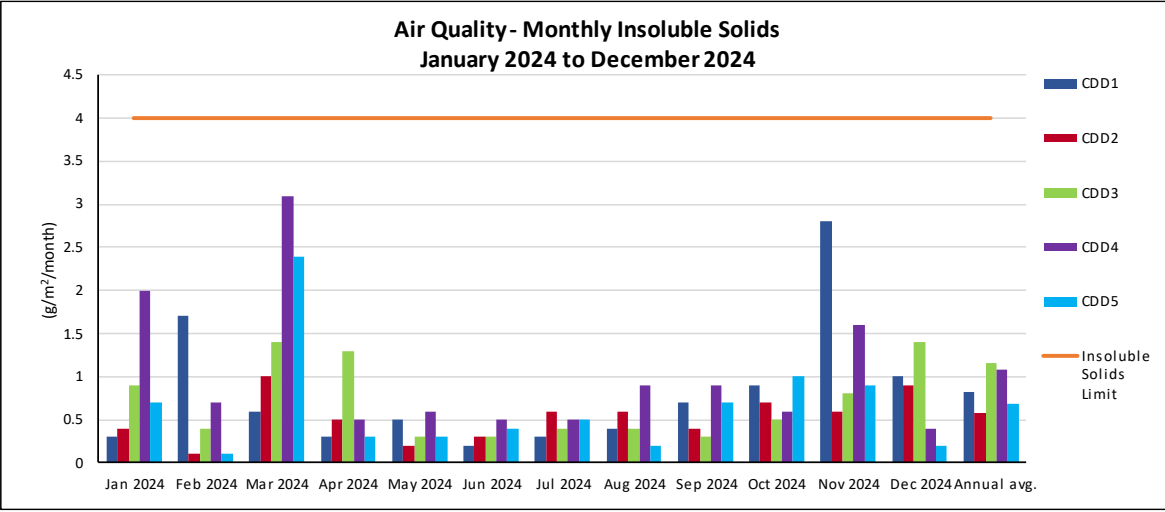
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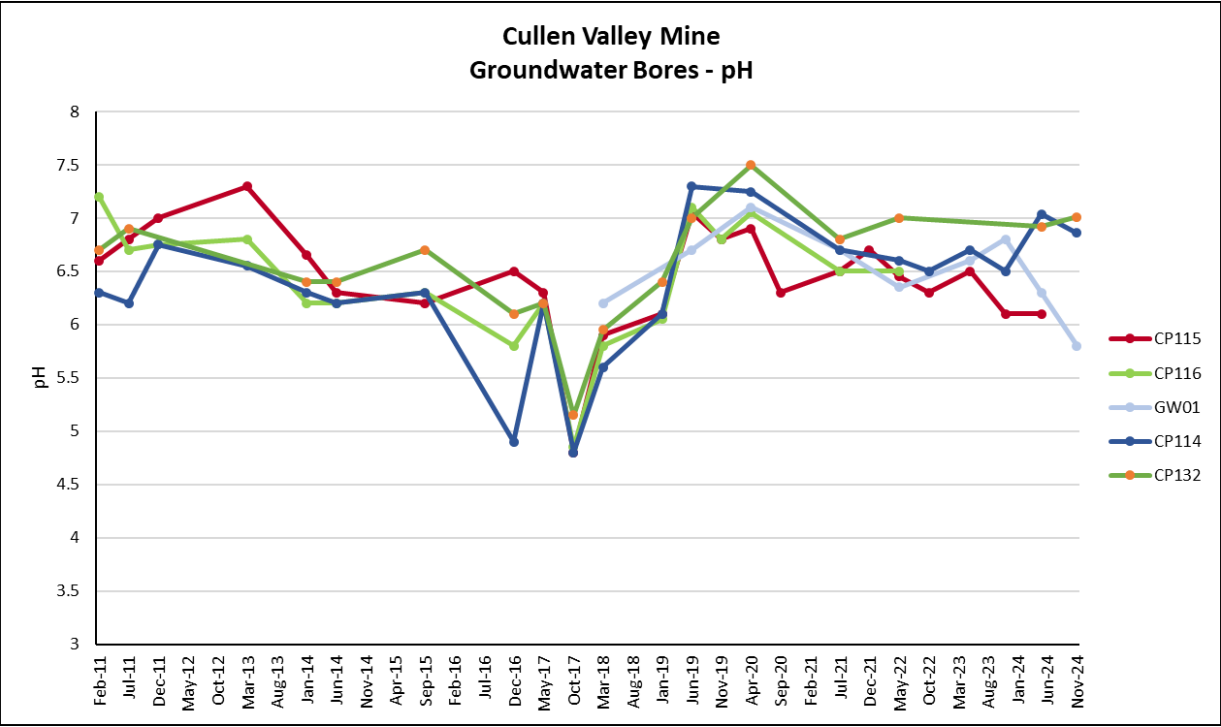
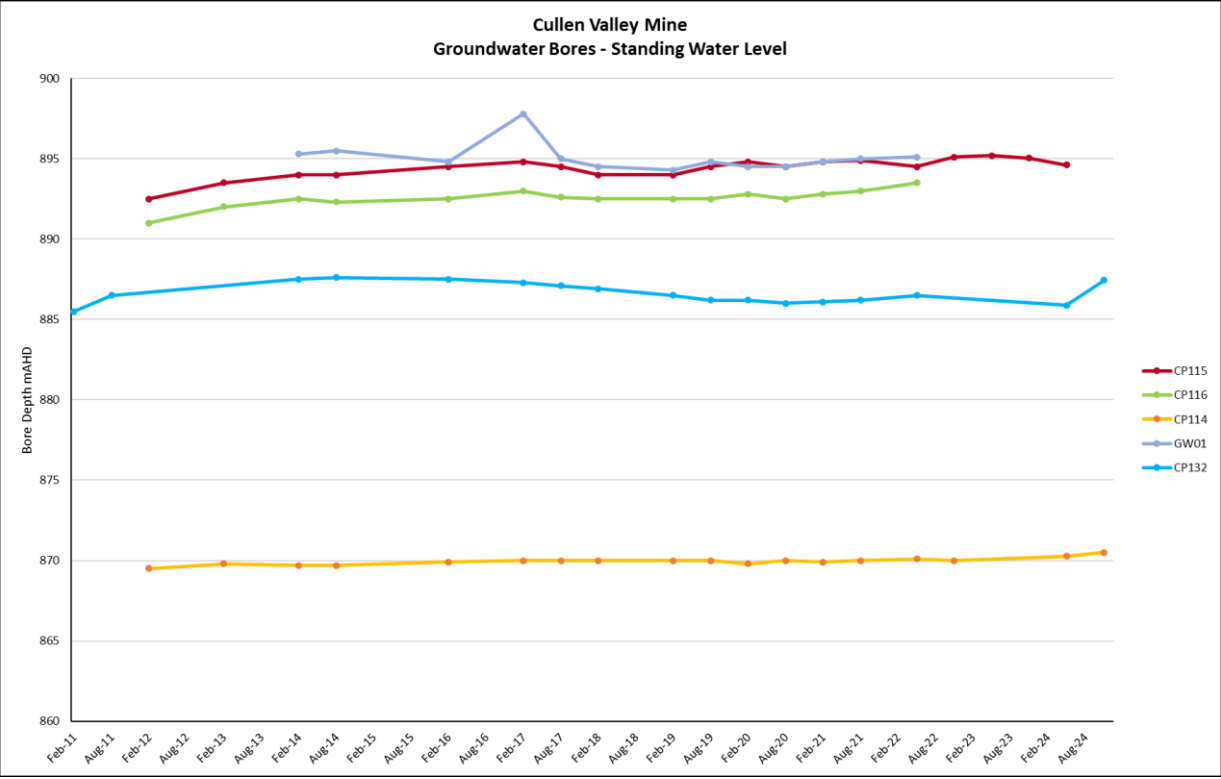
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Figure 5

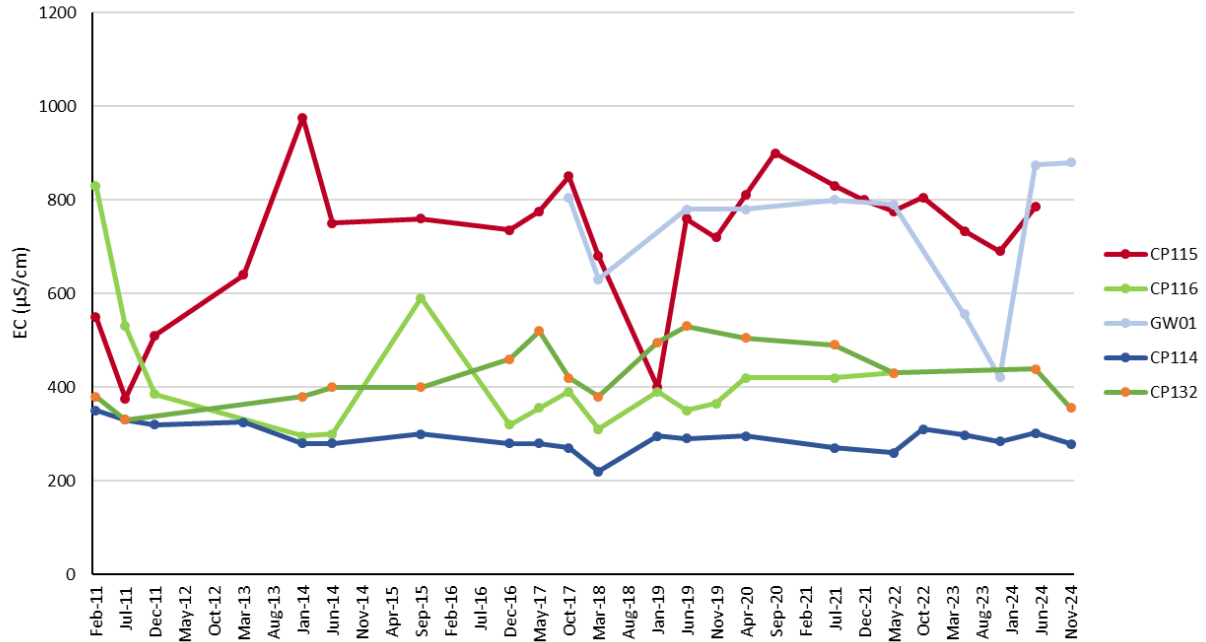


APPENDIX 2 - Monitoring Results

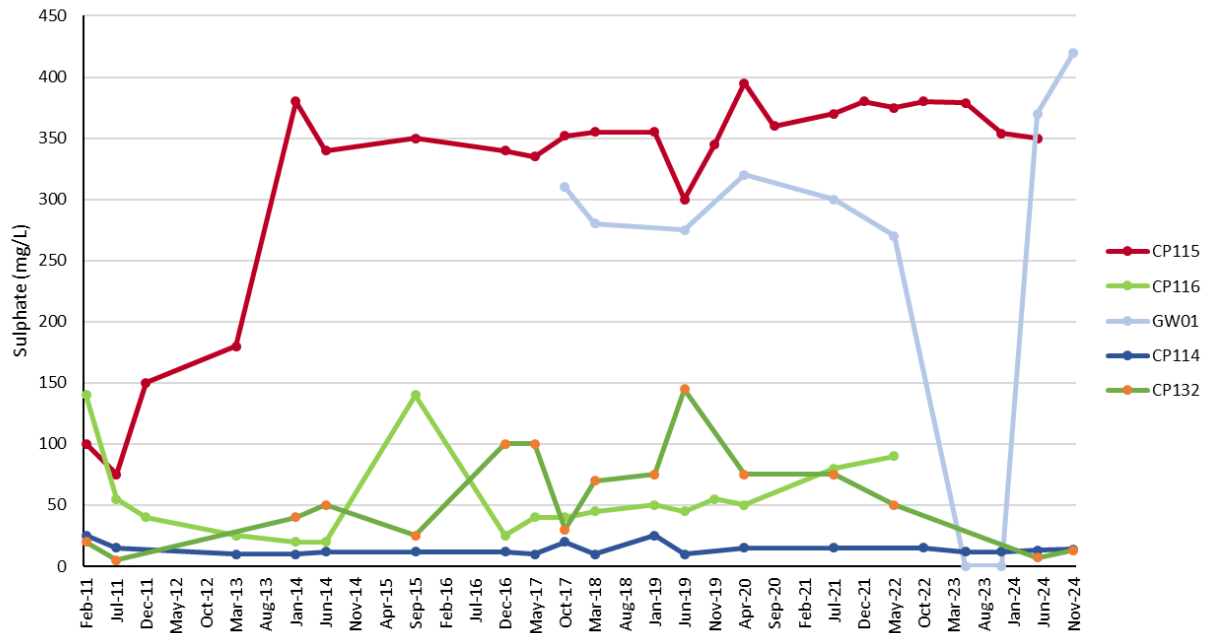


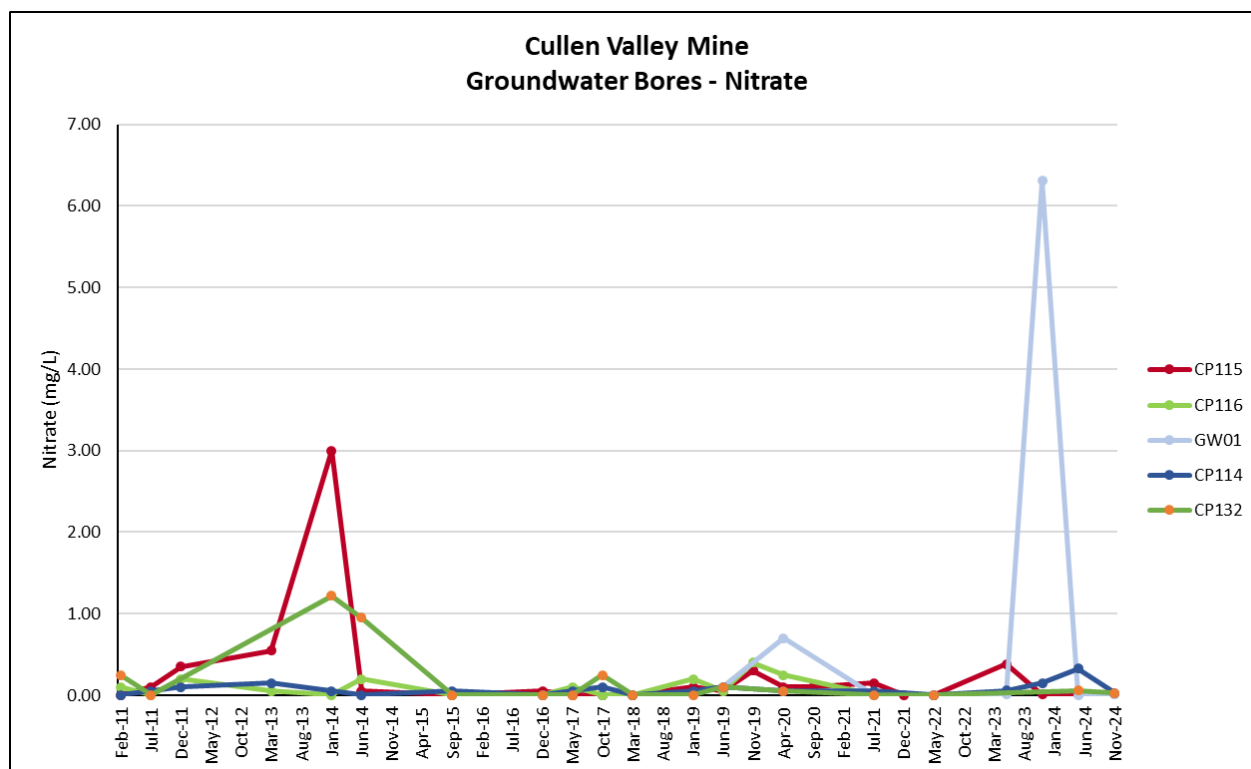
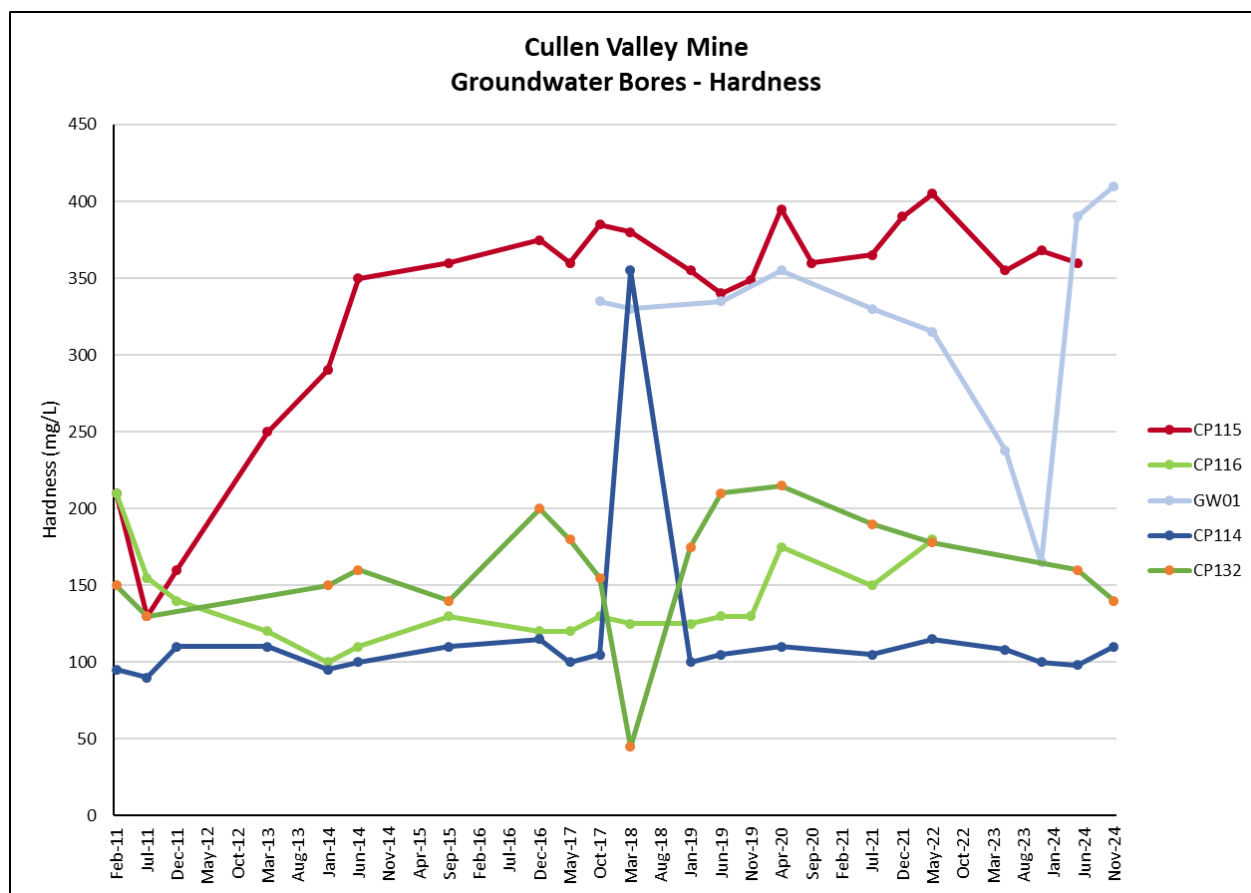


**Cullen Valley Mine
Groundwater Bores - EC**



**Cullen Valley Mine
Groundwater Bores - Sulphate**





Historical Noise monitoring results for years the past five (5) years (2019-2023) are shown in **Tables A to J**. Contribution from CVM was inaudible for all monitoring undertaken for 2013, and 2014.

Table A 2023 Quarterly Monitoring Results

Location	Criterion (dB)	Quarter 1 (LAeq)	Quarter 2 (LAeq)	Quarter 3 (LAeq)	Quarter 4 (LAeq)
Red Springs (N07)	37	IA	IA	IA	IA
Hillcroft (N08)	35	IA	IA	IA	IA
Forest Lodge (N10)	40	IA	IA	IA	IA
Doble Gate (N09)	43	IA	IA	IA	IA
Tilley (N06)	43	IA	IA	IA	IA

IA – Inaudible

Table B 2022 Quarterly Monitoring Results

Location	Criterion (dB)	Quarter 1 (LAeq)	Quarter 2 (LAeq)	Quarter 3 (LAeq)	Quarter 4 (LAeq)
Red Springs (N07)	37	IA	IA	IA	IA
Hillcroft (N08)	35	IA	IA	IA	IA
Forest Lodge (N10)	40	IA	IA	IA	IA
Doble Gate (N09)	43	IA	IA	IA	IA
Tilley (N06)	43	IA	IA	IA	IA

IA – Inaudible

Table C 2021 Quarterly Monitoring Results

Location	Criterion (dB)	Quarter 1 (LAeq)	Quarter 2 (LAeq)	Quarter 3 (LAeq)	Quarter 4 (LAeq)
Red Springs (N07)	37	36 (IA)	34 (IA)	41 (IA)	35 (IA)
Hillcroft (N08)	35	36 (IA)	36 (IA)	38 (IA)	32 (IA)
Forest Lodge (N10)	40	36 (IA)	31 (IA)	36 (IA)	42 (IA)
Doble Gate (N09)	43	49 (IA)	63 (IA)	43 (IA)	50 (IA)
Tilley (N06)	43	63 (IA)	68 (IA)	48 (IA)	53 (IA)

IA – Inaudible

Table D 2020 Quarterly Monitoring Result^s

Location	Criterion (dB)	Quarter 1 (LAeq)	Quarter 2 (LAeq)	Quarter 3 (LAeq)	Quarter 4 (LAeq)
Red Springs (N07)	37	44 (IA)	35 (IA)	43 (IA)	42 (IA)
Hillcroft (N08)	35	41 (IA)	33 (IA)	30 (IA)	33 (IA)
Forest Lodge (N10)	40	44 (IA)	38 (IA)	26 (IA)	38 (IA)
Doble Gate (N09)	43	52 (IA)	52 (IA)	60 (IA)	54 (IA)
Tilley (N06)	43	61 (IA)	66 (IA)	68 (IA)	63 (IA)

IA – Inaudible

Table E 2019 Quarterly Monitoring Results

Location	Criterion (dB)	Quarter 1 (L _{Aeq})	Quarter 2 (L _{Aeq})	Quarter 3 (L _{Aeq})	Quarter 4 (L _{Aeq})
Red Springs (N07)	37	39 (IA)	44 (IA)	41 (IA)	43 (IA)
Hillcroft (N08)	35	40 (IA)	44 (IA)	39 (IA)	38 (IA)
Forest Lodge (N10)	40	36 (IA)	43 (IA)	43 (IA)	32 (IA)
Doble Gate (N09)	43	62 (IA)	54 (IA)	63 (IA)	59 (IA)
Tilley (N06)	43	72 (IA)	67 (IA)	64 (IA)	68 (IA)

IA – Inaudible

APPENDIX 3 - CVM IEA 2021

Cullen Valley Mine (CVM)

Response to Recommendations

EIA Recommendations								
Condition Reference No #	Condition Detail	Condition Type	Risk Level of Non-compliance	Auditor Comments and Recommendations	CVM Response	Target Due Date	Completion Status	Comments - Status Update
Development Consent DA 200-5-2003 Non-compliance Recommendations								
Sch 3 Cond 1	The Applicant shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Administrative	Administrative	The applicant has generally implemented practicable measures to minimise harm to the environment. However, several notices have been issued over the audit period. The applicant should implement reasonable and practical measures to investigate anomalies in the readings even if no harm has been done to the environment.	CVM accepts the recommendation. During the audit period 2016 - 2021, there was no dedicated environmental manager onsite to manage the performance and delivery of consultants undertaking monitoring and associated reporting and follow up. CVM has directly employed a full time environmental manager onsite to manage these items toward establishing and maintaining compliance.	28-Feb-22	Completed	
Sch 4 Cond 25	The Applicant shall monitor the air quality impacts of the development at representative locations around the site, using the specified averaging period, frequency, and sampling method in Table 12 to the satisfaction of DEC and the Director-General.	Specific environmental conditions	Administrative	2018 AEMR - A power outage of the HVAS unit caused by thunderstorm resulted in a failure to monitor air quality in accordance with this condition. 2019 AEMR - The 30V+ 2 day monitoring period for depositonal dust was exceeded on one occasion (dec). 2020 AEMR - A mechanical fault with the HVAS unit resulted in a failure to monitor air quality in on two occasions. This item has no defined recommendation.	Power outages and mechanical failures are generally beyond control of site personnel, nevertheless a dedicated environmental manager is now employed onsite to manage the operation and performance of monitoring equipment and consultant technicians engaged to conduct monitoring toward establishing and maintaining compliance.	28-Feb-22	Completed	
Sch 4 Cond 27	The Applicant shall not cause or permit the emission of offensive odour beyond the boundary of the site in accordance with section 128 of the Protection of the Environment Operations Act 1997.	Specific environmental conditions	Low	There have been odour complaints in every year of the audit period regarding subsurface heating. 2016 - 4 complaints 2017 - 2 complaints 2018 - 3 complaints 2019 - 2 complaints 2020 - 2 complaints 2021 - 1 complaint 2022 - 4 complaints. Continue to monitor and implement current subsurface management plan. Consult and review if the situation worsens.	CVM addressed the complaints in consultation with the complainants, whilst undertaking physical inspections and remediation activities on areas found to be the source of odours which are associated with sub-surface heating on the CVM site. CVM consulted closely with the Resources Regulator during 2022, implementing an agreed trial irrigation methodology to address the heating issues and assist in extinguishing / management of the heating, whilst continued treatment as per the approved spot treatment methods continued in parallel. The Resources Regulator conducted a site inspection of the trial irrigation in late please Any) indicating satisfaction with the process.	2-Jul-22	Ongoing	Trial irrigation of heating areas was initiated on 14/6/2022 following close consultation with the Resources Regulator demonstrating a measurable decrease in ground based heat. A number of adverse weather conditions contributed to several odour incidents in the first half of 2022 prior to and at the initiation of the irrigation program, however the sole complainant stated in a meeting on the 31 August 2022 that there was a significant improvement overall in the odour from CVM following start of the trial irrigation. Continuation of the irrigation of heating areas is proposed during 2023 in accordance with the methodology agreed with the Resources Regulator in addition to compaction methods to help extinguish / manage heating continuing treatment as per the approved methods in addition to further capping / sealing of heating areas with overburden / rehabilitation materials as remnant mining occurs at CVM.
Sch 4 Cond 31a	Describe the immediate and long-term compensatory habitat proposal, and demonstrate how this proposal would be integrated with the proposed rehabilitation of the site and surrounding areas of remnant vegetation.	Specific environmental conditions	Administrative	An explicit plan covering expected short, medium and long-term should be summarised in AEMR.	CVM will provide an account in the AR of the Annual Biodiversity Monitoring Report outcomes which includes assessment of the Compensatory Habitat, and further, consult with its ecologists toward and required revision if necessary of the management plan which are currently undergoing agency consultation. CVM management plans are currently undergoing agency consultation, and required changes will be adopted in the appropriate plans.	21-Apr-22	Completed	The approved CVM Flora and Fauna Mgt Plan (21 April 2022) describes the compensatory habitat area establishment and management techniques to protect the land and exclude open cut mining. The plan addresses short-, medium- and long-term maintenance and management actions and permanent protection options to be determined prior to the cessation of approved mining and includes 2 options to be determined in consultation with the NSW Government. A dedicated area for <i>Peromyscus macgillivrayi</i> has been established within the CVM approval boundary, the ongoing management of which is described within the approved CVM Special Mgt Plan. The Annual Biodiversity Monitoring program includes assessment and reporting of the status of CVM areas.
Sch 4 Cond 31f	Set completion criteria for the compensatory habitat proposal.	Specific environmental conditions	Administrative	No completion criteria were found for compensatory habitat. The criteria should be developed and reported in AEMR. Criteria should be developed in tandem with short-, medium and long-term goals.	CVM will provide an account in the AR of the Annual Biodiversity Monitoring Report outcomes which includes assessment of the Compensatory Habitat, and further, consult with its ecologists toward and required revision if necessary of the management plan which are currently undergoing agency consultation. CVM management plans are currently undergoing agency consultation, and required changes will be adopted in the appropriate plans.	21-Apr-22	Completed	Completion criteria as described are outlined with the approved CVM Flora and Fauna Mgt Plan. (8, you may want to add the some of the criteria from the mgt plans to the report).
Sch 4 Cond 36a	Within 2 years of the date of this consent, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission, and pay the full cost of, an Independent Audit of the compensatory habitat proposal. This audit must be conducted by a suitably qualified, experienced, and independent person whose appointment has been approved by the Director-General.	Specific environmental conditions	Administrative	Previous audit was completed on the 26 Nov 2016 by SIB Consulting Australia. An extension date was granted for this audit to March 2022. CARAS was endorsed on 13 December 2021 to conduct the current audit period. Date of this audit was 2 February 2022. There item has no defined recommendation.	Canterbury Coal (CVM) wrote to DPIE on the 15th of December 2021 requesting an extension for completion of the Independent Environmental Audit for CVM stating reasons as the request. A subsequent extension was granted until 24 March 2022.	15-Mar-22	Completed	Report completed and submitted 15th March 2022.
Sch 4 Cond 42	For each monitoring/discharge point, the Applicant shall monitor (by sampling and obtaining results by analysis) the concentration of each pollutant in Table 15, using the specified units of measure, frequency, and sampling method.	Specific environmental conditions	Administrative	Monthly water quality monitoring is carried out at discharge points. Monitoring in 2019 and 2020 were affected due to bushfires.	CVM employs an external organisation to conduct environmental sampling associated with its monitoring program. During the well documented extreme bushfire conditions in late 2019 / early 2020 directly impacted environmental monitoring preventing access to monitoring sites.	NA	Completed	
Sch 4 Cond 43	Within 6 months of the date of this consent, the Applicant shall prepare (and then implement) a Site Water Management Plan for the development, in consultation with DEC and DPI, and to the satisfaction of the Director-General. This plan must include: a) the predicted water usage; b) a Surface Water Monitoring Program; and c) an Erosion and Sediment Control Plan.	Specific environmental conditions	Administrative	In 2017 a revised WMP has been sent to DPIE for approval, however this is still pending. Monitoring and usage is outlined in AEMR; however they are very brief. Surface Water Monitoring program and Erosion and Sediment control plan are in place. This item has no defined recommendation.	CVM submitted an entire suite of new management plans to DPIE (and other agencies) for agency stakeholder consultation in February 2022 including a Site Water Management Plan. Additional plans / information includes predicted site water usage, surface water monitoring program and a standalone erosion and sediment control plan. CVM will work with agencies to finalise approval of these plans toward the restart of mining remnant coal resources at CVM in early 2022.	21-Apr-22	Completed	Matters addressed in CVM Erosion and Sediment Control Plan and Site Water Mgt Plans as approved on the 21 April 2022.
Sch 4 Cond 44	The Surface Water Monitoring Program shall include: a) detailed baseline data on surface water flows and quality; b) surface water impact assessment criteria; c) a program to monitor surface water flows and quality; and d) a program to monitor the effectiveness of the Erosion and Sediment Control Plan.	Specific environmental conditions	Administrative	There is a Surface Water Monitoring Program in the EMP. However, it does not provide much detail on a) and b). Additional information is required. In 2017, a standalone water management plan that included a surface water monitoring program was issued to DPIE for approval.	CVM accepts this recommendation. CVM submitted an entire suite of new management plans to DPIE (and other agencies) for agency stakeholder consultation in February 2022 including a Site Water Management Plan which includes a detailed surface water monitoring program. CVM will work with agencies to finalise approval of these plans toward the restart of mining remnant coal resources at CVM in early 2022.	21-Apr-22	Completed	Matters addressed in CVM Site Water Mgt Plan as approved on the 21 April 2022.
Sch 4 Cond 45	The Erosion and Sediment Control Plan shall: a) comply with the requirements of the Department of Housing's Managing Urban Stormwater: Soils and Construction manual; b) identify activities that could cause soil erosion or discharge sediment or water pollutants from the site; c) describe the location, function and capacity of all erosion and sediment control structures, and nominate which, if any, of these structures would be used as water sources for the development; and d) describe the measures to minimise soil erosion and the potential migration of sediments to downstream waters.	Specific environmental conditions	Administrative	There is no discussion of compliance with requirements set by Department of Housing's Managing Urban Stormwater. Activities that cause erosion are identified in Section 5. The locations of structures are outlined but not described in detail. Measure to minimise soil erosion are covered in Section 5. This item has no defined recommendation.	CVM submitted an entire suite of new management plans to DPIE (and other agencies) for agency stakeholder consultation in February 2022 including an Erosion and Sediment Control Plan which includes reference to the Blue Book (London), 2004 in Sections 2.4 and 2.5. Structures in Section 2.4 and measures to minimise soils erosion in Sections 2.4 and 2.6. CVM will work with agencies to finalise approval of these plans toward the restart of mining remnant coal resources at CVM in early 2022.	21-Apr-22	Completed	Matters addressed in CVM Erosion and Sediment Control Plan as approved on the 21 April 2022.
Sch 4 Cond 59	The Applicant shall not cause, permit or allow any waste generated outside the mine to be received at the mine for storage, treatment, processing, reprocessing or disposal, or any waste generated at the mine to be disposed of at the mine, except as expressly permitted by a DEC licence. Note: This condition only applies to the storage, treatment, processing, reprocessing, or disposal of waste that requires a licence under the Protection of the Environment Operations Act 1997.	Specific environmental conditions	Administrative	VENM/CVM dirt have been received at CVM in 2018 and 2019 to help with rehabilitation works. DPIE requires an approval and modification of current development consent.	CVM accepts the recommendation. A small quantity spoil from a major infrastructure project in the Sydney Metropolitan Region was imported to assist with rehabilitation works. The spoil was characterised as VENM or ERM in accordance with the NSW EPA waste guidelines. The import of all materials from offsite was stopped following correspondence / consultation with DPIE and the Resources Regulator. Should the import of VENM or ERM materials be considered in future, CVM will seek the appropriate approvals / modification in consultation with DPIE and other regulatory agencies.	NA	Completed	
Sch 6 Cond 8	The Applicant shall ensure that there is a Community Consultative Committee to oversee the environmental performance of the development. This committee shall: a) be comprised of: • 2 representatives from the Applicant, including the person responsible for environmental management at the mine; • 1 representative from Council; and • 4 representatives from the local community, whose appointment has been approved by the Director-General in consultation with the Council; b) be chaired by an independent person whose appointment has been endorsed by the Director-General; c) meet at least twice a year; and d) review and provide advice on the environmental performance of the development, including any environmental management plans, monitoring results, audit reports, or complaints.	ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING & REPORTING	Administrative	Only one CCC meeting were held per year in 2019 and 2020. DPIE noted this is a technical non-compliance. During 2018 CCC, it was agreed that one CCC meeting held annually while on care and maintenance Table 1.3. Intent to start biannual once mine operations commence. This item has no defined recommendation.	It is anticipated that Cullen Valley Mine will be move from care and maintenance to operational status in early 2022. As such it is intent to restart the twice yearly CCC meetings covering both CVM and INV. This matter will be raised with the CCC members at the next meeting on the 15 March 2022.	15-Mar-22	Completed	CC Meeting of 15 March 2022 unanimously supported restart of the twice-yearly meetings.
Environment Protection Licence EPL 10341 Recommendations								
L4.4	For the purpose of condition L4.3, a) Data recorded by the meteorological station as EPA Licence Point 5 must be used to determine meteorological conditions; and b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Pollutants Policy.	Limit Conditions	Administrative	Meteorological data was sourced from the Bureau of Meteorology's Bathurst weather station in 2016 and 2017. This station is located 45km away and unlikely to be representative of onsite weather conditions. However, a new monitoring system was installed on site in 2018 and carries out the requirements of this condition.	As described, a new met station was installed at the CVM site in 2018. Monitoring data from that site now informs the CVM Met requirements.	NA	Complete	
L5.1	No condition of this licence identifies a potentially offensive odour for the purpose of section 128 of the Protection of the Environment Operations Act 1997. Note: Section 128 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.	Limit Conditions	Low	Complaints regarding odours has been made every year of the auditing period.	CVM accepts the recommendation. During the audit period, CVM addressed the complaints in consultation with the complainants, whilst undertaking physical inspections and remediation activities on areas found to be the source of odours which are associated with sub-surface heating on the CVM site. Following issue of a 240 Notice by the Resources Regulator regarding heating (the cause of the odours), CVM responded with an updated MOP and Plan of Works which was approved. CVM has since Feb 2022 consulted closely with the Resources Regulator to add further measures to address the heating issues at CVM, including trial irrigation and compaction methods to help extinguish / manage heating, and continued treatment as per the approved methods in addition to further capping / sealing of heating areas with overburden / rehabilitation materials as remnant mining occurs at CVM.	Ongoing	Open	Trial irrigation of heating areas was initiated on 14/6/2022 following close consultation with the Resources Regulator demonstrating a measurable decrease in ground based heat. A number of adverse weather conditions contributed to several odour incidents in the first half of 2022 prior to and at the initiation of the irrigation program, however the sole complainant stated in a meeting on the 31 August 2022 that there was a significant improvement overall in the odour from CVM following start of the trial irrigation. Continuation of the irrigation of heating areas is proposed during 2023 in accordance with the methodology agreed with the Resources Regulator in addition to compaction methods to help extinguish / manage heating continuing treatment as per the approved methods in addition to further capping / sealing of heating areas with overburden / rehabilitation materials as remnant mining occurs at CVM.
Generic Recommendations Section B Audit Report								
B.1	Update all mgt plans			CARAS recommend that after a prolonged period of care and maintenance, all management plans should be reviewed and updated prior to recommencement of active mining.	CVM accepts this recommendation. CVM submitted an entire suite of new management plans to DPIE (and other agencies) for agency stakeholder consultation in February 2022. CVM will work with agencies to finalise approval of these plans toward the restart of mining remnant coal resources at CVM in early 2022.	21/04/2022	Completed	All CVM management plans were updated and approved by DPIE
B.2	Sub-Surface Heating Response Management Plan			The Sub-Surface Heating Response Management Plan should be included in the updated management plans for the operation of CVM. This will address the concerns in regard to nuisance odour from the site. Our recommendation is that this plan will be implemented as part of the mine recommendation works	CVM are presently in the process of preparing the new Rehabilitation Management Plans which replace the MOP from 2 July 2022. The RMP will address the sub-surface heating at CVM. CVM has since Feb 2022 consulted closely with the Resources Regulator to add further measures to address the heating issues at CVM, including trial irrigation and compaction methods to help extinguish / manage heating, and continued treatment as per the approved methods in addition to further capping / sealing of heating areas with overburden / rehabilitation materials as remnant mining occurs at CVM. These items will also be captured in the RMP.	21/04/2022	Completed	
B.3	Administrative - Non-compliance			The Auditor identified nine (9) administrative non-compliance events, where CVM failed to comply with the consent conditions for the reasons as discussed in Section 7 of this report. Our recommendation is that CVM should engage a dedicated Environmental Manager (EM), prior to recommencing of extractive mining operations to ensure the implementation of all practicable measures to prevent and/or minimise any harm that may result from the construction, operation, or rehabilitation of the development	CVM accepts this recommendation. CVM has directly employed a full time environmental manager onsite to manage these items toward establishing and maintaining compliance.	28/02/2022	Completed	
B.4	Compensatory Habitat			Development Consent DA 200-5-2003 Non-compliance Recommendations	Issue addressed in recommendations and response in Development Consent DA 200-5-2003 Non-compliance Recommendations section above.	NA	NA	
B.5	Site Boundaries and Aboriginal Sites			The identification of the boundaries to Compensatory Habitat Areas and the locations of the Aboriginal Ancestral Sites (referenced in DA Condition 55 and 56) may have become enveloped in regrowth during the care and maintenance period. Our recommendation is that marking, and signage should be installed to clearly identify these nominated locations.	CVM accepts this recommendation. CVM will investigate existing signage and replace and / or refurbish as required.	30/06/2022	Completed	New signs have been purchased and the installation of sign have started

