COWAL GOLD OPERATIONS

2022 ANNUAL REVIEW

COWAL GOLD OPERATIONS
2022 Annual Review

Name of Operation	*Cowal Gold Operations*
Name of Operator	*Evolution Mining (Cowal) Pty Limited*
Development Consent	*DA 14/98 and SSD 10367*
Name of Holder of Development Consent	*Evolution Mining (Cowal) Pty Limited*
Mining Lease #	*ML 1535*
Name of Holder of Mining Lease	*Evolution Mining (Cowal) Pty Limited*
Mining Lease #	*ML 1791*
Name of Holder of Mining Lease	*Evolution Mining (Cowal) Pty Limited*
Environmental Protection Licence #	*EPL11912*
Name of Holder of EPL	*Evolution Mining (Cowal) Pty Limited*
Water Licence #	*WAL 36569, WAL 31864, WAL 36615, WAL 36617, WAL 13749, WAL 14981, WAL 13748, WAL 13748, WAL 31568, WAL 31563, WAL 42993*
Name of Holder of Water Licences	*Evolution Mining (Cowal) Pty Limited*
Annual Review Start Date	*1 January 2022*
Annual Review End Date	*31 December 2022*

I, John Penhall, certify that this audit report is a true and accurate record of the compliance status of the Cowal Gold Operations for the period 1 January – 31 December 2021 and that I am authorised to make this statement on behalf of Evolution Mining (Cowal) Pty Limited.

Note.

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.

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

Name of Authorised Reporting Officer	*John Penhall*
Title of Authorised Reporting Officer	*General Manager*
Signature of Authorised Reporting Officer	
Date	*31 March 2023*

Prepared by	
Name	**Tammy Rawson**
Title	**Snr Environmental Advisor**
Date	**31 March 2023**
Signature	
Reviewed by	
Name	**Shaune Finn**
Title	**Sustainability Manager**
Date	**31 March 2023**
Signature	

Document #	**COW.400.05.6047**
Issued to	**Steve O'Donoghue – Department of Planning and Environment**
Date	**31 March 2023**

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1. STATEMENT OF COMPLIANCE

The compliance status of the Cowal Gold Operations (CGO) with its relevant approval conditions at the end of the reporting period (31 December 2022) is provided in Table 1.

There was one occurrence during the reporting which exceeded limits in the DA 14/98 and EPL 11912, which is covered in detail in section 6.6.

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Development Consent DA 14/98	No
State Significant Development 10367	YES
Environmental Protection Licence (EPL) 11912	No
Mining Lease (ML) 1535	YES
Mining Lease (ML) 1791	YES

2. INTRODUCTION

The 2022 Annual Review (AR) has been prepared by Evolution Mining (Cowal) Pty Limited (Evolution) for the CGO in accordance with the requirements of Condition 9.1(b) of the development consent (DA 14/98) for the CGO and condition C9 of State significant Development 10367. This document also satisfies the requirements for Condition 26 of the Conditions of Authority for ML 1535. This AR is also consistent with the New South Wales (NSW) Government's (2015) Annual Review Guideline – Post-approval Requirements for State Significant Mining Developments.

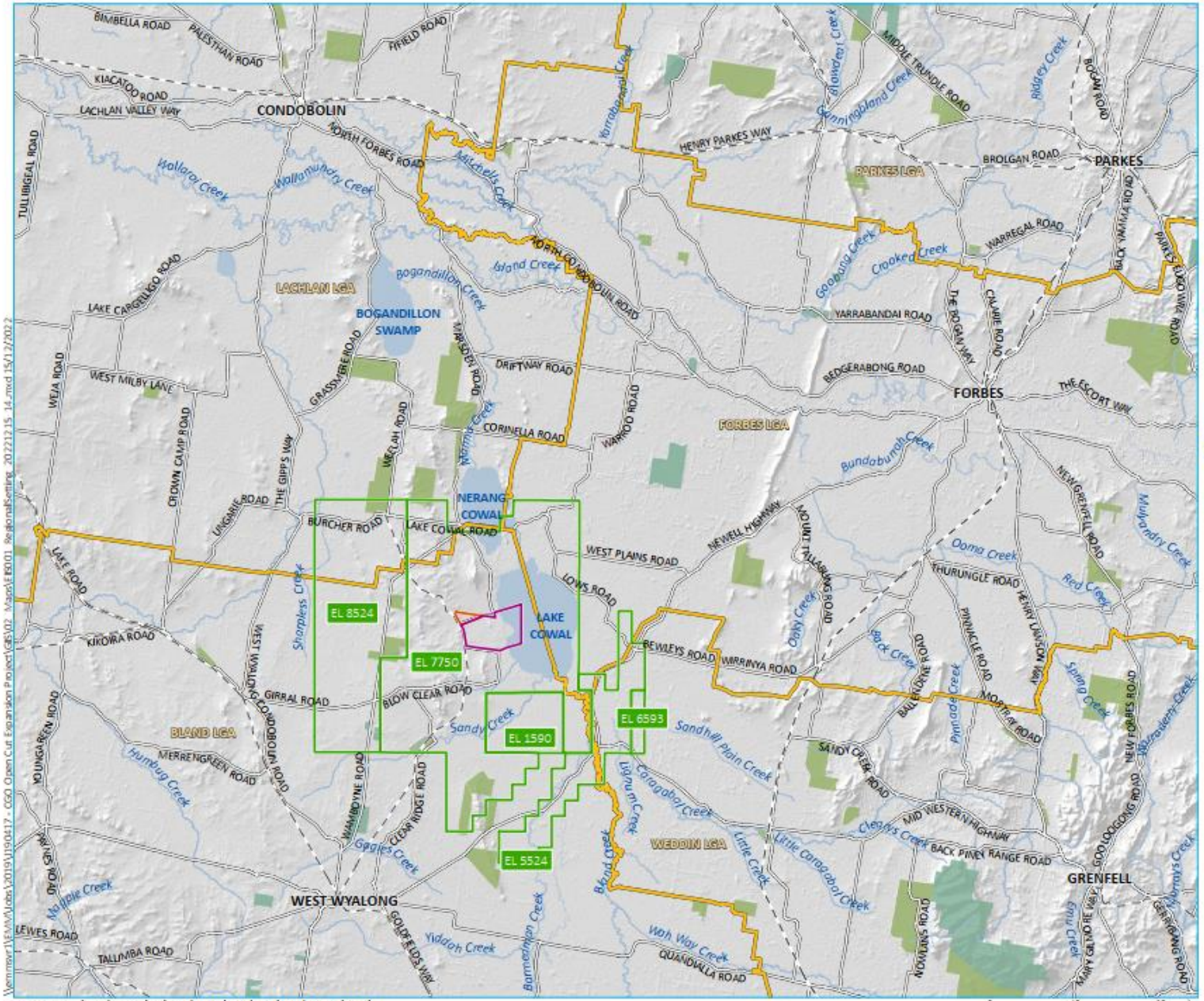
2.1. CGO BACKGROUND

The CGO is a gold-silver mine owned and operated by Evolution and is located approximately 38 kilometers (km) north-east of West Wyalong, NSW (Figure 1). The land immediately adjacent to and surrounding the CGO consists of Lake Cowal and farming land (Figure 2 shows the land tenure of properties in the vicinity of the CGO). A satellite image of the CGO was captured in February 2023 and is presented on Figure 3, which also presents the current operational disturbance footprint and general arrangement of the CGO components. Land preparation areas and the extent of rehabilitation during the reporting period is presented on Figure 4, while the offset areas are presented on Figure 5. Further information relating to rehabilitation and offset areas are provided in Section 6.8 and 8 respectively.

North Limited (North, 1998) commenced exploration along the western side of Lake Cowal in 1981. From 1981 to 1994, exploration was concentrated on the Endeavour 42 (E42) ore body to increase the size and confidence of the Resource by infill and deep drilling.

North received Development Consent for the Cowal Gold Project in February 1999. North was later acquired by Rio Tinto which subsequently sold the Cowal Gold Project to Homestake Australia Limited (Homestake). Homestake commenced advanced drilling on E42 in late 2001. In December 2001, Barrick (Cowal) Pty Ltd (Barrick) acquired Homestake and its operating subsidiary. Barrick continued the drilling program of the E42 ore body between 2001 and 2005. During 2003 and 2004, the CGO underwent a detailed design phase and construction commenced on 12 January 2004. Mining operations commenced in April 2005, followed by operation of the final stage of the open pit dewatering system in June 2005. Processing operations commenced in April 2006. Evolution acquired Cowal on 24 July 2015.

In 2020, Evolution submitted State Significant Development application 10367 to DPE for assessment. On 30 September 2021 the DPE granted approval for SSD 10367 approving underground mining at the Cowal Gold Operation. On 7 November 2022, Modification 1 (MOD 1) of SSD 10367 was approved, with minor amendments to the mine design footprint.



KEY

- Mining lease (ML1535)
- Mining lease (ML1791)
- Exploration licence (EL)
- Rail line
- Main road
- Named watercourse
- Named waterbody
- Local government area
- NPWS reserve
- State forest

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Figure 1
CGO Locality

Evolution MINING

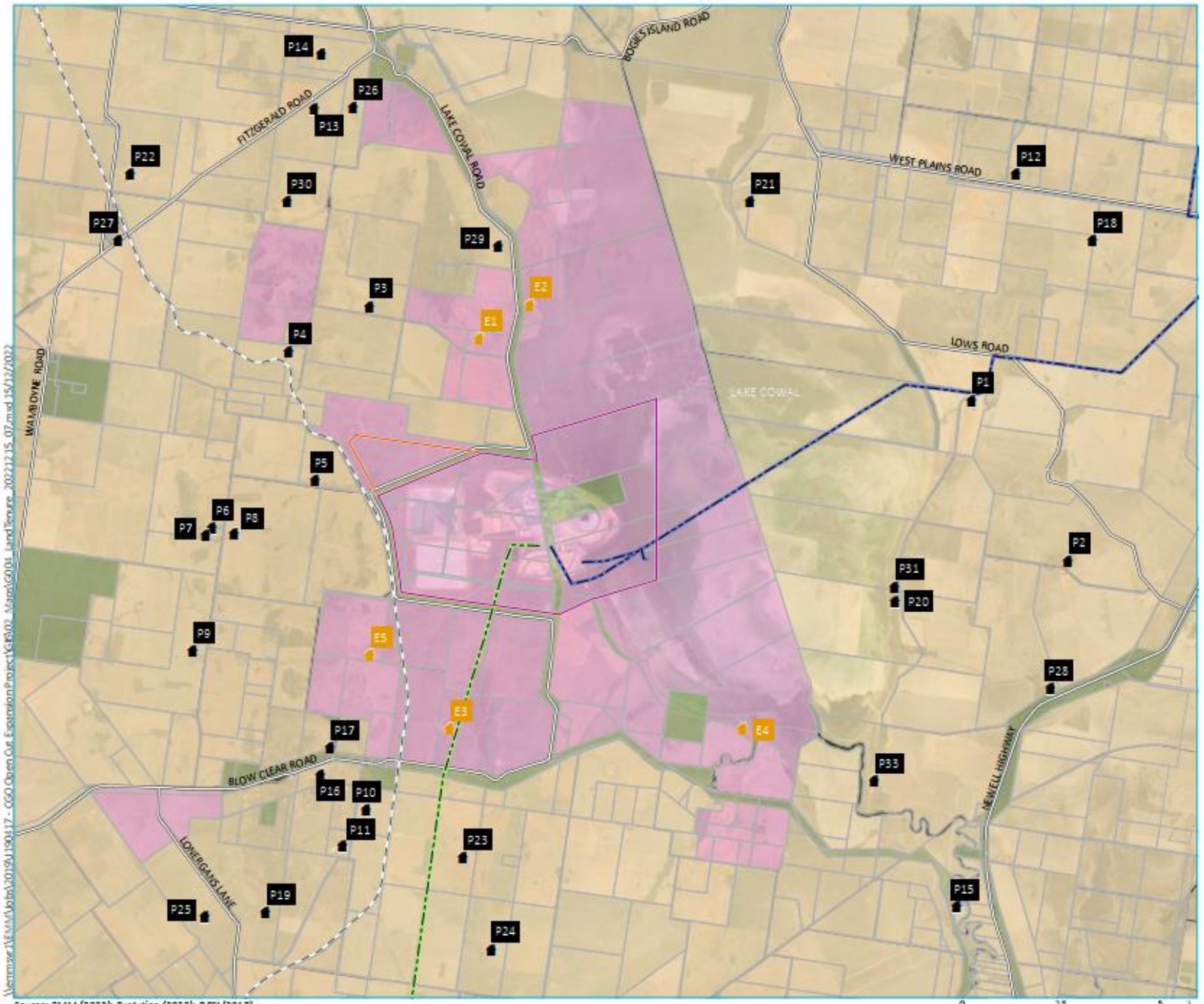

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Figure 2
Land Tenure

Evolution MINING

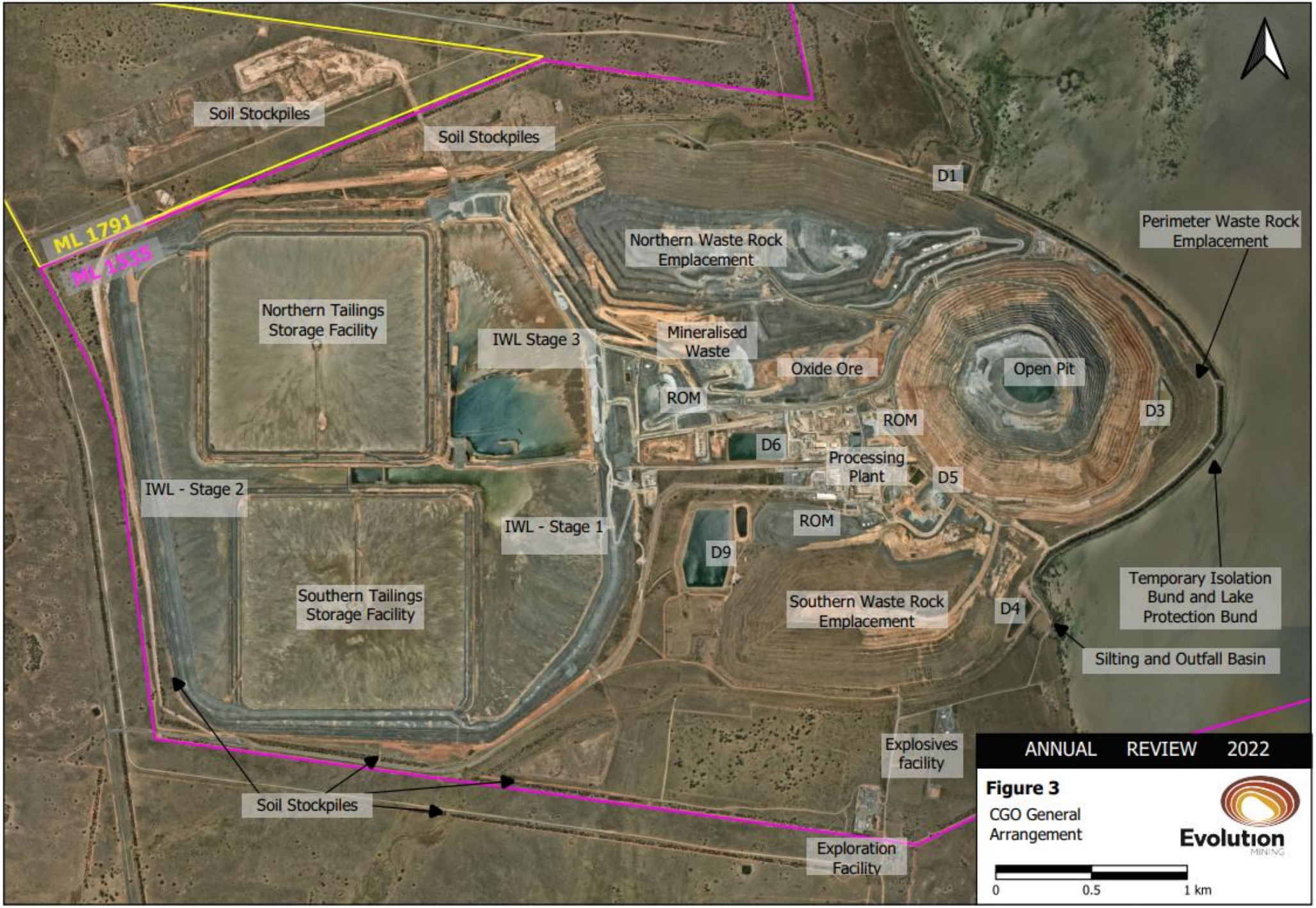
Soil Stockpiles
Soil Stockpiles
ML 1791
ML 1535
Northern Tailings Storage Facility
IWL Stage 3
Northern Waste Rock Emplacement
D1
Perimeter Waste Rock Emplacement
Mineralised Waste
Oxide Ore
Open Pit
ROM
ROM
D3
D6
Processing Plant
D5
IWL - Stage 2
IWL - Stage 1
ROM
D9
Southern Tailings Storage Facility
Southern Waste Rock Emplacement
D4
Temporary Isolation Bund and Lake Protection Bund
Silting and Outfall Basin
Explosives facility
Soil Stockpiles
Exploration Facility
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Figure 3
CGO General Arrangement
Evolution MINING
0
0.5
1 km


ML 1791
ML 1535
Rehabilitation Progress
Landform Establishment
Ecosystem and land use establishment
Ecosystem and land use development
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Figure 4
Areas under partial rehabilitation
Evolution MINING
0
0.5
1 km


Proposed Offset Area 3
Northern Offset Area 2
RVEP Area 2
RVEP Area 1
RVEP Area 3
Proposed Offset Area 6
Southern Offset Area 1
RVEP Area 4
Biodiversity Areas
Remnant Vegetation Enhancement Program Areas
Existing Offset Areas
Proposed Offset Areas
ANNUAL REVIEW 2022
Figure 5
Location of Offset and RVEP Areas
Evolution
0
1.5
3 km

2.2. MINE CONTACTS

Contact details for key Evolution employees at the CGO are provided below:

John Penhall
General Manager
Telephone: (02) 6975 4708
Email: John.Penhall@evolutionmining.com

Shaune Finn
Sustainability Manager
Telephone: 0408 549 406
Email: shaune.finn@evolutionmining.com

Tammy Rawson
Senior Environmental Advisor
Telephone: 0418 672 137
Email: tammy.rawson@evolutionmining.com.au

The street and postal addresses for the CGO are provided below:

Street Address
Lake Cowal Road
LAKE COWAL NSW 2671

Postal Address
PO Box 210
WEST WYALONG NSW 2671

3. APPROVALS

3.1. CURRENT LIST OF CONSENTS, LEASES, LICENCES AND PERMITS

The key consents, leases, licences and permits under which the CGO operates (relevant to the reporting period) are presented in Table 2. Any applicable changes to these approvals during the reporting period are also outlined in Table 2.

Table 2: Key Consents, Leases, Licences and Permits

Instrument	Relevant Authority	Date of Grant	Expiry Date	Last Issue Date	Changes During ARPeriod
EPBC 2017/7989	DAWE	5/02/2019	31/12/2032	05/02/2019	Nil
Development Consent(DA 14/98)	DPE	26/02/1999	31/12/2040	30/09/2021	Nil
State Significant Development (SSD 10367)	DPE	30/09/2021	31/12/2040	7/11/2022	MOD 1 granted – UG Optimisation
Development Consent (DA2011/64) (Eastern Saline Bore field [ESB])	FSC	20/12/2010	Life of ML	2010	Nil
Mining Lease (ML 1535)	DRG	13/06/2003	13/06/2024	31/08/2022	Inclusion of new standard conditions on mining leases
Mining Lease (ML 1791)	DRG	20/06/2019	20/06/2040	31/08/2022	Inclusion of new standard conditions on mining leases
Environment Protection Licence (EPL 11912)	EPA	23/12/2003	N/A	09/06/2022	Update of monitoring locations and alignment with DA 14/98 (MOD16) and SSD 10367
Permit #1361 under section 87(1) of the NPW Act	OEH	23/05/2002	Life of ML	2002	Nil

Consent #1467 under section 90 of the NPW Act	OEH	31/03/2022	31/12/2040	31/03/2022	Extension of mine life updated
Permit #1468 under section 87(1) of the NPW Act	OEH	31/03/2022	31/12/2040	31/03/2022	Extension of mine life updated
Consent #1680 under section 90 of the NPW Act	OEH	28/07/2003	Life of ML	31/12/2040	Extension of mine life updated
Permit #1681 under section 87(1) of the NPW Act	OEH	28/07/2003	Life of ML	31/12/2040	Extension of mine life updated
AHIP number: C0004570	OEH	27/06/2019	31/12/2032	27/06/2019	Nil
Care Agreement C0004976	OEH	01/07/2019	31/12/2032	01/07/2019	Nil
Bland Creek Paleochannel (BCPC) bore field. Water Access Licence (WAL)31864 Water supply work approval 70WA614076	DI-Lands &Water	14/09/2012	13/9/2025	2015	Nil
Eastern Saline Bore field WAL 36569 Water supply work approval 70WA614933	DI-Lands &Water	10/06/2011	09/06/2026	20/11/2020	Nil
Saline groundwater supplybore field within ML 1535 WAL 36615 Water supply works approval 70WA614090	DI-Lands & Water	21/03/2014	13/09/2025	13/09/2015	Nil
Pit dewatering WAL 36615 Water supply works approval 70WA614090	DI-Lands & Water	21/03/2014	13/09/2025	13/09/2015	Nil
Pit dewatering WAL 36617 Water supply works approval 70WA614090	DI-Lands & Water	21/03/2014	13/09/2025	13/9/2015	Nil
Monitoring and test bore licences	DI-Lands & Water	Various	Various	2015	Nil
High Security Title WAL13749	DI-Lands & Water	21/12/2006	Life of ML	21/12/2006	Nil
High Security Title WAL14981(80 Units)	DI-Lands & Water	15/09/2011	Life of ML	15/092011	Nil
General Security WAL13748	DI-Lands & Water	21/12/2006	Life of ML	21/12/2006	Nil
Lake Cowal pipeline and Temporary Isolation Bund and Lake Protection Bund structures Water Supply Works Approval614805	DI-Lands & Water	12/01/2010	13/9/2025	13/9/2015	Nil

DPE: NSW Department of Planning and Environment.

DI-Lands & Water: Department of Industry – Lands & Water.

DRG: Division of Resources and Geoscience – within the Department of Planning and Environment

EPA: NSW Environmental Protection Authority.

FSC: Forbes Shire Council.

NPW Act: NSW *National Parks and Wildlife Act 1974.*

OEH: NSW Office of Environment and Heritage.

3.2. STATUS OF ENVIRONMENTAL MANAGEMENT PLANS REVIEW

Several Environmental Management Plans (EMPs) were approved by the DPE during the reporting period. Management plans have been reviewed following the approval of SSD and MOD 1, relevant management plans have been updated and submitted via the Major Projects planning portal.

4. OPERATIONS SUMMARY

4.1. MINING AND PROCESSING OPERATIONS

During the reporting period, mining operations from the E42 open pit and underground continued as per relevant approvals outlined in Section 3.1. The processing plant also operated as per all relevant approvals. A summary of key production statistics for the reporting period are provided in Table 3 below.

Table 3: Production Summary

Material	Approved Limit	2018 AR	2019 AR	2020 AR	2021 AR	2022
Ore (t)	N/A	7,119,947	3,963,558	2,183,946	6,841,017	13,718,828
Mineralised Waste (t)	N/A	670,907	638,904	915,622	821,296	1,193,243
Waste Rock (t)	N/A	24,404,148	13,807,518	16,812,132	14,200,057	8,965,813
Northern Waste Rock Emplacement (NWRE) (m AHD)	308[1]	268[3]	268	288		308
Southern Waste Rock Emplacement (SWRE) (m AHD)	283[1]	278	283	283	283	283
Perimeter Waste Rock Emplacement (PWRE) (m AHD)	233[1]	209	223	223	223	223
Waste rock for use as gravel road base (t per year)	150,000	N/A	N/A	102,470	43,717	56,616
Tailings Storage Facilities (TSFs)/ Integrated Waste Landform						
Northern TSF (NTSF) (m AHD)	264[1]	236	240.5	240.5	240.5	240.5
Southern TSF (STSF) (m AHD)	272[1]	243.7	243.7	248.4	248.4	248.4
Integrated Waste Landform (IWL) (m AHD)	246	Under Construction	Under Construction	233	239	243
Mill Throughput (Mtpa)	7.5[2]	7.94	8.36	8.31	8.72	8.64
Saleable Product (oz)	N/A	244,217	270,492	231,133	217,429	240,255

[1] Development Consent Condition 1.2(c). Following approval of MOD16 on 30 September 2021

[2] Development Consent Condition 1.2(b).

t – tonne; m AHD – metres Australian Height Datum; Mtpa – million tonnes per annum; Oz – ounce.

4.1.1. Mining

Mining of the open pit during 2022 occurred in Stage H exclusively. Mining in Stage H occurred from Relative Level (RL) 958 metres (m) to RL 885 metres, representing a vertical advance of 73 metres.

Vertical dewatering systems were maintained throughout the reporting period. Horizontal holes were drilled as mining progressed through Stage H in order to de-pressurise specific areas from January to December 2022.

Waste rock mined from the open pit where appropriate was sent to the IWL, any remaining waste was stockpiled on the North Waste emplacement or used on outer slope rehabilitation.

Waste mined from the South East Oxides where appropriate was sent to the IWL, any remaining was sent to either the Southern Waste Emplacement, or the clay stockpile for later use in the IWL.

Mining operations will continue in Stage H during the 2023 reporting period.

4.1.2. Processing

Processing continued throughout the reporting period. No changes to the processing operation took place during the reporting period.

Completion of stage 2 construction on the IWL occurred at the start of October 2021, with commissioning and deposition commencing on the 15th of that month. Construction of the IWL stage 3 was completed in the reporting period. Deposition into stage 2 of the IWL was completed for the current augmentation at the start of Oct 2022, with Stage 3 deposition commencing immediately after.

In accordance with Development Consent Condition 5.3(a), cyanide levels in the aqueous component of the tailings slurry stream did not exceed 20 mg cyanide weak acid dissociable per litre (CN_{WAD}/L) (90 percentile over six months) and exceeded the permissible limit of 30 mg CN_{WAD}/L (maximum permissible limit at any time at the process plant) only once during the reporting period. Immediate action was taken to shut down the plant to ensure that no environmental harm resulted. This is covered in detail in section 6.6.

Processing operations will continue in 2023, including general process improvements

4.2. EXPLORATION

Exploration activities within ML 1535 undertaken during the reporting period included exploration and Resource development drilling within and surrounding the main E42 open pit and proximal deposits, including Endeavour 46, Galway/Regal and Endeavour 41 deposits.

A total of approximately 160,919m of drilling was completed within ML1535 during the reporting period including:

- A total of 2,946 holes for 82,068m in-pit RC drilling
- A total of 437 holes for 71,155.15m diamond drilling
- A total of 3 holes for 444m RC drilling
- A total of 15 holes for 301m Auger drilling

With the exception of the in-pit RC drilling, all holes were progressively rehabilitated. Cuttings were returned to Auger and RC holes, and diamond holes were fully cement grouted. Land disturbance within ML 1535 was minimal as a result of the exploration activities, and rehabilitation of the drilling areas was undertaken on completion of each program.

Exploration and Resource development drilling are expected to continue within ML 1535 throughout 2023 and is outlined in the currently approved Rehabilitation Reform. Further Geotechnical and Underground drilling is proposed to be undertaken during 2023.

4.3. HAZARD AUDIT

The triennial hazard audit was conducted in field from 17-19 May and the remote component was completed by 27 May 2022. The final report was provided to the Department on 27 May 2022. All actions arising for the audit were closed out by the 27th of February 2023. Next Hazard audit is scheduled to occur in 2025 and will be reported on in the proceeding AR.

5. ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

No additional directions were given by the administering department for the 2022 Annual Review.

6. ENVIRONMENTAL PERFORMANCE

Environmental management at the CGO during this reporting period has been conducted in accordance with EMPs prepared by CGO, required under Development Consent.

Overall Performance against Licences, Approvals and Environmental Management Plans and Effectiveness of Environmental Management

Evolution has fully complied in this reporting period with commitments in Resources Regulator (formerly DRG/DRE) approved and updated MOPs.

The EPL 11912 Annual Return for the 23 December 2021 to 22 December 2022 reporting period was submitted to the EPA via the portal on 23 February 2023. Historical returns and any associated non-compliances can be found on the EPA website at: http://www.epa.nsw.gov.au/prpoeoapp/.

Evolution has relevant project management systems, staffing and independent consultancy arrangements in place to be in a position of confidence regarding compliance with all relevant licences, approvals and EMPs. Evolution expects to undertake CGO activities for the next reporting year in accordance with all relevant licences, approvals and EMPs. Section 6 discusses the management objectives and targets for CGO during this and the next reporting period.

Overall, due to Evolution's substantial compliance with EMPs, environmental management for CGO during the reporting period is considered highly effective.

6.1. AIR QUALITY

Development Consent Condition 6.1(a) details air quality impact assessment criteria against which air quality monitoring results are compared for CGO. As required Development Consent Condition 6.1(c) the CGO Air Quality Management Plan (AQMP) has been prepared, submitted and approved by DPIE (18 February 2016).

Monitoring and management of air quality and meteorology during this reporting period was undertaken in accordance with relevant Development Consent conditions, the approved AQMP and EPL 11912.

Evolution reported to the National Greenhouse and Energy Reporting Scheme and National Pollutant Inventory for CGO during this reporting period.

6.1.1. Environmental Management

6.1.1.1. Control Strategies

Air quality safeguards and control strategies were implemented at CGO during the reporting period to minimise dust emissions from mining activities and exposed areas in accordance with Development Consent conditions, approved AQMP and EPL 11912. These control strategies are summarised in Table 4.

Table 4: Air Quality Safeguards and Control Strategies Implemented during Reporting Period

Source	Control Strategies
Disturbed Surfaces	• Disturbed surfaces were watered using water trucks to suppress dust.
Access Roads	• Access roads were watered and regularly maintained. • A dust suppressant chemical (PetroTac) was applied to unsealed roads around the general administration and processing plant area to reduce dust generation. • Site access routes are clearly marked, and workplace inductions specify routes. • Speed of vehicles travelling on unsealed surfaces is restricted.
Soil Stripping	• Access tracks used for soil stripping during loading and unloading cycle were watered. • Soil stripping was limited to areas required for future mining operations.

6.1.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.1.1.3. Variations from Proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.

6.1.2. Environmental Performance – Air Quality

6.1.2.1. Monitoring

6.1.2.2. Meteorological Monitoring

CGO's Automatic Weather Station (AWS) meteorological station, located near the southern ML 1535 boundary, collected meteorological data throughout the reporting period. The station measures real-time wind speed and direction, standard deviation of wind direction, temperature (2 m, 10 m), barometric pressure, humidity, solar radiation and rainfall. The CGO AWS is supported by quarterly independent maintenance and calibration, and provides daily summary reports and automatic alerts.

Monthly total rainfall measured at CGO AWS is shown in Table 5. Total annual rainfall for 2022 reporting period was 745.6 millimetres (mm). Other parameters recorded by CGO AWS meteorological station during the reporting period are presented in Table 6 and Figure 6a. Annual and seasonal wind roses from CGO AWS are presented in Figures 6b and 6c.

Atmospheric stability refers to the degree of turbulence or mixing that occurs within the atmosphere and is a controlling factor in the rate of atmospheric dispersion of dust from mining operations (Zephyr Environmental, 2023). Highly stable conditions lead to poor dispersion while unstable conditions enable more effective dispersion of pollutants.

Atmospheric stability for 2022 has been calculated using the AWS meteorological data collected, and Graph 1 presents the diurnal variation in atmospheric stability at Cowal. The profile shows that atmospheric instability increases during the daylight hours as the sun generated convective energy increases, whereas stable atmospheric conditions prevail during the night-time. This profile indicates that potential for effective atmospheric dispersion of emissions would be greatest during day-time hours and lowest during evening through to early morning hours (Zephyr Environmental, 2023).

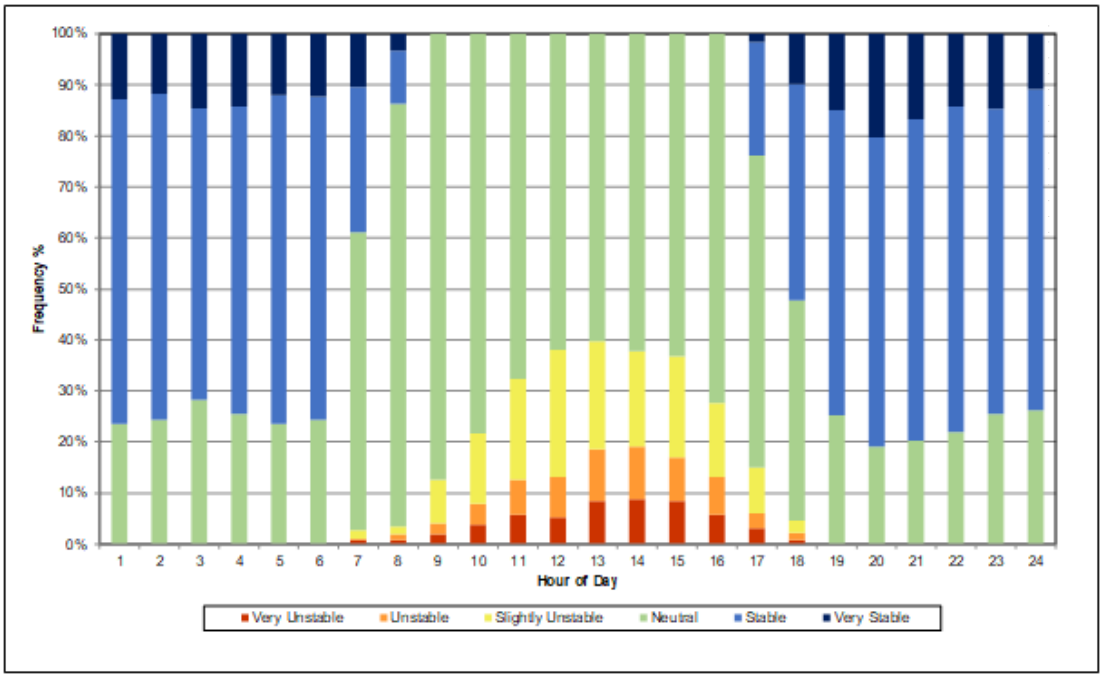
Table 5: Monthly Rainfall Measured at CGO AWS 2011 – 2022

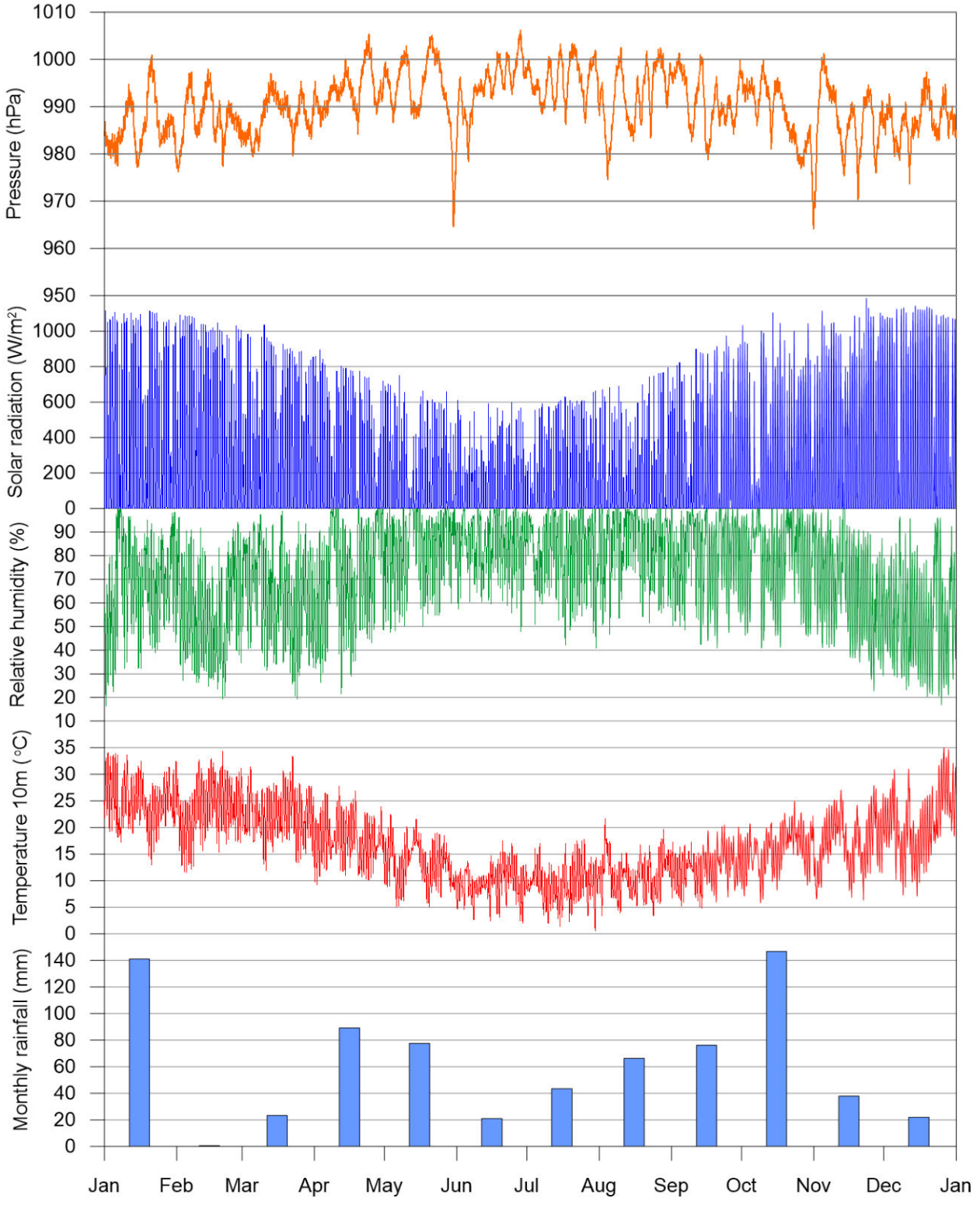
Month	2011 (mm)	2012 (mm)	2013 (mm)	2014 (mm)	2015 (mm)	2016 (mm)	2017 (mm)	2018 (mm)	2019 (mm)	2020 (mm)	2021 (mm)	2022 (mm)
January	24.4	26.6	5.2	32	75.8	67	24.8	21	24.8	18.8	57.2	141
February	138.6	129.2	26	23.2	11	1.4	8.6	3.6	31.8	61.0	54.4	0.6
March	146.2	78	45.4	71	0.4	16.8	45.4	1.2	57.4	56.4	127.6	23.4
April	20.2	15.6	3.4	20.2	56.8	11.4	18.6	7.8	0	126.8	0	89.2
May	22	32.6	30.4	21.2	12.8	61.8	31	22	19.8	15.2	28	77.6
June	29.4	29.6	87.8	59.4	27.2	122.6	7.6	40	21.2	34.2	112.8	21
July	11.8	49.8	33.4	9	77.2	72.6	27.8	2.2	9	41.6	45.4	43,6
August	41.8	19	18.8	10.8	49	31.2	22.4	4.4	10.2	52.0	19.2	66.4
September	13.8	25	60.4	16.8	8.6	136.8	0.8	4.2	5	29.0	44.2	76.2
October	31	16	7.2	15.2	52.6	28.8	38	30.4	8.6	51.4	26.2	146.8
November	130.4	36.4	9	1.6	24.6	28	50.6	38	13.2	33.2	153	37.8
December	135	27	14.6	48.4	19.2	24.8	123.8	24.8	1.6	44.8	30.4	22.0
TOTAL	**744.6**	**484.8**	**341.6**	**328.8**	**415.2**	**603.2**	**399.4**	**199.6**	**202.6**	**564.4**	**698.4**	**745.6**

Table 6: Monthly Average Meteorological Data (2022)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Humidity (%)	67.2	55.1	63.8	61.8	77.6	84.9	81.9	85.2	79.9	80.03	66.2	54.1
Mean Pressure (mbar)	986.0	987.7	987.9	993.6	993.7	994.8	995.8	992.3	991.4	988.3	987.3	987.0
2m Temp Min (°C)	12.5	11.1	11.6	5.9	3.2	0	-1.4	0	2.8	3.5	4.8	5.8
2m Temp Max (°C)	34.6	35.2	34.2	28.4	22.9	17.8	17.9	22.1	21.1	25.4	35.4	35.4

Graph 1: Diurnal variation in stability for CGO during 2022

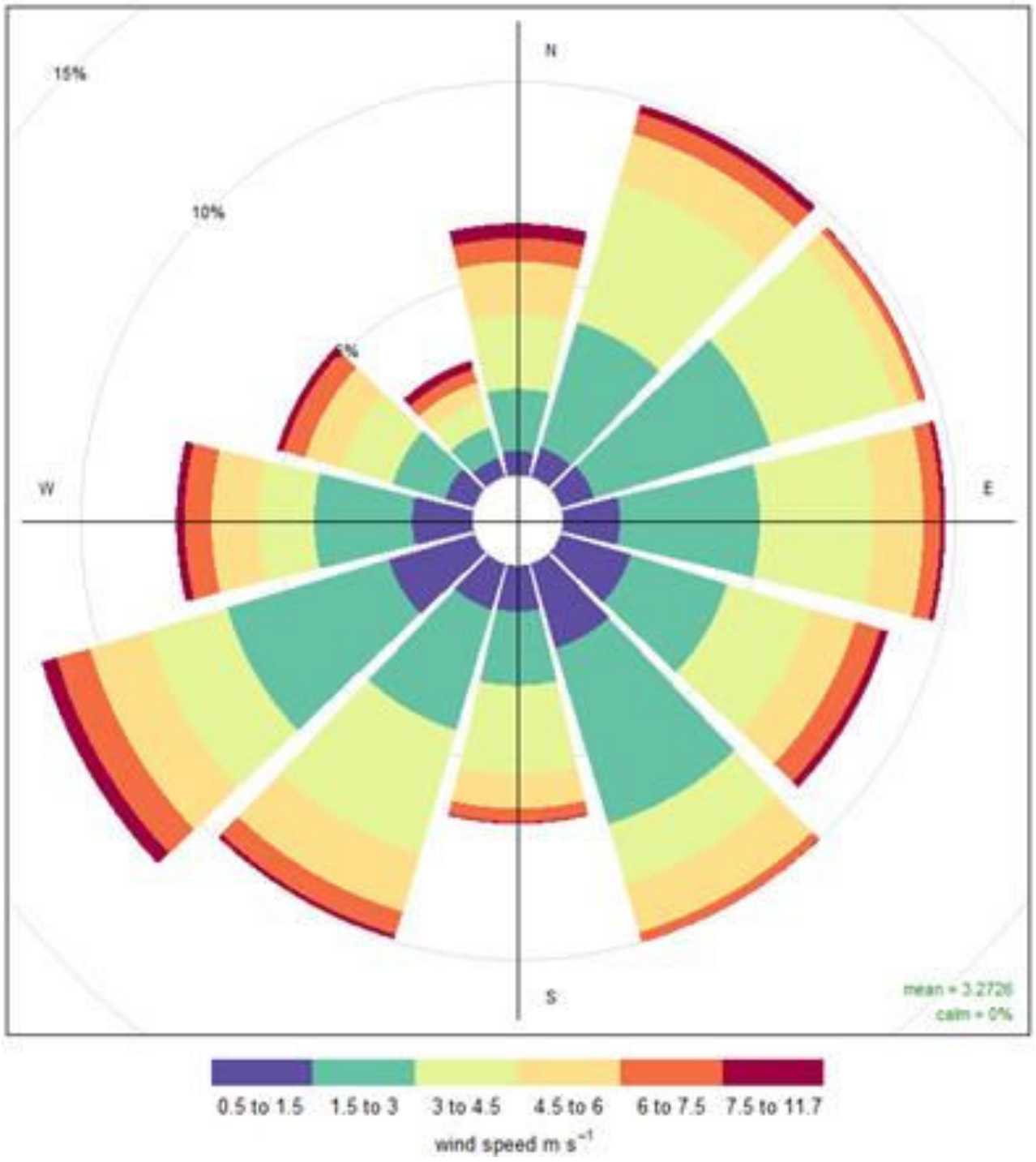




Source: Zephyr Environmental (2023)

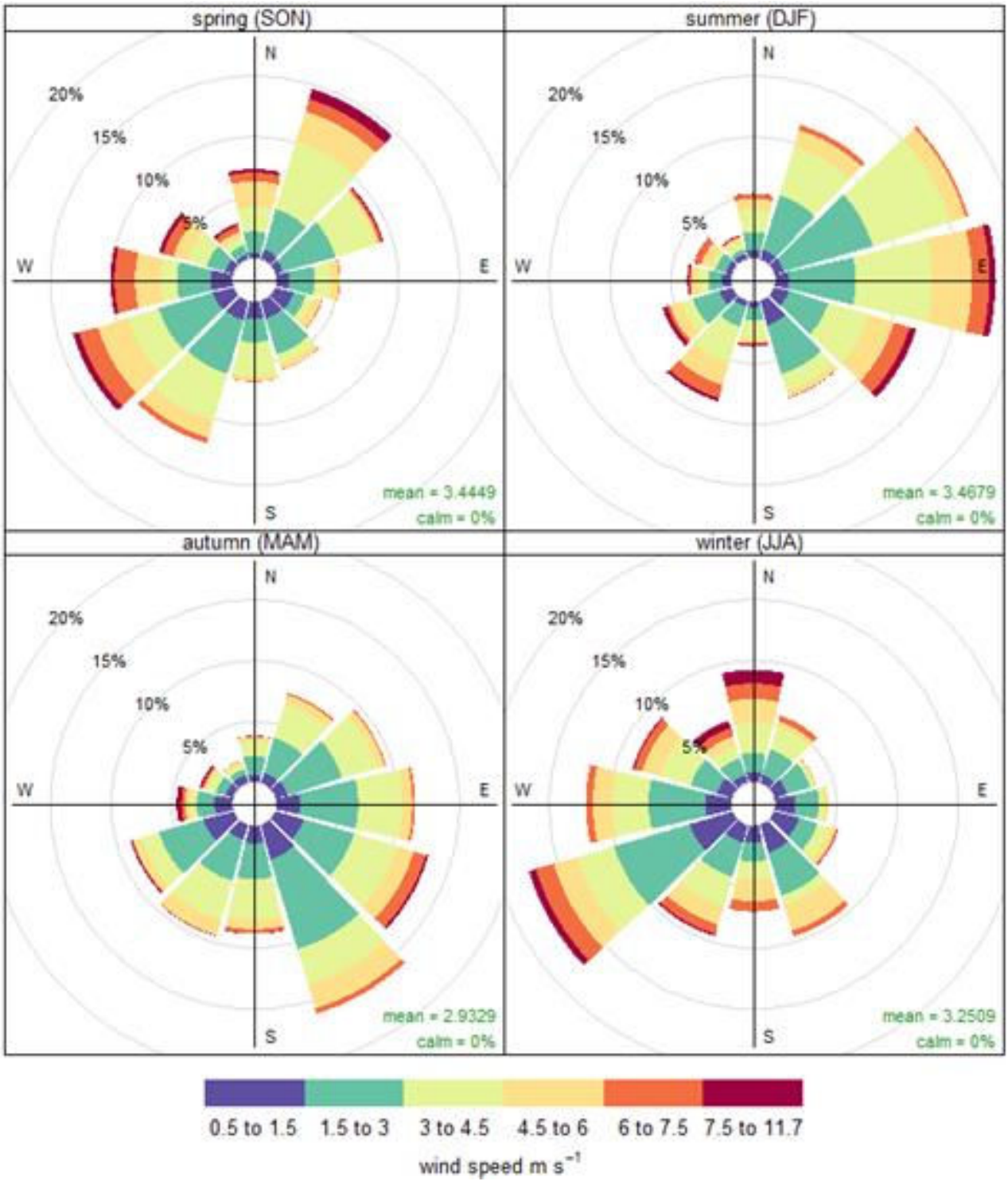
FIGURE 6a
Annual Meteorological Summary for 2022

Evolution MINING Cowal



Source: Zephyr Environmental (2023)

FIGURE 6b
Annual Wind Rose for 2022



Source: Zephyr Environmental (2023)

FIGURE 6c
Seasonal Wind Roses for 2022

6.1.2.3. Air Quality Monitoring

During the reporting period, dust monitoring was carried out in accordance with the AQMP utilising depositional (static or gravimetric) and high-volume Total Suspended Particulate (TSP) sampling equipment.

The high-volume air sampler (HVAS) was used throughout 2022 to obtain measurements of suspended solids approximately every 7 days. The HVAS collects suspended particles with diameters less than approximately 50 µm. This enables determination of dust concentrations in units of mass per cubic metre (µg/m3). The HVAS monitor is located at a company owned residence near CGO (Coniston). The TSP criteria adopted by the EPA were recommended by the National Health and Medical Research Council of Australia as the maximum permissible level of TSP in air to protect public health in residential environments.

There is also a BAM co-located with the HVAS that measures PM10 continuously, together with wind speed and wind direction. PM10 assessments are based on values inferred from TSP measurements, which is consistent with the approach utilised in historical Annual Reviews. PM2.5 monitoring requirements were also introduced during 2021, with the approval of MOD 16 (DA 14/98). Like PM10, PM2.5 is not measured directly but is inferred from TSP. An HVAS with a PM2.5 head will be co-located with the TSP HVAS to carry out direct measurements of PM2.5 prior to the commencement of underground production.

A network of static dust deposition gauges was used throughout 2022 to collect monthly dust samples. The dust gauges are located at varying distances and directions from the CGO open pit (Figure 7). A number of gauges are situated near homesteads of properties that adjoin the mine site, and a number are near areas of ecological importance (i.e. Lake Cowal). Two duplicate dust gauges are installed near pre-existing dust gauges (DG1 and DG13), with dust samples collected and analysed quarterly for metal concentrations. Quarterly dust gauges allow for a longer sampling period and a larger sample size for analysis and are used to compare and verify monitoring results against monthly CGO dust monitoring programme. There was also duplicate sampling carried out at two gauges, DG1 Test and DG9 Test, which are co-located with DG1 and DG9, to understand the variability between samples taken at the same location.

6.1.2.4. Air Quality Impact Assessment Criteria

Table 7 details long-term impact assessment criteria for deposited dust for any residence on privately-owned land, as required by Development Consent Condition 6.1(a).

Table 7: Long-term Impact Assessment Criteria for Deposited Dust

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Deposited dust[1]	Annual	2 g/m²/month[2]	4 g/m²/month[3]

1 Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: *Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.*

2 Incremental impact (i.e. incremental increase in concentrations due to the development on its own).

3 Cumulative impact (i.e. incremental increase in concentrations due to Cowal Gold Operations plus background concentrations due to all other sources).

Table 8 and Table 9 detail the long–term and short-term impact assessment criteria for TSP, particulate matter less than (<) 10 µm (PM10) and <2.5 µm (PM2.5) for any residence on privately-owned land as required under Development Consent Condition 6.1(a).

Table 8: Long-term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion [1]
Total suspended particulate (TSP) matter	Annual	90 µg/m³ [2]
Particulate matter < 10 µm (PM_{10})	Annual	25 µg/m³ [2]
Particulate matter < 2.5 µm ($PM_{2.5}$)	Annual	8 µg/m³ [2]

1 Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

2 Cumulative impact (i.e. incremental increase in concentrations due to Cowal Gold Operations plus background concentrations due to all other sources)

Table 9: Short-term Impact Assessment Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion [1]
Particulate matter < 10 µm (PM_{10})	24 hours	50 µg/m³ [2]
Particulate matter < 2.5 µm ($PM_{2.5}$)	24 hours	25 µg/m³ [3]

[1] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

[2] Cumulative impact (i.e. incremental increase in concentrations due to Cowal Gold Operations plus background concentrations due to all other sources).

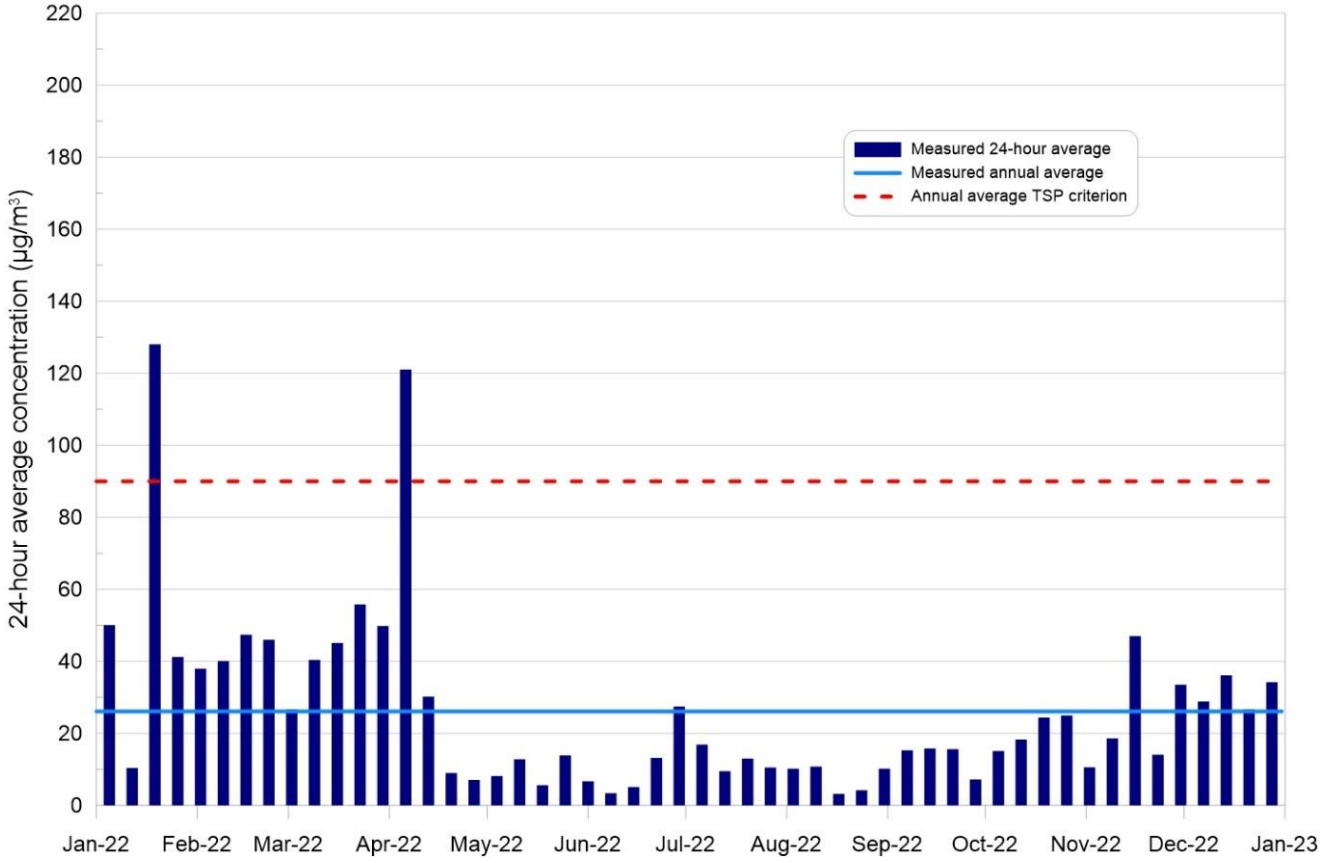
[3] Incremental impact (i.e. incremental increase in concentrations due to the development on its own).

6.1.2.5. Performance Outcomes

6.1.2.6. Total Suspended Particulates

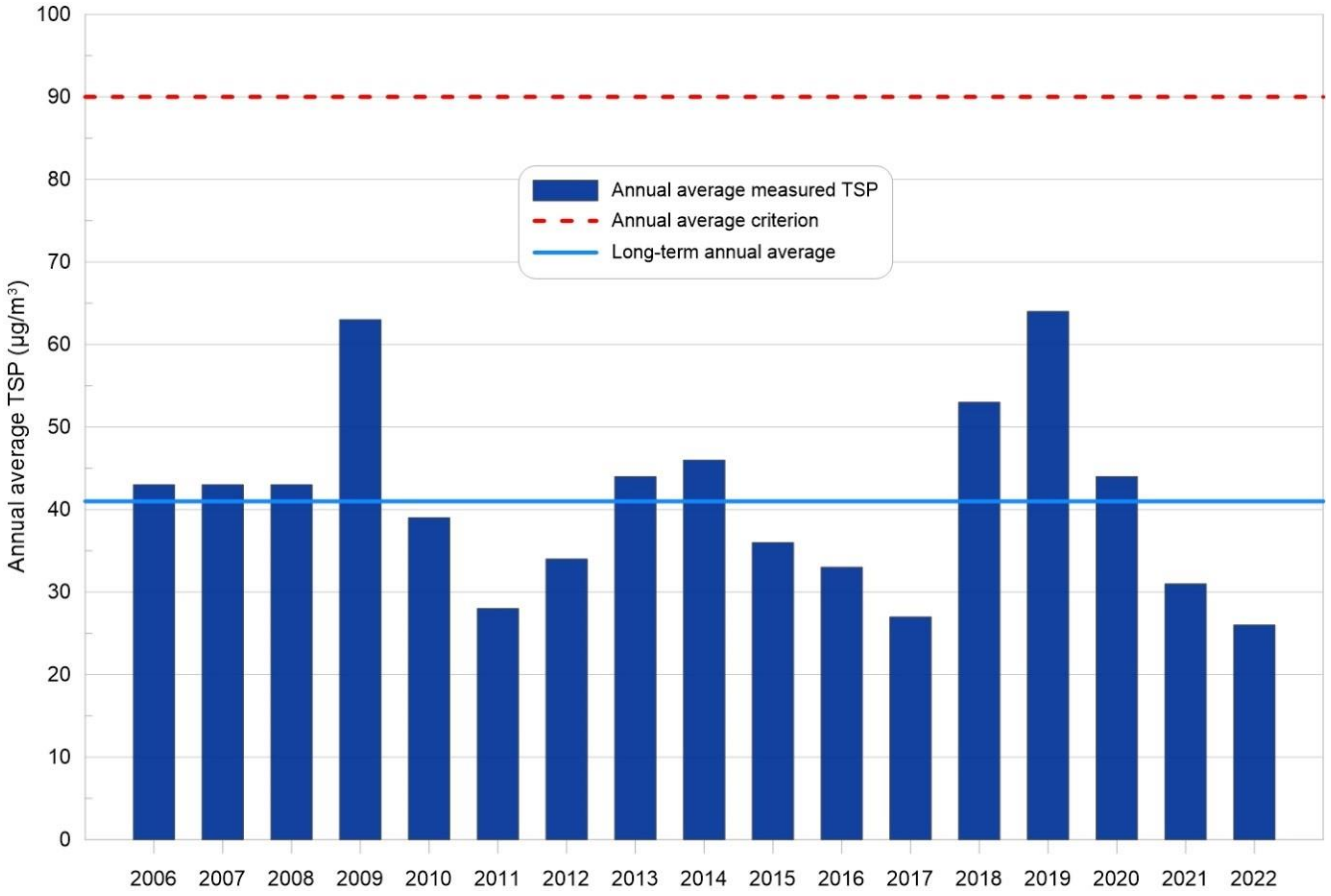
Measurements of TSP, taken by the HVAS on a (generally) seven-day cycle, are shown below in Graph 2. While there are individual elevated concentrations, annual average calculated from 52 measurements (26.1 µg/m3) was well below annual average TSP criterion of 90 µg/m3. The two elevated measurements were 128 µg/m3, measured on 19 January, and 121 µg/m3, measured on 6 April. High winds on both days are considered to have elevated regional dust generation from a range of sources.

Graph 2: TSP masses measured at Coniston Homestead during 2022.



Historical annual average TSP measurements from 2006 to 2022 are displayed in Graph 3. The annual averageTSP concentrations for 2022 are not only below the assessment criterion, but also well below the long-term averagefor the site of 41 µg/m3. This indicates that annual concentrations are influenced by external factors, such as drought, with high annual averages in years following significant drought (2009 and 2019), and much lower concentrations in wetter years (2021 and 2022).

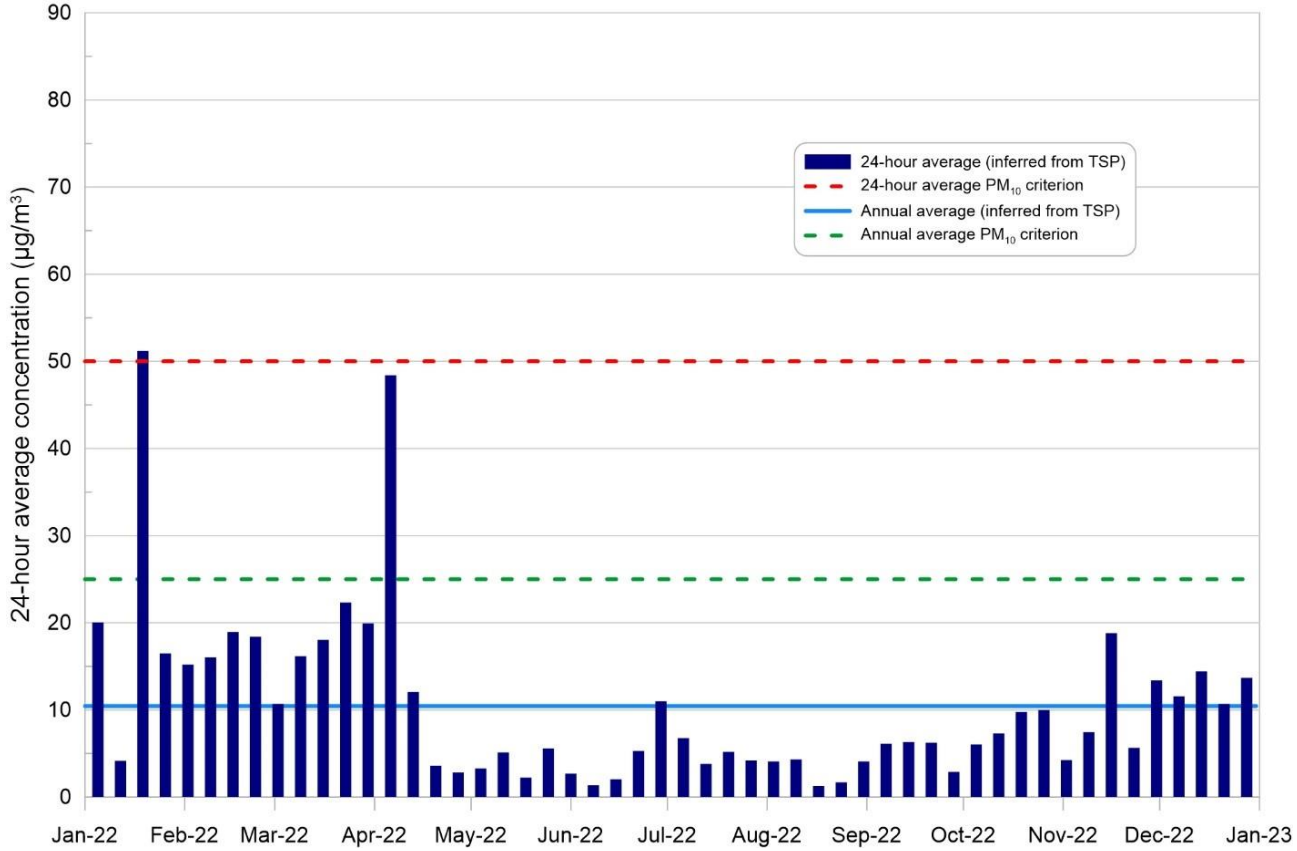
Graph 3: Annual average TSP concentrations – 2006 to 2022



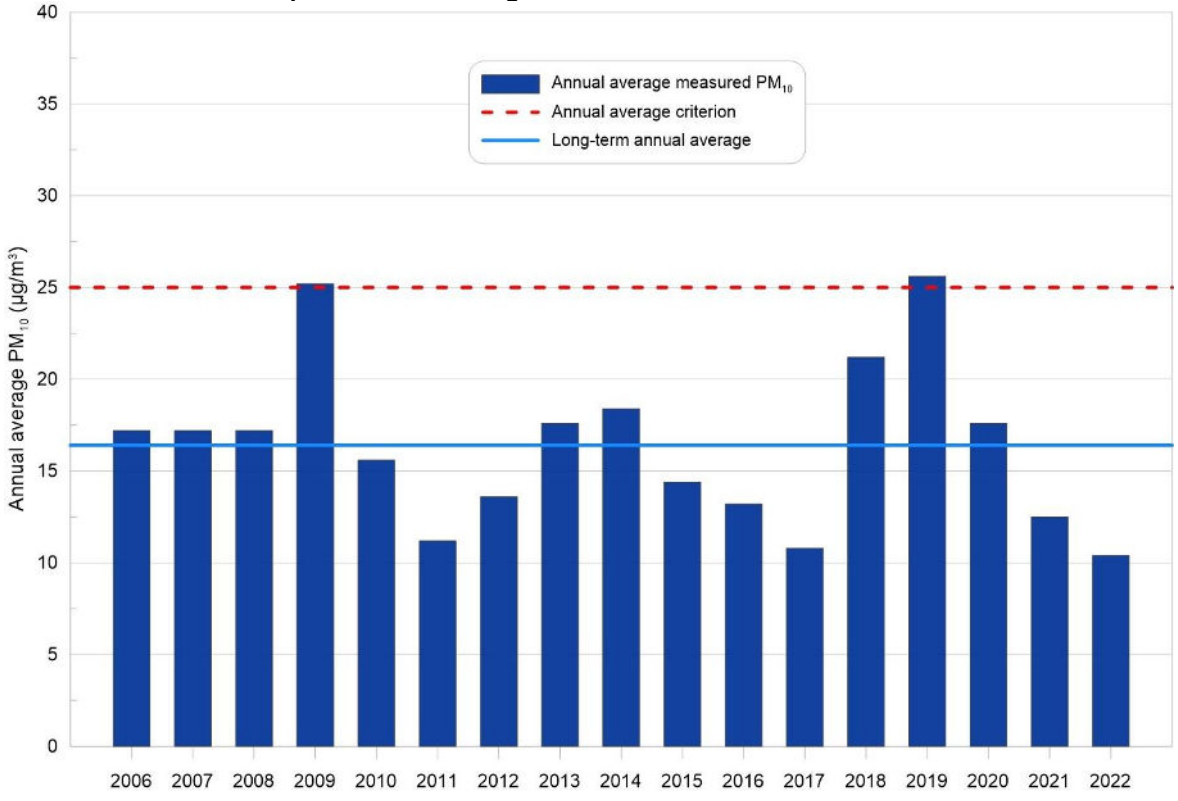
6.1.2.7. Particulate matter < 10 µm (PM_{10})

As described in the *Cowal Gold Mine Extension Modification Air Quality Impact Assessment* undertaken by Pacific Environment Limited (PEL) (2013), PM_{10} can be calculated as 40% of measured TSP (NSW Minerals Council, 2000). All 'inferred' average PM_{10} concentrations remain below the 24-hour average criterion (Graph 4), except for an event on 19 January 2022.There were high winds on 19 January, potentially resulting in elevated concentrations on this day of 51.2 µg/m3 (inferred from TSP). Despite this, annual average for 2022 of 10.4 µg/m3 remained well below the annual criterion of 25 µg/m3. The 'inferred' annual average PM_{10} for 2022 concentration was also well below the long-term average of 16.4 µg/m3, as shown in Graph 5.

Graph 4: PM10 data inferred from TSP measurements – 2022



Graph 5: Annual average PM10 inferred from TSP measurements – 2006 to 2022

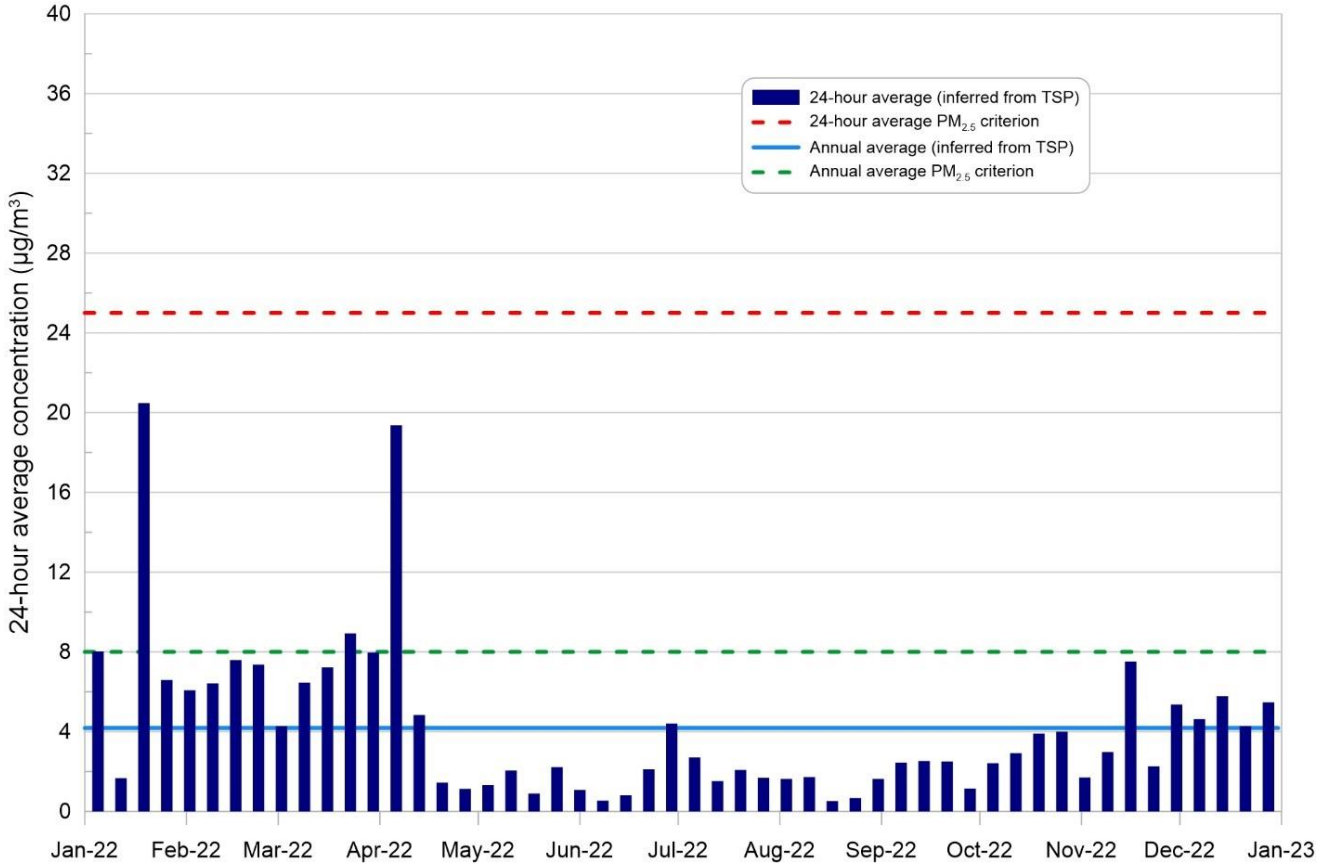


6.1.2.8. Particulate matter < 2.5 µm ($PM_{2.5}$)

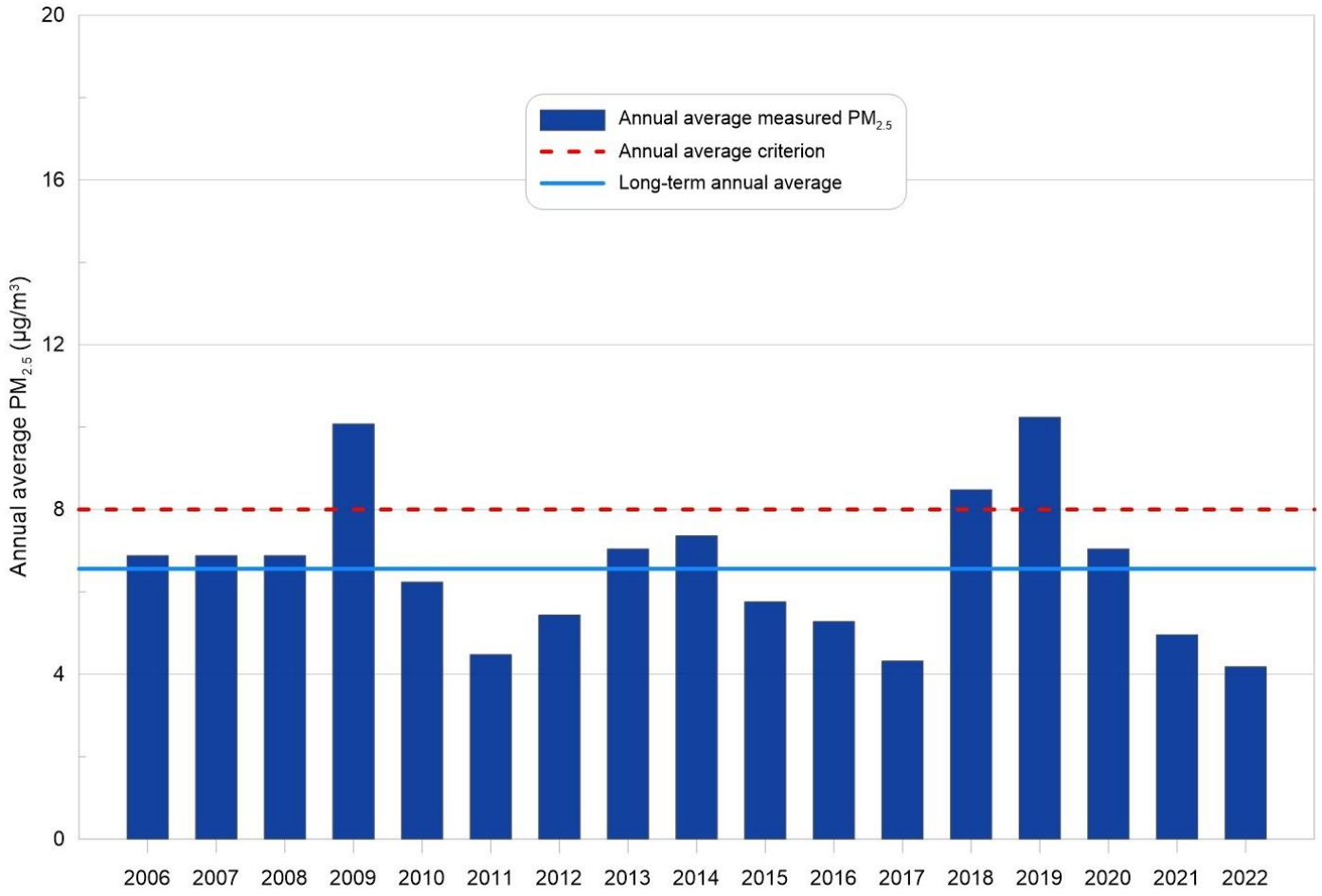
Like PM_{10}, $PM_{2.5}$ is not measured directly but again is inferred from TSP. An HVAS with a $PM_{2.5}$ head will be co-located with TSP HVAS to carry out direct measurements of $PM_{2.5}$ prior to commencement of underground production. In the meantime, the following methodology has been used to estimate $PM_{2.5}$ concentrations.

Historical data from co-located PM_{10} and $PM_{2.5}$ monitors in the Hunter Valley have determined that the ratio between the two, for a non-urban environment, is approximately 40%. That is, typically 40% of PM_{10} (or approximately 16% of TSP) falls within the $PM_{2.5}$ size fraction (Zephyr Environmental, 2023). Graph 6 shows $PM_{2.5}$ data based on these TSP measurements. All inferred $PM_{2.5}$ concentrations remain below the 24-hour average criterion. The annual average in 2022 of 4.2 µg/m3 remained well below the annual criterion of 8 µg/m3. The longer term inferred average PM2.5 concentration is also well below the long-term average of 8 µg/m3, as shown in Graph 7.

Graph 6: PM2.5 data inferred from TSP measurements – 2022



Graph 7: Annual average PM2.5 inferred from TSP measurements – 2006 to 2022



6.1.2.9. Deposited Dust

A detailed discussion of depositional dust monitoring results is provided in the Annual Air Quality Review 2022 (Zephyr Environmental, 2023). A summary of key findings is provided below and in Table 10.

Measured total insoluble solids are used to determine compliance with the relevance assessment criteria. Seven of ten dust gauges (DG1, DG6, DG7, DG9, DG13, DG14 and Site 52) recorded annual averages less than the prescribed 4 g/m2/month. Gauges DG6, DG7 and DG13 were inaccessible for much of the latter half of 2022 due to heavy rainfall periods and flooding.

McLintocks Shed and Site Office registered annual averages above the 4 g/m2 /month limit. Both of these sites had one or two extremely high values through the year that strongly influenced the annual average. Whilst it is possible these samples may have been contaminated the field notes do not indicate anything to support this, other than large amounts of dirty water. Recorded values from other sites have been removed from the annual average calculation due to various contamination issues. For these two sites:

- Site Office gauge is located south of the open pit and waste rock emplacements. Highest deposition levels were recorded in October when winds of higher speeds were predominantly from the north northeast. It's possible these contributions were from activities at CGO, however, there were also significant rain periods during the month so there was a lower potential for wind erosion.
- McLintocks Shed levels were above 4 g/m2/month for 5 months of 2022. This site is directly west of the tailings storage facility, however, there is no consistent pattern of high deposition levels occurring during months with dominant easterly winds. In fact, the months with highest deposition levels are June and September that have few easterly winds. It is therefore not likely that the elevated deposition levels were due to activities at CGO.

DGI5 was only accessible for two months of 2022 and as such there was insufficient data to make a statistically valid determination of the annual dust deposition.

Table 10: Monthly and annual average dust deposition rates (insoluble solids) for 2022

Month	DG1	DG6	DG7	DG9	DG13	DG14	DG I5	McLintocks Shed	Site 52	Site Office
January	2.1	5.0	11.3	2.2	ND*	ND*	ND^	2.1	4.2	3.1
February	0.7	0.3	1.0	1.0	ND*	0.6	ND^	3.4	0.4	0.5
March	1.6	3.1	2.9	1.2	ND*	1.4	ND^	9.0	6.0	2.9
April	1.5	ND*	4.8	2.7	ND*	4.3	ND^	ND*	4.1	5.6
May	1.5	10.6	1.5	0.8	9.6	1.2	ND^	ND*	2.9	8.2
June	0.6	3.4	0.5	0.9	1.2	0.6	0.9	11.2	2.5	5.9
July	0.5	0.7	0.3	0.5	1.1	0.6	1.6	4.2	2.9	2.3
August	0.6	0.7	0.6	2.1	0.6	0.4	ND^	1.5	2.5	2.1
September	0.7	1.4	ND^	1.8	ND^	0.8	ND^	37.3	3.6	8.5
October	0.9	ND^	ND^	0.7	ND^	4.1	ND^	3.7	ND*	36.5
November	1.2	ND^	ND^	0.9	ND^	ND^	ND^	5.6	ND^	9.5
December	1.3	ND^	ND^	0.8	ND^	ND^	ND^	3.6	ND^	1.5
Average	**1.1**	**3.2**	**2.9**	**1.3**	**3.1**	**1.5**	**ND****	**8.2**	**3.3**	**7.2**

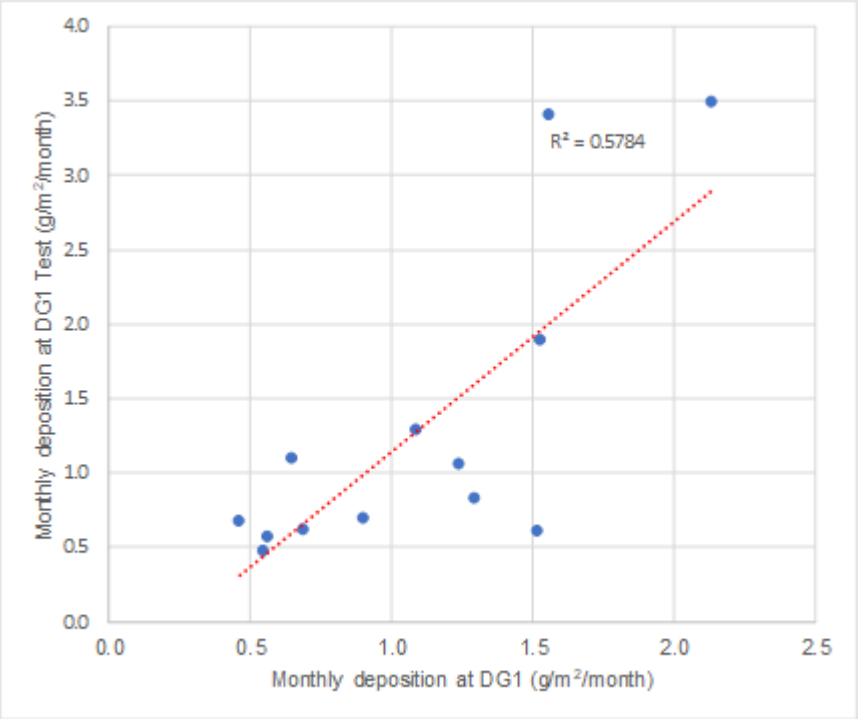
^ Samples not collected as the site could not be accessed due to high water levels
** Contaminated and not included in the annual average*
*** Not sufficient data captured in the year to calculate an annual average*

Due to the nature of this sampling method, depositional dust samples can sometimes become contaminated by presence of trapped insects and bird droppings that leads to anomalous results. The accompanying field logs note when this occurrs, and these can be taken into consideration when discussing the results.

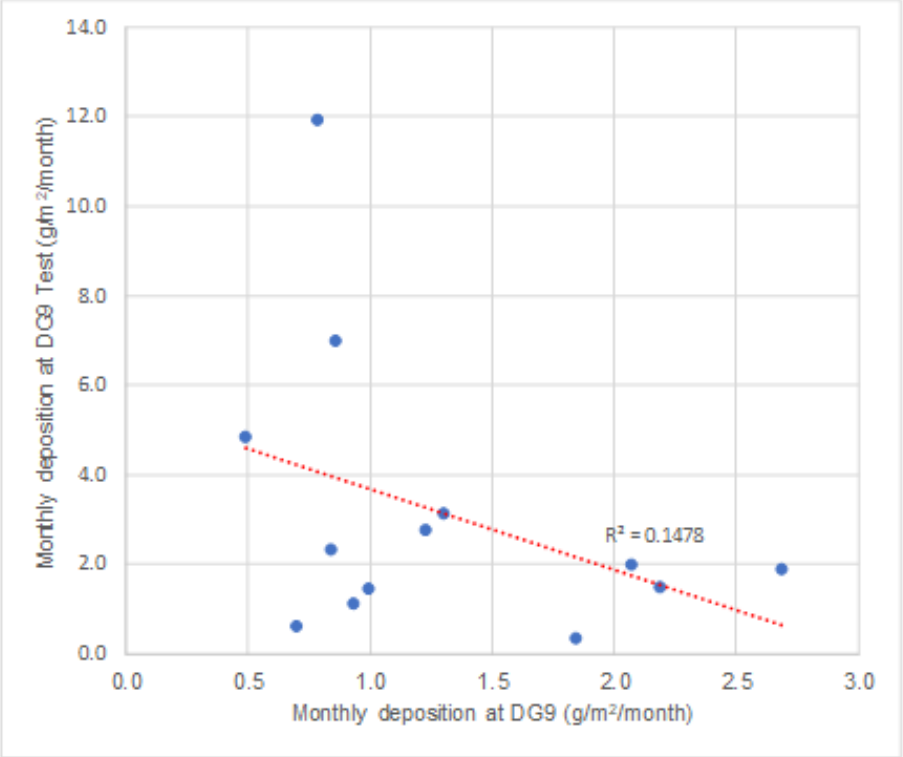
Additional sampling was also carried out at DG1 Test and DG9 Test throughout 2022, which are co-located with DG1 and DG9 to understand variability between samples taken at the same location. Despite 'test' gauges also measuring annual averages below 4 g/m2/month, Graphs 8 and 9 show poor correlation between duplicate samples taken at the same location. Deposition gauges are relatively antiquated and not a particularly useful method of measuring air quality (Zephyr Environmental, 2023).

It is suggested that depositional dust network be downsized to reflect this, with preference given to the HVAS and continuous measurements of airborne particulates. Reasonable coverage and representation could be achieved by retaining DG01, DG09, DG14 and McLintocks Shed. This would cover areas to the north, south, east and west, as well as retaining a co-located gauges with HVAS (DG01) and a site representative of the lake (DG14) (Zephyr Environmental, 2023).

Graph 8: Correlation between monthly deposition levels at DG1 and DG1 Test



Graph 9: Correlation between monthly deposition levels at DG9 and DG9 Test



6.1.2.10. Comparison with Environmental Impact Statement (EIS) Predictions

PEL's (2013) modelling predicted the Coniston residence (i.e. the location of the HVAS [hv1]) as the receiver with highest predictions for 24-hour average PM10, annual average PM10, TSP and depositional dust. Table 11 summarises 2022 monitoring results for 24-hour average PM10, annual average PM10, TSP and depositional dust and predicted results at Coniston in comparison with relevant Development Consent air quality impact assessment criteria for 24 hour and annual average PM10, TSP and depositional dust.

2022 monitoring results for maximum 24 hour average PM10, annual average PM10 and annual average TSP were higher than the predicted Coniston results, one reason for this is that the predicted results show the incremental impact from CGO, whereas the monitoring results are cumulative from all sources.

Table 11: Summary of Predicted PM_{10}, TSP and Dust Deposition at HV1

Emission Parameter	2022 Monitoring Results	Predicted Result at Coniston[a d]	Development Consent Air Quality Impact Assessment Criteria[b]
Maximum 24-Hour Average PM_{10}	51.2 µg/m^2	28.8 µg/m	[c] 50 µg/m^3
Annual Average PM_{10}	10.4 µg/m^2	3.7 µg/m	[c] 25 µg/m^3
Annual Average TSP	26.1 µg/m^2	3.9 µg/m	[c] 90 µg/m^3
Annual Average Depositional Dust	1.1 g/m^2/month	0.16 g/m^2/month	[c] 4 g/m^2/month

[a] Source: PEL (2013).

[b] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

[c] Cumulative impact (i.e. incremental increase in concentrations due to Cowal Gold Operations plus background concentrations due to all other sources).

[d] Incremental impact (i.e. incremental increase in concentrations due to the development on its own).

6.1.3. Reportable Incidents

There was an exceedance of dust deposition annual average criterion of 4 g/m2/month at gauges Site Office and McLintocks Shed though as previously described, these exceedances are unlikely due to activities at CGO. Though not reportable incidents, they have been included for transparency.

There was also one inferred exceedance in maximum 24-hour average PM10 concentration criterion of 50µg/m3. This occurred on 19 January 2022, when there were high winds, potentially causing the elevated concentration on this day of 51.2 µg/m3. Again, though not a reportable incident, it has been included for transparency.

6.1.4. Further Improvements

Key recommendations of Zephyr Environmental (2023) review are summarised as follows:

1. Retain continuous PM10 monitoring at HVAS site to enable comparison of datasets.
2. Implement PM2.5 monitoring co-located with TSP HVAS and continuous PM10, prior to commencement of UG mining production.
3. Rationalise dust deposition gauge network, reducing it to four gauges at locations DG01, DG09, DG14 and McLintocks Shed.

6.2. BLASTING

Development Consent Condition 6.3(a) details blast impact assessment criteria relevant to CGO. As required by Development Consent condition 6.3(e), a Blast Management Plan (BLMP) has been prepared and endorsed.

Monitoring and management of blasting during the reporting period was undertaken in accordance with relevant Development Consent conditions, the approved BLMP and the EPL 11912.

6.2.1. Environmental Management

In accordance with Development Consent Condition 6.3, BLMP and EPL 11912 Conditions L5 and M7, four blast monitors have been installed at designated locations around CGO to record ground vibration and air blast overpressure (Figure 7). In addition, a 'control' monitor is installed at BM10, located on the eastern edge of the open pit.

6.2.1.1. Control Strategies

In accordance with the BLMP, control strategies for blasting during operation of the open pit include the following:

- Reducing Maximum Instantaneous Charge (MIC) to lowest possible level.
- Use of crushed aggregate material for stemming blast holes to maximise confinement of explosives in the blast hole thereby minimising air blast effects.
- Design of drill patterns to ensure stemming heights in blast holes are adequate to ensure confinement ofthe explosives.
- Delaying or postponing blast times in unfavourable weather conditions where possible.

Additionally, Evolution has adopted a practice of spacing pre-split and production blasts by one to two minutes to reduce potential for cumulative overpressure impact on the immediate surrounds of Lake Cowal.

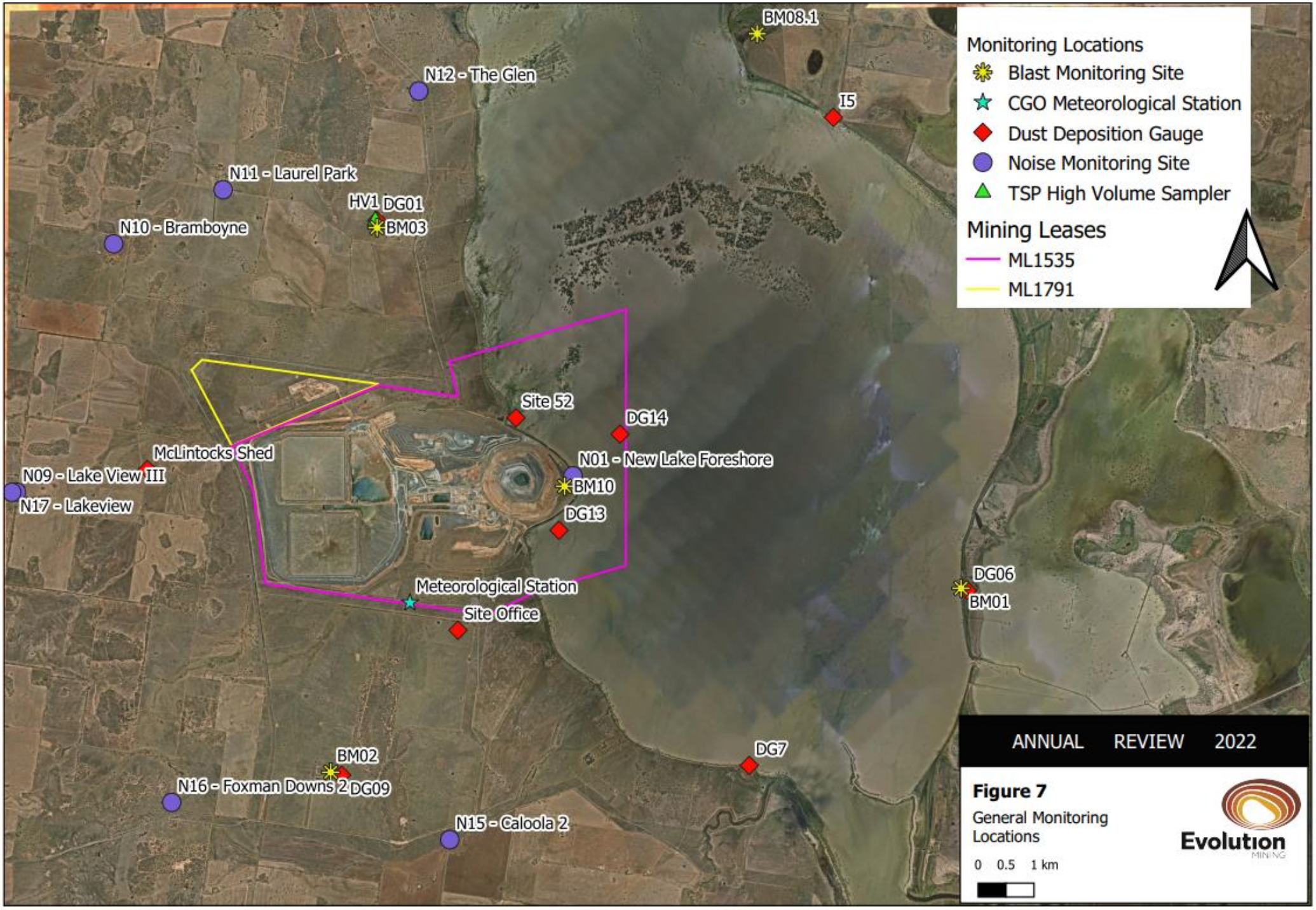
In accordance with Development Consent Condition 6.3, BLMP and EPL 11912 Condition M7, air blast overpressure and ground vibration levels must be measured at nearby residences BM01, BM02, BM03 and BM08.1, and at the general monitoring site BM10.

6.2.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period are considered to be effective as demonstrated by environmental performance indicators.

6.2.1.3. Variations from Proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.


BM08.1
N12 - The Glen
I5
N11 - Laurel Park
HV1
DG01
BM03
N10 - Bramboyne
Site 52
DG14
McLintocks Shed
N09 - Lake View III
N17 - Lakeview
N01 - New Lake Foreshore
BM10
DG13
DG06
BM01
Meteorological Station
Site Office
BM02
DG7
N16 - Foxman Downs 2
DG09
N15 - Caloola 2
Monitoring Locations
Blast Monitoring Site
CGO Meteorological Station
Dust Deposition Gauge
Noise Monitoring Site
TSP High Volume Sampler
Mining Leases
ML1535
ML1791
ANNUAL REVIEW 2022
Figure 7
General Monitoring Locations
0 0.5 1 km
Evolution MINING

6.2.2. Environmental Performance – Blasting

6.2.2.1. Monitoring

Monitoring locations BM01 (Gumbelah) and BM08.1 (Cowal North) are categorised as 'residence on privately owned land' and required to comply with compliance limits specified in Condition 6.3 of Development Consent (Table 12). Monitoring was also undertaken at locations BM02 (Hillgrove Residence), and BM03 (Coniston Residence), located on company owned land (Figure 7). In addition to monitors located at sensitive receptors, one non-reported monitor (BM10) was located adjacent to the open pit within ML 1535.

Ground vibration and air overpressure monitoring was conducted with the use of Instantel (Series III and Micromates) blast monitors. Five units were located at fixed monitoring stations in accordance with the BLMP. All blast monitoring equipment underwent an annual calibration, in accordance with Australian Standard specifications. Additional to monitor and sensor calibrations, all batteries were replaced, and routine maintenance carried out on all units.

Blast operations occurred in open pit over the course of the 2022 reporting period. Underground blasting activities were included in compliance reporting from October 2021, following the approval of MOD 16 (DA 14/98).

Table 12: Blasting Impact Assessment Criteria

Location and Time	Air blast Overpressure (dB [Lin Peak])	Ground Vibration (mm/s)	Allowable Exceedance
Residence on privately-owned land - Anytime	120	10	0%
Residence on privately-owned land - Monday to Saturday during day	115	5	5% of the total number of blasts over a period of 12 months
Residence on privately-owned land - Monday to Saturday during Evening	105	2	
Residence on privately-owned land - Monday to Saturday at Night, Sundays and Public holidays	95	1	

Notes: mm/s – millimetres per second; dB – decibel.

During the 12-month monitoring period there were several incidents where a unit was offline for more than 24 hours, as follows for monitoring units:

- BM01 (Gumbelah) was offline between 4th March 2022 – 8th March 2022
- BM08.1 (Cowal North) was offline between 4th March 2022 – 9th March 2022
- BM08.1 (Cowal North) was offline between 12th March 2022 – 15th March 2022
- BM08.1 (Cowal North) was offline between 23rd March 2022 – 30th March 2022
- BM08.1 (Cowal North) was offline between 31st March 2022 – 4th April 2022
- BM03 (Coniston) was offline between 22nd July 2022 – 25th July 2022
- BM03 (Coniston) was offline between 30th July 2022 – 3rd August 2022
- BM01 (Gumbelah) was offline between 18th August 2022 – 22nd August 2022
- BM01 (Gumbelah) was offline between 21st September 2022 – 26th September 2022

6.2.2.2. Performance Outcomes

Ground Vibration

A total of 885 blasts were fired during the 2022 reporting period, including 184 Open Pit and 701 Underground blasts. Based on monitoring data and blasting information available, recorded levels of ground vibration induced by blasting activities conducted at CGO were compliant with respect to relevant ground vibration limits for both operations (Table 12 vs 14).

Peak vibration level for Open Pit Blasting was 0.30mm/s at BM03 – Coniston residence on 14th July 2022.

Peak vibration levels for underground blasting was 0.76mm/s at BM08.1 – Cowal North on 25th August 2022.

Air Overpressure

A detailed examination of monitoring data and blasting information was undertaken to ascertain overpressure levels recorded around blasting. No Open Pit or Underground blast-related events exceeded the maximum compliance level of 120dB(L).

However, a total of 16 Open Pit blasting events were identified as potentially having a peak overpressure level exceeding other relevant compliance criteria during 2022. These events were analysed in detail to determine likely sources of overpressure. From the 16 events that exceeded compliance levels, three (3) of these were assessed to be most likely related to blasting practices (Table 13a), with the remaining being attributed to localised environmental factors, such as wind (Saros, 2023).

Table 13a: Open Pit Overpressure Events most likely related to blasting practices (2022)

Monitoring Location	Date	Time	Level		Compliance Limit	Comments
			PPV mm/s	O' Press dB(L)		
BM08.1 - Cowal North	12/06/2022	17:18:48	0.03	95.9	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM02 - Hillgrove	19/06/2022	12:37:02	0.14	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM08.1 - Cowal North	26/06/2022	13:51:52	0.03	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.

A total of 104 Underground blast events were identified as having a peak overpressure level exceeding the relevant compliance criteria during 2022. These events were analysed in detail to determine the likely source of overpressure. Of the 104 events that exceeded compliance levels, one (1) event was assessed to be most likely related to blasting practices (Table 13b), and the remaining 103 being attributed to localised environmental factors, such as wind (Saros, 2023).

Table 13b. Underground Overpressure Events most likely related to blasting practices (2022)

Monitoring Location	Date	Time	Level		Compliance Limit	Comments
			PPV mm/s	O' Press dB(L)		
BM02 - Hillgrove	13/10/2022	5:46:25	0.07	107.0	95dB(L) - Night time limit	Likely blast related.

All exceedances identified at blast times were in relation to the Sundays' and Public Holidays' compliance limit of 95dB(L). This is to be anticipated given the Sundays' and Public Holiday's overpressure level of 95dB(L) is a significant reduction to the normal weekday and Saturday limit of 115dB(L). It is important to note that this 20dB(L) reduction is equivalent to reducing the weekday and Saturday limit by 90% for Sunday and Public Holiday blasting.

Table 14: Compliance percentages for previous 12 months (2022)

Type of Exceedance	Total Number of Blasts (12 months)	No. of Exceedences (12 Months)			
		Daily Operation	Evening Operation	Night, Sunday and Public Holiday	Total % Exceedance
Open Pit					
Vibration	184	0	0	0	0.0%
Overpressure	184	0	0	3	1.6%
Underground					
Vibration	701	0	0	0	0.0%
Overpressure	701	0	0	1	0.1%
Combined					
Vibration	885	0	0	0	0.0%
Overpressure	885	0	0	4	0.5%

Community Complaints

During this reporting period there were no community complaints received in relation to blasting.

Comparison with EIS Predictions

Blasting monitoring results during the reporting period are consistent with previous years and with the predictions detailed in the *Cowal Gold Operations Mine Life Extension Modification Environmental Assessment* (Evolution, 2016) and MOD 16:

- No exceedance of air blast overpressure level of 120 dB(L) or ground vibration level of 10 mm/s at any residence on privately-owned land at any time.
- Not more than 5% of total number of blasts at any residence on privately-owned land exceeding air blast overpressure levels or ground vibration levels Monday to Saturday during the day, evening, night or on Sundays and public holidays.
- 100% of ground vibration levels compliant with license conditions.
- Following a detailed review of overpressure results for events that were above the compliance levels,
  - Open Pit – three (3) were identified as being most likely related to blasting practices. This is 1.6% of total surface blasts for the monitoring period;
  - Underground – one (1) was identified as being most likely related to blasting practices. This is 0.1% of total underground blasts for the monitoring period; and
  - All other peak levels above compliance limitations were affected by localised environmental factors and were not distinguishable above background levels.
- All three (3) open pit blast related overpressure results exceeding the nominated compliance criteria, all three (3) of these events occurred on a Sunday or Public Holiday where a conservative 95 dB(L) limit applies.
- One (1) underground blast related overpressure result exceeding the nominated compliance criteria, occurred during the night period where a conservative 95 dB(L) limit applies.
- Blast induced overpressure impacts were compliant within licence conditions.

6.2.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.2.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.3. OPERATIONAL NOISE

Development Consent Condition 6.4(c) details noise impact assessment criteria relevant to CGO. As required by Development Consent condition 6.4(e), a Noise Management Plan (NMP) has been established and is in place at CGO.

Monitoring and management of noise during this reporting period was undertaken in accordance with relevant Development Consent conditions, approved NMP and EPL 11912.

6.3.1. Environmental Management

6.3.1.1. Control Strategies

In accordance with the NMP, control strategies used at CGO during the reporting period utilised best management practices and best available noise minimisation technology economically achievable.

6.3.1.2. Best Management Practice

Best management practices applied during the reporting period to minimise CGO noise emissions included:

- A Lake Protection Bund providing noise shielding, thereby reducing noise levels that can propagate from the open pit across Lake Cowal.
- Where appropriate or possible, locate mobile noise generating equipment behind structures that act as barriers, or at a greatest distance from any noise sensitive areas or orienting the equipment so that noise emissions are directed away from any sensitive areas where practicable or possible.
- Where there are several noisy pieces of equipment, scheduling operations so they are used separately rather than concurrently.
- Keeping equipment well maintained.
- Operating equipment in line with manufactures operating protocols.
- Educating staff on effects of noise and use of quiet work practices.

6.3.1.3. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.3.1.4. Variations from Proposed Strategies

There were no variations from proposed control strategies during the reporting period.

6.3.2. Environmental Performance – Operational Noise

6.3.2.1. Monitoring

Noise monitoring was undertaken during the reporting period to demonstrate compliance with noise impact assessment criteria set out in Development Consent Condition 6.4(c), which requires that noise generated by CGO does not exceed the criteria outlined in Table 15 below, at any residence on privately-owned land.

Development Consent 16/21 Mod 16 was updated in September 2021 to include a sleep disturbance night time criteria of 52dB (Lmax).

Table 15: Noise Impact Assessment Criteria dB(A) $L_{Aeq\ (15minute)}$

Location (Figure 7)	MOD14 - Day/Evening/Night	Night (Lmax)
Lakeview III	38	52
The Glen	37	
Lakeview, Foxham Downs II	36	
All other privately-owned land	35	

Spectrum Acoustics conducted mine operational noise monitoring at quarterly intervals throughout the reporting period in accordance with the NMP and Development Consent. Table 16 provides a summary of the quarterly attended noise monitoring results for the Laurel Park, Bramboyne, Lakeview, Lakeview III, The Glen, Caloola and Foxam Downs II properties during the reporting period (Spectrum Acoustics, 2023a, 2023b, 2023c, 2023d). For each sample point, two consecutive 15-minute field measurements were taken, providing two values for the Mine Contributed L_{Aeq} (15minute) – dBA within Table 16.

Table 16: Attended Noise Monitoring Results for 2022 - Mine Contributed L_{Aeq}(15minute) - dBA

Location	Period	Feb-22		May-22		Aug-22		Nov-22	
N09 Lakeview III	Day	33	33	24	22	<20	<20	<20	<20
	Evening	<20	<20	<20	<20	29	30	<20	<20
	Night	<20	<20	<20	<20	20	23	<20	<20
N10 Bramboyne	Day	<20	22	<20	<20	<20	<20	<20	<20
	Evening	<20	<20	<20	<20	<20	<20	<20	<20
	Night	<20	<20	<20	<20	<20	<20	<20	<20
N11 Laurel Park	Day	<20	<20	<20	<20	<20	<20	<20	<20
	Evening	<20	<20	22	20	<20	<20	<20	<20
	Night	<20	<20	22	20	<20	<20	25	25
N12 The Glen	Day	<20	<20	<20	<20	<20	<20	<20	<20
	Evening	<20	<20	<20	<20	<20	<20	<20	<20
	Night	<20	<20	<20	20	<20	<20	<20	<20
N15 Caloola 2	Day	25	25	22	23	32	30	<20	<20
	Evening	<20	<20	<20	<20	25	23	<20	<20
	Night	22	24	<20	<20	33	33	<20	<20
N16 Foxman Downs II	Day	32	32	<20	<20	<20	<20	<20	<20
	Evening	<20	<20	<20	<20	29	30	<20	<20
	Night	22	20	<20	<20	20	23	<20	<20
N17 Lakeview I & II	Day	33	33	24	22	<20	<20	<20	<20
	Evening	<20	<20	<20	<20	31	31	<20	<20
	Night	<20	<20	<20	<20	<20	<20	<20	<20

Source: Spectrum Acoustics (2022a, b, c, d).

Notes: <20 = Mine noise emission inaudible or barely audible.

Spectrum Acoustics also measured L_1 (1 min) (i.e. Lmax) noise levels for each night time monitoring period as summarised in Table 17 below for the Laurel Park, Bramboyne, Lakeview, Lakeview III, The Glen, Caloola and Foxam Downs II properties. The measured L_1 (1 min) level shown is for mine noise only.

Table 17 CGO Sleep Disturbance Monitoring Results dB(A), L_1 (1 min) Night Period

Location	Feb-22	May-22	Aug-22	Nov-22
N09	n/a	n/a	30	n/a
Lakeview III	n/a	n/a	n/a	n/a
N10	n/a	n/a	n/a	n/a
Bramboyne	n/a	n/a	n/a	n/a
N11	n/a	25	n/a	30
Laurel Park	n/a	28	n/a	28
N12	n/a	<20	n/a	n/a
The Glen	n/a	25	n/a	n/a
N15	28	n/a	38	n/a
Caloola 2	30	n/a	40	n/a
Foxman	26	n/a	33	n/a
Downs II	28	n/a	33	n/a
N17	n/a	n/a	n/a	n/a
Lakeview I & II	n/a	n/a	n/a	n/a

6.3.2.2. Performance Outcomes

Attended noise monitoring results for all the properties were well below noise impact assessment criteria for these properties as defined in Development Consent Condition 6.4(c).

6.3.2.3. Comparison with EIS Predictions

Table 18 summarises SLR's (2013) predicted $L_{Aeq(15\ minute)}$ noise levels at the nearest privately-owned residential receivers (excluding those properties already afforded acquisition rights [i.e. Westella]) during day, evening and night-time periods with adverse meteorological conditions of a strong inversion, in comparison to noise impact assessment criteria for these properties listed in Development Consent Condition 6.4(c).

Table 18: Summary of Predicted Intrusive $L_{Aeq(15\ minute)}$ Noise Levels at nearest privately owned residential receivers

Privately-owned Residential Receiver	Predicted Noise Level $L_{Aeq(15\ minute)}$ Day/Evening/Night-time during Strong Inversion (1800 – 0700 hours)	Noise Impact Assessment Criteria defined in Development Consent Condition 6.4(c)
Laurel Park	37	35
Bramboyne	36	35
Bungabulla	35	35
The Glen	36	37
Gumbelah	35	35

Source: SLR (2013).

6.3.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.3.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.4. VISUAL, STRAY LIGHT

Development Consent Condition 6.5(b) and SSD 10367 condition B20 details the requirements for the management of visual and off-site lighting impacts from CGO.

CGO received no lighting complaints during the reporting period.

6.4.1. Environmental Management

6.4.1.1. Control Strategies

In accordance with Development Consent Condition 6.5(b) and SSD 10367 condition B20, visual impact mitigation measures that have been employed at the CGO during the reporting period included landscaping and design specifically conducted for visual impact mitigation purposes. Specific strategies during the reporting period included:

- utilising existing vegetation as visual screens.
- planting of vegetation screens around the ML 1535 boundary.
- construction of waste emplacements, reducing visual impact of the processing plant from the eastern sideof Lake Cowal.
- placement of topsoil stockpiles on the southern and western sides of the STSF to break the view from the relocated Travelling Stock Route.
- ensuring no fixed outdoor lighting shines directly above the horizon.
- ensuring mobile lighting is directed internal of the mine lease.

6.4.1.2. Effectiveness of Control Strategies

The control strategies implemented during the reporting period were considered effective as demonstrated by the environmental performance indicators.

6.4.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.4.2. Environmental Performance – Stray Light

6.4.2.1. Monitoring

A summary of the landscape maintenance and monitoring programme implemented during the reporting period is provided in Table 19.

Table 19: Landscape Maintenance and Monitoring Summary

Component	Monitoring Frequency	Monitoring Method	Typical Maintenance
Landscaping Works			
• General Inspections	Annual	Visual assessment of moisture stress, plant survival, presence of weeds and erosion/ sedimentation.	• Supplementary watering if required. • Control of invasive weed species. • Supplementary planting of failed plants where necessary.
• Erosion Inspections	Following significant, high intensity rainfall events.	Visual assessment of earth mound screening to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	• Repair any significant erosion or washout areas on earth mounds. • Stabilisation with Jute mesh or other materials as required. • Additional revegetation planting or sowing if required.
Buildings, Structures and Facilities	Annual	Visual assessment as required.	• Replace or repair items as necessary to maintain structural integrity. • Repaint any exterior surfaces where the finish has deteriorated. • Maintain fixed outdoor and in-pit mobile lighting.
Rehabilitation Works			
• General Inspections	Annual	Monitoring in accordance with the RMP, the BOMP and MOP (with reporting in the AR).	• Repair any significant erosion or washout areas. • Control of invasive weed species in accordance with the Land Management Plan. • Supplementary planting or seeding of failed plants where necessary.
• Erosion Inspections	Following significant, high intensity rainfall events.	Visual assessment of rehabilitation works to determine if significant erosion or washouts have occurred in accordance with the ESCMP.	• Repair any significant erosion or washout areas on earth mounds. • Stabilisation with Jute mesh or other materials as required. • Additional revegetation planting or sowing if required.

ESCMP - Erosion and Sediment Control Management Plan
BOMP – Biodiversity Offset Management Plan
RMP – Rehabilitation Management Plan

6.4.2.2. Performance Outcomes

Visual impact management and landscape maintenance and monitoring measures conducted during the reporting period included:

- inspections and maintenance of fixed outdoor lighting and in-pit mobile lighting.
- general inspections of landscaping (i.e. visual screens) and rehabilitation works.
- monitoring of tree and shrub survival rates of landscape plantings; and
- erosion inspections of landscaping and rehabilitation works following periods of significant, high intensity rainfall.

As a result of this visual landscape monitoring the following maintenance activities were undertaken:

- weed control within landscaping and rehabilitation areas by manual removal or chemical application; and
- maintenance of erosion control structures.

6.4.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.4.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.5. EROSION AND SEDIMENT

Development Consent Condition 3.5(a) provides erosion and sediment control strategies for works to be undertaken throughout the life of the CGO (i.e. construction and operations).

Monitoring and management of erosion and sediment control during the 2022 reporting period was undertaken in accordance with the relevant Development Consent Conditions, relevant ML 1535 and ML 1791 conditions, the ESCMP and EPL 11912.

6.5.1. Environmental Management

6.5.1.1. Control Strategies

A summary of the control strategies/management measures implemented during the reporting period in accordance with the ESCMP is provided in Table 20.

Table 20: Summary of Erosion and Sediment Control Strategies/ Management Measures

Project Development	Control Strategy/Management Measure
Temporary Erosion and Sediment Controls Systems	
Internal Mine Access Road	• Minimisation of disturbance to watercourses that cross roads. • Provision of culverts and diversion of runoff from undisturbed areas. • Erection of sediment control barrier downslope of small, disturbed areas. • Provision of sediment basins for concentrated runoff areas. • Stabilization of access road surface. • Rapid stabilisation and revegetation of road batters.
ML 1535 and ML 1791 Fences	• Minimising area disturbed and restricting access to non-disturbed areas.
Ore Stockpile and Process Plant Area	• Minimising area disturbed and restricting access to non-disturbed areas. • Settlement/plant runoff storage. • Installation of sediment control barrier. • Installation of runoff collections drains. • Dewatering of settlement storage following rainfall events. • Ripping and rehabilitation of hardstand areas.
Soil Stockpiles	• Use of sediment control barrier and sediment traps to minimise soil movement. • Use of diversion banks, channels and rip-rap structures to divert surface water around disturbed areas and control runoff velocity.
Internal Mine Roads	• Constructing all access roads at an appropriated slope along contour, where practicable. • The use of spoon drains, table drains and concrete culverts to control surface runoff from access roads. • Ripping and rehabilitation of roads no longer required for access.
Contractors' Area	• Minimising area disturbed and restricting access to non-disturbed areas. • Erection of sediment control barrier downslope of small, disturbed areas. • Provision of sediment basins for concentrated runoff areas. • Ripping and rehabilitation of hardstand areas.
Earthworks Associated with Landscaping	• Use of sediment control barriers and sediment traps to minimise soil movement.

Project Development	Control Strategy/Management Measure
Internal Catchment Drainage System (ICDS)	• Construction the ICDS as described in ESCMP. • Construction of sediment retention storages to reduce non-colloidal fraction of sediment carried in runoff from large disturbed areas. Storages sized to provide flow detention and effective settlement during small to medium sized flood events (1 in 20 year 1 hour event). • Use of small-scale runoff controls comprising hay bales and rockfill bunds to control sediment loads in runoff from small areas. Silt control hay bale weirs installed downslope of all disturbed areas. • Rapid stabilisation of disturbed areas using contour banks and furrows, erosion-stable drainage paths and early revegetation or armouring of disturbed areas. Disturbed areas rapidly stabilised to reduce sediment fluxes.
Permanent Erosion and Sediment Controls Systems	
Lake Isolation System	• Construction of Temporary Isolation Bund and Lake Protection Bund as described in ESCMP. • Stabilisation and revegetation of batters of Temporary Isolation Bund and Lake Protection Bund.
Up-Catchment Diversion System (UCDS)	• Construction of UCDS as described in ESCMP to divert upper catchment wateraround CGO. • Installation of rip-rap structures along UCDS and rock outfalls at confluences with existing natural drainage lines. • Vegetation stabilisation.
Earth Mounds (associated with the ICDS)	• Vegetative stabilisation.
Monitoring and Maintenance	• Water quality monitoring in accordance with Surface Water, Groundwater, Meteorological and Biological Monitoring Program (SWGMBMP). • Maintenance of erosion and sediment control structure where necessary.

6.5.1.2. Effectiveness of Control Strategies

The control strategies implemented during the reporting period were considered to be effective as demonstrated by the environmental performance indicators.

6.5.1.3. Variations from Proposed Control Strategies

There were no variations to the proposed control strategies during the reporting period.

6.5.2. Environmental Performance – Erosion & Sediment

6.5.2.1. Monitoring

In accordance with the ESCMP, inspections and maintenance of erosion and sediment control structures (e.g. silt fences, hay-bales, sediment ponds and diversion structures) occurred as required during the reporting period.

The ESCMP also requires the following to be reported in the AR:

- Surface and groundwater monitoring results.
- Comparison of surface water and groundwater monitoring results with criteria in the SWGMBMP.
- Interpretation and discussion of the surface and groundwater monitoring programme results.
- Community Environmental Monitoring & Consultative Community (CEMCC) decisions relating to ESCMP issues.

6.5.2.2. Performance Outcomes

The CGO geotechnical department conducted monthly monitoring and assessment of structures such as all water holding facilities on site, waste emplacements and the lake protection bund for sediment movement and erosion control effectiveness in accordance with the CGO's Monitoring Programme for the Detection of Movement of the Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls. The monthly monitoring and assessments indicated no significant sediment movement, ponding or erosion incidence of the contained water storages, waste rock emplacements, lake protection bund and temporary isolation bund, however, some pooling was experienced following significant rainfall events. These were managed effectively through draining techniques. UCDS and ICDS inspections are carried out quarterly using a drone to ensure full inspection.

Higher than average rainfall was experienced in the reporting period and Lake Cowal has filled. Monitoring during 2021 identified that there was some erosion occurring on the temporary isolation bund resultant from wave action and high winds. The intent had been to implement remedial actions in 2022 but flooding again during the reporting period made this unachievable.

Progressive rehabilitation for final landform slopes continues to demonstrate effective erosion control as evidenced by independent specialists DnA Environmental (DnA Environmental, 2023c). With specific findings including:

- The range of monitoring data in 2022 indicates there have been significant ecological and chemical changes within the rehabilitation areas, largely because of volunteer colonisation by exotic annual grasses, and this has provided widespread stability.
- Rocky substrate produced in NWRE is likely to have provided habitat that has higher seeding establishment and as a result further increased stability.
- Rills on SWRE and NWRE that had previously exhibited active erosion are now well covered in plant growth and continue to be stable with little apparent active erosion. Some new rills are developing on PWRE and it is anticipated that vegetation growth will stabilise these areas.

Continued monitoring however will be necessary and remedial actions required where riling may deteriorate and exposed areas of rehabilitation and/or risk sediment release to the environment.

6.5.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.5.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.6. CYANIDE MANAGEMENT

Development Consent Condition 5.3 outlines requirements in relation to management of cyanide at CGO. A cyanide monitoring program has been developed for CGO and is incorporated into CGO's Cyanide Management Plan (CMP), which has been prepared in accordance with Development Consent Condition 5.3(b).

EPL 11912 requires Evolution to undertake cyanide monitoring at points identified in EPL 11912 Condition P1.3. Cyanide monitoring points and frequencies required by EPL 11912 are consistent with monitoring required by Development Consent and the CMP (Cyanide Management Plan). The CMP has also been prepared to address relevant requirements of ML 1535.

Monitoring and management of cyanide during the reporting period was undertaken in accordance with relevant Development Consent Conditions, approved CMP and EPL 11912.

Evolution has continued to report monthly weak acid dissociable cyanide (CNWAD) results on the company's website during the reporting period. Evolution Continues to report and discussed these results with the CEMCC at all quarterly meetings.

6.6.1. Environmental Management

6.6.1.1. Control Strategies

A summary of control strategies that continue to be implemented during the reporting period, in accordance with CMP, is provided below:

- Containment of all tailing's waters within the TSFs/ IWL, processing plant and processing plant dams.
- Maintenance of Lake Protection Bund and upper catchment diversion drain systems.
- Provision of emergency containment channels alongside pipelines to and from TSFs/ IWL.
- Maintenance of process pipe work, equipment and leak detection equipment.
- Terrestrial fauna protection fencing and avifauna deterrent methods to minimise potential for impacts from tailings operations.
- Use of sodium metabisulphite to destruct cyanide in tailings slurry to permissible levels before the processing plant slurry discharge is pumped to the IWL (with standby Caro's Acid circuit).
- Routine monitoring and reporting of tailings facility flows, ground and surface waters, and employee workareas for cyanide levels.
- Maintenance of emergency preparedness of employees and supply chain in reporting and response capability.
- Routine patrols of tailings and process areas to ensure the potential for spillage, dust or native fauna and flora impacts are minimised.

The CGO is certified under the International Cyanide Management Institute's (ICMI) Code for Cyanide Management. Details regarding the re-certification audit are provided on the ICMI's website: http://www.cyanidecode.org/signatory-company-categories/evolution-mining-cowal-pty-ltd-australia

6.6.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered to be effective as demonstrated by environmental performance indicators.

6.6.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.6.2. Environmental Performance – Cyanide

6.6.2.1. Monitoring

In accordance with CMP and Development Consent Condition 5.3(d), results of CN_{WAD} monitoring of tailings discharge (at the processing plant) and decant water were monitored during the reporting period. Levels of CN_{WAD} recorded are presented in Table 21. Note planned shutdowns occurred 15th to 22nd February, and 25th -29th August, and inclement weather 22nd August hence the reduced samples taken during these months.

6.6.2.2. Performance Outcomes

With exception of one isolated incident (see below), CN_{WAD} levels within aqueous components of the tailings slurry stream were maintained so that they did not exceed 20 milligrams (mg) CN_{WAD}/L (90 percentile over six months) and 30 mg CN_{WAD}/L (maximum permissible limit at any time) at the process plant during the reporting period. Groundwater results for cyanide during the reporting period remained at or below the laboratory detection limit. A single Weak Acid Dissociable (WAD) cyanide measurement at the Tailings Hopper exceeded 20ppm during March 2022. This was a singular event and did not exceed the 90th percentile.

Table 21: CN_{WAD} Levels of Aqueous Component of Tailings Slurry – 2022

			CN_{WAD} (mg/L equivalent to ppm)	
Frequency	**Month**	**No. Sampled during Month**	**Minimum**	**Maximum**
Twice daily	January	62	0.00	6.48
Twice daily	February^	42	0.00	12.82
Twice daily	March	62	0.176	21.49
Twice daily	April	60	0.00	11.283
Twice daily	May^	63	0.00	36.00
Twice daily	June	60	0.00	13.71
Twice daily	July	62	0.13	11.29
Twice daily	August^	44	0.13	9.73
Twice daily	September^	60	0.00	10.5
Twice daily	October	62	0.00	10.7
Twice daily	November	60	0	7.99
Twice daily	December	62	0	12.61

Notes: ^Planned shutdown occurred February 15th -22nd.
One day shutdown occurred 25th May, and 7th September.
Planned shutdown occurred August 25th-29th, inclement weather occurred August 22nd.

6.2.1 Reportable Incidents

On 26 May 2022, WAD cyanide at the processing plant Tailings Hopper exceeded the 30ppm license trigger. The processing plant was immediately shutdown in accordance with the Float Tails Leach (FTL) Cyanide Destruct Controlling WAD CN Discharge Level procedure (CGO PRO SWI 420). A combination of Caros acid dosing and dilution was used to reduce the WAD cyanide. Elevated WAD levels were not detected at the decant pond in the IWL, indicating that remedial actions adequately controlled the risk of environmental impact.

Through internal investigation, it was determined that the cyanide addition was taken out of automated control and set to a fixed dosing point during a processing plant shutdown, which overrode the analyzer set point for control. The free cyanide high alarm did not activate due to co-incident incorrect programming logic, which caused free cyanide levels to rise.

A detailed incident report was provided by Mr Simon Coates, Superintendent – Environment, on 26 May 2022. The primary preventative action associated with this incident was to update the logic controls / alarms for when the system is taken out of automatic control, with secondary actions associated with updating the Cyanide Management Plan in consultation with DPE.

6.6.3. Further Improvements

No further improvements are proposed for the next reporting period.

6.7. FLORA

Development Consent Condition 3.2 details requirements for CGO in relation to management of flora and fauna. A Flora and Fauna Management Plan (FFMP) and Threatened Species Management Protocol (TSMP) has been developed for CGO in accordance with Development Consent Conditions 3.2(b) and 3.2(c), respectively. The FFMP has also been prepared to address relevant requirements of ML 1535 and ML 1791.

Monitoring and management of flora continued in accordance with requirements of the FFMP, TSMP, BOMP and the RMP during the 2022 reporting period.

6.7.1. Environmental Management

6.7.1.1. Control Strategies

Flora control strategies for CGO are described in FFMP. The following control strategies were implemented at CGO during the 2022 reporting period:

- implementation of Compensatory Wetland Management Plan (CWMP) initiatives and the Remnant Vegetation Enhancement Program (RVEP).
- incorporation of flora management initiatives during operational design.
- implementation of the Vegetation Clearance Protocol (VCP).
- implementation of the TSMP.
- weed management and pest control.
- flora monitoring programme.
- observance of the Threatened Species Management Strategies (TSMS) for the relevant Endangered Ecological Communities:
  - Inland Grey Box Woodland Myall Woodland
  - Aquatic Ecosystems (lower Lachlan River)
  - Weeping Myall Woodland
- provision of information relevant to management of native flora during employee and contractor inductions.
- development and submission of an RMP (including mine site rehabilitation performance, completion criteria and a mine site rehabilitation monitoring programme relevant to approved CGO); and
- development and submission of a BOMP (including an offset performance, completion criteria and an offset monitoring programme relevant to approved CGO offset areas).

6.7.1.2. Effectiveness of Control Strategies

The control strategies implemented during 2022 reporting period were effective as demonstrated by environmental performance indicators.

6.7.1.3. Variations from Proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.

6.7.2. Environmental Performance – Flora

6.7.2.1. Monitoring

Monitoring and management of flora continued in accordance with the requirements of the FFMP (Section 6.7.1.1), the BOMP and the RMP during the 2021 reporting period.

Flora monitoring was conducted during the reporting period in accordance with the RMP, though some was heavily impacted by flooding in 2022, including within the following areas:

- Compensatory Wetland (CW);
- Rehabilitation areas and rehabilitation trial areas;

- Offset management areas;
- *Pilularia novae-hollandiae* (Austral Pillwort) habitat; and
- RVEP areas (Figure 5).

6.7.2.2. Performance Outcomes

Flora monitoring within the CW and RVEP areas was undertaken by DnA Environmental (2023b & 2023d) during the 2022 reporting period. A summary of the results from this monitoring survey are outlined below.

Compensatory Wetland

Historically the range of ecological characteristics have been significantly impacted on by fluctuating water levels associated with the wetting and drying cycles of the lake.

During 2017 - 2019, the drought combined with increased grazing by macropods resulted in decline in numerous characteristics of lake foreshore communities, however, water receding from the lakebed also led to an increase in other ecological attributes in the wider lakebed communities, including development of vast ephemeral grasslands and significant regeneration of a variety of wetland trees and shrubs. Many old growth trees however were becoming senescent (aging process) and/or deteriorating in condition due to a combination of factors, including grazing, drought and storm damage.

In 2020 and 2021, there had been above average rainfall and the lake was relatively full in those two monitoring years. In 2021 the monitoring reference points were partially under water, but nonetheless the data demonstrated significant growth of vegetation on upper banks and floodplains, including desirable native perennial ground covers. Mature trees and shrubs showed improved in health since the drought, with many bearing reproductive structures. Saplings from previous regeneration events that were tall enough (>2.0m), where at the time considered likely to survive the 2021 period of inundation but that prognosis may not be valid with flooding in 2022. Nonetheless the 2020 and 2021 data indicated period of regeneration events of primary wetland species, which have been strongly impacted on by seasonal conditions and resultant water levels.

Monitoring was attempted in 2022 but with no access to reference points photographs were collected from adjacent locations. A selection of these photos is provided in Plate 1 below.

No threatened species have been recorded in any Compensatory Wetland monitoring site since monitoring began in 2005.

In 2020 and 2021, Lippia (*Phyla canescens*) was found along lake edges and then at Transect 31 in 2021. Whilst no difference in weed abundance was observed from 2020 to 2021, an assessment couldn't be made in 2022. It is expected that continued weed control will be required.

The results to date of 2020 and 2021 that indicated significant improvement in the health of the lake and the lake foreshore environments could not be validated in 2022. It is expected that the nature of flooding in 2022 will broadly enhance the colonisation of native perennial grasses and natural regeneration of endemic lake species including River Red Gum, Lignum and Native Liquorice however the regional nature of inundation may cause localized impacts. Most changes in the wetlands have occurred as a result of climatic and biophysical factors rather than directly from CGO intervention.

Plate 1: Selection of Photos from Compensatory Wetland Monitoring 2022
(Photos by DnA Environmental 2023b)

Reference site (RLake01) near "Lakeside" homestead	Near 'Lake Cowal" Homestead	Reference point NWRE looking northeast
		

Pilularia novae-hollandiae (Austral Pillwort) Habitat

Annual surveys conducted between 2006 – 2021 failed to locate Austral Pillwort in Lake Cowal area despite extensive and targeted searches.

As areas largely remained free from livestock grazing since inception of the mine, there has been increasing levels of competitive ground that has reduced availability of suitable habitat for the Austral Pillwort and made it hard to see them during surveys if present. Drought conditions during 2017 – 2019 resulted in increased grazing and disturbance in most areas around Lake Cowal, reducing abundance of competitive ground covers and associated deep litter layers thus increasing the area of suitable habitat, when seasonal conditions returned. So whilst rainfall has improved since 2020 and there is optimum potential habitats available, it is likely that if Austral Pillwort were present the specific habitat has been under water at time of the early survey attempts.

This year flooding and excess surface water had again filled gilgais, resulting in another nil result in survey effort in early November.

CGO commissioned additional external independent consultants to re-survey a short time after November 2022 survey as hotter and drier conditions had resulted in water levels in many of gilgais to recede, providing optimum Austral Pillwort habitat. Full results of surveys and resultant habitat distribution at Lake Cowal are to be provided by EMM Consulting in the 2023 Annual Review.

Despite many historic annual surveys failing to find Australia Pillwort since 2006, it appears that Austral Pillwort continues to populate the Lake Cowal area and reinforces the requirement for Austral Pillworts particularly specific and short habitat requirements. This year additional information about these habitat requirements was gained and future surveys may need to be adjusted to accommodate these. In addition, improved surveys and recording methods will be advantageous to monitoring and managing these small populations.

Remnant Vegetation Enhancement Program (RVEP)

Six permanent monitoring sites, Hill01, Hill02, Hill03, Hill04, RVEP3 and RVEP4 are surveyed annually (when accessible) to monitor changes in vegetation cover, species diversity and to determine extent of regeneration occurring within these conservation areas. The monitoring methodology is a simplified version of CGO annual rehabilitation monitoring program and includes an assessment of ecosystem characteristics using an adaptation of methodologies derived from CSIRO Grassy Woodland benchmarking project and associated Biometric Model. It does not include Landscape Function Analysis or comprehensive soil sampling. RVEP monitoring has been undertaken in spring, with 2022 monitoring undertaken during November. This year due to flooding, only four sites situated on Fellman's Hill (RVEP1) were able to be assessed.

Despite loss of several individuals because of drought induced mortality in 2021, highest stem densities continued to be recorded in Hill03 (51 live individuals), with several new individuals this year due to increase in growth of saplings. There has been no further change in tree densities in the remaining Hill sites which had densities of between 4 and 18 trees.

In Hill sites, the most common trees were *Eucalyptus dwyeri* (Dwyer's Red Gum), *E. microcarpa* (Grey Box), *E. sideroxylon* (Mugga Ironbark), *Geijera parviflora* (Wilga), *Alectryon oleifolius* (Rosewood) and *Allocasuarina*

verticillata (Drooping Sheoak). Mature shrubs were *A. doratoxylon* (Spearwood) and *Pittosporum angustifolium* (Butterbush). In sites RVEP3 & 4 trees included old growth *E. camaldulensis* (River Red Gum).

All RVEP sites contained a population of shrubs and juvenile trees (dbh<5cm) with densities being highly variable across range of sites. In 2019, densities of shrub and juvenile trees in Hill01, Hill02 and Hill03 tended to decline since 2013 due to prolonged dry combined with increased grazing pressure by resident macropods. In 2020, there was a significant increase in seedling densities in Hill01 and Hill03 and a minor increase in Hill04, however there were fewer in Hill02. This year additional seedlings were recorded in Hill02, Hill03 and Hill04, however fewer were recorded in Hill01, perhaps due to difficulty finding them amongst dense grassy understorey. This year shrub and juvenile tree densities ranged from 8 to 262.

In Hill sites, the most common shrub species recorded were *A. doratoxylon*, *A. deanei*, *Cassinia laevis* (Cough Bush) and this year an *Acacia pravifolia* (Coil-pod Wattle) seedling was found in Hill02. Juvenile *Allocasuarina verticillata*, Callitris glaucophylla, *Geijera parviflora*, E. dwyeri were also recorded in low densities in some sites.
A single *Lycium ferocissimum*, a priority weed was recorded at Hill04.

In 2019 floristic diversity was at its lowest since monitoring began and was especially low in Hill RVEP sites where there were only three species recorded in both Hill01 and Hill03. There was a higher number in transitional woodland/grassland sites Hill02 and Hill04 with 14 and 23 species respectively. In 2019, in RVEP3 and RVEP4 there were 23 and 17 species recorded respectively. This year, there has been a significant increase in floristic diversity with highest diversity being recorded in Hill02 and Hill04. In 2021, there was a significant increase in floristic diversity in all sites. This further increased in 2022 to the point that diversity was the highest it has been in three Hill monitoring sites. Sites Hil02 and Hill04 were particularly diverse with 63 and 74 species respectively, with between 26 and 32 species in Hill01 and Hill03.

Since 2020, there was significant improvement in ground cover abundance and diversity because of improved seasonal conditions and relaxation in grazing pressure. However a minor decrease was recorded in Hill01 and Hill03 this year due to disturbance by macropods. Total ground covers in Hill woodland sites during 2022 ranged from 88-96%. Continued monitoring of macropod populations and their effects on the condition of the vegetation will be required.

Vegetation Clearance

The only vegetation cleared within 2022 was removal of single trees to facilitate safe access to areas of site. These trees were all in areas of previously VCPs, where the trees had not been felled due to accessibility issues cause from rainfall events throughout the year.

6.7.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.7.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.8. BIODIVERSITY OFFSET AREAS

Development Consent Condition 3.4 details requirements for CGO in relation to biodiversity offset strategy. A BOMP has been developed for CGO in accordance with Development Consent Condition 3.4(c). The BOMP has also been prepared to reflect approved biodiversity offset strategy described in subsequent Environmental Assessments and approvals.

Monitoring and management of biodiversity offset areas continued in accordance with the requirements of the BOMP and Development Consent during the reporting period.

6.8.1. Environmental Management

6.8.1.1. Control Strategies

The Biodiversity Offset Strategy is described in the BOMP and includes:

- a description of the offsets.
- objectives for the offsets.
- short, medium and long-term management measures and performance criteria.
- a description of how the strategy integrates with the CGO's rehabilitation programme.
- a monitoring program.
- revegetation and regeneration performance indicators and completion criteria.
- details for the long-term protection mechanism for the offset areas; and
- the conservation bond requirements relevant to implementation of the biodiversity offset strategy.

The following control strategies were implemented at the CGO during the reporting period:

- Offsets for existing areas have been secured.
- Seeking to confirm locations of new offset areas, progress securing tenure and calculating the required bond/ credits (Figure 16).
- Weed management and pest control was attempted but impacted by access challenges from high rainfall and flooding. It is anticipated to resume in 2023 with improved conditions and access.
- Offset monitoring program.

6.8.1.2. Effectiveness of Control Strategies

The control strategies implemented during the reporting period were effective as demonstrated by the environmental performance indicators.

6.8.1.3. Variations from Proposed Control Strategies

Evolution completed a cull of Eastern Grey Kangaroos within Felman's Hill area in 2017 and 2018, as the population became unsustainable. CGO applied for 200 drop tags from Griffith NSW National Parks & Wildlife Services prior to conducting the cull. No Culling program has occurred since 2020 due to extreme wet weather deeming the properties inaccessible but would be considered if macropod numbers continue to increase and access can be attained.

6.8.2. Environmental Performance – BOA

As required by Development Consent Condition 3.4(b), Evolution is required to enter into a Voluntary Planning Agreement (VPA) with the NSW Minister for Planning to secure tenure over 440 hectares (ha) of land to the north and south of ML 1535 as a biodiversity offset for the CGO. Additional offset areas proposed through MOD14 (Figure 5) are currently under review, pending consultation with Bland Shire Council (BSC). DPE provided an extension to the retirement deadline for the MOD14 offsets by the end of October 2022.

6.8.2.1. Monitoring

Monitoring and management of the offset management areas continued in accordance with the requirements of the BOMP during the reporting period, though some monitoring locations could not be accessed.

6.8.2.2. Performance Outcomes

In 2022, biodiversity offset monitoring was undertaken by DnA Environmental (2023a). The monitoring methodologies are consistent with the Biodiversity Offset Management Plan (BOMP) and with other CGO programs and includes Landscape Function Analyses (LFA); accredited soil analyses; and an adapted Biometric Assessment Method (BAM).

No rills were recorded in the Northern or Southern Offset Areas, neither where any threatened species.

Ground cover, after declines due to impacts of drought and grazing between 2017 and 2019, have continued to show improvement. This has meant that all slope and hill offset sites (except SOA03) have continued to show improved higher ecological function.

All of the Northern and Southern Offset sites have elevated levels of iron and iron concentrations but these results are also seen in all of the hill woodland reference sites, suggesting that these elements may naturally occur in elevated levels in the Lake Cowal environment.

In terms of meeting completion targets there was an absence of mature trees and shrubs and associated structure and habitat requirements in all NOA and SOA monitoring sites. In most NOA and SOA enhancement areas additional revegetation activities will be required as density and diversity of existing mature seed producing trees and shrubs is low and little natural regeneration has occurred despite exclusion of grazing for many years. Revegetation activities undertaken in the western paddock of the Southern Offset Area which occurred in 2017 have shown ecological succession towards more mature tress and shrubs. The activities undertaken in this area have validated an approach that can commence in other parts of the offset areas when long term meteorological conditions appear appropriate for seeding.

A broader summary of trends from monitoring the Southern and Northern Offset are outlined in the sections below.

6.8.2.3. Northern Offset Area

The Northern Offset Area (NOA) are focused on ‘Slope Woodlands’ landscapes and contain approximately 74 ha of Weeping Myall Woodland Endangered Ecological Community (EEC) listed under both the Commonwealth Environment Protection and the Biodiversity Conservation Act, 1999 (EPBC Act) and the NSW Biodiversity Conservation Act, 2016 (BC Act) and approximately 1 ha of Grey Box Woodlands EEC listed under the EPBC Act.

Floristic species diversity in NOA sites followed similar trends to reference sites as a result of changing seasonal conditions. This year there were 47 – 54 species (slightly down from 52 – 58 in 2021) species in the NOA sites, with 17 – 18 (reduction from 17 – 20) of these being exotic species. This year native plants provided 74% (down from 88% in 2021) of the live plant cover in the reference site, while there was an improvement to 67% (from 59% in 2021) native plant cover in the offset sites. Hence whilst there is still an issue with exotics; comparatively the reference sites and offset sites are becoming comparable.

Ground cover as an ecological indicator on an annual basis may not reflect the wholistic situation as drier conditions typically increase the proportion and percentage of live native species, whereas the opposite is true in wetter conditions where weeds increase in abundance. This year native plant ground cover in reference sites was 79% compared to 31-39% in NOA sites. The exotic species of concern included Wild Oats (*Avena fatua*), Wimmera Ryegrass (*Lolium rigidum*) and Crested Speargrass (*Austrostipa blackii*). CGO is committed to continue to carefully implement weed management with a combination of chemical and physical control necessary. Chemical control will continue to ensure no spray drift onto non-target species especially old growth paddock trees. Physical removal will be needed to be coupled with replacement of shrub thicket habitats.

The soil in the NOA slope monitoring sites tended to be slightly to moderately alkaline, saline and low in organic matter.

6.8.2.4. Southern Offset Area

The Southern Offset Area (SOA) are focused on ‘Hill Woodlands’ landscapes but include some ‘Slope Woodland’ landscapes. The SOA contains approximately 122 ha of Weeping Myall Woodland EEC listed under both the EPBC Act and the BC Act, and approximately 150 ha of Grey Box Woodlands EEC listed under the EPBC Act.

These areas have been defined as offset enhancement areas. The cleared 100 ha of agricultural land mapped as Spear Grass – Windmill Grass Grassland to the west of Fellman's Hill in the SOA has been identified as the offset revegetation area.

The SOA monitoring sites are situated in old cropping paddocks and have become stable due to the relatively high levels of litter largely derived from dead annual plants and hard compacted soils. In previous years, the four SOA's have remained as well vegetated grassland areas with 100% functional patch areas, despite grazing by livestock in SOA03 and SOA04 in 2016. This year an increase in total ground covers was recorded in all reference and offset sites.

Floristic species diversity in SOA sites followed similar trends to reference sites as a result of changing seasonal conditions. This year there were 43 – 62 species (a slight improvement from 41 – 58 species in 2021) species in the SOA sites, with 11 – 22 (similar to 10 – 21 in 2021) of these being exotic species. As a consequence the percentages of native species in SOA sites has slightly improved (62% – 73%), however this still compares unfavorably to the 68% to 76% relative percentages in reference sites.

This year there has been a decrease in ground cover in SOA sites, with sites having 15% to 38% perennial cover compared to 16% and up to 46% in reference sites. This has seen an increase in dead leaf litter of between 30% and 54% and annuals displacing perennials in the remainder of SOA areas. It is likely the prevalence of annuals is a consequence of the agricultural history of the SOA and native perennials will recover during drier periods and with appropriate weed control.

Soil pH in the Grey Box Woodlands was higher compared to the Dwyer's Red Gum, but collectively the soil pH ranged from 4.6 – 5.9. The soils in the Grey Box Woodlands were moderately to strongly acidic, while in the Dwyer's Red Gum Woodland the soils were very strongly acidic (Bruce and Rayment 1982). The soil pH recorded in the southern offset sites ranged from 6.0 – 6.9 and were moderately acidic to neutral and within desirable agricultural ranges.

All SOA sites had an Electrical Conductivity (EC) comparable to the local woodlands and are non-saline.

SOA hill woodlands have similar diversity of native species as reference sites, there has been an increase in exotic species during the year. Of particular concern *Lycium ferocissimum* (African Boxthorn), a priority weed was recorded in four sites (SOA04, 05, Grey02, RSlope01). CGO is committed to continue to carefully implement weed management with a combination of chemical and physical control necessary. Chemical control will continue to ensure no spray drift onto non-target species, especially old growth paddock trees. Physical removal will need to be coupled with replacement of shrub thicket habitats.

6.8.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.8.4. Further Improvements

Additional Woodland reference sites are needed to provide a robust range of independent control sites. Attempts have been made to identify suitable sites and this will continue in 2023.

6.9. FAUNA

As outlined in Section 6.7, Development Consent Condition 3.2 details requirements for CGO in relation to management of flora and fauna. A FFMP and TSMP have been developed for CGO in accordance with Development Consent Conditions 3.2(b) and 3.2(c), respectively. The FFMP has also been prepared to address relevant requirements of ML 1535.

Monitoring and management of fauna continued in accordance with requirements of the FFMP, TSMP, BOMP and RMP during this reporting period.

6.9.1. Environmental Management

6.9.1.1. Control Strategies

Relevant control strategies for management of fauna species are described in the FFMP, RMP and BOMP though in summary include:

- implementation of conservation and enhancement initiatives via compensatory wetland and remanent vegetation enhancement (CWMP and RVEP).
- incorporation of fauna management initiatives during operational design.
- implementation of vegetation clearance protocols including pre-clearance surveys (see VCP for detail).
- implementation of specific controls for threatened species (see TSMP).
- management of impacts on terrestrial and aquatic fauna.
- rehabilitation of disturbance areas.
- weed management and pest control.
- fauna monitoring program.
- maintaining a clean, rubbish free environment to discourage scavenging.
- prohibition for introduction of animals including domestic pets on ML 1535.
- imposing speed limits within ML 1535 to reduce the risk of fauna mortality via vehicular strike; and
- provision of information relevant to the management of native fauna during employee and contractor inductions.

6.9.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by the environmental performance indicators.

6.9.1.3. Variations from proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.

6.9.2. Environmental Performance – Fauna

6.9.2.1. Monitoring

In accordance with the FFMP, monitoring activities in relation to fauna were conducted during this reporting period, including:

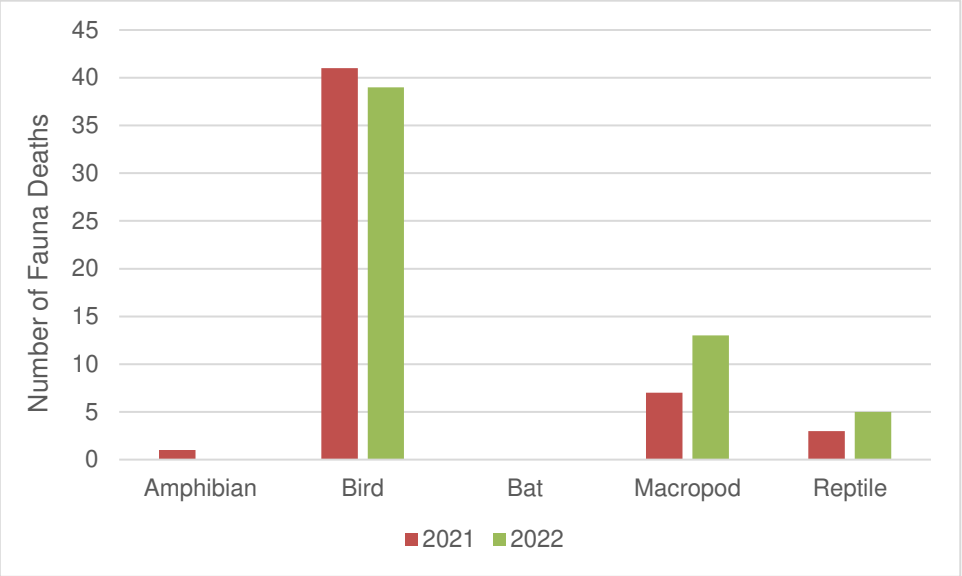
- continuation of long-term monitoring of bird breeding.
- bat call monitoring at the active TSF and control site.
- twice daily monitoring of any fauna usage of the IWL.
- weekly boundary inspections of ML 1535.
- daily and weekly fauna incident inspections and field patrols.
- annual compensatory wetland habitat and fish investigation.

6.9.2.2. Performance Outcomes

Reported Fauna Deaths

There was a total of 57 fauna incidents on ML 1535 during the reporting period (Graph 10), which was consistent with 52 fauna deaths recorded during 2021. All injured or deceased fauna were taken to the local vet for examination as required (i.e. in instances where cause of death cannot be immediately determined). There were no cyanide related fauna incidents or deaths recorded during 2022.

Graph 10: Number of Fauna Deaths for the Reporting Period



Lake Cowal Waterbird Monitoring

Long-term monitoring of bird breeding continued during 2022 with specific programs undertaken in January, February, August, October & November 2022. A summary of monitoring results undertaken by Malcom Carnegie and Professor Peter Gell (Diatoma 2022a, 2022b, 2022c) during the reporting period is provided below. The location of waterbird monitoring transects are presented on Figure 8.

January & February 2022

Lake Cowal was visited on 21 – 23 January 2022, with water levels increased since low levels in 2021 and were considered close to lake capacity. Transect lines were surveyed on foot and birds observed with aid of binoculars. In addition to the January survey, colonial breeding areas on northern parts of Lake Cowal were surveyed by boat on 11 February 2022. Water levels remained high, and there was much activity in the colonial breeding areas.

A total of 37 species were observed exceeding previous 'January' counts since 2011. In contrast a total of 1832 birds was low relative to counts since 2010 (Diatoma, 2022a). Transect 7 supported the greatest number of species (32) and Transect 8 the greatest number of birds (669).

High lake levels reduced extent of shallow water around the lake margins and so there were few small wading species observed. Birds typical of infilling events, including Hoary-headed and Great-crested Grebes, and White-necked Heron, were common. Other deep water species such as grebes and Eurasian Coot were common and diving ducks were observed.

Despite no Australian Pelicans being recorded, the diversity and number of fish-eating birds was higher than in October 2021 and proportions of these species is likely to increase as this high lake phase continues. Colonial breeding had recommenced in October 2021 and was now active with over 16,000 nests observed. Grebes, ducks, Black Swan and gallinules were recorded breeding.

An extensive cyanobacterial ('blue-green algae') bloom was observed on Transect 1 (Figure 8). Several dead fish (carp, goldfish) were observed nearby. Several dead waterbirds were also observed across the transects including Hoary-headed Grebe, Grey Teal, Chestnut Teal; Pink-eared Duck, Australian Wood Duck, Eurasian Coot, Purple Swamphen, Australian White Ibis and Straw-necked Ibis. An injured Royal Spoonbill was observed on Transect 8. Cyanobacteria are known to bloom during warm, still conditions after major runoff events. The number of fish and bird kills are unusual however, and may mark the influx of high loads of nutrient runoff.

August 2022

Lake Cowal was visited on 25 – 28 August 2022. Lake levels remained high and so it was possible for the original survey lines to be followed with transects situated around the lake margins. They were surveyed on foot and all birds observed between water's edge and up to 400 m into Lake Cowal, were noted. Few birds were observed visiting areas that typically host colonial breeding despite the high water levels.

As lake waters were high the margins of Lake Cowal were inundated. Ongoing rain had continued to promote grass growth around margins of the lake.

A total of 27 species were observed along transects, which is among the lowest of August tallies since refilling in 2010 (Diatoma, 2022b). The total of 564 birds observed was also the lowest for this seasonal period. Transects 2 and 7 (Figure 8) supported the greatest number of species while Transect 7 the greatest number of birds.

The species recorded most were Australian Pelican (41), Hoary-headed Grebe (63), Pacific Black Duck (55), Grey Teal (136), Black-tailed Native-Hen (69), and Eurasian Coot (95). The bird assemblage at Lake Cowal supported low numbers of fish-eating species (9.6%) and almost no small wading species. The assemblage was dominated by ducks (43.4%) and waterhens (30%) (Diatoma, 2022b). This assemblage is typical of high water levels with little mudflat habitat available for waders.

The species count was lowest August tally (2010 – present) for Grey Teal, second lowest for Pink-eared Duck, Eurasian Coot and White-faced Heron and third lowest for Australian Wood Duck. It was the first time since 2010 that no Masked Lapwings were recorded. By contrast, it was third highest tally for Black-tailed Native hens since 2010.

Several species were observed in colonial breeding areas at the northern end of the lake. However colonial breeding rarely commences in August. Typically, it is greatest when the lake level is high and is not declining so the August 2022 infilling phase was considered likely to stimulate widespread breeding during spring.

October & November 2022

Lake Cowal was visited on 19, 22 and 26 October 2022. Lake levels were 30 cm higher than previous record levels in November 2016. Transect lines (Figure 8) were surveyed on foot and birds observed with aid of binoculars. In addition to the October survey, colonial breeding areas on northern parts of Lake Cowal were surveyed by boat on 17 November 2022.

A total of 28 species were observed along transects (Diatoma, 2022c). Only twice since 2010 have fewer species been recorded in October surveys. The total of 428 birds observed was also substantially lower than any October survey taken since 2010. High water levels typically support fewer birds, and a lower diversity, as many habitats (mudflats, cane-grass, lignum) are inundated. Transect 8 supported greatest number of species (19) and greatest number of birds (208).

The most recorded species were Pacific Black Duck (41), Grey Teal (101), Intermediate Egret (49) and Straw-necked Ibis (45). The assemblage is characterised by a low number (< 3%) of small wading species. This is due to inundation of lake margins which provide shallow water habitat at lower water levels. Larger wading birds (egrets, herons, ibis, spoonbills) were well represented (33%) as were duck species (46%). These proportions reflect the deeper nature of the lake and limited availability of shallow water habitat for wading birds.

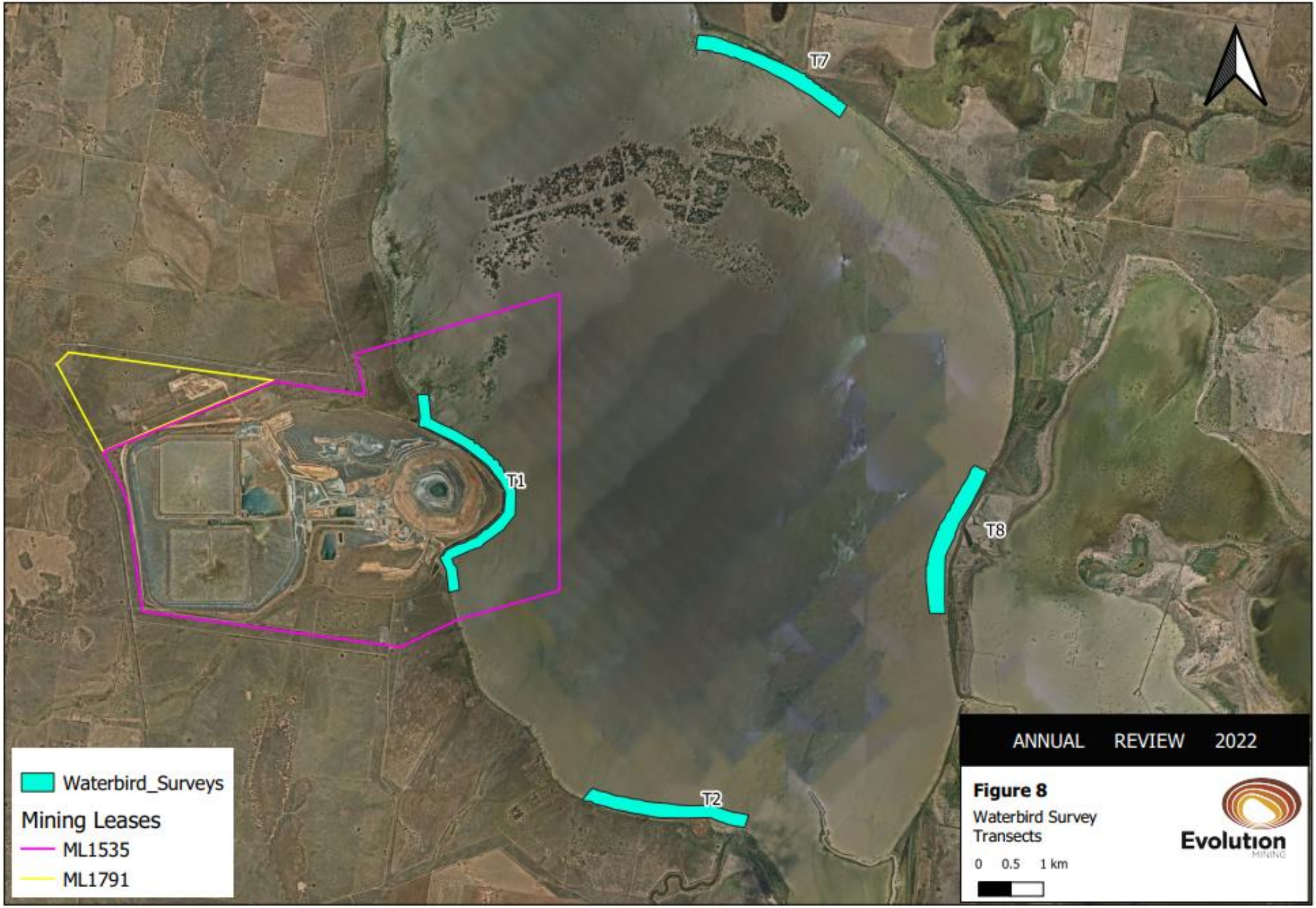
Numbers of Great Egret and Intermediate Egret were the highest for October since filling in 2010 (Diatoma, 2022c), while higher Straw-necked Ibis numbers were only recorded in the previous October. Species that are commonly recorded in October, but were absent or rare in this survey, included cormorant species, Hoary-headed Grebe, Australasian Grebe, Australasian Shoveler, Yellow-billed Spoonbill, Black-winged Stilt and Whiskered Tern.

Colonial breeding

Colonial breeding usually occurs in October in all years where water levels were high and rising, and surveys have been timed to suite this cycle. It was anticipated that observations of breeding activity in twelve species would occur. Large numbers of Straw-necked Ibis were observed in stands of lignum in Coniston Lake (Diatoma, 2022c). Several species were observed breeding along survey transects, and during colonial breeding survey. Ten juvenile Grey Teal were observed at Transect 8 along with two nests of Pink-eared Duck. A pair of Freckled Duck were observed breeding on Coniston Lake. Six juvenile Eurasian Coot were seen on Transect 1.

Colonial breeding had recommenced with almost 1200 nests observed. Ongoing rise in water levels inundated most nests (Plate 2) and substantial losses were observed.

Plate 2. Straw-necked Ibis nest with adult and young at water level

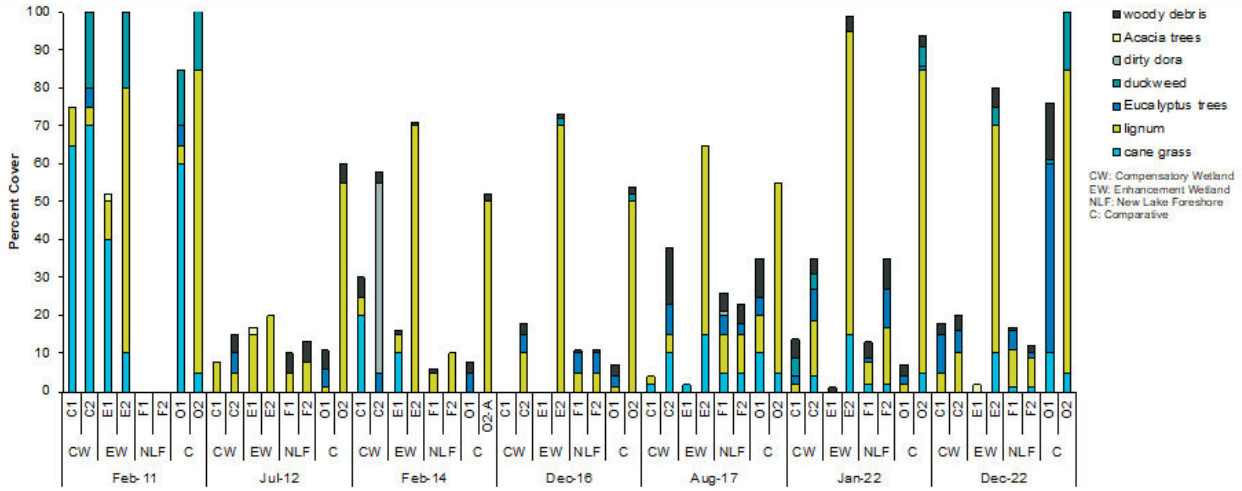

T7
T1
T8
T2
Waterbird_Surveys
Mining Leases
ML1535
ML1791
ANNUAL REVIEW 2022
Figure 8
Waterbird Survey Transects
0 0.5 1 km
Evolution MINING

Compensatory Wetland Habitat and Fish Investigation

A compensatory wetland habitat and fish investigation was conducted during December 2022, in accordance with the requirements of the CWMP and DA14/98. Survey work was conducted from 6th to 8th December 2022 while the lake was substantially inundated. FRC Environmental previously undertook similar assessments in 2011, 2012, 2014, 2016, 2017 and 2022 (12th to 15th January).

Fish communities and habitat for aquatic fauna were assessed at sites within Compensatory Wetland, Enhancement Wetland and New Lake Foreshore areas (Graph 11). Comparative sites were also assessed within areas of Lake Cowal next to ML1535 to provide comparative data regarding fish communities and aquatic habitat of the lake. In December 2022, the water levels were high and the habitat available to fish was limited to lignum, eucalypt trees, woody debris, and patchy cane grass. There was some duckweed at three sites. Water levels were higher than in January 2022, making it difficult to spot non-floating cane grass. Two had very low aquatic habitat cover, while one site had no visible aquatic vegetation present. Dense lignum growth present at two sites provided moderate aquatic habitat cover for fish species.

Graph 11: Percent cover of vegetation and large woody debris at each site from 2011 to 2022.



Diversity of fish species in Lake Cowal in the recent survey was moderate compared to historical studies. Four (4) native species (carp gudgeon, flathead gudgeon, golden perch, and Australian smelt) and three (3) introduced species (European carp, goldfish and eastern Gambusia) were caught in December 2022 (FRC 2023). The native fish community was highly variable, with only carp gudgeon caught in each survey. The December 2022 survey was the first recorded identification of golden perch in Lake Cowal since FRC Environmental surveying began. Community composition of fish in surveys was similar to community composition of fish recorded elsewhere in areas of the Murray-Darling Basin that experience adverse environmental conditions (i.e. ephemeral waterbodies, high water temperatures, low percent saturation of dissolved oxygen) (Gilligan, 2005). Such communities are often dominated by eastern Gambusia with some native carp gudgeon, and occasionally, other tolerant, small-bodied species, such as introduced goldfish (FRC 2023).

Variation in fish communities between surveys (i.e. temporal variation) was slightly greater than variation among sites or among the fish habitat management areas (i.e. Compensatory Wetland, Enhancement Wetland, New Lake Foreshore and comparative) within each survey (i.e. fish communities were relatively homogeneous among sites during each survey event, but fish communities were subtly different between surveys). However, it is important to note that different fishing methods were used across the surveys (FRC Environmental, 2023) and this may contribute to the observed temporal variation in fish communities.

During the late summer surveys (i.e. February 2011 and February 2014) and late winter survey (August 2017) all sites, excluding the two dry sites in February 2014, had juvenile, intermediate and adult fish. In contrast, mostly adult fish, with some intermediates and very few juveniles were caught during the January and December 2022 surveys and mostly adult fish and only one intermediate individual (i.e. no juveniles) were caught during the mid winter survey in July 2012.

No dead fish were noted in the December 2022 survey and all fish caught were generally healthy and without noticeable signs of disease, parasites or malformations.

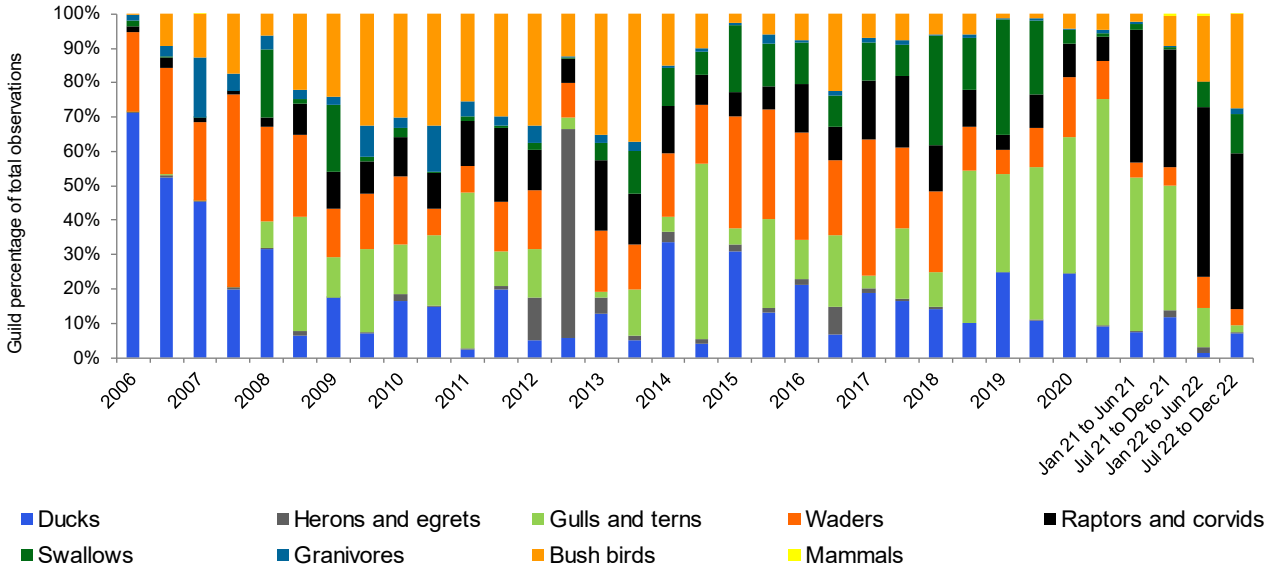
Fauna Monitoring of IWL and ML 1535 Boundary

Fauna observations during 2022 boundary inspections were lower than in 2021 as the route had to be modified to all weather roads, avoiding the full mining lease boundary. This modification resulted in a smaller area of cover and hence less habitat to identify fauna species. Detailed fauna usage reports in relation to the active IWL areas were prepared by Donato Environmental Services (DES) (2022; 2023) during the reporting period being, 1 January to 30 June 2022 and 1 July 2021 to 31 December 2022, respectively.

The main findings included:

- With the exception of an isolated incident on 25th March 2022 (Section 6.6), the cyanide discharge concentrations were below those required by the Development Consent.
- Monitoring of cyanide concentrations within the active IWL and other water bodies has been conducted frequently and at a high standard consistent with industry best practice.
- Construction of the new IWL perimeter fence and the access road was progressing, but not completed.
  - In February, missing or unattached fine mesh (vermin mesh) at the base of the primary fence were identified. By June correction of these issues had commenced in line with scheduled fence building activity.
  - The February inspection observed large washouts under sections of the fence where surface water flowed during heavy rainfall events, by June these had been repaired. The fence is now being installed with a skirt covered with gravel, which should further reduce the possibility of rainfall washouts. The vermin mesh fence is still to be completed in isolated sections and open trenches still exist in several sections of the fence.
- Considering currently accepted knowledge of cyanide toxicosis in the gold industry, the range of concentrations reported at CGO are considered benign to wildlife (DES, 2022).
- No cyanide-related wildlife mortality or effect was recorded at the IWL.
- CGO processing personnel (mill technicians) conducted twice-daily routine inspections for wildlife at the IWL on 718 occasions from a possible 365 days (98%) during 2022. The frequency of systematic wildlife surveys makes it unlikely that cyanide-related wildlife deaths were occurring undetected.
- Birds were the most common diurnal vertebrate wildlife recorded alive visiting and interacting directly with the IWL during the 2022 monitoring period. Birds were identified from eight guilds, in varying abundances, at the active IWL (Graph 12).
- Lake Cowal is described as at capacity with abundant activity in the breeding colonies. At capacity there is limited shoreline for waders and dabbling ducks, which is reflected in the low visitations of these guilds at the IWL (DES, 2023).
- There are environmental influences that cause fluctuations in wildlife visitations. The previous mouse plague in 2020 and early 2021 contributed to high visitations of raptors and corvids, the most frequently recorded guilds.
- In the first half of 2022, wildlife observations have stabilised, as scavenger prey oscillates between a dwindling mouse population and an increasing waterbird fledgling population. The overall composition since April 2006 has also changed, with a more even distribution between the eight guilds becoming more evident in recent years (Graph 12). In the second half of 2022 the bushbird guild has increased by a third, likely influenced by high rainfall. Interestingly gulls and terns have significantly fallen in number.
- No insectivorous bat deaths were recorded at the IWL during the 2022 monitoring period or since systematic wildlife monitoring commenced in April 2006.
- Nocturnal surveys, including echolocation call recording methods, indicate that insectivorous bats were consistently present in the airspace above the active IWL and the control site.
- Monthly nocturnal surveying conducted at CGO represents a proactive approach to environmental monitoring.

Graph 12: Guild-specific percentages of total wildlife observations recorded at the active IWL cell



6.9.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.9.4. Further Improvements

No further improvements are proposed for the next reporting period, however CGO and DP&E are in negotiations about broader changes to IWL TSF monitoring program.

6.10. WEEDS AND PESTS

General weed and pest management activities within ML 1535 and biodiversity offset areas have been managed during this reporting period in accordance with the Land Management Plan (LMP), the FFMP and the BOMP.

6.10.1. Environmental Management

6.10.1.1. Control Strategies

In accordance with the LMP, FFMP and BOMP, control strategies for weed management on Evolution owned land (as well as biodiversity offset areas) include in summary the following:

- identification of weeds by regular and annual site inspections.
- communication with other landholders/leaseholders and regulatory authorities to keep weed management practices in line with regional weed control activities.
- mechanical removal of identified noxious weeds and/or the application of approved herbicides in authorised areas (herbicide use in wetland areas will be strictly controlled).
- implementing follow-up site inspections to determine effectiveness of weed control measures; and
- pest control activities.

Implementation of weed management strategies typically occurs according to seasonal and climatic requirements.

Pest control activities within ML 1535, ML 1791 and offset areas described in LMP, FFMP and the BOMP include in summary the following measures:

- regular property inspections to assess status of pest populations within Evolution owned land;
- mandatory pest control for declared pests (i.e. rabbits, foxes, pigs and wild dogs) in accordance with Pest Control Orders under NSW Local Land Services Act, 2013; and
- inspections to assess effectiveness of control measures implemented and review these if necessary.

6.10.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.10.1.3. Variations from Proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.

6.10.2. Environmental Performance – Weeds & Pests

6.10.2.1. Monitoring

In accordance with the LMP, the FFMP and the BOMP, Evolution has implemented a weed monitoring program at CGO. Evolution-owned land including biodiversity offset areas continue to be surveyed for weeds annually. Follow-up inspections are also made in specific areas following implementation of weed control measures (to assess the success of weed controls). Weed monitoring is conducted by suitably qualified personnel from a slow-moving vehicle or on foot.

Weed monitoring includes identification of:

- extent of weed occurrence (noxious or otherwise).
- details of weed distribution (i.e. locations of infested areas) and possible reasons for any infestations (e.g. a change in land use practices).
- optimum herbicide application or physical removal timing (for implementation of controls).
- any resistance to an herbicide type or herbicide application technique (on the basis of success of previous controls); and
- identification of any new weed species that may be carried into the CGO area on vehicles accessing the site and become established near the vehicle wash-down area.

6.10.2.2. Performance Outcomes

Weed Management

During 2022 the wetter, cooler conditions were expected to favour annual exotics species. Coupled with this, large portions of Evolution Mining leaseholds were inaccessible as the boggy ground conditions made weed control unsafe for both vehicular and personnel on foot. It is in this context that the annual weed survey was undertaken between 5 – 8 December 2022.

One species of Priority Weed for the Riverina Local Land Services Area, African Boxthorn (*Lycium ferocissimum), was recorded (NGH, 2023).

Eight species listed as weeds of concern under the Riverina Regional Strategic Weed Management Plan (RRSWMP) 2017 – 2022 were identified during the 2022 survey and exhibited the following trends:

- African Boxthorn (**Lycium ferocissimum*). A comparison of 2021 to 2022 weed surveys shows an increase in abundance of African Boxthorn, and continued weed control is required.
- Bathurst Burr (**Xanthium spinosum*). Bathurst Burr had a stable trend between 2021 and 2022 but is known to easily spread as burrs adhere to vehicles tyres, livestock and other animals.
- Galvanised Burr (*Sclerolaena birchii*). Galvanised Burr had a stable trend between 2021 and 2022 but is known to easily spread as burrs adhere to vehicles tyres, livestock and other animals.
- Horehound (**Marrubium vulgare*). Horehound was not recorded during 2021 but in 2022 it was found in three transects, hence showing an increase between sample years.
- Paterson's Curse (**Echium plantagineum*). Paterson's Curse had a stable trend over reporting periods.
- Scotch Thistle (**Onopordum acanthium*). Scotch Thistle had a stable trend over reporting periods.
- St John's Wort (**Hypericum perforatum*). A slight increase in abundance of St John's Wort between 2021 and 2022.
- Treasure Flower (**Gazania linearis*). Treasure Flower was not recorded during 2021 but was in 2022, hence showing an increase between sample years.

Eleven other weed species were identified during the 2022 survey period. These species are not listed as priority weeds or weeds of concern under the RRSWMP 2017 – 2022 and included (with trend between 2021 & 2022):

- Aaron's Rod (**Verbascum thapsus*). Increasing trend.
- Black Roly-poly (*Sclerolaena muricata*). Slightly increasing trend.
- Camel melon (**Cucumis sp.*). Increasing trend.
- Common Nightshade (**Solanum nigrum*). Stable trend.
- Fleabane (**Conyza sp.*). Significant increasing trend.
- Malta Thistle (**Centaurea melitensis*). Malta Thistle was not recorded during 2021 but was in 2022, hence an increasing trend between sample years.
- Narrow-leaved Cotton Bush (**Gomphocarpus fruticosus*). Narrow-leaved Cotton Bush was not recorded during the 2021 but was in 2022, hence an increasing trend between sample years.
- Nerium (**Nerium oleander*). Nerium was not recorded during the 2021 but was in 2022, hence an increasing trend between sample years.

- Saffron Thistle (**Carthamus lanatus*). Slightly increasing trend.
- Spear Thistle (**Cirsium vulgare*). Increasing trend.
- White Torch Cactus (**Soehrensia spachiana*). White Torch Cactus was not recorded in 2021 but was identified in one location in 2022. Increasing trend.

Whilst weeds identified are present throughout the wider region Evolution understands that as a landowner the presence of these weeds brings about a General Biosecurity Duty, meaning that as far as practicable steps are taken to ensure the biosecurity risk is prevented, eliminated or minimised so far as reasonably practicable.

The year of 2022 had a higher-than-average rainfall for Lake Cowal and the surrounding area, and unfortunately as a consequence large portions of Evolution land or leaseholds were inaccessible. The weather both made access unsafe and/or also meant that less chemical based weed control could be undertaken.

Notwithstanding where possible a mixture of spot spraying, cut and paste and roadside spraying was used to target a variety of weeds across the mine site and within leased areas. High disturbance areas such as fire breaks and roads, as well as priority weeds were targeted. The following weeds and vegetation were specifically targeted during 2022:

- African Boxthorn (*Lycium ferocissimum*)
- Bathurst Burr (*Xanthium spinosum*)
- Galvanised Burr (*Sclerolaena birchii*)

Lippia (*Phyla nodiflora*) was also targeted by weed spraying, however this weed species wasn't recorded during 2022 weed surveys but access to the lake bed was not possible.

Evolution anticipates that ground conditions will improve in 2023 and broader weed management practices will once again be implemented to help prevent the spread and establishment of these weed species.

Pest Management

A pest eradication program continued during the reporting period using collapsible traps, 1080 Fox baits and Talon mouse bait blocks and traps. No rabbit baiting was conducted during the reporting period.

CGO efforts to investigate the viability of a feral pig program in 2022 were hampered by an inability to access likely habitat in 2022 due to the record flooding in the area. This matter will continue be re-examined in 2023 but also consider how to integrate with NSW and Commonwealth initiatives in this area.

6.10.3. Reportable Incidents

No incidents were recorded in the reporting period.

6.10.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.11. ABORIGINAL HERITAGE

Development Consent Condition 3.1(a)(ii) outlines requirements in relation to salvage, excavation and monitoring of archaeological sites within CGO area prior to and during development. An Indigenous Archaeology and Cultural Heritage Management Plan (IACMP) has been prepared and approved for CGO.

Monitoring and management of Aboriginal objects and archaeological sites continued in accordance with IACHMP and relevant permits and consents (under Section 87 and Section 90 of the NPW Act) during the 2022 reporting period.

6.11.1. Environmental Management

6.11.1.1. Control Strategies

The IACHMP sets out salvage, excavation, monitoring and other management measures that have been undertaken for each registered archaeological sites and other Aboriginal objects within CGO areas.

In general, the strategies include protection; investigation; collection; excavation; documentation and storage of Aboriginal objects in an on-site temporary “Keeping Place”.

Sites LC2, LC3 and LC4 are managed in accordance with Special Conditions 6, 12 and 13 of Permit 1468.

Management measures are not limited to registered sites. Permit 1468 and Permit 1681 authorise a range of management measures and mitigation measures via the Research Design and Study Plan for other Aboriginal objects at CGO that are not contained within Registered Sites.

Activities undertaken during the reporting period included the following:

- Numerous cultural heritage and due diligence inspections with archaeologists and representatives from the Aboriginal community.
- Archaeological salvage activities with archaeologists and representatives from the Aboriginal community.

It is noted that most of cultural heritage work in 2022 reporting period continued to be surface and subsurface monitoring for Modification approval areas for the IWL, exploration drill pads and roads.

6.11.1.2. Effectiveness of Control Strategies

Control strategies implemented during this reporting period were considered effective as demonstrated by environmental performance indicators.

6.11.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.11.2. Environmental Performance – Aboriginal Heritage

6.11.2.1. Monitoring

During the reporting period, due diligence inspections were undertaken within proposed exploration areas.

6.11.2.2. Performance Outcomes

No non-compliance issues were reported.

6.11.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.11.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.12. EUROPEAN HERITAGE

The Heritage Management Plan (HMP) was prepared in accordance with Development Consent Condition 3.1. Monitoring and management of European heritage continued in accordance with the HMP during the reporting period.

6.12.1. Environmental Management

6.12.1.1. Control Strategies

An interpretive display has been established at the Lake Cowal Conservation Centre (LCCC) in consultation with the Lake Cowal Foundation (LCF), Bland Shire Council (BSC) and Bland District Historical Society. The display includes maps, photographs, narrative, and fragments/elements salvaged from the Cowal West Homestead Complex to illustrate its history. Other items containing a level of local heritage significance identified in the HMP will continue to be maintained in accordance with the HMP.

6.12.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period are considered effective as demonstrated by environmental performance indicators.

6.2.1.1 Variations from Proposed Control Strategies

There were no variations from proposed control strategies during the reporting period.

6.12.2. Environmental Performance – European Heritage

6.12.2.1. Monitoring

Inspections of heritage sites are conducted periodically in accordance with the HMP.

6.12.2.2. Performance Outcomes

The maintenance works carried out within the Lake Cowal Homestead have been effective in preserving integrity and heritage value of the buildings.

6.12.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.12.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.13. BUSHFIRE

Development Consent Condition 3.6 and Emergency Preparedness Response Plan (EPRP), RMP and BOMP describe fire preventative measures and fuel management measures for the mine site, rehabilitation areas and biodiversity offset areas.

Monitoring and management of bushfire risk continued in accordance with Development Consent Condition 3.6, the EPRP, RMP and BOMP during the 2021 reporting period.

6.13.1. Environmental Management

6.13.1.1. Control Strategies

In accordance with the RMP and BOMP, bushfire preventative and control strategies for the CGO and CGO offset areas include:

- educating employees and contractors on general fire awareness and response procedures.
- fire track (and fire break) maintenance for fire control.
- annual inspections to identify areas requiring bushfire control measures including assessment of fuel loads.
- fuel management (e.g. hazard reduction burns) in consultation with the NSW Rural Fire Service.

6.13.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.13.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.13.2. Environmental Performance – Bushfire

6.13.2.1. Monitoring

In accordance with Development Consent Condition 6.2, data from the meteorological station maintained on-site was used to determine whether current weather conditions were suitable for fire management activities, and to assist in the management of bushfire fighting activities.

The Weather Zone lightning tracking system was introduced to operations in early-2012. The Mining Dispatch Control Room operators continually monitor and pass on alert levels between red, orange and yellow to other employee groups and the Emergency Response Team until all clear conditions resume.

6.13.2.2. Performance Outcomes

There were no uncontrolled bushfires within ML 1535 or biodiversity offset areas during this reporting period.

Several all-weather access tracks are established and have been maintained during this reporting period on Evolution-owned land and within Lake Cowal.

6.13.3. Reportable Incidents

There were no other reportable incidents during the reporting period.

6.13.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.14. HYDROCARBON CONTAMINATION

A Hazardous Materials Management Plan (HMMP) has been prepared for CGO in accordance with Development Consent Condition 5.4 (d), The HMMP was approved in October 2020. Monitoring and management of hazardous waste and chemicals continued in accordance with HMMP during this reporting period.

6.14.1. Environmental Management

6.14.1.1. Control Strategies

Evolution employees and contractors have adopted a Chemical Management Strategy as part of the HMMP. This strategy allows for the management of each chemical used at the CGO.

Control strategies include:

- Site wide inductions, awareness and training on Hazardous Substances and Hydrocarbon spill response.
- Concrete bunding and tankage integrity audits.
- Area planned general inspections.
- Hazardous Substance and Dangerous Goods Register.
- Incident reporting and follow up action items.
- Bioremediation Facility for treatment of hydrocarbon contaminated soils.

6.14.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.14.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.14.2. Environmental Performance – Hydrocarbons

6.14.2.1. Monitoring

Monitoring for hydrocarbon contamination continued during the reporting period.

6.14.2.2. Performance Outcomes

A number of minor substance spillage incidents occurred during 2022; however, these spills were classified as low risk and not material. All spills were fully contained, recovered and/ or treated in the bioremediation facility.

Concrete bunding and tankage integrity audit was undertaken in April 2022 by Techt (Techt 2023). Key findings include:

- Marked improvement in quality of repairs and maintenance associated with bunding in the two years since the last audit. Notwithstanding two failure pathways need ongoing focus, being:
  - Heaving of clay soils as primary cause for cracking and concrete slab movement. This movement has caused elastomeric jointing materials to fail prematurely and for proud crack edges to form trip hazards within the plant. Cracked concrete has produced high edges that are a trip hazard, these should be addressed by either grinding down or by building up with grout to reduce the risk. There is limited environmental risk from this heaving as the elastomeric joints are repaired.
  - Chemical attack is responsible for widespread exposed aggregate degradation that can and is minimised by applying a protective coating, such as a silane treatment, or similar to reduce chloride ingress to the reinforcement. There is limited environmental risk where this treatment is continued.
- Three areas of urgent repair were identified being:
  - Recovery sump within the Sulphuric Acid reagent storage;
  - Diesel bulk storage fencing and some blockwork; and
  - Concentrate thickener pool wall is cracking and exhibiting some signs of corrosion.

- A total of forty other repair observations made in the audit were of lower priority.

CGO has commenced the design, capital acquisition, tender and execution work to address the above matters in order of priority in 2023.

6.14.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.14.4. Further Improvements

No further improvements are proposed for the next reporting period.

6.15. WASTE MINIMISATION

6.15.1. Environmental Management

6.15.1.1. Monitoring

Waste materials generated at CGO are tracked according to waste stream with monthly records kept pursuant with relevant licences, permits and applicable legislation. Additionally hazardous materials are used in accordance with the HMMP.

6.15.1.2. Performance Outcomes

Evolution seeks to minimize generation of waste and where it cannot be minimized then recycle materials where possible. Volumes of waste produced during the 2022 reporting period are seen in Table 22 below.

Hazardous waste materials generated during 2022 included items such as air and oil filters, waste oil and grease, hydraulic hoses, batteries, coolant, obsolete chemical products, sewage effluent, drums and containers. Of the 1232.2 tonnes generated over 98% by weight was recycled and just under 21 tonnes had to be disposed of into landfill.

General (or non-hazardous) waste streams recycled included paper and cardboard, car and truck tyres, scrap steel, mill balls, scrap lights and liners, timber pallets and fire extinguishers. 2495.8 tonnes of non-hazardous waste was generated during 2022 and of this 73.4% of general waste was recycled during the reporting period.

Table 22. Waste and Recycling Totals for 2022

Waste Class	Waste Produced (tonnes)	Recycled (tonnes)	Percentage Recycled	Waste Disposed (tonnes)
Hazardous Waste	1232.2	1211.5	98.3%	20.7
General Waste (Non Hazardous)	2495.8	1831.1	73.4%	664.8
TOTAL Waste	3734.1	3048.6	81.6%	685.5

6.15.1.3. Control Strategies

Control strategies include:

- Buying in bulk wherever possible to economise on cost and reduce packaging materials.
- Recycle waste streams where possible including scrap steel, waste oil, paper, cardboard, etc

6.15.1.4. Effectiveness of Control Strategies

The control strategies implemented during the reporting period were considered to be effective as demonstrated by the environmental performance indicators.

6.16. WASTE GEOCHEMISTY

During annual on-site AR performance review meetings in 2005 and 2006, the then DPI Mineral Resources requested confirmatory test-work of waste rock geochemistry to be undertaken. In their 2007 report, the Independent Monitoring Panel also recommended that Evolution continue to monitor waste rock being removed from the open pit, to facilitate identification of potentially acid-generating material (if present) and selective placement of that material within waste emplacements.

6.16.1. Environmental Management

Regional and local geology of the E42 Deposit has been described by McInnes, Miles, Radclyffe, Brooker, (1998). In summary the complex consists of calc-alkaline to shoshonitic volcanic rocks and related sedimentary rocks deposited in a deep-water environment and are unconformably overlain, in parts, by Siluro-Devonian Manna Conglomerate. The auriferous quartz-carbonate-sulphide and carbonate-quartz-sulphide veins occur throughout the deposit and have a consistent dip of 305° and dip of 35° to the southwest. McInnes *et al*. (1998) describe the gold-bearing veins as generally being associated with one of two alteration styles: ankerite-quartz-pyrite-sphalerite- chalcopyrite-galena veins, which are associated with ankerite-quartz-sericite-carbonate alteration; and quartz, potassium feldspar, pyrite, sphalerite, and chalcopyrite veins associated with the chlorite-carbonate-pyrite alteration. Oxide blankets occur at the base of tertiary transported lacustrine cover, saprolite-saprock transition and at the base of oxidation (*pers. comm*, McInnes, Freer [2007]). These flat lying blankets can be up to several hundred metres wide and 1 m to 15 m thick and are interpreted to have formed as a result of remobilisation of gold during weathering processes in association with water table fluctuations.

6.16.1.1. Control Strategies

Based on prior test work there is no indication that the E42 Deposit or associated process tailings are acid forming (Environmental Geochemistry International Pty Ltd [EGI], 2004; and Geo-Environmental Management [GEM], 2009; 2013). Overall, EGi (2004) results indicated a very low likelihood of Acid Rock Drainage (ARD) generation from waste rock and tailings material that was sampled in the testing programs. Therefore, no special handling requirements are indicated for ARD control at the CGO.

Operational monitoring and testing was recommended to be a carried out on an occasional and as needed basis to confirm the low ARD potential of all waste types with particular focus on any unexpected rock types or alteration types which may be exposed during mining. CGO within its grade control program continues to examine sulfur concentration and if significant adverse results are identified during block modelling the matter will trigger additional ARD examination.

Chemical groundwater data will continue to be collected as part of the groundwater monitoring programme detailed in the SGWMBMP. Leachate water quality monitoring will continue to be undertaken at the NWRE, SWRE and PWRE external toe drain points in accordance with the EPL 11912.

6.16.1.2. Effectiveness of Control Strategies

Control strategies implemented during the reporting period were considered effective as demonstrated by environmental performance indicators.

6.16.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

6.16.2. Environmental Performance – Geochemistry

Results of detailed geochemical investigations of waste rock and tailings were reported in the EIS and in subsequent environmental assessments undertaken for CGO. Ongoing periodic field observations undertaken during the reporting period confirmed the low salinity potential of waste hard rock types mined during the reporting period.

Barrick commissioned O'Kane in late-2007 to conduct repeat test work of Waste Rock Emplacement and contents of the TSFs. O'Kane representatives visited site to obtain samples in January 2008. A report was delivered in June 2008 (O'Kane, 2008) and was provided to the DRE. O'Kane (2008) concluded that results are generally consistent with previous investigations that predicated waste rock would be predominantly non-acid forming. Geo-Environmental Management Pty Ltd (GEM, 2009) also verified these findings.

A geochemical assessment of proposed Pebble materials was carried out in 2020 (GEM 2020) which confirmed previous findings indicating a very low likelihood of ARD generation from waste rock materials.

6.16.3. Reportable Incidents

There were no reportable incidents during the reporting period.

6.16.4. Further Improvements

No further improvements are proposed for the next reporting period.

7. WATER MANAGEMENT

7.1. WATER SUPPLY

Water taken by CGO during the reporting period is summarised in Table 23 below.

Table 23: Water Taken for CGO during 2022

Water Licence #	Water Sharing Plan, Source, Management Zone	Entitlement (ML)	Passive Take/Inflows	Active Pumping (ML)	TOTAL
WAL 31864 (BCPC)	*Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012.*	15ML/day and 3,350ML/yr	-	981.6	981.6
WAL 36569 (ESB)	Upper Lachlan Alluvial Groundwater Source. Upper Lachlan Alluvial Zone 7 Management Zone	300 ML (with temporary transfer of 750 ML per bore per yr)	-	41.2	41.2
WAL 36615 (Saline groundwater supply bore field within ML 1535 and pit dewatering bores)		3,660 ML/yr	-	-	-
WAL 36617 (pit dewatering)	*Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011.* Lachlan Fold Belt Murray Darling Basin Groundwater Source. Lachlan Fold Belt Mdb (Other) Management Zone	3,294 ML/yr	-	1026.57	1026.57
WAL 13749 (High Security Title)	*Water Sharing Plan for the Lachlan Regulated River Water Source 2003.* Lachlan Regulated River Water Source. That Part of The Water Source Upstream of Lake Cargelligo Weir.	Zero share component enabling temporary trade of water from regulated Lachlan River source.	-	301.42	301.42
WAL 13748 (General Security)			-		
WAL 14981 (High Security Title)	*Water Sharing Plan for the Lachlan Regulated River Water Source 2003.* Lachlan Regulated River Water Source. That Part of The Water Source Downstream of Lake Cargelligo Weir.	80-unit shares.	-		

Notes: ML – megalitre; ML/day – megalitres per day; ML/year – megalitres per year.

7.1.1. Groundwater

A total of 981.6 ML of water was extracted from Bland Creek Palaeochannel borefield (BCPC) during the 2022 reporting period (Table 23), less than 30% of the annual allocation. Groundwater levels associated with BCPC are monitored on a continuous basis by the DPE Water groundwater monitoring bore on Burcher Road (GW036553). Contingency measures have been developed for implementation when water levels reach 137.5 m AHD and tighten further at 134 m AHD. These trigger levels were developed in consultation with the then NSW Office of Water (NoW) and other water users near the BCPC including irrigators, stock and domestic users. The trigger levels were not reached during this reporting period.

In addition, as agreed with the then NoW and BCPC Water Users Group, Evolution conducted regular surveys to monitor 11 monuments on the east side of Lake Cowal for any evidence of soil compaction. Monitoring of these monuments has indicated no significant movement to date and shows no specific trends that would be of concern.

Development Application No. 2011/0064 was granted by the Forbes Shire Council (FSC) on 20 December 2010 for the construction and operation of the ESB, located approximately 10 km east of Lake Cowal's eastern shoreline (Figure 9b). Water extraction from the ESB is licensed under WAL 36569. The total volume extracted from the ESB during the 2022 reporting period was 41.2 ML, less than 3% of the current allocation limit.

A saline groundwater supply borefield on the floor of Lake Cowal within ML 1535 (Figure 9a) was commissioned in mid-2009. Water extraction from this saline groundwater supply borefield within Lake Cowal is licensed under WAL 36615. However, no extraction has occurred since April 2010 due to access restrictions from the inundation of Lake Cowal with both production and monitoring bores remaining capped. Access via a gravel track to these bores was reinstated during 2015, however extraction from these bores did not occur during the reporting period.

A total of 1026.57 ML, or ~31% of current allocation limits, was extracted from open pit dewatering sumps (which collected water during the 2022 reporting period via rock wall seepage, horizontal depressurisation bores, underground dewatering, and rainfall). Water extraction from the open pit dewatering borefield is licensed under WAL 36615 and WAL 36617.

Extracted water was used mainly for ore treatment within the processing plant, dust suppression on haul roads and soil conditioning to achieve optimal compaction rates during IWL construction works.

7.1.2. Surface Water

A total of 301.42 ML was pumped from the Jemalong Irrigation Channel during 2022, which marks a significant reduction from the previous two reporting periods (603.34ML in 2021 and 2677.0 ML in 2020).

The Jemalong Irrigation Channel water was purchased from the regulated Lachlan River trading market. Water access from the Lachlan River Regulated Water Source is licensed under Evolution's High Security WAL 14981 (80 Unit Shares) and General Security WAL 13748 (30 Unit Shares). High Security WAL 13749 has no allocated Unit Shares and is used for temporary water transfers only.
Licensed water from the Lachlan River is supplied via a pipeline from the Jemalong Irrigation Channel to the BCPC Bore 4 pumping station (Figure 9b).

The CGO water management system is conceptually shown in Figure 10.

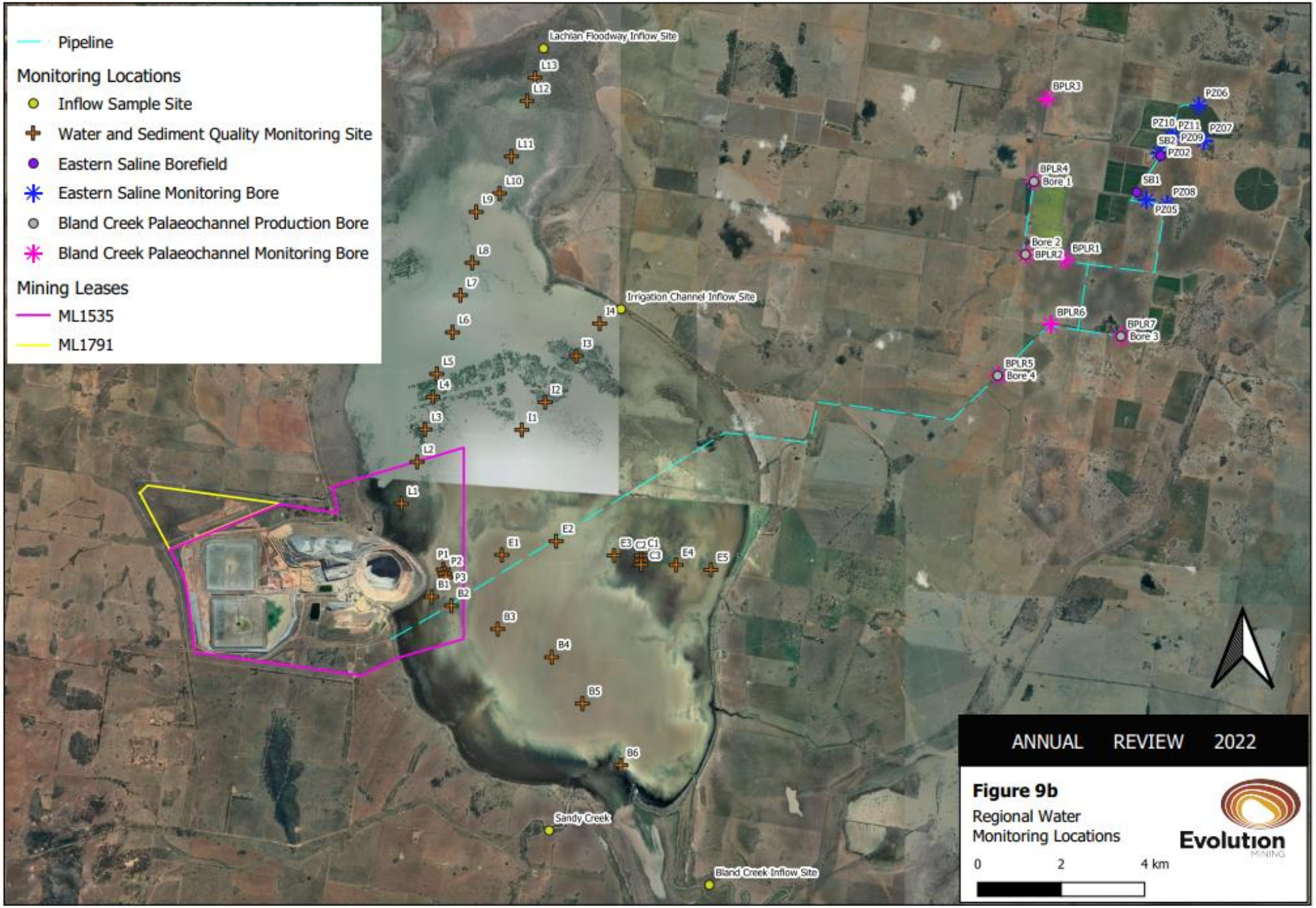
CGO's Water Management Plan (WMP) and MOP provide further detail regarding water management at CGO.

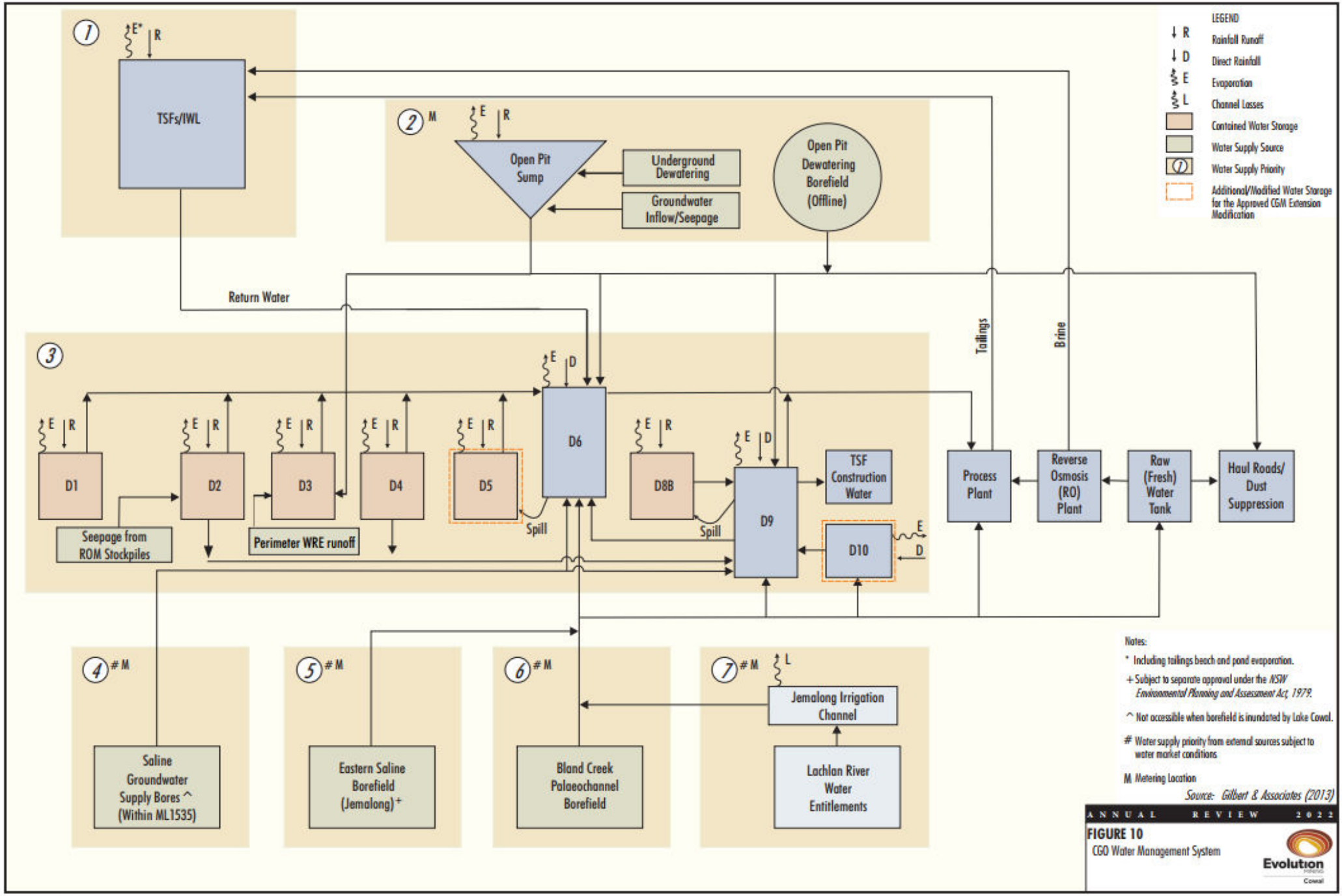
7.2. SURFACE WATER

The WMP and the SWGMBMP have been prepared in accordance with Development Consent Conditions 4.4(a) and 4.5(b) (and other relevant Development Consent Conditions) to guide water management and detail the CGO's water monitoring programme, respectively.

Monitoring and management of surface water during the reporting period has been undertaken in accordance with relevant Development Consent Conditions, the WMP, the SWGMBMP and the EPL 11912.


Monitoring Locations
Surface Water
Water and Sediment Quality Monitoring Site
Monitoring Bore
Mining Leases
ML1535
ML1791
L2
L1
UCD North
P561A
P561B
P418B
P418A
IWL01A
IWL01B
NDC-1
IWL02A
IWL02B
PDB1B
D1
PDB1A
P558A-R
IWL03A
IWL03B
P555A-R
P555B
IWL04A
IWL04B
IWL05A
IWL05B
P417A
P417B
IWL06A
IWL06B
D8B
D9
D2
D6
PP01
PP02
D5
PP06
PP03
PP04
D4
PDB5B
PDB5A
UCD South
D3 PDB3A
PDB3B
P1
P2
P3
B1
WB12
B2
ANNUAL REVIEW 2022
Figure 9a
ML1535 Water
Monitoring Locations
Evolution MINING
0
0.5
1 km


Pipeline
Monitoring Locations
Inflow Sample Site
Water and Sediment Quality Monitoring Site
Eastern Saline Borefield
Eastern Saline Monitoring Bore
Bland Creek Palaeochannel Production Bore
Bland Creek Palaeochannel Monitoring Bore
Mining Leases
ML1535
ML1791
Lachlan Floodway Inflow Site
Irrigation Channel Inflow Site
Sandy Creek
Bland Creek Inflow Site
BPLR3
BPLR4
Bore 1
BPLR1
Bore 2
BPLR2
BPLR6
BPLR7
Bore 3
BPLR5
Bore 4
PZ06
PZ10
PZ11
PZ07
SB2
PZ09
PZ02
SB1
PZ08
PZ05
ANNUAL REVIEW 2022
Figure 9b
Regional Water
Monitoring Locations
Evolution
MINING
0
2
4 km



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7.2.1. Environmental Management

7.2.1.1. Control Strategies

The site water management system is designed to contain all potentially contaminated water and comprises the following major components:

i. Up Catchment Diversion System (UCDS).

ii. Lake Isolation System (comprising the Temporary Isolation Bund (TIB), Lake Protection Bund (Lake Protection Bund) and PWRE.

iii. Internal Catchment Drainage System (including the permanent catchment divide and contained water storages).

iv. Integrated Erosion and Sediment Control System.

v. E42 Open Pit and Underground Dewatering System.

Site water management system is designed to contain all potentially contaminated water generated within the closed catchment of ML 1535 area while diverting all other water around the perimeter of site. The UCDS, Lake Isolation System and Internal Catchment Drainage System are designed to minimise volume of surface water entering ML 1535 by isolating site from Lake Cowal and catchments up-slope of UCDS. Surface water collected within ML 1535 is controlled using several water management structures designed to prevent discharge to Lake Cowal. No discharge to Lake Cowal has occurred during the reporting period or prior.

7.2.1.2. Effectiveness of the Control Strategies

The control strategies implemented during the reporting period were considered to be effective as demonstrated by the environmental performance indicators.

7.2.1.3. Variations from Proposed Control Strategies

There were no variations from the proposed control strategies during the reporting period.

7.2.2. Environmental Performance – Surface Water

7.2.2.1. Monitoring

During the reporting period surface water monitoring was conducted in accordance with the WMP, SWGMBMP and EPL 11912. Surface water monitoring locations within ML 1535 are shown in Figure 9a.

7.2.2.2. Performance Outcomes

Surface Water Quality

Electrical conductivity (EC), pH and Total Suspended Solids (TSS) results fluctuated across on-site surface water ponds throughout the 2022 reporting period, likely due to changes in standing water level within ponds (Table 24). pH results were relatively stable throughout the reporting period, ranging from 6.43 to 9.35 across on-site surface water ponds. EC ranged from 91.5 to 53,322 microSeimens per centimeter (µS/cm) and TSS ranged from 2,077 to 53,322 milligrams per litre (mg/L) and were both significantly influenced by filling and drying of ponds (Table 24). Observed monitoring results and fluctuations are generally consistent with previous reporting periods.

A comparison of surface water results with ANZG (2018) guidelines has not been undertaken for on-site surface water ponds as they are contained inside a closed catchment within the mining lease area. The closed catchment is engineered to contain all runoff on the mining lease and physically separates mine water from offsite waters in the upstream diversion drains and Lake Cowal.

Table 24: Summary of Monthly and Quarterly Surface Water Monitoring Results for 2022

Monthly Surface Water Monitoring - D1, D4, UCD North and UCD South				
Dam D1	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	22	6.53	194.8909	4122
Electrical Conductivity - Field (µS/cm)	22	6.79	5057.5	6864.4
Total Suspended Solids (mg/L)	22	4	26.40909	80
Dam D4	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	22	6.43	7.938182	8.95
Electrical Conductivity - Field (µS/cm)	22	4205	7323.191	10521.1
Total Suspended Solids (mg/L)	21	2	41.57143	251
UCD North	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	22	7.08	7.788636	8.86
Electrical Conductivity - Field (µS/cm)	22	167	310.7455	789
Total Suspended Solids (mg/L)	22	11	42.04545	252
UCD South	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	22	7.47	8.415	9.06
Electrical Conductivity - Field (µS/cm)	22	91.5	479.4409	4702
Total Suspended Solids (mg/L)	22	21	53.68182	146
Dam D9	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.82	8.16	8.56
Electrical Conductivity - Field (µS/cm)	4	8399	9738.975	11104.9
Total Suspended Solids (mg/L)	4	4	7	10
Dam D6	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.52	7.965	8.28
Electrical Conductivity - Field (µS/cm)	4	9724	15172.73	23055.9
Total Suspended Solids (mg/L)	3	6	17.66667	29
Quarterly Surface Water Monitoring – D2, D3, D8B, D9, D6, D5 and Pit Sumps				
Dam D5	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.62	8.3975	9.35
Electrical Conductivity - Field (µS/cm)	4	2077	3685.575	4892
Total Suspended Solids (mg/L)	4	9	22.5	36
Dam D2	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.86	8.1325	8.5
Electrical Conductivity - Field (µS/cm)	4	7736	8859.925	9883.7
Total Suspended Solids (mg/L)	4	4	46.5	78
Dam D3	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.43	7.8825	8.25
Electrical Conductivity - Field (µS/cm)	4	7300	17981.03	29489
Total Suspended Solids (mg/L)	4	3	33.75	61
Dam D8B	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.87	8.515	9.25
Electrical Conductivity - Field (µS/cm)	4	2469	6190.85	13241.4
Total Suspended Solids (mg/L)	4	16	100.5	273
Dam D9	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	7.82	8.16	8.56
Electrical Conductivity - Field (µS/cm)	4	8399	9738.975	11104.9
Total Suspended Solids (mg/L)	4	4	7	10
Dam D6	**COUNT**	**MIN**	**MEAN**	**MAX**

Monthly Surface Water Monitoring - D1, D4, UCD North and UCD South				
pH - Field	4	7.52	7.965	8.28
Electrical Conductivity - Field (µS/cm)	4	9724	15172.73	23055.9
Total Suspended Solids (mg/L)	3	6	17.66667	29
Pit Sump 1	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	10	6.95	7.654	8.01
Electrical Conductivity - Field (µS/cm)	10	25300	32421.91	53322
Total Suspended Solids (mg/L)	10	85	882.1	4540
Pit Sump 2	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	1	7.91	7.91	7.91
Electrical Conductivity - Field (µS/cm)	1	29476	29476	29476
Total Suspended Solids (mg/L)	1	538	538	538
Pit Sump 3	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	1	7.99	7.99	7.99
Electrical Conductivity - Field (µS/cm)	1	28239	28239	28239
Total Suspended Solids (mg/L)	1	370	370	370

^ Dam D9 was used as storage for water collected from surface water runoff dams after heavy rain.

EC and TSS results fluctuated across both UCD North and UCD South throughout the reporting period, due to changes in standing water level in the area. pH results were generally stable throughout the reporting period and ranged from 7.08 to 9.06 across both ponds. UCD North was unable to be accessed from May-August (inclusive), due to high water levels in the lake. 2022 monitoring results and fluctuations due to changes in standing water levels are consistent with previous reporting periods and base line monitoring results for the 1991-1992 periods, which are above ANZG (2018) guideline values for pH, EC and turbidity.

Lake Cowal

In early 2020, Lake Cowal and surrounds experienced high levels of rainfall after a sustained period of below average rainfall since the 2016 floods. The total rainfall for February-April in 2020 was 297.2 mm, which was more than two and a half times the long-term average for Wyalong Post Office Weather Station, thus making it the highest recorded rainfall for that period since 1969 (BOM (Bureau of Meteorology), 2022). There was sustained high rainfall throughout 2021 continuing to steadily fill Lake Cowal. In 2022, there was above average rainfall in January, April, May, July, August, September, October and November (BOM, 2022).

During the high rainfall period from 2020 to 2022, and subsequent floods, the lake rose from a dry state to a peak of 207.79m RL (AHD) on 11th of November 2022. The lake is likely going to remain or fall from its current water level in the following months due to predicted easing of La Niña event over northern and eastern Australia for the 2022-23 summer. The lake water level heights from 2010 to 2022 are presented in Graph 13.

Water quality monitoring at Lake Cowal was undertaken by Evolution Mining personnel (weekly) and DM McMahon Pty Ltd (monthly/ quarterly). In 2022, 35 locations were sampled for lake water. All lake transect locations were able to be sampled owing to the high-water levels. The quarterly lake sampling events were conducted on 25 January 2022, 11-12 April 2022, 7-8 July 2022 and 17-18 October 2022.

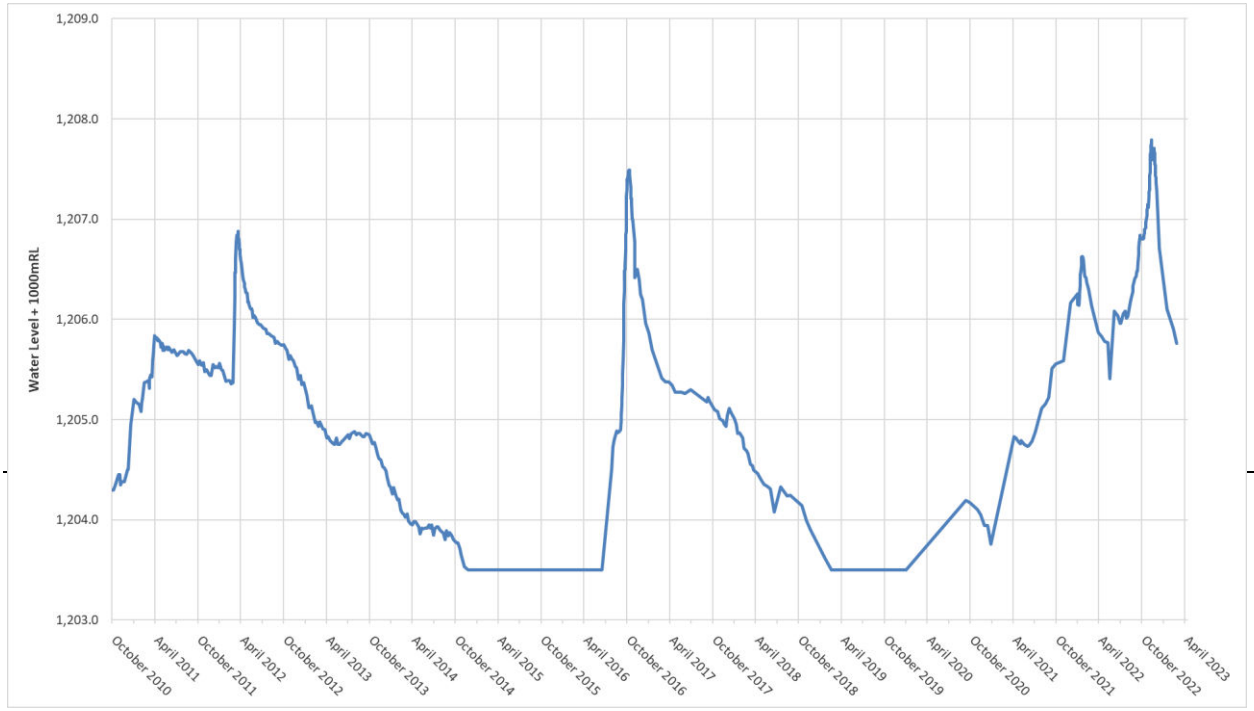
Key summaries of the lake water monitoring results (DM McMahon, 2022) are provided in the subsections below and in Table 25.

A comparison of the 2022 Lake Cowal water quality results against the ANZECC and ARMCANZ (2000) default trigger values for surface water (lakes) indicates that 2022 monitoring results (totals and dissolved) are below or only marginally above default trigger values. Heavy metal readings were similar to historical data and pH and EC were within range of values previously recorded.

A comparison of 2022 Lake Cowal sediment results against ANZG (2018) trigger values indicated that results were all below recommended default trigger values (Table 26).

Plate 3: Aerial View of the Lake Protection Bund (February 2023)

Graph 13: Lake Cowal Water Level 2011 - 2022



pH and Electrical Conductivity

Lake water pH, field and laboratory determination, ranged from 5.82 to 9.77 units with a mean of 7.77 units, which was not within baseline water quality data collected in 1991 – 1992. However, it is within ANZG (2018) guideline values (Table 24). The average lake water pH in 2022 was 0.11 units lower than in 2021, and 0.36 units lower than the 2011-2018 average.

Lake water EC ranged from 41 to 628 µS/cm with a mean of 254 µS/cm, which falls within the baseline data results, however, some results fell below minimum recorded EC during baseline monitoring. Lake water EC was

higher than freshwater guideline values (ANZG, 2018). However, electrical conductivity will vary depending upon catchment geology (Table 24). The data trends analysis demonstrated that lower EC levels corresponded with high inflows and lake levels; and higher EC levels occurred when inflows and lake levels were the lowest. This is consistent with the historical trends.

Turbidity and Suspended Solids

Turbidity of lake water ranged from 7.6 to 328 NTU with a mean of 147.4 NTU, which is within baseline data range from 1991 – 1992. Turbidity of Lake Cowal water in 2022 was higher than ANZG (2018) level of 20 NTU for Fresh Water, though lakes in catchments with highly dispersive soils will have high turbidity (ANZG, 2018).

Suspended solid concentration in lake water ranged from 4 to 281 mg/L with an average of 49 mg/L. ANZG (2018) recommended guideline trigger values for toxicants does not include a trigger value for suspended solids. The suspended solid concentration in 2022 was slightly higher than 2021 monitoring period.

Dissolved Oxygen

Dissolved Oxygen concentration of lake water ranged from 4.05 to 13.23 mg/L with a mean of 8.54 mg/L, which was higher than 2021 monitoring period. The mean dissolved oxygen concentration was within the 1991-92 baseline results for Lake Cowal.

Heavy Metals (total and dissolved)

Dissolved arsenic concentration of lake water ranged from <0.001 to 0.007 mg/L with an average concentration of 0.0027 mg/L. For total arsenic concentration, results ranged from 0.001 to 0.006 mg/L with a mean of 0.0036 mg/L. The concentration of both dissolved and total arsenic exceeded ANZG (2018) default trigger value of 0.0008 mg/L, however it was lower than 2018 mean concentration of 0.0098 mg/L (total) and 0.0092 mg/L (dissolved), and similar to 2021 results, see Attachment D.

Dissolved lead concentration of lake water was below the limit of reporting for all samples (<0.001 mg/L). For total lead concentration, the results ranged from <0.001 to 0.007 mg/L with a mean of 0.0032 mg/L. The concentration of total lead exceeded ANZG (2018) default trigger value of 0.0001 mg/L and was higher than 2021 mean concentration of 0.0024 mg/L (total).

Dissolved nickel concentration of lake water ranged from 0.002 to 0.004 mg/L with an average concentration of 0.0027 mg/L. For total nickel concentration, results ranged from 0.002 to 0.012 mg/L with a mean of 0.007 mg/L. The concentration of both dissolved and total nickel was lower than ANZG (2018) default trigger value of 0.008 mg/L. The mean dissolved nickel concentration decreased from 0.0058 mg/L in 2021, whilst mean total nickel concentration increased from 0.002 mg/L in 2021.

The mean concentrations of other heavy metals (total and dissolved); including zinc, mercury, selenium, copper and cadmium; were all below the limit of reporting and/or ANZG (2018) default trigger values.

Historical data trends analysis indicated that high metals concentrations were found at the times where inflow and lake level were low. This may be due to accumulation through evaporation. However, when inflow and lake level were high, the metals concentration was low.

Table 25: Summary of Lake Cowal Water Monitoring – 2010 – 2022

Parameter	Lake Cowal Water Quality Results (November 2010 – Mean#)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2012) Ranges (Mean)	Lake Cowal Water Quality Results (2013) Ranges (Mean)	Lake Cowal Water Quality Results (2014) Ranges (Mean)	Lake Cowal Water Quality Results (2016) Ranges (Mean)	Lake Cowal Water Quality Results (2017) Ranges (Mean)	Lake Cowal Water Quality Results (2018) Ranges (Mean)	Lake Cowal Water Quality Results (2021) Ranges (Mean)	Lake Cowal Water Quality Results (2022) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Fresh Waters ^ ~
Alkalinity (mg/L)	105	64 – 142 (100)	50 – 152 (87)	113 – 178 (157)	191 – 322 (269)	44 – 356 (160)	102 – 192 (140)	199 – 320 (244)	107 – 151 (129)	45 – 153 (103)	NA	NA
Suspended Solids (mg/L)	6 - 192	5 – 184 (38)	7 – 274 (67)	66 – 472 (216)	57 – 556 (233)	13 – 417 (145)	24 – 650 (361)	36 – 130 (70)	3 – 87 (26)	4 – 281 (49)	NA	NA
Acidity – Alkalinity scale (pH)	7.03 – 8.27	7.22 – 8.82 (8.14)	5.56 – 9.78 (7.81)	7.82 – 8.43 (8.19)	8.45 – 8.97 (8.72)	7.05 – 8.76 (7.8)	7.12 – 8.44 (7.88)	8.27 – 9.01 (8.61)	6.65 – 9.19 (7.88)	5.82 – 9.77 (7.77)	8.27 – 8.67	6.5 to 8.0
Electrical Conductivity (µS/cm)	100 – 701	190 – 727 (322)	107 – 433 (236)	351 – 572 (503)	882 – 1350 (1193)	119 – 1350 (583)	299 – 511 (409)	514 – 838 (641)	213 – 619 (346)	41 – 628 (254)	222 – 1557[1, 3]	20 to 30 µS/cm[1]
Turbidity (NTU)	8.2 – 211	11.5 – 144 (53.3)	7.8 – 829 (246.1)	271 – 755 (470)	189 – 671 (391)	57 – 644 (366)	26.7 – 640 (360.6)	58.4 – 300 (180.9)	4.6 – 204 (115.1)	7.6 - 328 (147.4)	22 – 224	1 to 20[2]
Dissolved Oxygen (mg/L)	0.84 – 8.89	1.64 – 14.74 (9.76)	2.24 – 17.89 (8.95)	1.84 – 12.70 (9.03)	5.65 – 13.83 (9.0)	0.08 – 8.57 (6.46)	0.04 – 15.97 (9.4)	3.18 – 23.53 (9.51)	6.20 – 9.58 (8.08)	4.05 – 13.23 (8.54)	7.3 – 11.5	90 to 110 (derived from daytime measurements)
Temperature (°C)	24.9	9.6 – 29.8 (18.4)	7.5 – 28.8 (16.7)	9.80 – 27 (17.4)	7.8 – 30 (18.6)	11.7 – 27.3 (18.3)	7.6 – 29.2 (16.7)	20.0 – 27.6 (23.0)	4.86 – 28.2 (18.7)	2.3 – 28.0 (17.0)	NA	Not applicable
Depth (m)	0.10 – 1.20	0.60 – 2.50 (1.7)	0.50 – 3.60 (2.0)	0.40 – 2.00 (1.2)	0.25 – 1.0 (0.54)	0.8 – 4.5 (2.6)	0.6 – 3.1 (1.64)	0.4 – 1.8 (1.18)	0.7 – 3.33 (2.05)	0.0 – 4.4 (2.49)	0.2 – 2.0	Not applicable
Lake Water Level (m)	204.5	205.25 – 205.75	205.40 – 206.88	204.33 - 205.24	203.5 - 204.78	204.88 – 207.45	204.93 - 205.86	204.95 – 203.62	204.73 – 206.17	205.41 – 207.79	205.1	Not applicable

Table 25 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2022

Parameter	Lake Cowal Water Quality Results (November 2010 – Mean#)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2012) Ranges (Mean)	Lake Cowal Water Quality Results (2013) Ranges (Mean)	Lake Cowal Water Quality Results (2014) Ranges (Mean)	Lake Cowal Water Quality Results (2016) Ranges (Mean)	Lake Cowal Water Quality Results (2017) Ranges (Mean)	Lake Cowal Water Quality Results (2018) Ranges (Mean)	Lake Cowal Water Quality Results (2021) Ranges (Mean)	Lake Cowal Water Quality Results (2022) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Fresh Waters ^ ~
Total Iron (mg/L)	6.50	0.36 – 11.00 (2.50)	0.92 – 22.6 (9.55)	2.54 – 33.6 (21.49)	4.76 – 21.7 (11.7)	4.05 – 21.7 (14.81)	10.7 – 25.4 (16.6)	<0.05 – 12.8 (7.47)	0.29 – 13 (5.37)	0.33 – 13.2 (5.32)	NA	NA (insufficient data)
Calcium (mg/L)	17	10 – 26 (19)	8 – 28 (14)	22 – 32 (26)	20 – 50 (42)	8 – 41 (22)	15 – 30 (23)	24 – 47 (36)	18 – 27 (23)	10 – 26 (17)	NA	NA
Magnesium (mg/L)	10	6 – 12 (9)	4 – 14 (7)	9 – 17 (13.4)	16 – 32 (29)	4 – 32 (14)	9 – 20 (12)	15 – 25 (19)	10 – 16 (11)	6 – 14 (9)	NA	NA
Potassium (mg/L)	15	12 – 19 (15)	12 – 19 (14)	14 – 27 (21)	26 – 36 (31)	5 - 27 (15)	12 – 18 (16)	17 – 25 (22)	8 – 14 (13)	4 – 19 (14)	NA	NA
Sodium (mg/L)	19	13 – 35 (24)	12 – 38 (22)	35 – 59 (50)	105 – 168 (144)	9 – 164 (64)	27 – 43 (37)	50 – 91 (64)	27 – 44 (32)	17 – 40 (28)	NA	NA
Chloride (mg/L)	25	19 – 41 (28)	12 – 66 (22)	36 – 61 (51)	91 – 194 (155)	9 – 194 (77)	26 – 39 (34)	42 – 77 (56)	25 – 76 (35)	18 – 80 (35)	NA	NA
Sulphate (mg/L)	3	1 – 10 (2)	1 – 10 (4)	14 -38 (21)	29 – 37 (33)	1 - 37 (16)	6 – 15 (8)	9 – 18 (11)	6 – 14 (9)	2 – 21 (8)	NA	NA
Cations (mg/L)	2.81	1.98 – 3.77 (3.02)	1.56 – 3.82 (2.11)	3.74 – 5.85 (5.13)	8.85 – 12.6 (11.51)	1.35 – 12.4 (5.4)	3.09 – 5.4 (4.13)	5.58 – 8.56 (6.73)	3.28 – 4.58 (3.79)	N/A	NA	NA
Anions (mg/L)	2.83	1.93 – 3.67 (2.91)	1.45 – 3.77 (2.00)	3.76 – 5.78 (5.02)	1.1 – 13.2 (11.05)	0.35 – 13.2 (5.40)	3.00 – 5.11 (3.93)	5.37 – 8.70 (6.7)	3.51 – 4.73 (3.78)	2.03 – 4.47 (3.20)	NA	NA

Table 25 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2022

Parameter	Lake Cowal Water Quality Results (November 2010 – Mean[#])	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2012) Ranges (Mean)	Lake Cowal Water Quality Results (2013) Ranges (Mean)	Lake Cowal Water Quality Results (2014) Ranges (Mean)	Lake Cowal Water Quality Results (2016) Ranges (Mean)	Lake Cowal Water Quality Results (2017) Ranges (Mean)	Lake Cowal Water Quality Results (2018) Ranges (Mean)	Lake Cowal Water Quality Results (2021) Ranges (Mean)	Lake Cowal Water Quality Results (2022) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Fresh Waters ^ ~
Arsenic (mg/L)	0.006[3] (total)	<0.001 – 0.007 (0.003[3]) (total)	0.002 – 0.007 (0.004[3]) (total)	0.006 – 0.014 (0.009[3]) (total)	0.014 – 0.023 (0.018[3]) (total)	0.002 – 0.02 (0.00748[3]) (total)	<0.001 – 0.01 (0.005) (total)	0.008 – 0.012 (0.0098) (total	0.002 – 0.004 (0.0037[3]) (total)	0.0001- 0.006 (0.00363) (total)	0.0026[3] (total)	0.008
	0.005[3] (dissolved)	<0.0003 – 0.006 (0.0026[3]) (dissolved)	0.001 – 0.006 (0.003[3]) (dissolved)	0.003 – 0.011 (0.007[3]) (dissolved)	0.012 – 0.024 (0.017[3]) (dissolved)	0.0001 – 0.014 (0.00561[3]) (dissolved)	0.003 – 0.006 (0.0045) (dissolved)	0.007 – 0.013 (0.0092) (dissolved)	0.001 – 0.005 (0.0026[3]) (dissolved)	<0.001 – 0.007 (0.00273) (dissolved)	0.0016[3] (dissolved)	
Cadmium (mg/L)	0.0001[3] (total)	<0.0001 - 0.001 (0.0001[3]) (total)	<0.0001 – 0.005 (0.0002[3]) (total)	0.0001 – 0.0002 (0.0001[3]) (total)	0.0001 – 0.0001 (0.0001[3]) (total)	0.0001 – 0.0002 (0.0001[3]) (total)	0.0001 – 0.0002 (0.0001) (total)	<0.0001 – <0.0001 (<0.0001) (total)	<0.0001 – <0.0001 (<0.0001[3]) (total)	<0.0001 – <0.0001 (<0.00013) (total)	0.000055[3] (total)	0.0006
	0.0001[3] (dissolved)	<0.0001 – 0.0004 (0.0001[3]) (dissolved)	<0.00001 – <0.0001 (0.00001[3]) (dissolved)	0.0001 – 0.0002 (0.0001[3]) (dissolved)	0.0001 – 0.0002 (0.0001[3]) (dissolved)	0.0001 – 0.0001 (0.0001[3]) (dissolved)	<0.0001 – <0.0001 (<0.0001) (dissolved)	<0.0001 – <0.0001 (<0.0001) (dissolved)	<0.0001 – <0.0001 (<0.0001[3]) (dissolved)	<0.0001 – <0.0001 (<0.00013) (dissolved)	0.00005[3] (dissolved)	
Molybdenum (mg/L)	0.001[3] (total)	<0.001 – 0.006 (0.0012[3]) (total)	<0.001 – 0.004 (0.001[3]) (total)	0.001 – 0.003 (0.0014[3]) (total)	0.002 – 0.005 (0.003[3]) (total)	0.001 – 0.003 (0.0016[3]) (total)	<0.001 – 0.002 (0.001) (total)	0.001 – 0.004 (0.0017[3]) (total)	<0.001 – <0.001 (<0.0013) (total)	<0.001 – 0.001 (0.0013) (total)	NA	NA (insufficient data)
	0.001[3] (dissolved)	<0.001 - 0.001 (0.001[3]) (dissolved)	<0.001 – 0.001 (0.001[3]) (dissolved)	0.001 – 0.002 (0.0014[3]) (dissolved)	0.003 – 0.004 (0.035[3]) (dissolved)	0.001 – 0.004 (0.0019[3]) (dissolved)	<0.001 - 0.003 (0.0012) (dissolved)	<0.001 – 0.003 (0.001[3]) (dissolved)	<0.001 – 0.002 (0.0011[3]) (dissolved)	<0.001 – 0.001 (0.0013) (dissolved)	NA	

Table 25 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2022

Parameter	Lake Cowal Water Quality Results (November 2010 – Mean#)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2012) Ranges (Mean)	Lake Cowal Water Quality Results (2013) Ranges (Mean)	Lake Cowal Water Quality Results (2014) Ranges (Mean)	Lake Cowal Water Quality Results (2016) Ranges (Mean)	Lake Cowal Water Quality Results (2017) Ranges (Mean)	Lake Cowal Water Quality Results (2018) Ranges (Mean)	Lake Cowal Water Quality Results (2021) Ranges (Mean)	Lake Cowal Water Quality Results (2022) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Fresh Waters ^ ~
Nickel (mg/L)	0.007[3] (total)	<0.001 – 0.009 (0.0036[3]) (total)	<0.001 – 0.018 (0.009[3]) (total)	0.006 – 0.025 (0.018[3]) (total)	0.010 – 0.025 (0.016[3]) (total)	0.004 – 0.025 (0.015[3]) (total)	0.009 – 0.021 (0.0147) (total)	0.003 – 0.012 (0.008[3]) (total)	0.002 – 0.003 (0.002[3]) (total)	0.002 – 0.012 (0.007[3]) (total)	NA	0.008
	0.004[3] (dissolved)	<0.001 – 0.004 (0.0023)[3] (dissolved)	<0.001 – 0.004 (0.003[3]) (dissolved)	0.002 – 0.005 (0.0035[3]) (dissolved)	0.004 – 0.007 (0.006[3]) (dissolved)	0.002 – 0.007 (0.0052[3]) (dissolved)	0.002 – 0.02 (0.0032) (dissolved)	0.001 – 0.005 (0.0032[3]) (dissolved)	0.002 – 0.011 (0.0058[3]) (dissolved)	0.002 – 0.004 (0.0027[3]) (dissolved)	NA	
Lead (mg/L)	0.003[3] (total)	<0.001 – 0.004 (0.0013[3]) (total)	<0.001 – 0.009 (0.004[3]) (total)	0.003 – 0.015 (0.009[3]) (total)	0.003 – 0.010 (0.006[3]) (total)	0.002 – 0.011 (0.0067[3]) (total)	0.003 – 0.06 (0.008) (total)	<0.001 – 0.005 (0.0029[3]) (total)	<0.001 – 0.005 (0.0024[3]) (total)	<0.001 – 0.007 (0.00343[3]) (total)	0.0029[3](total)	0.001
	0.001[3] (dissolved)	<0.001 - 0.001 (0.001[3]) (dissolved)	<0.001 – 0.003 (0.001[3]) (dissolved)	0.001 – 0.001 (0.001[3]) (dissolved)	0.001 – 0.001 (0.001[3]) (dissolved)	0.001 – 0.01 (0.0015[3]) (dissolved)	<0.001 – 0.01 (0.003) (dissolved)	<0.001 - <0.001 (<0.001[3]) (dissolved)	<0.001 - <0.001 (<0.001[3]) (dissolved)	<0.001 - <0.001 (<0.001[3]) (dissolved)	0.0005[3] (dissolved)	
Antimony (mg/L)	0.001[3] (total)	<0.001 – 0.004 (0.0014[3]) (total)	<0.001 – <0.001 (0.001[3]) (total)	0.001 – 0.001 (0.001[3]) (total)	0.001 – 0.050 (0.017[3]) (total)	0.001 – 0.05 (0.017[3]) (total)	<0.001 - <0.001 (<0.001) (total)	<0.001 – <0.001 (<0.001[3]) (total)	<0.001 – <0.001 (<0.001[3]) (total)	<0.001 – 0.007 (0.0027[3]) (total)	NA	NA (insufficient data)
	0.001[3] (dissolved)	<0.001 - 0.001 (0.001[3]) (dissolved)	<0.001 – <0.001 (0.001[3]) (dissolved)	0.001 – 0.001 (0.001[3]) (dissolved)	0.001 – 0.001 (0.001[3]) (dissolved)	0.001 – 0.0001 (0.001[3]) (dissolved)	<0.001 - <0.001 (<0.001) (dissolved)	<0.001 - <0.001 (<0.001) (dissolved)	<0.001 - <0.001 (<0.001[3]) (dissolved)	<0.001 - <0.002 (<0.001[3]) (dissolved)	NA	

Table 25 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2022

Parameter	Lake Cowal Water Quality Results (November 2010 – Mean#)	Lake Cowal Water Quality Results (2011) Ranges (Mean)	Lake Cowal Water Quality Results (2012) Ranges (Mean)	Lake Cowal Water Quality Results (2013) Ranges (Mean)	Lake Cowal Water Quality Results (2014) Ranges (Mean)	Lake Cowal Water Quality Results (2016) Ranges (Mean)	Lake Cowal Water Quality Results (2017) Ranges (Mean)	Lake Cowal Water Quality Results (2018) Ranges (Mean)	Lake Cowal Water Quality Results (2021) Ranges (Mean)	Lake Cowal Water Quality Results (2022) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992)	Fresh Waters ^ ~
Zinc (mg/L)	0.012[3] (total)	<0.005 – 0.038 (0.0074[3]) (total)	<0.005 – 0.04 (0.016[3]) (total)	0.008 – 0.079 (0.036[3]) (total)	0.009 – 0.047 (0.023[3]) (total)	0.006 – 0.047 (0.028[3]) (total)	0.015 – 0.045 (0.027) (total)	<0.005 – 0.020 (0.011[3]) (total)	<0.005 – 0.023 (0.011[3]) (total)	<0.005 – 0.034 (0.001[3]) (total)	0.012[3](total)	0.0024
	0.015[3] (dissolved)	<0.005 – 0.022 (0.0109[3]) (dissolved)	<0.005 – 0.264 (0.035[3]) (dissolved)	0.005 – 0.067 (0.018[3]) (dissolved)	0.005 – 0.03 (0.011[3]) (dissolved)	0.005 – 0.052 (0.014[3]) (dissolved)	<0.005 – 0.017 (0.0064) (dissolved)	<0.005 – <0.005 (<0.005) (dissolved)	<0.005 – <0.005 (<0.005[3]) (dissolved)	<0.005 – <0.006 (<0.005[3]) (dissolved)	0.00306[3] (dissolved)	

^ Guideline values in accordance with ANZG 2018.
~ 99% protection level trigger values for toxicants – lakes and reservoirs.
N/A – Not Available.
ANZG (2018) notes that conductivity in lakes is generally low but will vary depending upon catchment geology.
ANZG (2018) notes that lakes in catchments with highly dispersive soils will have high turbidity.
[3] Mean value.
Two readings only for December 2010

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7.2.3. Reportable Incidents

There were no reportable incidents during the reporting period.

7.2.4. Further Improvements

No further improvements are proposed for the next reporting period.

Table 26: Summary of Lake Cowal Sediment Results

Parameter	Lake Cowal Sediment Results (November 2010)	Lake Cowal Sediment Results (2011) Range (Mean)	Lake Cowal Sediment Results (2012) Range (Mean)	Lake Cowal Sediment Results (2013) Range (Mean)	Lake Cowal Sediment Results (2014) Range (Mean)	Lake Cowal Sediment Results (2016) Range (Mean)	Lake Cowal Sediment Results (2017) Range (Mean)	Lake Cowal Sediment Results (2018) Range (Mean)	Lake Cowal Sediment Results (2021)Range (Mean)	Lake Cowal Sediment Results (2022) Range (Mean)	DVG^
Electrical Conductivity (µS/cm)	33 – 142 (94)	3 – 162 (99)	49 – 215 (94)	53 – 187 (105)	70 – 207 (133)	45 – 218 (105)	46 – 184 (90)	47 – 162 (90.7)	48 – 171 (86)	41 – 628 (242)	No data
Arsenic (mg/L)	2.6 (total)	0.02 – 5.6 (3.1)[1] (total)	1 – 6 (3.2)[1] (total)	1.9 – 5.8 (3.2)[1] (total)	2.2 – 6.0 (3.62)[1] (total)	1.6 – 5.8 (3.2) [1] (total)	1.3 – 5.6 (2.8) (total)	1.8 – 3.3 (2.62) (Total)	1.6 – 4.6 (2.74) (total)	1.6-4.6 (3.1) (total)	20
	1.5 (extractable)	<0.1 – 1.8 (1.25)[1] (extractable)	1 – 3.1 (1.4)[1] (extractable)	1 – 3.1 (1.2)[1] (extractable)	1 – 2.2 (1.38)[1] (extractable)	1 – 3.4 (1.7) [1] (extractable)	<1 – 3.4 (1.4) (extractable)	<1 - 1.8 (1.26) (extractable)	<1 – 2.2 (1.20) (extractable)	1.0 – 3.2 (1.8) (extractable)	
Cadmium (mg/L)	1 (total)	<1 - <1 (1)[1] (total)	1 – 1 (1)[1] (total)	1 – 1 (1)[1] (total)	1 – 1 (1)[1] (total)	1 – 1 (1) [1] (total)	<1 - <1 (<1) (total)	<1 - <1 (<1) (total)	<1 - <1 (<1) (total)	<1 - <1 (<1) (total)	1.5
	0.1 (extractable)	<0.1 - <0.1 (0.1)[1] (extractable)	0.1 – 0.1 (0.1)[1] (extractable)	0.1 -0.1 (0.1)[1] (extractable)	0.1 – 0.1 (0.1)[1] (extractable)	0.1 – 0.1 (0.1) [1] (extractable)	<0.1 - <0.1 (<0.1) (extractable)	<0.1 - <0.1 (<0.1) (extractable)	<0.1 - <0.1 (<0.1) (extractable)	<0.1 - <0.1 (<0.1) (extractable)	
Lead (mg/L)	15 (total)	8 – 20 (13.7)[1] (total)	7 – 20 (12.6)[1] (total)	8 – 23 (14.2)[1] (total)	9 – 20 (13.53)[1] (total)	5 – 18 (12.55) [1] (total)	7 – 22 (12) (total)	6 - 13 (10.36) (total)	6 – 32 (13.52) (total)	7 – 21 (14) (total)	50
	8.7 (extractable)	3.8 – 15 (8.8)[1] (extractable)	4.3 – 14.5 (8.6)[1] (extractable)	3.5 –13.3 (7.33)[1] (extractable)	5.3 -13.5 (8.51)[1] (extractable)	3.5 – 14.8 (8.09) [1] (extractable)	4.4 – 16.3 (8.4) (extractable)	4.2 – 9 (7.0) (extractable)	2 – 11.2 (5.08) (extractable)	3.8 – 12.7 (8.1) (extractable)	

Table 26 (Continued): Summary of Lake Cowal Sediment Results

Parameter	Lake Cowal Sediment Results (November 2010)	Lake Cowal Sediment Results (2011) Range (Mean)	Lake Cowal Sediment Results (2012) Range (Mean)	Lake Cowal Sediment Results (2013) Range (Mean)	Lake Cowal Sediment Results (2014) Range (Mean)	Lake Cowal Sediment Results (2016) Range (Mean)	Lake Cowal Sediment Results (2017) Range (Mean)	Lake Cowal Sediment Results (2018) Range (Mean)	Lake Cowal Sediment Results (2021) Range (Mean)	Lake Cowal Sediment Results (2022) Range (Mean)	DVG ^
Zinc (mg/L)	31.5 (total)	14 – 57 (32.5)[1] (total)	11 – 43 (23.3)[1] (total)	13 – 63 (33.2)[1] (total)	16 – 100(36.8)[1] (total)	11 – 39 (25.8) [1] (total)	11 – 37 (22) (total)	10 - 23 (16.5) (total)	12 – 36 (24.74) (total)	14-86 (31) (total)	200
	3.5 (extractable)	1 - 14.8 (3.9)[1] (extractable)	1.1 – 7.7 (3.6)[1] (extractable)	1 – 11.4 (3.4)[1] (extractable)	3.3 – 52 (27.19)[1] (extractable)	1.2 – 6.3 (2.83) [1] (extractable)	<1 – 10.5 (3.3) (extractable)	1.2 – 4.4 (2.5) (extractable)	<1 – 6.1 (1.99) (extractable)	1-7.8 (2.8) (extractable)	
Antimony (mg/L)	5 (total)	<5 - <5 (5)[1] (total)	5 – 5 (5)[1] (total)	<5 - <5 (5)[1] (total)	<5 – <5 (5)[1] (total)	5 – 5 (5) [1] (total)	<5 - <5 (<5) (total)	<5 - <5 (<5) (total)	<5 - <5 (<5) (total)	<1 - <1 (<1) (total)	2
	1 (extractable)	<1 – 6.9 (1.1)[1] (extractable)	1 – 7.6 (1.1)[1] (extractable)	1 - 4.8 (1.18)[1] (extractable)	1- 2 (1.03)[1] (extractable)	1 – 2.2 (1.02) [1] (extractable)	<1 – 1.9 (1.1) (extractable)	<1 – 3.4 (1.19) (extractable)	<1 – <1 (<1) (extractable)	<1 – <1 (<1) (extractable)	

After: NSR Environmental Consultants (1995) and DM McMahon (2022).

^ Guideline values in accordance with ANZECC and ARMCANZ (2000) recommended sediment default guideline value (DGV).

[1] Mean value.

7.3. GROUNDWATER

The WMP and the SWGMBMP have been prepared in accordance with Development Consent Conditions 4.4(a) and 4.5(b) (and other relevant Development Consent Conditions) to guide water management and detail the CGO's water monitoring programme, respectively.

Evolution also holds various licences for monitoring bores, open pit dewatering bores and CGO supply water/production bores.

Monitoring and management of groundwater during the reporting period has been undertaken in accordance with relevant Development Consent Conditions, the WMP, the SWGMBMP and the EPL 11912.

7.3.1. Environmental Management

7.3.1.1. Control Strategies

The WMP establishes the following objectives for CGO site water management system including groundwater:

- Prevent quality of any surface water (including waters within Lake Cowal) and groundwater being degraded, through containment of all potentially contaminated water (contained water) generated within CGO and diversion of all other water around the perimeter of site.
- Manage quantity of surface water and groundwater within and around the mine site through appropriate design (i.e., sizing), construction and operation of water management structures.
- Establish a monitoring, review and reporting programme that facilitates identification of potential surface water and groundwater impacts and development of ameliorative measures as necessary, including provision of appropriate compensation measures for landholders affected by changes to flood regime of Nerang Cowal.

The review procedure relevant to groundwater monitoring detailed in SWGMBMP provides:

> *Groundwater Monitoring: Groundwater quantity and quality data will be compared to relevant baseline data, data collected since the commencement of operations and assessment presented in the Project EIS. Where the data analysis indicates that an adverse impact is occurring to the efficiency of surrounding bores an investigation will be undertaken to determine the need and type of ameliorative measures. The scope and timeframe of the investigation will be developed in consultation with the relevant authorities. The results of the investigation will be presented to the relevant authorities and the CEMCC within the agreed timeframe.*

In order to monitor important background and predicted future water level drawdowns, monitoring bores and piezometers have been installed within ML 1535 and within aquifers potentially affected by CGO (i.e., surrounding BCPC Bore field and ESB) (Figures 9a and 9b).

In accordance with the SWGMBMP, groundwater monitoring includes:

- monitoring of bores in aquifers potentially affected by the CGO (drawdown levels); and
- feedback from private groundwater users regarding adverse changes in groundwater quantity.

7.3.1.2. Effectiveness of the Control Strategies

The control strategies implemented during the reporting period were considered effective as demonstrated by the environmental performance indicators.

7.3.1.3. Variations from Proposed Control Strategies

There were no variations from the control strategies during the reporting period.

7.3.2. Environmental Performance – Groundwater

7.3.2.1. Monitoring

During the reporting period groundwater monitoring was conducted in accordance with SWGMBMP and EPL 11912. Groundwater monitoring locations within ML 1535 are shown in Figure 9a and regional groundwater monitoring locations shown on Figure 9b. The CGO water management system is outlined in Figure 10.

7.3.2.2. Performance Outcomes

A Groundwater Monitoring Annual Review 2022 report has been prepared by SLR Consulting Australia (2023), which provides a detailed description and interpretation of the groundwater monitoring results during the reporting period. Piper Plots of groundwater chemistry of the BCPC Bore field, processing plant area bores, pit area bores and TSF bores are provided on Figure 11. Contour maps of the hydraulic head and a cross sectional interpretation are presented in Figures 12 and 13, respectively. Key summaries of the groundwater monitoring results presented in SLR (2023a) are provided in the subsections below.

Groundwater Levels

The Cowal groundwater system generally shows some, but limited, response to rainfall. Within the BCPC borefield there is an inferred relationship where above average rainfall results in less draw on the borefield and consequent recovery of borefield water levels. For the mine site area there is no relationship observed between rainfall and water levels, with the main groundwater level response linked to pumping for water supply and pit dewatering.

Groundwater extraction within BCPC has resulted in a maximum groundwater drawdown of approximately 67 m (in bore BPLR5) since April 2004 (lowest level recorded for BPLR5 was in October 2018). Water levels in the borefield are still well within prescribed trigger levels and generally reflect the pumping schedule (Figure 14a). Monitoring bores showed an average drawdown since April 2004 of approximately 35m, a 12m recovery during 2022. Monitoring bore BPLR3 is an exception with only 20m drawdown as it is screened at a higher interval within Lower Cowra Formation rather than Lachlan Formation (SLR, 2023a).

In the CGO mine area, piezometric levels generally decline toward the pit and show the following features:

- Pit dewatering has resulted in a maximum measured drawdown of approximately 79 m in monitoring bores immediately adjacent to the pit area and were relatively stable during 2022. As is to be expected, water levels have a steep gradient adjacent to the pit and stabilise at distance from the pit (Figure 12), with little reduction below pre-mining levels of approximately 200 m AHD at distances greater than approximately 2 km from the pit centre.
- Vertical hydraulic gradients within the groundwater system are downward indicating drainage from saprock, and groundwater levels tend to be highest in the upper transported material and lowest in the saprock.
- The observation of a limited zone of influence after 15 years of mine dewatering indicates low lateral permeability.
- The pit will continue to dominate groundwater flow directions at the mine site and any groundwater contamination that occurs within the mine site, including all the groundwater between the IWL TSF and the pit will eventually flow towards and into the pit (SLR, 2023a).

Localised increase in groundwater levels is observed in the vicinity of the IWL TSF area. In 2009 Coffey was engaged to undertake modelling and assess changes in groundwater level in this area (Coffey, 2009). The calibrated model indicated that increasing groundwater levels south of the TSF (MON02A and MON02B) and east (P412A-R since decommissioned with building the IWL) are related to movement of seepage from the TSF (Coffey, 2009b). It was also assessed that groundwater level rises associated with the TSF are not expected to reach the ground surface (Coffey, 2009) and in December 2022 water levels remain at or below 4m from ground surface. Additional work in 2022 examined groundwater mounding but with a focus on considering both hydrogeological and geochemical analysis, and it found that increased pore pressure has occurred from the weight of the IWL TSF (SLR, 2023b) rather than seepage. Increased groundwater levels surrounding the South and North TSF are a result of compression of aquifer materials due to high clay content (and resultant low hydraulic conductivities) between strata underlying the TSF.

Standing water levels measured during the reporting period are presented in Figure 14 a-d.

Groundwater Quality

Variations in groundwater chemistry can be due to natural conditions such as drought and biological activity, changes in groundwater level due to pit dewatering or water supply pumping, or possible anthropogenic inputs such as the introduction of cyanide in the gold extraction process. Possible reasons for changes in water quality are discussed below.

Physiochemical parameters pH and EC can fluctuate significantly but have remained within historic ranges since mining operations began in 2004. ANZG 2018 default guideline values for pH range from 6.5 to 8, and are based on values for NSW upland rivers. Whilst some pH results are consistently below the lower guideline value (pH 6.5) these levels have remained stable since the start of measurements, which predate any mine activity. These slightly acidic to neutral measurements are similar to baseline EIS levels.

EC results have generally remained stable and are similar to, or higher than, baseline EIS levels for all monitoring bores. The only exemption being pit area monitoring bore PDB1B that showed a decline in groundwater EC. This decline is likely the influence of freshwater, either as direct surface water ingress or influence of a seasonal shallow groundwater contributing to the deeper aquifer.

Trends in major ions have generally remained stable, though statistical analyses suggest slight increases in sodium concentrations for one of seven Bland Creek Palaeochannel bores (BLPR2) and two monitoring bores in the TSF area (P417B and IWL05B), while Pit Area Bore PDB1B showed a significant decrease in sodium concentrations. Overall, from 2004 to 2010 there was an increase in sodium concentrations and since then there has been broad decreasing trends in most bores. These trends are stronger in the mining area than for the PCBC borefield and the Eastern Saline borefield. This suggests that a cause for the initial increase may be related to severe drought conditions between 2004 and 2010 since groundwater with higher TDS, in high evaporation climates, is more prone to impact by drought conditions.

Significant variations in pH, EC, sodium, sulphate and iron levels at BCPC bore BPLR2 may be related to bore completion or localised ground conditions, as the trend is not reproduced in other monitoring bores. In particular in 2021 it was suspected that steel casing in BPLR2 may have corroded and begun to collapse. During July 2022 monitoring equipment became stuck in the hole and hasn't been able to be sampled since, thereby confirming the supposition.

Variations in metal concentrations continue to reflect natural heterogeneity in ground conditions and redox reactions, rather than direct impacts from mining. Regional groundwater is in a metalliferous geological terrain in which iron and manganese naturally dominate the metal concentrations. In the absence of low pH conditions iron and manganese in groundwater are controlled by the availability of oxygen. Local fluctuations in manganese and iron concentrations were evident in the pit area and this may be related to ground disturbance and proximity.

Groundwater levels have been increasing around the TSF since tailings deposition commenced in 2006 yet only copper and siderophile elements iron, manganese. nickel and molybdenum show an increase. Concentrations of the other metals (cadmium, lead, selenium and zinc) together with sulphate, sodium and bicarbonate remained unchanged since the start of measurements in 2005. An increase of siderophile elements suggests that increasing groundwater levels is mainly due to an increase in hydrostatic pressure asserted by the TSF on low hydraulic conductivity aquifers below. The resulting increase in groundwater levels submerge secondary iron and manganese mineral in the weathered strata and at same time change geochemical conditions from mainly oxidized to anoxic. Under anoxic conditions secondary iron and manganese minerals will become unstable and dissolve, releasing iron, manganese, nickel and molybdenum into groundwater. The presence of copper may be explained by an uptake of copper during the initial formation of secondary iron and manganese minerals. Upon dissolution of these, copper will also be released.

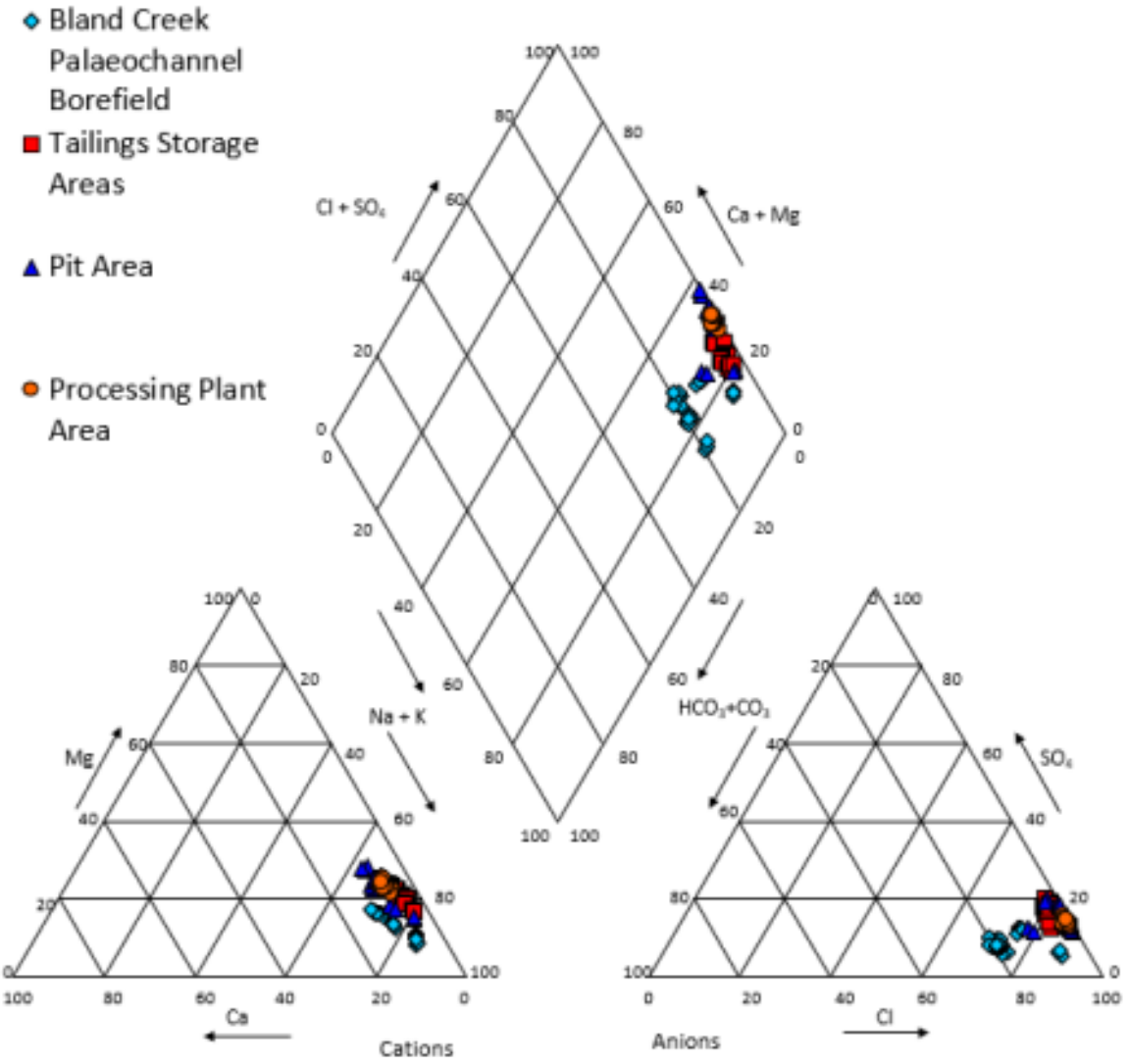
During the 2022 reporting period there were no cyanide detections in the groundwater monitoring network. The last detection of cyanide was in three bores on 15 October 2019 but when resampled ten days later all bores were found to be below the level of detection. Prior to that there have been no detections since 2013.

7.3.3. Reportable Incidents

There were no reportable incidents during the reporting period.

7.3.4. Further Improvements

Monitoring Bores BLPR2 will be decommissioned and replaced.



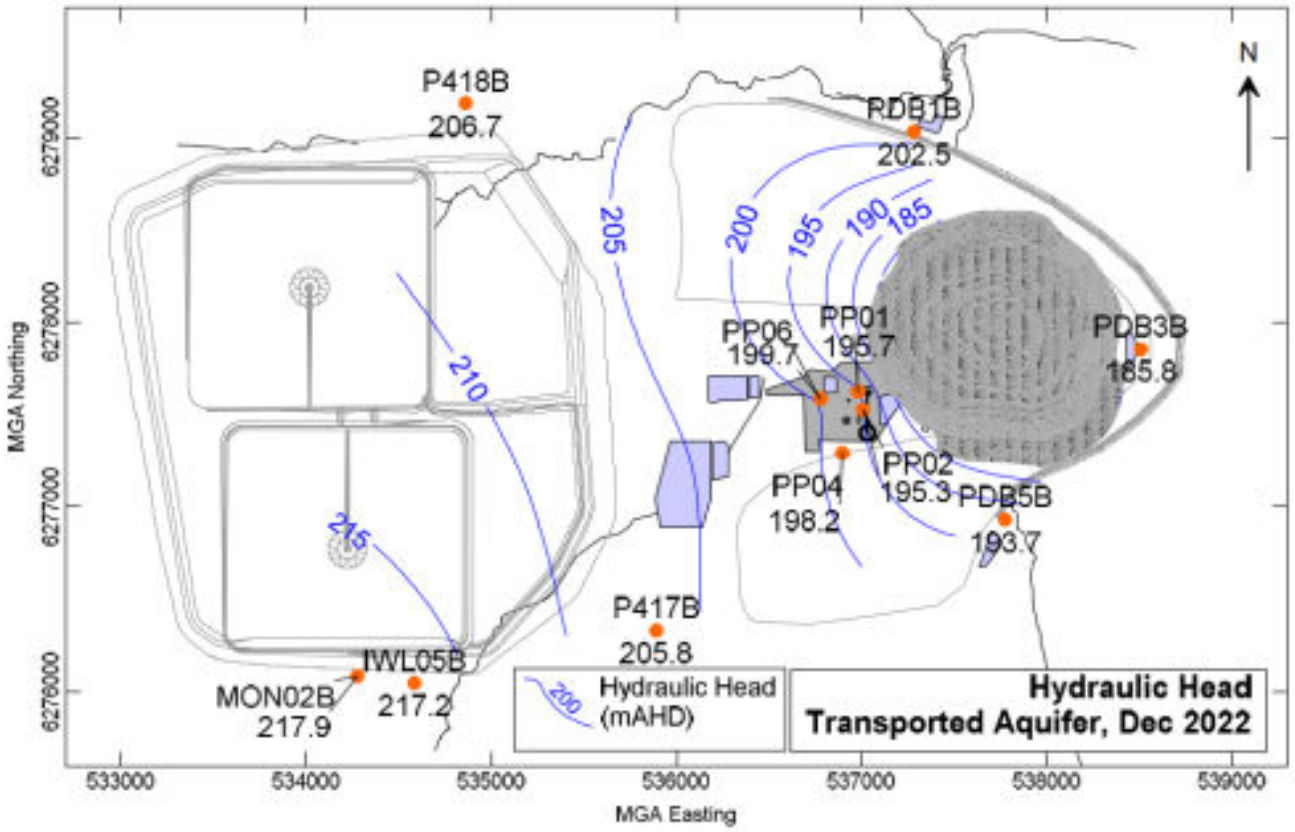
Source: SLR (2022)

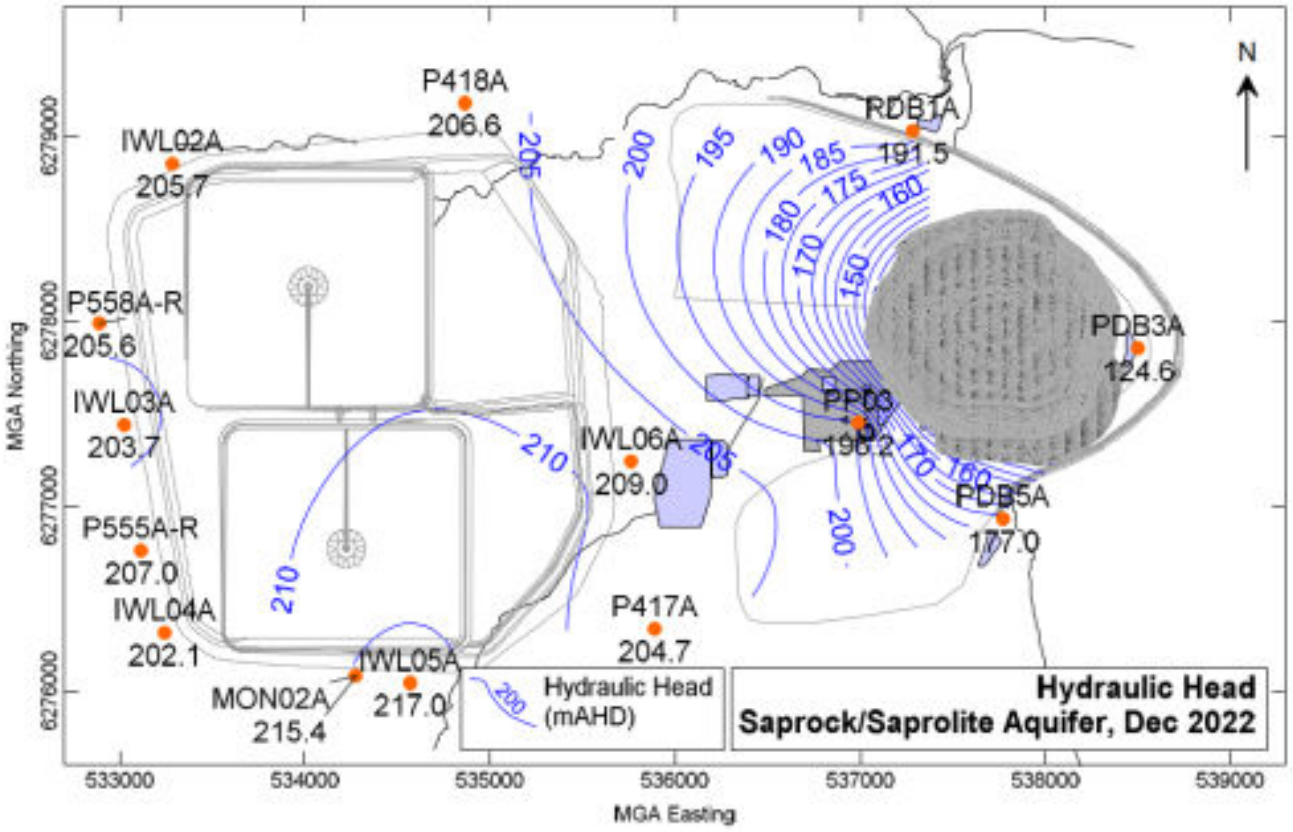
ANNUAL REVIEW 2022

FIGURE 11

Piper Plot of Groundwater Chemistry

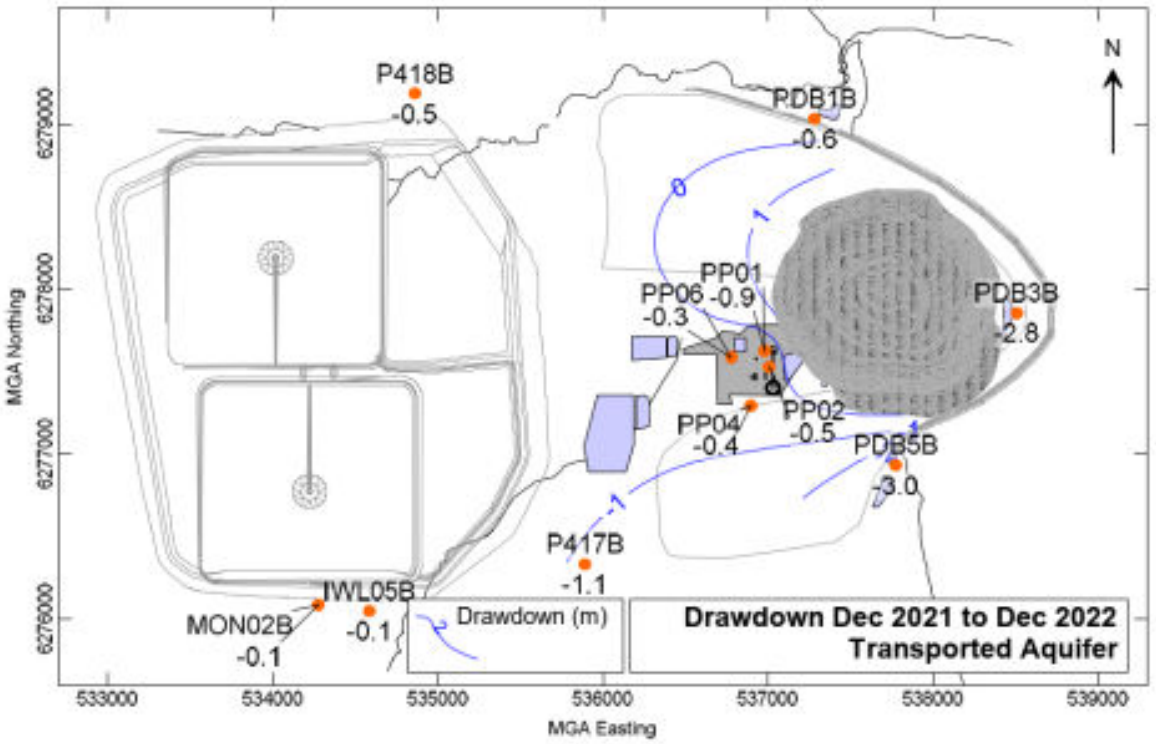
Evolution Mining

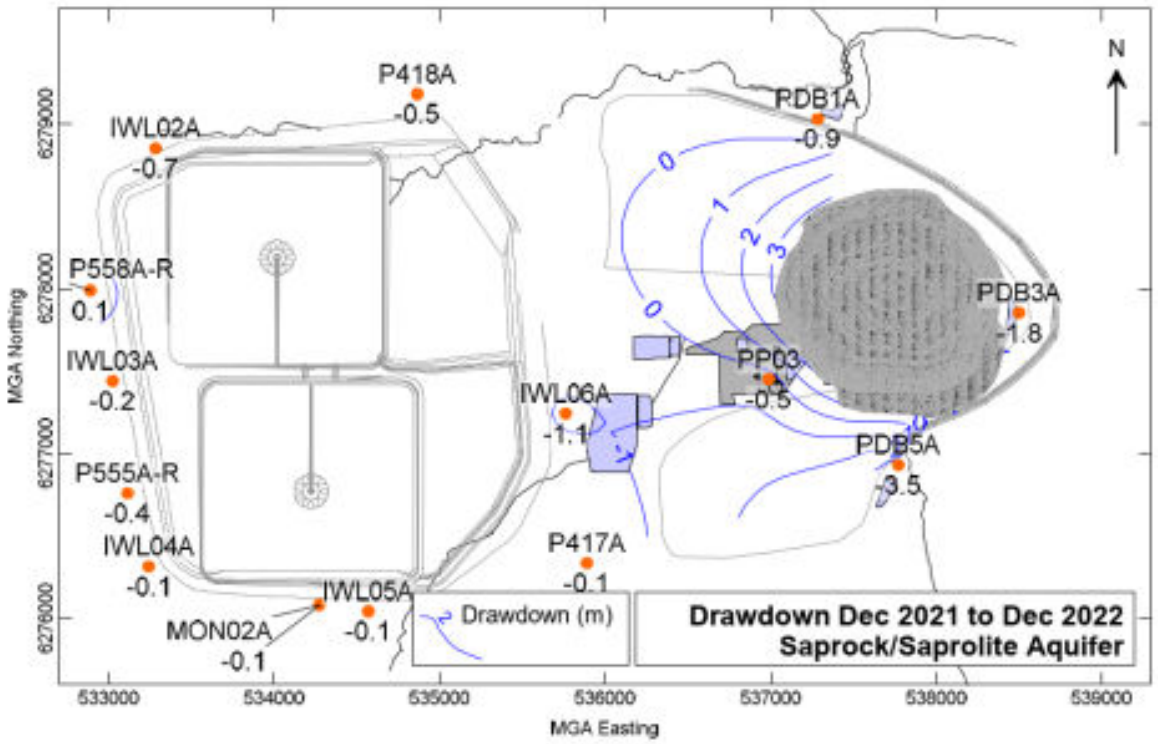




Source: SLR (2023)

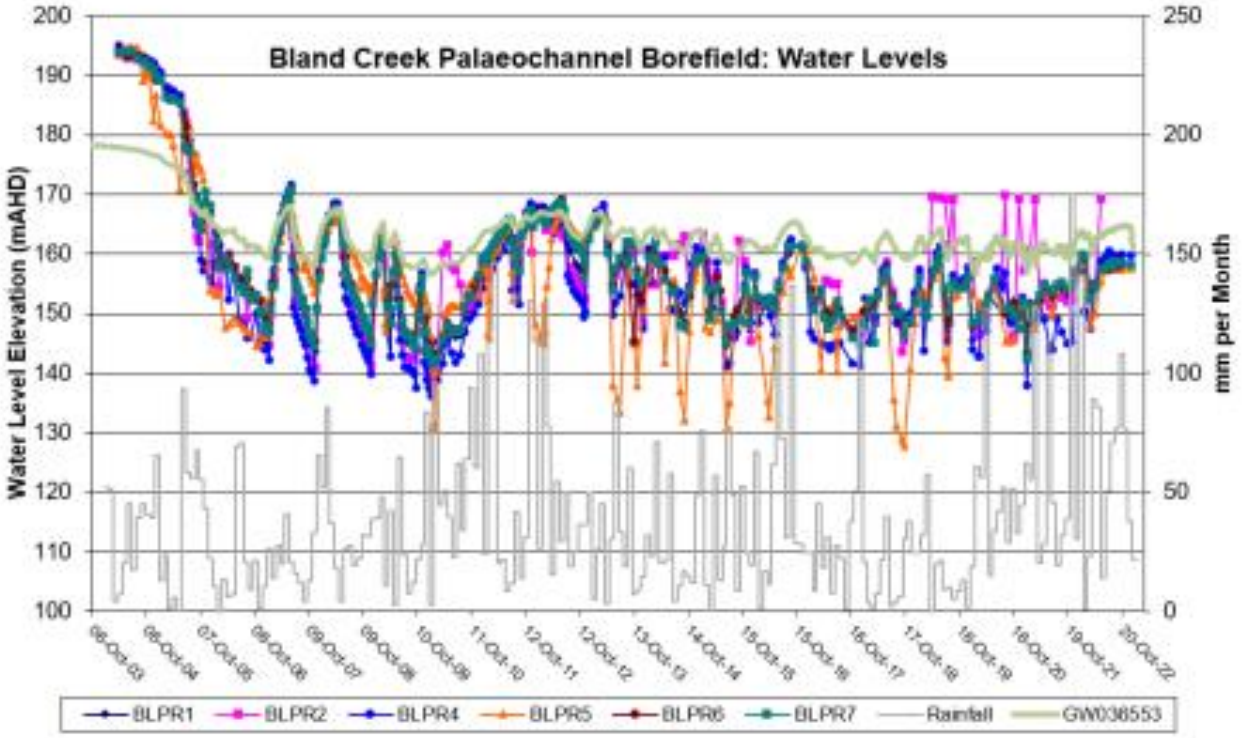
ANNUAL REVIEW 2022
FIGURE 12
Hydraulic Head (mAHD), Dec 2022

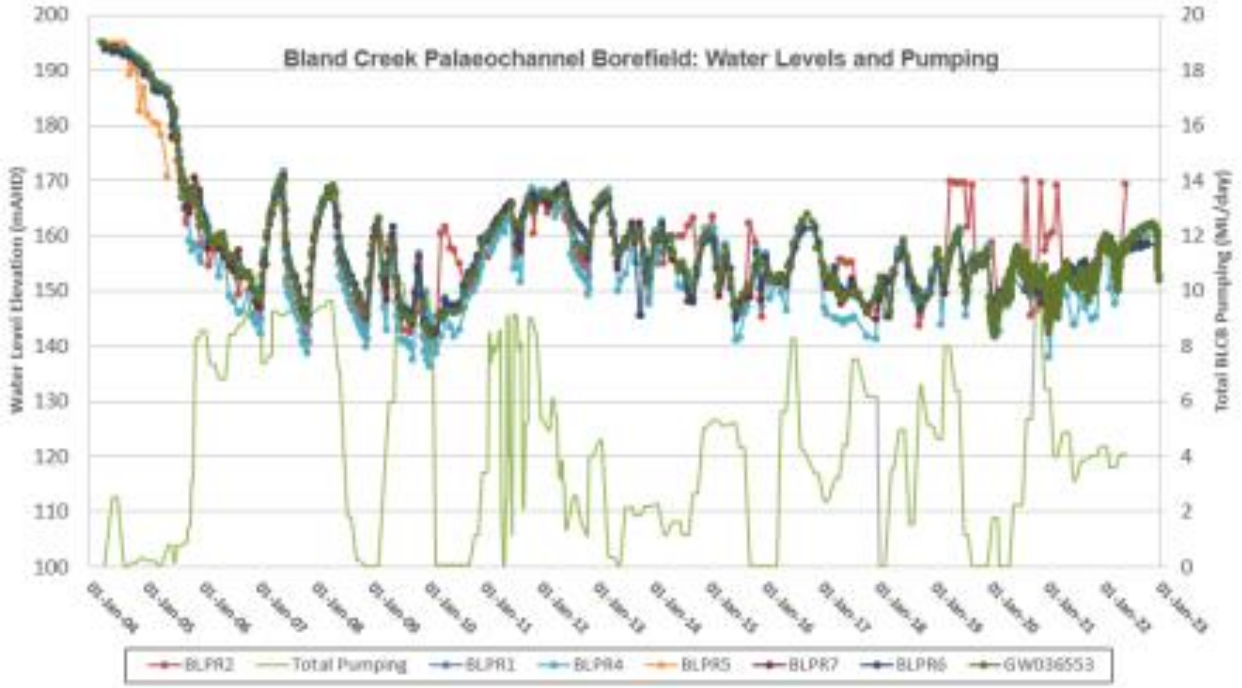




Source: SLR (2023)

ANNUAL REVIEW 2022
FIGURE 13
Groundwater Drawdown (m)
Dec 2021 - Dec 2022
Evolution





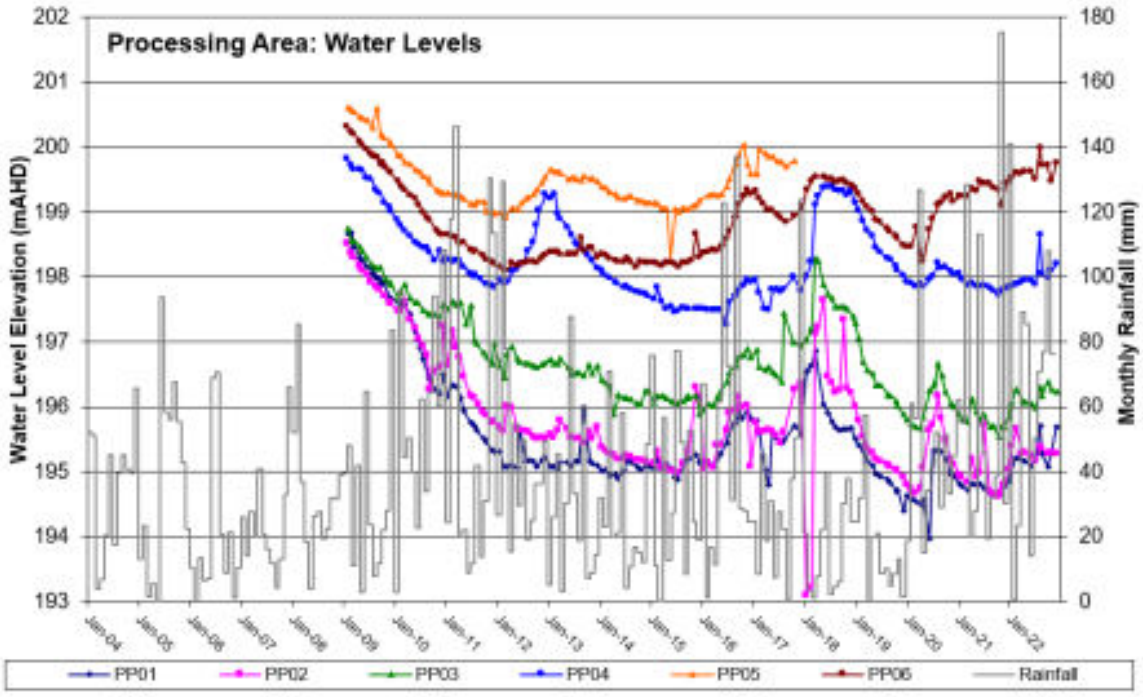
Source: SLR (2023)

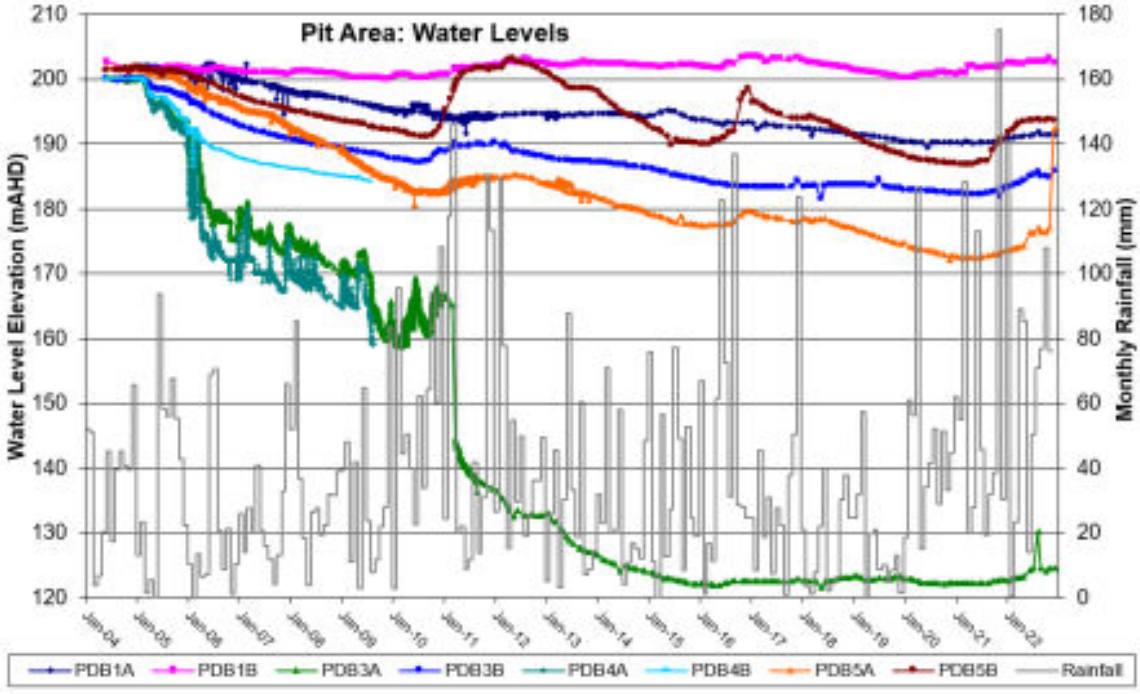
ANNUAL REVIEW 2022

FIGURE 14a

Standing Water Levels Measured During the Reporting Period

Evolution Mining





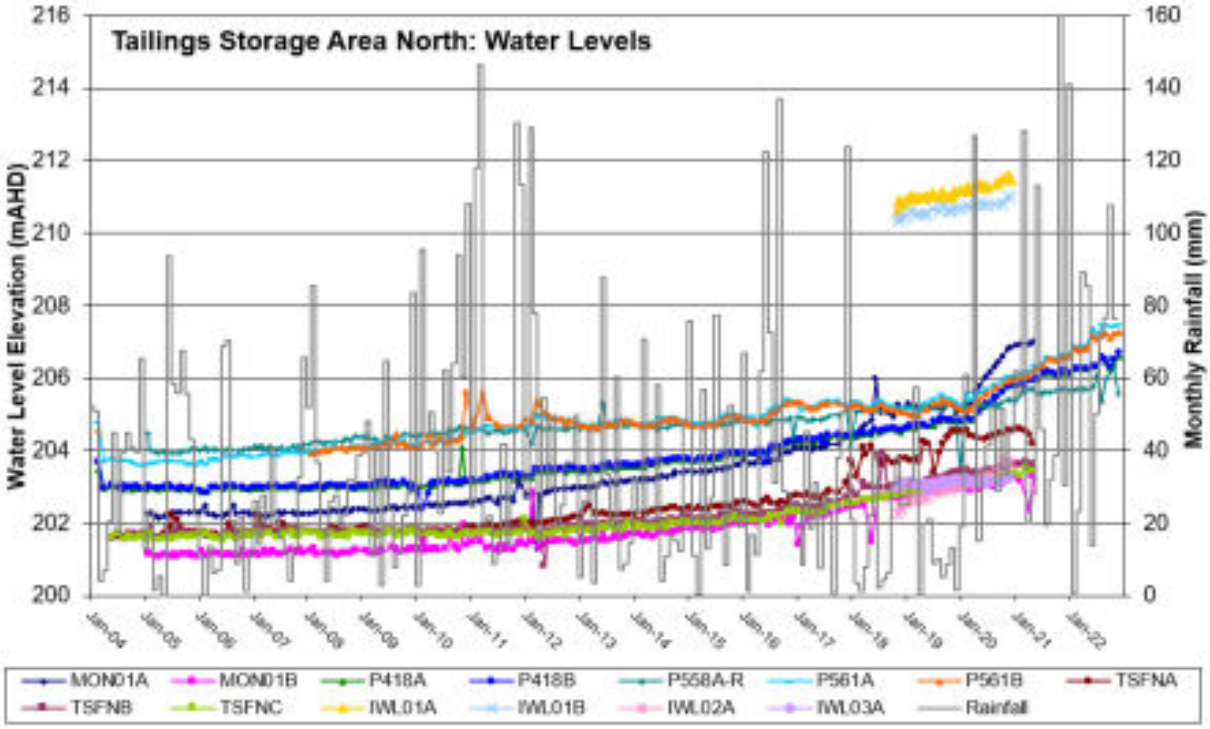
Source: SLR (2023)

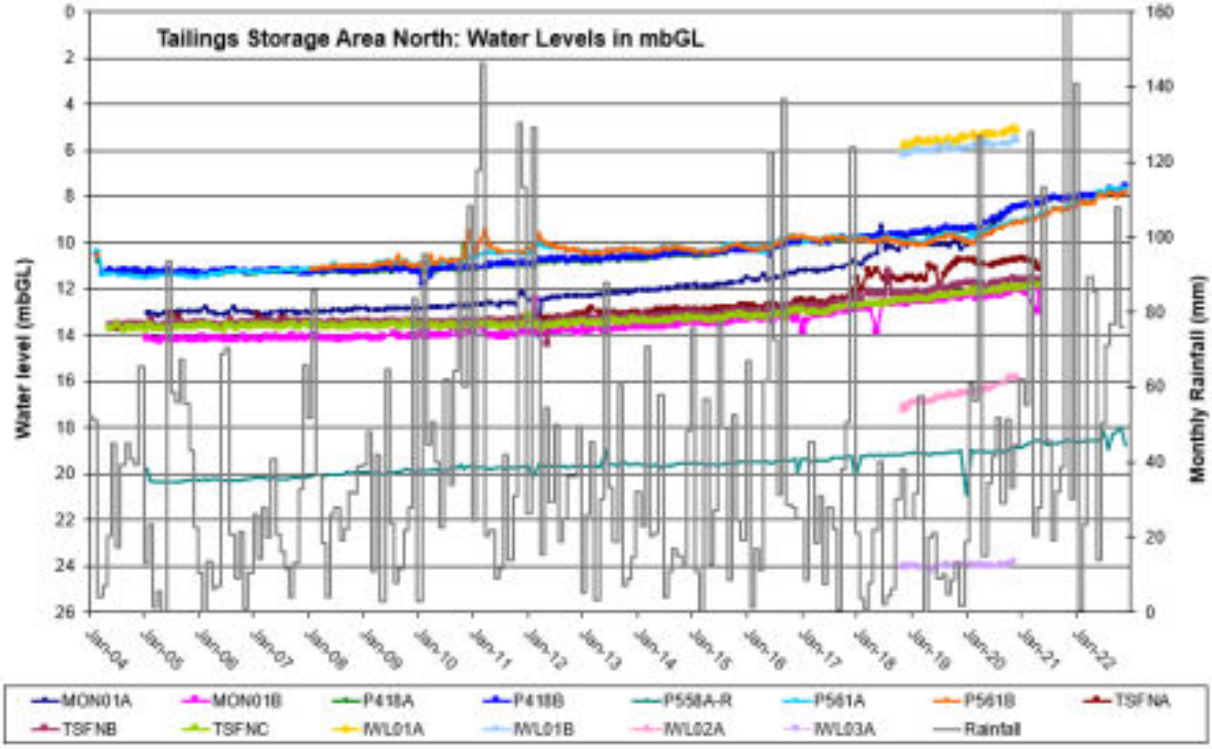
ANNUAL REVIEW 2022

FIGURE 14b

Standing Water Levels Measured During the Reporting Period

Evolution





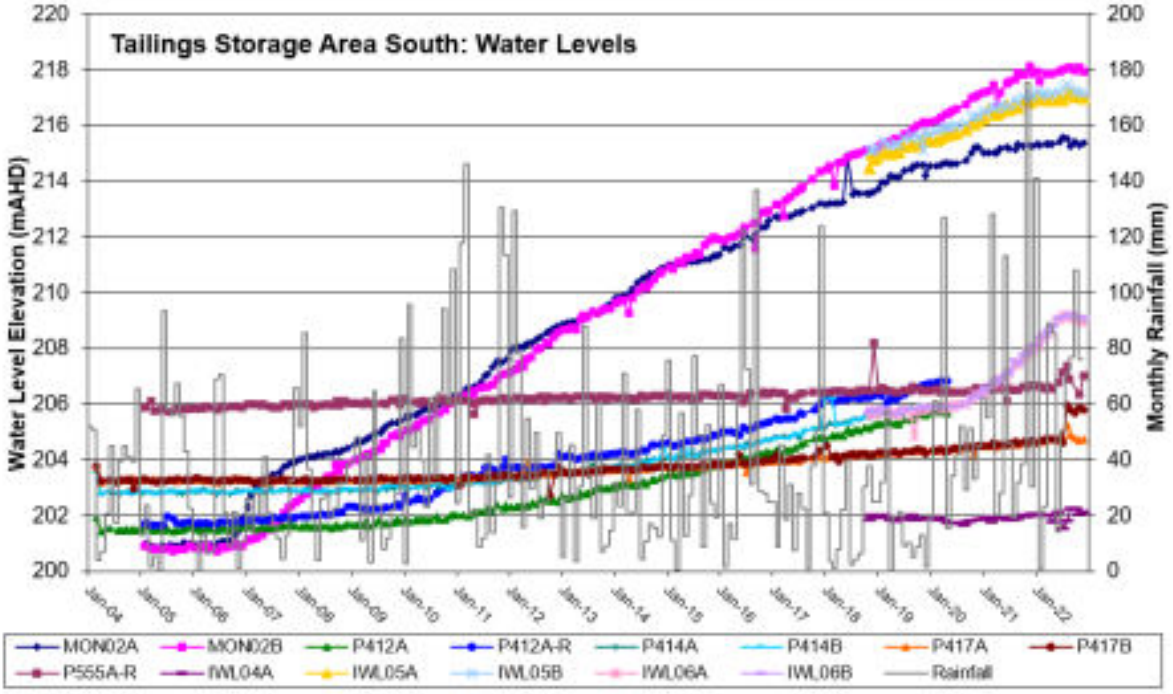
Source: SLR (2023)

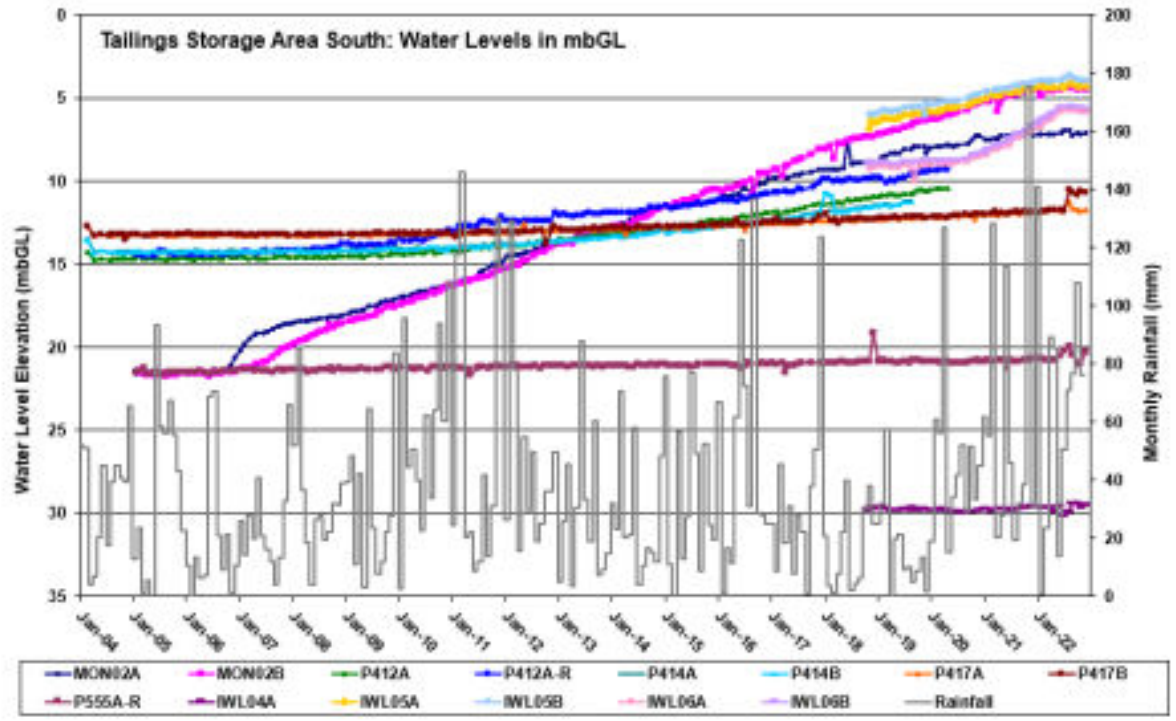
ANNUAL REVIEW 2022

FIGURE 14c

Standing Water Levels Measured During the Reporting Period

Evolution





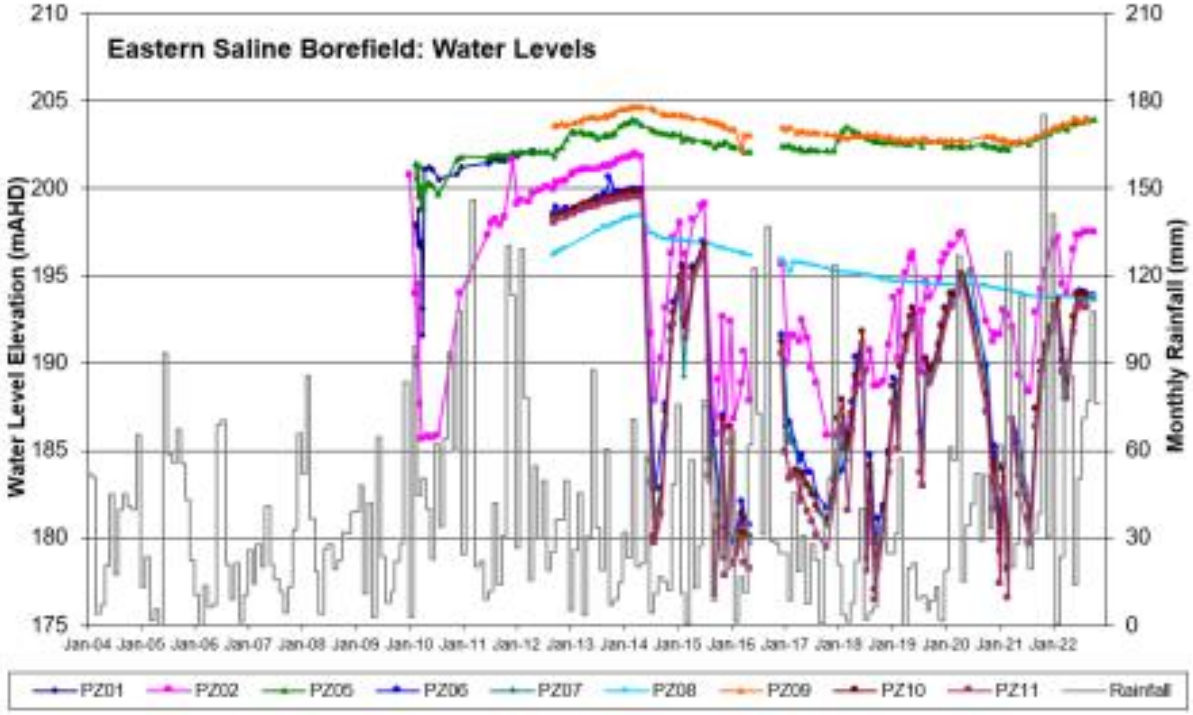
Source: SLR (2023)

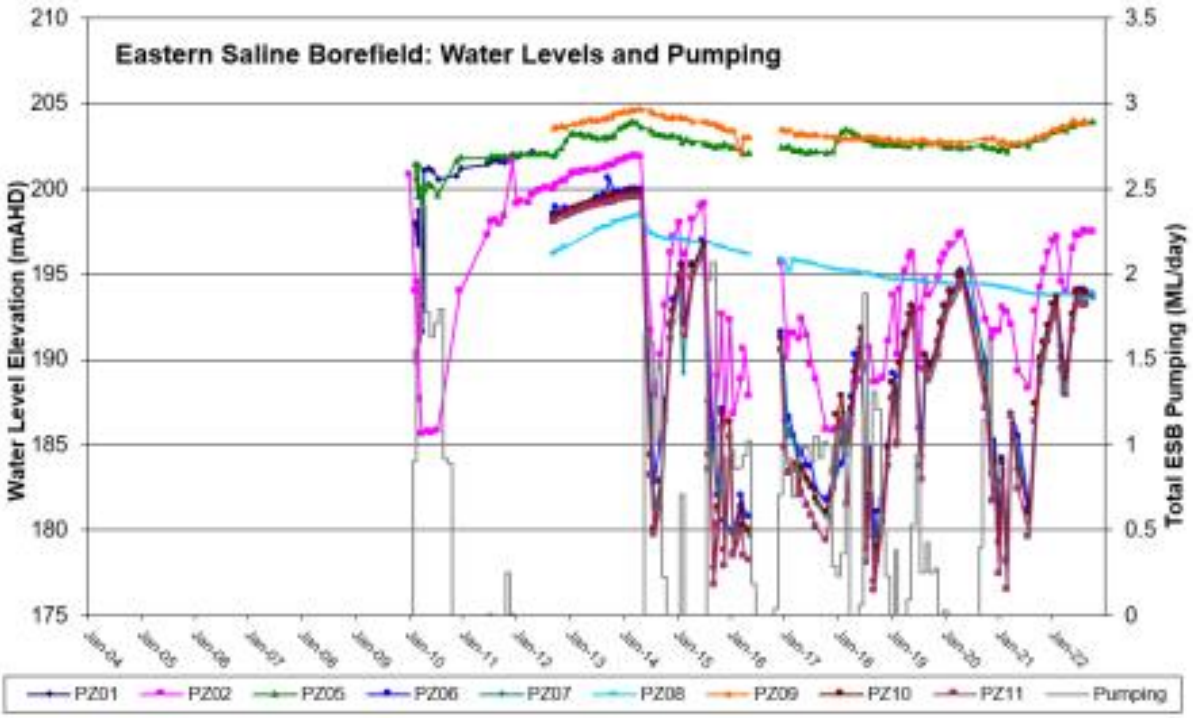
ANNUAL REVIEW 2022

FIGURE 14d

Standing Water Levels Measured During the Reporting Period

Evolution





Source: SLR (2023)

ANNUAL REVIEW 2022

FIGURE 14e

Standing Water Levels Measured During the Reporting Period

Evolution Mining

Cowal Gold Operations – 2022 Annual Review

8. REHABILITATION

Condition 2.4(c) of the DA 14/98 and condition B24 of SSD 10367 requires Evolution to prepare a Rehabilitation Management Plan (RMP). The RMP was updated in 2022 in line with Rehabilitation reforms using the 'Form and Way: Rehabilitation Management Plan (large mines)' as a guideline.

CGO operated in accordance with an approved RMP. The RMP includes a rehabilitation monitoring programme that was developed to monitor the effectiveness of the short, medium and long-term mine site rehabilitation measures and progress against performance and completion criteria.

Monitoring and management of rehabilitation areas was undertaken during the reporting period in accordance with relevant conditions in the Development Consent, ML 1535, ML 1791, and the RMP.

8.1. REHABILITATION OF DISTURBED LAND

A review of rehabilitation and disturbance data as completed in 2022, in alignment with the requirements of the Resources Regulator Operational Rehabilitation Reforms. Under the new framework, the total active disturbance area for ML 1535 and ML 1791 was measured to be 1598 ha at the end of the reporting period. Land being prepared for rehabilitation or under active rehabilitation was approximately 153 ha at the end of the reporting. The 12 ha of land being prepared for rehabilitation did not occur in 2022, and in response 15ha is being prepared for rehabilitation along the south-western wall of the IWL in 2023. There was no completed rehabilitation at the end of the reporting period.

A summary of rehabilitation undertaken at the CGO during the reporting period is described below:

- NWRE – North Wall - continued monitoring of 47.9ha on all lower, mid and upper batters, post seeding.
- SWRE – Internal Wall - continued monitoring of stabilising rock armour placement on 18ha.
- SWRE – South Wall - continued monitoring 37.7ha on all lower, mid and upper batters post seeding.
- SWRE – South Wall (rock – topsoil trial plots) ongoing monitoring of the direct seeding of November 2011.
- PWRE – Inner and outer Perimeter wall - continued monitoring of shaped oxide layer to design of approximately 6ha.
- Temporary Isolation Bund and Lake Protection Bund - road and weed maintenance where possible;

Table 27 provides a summary of rehabilitation activities at the CGO during the reporting period. The table includes details of rehabilitation at the start of the reporting period and estimated for the next report.

Table 27: Rehabilitation Summary

		Area Affected/Rehabilitated (hectares)		
		Previous Reporting Period (2021)*	**Current Reporting Period (2022)**	**Next Reporting Period (estimated) (2023)**
A	Total Mine Footprint	1,598	1,598	1,598
B	Total Active Disturbance	1,598	1,598	1,598
C	Landform Establishment	11.83	11.83	15
D	Ecosystem and land use establishment	140.02	140.02	140.02
E	Ecosystem and land use development	21.18	21.18	21.18
E	Completed Rehabilitation	0	0	0

**2021 reported areas and categories superseded by Resources Regulator Rehabilitation Reforms framework*

During the next reporting period, rehabilitation activities at the CGO will continue in line with the RMP. Some seeding may not progress in 2023 depending on annual exotic formation following rainfall in 2022 and expected seasonal conditions.

Table 28 provides details of the nature of disturbance and rehabilitation status for areas that have been disturbed including this reporting period.

All disturbed areas/structures had temporary erosion and sediment control measures implemented during construction in accordance with the ESCMP. Control measures included temporary sediment traps, sediment filters, diversion banks and silt fences. Further detail of erosion and sediment control measures for these areas/structures is described in the ESCMP.

Table 28: Nature of Disturbance and Rehabilitation Status of Disturbed Land

Disturbed Area	Nature of Disturbance				Area (ha) (approximate)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
NTSF						
• Floor	✓	✓	✓	Complete	168	Not yet rehabilitated
• Starter embankment	✓	✓	✓	Complete	12	Rehab removed
• Upstream lift	N/A	N/A	✓	Complete	8	Rehab removed
• Upstream lift	N/A	N/A	✓	Complete	16	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	24	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	32	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete		
STSF						
• Floor	✓	✓	✓	Complete	156	Not yet rehabilitated
• Downstream lift	✓	✓	✓	Complete	13	Shaped and covered
• Upstream lift	✓	✓	✓	Complete	24	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	32	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	40	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	48	Rehabilitation discontinued due to IWL encapsulation.
• Upstream lift	N/A	N/A	✓	Complete	56	Rehabilitation discontinued due to IWL encapsulation.
IWL						
• Stage 1	✓	✓	✓	Commenced		Rehabilitation shaping commenced on outer batters.
• Stage 2	✓	✓	✓	Commenced		Not yet rehabilitated
• Stage 3	✓			Commenced		Not yet rehabilitated
Open Pit	✓	✓	✓	Commenced	120	Not yet rehabilitated
PWRE	✓	✓	✓	Commenced	60	All sections shaped and covered

Disturbed Area	Nature of Disturbance				Area (ha) (approximate)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
NWRE (excluding outer batters)	✓	✓	✓	Commenced	248	Not yet rehabilitated
SWRE (excluding outer batters)	✓	✓	✓	Commenced	140	Southern section shaped
NWRE outer batters	✓	✓	✓	Commenced	65	Some sections shaped and covered
SWRE outer batters	✓	✓	✓	Commenced	57	Some sections shaped and covered
Ore Stockpiles	✓	✓	✓	Commenced	74	Not yet rehabilitated
Tailings service corridor	✓	✓	✓	Complete	5	Not yet rehabilitated
Soil stockpiles	✓	✓	✓	Commenced	91	Self seeding cover
Processing plant (including contained water storages D5 and D6)	✓	✓	✓	Complete	20	Not yet rehabilitated
Mining Hardstand (including workshop and fuel farm)	✓	✓	✓	Complete	8	Not yet rehabilitated
Internal mine access road	✓	✓	✓	Complete	8	Not yet rehabilitated
Contained water storages D1 and D4	✓	✓	✓	Complete	5	Not yet rehabilitated
Contained water storages D2, D3 & D8B	✓	✓	✓	Complete	11	Not yet rehabilitated
Contained Water Storage D9	✓	✓	✓	Complete	13	outer batters vegetated with grass species
Stilling basin and outfall	✓	✓	✓	Complete	1	Not yet rehabilitated
Temporary tank and holding pond for bore field water	✓	✓	✓	Complete	<1	Not yet rehabilitated
Mine dewatering bores	✓	N/A	✓	Complete	<1	Not yet rehabilitated
Minor internal roads and haul roads	✓	✓	✓	Commenced	40	Not yet rehabilitated
Temporary laydown areas	✓	✓	✓	Complete	2	Not yet rehabilitated
Exploration Geology office	✓	✓	✓	Complete	1	Not yet rehabilitated

Disturbed Area	Nature of Disturbance				Area (ha) (approximate)	Rehabilitation Status
	Vegetation Cleared	Topsoil and Subsoil Stripped	Earthworks	Construction Works Status*		
Administration office	✓	✓	✓	Complete	1	Not yet rehabilitated
Temporary administration office	✓	✓	✓	Complete	1	Not yet rehabilitated
ML 1535 perimeter fence	✓	N/A	✓	Complete	<1	Not yet rehabilitated
Magazine compound	✓	✓	✓	Complete	2	Not yet rehabilitated
Temporary isolation bund	✓	✓	✓	Complete	10	Rehabilitated
Lake protection bund	✓	✓	✓	Complete	10	Rehabilitated
Up-catchment diversion system	✓	✓	✓	Complete	2	Rehabilitated and under maintenance, excluding new areas which are under maintenance.
Internal catchment drainage system (permanent catchment divide)	✓	✓	✓	Complete	2	Rehabilitated and under maintenance
BCPC water supply pipeline	✓	✓	✓	Complete	2	Not yet rehabilitated
Saline groundwater supply bore field and associated pipeline	N/A	✓	✓	Commenced	10	Not yet rehabilitated
Boart Longyear office	✓	✓	✓	Complete	1	Not yet rehabilitated
Bioremediation area	✓	✓	✓	Complete	1	Not yet rehabilitated
Waste management yard	✓	✓	✓	Complete	1	Not yet rehabilitated
TSF construction compound	✓	✓	✓	Complete	2	Not yet rehabilitated

N/A: Not applicable.

** Construction works status refers to earthworks, excavations and/or emplacement of material.*

During the reporting period no additional final landform areas became available for additional progressive rehabilitation. The following text provides detail of rehabilitation monitoring conducted on each key final landform at the CGO.

Annual rehabilitation (and visual) monitoring of revegetated landforms is conducted to ensure vegetation is establishing and to determine need for any maintenance and/or contingency measures (such as requirement for supplementary plantings, erosion control and weed control). The rehabilitation works are subject to ongoing independent consultant review of effectiveness.

Progressive rehabilitation of each key final landform will continue to be undertaken in accordance with relevant environmental assessments and approvals and the RMP.

8.1.1. Perimeter Waste Rock Emplacement (PWRE)

The PWRE has been constructed to approximately 223 mAHD and surrounds the open pit to north, east and south (Plate 4). The emplacement occupies an area of approximately 60 ha and forms part of the series of embankments (i.e. Temporary Isolation Bund and Lake Protection Bund (Plate 3)) between the open pit and Lake Cowal. Emplacement elevation has been designed to reduce potential noise and light impacts of mining and processing on the surrounding environment and sensitive receptors.

Approximately 21ha of the inner and outer perimeter wall was previously seeded and 6ha were reshaped and rock armoured. Both areas were monitored for stabilisation and effectiveness of seeding during 2022 reporting period.

Plate 4: Aerial View Perimeter Waste Rock Emplacement (February 2023)

8.1.2. Northern Waste Rock Emplacement (NWRE) – Outer Batters

The NWRE is approved to be constructed to approximately 308 mAHD and will occupy an area of approximately 313 ha northwest of the pit (Plate 5).

No additional rehabilitation was conducted on the NWRE during the reporting period. Monitoring of previously rehabbed areas continued throughout the reporting period.

Tube stock planted in previous years on the NWRE was monitored during this reporting period.

Plate 5: Aerial View Northern Waste Rock Emplacement (February 2023)

8.1.3. Southern Waste Rock Emplacement (SWRE) – Outer Batters

The SWRE is approved to be constructed to approximately 283 mAHD and will occupy an area of approximately 185 ha southwest of the pit. The SWRE was constructed predominately with oxide waste and is encapsulated with waste rock armour.

No additional rehabilitation was conducted on the SWRE during the reporting period. Monitoring of previously rehabbed areas continued throughout the reporting period.

8.1.4. Northern and Southern Tailings Storage Facility (TSF) – Starter Embankments and Lifts

No rehabilitation occurred on NTSF, STSF or IWL during this reporting period due to construction of IWL. The construction of IWL primarily used waste rock and therefore will be protected from erosion.

The long-term rehabilitation objectives for TSFs include re-establishment of woodland and grass communities and will commence following cessation of tailings deposition.

Any emergent deeper-rooted species that germinate in walls of TSF structures continued to be poisoned by stump paste with glyphosate. As per ongoing TSF fauna protection practices, no trees shall be encouraged to grow until after final capping is completed on the IWL.

Plate 6: Aerial View - Southern Waste Rock Emplacement (February 2023)

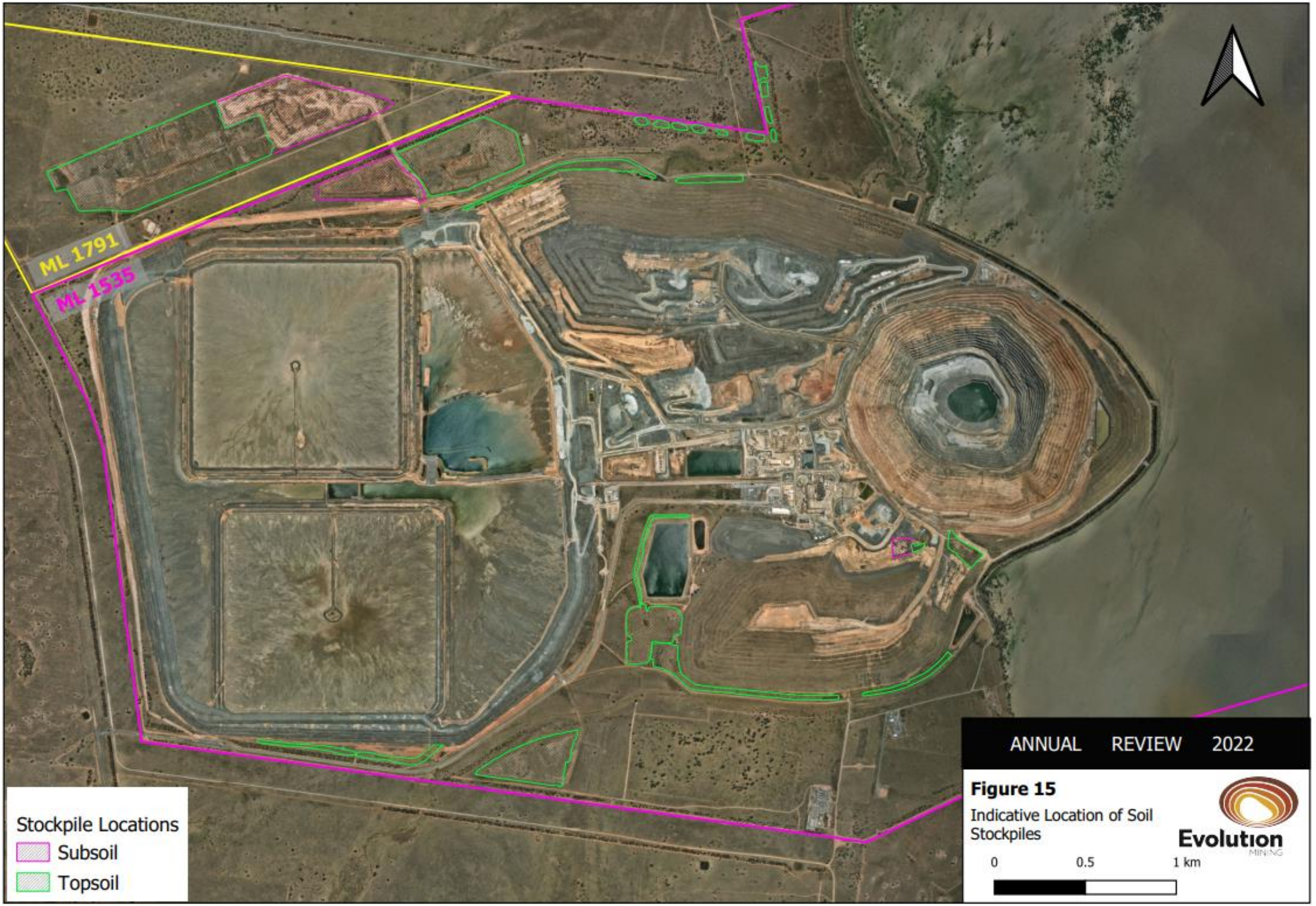
8.1.4.1. Boundary Amenity Plantings

Inspections of vegetation screening surrounding CGO identified no additional tube stock were required to be planted during the reporting period. This will continue to be reassessed as disturbance to tree screens for approved development occurs and additional planting will be investigated and may be implemented in future reporting periods.

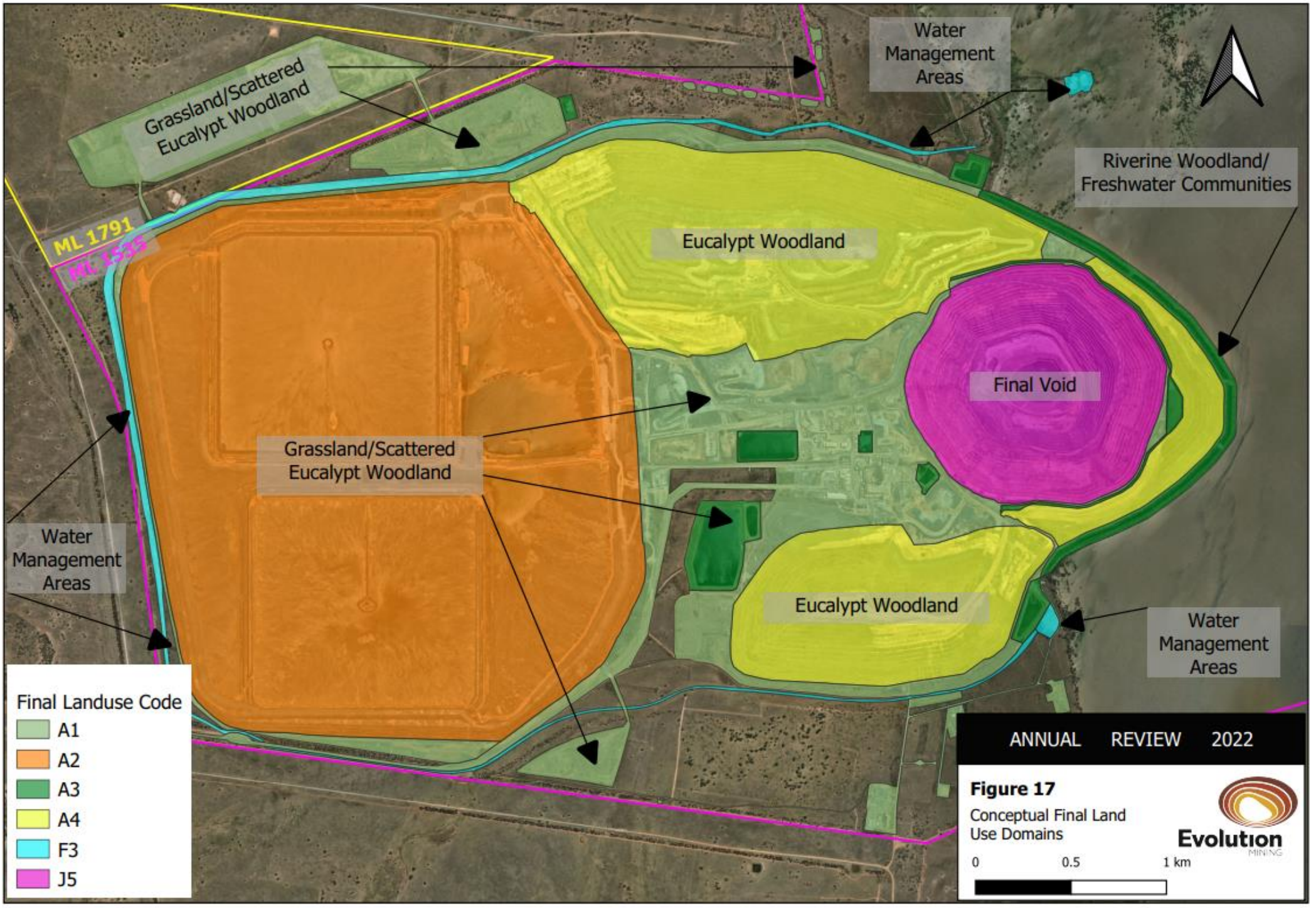
8.2. REHABILITATION MONITORING RESULTS

Monitoring within the active rehabilitation areas was undertaken by DnA Environmental (2023c) during the reporting period. A summary of the results from this monitoring survey are outlined below. The indicative location of soil stockpiles and the location of rehabilitation offset and RVEP monitoring sites are presented on Figures 15 and 16, respectively. Conceptual Final Land Use Domains, developed in accordance with the requirements of the 2022 Operations Rehabilitation Reforms, are presented on Figure 17. For the purposes of Figure 17, Final Land Use Codes represent the following descriptions:

- A1 – Native Ecosystem (former infrastructure Area)
- A2 - Native Ecosystem (former Tailings Storage Facility)
- A3 - Native Ecosystem (former Water Management Area)
- A4 - Native Ecosystem (former Overburden Emplacement Area)
- F3 – Water Management Area (to be retained)
- J5 – Final Void (to be retained)


ML 1791
ML 1535
Stockpile Locations
Subsoil
Topsoil
ANNUAL REVIEW 2022
Figure 15
Indicative Location of Soil Stockpiles
Evolution MINING
0
0.5
1 km


Proposed
Offset Area 3
Northern
Offset Area 2
RVEP Area 2
RVEP Area 1
RVEP Area 3
Proposed
Offset Area 6
Southern
Offset Area 1
RVEP Area 4
Rehab_Monitoring_Sites
Offset_Monitoring_Sites
Reference_Sites
ANNUAL REVIEW 2022
Figure 16
Rehabilitation, Offset and
RVEP Monitoring Sites
Evolution
0
1.5
3 km


Water Management Areas
Grassland/Scattered Eucalypt Woodland
Riverine Woodland/ Freshwater Communities
ML 1791
ML 1535
Eucalypt Woodland
Final Void
Grassland/Scattered Eucalypt Woodland
Water Management Areas
Eucalypt Woodland
Water Management Areas
Final Landuse Code
A1
A2
A3
A4
F3
J5
ANNUAL REVIEW 2022
Figure 17
Conceptual Final Land Use Domains
Evolution MINING
0
0.5
1 km

8.1.1 Waste Rock Emplacement Monitoring Results

The range of ecological monitoring data in 2022 indicated there have been significant ecological and chemical changes occurring within rehabilitation areas, largely as a result of volunteer colonization of exotic annual grasses especially Lolium rigidum (Wimmera Ryegrass) and/or Avena fatua (Wild Oats). While Lolium and Avena are typically hayed off during annual monitoring period, dead leaf litter has been accumulating to provide a thick mulch cover across much of the rehabilitation areas. This has been essential not only to provide stability, but accumulating and decomposing litter assists with development of soil surface profile, reducing soil hardness, increasing soil coherency and improving water infiltration capacity of rather unstable, nutrient poor soils.

Extreme seasonal conditions between monitoring years have had a significant effect on ground cover composition and ecological function in both rehabilitation and reference sites, therefore profound changes in ecological recovery should be considered with a degree of flexibility. While some sites contained weed species, these species are part of successional processes and make a positive contribution in providing protective ground cover that assists development of microbial and nutrient recycling processes and resultant functional capacity of a site. Most exotic species are common agricultural weeds also found in reference sites and/or local areas and are likely to decline in abundance over time as native perennial ground covers become more established.

Data indicates that volunteer native perennial grasses and saltbushes are increasing in abundance across most WREs as rehabilitation areas develop, however they tended to decline during years of abundance such as 2022 since wetter, cooler conditions favour annual exotics species.

Presently there is a lack of mature and juvenile trees and shrubs across most WRE rehabilitation areas. Deep ripping to reduce competitive ground covers and re-seeding was undertaken in 2018 to address low tree and shrub establishment, however there was limited rainfall between then and 2020. Monitoring for further seedling establishment again this year indicated recorded few additional seedlings and further rehabilitation treatments is most likely to be required.

Floristic diversity has typically fluctuated with changes in seasonal conditions and as expected this year all sites had a higher diversity of species due to improved rainfall conditions, though much of this was through increased exotic species diversity. While native species diversity was too low in most rehabilitation sites, all sites except NWRE01 had an acceptable diversity of exotic species this year.

Minor to major rilling has previously been observed on NWRE and SWRE but as these have become well covered with thick plant growth they have stabilized and no longer exhibit active erosion. Newer areas of rehabilitation are showing some active erosion but as plant establishment continues it is anticipated that these will also stabilise.

Electrical Conductivity (EC), Exchange Sodium Percentage (ESP) and Sulfur (S) are naturally occurring in geology of the area and below levels of concern for formation of Acid Rock Drainage. However these parameters are known to inhibit vegetation growth and CGO tracks EC, ESP and S values in WREs against relevant guidelines (agricultural and reference sites) as an indicator of future revegetation success. Monitoring results in WRE soils demonstrated an improving (reducing) trend in EC, ESP and Sulfur (S) in numerous rehabilitation sites, after high rainfall activity and is expected to continue improving over time. However several sites (NWRE02, 05 & SWRE03) increased in 2022 despite longer term reductions and they remain in excess of recommended guidelines. Monitoring will continue to see if the overall trends continue and if the sites will attain guideline values.

Improved soil testing, management selection and placement of materials to be used in rehabilitation should be undertaken, with a particular emphasis for the need to use benign waste rock and healthy topsoil. Soils with a proven seedbank of ground cover species should be a priority topsoil resource, even if they contain an abundance of exotic seeds.

8.1.2 Rehabilitation Trial Monitoring Results

The NWRE rehabilitation trials were not assessed this year, however a summary of the trials and previous findings have been provided below.

The NWRE rehabilitation trial objective was to assess effectiveness of a variety of rehabilitation treatments, or combination of treatments, known to improve rehabilitation objectives in a replicated experimental design. The design incorporated “standard” rehabilitation procedures including a rock mulch underlay, topsoil, gypsum application and a sterile cover crop, which have proven to be essential components in rehabilitation of saline, sodic and dispersive topsoils and climatic conditions of semi-arid environments. These rehabilitation trials also

sought to determine if adequate rehabilitation outcomes can be obtained by reducing depth of topsoil from the recommended 300mm application whilst achieving a range of primary ecological completion targets.

The trial also assessed the effectiveness of applying different mulch types such as wheaten straw and seed-bearing native pasture hay as an erosion control treatment / seed application method. These have proven to be effective in earlier trials at Lake Cowal and in mine rehabilitation sites elsewhere. The trials also incorporated planting native tube stock to observe growth, establishment and survival of shrubs and trees on constructed landforms.

Due to the various issues associated with implementation of rehabilitation trials due to challenges with timing and practical application in achieving uniformity to experimental design, there was high variability within and across treatments, therefore, all results should be treated with caution.

Data in the trial sites until 2019 showed that:

- Most trial treatments demonstrated positive ecological succession, with significant improvements in function, ground cover and structure being recorded. During the drought, ecological function declined in all trial treatments including sites that had a higher level of grass cover. Shade provided by establishing trees tended to have a higher level of macropod disturbance.
- There was no apparent difference in effects of topsoil depth or mulching type, however mulching with either straw or native pasture hay tended to enhance ecological function of sites and assisted in development of sites compared to those without a mulch treatment, especially in the early developmental stages.
- All treatments with an application of straw or native pasture hay had functional patch areas that were comparable to the local woodlands on Hills (as did one site 150Nil02), but patch areas in the Grey Box woodlands were particularly low in 2019.
- Older rehabilitation sites had more developmental time, especially for voluntary establishment of Lolium (and other ground covers) to have an effect of stability and function of sites. Some areas without a mulching treatment were slow to develop, but there has been some voluntary establishment of ground covers such as Lolium.
- In the short to medium term, it appears all trial areas regardless of topsoil depth or mulching technique were improving in ecological function and developing in structure and composition. There has been an increase in growth in tubestock populations with trees and mature shrubs >5cm dbh recorded in all but one trial plot and are indicative of good growth rates.
- Increase in diversity and abundance of native perennial grasses and ground covers and many planted acacias and some eucalypts were of reproductive age and setting seed.
- Maturing trees and shrubs are likely to impact on diversity and composition of grassy understory which are likely to undergo significant change over time as mature canopy covers. This was already being observed as macropods congregated under trees that provided high levels of shade, thus reducing integrity of ground covers.
- Many undesirable soil attributes such as high Electrical Conductivity (EC), ESP and sulfur (S) appear not to have had a significant effect on ecological development of the area.
- During drought, there was a reduction in ecological function in most of the trial sites. However, many ecological attributes remained comparable to the woodlands occurring on the local hills and ridges which were also been negatively affected by the drought.

Plate 7 shows the NWRE trial site, and monitoring will continue during future reporting periods.

Plate 7: NWRE – Pond D1 North Trial Tube stock (February 2023)

9. COMMUNITY RELATIONS

Evolution recognises developing and maintaining a positive relationship with the local community is essential to running a successful mining operation.

Evolution strives to earn the trust of all with whom we interact, whether they be our employees, the communities where we live and work, the governments that host us, or other stakeholders with whom we engage in the sustainable development of mineral resources. The Community Relations Policy guides Evolution in its conduct of business around the world, including at the CGO.

9.1. COMMUNITY COMPLAINTS

The Development Consent, SSD 10367 and EPL 11912 require implementation of a complaint's mechanism. A community line for enquiries, feedback or complaints was established on 9 December 2003 and operates 24 hours per day. Complaints and/or concerns can be made by calling (02) 6975 3454 where a member of the Cowal Community team will advise the caller that they have reached the Evolution CGO Community line and assist with their enquiry, feedback or complaint. The information is logged along with the date and time that the call was made. Upon receiving an enquiry, the Community Team conducts necessary investigations and prepares a response. The caller is contacted within 24 hours of the complaint, to gather further information and notify of any proposed action to take place. Enquiries, complaints and feedback can also be made by emailing the community team on cgo.community@evolutionmining.com.

Complaints may also be submitted through regular stakeholder interactions that may occur between CGO personnel and community members from time to time.

Details of the Cowal Community Line and contact details are advertised quarterly in the following local newspapers; The West Wyalong Advocate, The Forbes Advocate and The Condobolin Argus. They are also included within the Cowal Update community newsletter, released by Evolution bi-annually and distributed to approximately 12,000 households within West Wyalong, Forbes, and Condobolin.

A summary of the community complaints received during the reporting period (as required by the Development Consent) is provided in Table 29.

Table 29: Summary of Community Complaints during the Reporting Period

Summary of Community Complaints 2022	
Record No 1	
Details	Construction works of UG Village outside of DA approved hours
Complaint/Concern	Community
Date	18/04/2022
Outcome	Received complaint through community line in regard to work being completed at Boundary Street accommodation village. The complaint was due to the fact works were being completed on a public holiday and before 7.30am. Also no water cart had being used, causing dust to affect nearby homes. Project Manager was contacted immediately and works ceased. Water truck to be used for future works.
Date of Response	Initial response – 18/04/2022Complai nt closed – 18/04/2022
Record No 2	
Details	Business owner of Wyalong
Complaint/Concern	Community
Date	12/04/2022
Outcome	1. Business owner called Community Line to advise that Evolution employees were currentlyparking in areas that were affecting community access. 2. Site communications went out to notify employees of parking protocols near and around buspick up/drop off points. Vehicle owners involved in complaint were notified and instructed to relocate parking to other areas. 3. Parking restrictions signage has also been investigated.
Date of Response	Initial response – 12/04/2022 Complaint closed – 14/04/2022
Record No 3	
Details	Resident of West Wyalong
Complaint/Concern	Community
Date	22/05/2022
Outcome	1. Received a call through the Cowal Community line that works were being completed at the Boundary Street accommodation village outside approved hours. 2. Project Manager contacted, works ceased immediately. Notice given to abide by approved DA working hours/day conditions.
Date of Response	Initial response – 22/05/2022Compla int closed – 22/05/2022
Record No 4	
Details	Business Owner of West Wyalong
Complaint/Concern	Community
Date	23/05/2022

Outcome	1. Business owner called Community Line to advise that Evolution employees were currently parking out the front of their hours for long periods of time restricting access. House is located at a bus pick up/drop off point. Site communications went out to employees informing of parking protocols near and around bus pick up/drop off points. Vehicle owners involved in complaint were notified and instructed to relocate parking to other areas.
Date of Response	Initial response – 23/05/2021 Complaint closded – 25/05/2022

Record No 5	
Details	Business Owner
Complaint/Concern	CGO operations concern
Date	15/06/2021
Outcome	1. Business owner called into the Evolution town office to notify us that his business driveway access was being obstructed by a parked vehicle owned by an Evolution employee. 2.Vehicle owner was notified immediately and presented in town soon after to move the vehicle that was obstructing access for business owner. Comms went out to site notifying EVN employees of parking etiquette around bus pick up/drop off points. 1. EVN looking into alternate parking area to alleviate community parking complaints.
Date of Response	Initial response – 15/06/2022Complaint closed – 17/02/2022
Record No. 6	
Details	Community Member
Complaint/Concern	CGO operations concern
Date	04/08/2022
Outcome	1. Received an email form nearby residents of Boundary Street Underground Accommodation Village in regard to the negative impact construction of camp is having to their stormwater runoff. They have noted after heavy rain that their driveway containing small stones is getting washed away. They have also been in contact with BSC. 2. EVN Checked and improved sediment fencing along the western boundaries. EVN to improve the existing construction/temporary swale drain along the internal perimeter. Discussion to take place with BSC about possible improvement options for Hyde Lane.
Date of response	Initial response – 04/08/2022 Closed – 06/08/2022
Record No.7	
Details	Community member
Complaint/Concern	CGO operations
Date	02/10/2022
Outcome	1. Received noise complaint in regard to construction works from the UG accommodation village. Resident believes construction is occurring out outside the permitted working hours/days allowed. 2. Evolution working with contractor and Council to determine working hours/days and works permitted to clear up any confusion with all parties involved. This information to be communicated to nearby residents ASAP. 3. Letter's distributed to nearby neighbours to UG accommodation village which outlines permitted working hours.
Date of response	Initial response – 02/10/2022 Closed - 31/10/2022

9.2. COMMUNITY LIAISON

9.2.1. Community Environmental Monitoring and Consultative Committee

During the reporting period, quarterly meetings of the CEMCC were conducted in accordance with the Development Consent.

The CEMCC was established prior to commencement of construction works, in accordance with the Development Consent requirements. The CEMCC monitors compliance with conditions of the Development Consent and other matters relevant to the operation of the mine.

The CEMCC meets on-site or in local communities, undertakes regular inspections, reviews environmental and audit reports and discusses any incidents or complaints that may have been registered. The CEMCC members are an active conduit between local communities and the CGO. Minutes are taken from each meeting and published on the Cowal Gold Mine website (http://www.evolutionmining.com.au/cowal/).

9.2.2. Community Consultation

The “Cowal Update” is the CGO community newsletter that is distributed to approximately 12,000 households in West Wyalong, Condobolin, and ForbesThe Cowal Update is released bi-annually June/December.

Evolution has previously extended invitations to numerous community groups to visit the CGO for presentations and site visits. Site visits have been undertaken by a number of groups during the reporting period including:

- Bland, Forbes and Lachlan Shire Councils;
- CEMCC Committee; and
- various secondary schools.

Unfortunately, due to the COVID pandemic, site visits to non-essential workers/visitors have been restricted.

Stakeholder meetings are carried out on-site (if seen as essential and meet current COVID restrictions) or in the local community depending upon the group and topic. These meetings can consist of 3 to 20 people, for example:

- CEMCC meetings (held quarterly)
- Local landholders, local community and charitable groups
- Local Government and State agency meetings.

Evolution also attended several off-site presentations involving the community including:

- local community and charitable groups
- Wiradjuri Condobolin Corporation
- Lachlan, Bland and Forbes Shire Councils; and
- Local secondary schools.

9.2.3. Indigenous Consultation

Evolution continued to work with the Wiradjuri community through the Wiradjuri Condobolin Corporation and a number of formal committees, including:

- the Cowal Project Coordinating Committee; and
- the Employment, Training and Business Committee.

The CGO meets with the Wiradjuri Condobolin Corporation on a regular basis.

9.2.4. Community Development

Evolution continued to support numerous donations, sponsorships and partnerships to a variety of local schools, annual events, charity and not for profit groups, community infrastructure and town advancement groups.

Evolution operated the Cowal Partnering Program, the Cowal Cares Program, the Shared Value Projects and the Endeavour and Wiradjuri Scholarship programs to facilitate financial contributions to the community during the reporting period.

9.2.5. The Lake Cowal Foundation Limited

The Lake Cowal Foundation (LCF) continues to grow into an important local independent “Environmental Trust”. The Foundation is actively supported financially and in-kind by CGO. The LCF Board meets as required, some meetings are held via teleconference.

In addition to housing the LCCC (Lake Cowal Conservation Centre) on Evolution-owned property ‘Hillgrove’, Evolution has also provided the LCF withconsiderable freehold property to undertake conservation and research projects.

The LCF has now been involved in approximately 50 conservation projects in the Lake Cowal region and has developed a relationship with 40 project partners, including:

- numerous local landowners and managers.
- Riverina and Central West Local Land Services.
- Lachlan Landcare, National Mallee fowl Recovery Team, National Landcare Program, Natural Heritage Trust, Environmental Trust, Greening Australia and DPI (Fisheries).
- Bland, Forbes, Lachlan, Weddin, and Temora Shire Councils.
- Charles Sturt University, CSIRO, Western Research Institute, Western Institute of TAFE and West Wyalong High School; and
- numerous local bodies such as the West Wyalong Anglers and Gardening Clubs.

Some of the projects that the LCF have completed or are involved in include:

- the LCCC where over 8,000 people visit and participate in environmental education and activities each year
- Lake Cowal and Bland Creek revegetation projects.
- Bland Creek Catchment Incentives Grants Project that has combined contributions of approximately $5 million.
- a Natural Sequence Farming project which aims to reconnect the hydrologic function of the 10 km Spring Creek with its floodplain.
- collaborative research with CSIRO Plant Industry into native grassland population dynamics.
- Pasture Re-establishment Trials and Pasture Cropping Trials.
- the restocking of Bland and Sandy Creeks with native fingerlings; and
- seed collection, assessment of remnant vegetation and establishment of an herbarium.

The LCF continues to be an important organisation with conservation, pastoral, community, government, educational and mining groups working collaboratively together to achieve considerable outcomes for the Lake Cowal region.

10. INDEPENDENT ENVIRONMENTAL AUDIT

An Independent Environmental Audit (IEA) was conducted in 2022 under a triennial requirement pursuant to DA 14/98 and SSD 10367. Environmental Resources Management Australia (ERM) were engaged by CGO and approved by Department of Planning and Environment (DP&E) on 28 March 2022 to conduct the IEA. Field components of IEA were subsequently undertaken between 11 and 13 April 2022 with report findings provided to CGO on 26 May 2022 and subsequently provided to DP&E by CGO on 8 June 2022 with a corrective action plan.

Out of 268 commitments and obligations within DA 14/98, SSD 10367, EPL 11912, ML 1535 and ML 1791 there were ten (10) non-compliances identified. It is CGO assessment that the non-compliances are generally administrative in nature and do not pose immediate risk to the environment. A summary of non-compliance matters raised, and CGO response are:

- Operations to construct the Integrated Waste Landform (IWL) occurred outside of 7am to 6pm without approval from DP&E in late 2021. Approval was subsequently received on 7 February 2022 and was considered an historical noncompliance.
- The Rehabilitation Management Plan needed to include geotechnical analysis of interaction of IWL, open pit and Lake Cowal. This requirement was introduced on 30 September 2021 and the Rehabilitation Management Plan was subsequently updated by August 2022.
- The Heritage Management Plan and Indigenous Archaeology and Cultural Management Plan needed to be updated to include a change to mine owners (Evolution) and State government agency names. The plans were updated and submitted by June 2022.
- The Biodiversity Management Plan and associated Biodiversity Offset Strategy needed to be updated to change to mine owners (Evolution) and State government agency names; and ensure correct alignment of Northern Offset and Southern Offset areas to development approvals – noting that total areas were correct. The plans were updated and submitted by June 2022.
- The Water Management Plan was, and needed to be, prepared by suitably qualified persons who had been endorsed by DP&E. The plan had been submitted by CGO and conditionally approved by DP&E on 15 April 2022 and had been submitted by CGO again on 20 May 2022 (prior to receiving ERM findings) to address DP&E conditional approval recommendations. CGO resubmitted the Water Management Plan in July 2022 to specifically include authors qualifications, experience and endorsement. This matter was a condition on DA 14/98 and SSD 10367 hence triggered two non-compliance findings.
- Within aqueous component of the slurry stream WADCN levels need to be below 30mg/L with all exceedances included in annual reports. In July 2021 one value went over 30mg/L WADCN and was included in the 2021 annual report but a value in February 2020 was not included in the 2020 annual report. CGO acknowledges this administrative oversight. This matter was a condition on DA 14/98 and EPL 11912 and hence triggered two non-compliance findings.
- Strategies, plans and programs have required review dates and administrative processes within DA 14/98. At the time of the ERM field visit CGO had not implemented an auditable register showing when documents are reviewed, whom by and tracking revisions. Whilst individual documents had document control measures that could demonstrate these changes, CGO agreed that a recently procured system (INX InForm) could be used to provide this register. CGO implemented these changes by July 2022.
- The annual report needs to include a section on waste minimisation and management measures. This condition was introduced on 30 September 2021 and should have been included in the 2021 annual report. CGO has implemented the requirement in this annual report (Section 6.15).

ERM suggested two (2) opportunities for improvement and six (6) associated recommendations:

- Air quality monitoring standardisation and rationalisation, such as: co-locating HVAS, PM10 and PM2.5 monitors; and reducing the number of dust deposition gauges. These improvements have been outlined in Section 6.1 of this annual report.
- Improved rehabilitation techniques to be included in the FY23 – FY25 rehabilitation program forecast, specifically: over-sowing areas previously rehabilitated but only primarily containing ground cover; increasing coarse woody debris to increase micro habitats. CGO will consider these initiatives, including if there is sufficient evidence to show no unforeseen consequences, in the next iteration of the rehabilitation program.
- Update the Flora and Fauna Management Plan; Compensatory Wetland Management Plan; Soil Stripping Management Plan; Hazardous Materials Management Plan and Air Quality Management Plans with updated mine owner (Evolution) and State government agency names. CGO updated these documents in 2022 in response to this finding.

11. INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1. NON-COMPLIANCES DURING THE REPORTING PERIOD

Summaries of any non-compliances during the audit period have been described in Sections 1 and 10 of the AR.

11.2. INCIDENTS DURING THE REPORTING PERIOD

On 26 May 2022, WAD cyanide at the processing plant Tailings Hopper exceeded the 30ppm license limit. The processing plant was immediately shutdown in accordance with the Float Tails Leach (FTL) Cyanide Destruct Controlling WAD CN Discharge Level procedure (CGO PRO SWI 420). A combination of Caros acid dosing and dilution was used to reduce the WAD cyanide. Elevated WAD levels were not detected at the decant pond in the IWL, indicating that remedial actions adequately controlled the risk of environmental impact.

Through internal investigation, it was determined that the cyanide addition was taken out of automated control and set to a fixed dosing point during a processing plant shutdown, which overrode the analyzer set point for control. The free cyanide high alarm did not activate due to incorrect programming logic, which caused free cyanide levels to rise.

A detailed incident report was provided by Mr Simon Coates, Superintendent – Environment, on 26 May 2022. The primary preventative action associated with this incident was to update the logic controls / alarms for when the system is taken out of automatic control, with secondary actions associated with updating the Cyanide Management Plan in consultation with DPE.

12. ACTIVITIES TO BE COMPLETED IN THE NEXT REPORTING PERIOD

Summaries of the activities to be completed in the next reporting period have been described in the ‘Further Improvements’ sections included throughout this AR.

13. REFERENCES

Australian and New Zealand Governments (ANZG, 2018*) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Canberra ACT, Australia. Available at www.waterquality.gov.au/anzguidelines

Australian Museum Business Services (2013) *Lake Cowal Waterbird Monitoring (1989 to 2012) Compilation Report.* Report prepared for Barrick (Australia Pacific) Limited.

Barrick (Cowal) Limited (2013) *Cowal Gold Mine Extension Modification Environmental Assessment*.

Bruce, R.C. and Rayment, G.E. (1982). *Analytical Methods and Interpretations Used by the Agricultural Chemistry Branch for Soil and Land Use Surveys, Bulletin No. QB2004*, Dept of Primary Industries, Brisbane, Qld.

Bureau of Meteorology (BOM) *Climate Data http://www.bom.gov.au/climate/data/* Data accessed 4 February 2022

Coffey Geotechnics (2009) *Cowal Gold Mine Groundwater Level Investigation.* Report No. GEOTLCOV21910AF- AB.

Coffey Geotechnics (2011a) *Cowal Gold Mine – Groundwater Monitoring Review 2010 – June 2011*. Report No. GEOTLCOV21910AN-AE.

Coffey Geotechnics (2011b) *Cowal Gold Mine Augmentation Project – Hydrogeological Assessment – March 2011*. Report No. GEOTLCOV21910AJ-AL.

Coffey Geotechnics (2012) *Cowal Gold Mine Pre-Feasibility Study – Mine Site Hydrogeological Assessment – 5 March 2012*. Report No. GEOTLCOV21910AM-AJ.

Diatoma (2022a) *Lake Cowal Waterbird Monitoring Survey Progress Report January 2022*. Prepared for Evolution Mining Lake Cowal.

Diatoma (2022b) *Lake Cowal Waterbird Monitoring Survey Progress Report August 2022.* Prepared for Evolution Mining Lake Cowal.

Diatoma (2022c) *Lake Cowal Waterbird Monitoring Survey Progress Report October 2022.* Prepared for Evolution Mining Lake Cowal.

Department of Foreign Affairs and Trade (2017) *Leading Practice Sustainable Development Program for the Mining Industry - Hazardous Materials Management*.

Department of Planning (2011) *Hazard Audit Guidelines. Hazardous Industry Planning Advisory* Paper No 5.

Division of Resources and Energy (2013) *ESG3: Mining Operations Plan (MOP) Guidelines,* September 2013.

DnA Environmental (2023a) *2022 Biodiversity Offset Areas Monitoring.* Prepared for Evolution (Cowal) Limited.

DnA Environmental (2023b) *2022 Compensatory Wetland Monitoring Report.* Prepared for Evolution (Cowal) Limited.

DnA Environmental (2023c) *2022 Rehabilitation Monitoring Report.* Prepared for Evolution (Cowal) Limited.

DnA Environmental (2023d) *2022 Remnant Vegetation Enhancement Program Monitoring Report.* Prepared for Evolution (Cowal) Limited.

DnA Environmental (2023e) *2022 Austral Pillwort Survey.* Prepared for Evolution (Cowal) Limited.

Donato Environmental Services (2022) *Seasonal Wildlife Use Patterns of the Cowal Gold Operations Tailings Storage Facility: 1 January to 30 June 2022.* Report to Evolution Mining, September 2022.

Donato Environmental Services (2023) *Seasonal wildlife use patterns of the Cowal Gold Operations integrated*

waste landform: 1 July to 31 December 2022. Technical memorandum to Grace Derrick Cowal Operations Evolution Mining, March 2023.

DM McMahon Pty Ltd (2022) *Surface Water and Sediment Sampling and Analysis Results 2022 Lake Cowal NSW.* Report No. 9018

Environmental Geochemistry International Pty Ltd (2004) *CGP Geochemical Assessment of Waste Rock and Process Tailings.*

ERM (2023). Environmental Resource Management Australia. *Independent Environmental Audit DA14/98 Mod 16, SSD 10367, EPL 11912, ML 1535 & 1791.*

Evolution (2016) Evolution Mining (Cowal) Pty Limited. *Cowal Gold Operations Mine Life Extension Modification Environmental Assessment.*

FRC Environmental (2023). *Cowal Gold Mine Compensatory Wetland Habitat and Fish Investigation* December, 2022.

Geo Environmental Management (2009) *Cowal Gold Mine E42 Modification – Modified Request – Tailings and Waste Rock Geochemical Assessment.*

Geo Environmental Management (2013) *Cowal Gold Mine Extension Modification – Tailings and Waste Rock Geochemical Assessment.*

Gilligan, J 2005, *Fish communities of the lower Murray-Darling catchment: Status and trends.*, Report prepared for NSW Department of Primary Industries.

McInnes, P., Miles, I., Radclyffe, D., and Brooker, M. (1998) *Endeavour 42 (E42) gold deposit, Lake Cowal; in Berkman D A, Mackenzie D H (Ed.s), 1998* Geology of Australian & Papua New Guinean Mineral Deposits The AusIMM, Melbourne Mono 22 pp 581-586.

NGH Pty Ltd (2023) *Weed Survey Report 2022 Evolution Mining*, Lake Cowal.

North Limited (1998) *Cowal Gold Project – Environmental Impact Statement.* Report prepared by Resource Strategies Pty Ltd.

NSR Environmental Consultants (1995) *Lake Cowal Gold Project Environmental Impact Statement*.

NSW Government (2015) *Annual Review Guideline – Post-approval Requirements for State Significant Mining Developments.* October 2015.

O'Kane Consultants Pty Limited (2008) *Waste Rock Geochemical Infill Programme Cowal Gold Mine, Pacific Environment Limited, (2013) Cowal Gold Mine Extension. Modification – Air Quality Impact Assessment.* Volume 2. Appendix F.

Pacific Environment Limited (2013) *Cowal Gold Mine Extension Modification – Air Quality Impact Assessment.*Report prepared for Barrick Australia Limited.

Pardoe, C. (2002) *Supplementary Archaeological Survey of Part of the Proposed Bore field and Pipeline for the Cowal Gold Project, Lake Cowal,* NSW - Draft Report.

Saros (2023) *Review of 2022 Blast Monitoring Results.*

SLR Consulting Australia Pty Ltd (2013) *Cowal Gold Mine Extension Modification Noise and Blasting Impact Assessment.*

SLR Consulting Australia Pty Ltd (2023a) *Groundwater Monitoring Annual Review 2022.*

SLR Consulting Australia Pty Ltd (2023b) *Cowal TSF Groundwater Mounding Review.* Memorandum prepared for Evolution Mining.

Spectrum Acoustics (2022a) *Cowal Gold Operations – Attended Noise Monitoring – February 2022.*

Spectrum Acoustics (2022b) *Cowal Gold Operations – Attended Noise Monitoring – May 2022.*

Spectrum Acoustics (2022c) *Cowal Gold Operations – Attended Noise Monitoring – August 2022.*

Spectrum Acoustics (2022d) *Cowal Gold Operations – Attended Noise Monitoring – December 2022.*

Techt (2023) *Cowal Gold Mine Bund Audit Report – 2022.*

Zephyr Environmental (2023) *Annual Air Quality Monitoring Review – 2022.*

14. GLOSSARY OF TERMS

AHD	Australian Height Datum (meters)
AQMP	Air Quality Management Plan
AR	Annual Review
ANZECC	Australian New Zealand Environmental Conservation Council
ANZG	Australian and New Zealand Governments. Typically referring to guidelines for fresh and marine water.
ARD	Acid Rock Drainage
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWS	Automatic Weather Station
BCPC	Bland Creek Paleochannel
BLMP	Blast Management Plan
BOMP	Biodiversity Offset Management Plan
BSC	Bland Shire Council
CEMCC	Community Environmental Monitoring & Consultative Committee
CGO	Cowal Gold Operations
CMP	Cyanide Management Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CW	Compensatory Wetland
CWMP	Compensatory Wetland Management Plan
DA	Development Approval used interchangeable with Development Consent
DPIE	Department of Planning Industry and Environment
DP&E	Department of Planning and Environment
DECCW	Department of Environment, Climate Change and Water (now EPA)
DPI	Department of Primary Industries
DRE	Department of Resources and Energy
DRG EC	Division of Resources and Geoscience Electrical Conductivity
EC	Electrical Conductivity
ECCC	Evolution Cowal Consultation Centre
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EPL	Environment Protection License
EPRP	Emergency Preparedness Response Plan
ESB	Eastern Saline Borefield
ESCMP	Erosion and Sediment Control Management Plan
ETBC	Employment Training Business Council (WCC – Evolution)
Evolution	Evolution Mining (Cowal) Pty Limited
FFMP	Flora and Fauna Management Plan
HMP	Heritage Management Plan
HWCMP	Hazardous Waste and Chemical Management Plan
IACHMP	Indigenous Archaeology and Cultural Heritage Management Plan
ICDS	Internal Catchment Drainage System
IEA	Independent Environmental Audit
LCCC	Lake Cowal Conservation Centre
LCF	Lake Cowal Foundation
LMP	Land Management Plan
MIC	Maximum Instantaneous Charge
ML	Mining Lease
MOP	Mining Operations Plan
NMP	Noise Management Plan
NPWS	National Park and Wildlife Service
NTSF	Northern Tailings Storage Facility
NWRE	Northern Waste Rock Emplacement
OEH	Office of Environment and Heritage

PWRE	Perimeter Waste Rock Emplacement
RL	Relative Level (metres)
RMP	Rehabilitation Management Plan
RRSWMP	Riverina Regional Strategic Weed Management Plan
RVEP	Remnant Revegetation Enhancement Programme
SSD	State Significant Development
STSF	Southern Tailings Storage Facility
SWRE	Southern Waste Rock Emplacement
SWGMBMP	Surface Water, Groundwater, Meteorological and Biological Monitoring Programme
TSF	Tailings Storage Facility
TSMP	Threatened Species Management Protocol
TSMS	Threatened Species Management Strategy
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UCDS	Up Catchment Diversion System
VCP	Vegetation Clearance Protocol
WAD	Weak Acid Dissociated
WIRES	Wildlife Information Rescue and Education Service
WMP	Water Management Plan