COWAL GOLD OPERATIONS

2020 ANNUAL REVIEW

COWAL GOLD OPERATIONS
2020 Annual Review

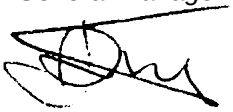
Name of Operation	*Cowal Gold Operations*
Name of Operator	*Evolution Mining (Cowal) Pty Limited*
Development Consent	*DA 14/98*
Name of Holder of Development Consent	*Evolution Mining (Cowal) Pty Limited*
Mining Lease #	*ML 1535*
Name of Holder of Mining Lease	*Evolution Mining (Cowal) Pty Limited*
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*
MOP Start Date (1)	*1 July 2020*
MOP End Date (1)	*30 June 2021*
MOP End Date (2)	*30 June 2022*
Annual Review Start Date	*1 January 2020*
Annual Review End Date	*31 December 2020*

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 2020 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	*30 July 2021*

Prepared by	
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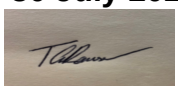
Date	**30 July 2021**
Signature	
Reviewed by	
Name	**Simon Coates**
Title	**Environmental Superintendent**
Date	**30 July 2021**
Signature	

Document #	**COW.400.04.4995SC**
Issued to	**Steve O'Donoghue – Department of Planning, Industry and Environment**
Date	**30 July 2021**

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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 2020) is provided in Table 1.

Table 1: Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Development Consent DA 14/98	YES
Environmental Protection Licence (EPL) 11912	YES
Mining Lease (ML) 1535	YES
Mining Lease (ML) 1791	YES

2 INTRODUCTION

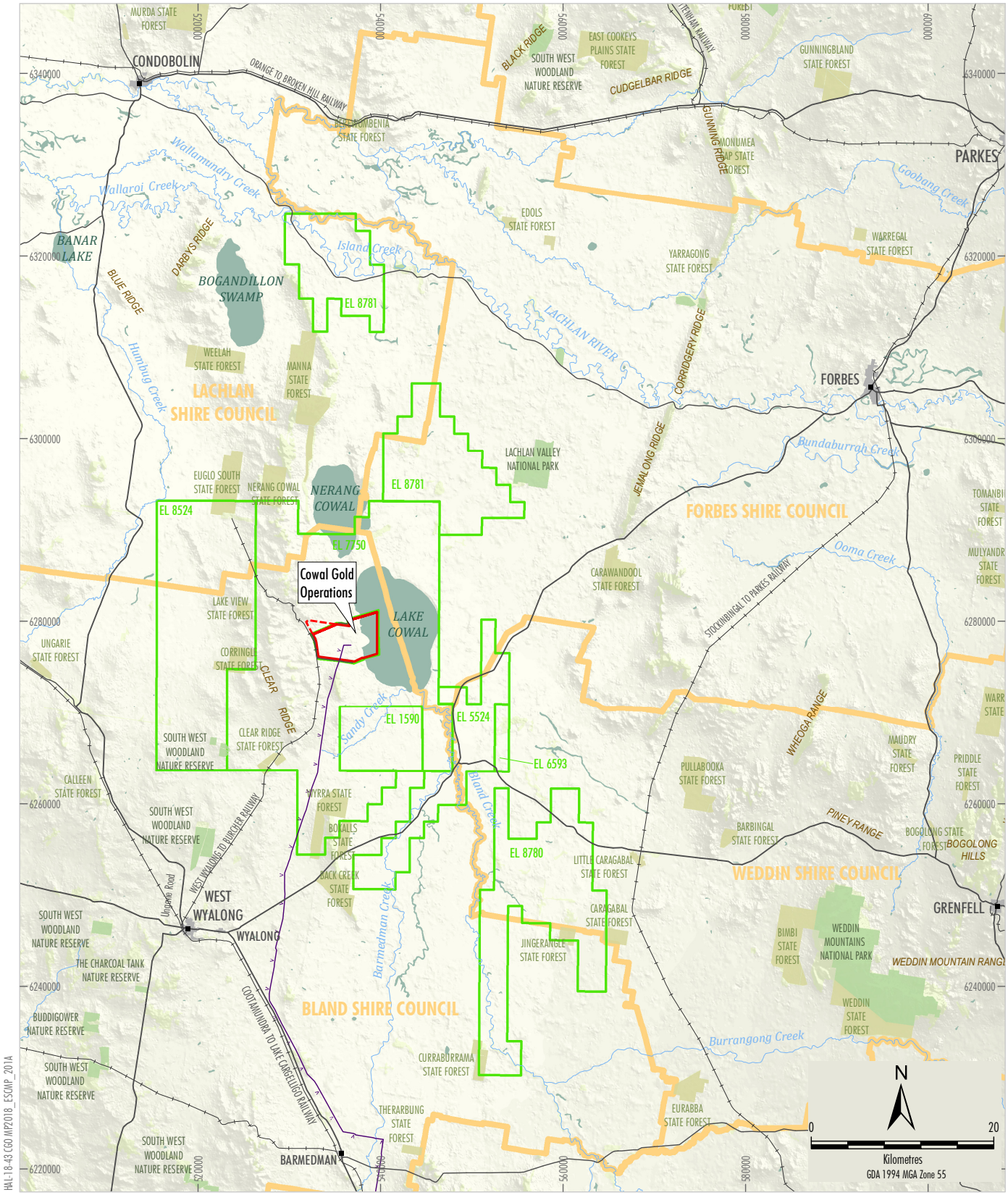
The 2020 Annual Review (AR) has been prepared by Evolution Mining (Cowal) Pty Limited (Evolution) for the CGO in accordance with the requirements of Condition 9.1(b) of the development consent (DA 14/98) for the CGO (granted on 26 February 1999) (development consent) (as modified) and Condition 26 of the Conditions of Authority for ML 1535 (granted on 13 June 2003). 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 kilometres (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 July 2020 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) 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 programme 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.



HAL-18-43 CGO MP2018_ESOMP_201A

LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Boundary (ML 1791)
- Exploration Licence (EL) National Park & Nature Reserve State Forest
- Local Government Area Boundary Electricity
- Transmission Line Railway

Source: © NSW Department of Finance, Services & Innovation (2017); Office of Environment & Heritage NSW (2017)

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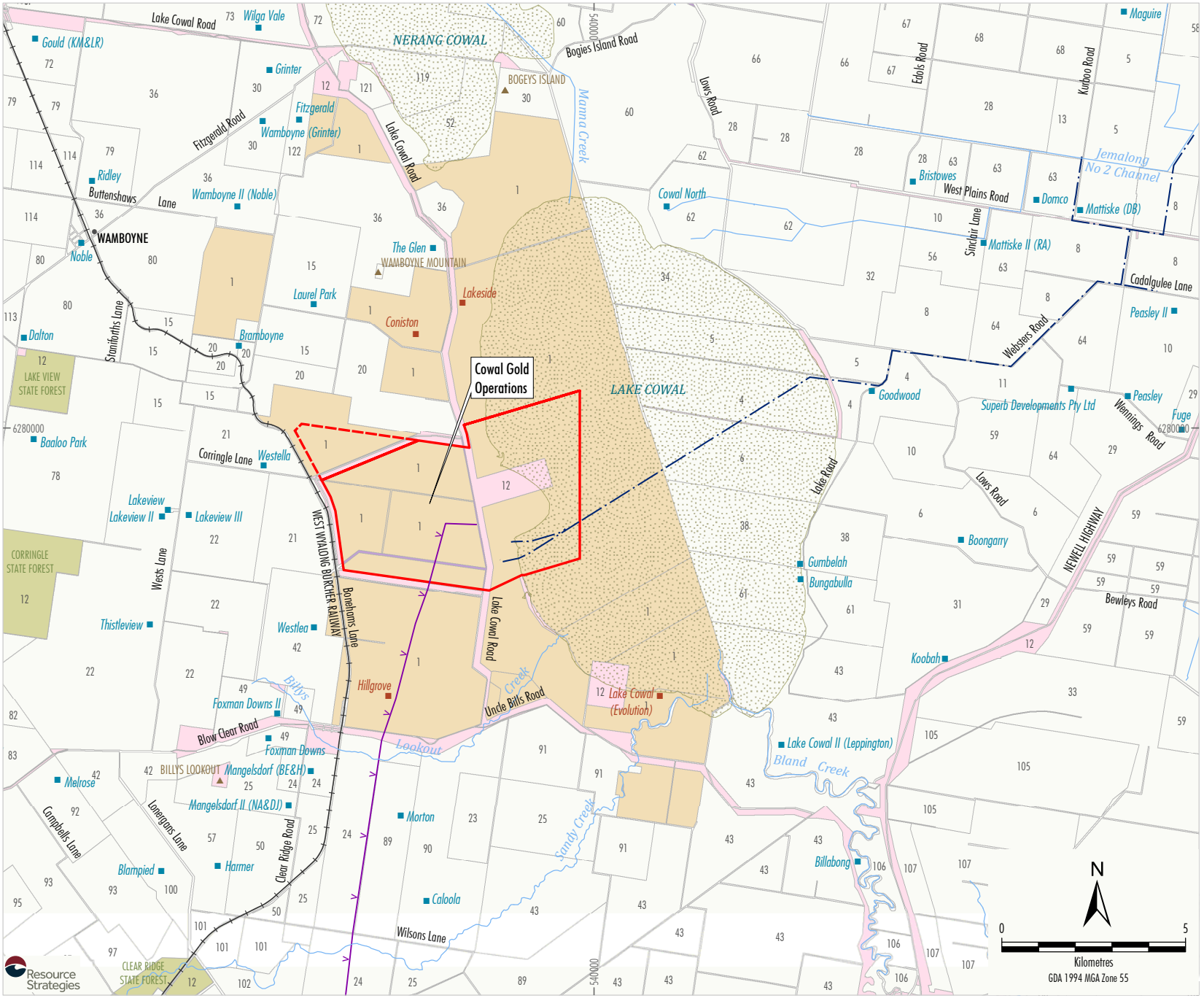
FIGURE 1

CGO Locality

Evolution MINING Cowal



LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Boundary (ML1791)
- Evolution Mining (Cowal) Pty Limited
- Crown Land
- Local Government
- Private Landholder
- State Forest
- Company-owned Dwelling
- Privately-owned Dwelling
- Railway
- Electricity Transmission Line
- Pipeline

Refer to Figure 1-3b for Landholder Key

Source: Evolution (2018); © NSW Department of Finance, Services and Innovation (2017)

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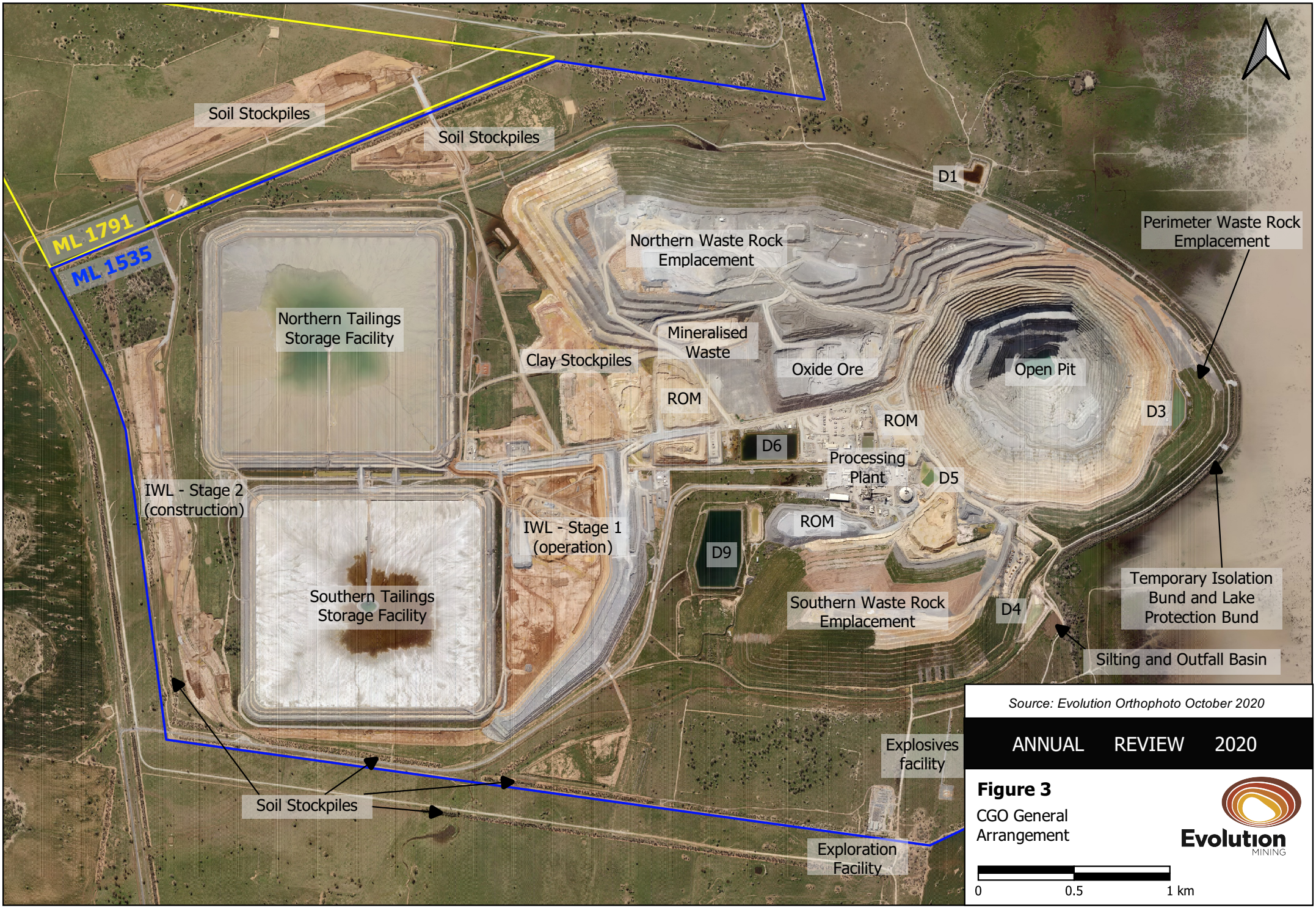
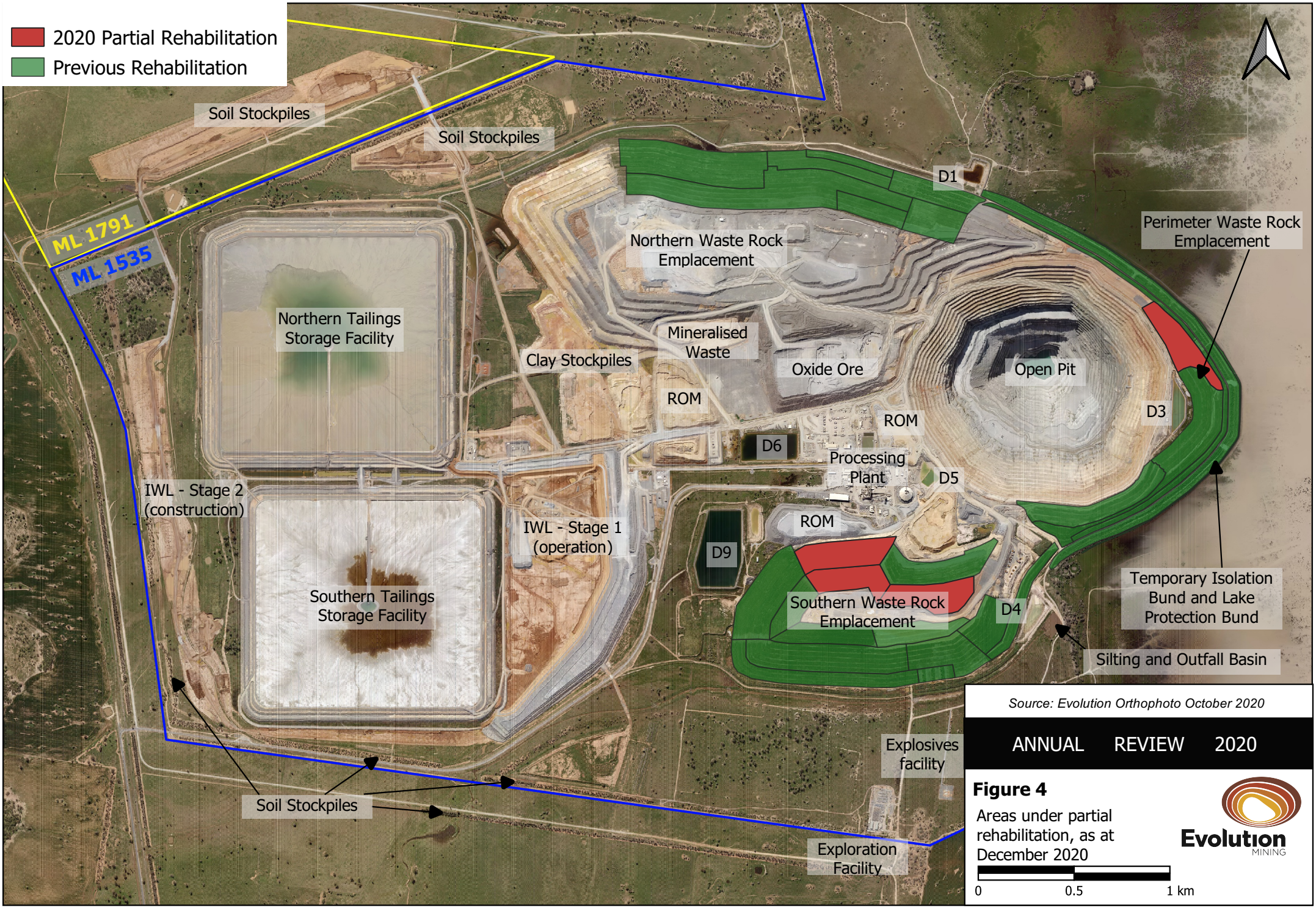
FIGURE 2

Land Tenure of CGO Area

Evolution MINING Cowal


Soil Stockpiles
Soil Stockpiles
ML 1791
ML 1535
D1
Perimeter Waste Rock Emplacement
Northern Waste Rock Emplacement
Northern Tailings Storage Facility
Mineralised Waste
Clay Stockpiles
Oxide Ore
Open Pit
ROM
D3
ROM
D6
Processing Plant
D5
IWL - Stage 2 (construction)
IWL - Stage 1 (operation)
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
Source: Evolution Orthophoto October 2020
ANNUAL REVIEW 2020
Figure 3
CGO General Arrangement
Evolution MINING
0
0.5
1 km


2020 Partial Rehabilitation
Previous Rehabilitation
Soil Stockpiles
Soil Stockpiles
ML 1791
ML 1535
Northern Tailings Storage Facility
Northern Waste Rock Emplacement
D1
Perimeter Waste Rock Emplacement
Mineralised Waste
Clay Stockpiles
Oxide Ore
Open Pit
ROM
D3
ROM
D6
Processing Plant
D5
IWL - Stage 2 (construction)
IWL - Stage 1 (operation)
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
Source: Evolution Orthophoto October 2020
ANNUAL REVIEW 2020
Figure 4
Areas under partial rehabilitation, as at December 2020
Evolution MINING
0
0.5
1 km

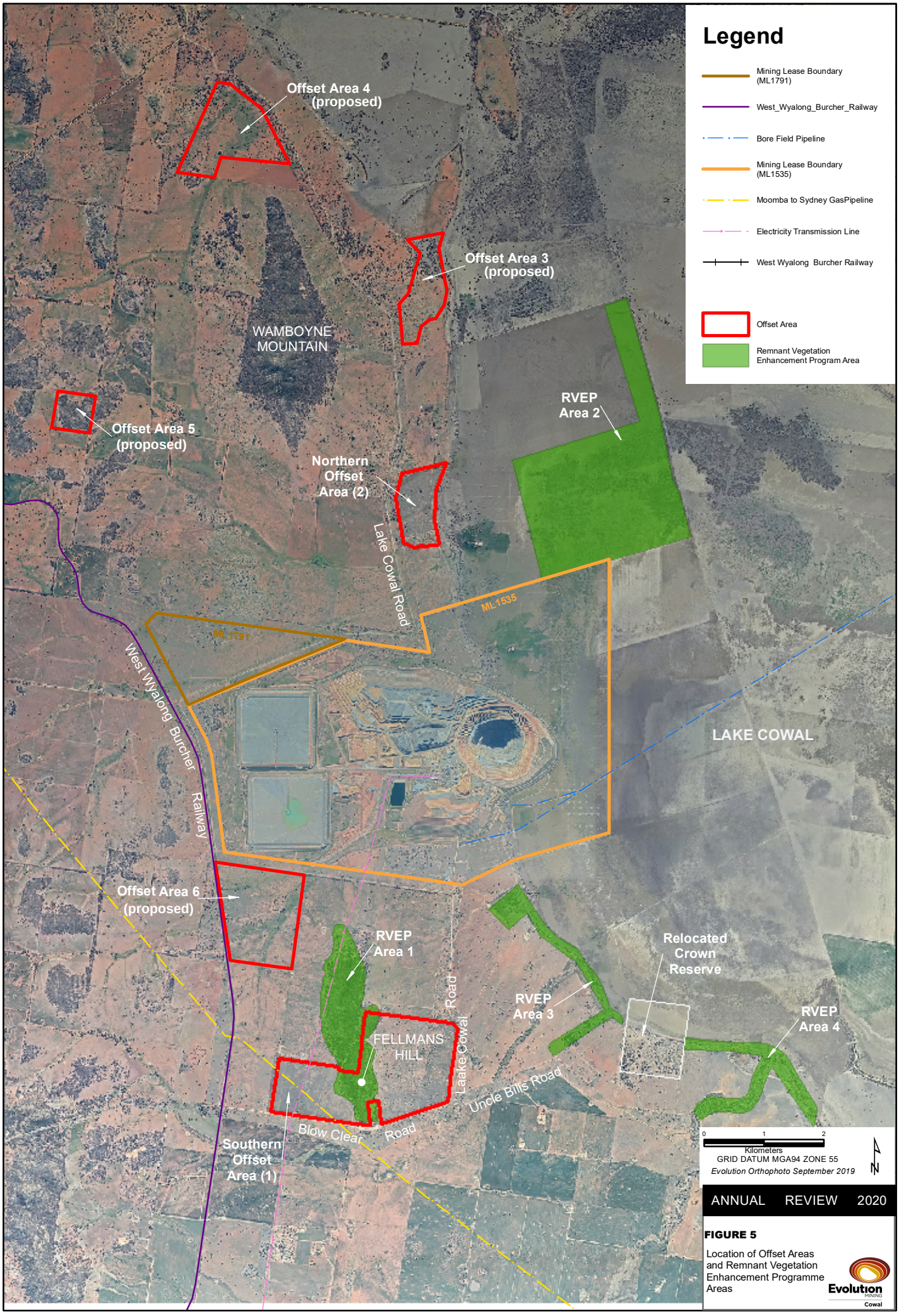


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FIGURE 5

Location of Offset Areas and Remnant Vegetation Enhancement Programme Areas

Evolution MINING Cowal

2.2 MINE CONTACTS

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

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

Simon Coates
Environmental Superintendent
Telephone: 0437371886
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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 AR Period
EPBC 2017/7989	DAWE	5/02/2019	31/12/2032	05/02/2019	Nil
Development Consent (DA 14/98)	DPIE	26/02/1999	31/12/2032	26/08/2019	Nil
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	13/06/2003	Nil
Mining Lease (ML 1791)	DRG	20/06/2019	20/06/2040	20/06/2019	Nil
Environment Protection Licence (EPL 11912)	EPA	23/12/2003	N/A	16/04/2020	Inclusion of ML1791
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	27/11/2002	Life of ML	2002	Nil
Permit #1468 under section 87(1) of the NPW Act	OEH	27/10/2003	Life of ML	2003	Nil
Consent #1680 under section 90 of the NPW Act	OEH	28/07/2003	Life of ML	2003	Nil
Permit #1681 under section 87(1) of the NPW Act	OEH	28/07/2003	Life of ML	2003	Nil
AHIP number: C0004570	OEH	27/06/2019	27/06/2033	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	Inclusion of SB03, SB04 and SB05 onto works approval.

Table 2 (Continued): Key Consents, Leases, Licences and Permits

Instrument	Relevant Authority	Date of Grant	Expiry Date	Last Issue Date	Changes During AR Period
Saline groundwater supply bore 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 Approval 614805	DI-Lands & Water	12/01/2010	13/9/2025	13/9/2015	Nil
NSW Dangerous Goods Acknowledgement (NDG037143)	WorkCover	2005	Life of ML	2005	Ongoing – upon change basis since 2015.

DPIE: 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 (previously the Division of Resources and Energy).

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

The following Environmental Management Plans (EMPs) were approved by the DPIE during the reporting period:

Hazardous Materials Management Plan
Cyanide management Plan

4 OPERATIONS SUMMARY

4.1 MINING AND PROCESSING OPERATIONS

During the reporting period, mining operations from the E42 open pit 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
Ore (t)	N/A	7,119,947	3,963,558	2,183,946
Mineralised Waste (t)	N/A	670,907	638,904	915,622
Waste Rock (t)	N/A	24,404,148	13,807,518	16,812,132
Northern Waste Rock Emplacement (NWRE) (m AHD)	308[1]	268[3]	268	1288
Southern Waste Rock Emplacement (SWRE) (m AHD)	283[1]	278	283	283
Perimeter Waste Rock Emplacement (PWRE) (m AHD)	233[1]	209	223	223
Tailings Storage Facilities (TSFs)				
Northern TSF (NTSF) (m AHD)	264[1]	236	240.5	240.5
Southern TSF (STSF) (m AHD)	272[1]	243.7	243.7	248.4
Mill Throughput (Mtpa)	7.5[2]	7.94	8.36	8.31
Saleable Product (oz)	N/A	244,217	270,492	231,133

[1] Development Consent Condition 1.2(c). Following approval of MOD14 on 4 October 2018 the limit for the NTSF and STSF were revised to 240.5 m AHD and 248.4 m AHD respectively.

[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 2020 occurred in Stage H exclusively. Mining in Stage H occurred from Relative Level (RL) 1145 metres (m) to RL 1020 metres, representing a vertical advance of 125 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 2020.

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. was sent to the IWL.

Mining operations will continue in Stage H during the 2021 reporting period.

4.1.2 Processing

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

Tailings were deposited into the stage 6 lift (5th augmentation) of the NTSF from the 1st January 2020 – 14th October 2020. Completion of stage 1 construction on the IWL occurred at the start of October 2020, with commissioning and deposition commencing on the 14th of that month. Construction of the IWL stage 2 commenced in the reporting period.

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 30 mg CN_{WAD}/L (maximum permissible limit at any time at the process plant).

Processing operations will continue in 2021, 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 the Endeavour 46, Galway/Regal and Endeavour 41 deposits.

A total of approximately 95,222 m of drilling was completed within ML 1535 during the reporting period including:

- A total of 1,147 holes for 32,600m in-pit RC drilling
- A total of 181 holes for 62,346m diamond drilling
- A total of 4 holes for 276m piezo drilling
- No regional exploration was conducted on ML1535 during 2020. Exploration was focussed on resource definition work at the GRE 46 UG deposit

With the exception of the in-pit RC drilling, all 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 2021 and is outlined in the currently approved MOP. Further Geotechnical and Underground drilling is proposed to be undertaken during 2021.

4.3 HAZARD AUDIT

The triennial hazard audit was conducted from 15-17 April 2019 and report provided to the Department on 14 May 2019. All actions arising for the audit were closed out by the 5th of December.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

No additional directions were given by the administering department for the 2019 AR within the reporting period. Due to the presence of COVID-19 during 2020, there were no site visits by DPIE during 2020.

6 ENVIRONMENTAL PERFORMANCE

Environmental management at the CGO during the reporting period has been conducted under the guidance of and in accordance with the EMPs prepared for the CGO, required under the Development Consent.

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

Evolution has fully complied with the commitments of the Resources Regulator (formerly DRG/DRE) approved MOP during the reporting period, and any subsequent updates approved by the Resources Regulator.

The EPL 11912 Annual Return for the 23 December 2019 to 22 December 2020 reporting period was submitted to the EPA via the portal on 12 February 2021. In the 2019 Annual Return, Evolution identified non-compliances related to monitoring not being undertaken at some monitoring points. A summary of the EPL 11912 non-compliances is provided on the EPA website at: http://www.epa.nsw.gov.au/prpoeoapp/.

Evolution has all the relevant project management systems, staffing and 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 the CGO during this and the next reporting period.

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

6.1 AIR QUALITY

Development Consent Condition 6.1(a) details the air quality impact assessment criteria against which air quality monitoring results are compared for the CGO. As required by 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 the reporting period was undertaken in accordance with the relevant Development Consent conditions, the approved AQMP and the EPL 11912.

Evolution reported to the National Greenhouse and Energy Reporting Scheme and National Pollutant Inventory for the CGO during the 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 the Development Consent conditions, the approved AQMP and the EPL 11912. These control strategies are summarised in Table 4.

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

Source	Control Strategies
Disturbed Surfaces	• Disturbed surfaces were watered using water trucks to suppress dust. • Areas for soil stripping were minimised to reduce the area of exposed ground at any one time.
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. • The speed of vehicles travelling on unsealed surfaces is restricted.
Soil Stripping	• Access tracks used for soil stripping during the 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

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

6.1.1.3 Variations from Proposed Control Strategies

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

6.1.2 Environmental Performance

6.1.2.1 Monitoring

Meteorological Monitoring

The CGO 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 daily summary reports and automatic alerts.

Monthly total rainfall measured at the CGO AWS is shown in Table 5. Total annual rainfall for the reporting period was 564.4 millimetres (mm). Other parameters recorded by the CGO AWS meteorological station during the reporting period are presented in Table 6.

Annual and monthly wind roses from the CGO AWS are presented in Figures 6a and 6b.

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.

A network of static dust deposition gauges was used throughout 2020 to collect monthly dust samples. The dust gauges are located at varying distances from the CGO open pit, and in a range of directions from the pit. A number of the gauges are situated near homesteads of properties that adjoin the mine site, and a number are near areas of ecological importance.

The high-volume air sampler (HVAS) was used throughout 2020 to obtain measurements of suspended solids, 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/m^3).

Table 5: Monthly Rainfall Measured at CGO AWS 2010 – 2020

Month	2010 (mm)	2011 (mm)	2012 (mm)	2013 (mm)	2014 (mm)	2015 (mm)	2016 (mm)	2017 (mm)	2018 (mm)	2019 (mm)	2020 (mm)
January	2.8	24.4	26.6	5.2	32	75.8	67	24.8	21	24.8	18.8
February	95.6	138.6	129.2	26	23.2	11	1.4	8.6	3.6	31.8	61.0
March	44.6	146.2	78	45.4	71	0.4	16.8	45.4	1.2	57.4	56.4
April	50.6	20.2	15.6	3.4	20.2	56.8	11.4	18.6	7.8	0	126.8
May	40	22	32.6	30.4	21.2	12.8	61.8	31	22	19.8	15.2
June	22.8	29.4	29.6	87.8	59.4	27.2	122.6	7.6	40	21.2	34.2
July	62.2	11.8	49.8	33.4	9	77.2	72.6	27.8	2.2	9	41.6
August	34	41.8	19	18.8	10.8	49	31.2	22.4	4.4	10.2	52.0
September	64.2	13.8	25	60.4	16.8	8.6	136.8	0.8	4.2	5	29.0
October	94	31	16	7.2	15.2	52.6	28.8	38	30.4	8.6	51.4
November	60.2	130.4	36.4	9	1.6	24.6	28	50.6	38	13.2	33.2
December	111.7	135	27	14.6	48.4	19.2	24.8	123.8	24.8	1.6	44.8
TOTAL	**682.7**	**744.6**	**484.8**	**341.6**	**328.8**	**415.2**	**603.2**	**399.4**	**199.6**	**202.6**	**564.4**

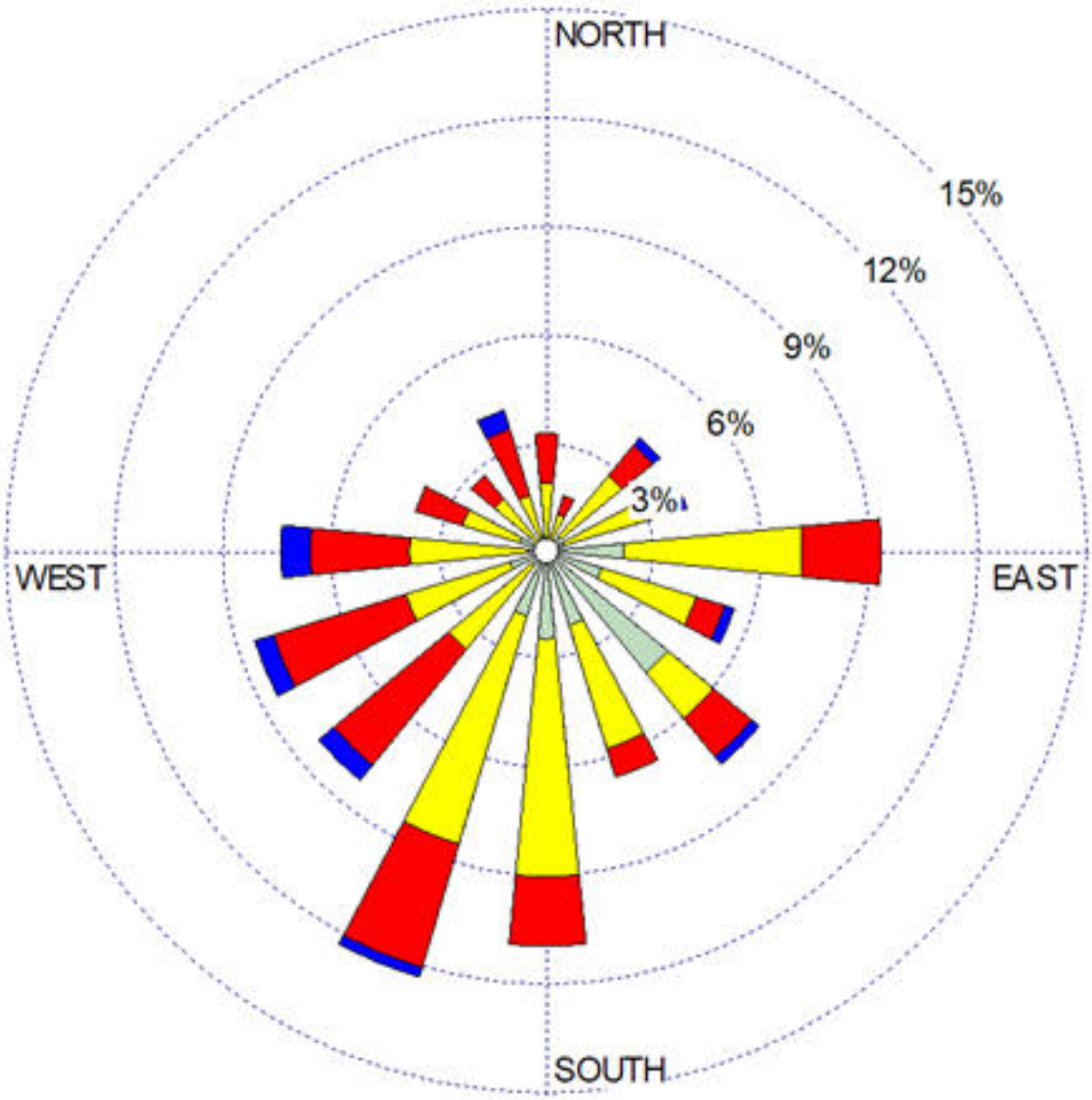
Table 6: Monthly Average Meteorological Data (2020)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Humidity (%)	57.8	52.4	52.9	67.8	69.8	79.4	86.2	82.7	72.9	64.0	48.3	46.1
Mean Pressure (mbar)	983.6	985.3	992.1	990.7	997.2	998.0	995.6	990.6	993.9	989.3	988.3	987.0
2m Temp Min (oC)	19.4	18.3	14.3	9.8	5.2	3.9	4.1	4.2	7.0	10.4	14.1	14.5
2m Temp Max (oC)	39.5	33.3	30.4	23.7	19.7	16.5	14.1	14.4	20.5	24.9	30.7	30.0

% - percentage; mbar – millibar; m/s – metres per second; ^{o} – degrees; ^{o}C – degrees Celsius.

The HVAS monitor is located at a company owned residence near the CGO. 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 the air to protect public health in residential environments.

Two duplicate dust gauges are installed near pre-existing dust gauges (DG01 and DG13), with dust samples collected and analysed quarterly for metal concentrations. Duplicate 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 the monthly CGO dust monitoring programme.



Wind speed (km/hr)

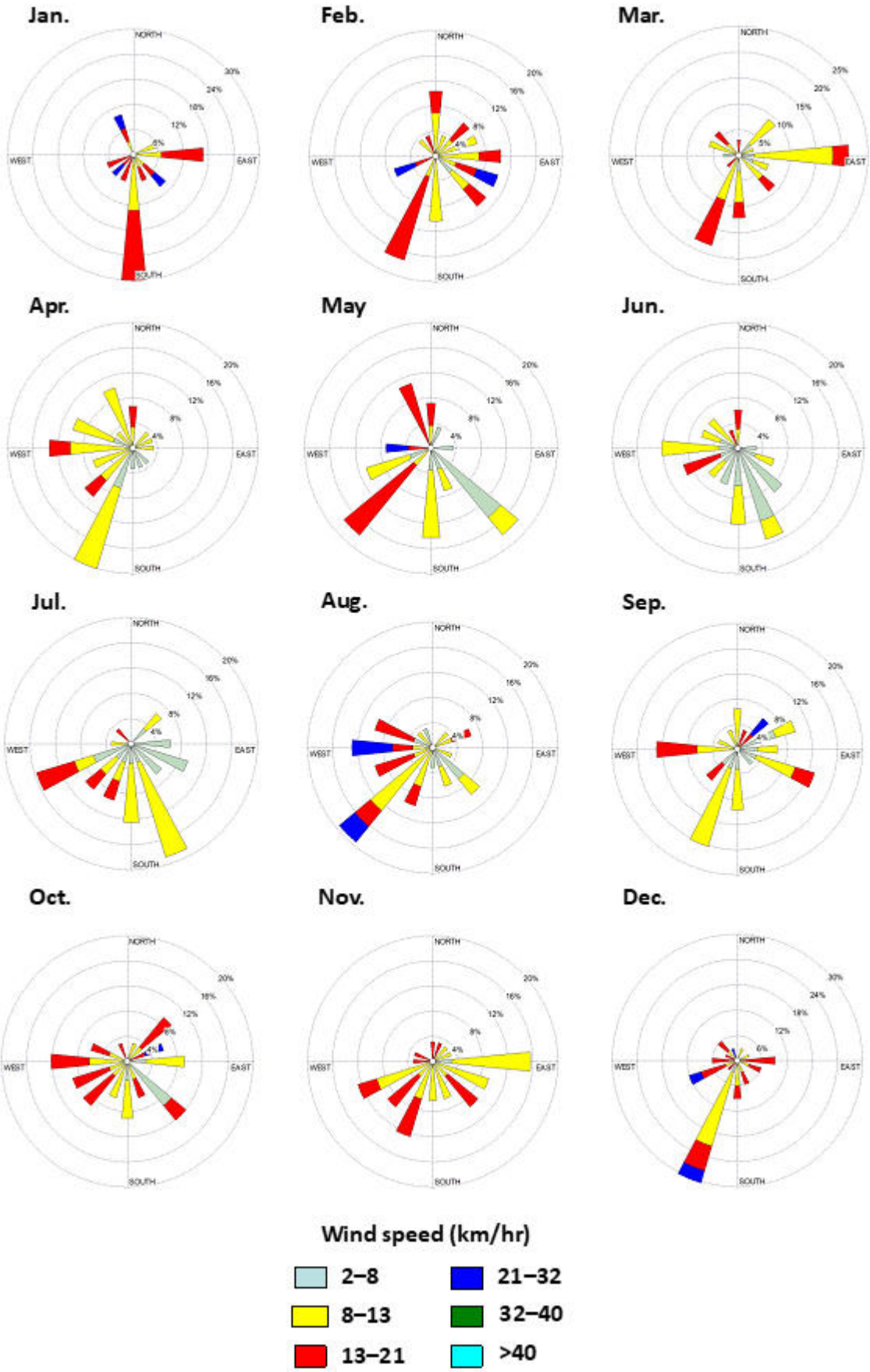
2–8	21–32
8–13	32–40
13–21	>40

Source: University of Sydney (2021)

FIGURE 6a

Annual Wind Rose for 2020

Evolution MINING Cowal



Source: University of Sydney (2021)

FIGURE 6b

Monthly Wind Roses for January - December 2020

Evolution MINING Cowal

Air Quality Impact Assessment Criteria

Table 7 details the 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] Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).

g/m²/month – grams per square metre per month.

Table 8 and Table 9 detail the long–term and short-term impact assessment criteria for TSP and particulate matter less than (<) 10 µm (PM_{10}) 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]

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

[2] Total impact (i.e. incremental increase in concentrations due to the development 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]

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

[2] Total impact (i.e. incremental increase in concentrations due to the development plus background concentrations due to all other sources).

6.1.2.2 Performance Outcomes

Total Suspended Particulates

The measurements of TSP, taken by the HVAS on a (generally) seven-day cycle, are shown below in Graph 1. In February, there was one 10-day cycle and a following 4-day cycle; in March, there was one 8-day cycle and a following 6-day cycle; in July, there was one 5-day cycle and a following 9-day cycle; in August, there was one 14-day cycle and a following 6-day cycle. The average mass of TSP for the year, from the 52 collected and reported samples, is 44 µg/m3.

On an annual average basis, the TSP data collected by the HVAS is below the NSW EPA (2001) assessment criterion for TSP matter (90 µg/m3). Compared to the previous two years of dry and dusty conditions, the mean TSP level in 2020 (44 µg/m3) was substantially lower – the mean TSP level in 2019 was 64 µg/m3 and in 2018 was 53 µg/m3. For five of the sampling periods in 2020, the 7-day TSP value exceeded 90 µg/m3 and two large values of 262 and 209 µg/m3 were recorded for sampling periods in the dry and dusty month of January 2020. Extensive bushfire smoke was also observed across the region during January 2020.

The seasonality of the TSP data in 2020 was very strong. During the summer and early autumn months of January to March, inclusive, the mean TSP value was 92 µg/m3, whereas between the cooler months of April and September, inclusive, the mean TSP value was only 18 µg/m3. In the late spring and early summer months of October to December, inclusive, the mean TSP value jumped to 45 µg/m3. Notably, there were observed high levels

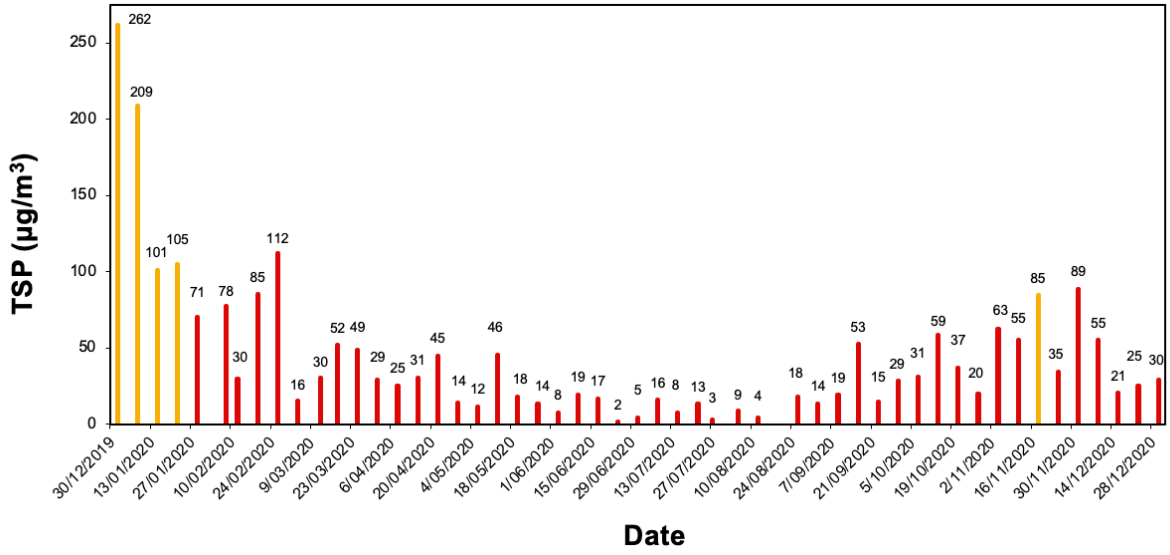
of district-wide dust activity and/or dust storms at CGO throughout January and in mid-November (orange-coloured columns in Graph 1). The two largest TSP values occurred in the weeks ending on January 1st and January 8th; for the month of January, the Dust Watch report indicated that the nearby town of West Wyalong received at least 74 hours of dust activity (Dust Watch, 2020a), while for the month of November, the Dust Watch report indicated "Dust also entered the State from South Australia (15/11/2020)" (Dust Watch, 2020b).

Furthermore, during the months of January and February 2020, there was pronounced bushfire activity across the eastern half of NSW (Dust Watch, 2020a), leading to periods of smoke haze at CGO. This smoke haze is likely to have contributed directly to the higher values of TSP recorded in early January, in particular.

Despite the obvious correlation of heightened regional dust activity and higher TSP values in 2020, the location of the HVAS some 4 km to the north of the ML area means that dust generated and transported from the mine site on southerly or south-south easterly winds may potentially have been intercepted.

According to the AWS records of wind direction for 2020, southerly winds were prominent during the January and May sampling periods, while south-south easterlies were prominent in June and July. In the case of January in particular, when TSP values were high to very high, it is possible that there were at least some fine-grained particulates from the ML, transported on southerly winds to the HVAS site. For the months of May, June and July, TSP values were generally very low, so it is very unlikely that winds in these months transported an appreciable amount of fine-grained particulates from the ML to the HVAS site.

Graph 1: TSP masses measured at the Coniston Homestead during 2020. (Orange-coloured columns represent those sampling periods with strong regional dust activity or large dust storms observed at the CGO.)



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). The annual average TSP collected by the HVAS in the reporting period was 44 µg/m^3 (University of Sydney, 2021). Accordingly, the annual average PM_{10} is calculated at 17.6 µg/m^3, below the 25µg/m^3 long term impact assessment criteria (Table 8).

The short-term impact assessment criterion for PM_{10} is 50 µg/m^3 (Table 9). The short-term impact assessment criterion for PM_{10} of 50 µg/m^3 was exceeded twice during the reporting period, with results of 104.8 µg/m^3 and 83.6 µg/m^3 recorded during periods of regional fires and heavy smoke on the 1st and 7th January 2020. These high readings are viewed as extraordinary events and therefore not considered as licence exceedances. As per table numbers 3-5 DA 14/98, excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agreed by the Secretary.

Deposited Dust

A detailed discussion of the dust monitoring results (including laboratory analysis of dust results) is provided in the University of Sydney's (2021) *Interpretation and Discussion of 2020 Air Quality Monitoring Results Cowal Gold Operations*. A summary of the key findings is provided below and in Table 10 (University of Sydney, 2021):

- Temporal and spatial variation in reported monthly dust deposition was moderate during 2020. Monthly deposition of 10 g insoluble solids/m^2 was exceeded 15 times in 2020, across nine different months and across seven different gauges.
- Changes in monthly dust deposition rates were only weakly correlated with season for all of the gauges, with slightly higher rates of dust deposition in the summer months. Monthly dust deposition rates averaged across all gauges ranged from 2.5 to 7.7 g/m^2, and in the January and February sampling periods the majority of gauges received moderately high rates of deposition.
- Compliance with the assessment criterion of 4 g/m^2/month average annual deposited dust was achieved at two of the six compliance gauges[1] during 2020.
- The cause of the exceedances in all of the compliance gauges can largely be attributed to substantial deposits (>10 g/m^2/month) in some or all of the February, April, July, August, September and October sampling periods.
- Three of the six other dust gauges (*DG7*, *DG11*, *DG12, DG13, DG14, I5*) recorded an annual average dust deposition above the assessment criterion. Again, these exceedances can largely be attributed to substantial deposits (>10 g/m^2/month) in some or all of the January, February, April, May, June and July sampling periods. Levels recorded in these gauges are not relevant to the CGO Development Consent conditions.

The assessment criterion for acceptable increases in dust deposition at a site is 2 g/m^2/month, and the acceptable limit for the annual average deposition rate has been set at 4 g/m^2/month, as shown in Table 1. However, distinguishing an increase in dust deposition due to a particular source (such as a mine) is difficult unless a large quantity of baseline monitoring data is available to determine natural variability. Cattle et al. (2012) report that the average rate of background dust deposition in the area of the CGO, estimated over thirty months during the 2007-2010 period (which included several substantial dust storm events), is 4.8 g/m^2/month, with a little under two-thirds of this amount being comprised of macro-organic matter. The estimate of background dust deposition as being 2 g/m^2/month for this area would appear to be well-founded if only inorganic (mineral) dust is considered.

Nevertheless, the analysis in this report focusses on whether or not the total deposited dust data (inorganic + organic components) complies with the annual average deposition rate of 4 g/m^2/month per gauge.

[1] Of the 12 depositional dust gauges installed at the Project for part or all of 2020, six are listed on the Environment Protection Licence and are therefore relevant to the assessment criterion for annual average deposited dust.

Table 10: Monthly and Mean Dust (Insoluble Solids) Deposition Rates (2020)

Dust Gauge Site	Monthly deposition of insoluble solids in dust (g/m^2/month)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
DG1	4.8	5.6	2.3	1.3	0.6	0.8	0.0	0.9	2.0	0.8	1.8	2.3	**1.9**
DG6	3.7	6.8	1.5	11.7	7.7	6.2	14.7	10.9	3.9	12.4	2.5	2.8	**7.1**
DG7	4.6	8.9	1.4	1.1	2.7	3.8	0.8	7.9	5.8	2.3	2.5	1.9	**3.6**
DG9	4.4	10.3	1.3	6.5	2.8	1.0	4.3	5.9	7.7	16.4	7.5	1.6	**5.8**
DG11*	4.7	4.9	2.4	–	–	–	–	–	–	–	–	–	**4.0**
DG12*	7.7	10.3	3.1	–	–	–	–	–	–	–	–	–	**7.0**
DG13^	11.9	8.9	9.2	10.5	39.9	18.9	15.9	–	–	–	–	–	**16.5**
DG14^	4.1	11.4	0.8	2.8	9.3	1.6	1.3	–	–	–	–	–	**4.5**
McLintock's Shed*	8.6	4.8	1.7	1.9	1.9	5.3	3.4	2.6	3.0	9.1	2.4	3.2	**4.0**
Site Office*	4.5	6.1	5.9	8.0	8.6	2.0	1.6	6.8	19.6	9.0	2.9	1.4	**6.4**
Site 52*	6.9	11.5	2.8	3.3	3.2	4.0	4.0	2.3	3.2	4.5	3.2	3.4	**4.3**
I5	4.1	5.2	2.0	1.2	0.6	0.5	0.2	1.5	5.3	4.4	2.4	3.5	**2.6**
Mean	**5.8**	**6.6**	**2.9**	**4.8**	**7.7**	**4.4**	**4.6**	**4.9**	**6.3**	**7.4**	**3.2**	**2.5**	

** The dust gauges DG11 and DG12 were de-commissioned after the March sampling period*
^ The dust gauges DG13 and DG14 could not be safely accessed after the July sampling period due to the high-water level of the lake.

Temporal and spatial variation in reported monthly dust deposition was moderate during 2020. The average dust deposition rate across all gauges in 2020 was 5.2 g/m^2/month, compared to 5.5 g/m^2/month in 2019, 4.1 g/m^2/month in 2018, 3.8 g/m^2/month in 2017, 2.7 g/m^2/month in 2015 and 2.8 g/m^2/month in 2014. The moderately high average deposition rate for 2020, which was higher than that of the much drier 2018, can be somewhat explained by the very high dust deposition at one of the gauges inside the ML area, *DG13*. Exclusion of the four gauges decommissioned (*DG11*, *DG12*) or not accessible for the entire year (*DG13*, *DG14*) would yield an average monthly dust deposition rate of 4.5 g/m^2/month.

The only gauge to receive less than 2.0 g dust/m^2 for at least six of the twelve monthly sampling periods was *DG1*, while the gauges *DG6*, *DG9*, *DG13*, *Site Office* and *Site 52* all received more than 4.0 g dust/m^2 for six or more of the twelve sampling periods. In nine of the monthly sampling periods, average dust deposition across all gauges exceeded 4.0 g/m^2/month. Fifteen dust deposits were comprised of 10 g/m^2/month or more in 2020; of these, ten contained an inorganic (mineral dust) component of more than 50%, while five contained an organic component comprising more than 50% of the deposit.

Changes in monthly dust deposition rates were not well correlated with season for all of the gauges, with the highest average dust deposition occurring in May (autumn), October (spring) and February (summer). The lowest dust deposition rates occurred in December (summer), March (autumn) and November (spring). For the two gauges with the lowest average dust deposition across the entire year, *DG1* and *I5*, the temporal variation was much more strongly correlated to season, with higher values in summer months and lower values in winter months.

After a relatively dry January in 2020, the CGO area received above average rainfall for the remainder of the year, breaking a two-year period of well-below average rainfall. As a result, dust storm activity across NSW was quite pronounced in January, but then diminished substantially until November. The NSW Government-funded Dust Watch program reported that the nearby town of West Wyalong received at least 74 hours of dust activity during January, with a large dust storm sweeping across the state on January 11th (Dust Watch, 2020a). All twelve dust

gauges at CGO received moderate to high amounts of dust in this sampling period, plus the February sampling period that followed. In November 2020, West Wyalong received 130 hours of dust activity, with the main source areas thought to be western NSW (Dust Watch, 2020b). Nevertheless, deposited dust amounts at the CGO gauges were only low to moderate for the November sampling period, suggesting that much of the observed dust was suspended dust, rather than deposited dust.

Each dust deposit is comprised of a soluble component and an insoluble component.

The soluble component is generally comprised of salts transported in rainfall or on dust particles, plus bird urine, the white-coloured component of bird droppings. Although the salt content of deposited dust varies greatly depending on factors such as the time elapsed since the previous rainfall event, even in central NSW, which is a large distance from the coast, salt loadings of dust can be significant (e.g. Blackburn & McLeod, 1983).

The insoluble solids component of each deposited dust sample is the one compared to the impact assessment criterion for deposited dust (NSW EPA, 2001). This insoluble solid component is comprised of combustible (generally organic material) and ash (generally inorganic mineral material) fractions. The combustible fraction of most samples is likely to include soil organic matter (Boon et al. 1998), fragments of plant materials, seeds, insects and bird droppings. For many of the 2019 field log entries of dust sampling from the gauges, the presence of insects, bird droppings and algae are noted, and occasionally organic debris (vegetative matter).

Although there is no indication of the amount of organic matter in the dust samples, given the prominent description of insects, bird droppings and algae in the 2020 field log, the combustible fraction of the insoluble solids may be used as a proxy for these organic materials. Examining the fifteen instances where the insoluble solids component was 10 g/m2/month or more, the combustible fraction comprised between 5 and 76%, with an average of 38%. This relatively low average value reflects the dominance of (mineral) raised dust in 2020. Soil organic matter, insects, bird droppings, algae and vegetative matter look to have contributed only moderately to some of the dust loads within and surrounding the CGO in 2020.

For the DG13 gauge, which received consistently high to very high deposits of dust for the first seven months of the year, it appears that local sources of dust from the nearby mining operations were not likely contributors, as other gauges close to the mining operations did not yield consistently high dust deposits during this period. From the field log records, it appears that bird droppings, insects and possibly muddy claws of roosting birds may have been responsible for these elevated amounts of dust. Similarly, the DG6 gauge received high amounts of deposited dust during the winter months; as this gauge is located well away from the mining operations, it is assumed that the elevated levels of dust are again due to bird droppings, insects and possibly muddy claws of roosting birds.

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 the highest predictions for 24-hour average PM_{10}, annual average PM_{10}, TSP and depositional dust. Table 11 summarises the 2020 monitoring results for 24 hour average PM_{10}, annual average PM_{10}, TSP and depositional dust and the predicted results at Coniston in comparison with the relevant Development Consent air quality impact assessment criteria for 24 hour and annual average PM_{10}, TSP and depositional dust.

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

Emission Parameter	2020 Monitoring Results	Predicted Result at Coniston[1]	Development Consent Air Quality Impact Assessment Criteria
Maximum 24-Hour Average PM_{10} [2]	44.8 µg/m^2	28.8 µg/m	50 µg/m
Annual Average PM_{10} [2]	14.5 µg/m^2	3.7 µg/m	25 µg/m
Annual Average TSP	44.0 µg/m^2	3.9 µg/m	90 µg/m
Annual Average Depositional Dust	1.9 g/m^2/month	0.16 g/m^2/month	4 g/m^2/month

[1] Source: PEL (2013).

[2] Two recorded extraordinary events (January 2020 bushfires) removed from annual average (104.8 and 83.6 µg/m3)

Monitoring data records from the HVAS recorded influence from local environmental factors (i.e. strong winds) and other off-site influences such as strong regional dust activity, large dust storms and smoke haze observed at the CGO on some dates of the 24 hour average PM_{10} monitoring results. The 24-hour average PM_{10} monitoring results exceeded 50 µg/m^3 five times during the reporting period, 4 of these occurred during recorded dust storms, regional smoke haze and high winds (i.e. extraordinary events) and are therefore not considered non-compliances (i.e. the result of non-mining related weather conditions). All other PM_{10} results fell below the 50 µg/m^3 limit.

6.1.3 Reportable Incidents

After a relatively dry January in 2020, the CGO area received above average rainfall for the remainder of the year, breaking a two-year period of well-below average rainfall. As a result, dust storm activity across NSW was quite pronounced in January, but then diminished substantially until November. Early spikes recorded in January 2020 were potentially also associated with regional bushfire haze/ smoke.

Compliance with the assessment criterion of 4 g/m2/month average annual deposited dust was achieved at two of the six compliance gauges during 2020. For the four gauges that did not achieve compliance, the exceedances can be largely attributed to substantial deposits (>10 g/m2/month) in some or all of the February, April, July, August, September and October sampling periods.

On an annual average basis, the TSP data collected by the HVAS was below the NSW EPA (2001) assessment criterion for TSP matter (90 µg/m3). For five of the sampling periods in 2020, the 7-day TSP value exceeded 90 µg/m3 and two large values of 262 and 209 µg/m3 were recorded for sampling periods in the dry month of January 2020, coinciding with extensive bushfire smoke across the region.

6.1.4 Further Improvements

The key recommendations of the University of Sydney's (2021) review are summarised as follows:

The issue of unrealistically high mean dust Cu concentrations has appeared in 2020, with both monthly and three-monthly Duplicate samples, both inside and outside the ML, returning mean Cu values much greater than those of CGO soils and rocks. Given that sampling equipment with brass fittings is not used at the CGO, and that dust Zn concentrations were not similarly extremely high, it is possible that another Cu-based compound such as algaecide may have been responsible for these spurious measurements. A review of the use of Cu-based algaecides at CGO should be conducted to determine whether this may be a cause of the spurious dust Cu concentrations estimated for 2020.

It is recommended that an updated set of local soil or dust source (e.g. rock crusher or tailings) samples should be analysed for the same suite of metals as the dust samples. It is recommended that the soil/dust source samples be provided and analysed both as a 'bulk sample' of several tens of grams mass and also as a sample of comparable mass to the dust samples. This way, any dilution effects caused by small sample size should become immediately obvious, and any systematic laboratory errors (e.g. consistently high Cd or Zn values, incomplete extraction of all Al from mineral grains) should also be apparent.

6.2 BLASTING

Development Consent Condition 6.3(a) details the blast impact assessment criteria relevant to the CGO. As required by Development Consent condition 6.3(e), the Blast Management Plan (BLMP) was approved by the DPIE on 10 December 2015.

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

6.2.1 Environmental Management

In accordance with Development Consent Condition 6.3, the BLMP and EPL 11912 Conditions L5 and M7, four blast monitors have been installed at designated locations around the 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 (Figure 7).

6.2.1.1 Control Strategies

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

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

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

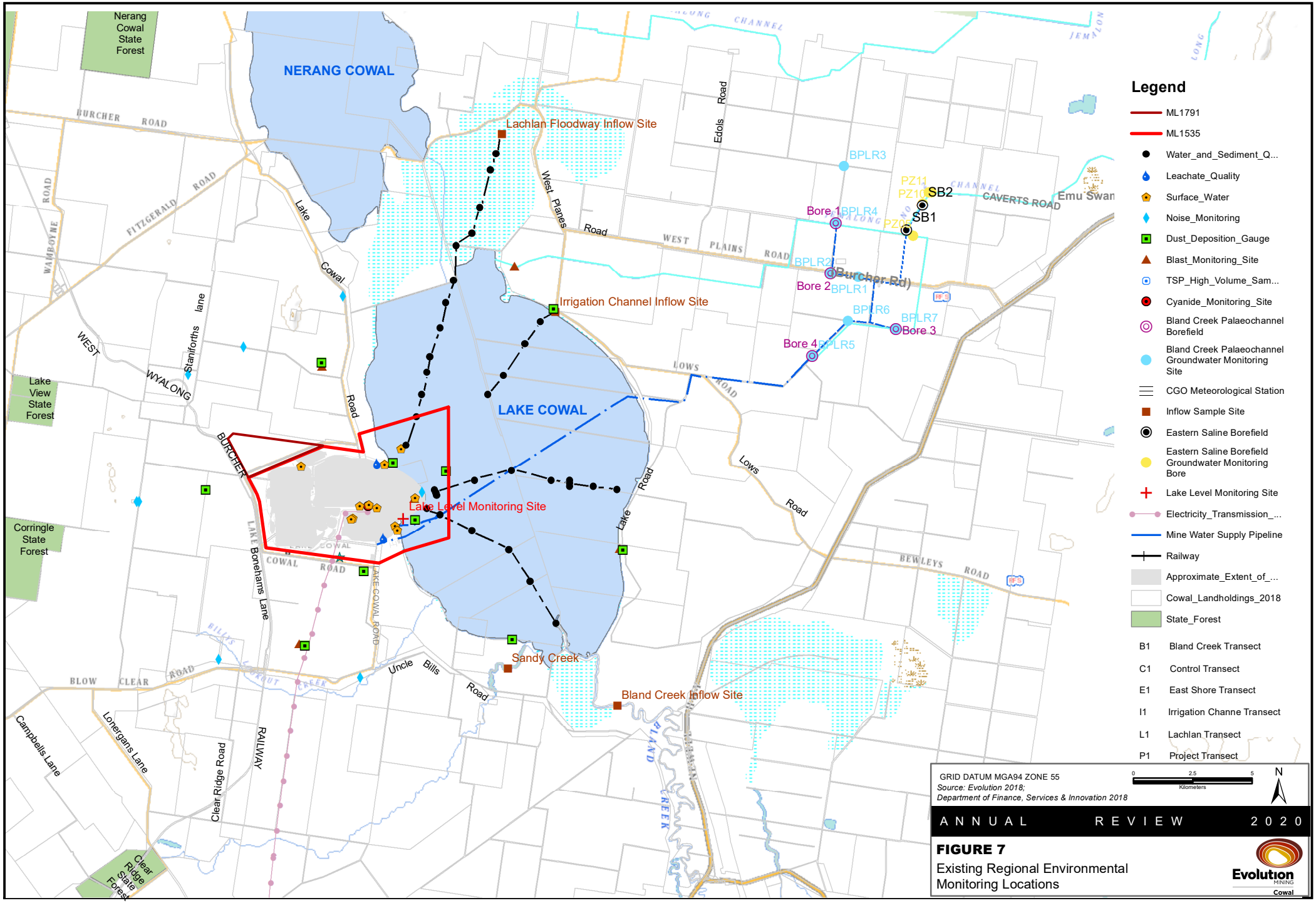
In accordance with Development Consent Condition 6.3, the BLMP and EPL 11912 Condition M7, air blast overpressure and ground vibration levels must be measured at nearby residences BM01, BM02, BM03 and BM08.1, and at the general monitoring site BM10.

6.2.1.2 Effectiveness of Control Strategies

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

6.2.1.3 Variations from Proposed Control Strategies

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


NERANG COWAL
LAKE COWAL
Nerang Cowal State Forest
Lake View State Forest
Corringle State Forest
Clear Ridge State Forest
Lachlan Floodway Inflow Site
Irrigation Channel Inflow Site
Lake Level Monitoring Site
Sandy Creek
Bland Creek Inflow Site
BPLR1
BPLR2
BPLR3
BPLR4
BPLR5
BPLR6
BPLR7
Bore 1
Bore 2
Bore 3
Bore 4
SB1
SB2
PZ10
PZ11
Emu Swan
Burcher Rd
BURCHER ROAD
FITZGERALD ROAD
WAMBOYNE ROAD
WEST WYALONG
Staniforths lane
Lake Cowal Road
West Plains Road
WEST PLAINS ROAD
Edols Road
CAVERTS ROAD
LOWS ROAD
Lows Road
BEWLEYS ROAD
Lake Bonehams Lane
LAKE COWAL ROAD
Uncle Bills Road
BLOW CLEAR ROAD
Campbells Lane
Lonergans Lane
Clear Ridge Road
RAILWAY
Legend
ML1791
ML1535
Water_and_Sediment_Q...
Leachate_Quality
Surface_Water
Noise_Monitoring
Dust_Deposition_Gauge
Blast_Monitoring_Site
TSP_High_Volume_Sam...
Cyanide_Monitoring_Site
Bland Creek Palaeochannel Borefield
Bland Creek Palaeochannel Groundwater Monitoring Site
CGO Meteorological Station
Inflow Sample Site
Eastern Saline Borefield
Eastern Saline Borefield Groundwater Monitoring Bore
Lake Level Monitoring Site
Electricity_Transmission_...
Mine Water Supply Pipeline
Railway
Approximate_Extent_of_...
Cowal_Landholdings_2018
State_Forest
B1 Bland Creek Transect
C1 Control Transect
E1 East Shore Transect
I1 Irrigation Channe Transect
L1 Lachlan Transect
P1 Project Transect
GRID DATUM MGA94 ZONE 55
Source: Evolution 2018;
Department of Finance, Services & Innovation 2018
0 2.5 5
Kilometers
N
ANNUAL REVIEW 2020
FIGURE 7
Existing Regional Environmental Monitoring Locations
Evolution MINING Cowal

6.2.2 Environmental Performance

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 the compliance limits specified in Condition 6.3 of the 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 the monitors described above at sensitive locations, one non-reported monitor (BM10) was located adjacent to the pit within ML 1535.

Ground vibration and air overpressure monitoring was conducted with the use of MiniMate blast monitors. Five units were used 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 the monitor and sensor calibrations, all batteries were replaced, and routine maintenance was carried out on all units.

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:

- The monitoring unit BM03 (Coniston residence) was offline on the 24th and 27th March 2020
- The monitoring unit BM10.1 (Near field) was calling home at the time of the event on the 9th July 2020
- The monitoring unit BM03 (Coniston residence) was offline from the 11th October 2020 until a replacement was sent and installed early November 2020
- The monitoring unit BM10.0 (Near field) was offline on the 4th December to the 16th December 2020
- The monitoring unit BM03 (Coniston residence) was offline on the 26th December 2020

6.2.2.2 Performance Outcomes

Ground Vibration

A total of 209 blasts were fired during the reporting period. Based on the monitoring data and blasting information available, recorded levels of ground vibration induced by blasting activities conducted at the CGO were compliant with respect to the relevant ground vibration limits.

Based on the monitoring data and blasting information available, recorded levels of ground vibration induced by blasting activities conducted at Cowal Gold Operations were compliant with respect to the relevant ground vibration limits. The maximum recorded vibration level was 0.22mm/s at BM08.1 – Cowal North on the 11th April 2020

Air Overpressure

A detailed examination of the monitoring data and blasting information was undertaken to ascertain the overpressure levels recorded around the time of the blast. A total of 23 events were identified as having a peak overpressure level exceeding the relevant compliance criteria.
The events have been analysed in detail to determine the likely source of overpressure. Of the 23 events that exceeded compliance levels, eight (8) of these was assessed to be most likely related to blasting practices, with the remaining being identified as localised environmental factors such as wind. (Table 13)
These have been identified by the extended durations of high overpressure readings within the 30minute histogram blast window.

Table 13: Overpressure Events most likely related to blasting practices (2019)

Monitoring Location	Date	Time	Level		Compliance Limit	Comments
			PPV mm/s	O' Press dB(L)		
BM03 - Coniston	12/01/2020	12:33:28	0.12	95.9	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM02 - Hillgrove	16/02/2020	12:37:00	0.14	95.9	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM03 - Coniston	16/02/2020	12:37:00	0.09	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM08.1 - Cowal	26/04/2020	12:27:02	0.05	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM01 - Gumbelah	19/07/2020	12:27:39	0.11	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM01 - Gumbelah	12/08/2020	12:34:32	0.12	117.2	115dB(L) - during weekdays and Saturdays'	Likely blast related.
BM02 - Hillgrove	30/08/2020	16:02:55	0.09	101.0	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM08.1 - Cowal	30/08/2020	16:02:55	0.04	95.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM01 - Gumbelah	30/08/2020	16:02:55	0.09	97.5	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM01 - Gumbelah	27/09/2020	12:28:14	0.11	101.0	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM08.1 - Cowal	27/09/2020	12:28:14	0.07	95.9	95dB(L) - Sundays' and Public Holidays	Likely blast related.
BM01 - Gumbelah	24/10/2020	13:04:30	0.12	115.2	95dB(L) - Sundays' and Public Holidays	Likely blast related.

All but one of the exceedances identified at blast times were related 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.

The CGO achieved compliance (3.8%) in relation to the specified air overpressure levels for the reporting period.

Table 14: Blasting Impact Exceedances

Monitoring Location	Date	Time	Level		Compliance Limit	Comments
			PPV mm/s	O' Press dB(L)		
BM03 - Coniston	2/02/2020	12:26:00	0.07	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal	2/02/2020	12:26:00	0.03	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	9/02/2020	12:30:35	0.17	104.2	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	9/02/2020	12:30:35	0.11	106.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	9/02/2020	12:30:35	0.06	101.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	1/03/2020	12:24:00	0.09	98.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	1/03/2020	12:24:00	0.03	101.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	1/03/2020	12:25:55	0.1	100.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	1/03/2020	12:25:55	0.06	100.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	15/03/2020	12:25:32	0.07	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	15/03/2020	12:27:53	0.11	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	22/03/2020	12:33:32	0.11	100.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	22/03/2020	12:33:32	0.08	103.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	22/03/2020	12:33:32	0.04	97.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01- Gumbelah	23/03/2020	12:34:55	0.1	98.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	23/03/2020	12:34:55	0.07	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	23/03/2020	12:34:55	0.06	97.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	29/03/2020	12:23:48	0.1	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	29/03/2020	12:23:48	0.1	101.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 – Gumbelah residence	11/04/2020	12:24:49	0.08	98.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	11/04/2020	12:24:49	0.18	105.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	11/04/2020	12:24:49	0.22	111.2	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	11/04/2020	12:24:49	0.11	95.9	95dB(L) -Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.

Monitoring Location	Date	Time	Level		Compliance Limit	Comments
			PPV mm/s	O' Press dB(L)		
BM01 - Gumbelah	11/04/2020	12:34:27	0.1	113.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	11/04/2020	12:34:27	0.11	113.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal	11/04/2020	12:34:27	0.04	107.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM03 - Coniston	5/07/2020	15:02:01	0.12	95.9	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	4/10/2020	15:16:52	0.02	101.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	4/10/2020	15:16:52	0.1	108.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	4/10/2020	15:16:52	0.21	102.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	15/11/2020	12:32:45	0.09	97.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	15/11/2020	12:32:45	0.22	101.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	15/11/2020	12:32:45	0.01	97.5	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM01 - Gumbelah	15/11/2020	12:35:30	0.1	98.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM02 - Hillgrove	15/11/2020	12:35:30	0.22	100.0	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.
BM08.1 - Cowal North	15/11/2020	12:35:30	0.07	98.8	95dB(L) - Sundays' and Public Holidays	Not blast related, Localised enviromental factors likely.

Community Complaints

During the 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) in that there was:

- No exceedance of the 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 the total number of blasts at any residence on privately-owned land exceeding the 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 were compliant with licence conditions
- The largest ground vibration level recorded at blast time in the monitoring period (2.17mm/s) was at BM08.1 - Cowal North residence on the 18th February 2019, however after analysis this was found not to be blast related
- Following a detailed review of overpressure results for events that were above the compliance levels, six (6) were identified as being most likely blast related. This is 0.74% of the total blasts for the monitoring period. All other peak levels above the compliance limitations were affected by localised environmental factors and were not distinguishable above background levels
- Blast induced overpressure impacts were compliant within licence conditions
- Compliance was achieved with the blasting limits whether assessed on the 12-month review period from the 1st January 2020 to the 31st December 2020 or based on a 12-month moving window

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 the noise impact assessment criteria relevant to CGO. As required by Development Consent condition 6.4(e), the Noise Management Plan (NMP) was approved by the DPIE on 5 March 2015.

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

6.3.1 Environmental Management

6.3.1.1 Control Strategies

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

Best Management Practice

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

- The Lake Protection Bund provides noise shielding, thereby reducing noise levels that could 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 the 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 the effects of noise and the use of quiet work practices.
- Specify maximum noise/sound levels when purchasing equipment.
- Including maximum noise/sound levels in tender documents and contracts.

6.3.1.2 Effectiveness of Control Strategies

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

6.3.1.3 Variations from Proposed Strategies

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

6.3.2 Environmental Performance

6.3.2.1 Monitoring

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

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

Location (Figure 7)	MOD14 - Day/Evening/Night
Lakeview III	38
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 15 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 recorded during the reporting period (Spectrum Acoustics, 2020a, 2020b, 2020c, 2020d).

Table 16: Summary of Attended Noise Monitoring Results

Property	February 2020	May 2020	August 2020	November 2020
Laurel Park (N11)	D - <20, <20	D - 24, 24	D - 20, 15	D - 20, <20
	E - <20, <20	E - <20, <20	E - 27, 27	E - <20, <20
	N - <20, <20	N - 20, 21	N - 25, 27	N - <20, <20
Lakeview III (N09)	D - <20, <20	D - <20, <20	D - 18, 17	D - <20, <20
	E - <20, <20	E - <20, <20	E - 15, 19	E - <20, <20
	N - <20, <20	N - <20, <20	N - 20, 20	N - 23, 20
Bramboyne (N10)	D - <20, 21	D - 21, 21	D - 32, 22	D - 30, 28
	E - <20, <20	E - <20, <20	E - 20, 19	E - <20, <20
	N - <20, <20	N - <20, <20	N - 20, 20	N - <20, <20
The Glen (N12)	D - <20, <20	D - <20, <20	D - <20, <20	D - <20, <20
	E - <20, <20	E - <20, <20	E - 22, 20	E - <20, <20
	N - <20, <20	N - 22, 22	N - 25, 24	N - <20, <20
Caloola 2 (N15)	D - 18, 15	D - 32, 23	D - <20, <20	D - 30, 31
	E - <20, <20	E - <20, 21	E - <20, <20	E - 22, 28
	N - 20, 24	N - 21, 23	N - <20, <20	N - 20, 25
Lakeview (N17)	D - <20, <20	D - <20, <20	D - <20, 15	D - 33, 30
	E - <20, <20	E - <20, <20	E - 26, 15	E - <20, <20
	N - <20, <20	N - 26, 27	N - 23, 26	N - 22, 20
Foxham Downs II (N16)	D - <20, <20	D - 20, 20	D - <20, <20	D - 35, 33
	E - <20, <20	E - <20, <20	E - <20, <20	E - <20, <20
	N - 23, 22	N - 27, 26	N - <20, <20	N - 20, 25

Source: Spectrum Acoustics (2020a, b, c, d).

Notes: D = day; E = evening; N = night.

6.3.2.2 Performance Outcomes

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

Comparison with EIS Predictions

Table 17 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 during a strong inversion, in comparison to the noise impact assessment criteria for these properties listed in Development Consent Condition 6.4(c).

Table 17: 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) details the requirements for the management of visual and off-site lighting impacts from CGO.

6.4.1 Environmental Management

6.4.1.1 Control Strategies

In accordance with Development Consent Condition 6.5(b), 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 landscaping strategies during the reporting period included:

- utilising existing vegetation as visual screens.
- planting of vegetation screens around the ML 1535 boundary.
- construction of the waste emplacements, reducing visual impact of the processing plant from the eastern side of 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.

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

6.4.2.1 Monitoring

A summary of the landscape maintenance and monitoring programme implemented during the reporting period is provided in Table 18.

Table 18: 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.

BOMP – Biodiversity Offset 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 reporting period was undertaken in accordance with the relevant Development Consent Conditions, relevant ML 1535 conditions, the approved 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 19.

Table 19: 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 the road. • 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 the access road surface. • Rapid stabilisation and revegetation of road batters.
ML 1535 Fences	• Minimising the area disturbed and restricting access to non-disturbed areas.
Ore Stockpile and Process Plant Area	• Minimising the 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.

Table 19 (Continued): Summary of Erosion and Sediment Control Strategies/ Management Measures

Project Development	Control Strategy/Management Measure
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 the 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 the 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.
Internal Catchment Drainage System (ICDS)	• Construction of the ICDS as described in the 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 the Temporary Isolation Bund and Lake Protection Bund as described in the ESCMP. • Stabilisation and revegetation of the batters of the Temporary Isolation Bund and Lake Protection Bund.
Up-Catchment Diversion System (UCDS)	• Construction of the UCDS as described in the ESCMP to divert upper catchment water around the 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 the 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

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.

During the reporting period minor scaling and reshaping works were carried out on the waste emplacements and drains to correct minor rilling of dispersive soils which during inspections has proved to be effective.

The progressive rehabilitation for final landform slopes continues to demonstrate effective erosion control as evidenced by independent specialists DnA Environmental (DnA Environmental, 2019a).

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

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

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

Evolution has continued to report monthly weak acid dissociable cyanide (CN_{WAD}) 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 the control strategies maintained during the reporting period in accordance with the CMP is provided below:

- Containment of all tailings waters within the TSFs, processing plant and processing plant dams. Maintenance of the Lake Protection Bund and upper catchment diversion drain systems.
- Provision of emergency containment channels alongside tailings storage pipelines to and from the TSFs. Maintenance of process pipe work, equipment and leak detection equipment.
- Terrestrial fauna protection fencing and avifauna deterrent methods to minimise the potential for impacts of 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 TSFs (with standby Caro's Acid circuit).
- Routine monitoring and reporting of tailings facility flows, ground and surface waters, and employee work areas 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

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

6.6.2.1 Monitoring

In accordance with the 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 20.

6.6.2.2 Performance Outcomes

In accordance with Consent Condition 5.3(d)(i), CN_{WAD} levels of the aqueous component of the tailings slurry stream were maintained so that they do 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. Monitoring results have remained low and within licence conditions.

Groundwater results for cyanide during the reporting period remained below the laboratory detection limit.

Table 20 : CN_{WAD} Levels of the Aqueous Component of the Tailings Slurry

			CN_{WAD} (mg/L)	
Frequency	**Month**	**No. Sampled during Month**	**Minimum**	**Maximum**
Twice daily	January	60	0	6.6
Twice daily	February	46	0	14.3
Twice daily	March	61	0	6.9
Twice daily	April	57	0.17	9.4
Twice daily	May	62	0.16	5.5
Twice daily	June	59	0	8.0
Twice daily	July	62	0.25	6.6
Twice daily	August	51	0	10.1
Twice daily	September	60	0.3	8.8
Twice daily	October	62	0	5.4
Twice daily	November	60	0	8.2
Twice daily	December	52	0.235	9.8

6.6.3 Reportable Incidents

No incidents occurred during the reporting period.

6.6.4 Further Improvements

No further improvements are proposed for the next reporting period.

6.7 FLORA

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

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

6.7.1 Environmental Management

6.7.1.1 Control Strategies

Flora control strategies for the CGO are described in the FFMP. The following control strategies were implemented at the CGO during the 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 (TSMSs) 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 the management of native flora during employee and contractor inductions.
- development and submission of an RMP (including mine site rehabilitation performance and completion criteria and a mine site rehabilitation monitoring programme relevant to the approved CGO); and
- development and submission of a BOMP (including an offset performance and completion criteria and an offset monitoring programme relevant to the approved CGO offset areas).

6.7.1.2 Effectiveness of Control Strategies

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

6.7.1.3 Variations from Proposed Control Strategies

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

6.7.2 Environmental Performance

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 reporting period.

Flora monitoring was conducted during the reporting period in accordance with the RMP, 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 (2019b) during the reporting period. A summary of the results from this monitoring survey are outlined below.

Compensatory Wetland

In 2019, total annual rainfall was 234mm and almost half of what is expected for the second consecutive year. Drought conditions were finally broken in 2020 with above average rainfall during in February and March and in April, 125mm was received. While rainfall was relatively low during May and June, expected monthly rainfall was typically received for the remainder of the year, with a total of 537mm recorded for the year.
In 2019, all monitoring sites were dry and had sufficient time for the native grasses to colonise the otherwise bare lake sediments. Ground cover in the compensatory wetland sites ranged from 67 – 96%. Ground cover was slightly lower in the remaining wetland areas as they were situated in the deepest parts of the lake with less development time, and ground cover ranged from 36 – 86% cover.

During this reporting period, floristic diversity was at an all-time low since monitoring had begun ranging from a low of 6 – 22 species. Native plants continued to be more diverse than exotic species in all sites and this year exotic species were limited with a maximum of three exotic species recorded in five sites.
This year, native plants provide all of the live plant cover in most sites. Exceptions included RW1 and RW2 with 65% and 92% native plant cover and GW2 and GW5 where native plants provided 57% and 93% of the live pant cover.
No threatened species have been recorded in any Compensatory Wetland monitoring site. In previous years Lycium ferocissimum (African Boxthorn), a priority weed of the Bland Shire was recorded in some of the Compensatory Monitoring sites. This year no priority weeds were recorded in any of the monitoring sites.

Most changes in the wetlands have occurred as a result of climatic and biophysical factors.

The results to date have generally indicated significant improvement in the health of the lake and the lake foreshore environments with extensive colonisation of native perennial grasses and natural regeneration of endemic lake species including River Red Gum, Lignum and Native Liquorice despite the ongoing drought, however floristic diversity was very low this year.

Pilularia novae-hollandiae (Austral Pillwort) Habitat

The annual surveys conducted since 2006 have failed to locate Austral Pillwort in the Lake Cowal area despite extensive and targeted searches. This year, the lake and all gilgias were completely dry and the seasonal conditions continued to be unsuitable for the Austral Pillwort.

During the reporting period, floristic diversity in a range of long-term CGO monitoring sites has declined as result of the drought and increased grazing from macropods.

During this reporting period, no Austral Pillwort were located (DnA Environmental, 2019c).

The increasing vegetation cover and extremes in seasonal conditions, particularly periods of extended hot dry conditions is likely to have impacted on populations of Austral Pillwort but the extent that this has occurred is unknown as none have been located since monitoring began.

Grazing of the grasslands and Gilgai by macropods (such as kangaroos) has reduced the abundance of competitive ground covers and deep litter layers in many areas. While the drought has not provided suitable conditions for Austral Pillwort thus far, it is possible that its habitat condition could be improved inadvertently as a result of this increased grazing activity.

Remnant Vegetation Enhancement Program (RVEP)

The 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 the extent of regeneration occurring within these conservation areas. The monitoring methodology has been a simplified version of the 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 in all years, with the 2019 monitoring undertaken during 28th October and the 6th November.

The highest stem densities continued to be recorded in Hill03 which had 49 live individuals recorded this year, despite the loss of two as a result of drought induced mortality . There were 17 individuals recorded at Hill01, as the acacia saplings continue to grow. There was no change in tree densities in the remaining sites, where there were 1 – 8 mature trees.

In the 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 the RVEP3 and 4 sites the trees included old growth E. camaldulensis (River Red Gum).

Dead stags were a common feature within the Fellman's Hill woodland sites Hill01, Hill02 and Hill03.The prolonged dry conditions appear to be having an ongoing effect on tree health, with an additional individual having died in Fellman's Hill sites. All sites had trees that were bearing reproductive structures such as buds, flowers or fruits. Most sites except Hill02 and Hill04 contained trees with hollows suitable for use by wildlife.

All sites contained a population of shrubs and juvenile trees (dbh<5cm) with densities being highly variable across the range of sites, ranging from a low of 1 in Hill01 to a high of 236 in RVEP3. Densities of shrub and juvenile trees in Hill01, Hill02 and Hill03 have tended to decline since 2013 due to the prolonged dry conditions combined with increased grazing pressure by resident macropods.

In the Hill sites, the most common shrub species were A. doratoxylon, A. deanei and Cassinia laevis (Cough Bush). Juvenile Allocasuarina verticillata, Callitris glaucophylla, Geijera parviflora, E. dwyeri, were also recorded in low densities in some sites. In RVEP3 and RVEP4, shrubs and juvenile tree species included Eucalyptus camaldulensis, Glycyrrhiza acanthocarpa (Native Liquorice) and Duma [Muehlenbeckia] florulenta (Lignum).

In 2017 prolonged dry conditions again resulted in a significant decline in species diversity in all RVEP sites, especially those on Fellman's Hill. In 2018 the lake water had further receded resulting in further increase in seedlings on RVEP 3 and 4, and in 2019 the lake was completely dry again increasing seedling numbers to 236.

This year, no species were recorded in all six sites, and only one species Sclerolaena muricata (Black Roly Poly) was common to three of the six sites. There were a variety of hardy native ground covers and subshrubs in Hill04, RVEP3 and RVEP4 including Atriplex semibaccata (Creeping Saltbush), Enchylaena tomentose (Ruby Saltbush), Salsola australis (Buckbush), Rytidosperma caespitosum (Wallaby Grass) and Vittadinia condyloides (Fuzzweed). Duma florulenta (Lignum) and E. camaldulensis were recorded in both RVEP3 and RVEP4.

The particularly dry conditions since 2017 has resulted in a decline in ground covers and floristic diversity in all RVEP sites, with these being compounded by an increase in grazing pressure by macropod populations. It must be noted that an approved Kangaroo culling operation had been undertaken at "Hillgrove" as part of the Southern Offset Area Biodiversity Offset Strategy just prior to and during the annual monitoring event in 2017 and towards the end of 2018.

Vegetation Clearance

Several campaigns of vegetation clearance activities were undertaken during the reporting period, including:

- January 2020, to allow for construction of the pipeline, haul road and stockpiles.
- March 2020, to allow for construction of the IWL.
- May 2020, to allow the construction of the UCDS.
- August 2020, to allow for construction of the IWL.
- October 2020, to allow for construction of the IWL.

All clearance works were undertaken consistent with the requirements of the VCP.

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 the requirements for the CGO in relation to the biodiversity offset strategy. A BOMP has been developed for the CGO in accordance with Development Consent Condition 3.4(c). The BOMP has also been prepared to reflect the approved biodiversity offset strategy described in subsequent Environmental Assessments and approvals. The BOMP was approved by the DPIE on 10 September 2015.

Monitoring and management of the biodiversity offset areas continued in accordance with the requirements of the BOMP and the 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:

- Progression in securing the tenure of the offset areas and calculating the required bond, to the satisfaction of the Secretary.
- Weed management and pest control.
- Offset monitoring program.

6.8.1.2 Effectiveness of Control Strategies

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

6.8.1.3 Variations from Proposed Control Strategies

Evolution completed a cull of Eastern Grey Kangaroos within the Felman's Hill area in 2017 and 2018, as the population became unsustainable (Section 6.7.2.2). The CGO applied for 200 drop tags from the Griffith NSW National Parks & Wildlife Services prior to conducting the cull. No Culling program was conducted in the reporting period but would be considered in 2021.

6.8.2 Environmental Performance

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 (labelled 4-6 in Figure 16) are currently under review, pending consultation with DPIE.

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.

6.8.2.2 Performance Outcomes

In 2020, biodiversity offset monitoring was undertaken by DnA Environmental (2018a). A summary of the results from this monitoring survey are outlined in the sections below.

Northern Offset Area

The Northern Offset Area (NOA) contains approximately 74 ha of Weeping Myall Woodland Endangered Ecological Community (EEC) listed under both the Commonwealth Environment Protection and 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.

The Acacia pendula – Casuarina cristata (Myall – Belah) woodland reference sites (RSlope01, RSlope02) contained some large bare areas which are often typical of these communities. This year, functional patch area remains very low despite the improved seasonal conditions, but high functional area (86 – 100%) has been restored in the Slope offset sites. This year all slope offset sites had a higher ecological function than the *Acacia pendula – Casuarina cristata* reference site, despite the lack of tree and shrubs.

This year the improved seasonal conditions resulted in an increase in ground covers and subsequently all monitoring sites had increased patch areas, however they remained relatively low in Grey02. In the Northern Offset Area (NOA) sites, functional patch area and related LO had also significantly declined in both sites in 2019 as a result of overgrazing by wildlife. This year both sites had significantly improved with LOIs of 86 - 100%.

This year, NOA02 continued to be the most ecologically functional Myall woodland community and scored a total of 159, despite the lack of trees or shrubs. SOA05 had significantly improved and was the next most functional community with a sum of 156, followed by NOA01 with 142.

The slope offset sites were had an increase in perennial ground covers this year with 20 – 25% recorded in the NOA sites. Floristic diversity has typically fluctuated with changes in seasonal conditions and this year all sites had a higher diversity of species than have been previously recorded due to the improved rainfall conditions. On average native species were more common per m2 than exotic species in all offset monitoring sites.

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

Both NOA sites had relatively high ECs and were also in the saline range with ECs of 0.263 dS/m and 0.262 dS/m respectively.

Southern Offset Area

The Southern Offset Area (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 very stable due to the relatively high levels of litter largely derived from dead annual plants and very hard compacted soils. In previous years, the four SOA's have remained 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.

This year the improved seasonal conditions resulted in an increase in ground covers and subsequently all monitoring sites had increased LOs. This year LO ranged from 58 – 100% in the reference sites (Figure 7-1). This year there has been a dramatic improvement in the functional patch areas of all four SOA sites, with 100% LO being recorded in SOA01 and SOA02, while there was 99% LO in SOA03. In SOA04, exposed areas of bare soils have persisted with this site having an LO 72% this year.

Floristic diversity has typically fluctuated with changes in seasonal conditions and this year all sites had a higher diversity of species than was previously recorded due to the improved rainfall conditions. There continued to be a large difference in the diversity of native plant species between the reference sites however all reference sites had the highest diversity of species in some sites since monitoring began and these have significantly increased to provide a target range of 3.0 – 9.0 native species per m2 (Figure 7-9). This year, the diversity of exotic species has also increased however they remained low in the reference sites with 0 – 1.6 exotic species per m2 (Figure 7-10).)

Over the past few years there was high seedling mortality in the reference sites, especially in Dwyers02 as a result of the drought. This year minor increases in were recorded with 9 – 68 individuals equating to densities of 90 – 680 per hectare with these being represented by 1 – 5 different species. This year most individuals were less than 0.5m in height, while some individuals were >2.0m in height especially in the Dwyer's Red Gum woodlands (Figure 7-6, Table 7-4).

One *Geijera parviflora* (Wilga) seedling continued to be recorded in SOA03 and five *Geijera parviflora* were recorded in SOA04. One *Brachychiton populneus* (Kurrajong) seedling was recorded in SOA01 in 2019, however this was not recorded this year. There continued to be an adequate density of shrubs and juvenile trees in SOA02 compared to the reference sites, however the remaining sites did not.
In 2017, ~7000 tube stock were planted in ~5 ha of the western side of the SOA with significantly higher survival rates of around 75% survival, and dead seedlings were replaced Therefore, survival rates and tree and shrub densities are likely to be much greater in some parts of the western side of the SOA enhancement area than was recorded in the monitoring sites SOA01 and SOA02.

The SOA sites tended to be dominated by a different range species and in SOA01 the exotic annual *Trifolium angustifolium* (Narrow-leaf Clover) was the most dominant species along with the native grass *Chloris truncata* (Windmill Grass). In SOA02, the natives *Vittadinia pterochaeta* (Rough Fuzzweed) and *Euphorbia drummondii* (Caustic Weed) were relatively abundant and so was *Lolium rigidum* (Wimmera Ryegrass) which was all but dead. In SOA03, the native forbs *Euphorbia drummondii, Dichondra repens* (Kidney Weed) and *Sida corrugata* (Corrugated Sida) were the most abundant, while in SOA04 native grasses *Chloris truncata, Aristida behriana* (Bunch Wiregrass) and *Austrostipa (nodosa?) (*Spear grass) provided the most cover
One Lycium ferocissimum (African Boxthorn) was recorded in RSlope01. No threatened species were recorded within the range of hill monitoring sites.

Soil pH in the Grey Box woodlands was higher compared to the Dwyer's Red gum, but collectively the soil pH ranged from 4.4 – 6.0. 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 offset sites ranged from 6.0 – 6.8 and were moderately acidic to neutral and within desirable agricultural ranges.

This year all SOA sites had an EC comparable to the local woodlands and are non-saline

In terms of meeting completion targets there was an absence of trees and shrubs and associated structure and habitat in both NOA and SOA monitoring sites. This year there was however an adequate density of shrubs and juvenile trees in SOA02 compared to the reference sites due to the planting of tube stock in 2017. Therefore, shrub and juvenile tree densities are likely to be much greater in some parts of the Western side of the SOA enhancement area than were recorded in either SOA01 or SOA02 monitoring sites. The revegetation activities across the SOA should result in the development of woodlands which are characteristically similar to the adjacent ridge and hill communities, and demonstrate an ongoing improvement in ecological performance, providing adequate grazing management is implemented.

6.8.3 Reportable Incidents

There were no reportable incidents during the reporting period.

6.8.4 Further Improvements

No further improvements are proposed for the next reporting period.

6.9 FAUNA

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

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

Evolution has not received formal approval of the TSMSs however, verbal advice was received from the DPIE (Kane Winward) on 26 September 2013 advising that Evolution can implement the EMPs and strategies (including the TSMSs) at the CGO which were pending formal approval by the DPIE.

6.9.1 Environmental Management

6.9.1.1 Control Strategies

The relevant control strategies for the management of fauna species are described in the FFMP, RMP and BOMP and include:

- implementation of CWMP initiatives and the RVEP.
- incorporation of fauna management initiatives during operational design.
- implementation of the VCP (including pre-clearance surveys).
- implementation of the 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 the 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

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

6.9.1.3 Variations from proposed Control Strategies

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

6.9.2 Environmental Performance

6.9.2.1 Monitoring

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

- continuation of long-term monitoring of bird breeding.
- bat call monitoring at the active TSF and control site.

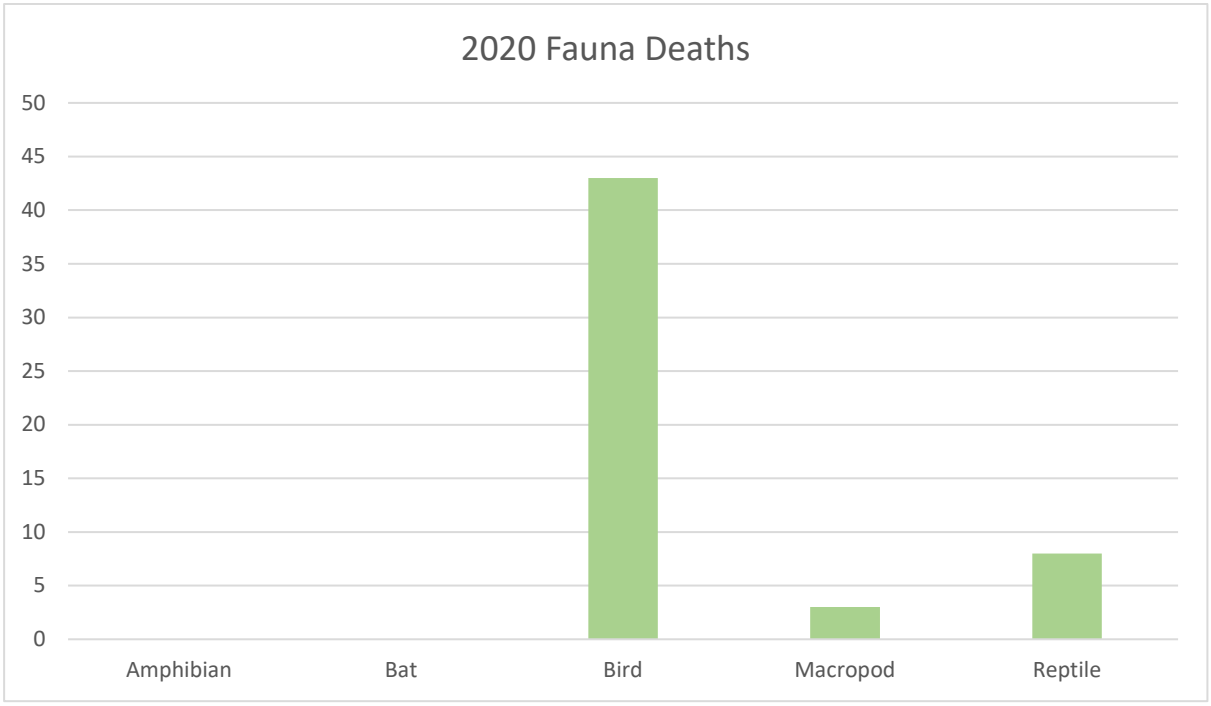
- twice daily monitoring of any fauna usage of the TSFs.
- weekly boundary inspections of ML 1535.
- daily and weekly fauna incident inspections and field patrols.

6.9.2.2 Performance Outcomes

Reported Fauna Deaths

There was a total of 54 fauna incidents on ML 1535 during the reporting period. 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.

Graph 1: Graph of Fauna Deaths for the Reporting Period



Lake Cowal Waterbird Monitoring

The long-term monitoring of bird breeding continued during January, August and October of the reporting period. A summary of monitoring results undertaken by Professor Peter Gell (2019a, 2019b, 2019c) during the reporting period is provided below. The location of waterbird monitoring transects are presented on Figure 8.

January 2020

No waterbirds were recorded from the transects owing to the lake being dry. The farm dam at the north end of transect 8 was found to host 74 Pink-eared Duck, 18 Australian Wood Duck, 12 Grey Teal, 2 Australian Shelduck and 8 Pacific Black Duck.
The extended drought conditions through NSW resulted in Lake Cowal remaining in a completely dry state. This continues the conditions observed since August 2019. While the Lake did not support waterbirds, there was some waterbirds roosting on farm dams around the lake margin

August 2020

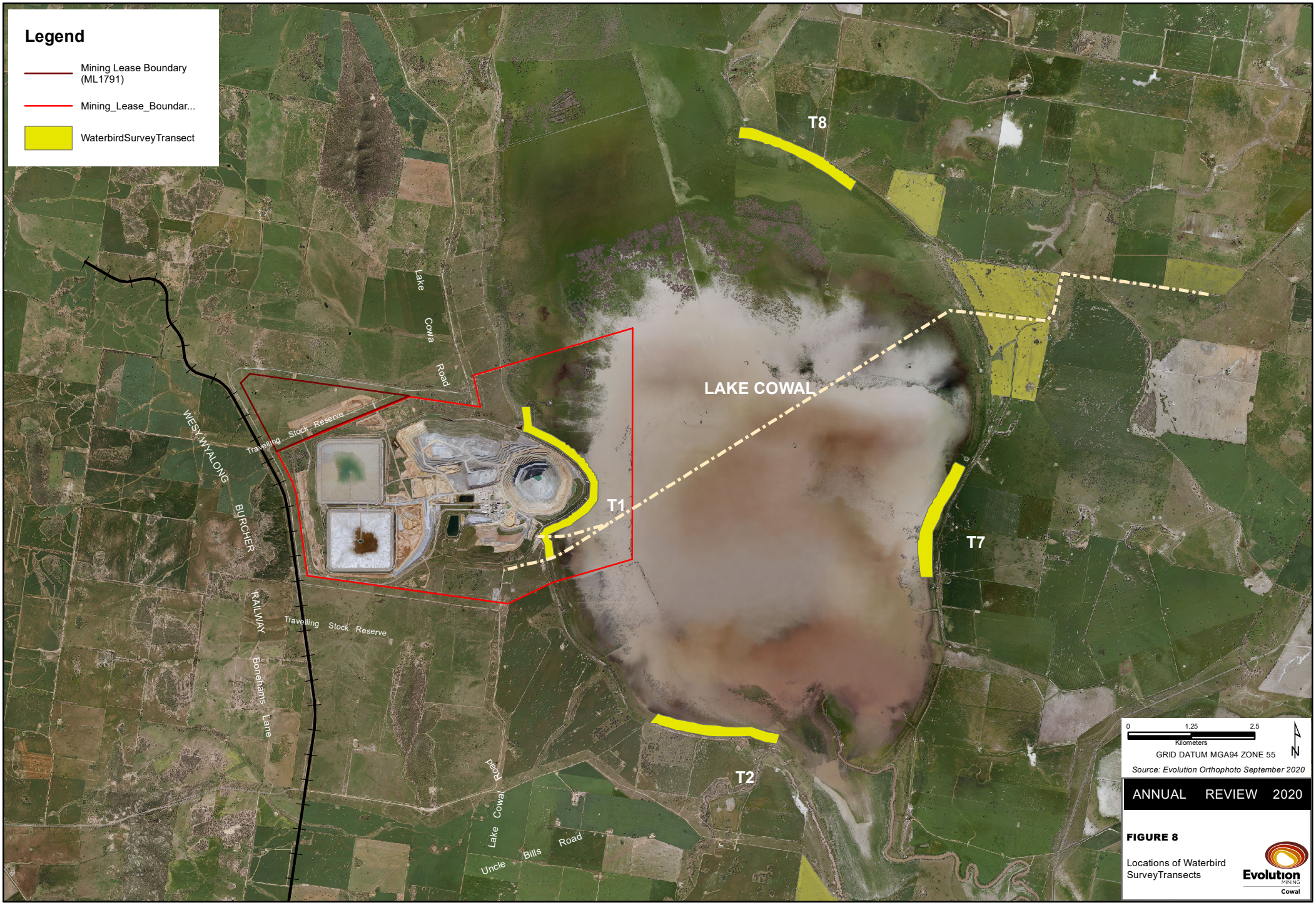
Lake Cowal was visited on August 31st, 2020. The lake proved to be mostly dry and so no transect surveys, or surveys for colonial waterbird breeding, was attempted. No data was collected on ambient conditions or vegetation. No waterbirds were recorded from the transects owing to the lake being dry.

November 2020

Lake Cowal was visited on November 24th, 2020#. The water level was low but high enough to undertake surveys on three transects. Transects 2 and 8 were surveyed on foot while transect 1 was surveyed from a slow moving vehicle. Birds were observed with Nikon 10x42 binoculars or a Tasco spotting scope. Few birds were observed visiting the areas that typically host colonial breeding suggesting the water levels were too low for breeding.

The most commonly recorded species were Hoary-headed Grebe (184), Grey Teal (3323), Eurasian Coot (195), Glossy Ibis (222), Sharp-tailed Sandpiper (214), Black-winged Stilt (1893) and Whiskered Tern (1394). The bird assemblage at Lake Cowal supported only low numbers of fish-eating species. The fauna remained dominated by ducks (44%) and wading birds (32%), reflecting the shallow nature of the lake and the widespread availability of shallow water habitat for feeding. The high numbers of Glossy Ibis, Black-winged Stilt and Whiskered Tern reflect the high density of cane grass around the margins of the lake.
The numbers of Grey Teal, Australasian Shoveler, Intermediate Egret, Glossy Ibis, Masked Lapwing, and Black-winged Stilt were the highest for October-November since filling in 2010.

The recent average rainfall was sufficient to fill Lake Cowal to the point where three of four transects could be surveyed. The extensive shallow water habitat has seen high bird species richness (34), and high abundance (7994), along transects despite there being no survey of transect 7. The widespread shallow habitat provided habitat for dabbling ducks (Grey Teal, Australasian Shoveler, Pink-eared Duck) and the waders Masked Lapwing, Sharp-tailed Sandpiper and Black-winged Stilt as well as herons, ibis and egrets.
Colonial breeding is greatest when the lake level is high and is not declining. Owing to the complete drying of the lake near transect 7, the usual breeding areas were connected by dry land exposing these areas to land-based predation. On account of this there was no colonial breeding activity evident.


Legend
Mining Lease Boundary (ML1791)
Mining_Lease_Boundar...
WaterbirdSurveyTransect
T8
LAKE COWAL
T1
T7
T2
Lake Cowal Road
Travelling Stock Reserve
WIESLYWYALONG
BURCHER
RAILWAY
Travelling Stock Reserve
Bonehams Lane
Lake Cowal Road
Uncle Bills Road
0
1.25
2.5
Kilometers
GRID DATUM MGA94 ZONE 55
Source: Evolution Orthophoto September 2020
ANNUAL REVIEW 2020
FIGURE 8
Locations of Waterbird SurveyTransects
Evolution MINING
Cowal

Fauna Monitoring of TSFs and ML 1535 Boundary

Fauna usage reports in relation to the TSF areas were prepared by Donato Environmental Services (DES) (2019a; 2019b) during the reporting period being, 1 January 2019 to 30 June 2019 and 1 July 2019 to 31 December 2019, respectively.

The main findings included:

- The cyanide discharge concentrations were below those required by the Development Consent.
- Monitoring of cyanide concentrations within the active TSFs and other water bodies has been conducted frequently and at a high standard consistent with industry best practice.
- Considering currently accepted knowledge of cyanide toxicosis in the gold industry, the range of concentrations reported at CGO are considered benign to wildlife.
- No cyanide-related wildlife mortality or effect was recorded at the TSFs.
- No insectivorous bat deaths were recorded at the TSF during the current monitoring period or since systematic wildlife monitoring commenced in April 2006.
- Nocturnal surveys indicate that insectivorous bats were consistently present in the airspace above the active TSF and the control site.
- Monthly nocturnal surveying conducted at CGO represents a proactive approach to environmental monitoring.
- Birds were the only diurnal vertebrate wildlife recorded to visit and interact with the active TSFs.
- The frequency of systematic wildlife surveys makes it very unlikely that cyanide-related wildlife deaths were occurring undetected.
- Lake Cowal is considered to be a vital influence in the composition and abundance of species occurring at the TSFs.

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.

6.10 WEEDS AND PESTS

General weed and pest management activities within ML 1535 and the biodiversity offset areas have been managed during the 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 the BOMP, the control strategies for weed management on Evolution-owned land (including the biodiversity offset areas) include (but are not limited to) 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 the effectiveness of the weed control measures; and
- pest control activities.

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

The pest control activities within ML 1535 and the offset areas described in the LMP, FFMP and the BOMP include the following measures:

- regular property inspections to assess the 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 the NSW *Local Land Services Act, 2013*; and
- inspections to assess the effectiveness of control measures implemented and review these if necessary.

Evolution undertakes pest control activities in conjunction with adjacent landholders for more effective pest control. This process is facilitated via consultation with local landholders and landholder groups through the CEMCC process.

6.10.1.2 Effectiveness of Control Strategies

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

6.10.1.3 Variations from Proposed Control Strategies

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

6.10.2 Environmental Performance

6.10.2.1 Monitoring

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

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 the weed survey undertaken for the reporting period, no Priority Weeds in the Riverina Local Land Services Area were recorded (NGH Environmental, 2020). Scattered individuals of African Boxthorn (*Lycium ferocissimum*) were previously recorded on transects 1, 4, 14, 24 & 50 during the 2019 survey, and transects 6 and 46 were heavily infested by African Boxthorn in 2018. However, recent weed control has been effective in eliminating this species in those areas. A comparison of the results from 2018, 2019 and 2020 shows an overall reduction in boxthorn present in the study area.

Four species listed as weeds of concern under the Riverina Regional Strategic Weed Management Plan (RRSWMP) 2017 – 2022 were identified during the 2020 survey, including:

- Bathurst Burr (**Xanthium spinosum*)
- Galvanised Burr (*Sclerolaena birchii*)
- Lippia (**Phyla canescens*)
- Caltrop (**Tribulus terrestris*)

Two other weed species were identified during the 2020 survey period. These species are not listed as priority weeds or weeds of concern under the RRSWMP 2017- 2022.

- Patterson's Curse (*Echium plantagineum)
- Camel melon (*Cucumis sp.)

These weeds all have a General Biosecurity Duty, which means any person who deals with these plants has a duty to ensure the biosecurity risk is prevented, eliminated or minimised so far as reasonably practicable.

Previous surveys recorded several additional species listed below. However, these species were not recorded during the 2020 survey period. Due to wet conditions, some transects where these species were recorded during the 2019 period could not be accessed.

- Fleabane (*Conyza sp*.)
- Noogooraburr (*Xanthium occidentale*)
- Scotch Thistle (*Onopordum acanthium*)

Lippia was recorded in areas along transect 31 on the lake fringe in 2020 (NGH Environmental, 2020). However, it was noted that this species may have been present in transects that could not be surveyed due to wet conditions. In 2019, Lippia was observed in transects 1, 2, 4, 31, 45 & 47. Continued weed control is required.

During the 2020 surveys, Bathurst Burr was only recorded at the start of the T6 transect (NGH Environmental, 2020). During 2019, Bathurst Burr was recorded along transects 2, 3, 10, 13, 15, 22, 25, 28, 41, 44, 45, 46, 47, 48, 52 & 53. The highest densities were previously recorded in transects 25 and 47. A comparison of the 2019 and 2020 survey results shows a large reduction in the abundance of Bathurst Burr within the survey area. However, continued weed control and monitoring is required.

During the 2020 survey, Galvanised Burr was present in transects 14, 22, 26, 30, 33, 35, 41, 42, 45, 46, 47, 51 and 52 (NGH Environmental, 2020). A relatively low abundance was observed in comparison to the 2019 survey period, where it was recorded in transects 3, 6, 9, 10, 11,12,14,15, 17, 19, 21, 22, 24, 26, 27, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56 & 57. Continued weed control is required.

During the 2020 surveys, Patterson's Curse was recorded within every surveyed transect except 5, 57, 0, and 47 (NGH Environmental, 2020). Patterson's Curse was previously recorded in transects 2, 6, 8, 9, 12, 14, 18, 20, 21, 24, 25, & 28 during the 2019 surveys. A relatively high abundance of this species was observed during the 2020

surveys, indicating that the weed should be controlled using slashing, weeding, herbicide spraying or biological control.

Fleabane was not recorded within the 2020 survey area (NGH Environmental, 2020). During the 2019 survey, fleabane was present only in transects 9 and 28, with 20-50 individuals observed.

During the 2020 survey, Saffron Thistle was recorded in transects 14, 16, 17, 28, 31,33, 34, 35, 36, 39, 41, 44, 46, 47, 49, 52, 53, T7 and T8 (NGH Environmental, 2020). A medium to high abundance was observed for this species, where patches of 50 – 100+ individuals were recorded within and adjacent to transect areas. Saffron Thistle was previously recorded in transects 9, 10, 11, 13, 14, 16, 22, 24, 30, 31, 33 & 47 during 2019. Ongoing monitoring and weed control are required.

Chinese Lantern (*Abutilon theophrasti*) was recorded en-route between T7 and T8 during the 2020 survey period (NGH Environmental, 2020). This species was located during the 2019 surveys along transect 29, however, this area was not able to be re-surveyed due to wet conditions in 2020.

General weed species also recorded during the 2020 survey period included Camel Melon (*Cucumis sp.*), Caltrop (*Tribulus terrestris*) and Variegated Thistle (*Silybum marianum*) (NGH Environmental, 2020). As these species are not native and may pose a biosecurity risk, CGO has a general biosecurity duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Noogoora Burr was not recorded within the 2020 survey area (NGH Environmental, 2020). The species was previously recorded on transects 4 and 9, which are situated along the floodplain and creek of Lake Cowal, suggesting seed dispersal via water to these areas (DPI VIC, 2020).

Scotch Thistle was not recorded within the 2020 survey area (NGH Environmental, 2020). In 2019, Scotch Thistle had previously increased in distribution and abundance. The weed was observed in transects 0, 1, 2, 14, 22, 26, 28, 31, 37, 38, 43, 45, 46, 43 & 53 in high numbers.

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.

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

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

6.11.1 Environmental Management

6.11.1.1 Control Strategies

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

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 proposed in the Research Design and Study Plan for other Aboriginal objects in the CGO area that are not contained within the Registered Sites. The details of the management and mitigation measures for other Aboriginal objects is contained in the Research Design and Study Plan (Pardoe, 2002) for the CGO as amended by Permit 1468 and Permit 1681.

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 the majority of cultural heritage work continues to be surface and subsurface monitoring for exploration drill pads and roads.

6.11.1.2 Effectiveness of Control Strategies

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

6.11.1.3 Variations from Proposed Control Strategies

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

6.11.2 Environmental Performance

6.11.2.1 Monitoring

During the reporting period, due diligence inspections were undertaken within proposed exploration areas within ML 1535.

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), 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

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

6.12.1.3 Variations from Proposed Control Strategies

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

6.12.2 Environmental Performance

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 during the reporting have been effective in preserving the 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 the Emergency Response Plan (ERP), 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 ERP, RMP and BOMP during the 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 the 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; and
- fuel management (e.g. hazard reduction burns) in consultation with the NSW Rural Fire Service.

6.13.1.2 Effectiveness of Control Strategies

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

6.13.1.3 Variations from Proposed Control Strategies

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

6.13.2 Environmental Performance

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 Kattron 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 the biodiversity offset areas during the reporting period.

A number of all-weather access tracks are established and have been maintained during the reporting period – within the ML 1535, 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 Waste and Chemical Management Plan (HWCMP) has been prepared for the CGO in accordance with Development Consent Condition 5.7, The HWCMP was revised and updated in July 2018. Monitoring and management of hazardous waste and chemicals continued in accordance with the HWCMP during the reporting period.

6.14.1 Environmental Management

6.14.1.1 Control Strategies

Based on the principles detailed in *Leading Practice Sustainable Development Program for the Mining Industry - Hazardous Materials Management* handbook (Department of Foreign Affairs and Trade, 2017), Evolution employees and contractors have adopted a Chemical Management Strategy as part of the HWCMP. 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.
- Annual 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

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

6.14.2.1 Monitoring

Hydrocarbon contamination continued to be monitored during the reporting period in accordance with the HWCMP.

6.14.2.2 Performance Outcomes

A number of minor substance spillage incidents occurred during the reporting period; however, these spills were classified as low risk and were fully contained, recovered or treated in the bioremediation facility.

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 GEOCHEMISTRY

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 the 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 the waste emplacements.

6.15.1 Environmental Management

The regional and local geology of the E42 Deposit has been described by Miles, Brooker, McInnes, *et al* [1993-1998]). 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 the 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.

6.15.1.1 Control Strategies

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

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.

6.15.1.2 Effectiveness of Control Strategies

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

6.15.1.3 Variations from Proposed Control Strategies

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

6.15.2 Environmental Performance

The results of detailed geochemical investigations of waste rock and tailings were reported in the EIS and in subsequent environmental assessments undertaken for the 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 the Waste Rock Emplacement and the 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 the results are generally consistent with previous investigations, which predicated that waste rock would be predominantly non-acid forming. GEM (2009) also verified these findings.

6.15.3 Reportable Incidents

There were no reportable incidents during the reporting period.

6.15.4 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 21 below.

Table 21: Water Taken for CGO

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.* Upper Lachlan Alluvial Groundwater Source. Upper Lachlan Alluvial Zone 7 Management Zone	15ML/day and 3,650ML/yr	-	922.1	922.1
WAL 36569 (ESB)		0 ML (with temporary transfer of 750 ML per bore per yr)	-	120.9	120.9
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	1.0	399.5	400.4
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.	-	2,677.0	2,677.0
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

The quantity of water approved to be extracted from the BCPC is limited by:

1. Development Consent Condition 4.1(b) which states:

   The maximum daily extraction of water from the Bland Creek Paleochannel shall not exceed 15 ML/day, or 3,650 ML/year; and

2. The current bore water licences.

A total of 922.1 ML of water was extracted from the BCPC bore field during the reporting period (Table 20). The groundwater level associated with the BCPC bore field is monitored on a continuous basis by the DI-Lands & Water groundwater monitoring bore on Burcher Road (GW036553). Contingency measures have been developed for implementation when water levels reach either RL 137.5 m AHD or RL 134 m AHD. These trigger levels were developed in consultation with the then NSW Office of Water (NoW) and other water users within the BCPC including stock and domestic users and irrigators. The trigger levels were not reached during the 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 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 7). Water extraction from the ESB is licensed under WAL 36569.

The total volume extracted from the ESB during the reporting period was 236.0 ML. The annual maximum extraction limit is 750 ML per bore.

The saline groundwater supply bore field on the floor of Lake Cowal within ML 1535 (Figure 9a) was commissioned in mid-2009. Water extraction from the saline groundwater supply bore field within Lake Cowal is licensed under WAL 36615. However, no extraction has occurred since April 2010 due to access restrictions resulting from the inundation of Lake Cowal. The production and monitoring bores on the floor of Lake Cowal remain 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.

An open pit dewatering bore field has been established external to the perimeter of the open pit. A total of 390 ML was extracted from the open pit dewatering sump (which collected water from rock wall seepage and rainfall) during the reporting period. Water extraction from the open pit dewatering bore field 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 TSF lift construction works.

7.1.2 Surface Water

A total of 2677.0 ML was pumped from the Jemalong Irrigation Channel during the reporting period. 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 WALs 14981 and 13749 (80 Units) and General Security (zero allocation) WAL 13748. Licenced water from the Lachlan River is supplied via a pipeline from the Jemalong Irrigation Channel to the BCPC Bore 4 pumping station (Figure 9b).

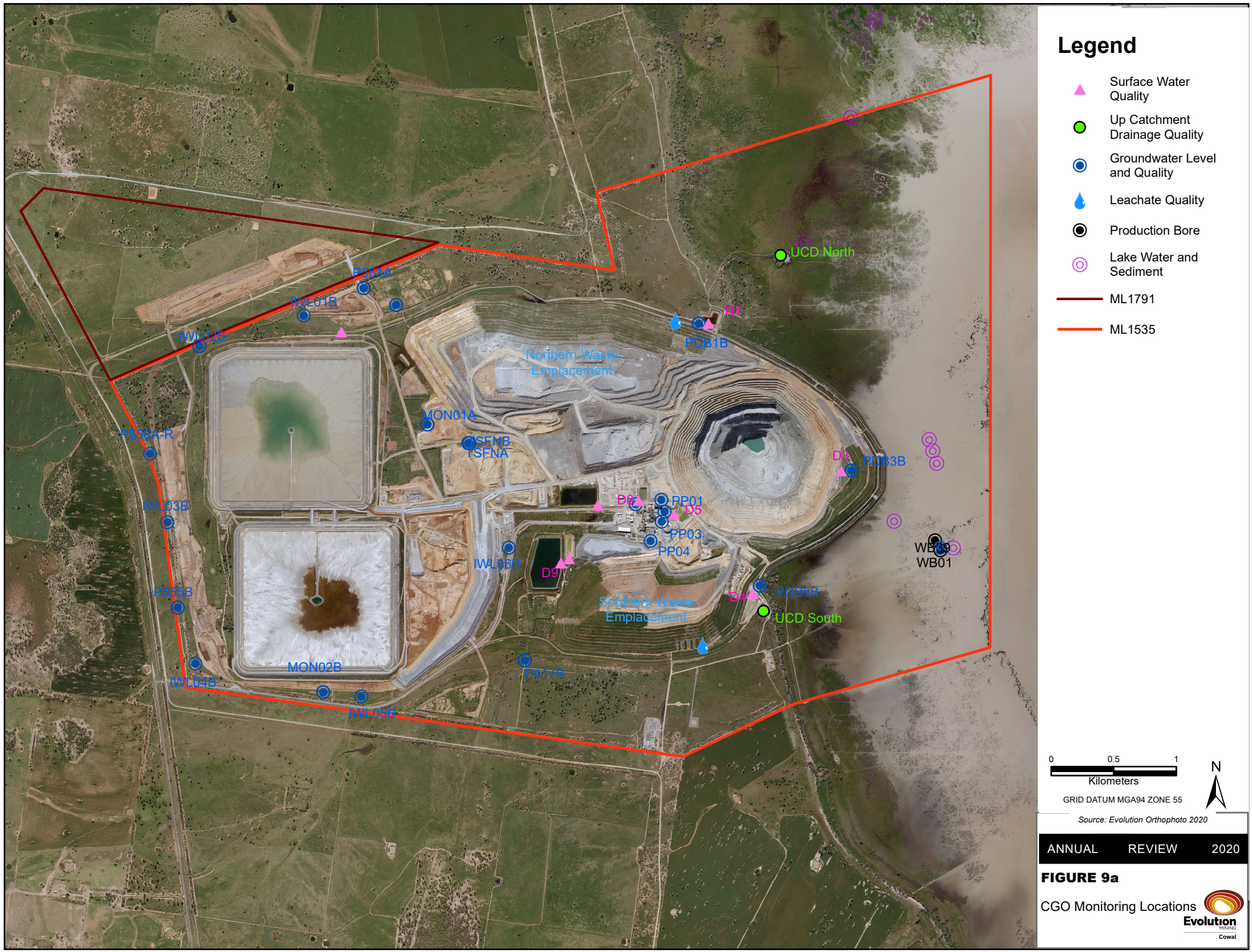
The CGO water management system is conceptually shown in Figure 10.

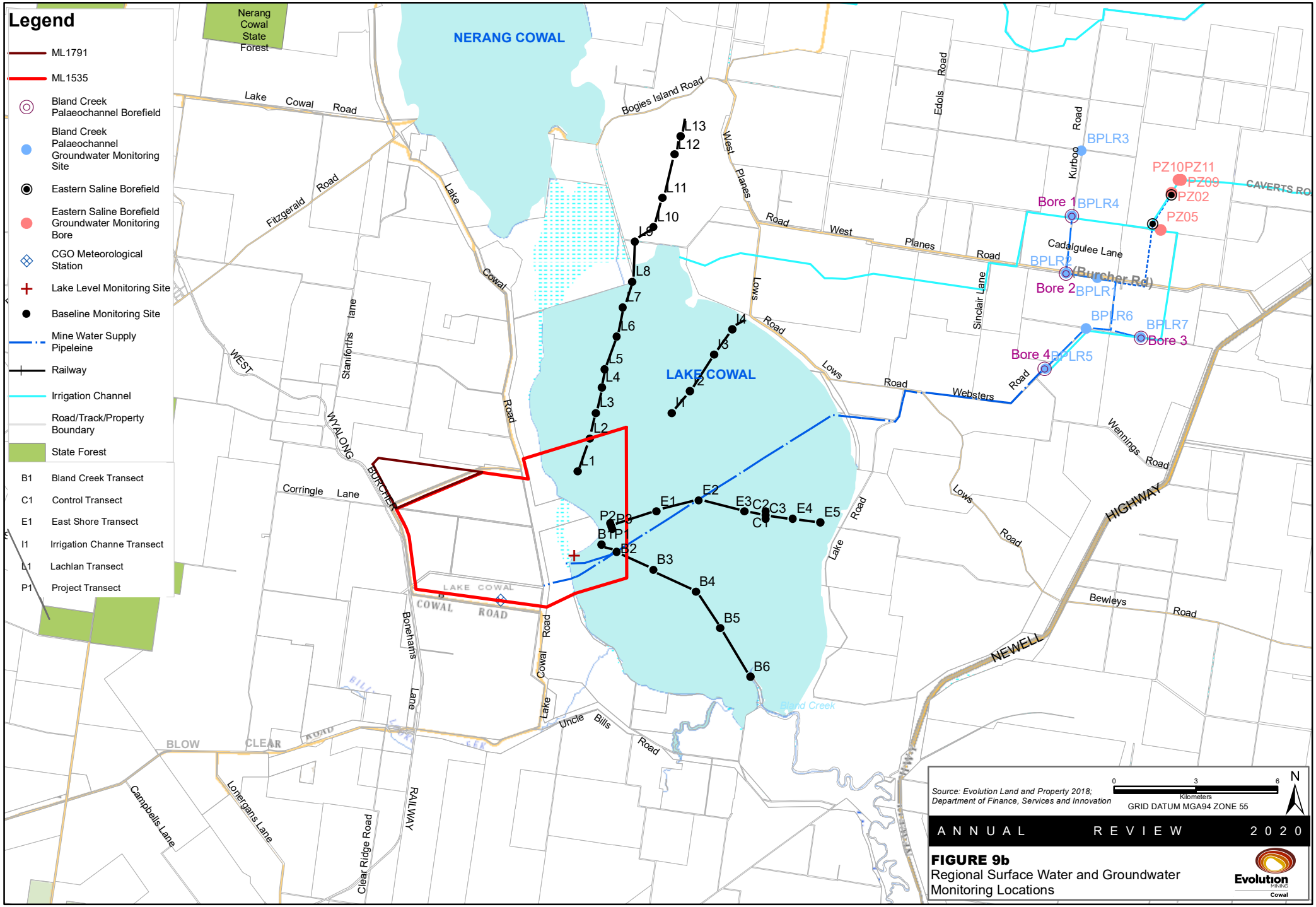
The CGO's Water Management Plan (WMP) and MOP provide further detail regarding water management at the CGO.

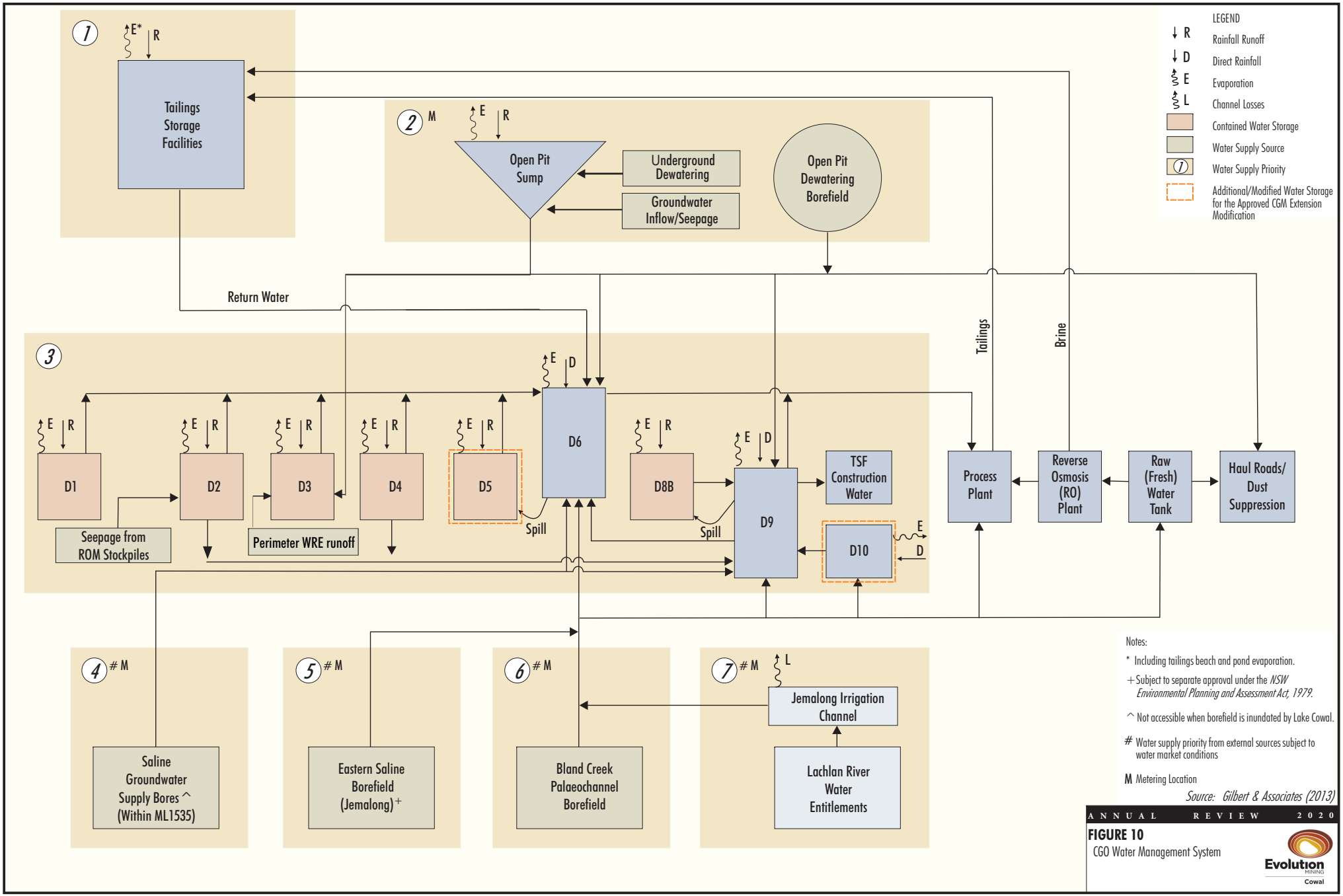
7.2 SURFACE WATER

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. The WMP and the SWGMBMP were approved in July 2018.

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.


Legend
Surface Water Quality
Up Catchment Drainage Quality
Groundwater Level and Quality
Leachate Quality
Production Bore
Lake Water and Sediment
ML1791
ML1535
UCD North
UCD South
D1
PD01B
Northern Waste Emplacement
Southern Waste Emplacement
MON01A
TSFNB
TSFNA
PP01
PP02
PP03
PP04
D5
D3
PD03B
D4
PD05B
WB39
WB01
D9
IWL06B
P417B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
MON02B
PS01A
PS02A-R
PS05B
0
0.5
1
Kilometers
N
GRID DATUM MGA94 ZONE 55
Source: Evolution Orthophoto 2020
ANNUAL REVIEW 2020
FIGURE 9a
CGO Monitoring Locations
Evolution MINING
Cowal


Legend
ML1791
ML1535
Bland Creek Palaeochannel Borefield
Bland Creek Palaeochannel Groundwater Monitoring Site
Eastern Saline Borefield
Eastern Saline Borefield Groundwater Monitoring Bore
CGO Meteorological Station
Lake Level Monitoring Site
Baseline Monitoring Site
Mine Water Supply Pipeleine
Railway
Irrigation Channel
Road/Track/Property Boundary
State Forest
B1 Bland Creek Transect
C1 Control Transect
E1 East Shore Transect
I1 Irrigation Channe Transect
L1 Lachlan Transect
P1 Project Transect
Nerang Cowal State Forest
NERANG COWAL
LAKE COWAL
Lake Cowal Road
Bogies Island Road
Fitzgerald Road
Lake Cowal Road
West Planes Road
Edols Road
Kurboo Road
Cadalgulee Lane
Sinclair Lane
Lows Road
Websters Road
Wennings Road
HIGHWAY
NEWELL
Bewleys Road
WEST WYALONG
Staniforths lane
Corringle Lane
BURCHER
COWAL ROAD
Bonehams Lane
Uncle Bills Road
Bland Creek
BLOW CLEAR ROAD
Campbells Lane
Lonergans Lane
Clear Ridge Road
RAILWAY
BPLR3
BPLR4
BPLR2
BPLR1
BPLR6
BPLR7
BPLR5
Bore 1
Bore 2
Bore 3
Bore 4
(Burcher Rd)
PZ10
PZ11
PZ09
PZ02
PZ05
CAVERTS RO
L13
L12
L11
L10
L9
L8
L7
L6
L5
L4
L3
L2
L1
I4
I3
I2
I1
E1
E2
E3
C2
C3
E4
E5
C1
P2
P3
B1
P1
B2
B3
B4
B5
B6
Source: Evolution Land and Property 2018; Department of Finance, Services and Innovation
0 3 6
Kilometers
GRID DATUM MGA94 ZONE 55
N
ANNUAL REVIEW 2020
FIGURE 9b
Regional Surface Water and Groundwater Monitoring Locations
Evolution MINING Cowal



ANNUAL REVIEW 2020

FIGURE 10
CGO Water Management System

Evolution MINING Cowal

HAL-04-22_AR2017_005A

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 Dewatering System.

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

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

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

pH, electrical conductivity (EC) and Total Suspended Solids (TSS) results fluctuated across the on-site surface water ponds throughout the reporting period likely due to changes in the standing water level within the ponds. pH results were the most stable throughout the reporting period, and ranged from 4.78 to 13.13 across the on-site surface water ponds. EC ranged from 70 to 66313 microSeimens per centimeter (µS/cm) and TSS ranged from 2 to 3290 milligrams per litre (mg/L) and were both significantly influenced by the filling and drying of the ponds with increases observed in the summer months due to decreasing standing water levels (Table 21).

These monitoring results and fluctuations are generally consistent with previous reporting periods.

A comparison of surface water results with the Australian and New Zealand Environmental Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) guidelines has not been undertaken for on-site surface water ponds as they are contained inside a closed catchment in 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 22: Summary of Monthly and Quarterly Surface Water Monitoring Results for the Reporting Period

Monthly Surface Water Monitoring - D1, D4, UCD North and UCD South				
Dam D1	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	14	5	7.07	8.98
Electrical Conductivity - Field (µS/cm)	14	621	6621	10219
Total Suspended Solids (mg/L)	14	1	87.72	1500
Dam D4	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	14	4.65	7.118	8.67
Electrical Conductivity - Field (µS/cm)	14	266	960	2444
Total Suspended Solids (mg/L)	14	21	334	3290
UCD North	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	16	5.86	7.51	9.43
Electrical Conductivity - Field (µS/cm)	16	143	775	2579
Total Suspended Solids (mg/L)	16	9	356	1560
UCD South	**COUNT**	**MIN**	**MEAN**	**MAX**
pH – Field	15	4.78	7.38	8.96
Electrical Conductivity - Field (µS/cm)	15	70	546	4049
Total Suspended Solids (mg/L)	15	4	1220	1216
Quarterly Surface Water Monitoring – D2, D3, D8B, D9, D6, D5 and Pit Sumps				
Dam D5	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	3	5.16	6.28	8.22
Electrical Conductivity - Field (µS/cm)	3	3069	3683	4546
Total Suspended Solids (mg/L)	3	5	20.2	27
Dam D6	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	5.2	6.93	8.15
Electrical Conductivity - Field (µS/cm)	4	9065	9065	15416
Total Suspended Solids (mg/L)	4	15	154	478
Pit Sump 1	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	9	5.85	5.85	8.1
Electrical Conductivity - Field (µS/cm)	9	30077	38341	47816
Total Suspended Solids (mg/L)	9	9	118	594
Dam D2	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	2	6.04	7.09	8.13
Electrical Conductivity - Field (µS/cm)	2	2146	3319	4492
Oil & Grease (mg/L)	2	17	17	17
Dam D3	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	4	5.71	7.08	7.82
Electrical Conductivity - Field (µS/cm)	4	10615	29838	66313
Oil & Grease (mg/L)	4	5	5	5

Table 22 (Continued): Summary of Monthly and Quarterly Surface Water Monitoring Results for the Reporting Period

Dam D9	COUNT	MIN	MEAN	MAX
pH - Field	4	5.49	8.79	13.13
Electrical Conductivity - Field (µS/cm)^	4	2045	6314	16486
Total Suspended Solids (mg/L)	4	2	5.71	13
Oil & Grease (mg/L)	4	5	5	5
Dam D8B	**COUNT**	**MIN**	**MEAN**	**MAX**
pH - Field	3	4.93	8.59	12.86
Electrical Conductivity - Field (µS/cm)^	3	6333	8860	12675
Total Suspended Solids (mg/L)	5	4	5.8	13

^ 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 the standing water level within the ponds. pH results were generally stable throughout the reporting period and ranged from 4.78 to 9.43 across both ponds.

EC ranged from 70 to 4049 µS/cm and TSS ranged from 4 to 1560 mg/L and were both significantly influenced by fluctuations due to changes in standing water levels

These 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 the ANZECC and ARMCANZ (2000) guidelines for pH, EC and turbidity.

Lake Cowal

During the reporting period, Lake Cowal was predominantly dry with the lake receding to by dry by mid-February, no samples were taken during this period as a result.

Plate 2: Aerial Photograph of the Lake Protection Bund

2016

2020

Graph 2: Lake Cowal Water Level 2011 - 2020

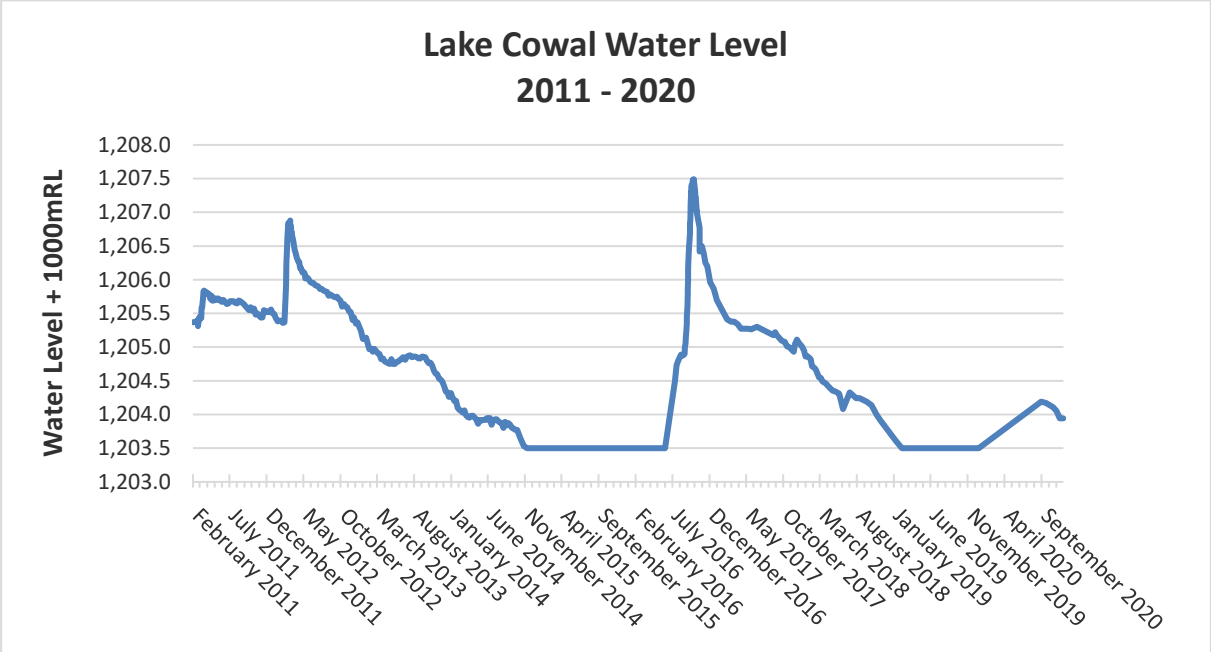


Table 22: Summary of Lake Cowal Water Monitoring – 2010 – 2018

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 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)	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)	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)	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)	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)	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)	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)	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)	0.2 – 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	205.1	Not applicable

Table 22 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2018

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 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)	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)	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)	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)	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)	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)	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)	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)	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)	NA	NA

Table 22 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2018

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 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	0.0026[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)	0.0016[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)	0.000055[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)	0.00005[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)	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)	NA	

Table 22 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2018

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 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)	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)	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)	0.0029[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)	0.0005[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)	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)	NA	

Table 22 (Continued): Summary of Lake Cowal Water Monitoring – 2010 – 2018

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 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)	0.012[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)	0.00306[3] (dissolved)	

Source: DM McMahon, 2018.

Table 23: Summary of Lake Cowal Inflow Water Quality Results – 2010 – 2018

	Lake Inflow Water Quality Results (November 2010 – Mean[#])	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Inflow Water Quality Results (2012) Ranges (Mean)	Lake Inflow Water Quality Results (2013) Ranges (Mean)	Lake Inflow Water Quality Results (2014) Ranges (Mean)	Lake Inflow Water Quality Results (2016) Ranges (Mean)	Lake Inflow Water Quality Results (2017) Ranges (Mean)	Lake Inflow Water Quality Results (2018) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992) [#]	Fresh Waters ^ ~
Alkalinity (mg/L)	50	16 – 79 (56)	39 – 101 (67)	95 – 170 (133)	NA	51 – 148 (78) [3]	131-131 (131)	NA	NA	NA
Suspended Solids (mg/L)	14	11 – 201 (53)	23 – 372 (124)	210 – 640 (425)	NA	4 – 63 (31) [3]	77-77 (77)	NA	NA	NA
Acidity – Alkalinity scale (pH)	7.3	7.17 – 7.73 (7.37)	7.55 – 7.90 (7.73)	7.73 – 7.87 (7.80)	NA	7.09 – 8.31 (7.52) [3]	7.58-7.58 (7.58)	NA	8.27 – 8.67	6.5 to 8.0
Electrical Conductivity (µS/cm)	178	126 – 348 (199)	89 – 871 (246)	365 – 551 (458)	NA	139 – 721 (262) [3]	435-435 (435)	NA	222 – 1557[1, 3]	20 to 30 µS/cm[1]
Turbidity (NTU)	116	31 – 807 (237)	18.6 – 693 (296)	337 – 2560 (1449)	NA	51 – 270 (122) [3]	357-357 (357)	NA	22 – 224	1 to 20[2]
Total Iron (mg/L)	6.5	0.90 – 42.8 (10.7)	2.09 – 36.7 (13.68)	20.8 – 180 (100)	NA	2.6 – 16.1 (8.6) [3]	0.12-0.12 (0.12)	NA	NA	NA
Calcium (mg/L)	9	3 – 15 (8)	5 – 23 (11.3)	10 – 29 (19.5)	NA	4 – 32 (15) [3]	21-21 (21)	NA	NA	NA
Magnesium (mg/L)	5.5	2 – 9 (5)	3 – 16 (6.9)	6 – 15 (10.5)	NA	3 – 28 (8.4) [3]	13-13 (13)	NA	NA	NA
Potassium (mg/L)	10.5	8 – 17 (12)	10 – 16 (12.6)	21 – 23 (22)	NA	2 – 9 (6.9) [3]	14-14 (14)	NA	NA	NA

Table 23 (Continued): Summary of Lake Cowal Inflow Water Quality Results – 2010 – 2018

	Lake Inflow Water Quality Results (November 2010 – Mean[#])	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Inflow Water Quality Results (2012) Ranges (Mean)	Lake Inflow Water Quality Results (2013) Ranges (Mean)	Lake Inflow Water Quality Results (2014) Ranges (Mean)	Lake Inflow Water Quality Results (2016) Ranges (Mean)	Lake Inflow Water Quality Results (2017) Ranges (Mean)	Lake Inflow Water Quality Results (2018) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992) [#]	Fresh Waters ^ ~
Sodium (mg/L)	15.5	11 – 34 (17)	14 – 45 (22.4)	48 – 51 (49.5)	NA	10 – 58 (20.4) [3]	50-50 (50)	NA	NA	NA
Chloride (mg/L)	18	9 – 28 (18)	12 – 94 (31)	40 – 55 (47.5)	NA	5 – 128 (31.8) [3]	49-49 (49)	NA	NA	NA
Sulphate (mg/L)	4.5	1 – 13 (5)[3]	2 – 11 (6.2)[3]	23 – 28 (25.5)[3]	NA	1- 27 (7) [3]	16-16 (16)	NA	NA	NA
Cations (mg/L)	1.7	1.11 – 2.40 (1.71)[3]	1.43 – 4.78 (2.46)[3]	3.62 – 5.49 (4.55)[3]	NA	1.38 – 3.45 (2.1) [3]	4.65-4.65 (4.65)	NA	NA	NA
Anions (mg/L)	1.6	1.26 – 2.27 (1.74)[3]	1.27 – 4.64 (2.33)[3]	3.61 – 5.43 (4.52)[3]	NA	1.38 – 6.65 (2.53) [3]	4.33-4.33 (4.33)	NA	NA	NA
Arsenic (mg/L)	0.0035[3] (total)	0.001 – 0.007 (0.003)[3] (total)	0.003 – 0.007 (0.004)[3] (total)	0.008 – 0.026 (0.017)[3] (total)	NA	0.002 – 0.005 (0.0028) [3] (total)	0.006-0.006 (0.0060)	NA	0.0026[3] (total)	0.008
	0.0015[3] (dissolved)	<0.001 – 0.004 (0.002)[3] (dissolved)	0.001 – 0.003 (0.002)[3] (dissolved)	0.002 – 0.006 (0.004)[3] (dissolved)	NA	0.001 – 0.004 (0.0016) [3] (dissolved)	0.002-0.002 (0.002)	NA	0.0016[3] (dissolved)	
Cadmium (mg/L)	<0.0001[3] (total)	<0.0001 - <0.001 (<0.0001)[3] (total)	<0.001 - <0.001 (0.001)[3] (total)	<0.0001 - <0.001 (<0.0001)[3] (total)	NA	0.0001 – 0.0001 (0.0001) [3] (total)	0.0001-0.0001 (0.0001)	NA	0.000055[3] (total)	0.0006
	<0.0001[3] dissolved)	<0.0001 – <0.0002 (<0.0001)[3] (dissolved)	<0.001 - <0.001 (0.001)[3] (dissolved)	<0.001 - <0.001 (0.001)[3] (dissolved)	NA	0.0001 – 0.0001 (0.0001) [3] (dissolved)	0.0001-0.0001 (0.0001)	NA	0.00005[3] (dissolved)	

Table 23 (Continued): Summary of Lake Cowal Inflow Water Quality Results – 2010 – 2018

	Lake Inflow Water Quality Results (November 2010 – Mean[#])	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Inflow Water Quality Results (2012) Ranges (Mean)	Lake Inflow Water Quality Results (2013) Ranges (Mean)	Lake Inflow Water Quality Results (2014) Ranges (Mean)	Lake Inflow Water Quality Results (2016) Ranges (Mean)	Lake Inflow Water Quality Results (2017) Ranges (Mean)	Lake Inflow Water Quality Results (2018) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992) [#]	Fresh Waters ^ ~
Molybdenum (mg/L)	<0.001[3] (total)	0.001 – 0.004 (0.0015)[3] (total)	<0.001 - <0.001 (0.001)[3] (total)	<0.001 - <0.001 (0.001)[3] (total)	NA	0.001 – 0.001 (0.001) [3] (total)	0.001-0.001 (0.001)	NA	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)	NA	0.001 – 0.001 (0.001) [3] (dissolved)	0.001-0.001 (0.001)	NA	NA	
Nickel (mg/L)	0.007[3] (total)	0.001 – 0.026 (0.008)[3] (total)	0.005 – 0.021 (0.011) [3] (total)	0.017 – 0.077 (0.047)[3] (total)	NA	0.005 – 0.013 (0.0078) [3] (total)	0.014-0.014 (0.014)	NA	NA	0.008
	0.002 – 0.003 (0.0025)[3] (dissolved)	0.002 – 0.005 (0.003)[3] (dissolved)	0.003 – 0.005 (0.004)[3] (dissolved)	0.004 – 0.004 (0.004)[3] (dissolved)	NA	0.001 – 0.006 (0.0039) [3] (dissolved)	0.004-0.004 (0.004)	NA	NA	
Lead (mg/L)	0.0035[3] (total)	<0.001 – 0.029 (0.006)[3] (total)	<0.001 – 0.021 (0.007)[3] (total)	0.007 – 0.097 (0.052)[3] (total)	NA	0.001 – 0.006 (0.0029) (total) [3]	0007-0.007 (0.007)	NA	0.0029[3] (total)	0.001
	0.001[3] (dissolved)	<0.001 - 0.003 (0.002)[3] (dissolved)	<0.001 – 0.007 (0.002)[3] (dissolved)	<0.001 – 0.001 (0.001)[3] (dissolved)	NA	0.001 – 0.002 (0.001) [3] (dissolved)	<0.001-<0.001 (<0.001)	NA	0.0005[3] (dissolved)	
Antimony (mg/L)	<0.001[3] (total)	<0.001 – 0.004 (0.002)[3] (total)	<0.001 - <0.001 (0.001)[3] (total)	<0.001 - <0.001 (<0.001)[3] (total)	NA	0.001 – 0.001 (0.001) [3] (total)	<0.001-<0.001 (<0.001)	NA	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)	NA	0.001 – 0.001 (0.001) [3] (dissolved)	<0.001-<0.001 (<0.001)	NA	NA	

Table 23 (Continued): Summary of Lake Cowal Inflow Water Quality Results – 2010 – 2018

	Lake Inflow Water Quality Results (November 2010 – Mean[#])	Lake Inflow Water Quality Results (2011) Ranges (Mean)	Lake Inflow Water Quality Results (2012) Ranges (Mean)	Lake Inflow Water Quality Results (2013) Ranges (Mean)	Lake Inflow Water Quality Results (2014) Ranges (Mean)	Lake Inflow Water Quality Results (2016) Ranges (Mean)	Lake Inflow Water Quality Results (2017) Ranges (Mean)	Lake Inflow Water Quality Results (2018) Ranges (Mean)	Lake Cowal Baseline Water Quality Results (1991 -1992) [#]	Fresh Waters ^ ~
Zinc (mg/L)	0.015[3] (total)	<0.005 – 0.074 (0.0022)[3] (total)	0.009 – 0.051 (0.024)[3] (total)	0.033 – 0.234 (0.134)[3] (total)	NA	0.007 – 0.027 (0.014) [3] (total)	0.025-0.025 (0.025)	NA	0.012[3] (total)	0.0024
	0.03[3] (dissolved)	<0.005 – 0.219 (0.046)[3] (dissolved)	<0.005 – 0.068 (0.036)[3] (dissolved)	0.005 – 0.009 (0.007)[3] (dissolved)	NA	0.005 – 0.008 (0.0055) [3] (dissolved)	0.13-0.013 (0.013)	NA	0.00306[3] (dissolved)	

Source: DM McMahon, 2018, North Limited (1998) and NSR Environmental Consultants (1995)

^ Guideline values in accordance with ANZECC and ARMCANZ (2000).

~ 99% protection level trigger values for toxicants – lakes and reservoirs.

NA – Not Available.

[1] ANZECC and ARMCANZ (2000) notes that conductivity in lakes is generally low, but will vary depending upon catchment geology.

[2] ANZECC and ARMCANZ (2000) notes that lakes in catchments with highly dispersible soils will have high turbidity.

[3] Mean value.

Two readings only for December 2010

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 24: 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)	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)	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)	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)	
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)	1.5
	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)	
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)	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)	

Table 24 (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)	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)	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)	
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)	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)	

After: NSR Environmental Consultants (1995) and DM McMahon (2018).

^ Guideline values in accordance with ANZECC and ARMCANZ (2000) recommended sediment quality guidelines.

[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. The WMP and the SWGMBMP were approved in July 2018.

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 the CGO site water management system including groundwater:

- Prevent the quality of any surface water (including waters within Lake Cowal) and groundwater being degraded, through the containment of all potentially contaminated water (contained water) generated within the CGO and diversion of all other water around the perimeter of the site.
- Manage the 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 the identification of potential surface water and groundwater impacts and the development of ameliorative measures as necessary, including provision of appropriate compensation measures for landholders affected by changes to the flood regime of Nerang Cowal.

The review procedure relevant to groundwater monitoring detailed in the 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 draw-downs, monitoring bores and piezometers have been installed within ML 1535 and within aquifers potentially affected by the CGO (i.e. surrounding the 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 to be 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

7.3.2.1 Monitoring

During the reporting period groundwater monitoring was conducted in accordance with the 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 Review 2020 report has been prepared by Coffey Geotechnics (2021), which provides a detailed description and interpretation of the groundwater monitoring results during the reporting period.

Stiff plots of water quality results for the BCPC Bore field, processing plant area bores, pit area bores and TSF bores are provided in Figures 11a and 11b. Piper Plots of groundwater chemistry of the BCPC Bore field, processing plant area bores, pit area bores and TSF bores are provided on Figure 12. Deep and shallow groundwater contours are presented in Figures 13a and 13b.

Key summaries of the groundwater monitoring results presented in the Coffey Geotechnics report are provided in the subsections below.

Groundwater Levels

The Cowal groundwater system generally shows limited response to rainfall. The main groundwater level response is to be pumping for water supply and pit dewatering. From 2004 to 2020, water supply pumping has resulted in a maximum drawdown of approximately 67 m in the Bland Creek Paleochannel Bore field, and pit dewatering has resulted in a maximum measured drawdown of approximately 79 m in the pit area monitoring bores. In general, vertical hydraulic gradients within the groundwater system surrounding the mine pit are downward. Measured piezometric levels within the Transported material tend to change more slowly than those for the Saprolite and Saprock.

Piezometric levels decline toward the pit with little reduction below the pre-mining level of approximately 200 m AHD at distances greater than approximately 2 km from the pit centre. Groundwater levels tend to be highest in the Transported material and lowest in the Saprock. The zone of influence after 15 years of mine dewatering is limited, indicating low lateral permeability.

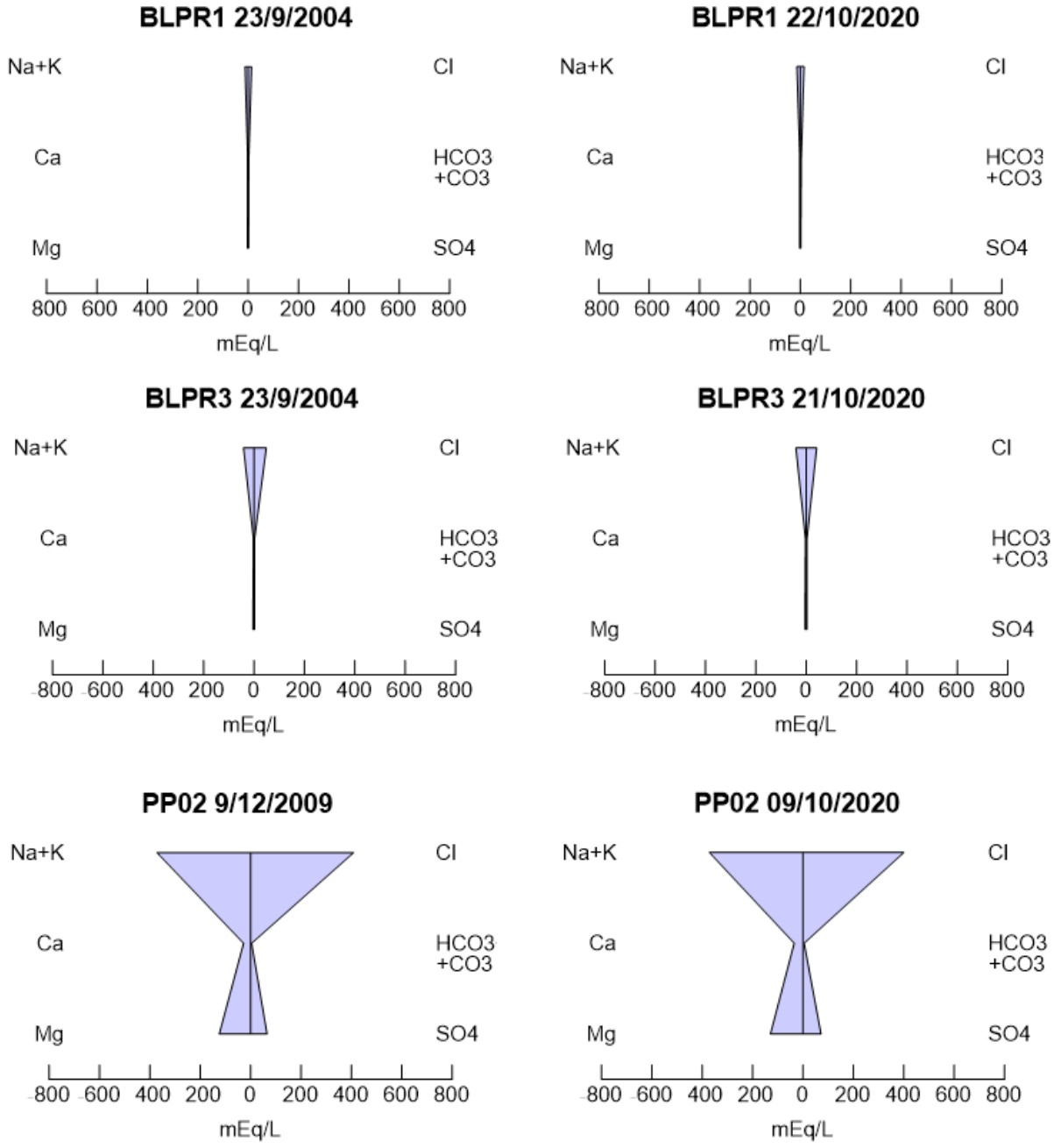
A localised increase in groundwater levels has been observed in the vicinity of the TSF area. A separate groundwater level investigation was conducted by Coffey to further assess the change in groundwater level in this area (Coffey, 2009b). A model of the groundwater system adjacent to the southern TSF was developed and calibrated to provide reasonable agreement with the measured groundwater levels in the area. It was concluded that increasing groundwater levels south of the southern TSF at bores MON02A and MON02B, and northeast of the southern TSF at P412A-R, are related to the movement of seepage from the TSF (Coffey, 2009b). The direction of seepage flow towards the open pit is consistent with the seepage flow direction predicted in the EIS and in hydrogeological assessments (Coffey, 2011b and 2012). It was also assessed that groundwater level rises associated with the TSF are not expected to reach the ground surface (Coffey, 2009b).

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

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 have generally remained stable for the groundwater data reviewed since mining operations began in 2004. ANZG 2018 default guideline values for pH range between 6.5 and 8 and are based on values for NSW upland rivers. Some pH results are below the guideline value of pH 6.5. However, pH levels have generally remained stable, are slightly acidic to neutral, and are similar to baseline EIS levels. EC results have generally remained stable and are similar to, or higher than, the baseline EIS levels.



Source: Coffey Geotechnics Pty Ltd (2021)

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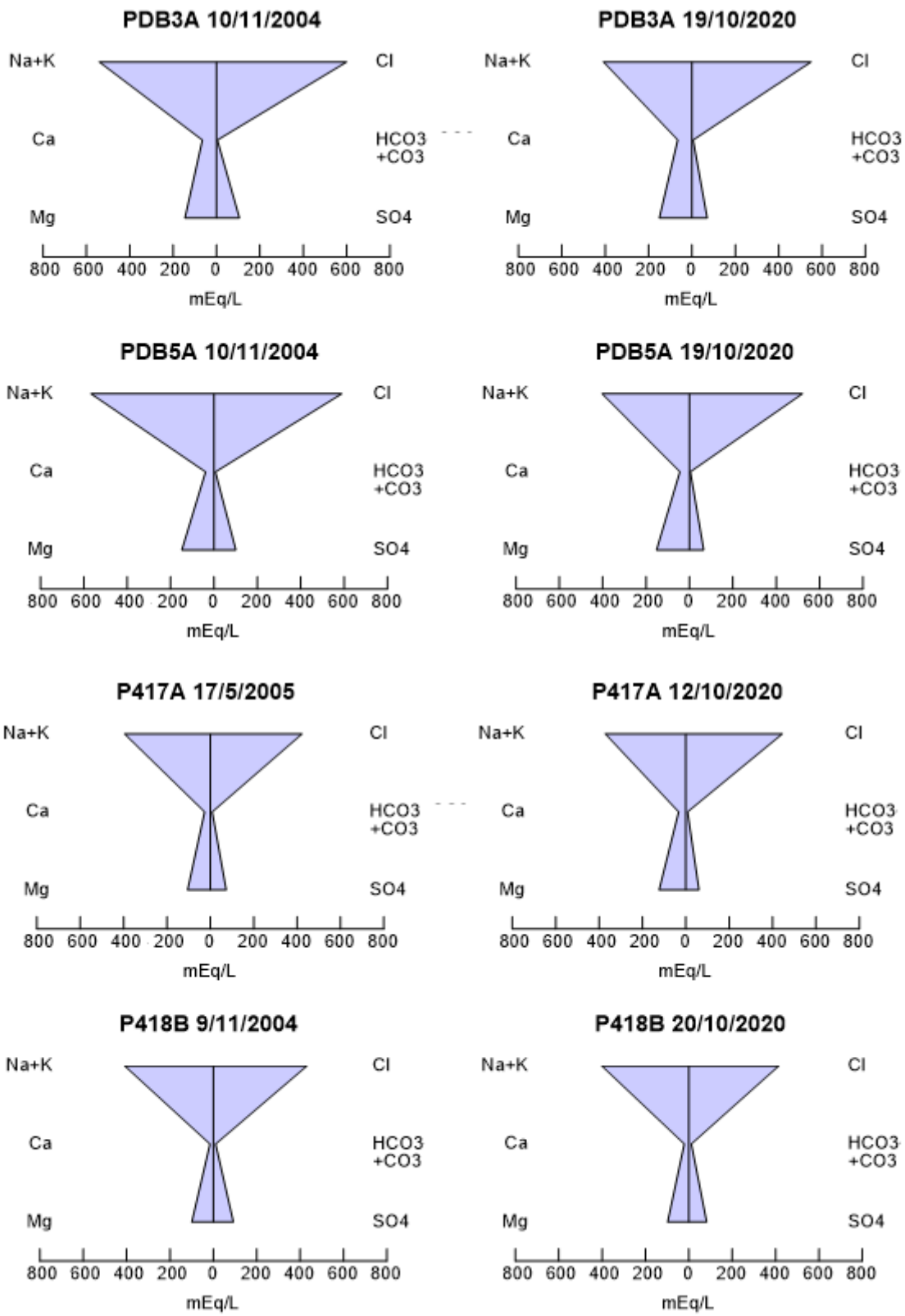
FIGURE 11a

Stiff Plots of Groundwater Chemistry (Bland Creek Palaeochannel Borefield and Processing Plant Area)

Evolution MINING Cowal

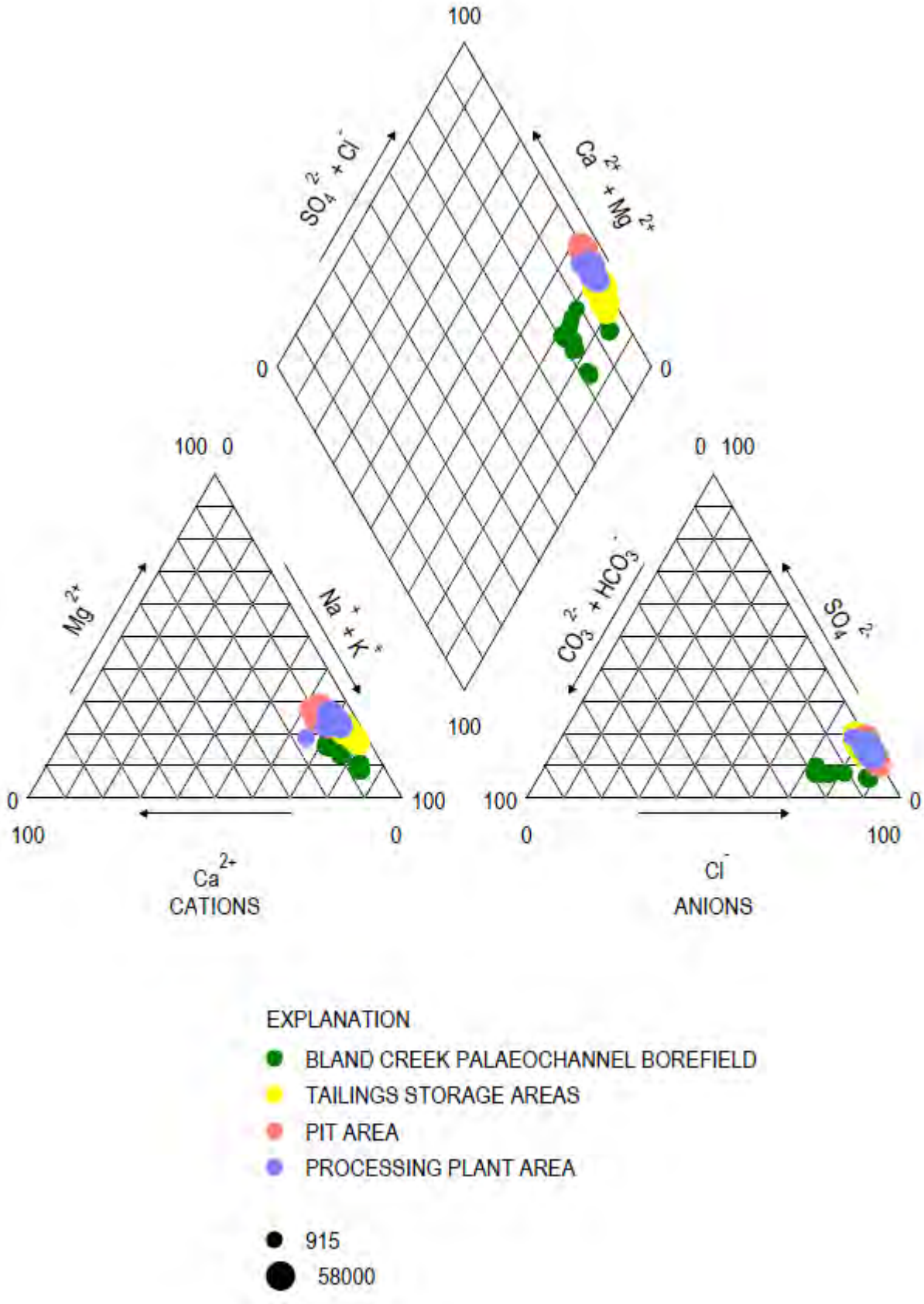


Source: Coffey Geotechnics Pty Ltd (2021)

FIGURE 11b

Stiff Plots of Groundwater Chemistry
(Pit Area and Tailings Storage Facility)

Evolution MINING Cowal

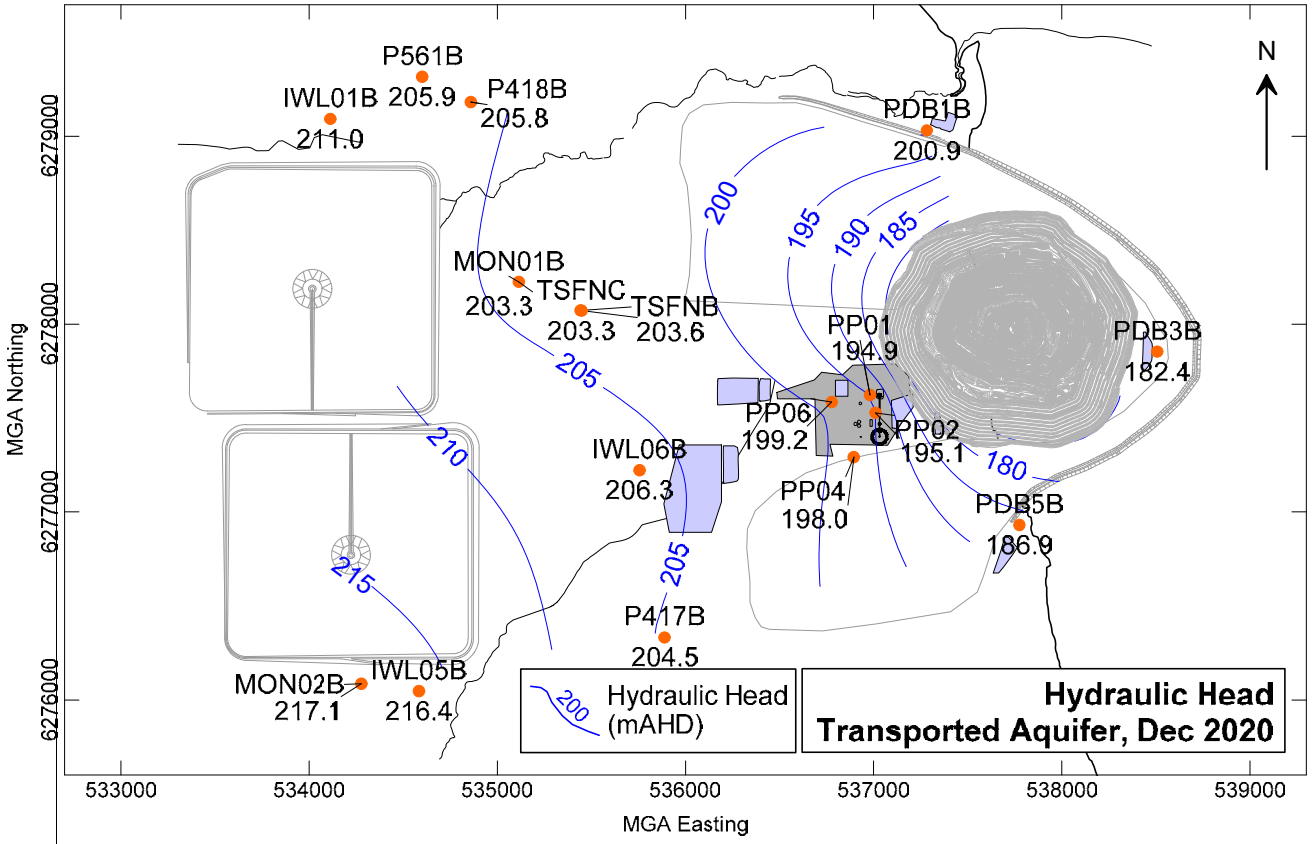


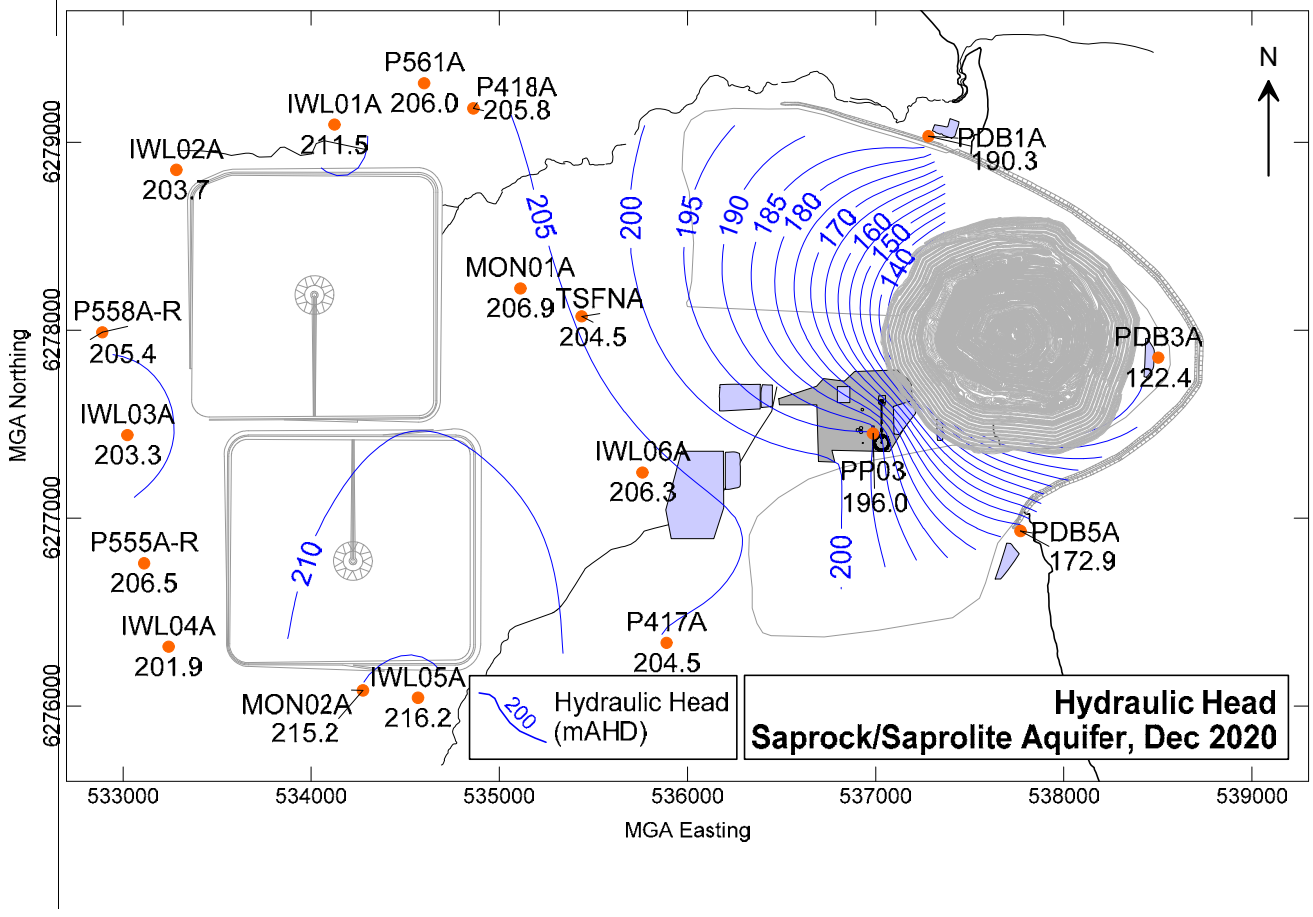
Source: Coffey Geotechnics Pty Ltd (2021)

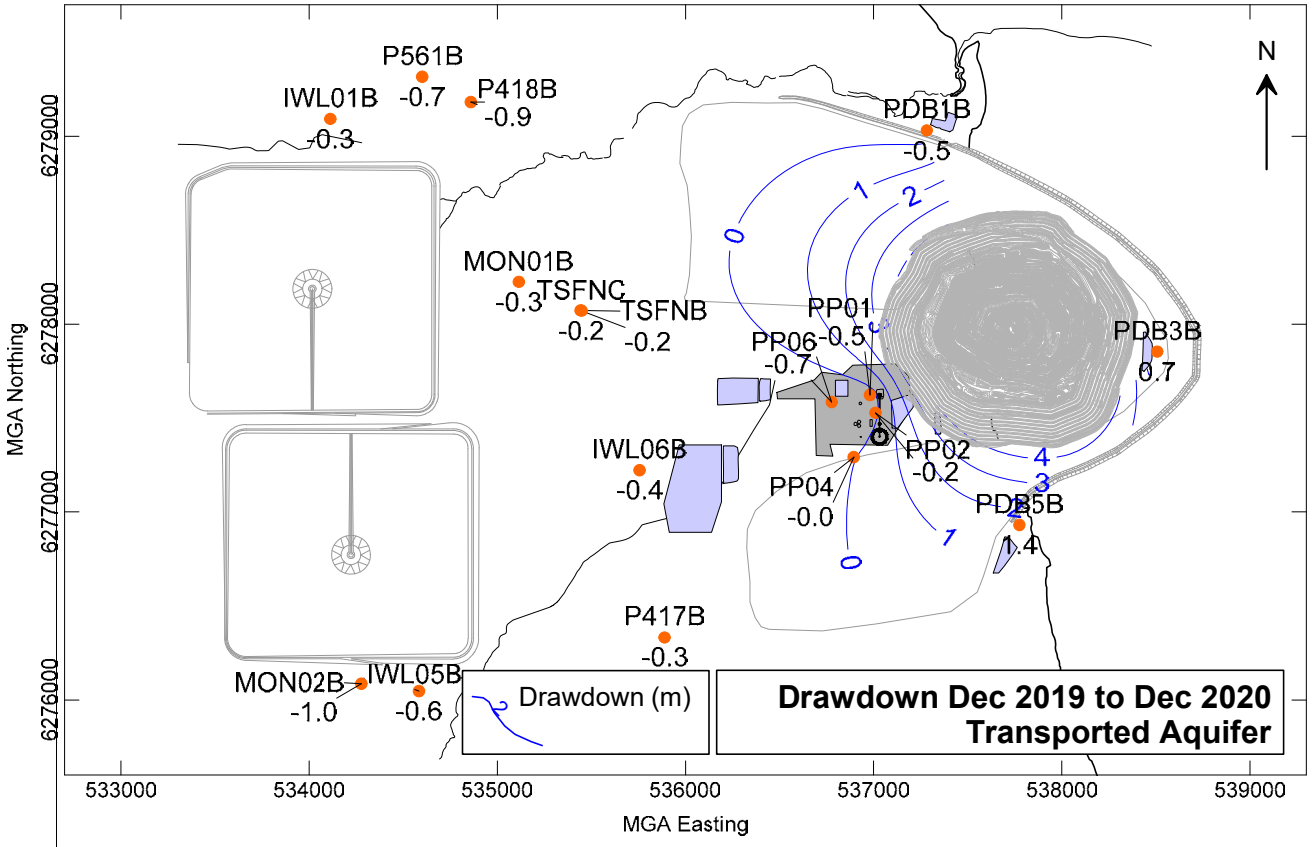
FIGURE 12

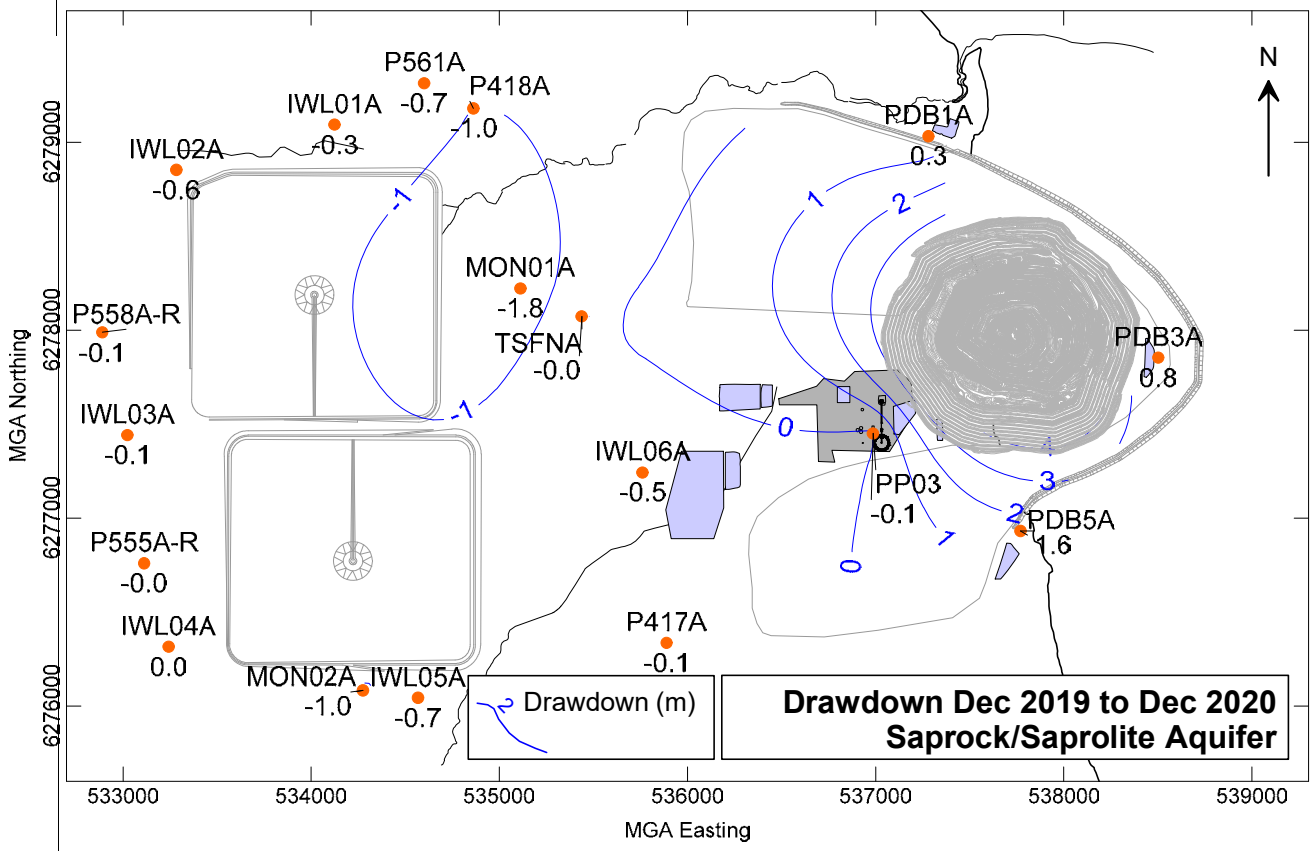
Piper Plot of Ground Chemistry

Evolution MINING Cowal


P561B
IWL01B 205.9
211.0
P418B
205.8
PDB1B
200.9
N
MON01B
203.3
TSFNC
203.3
TSFNB
203.6
PP01
194.9
PDB3B
182.4
PP06
199.2
PP02
195.1
IWL06B
206.3
PP04
198.0
PDB5B
186.9
P417B
204.5
MON02B
217.1
IWL05B
216.4
MGA Northing
MGA Easting
Hydraulic Head (mAHD)
Hydraulic Head
Transported Aquifer, Dec 2020


P561A
IWL01A 206.0
211.5
P418A
205.8
PDB1A
190.3
N
IWL02A
203.7
MON01A
206.9
TSFNA
204.5
P558A-R
205.4
PDB3A
122.4
IWL03A
203.3
IWL06A
206.3
PP03
196.0
P555A-R
206.5
PDB5A
172.9
IWL04A
201.9
P417A
204.5
MON02A
215.2
IWL05A
216.2
MGA Northing
MGA Easting
Hydraulic Head (mAHD)
Hydraulic Head
Saprock/Saprolite Aquifer, Dec 2020





Source: Coffey Geotechnics Pty Ltd (2021)

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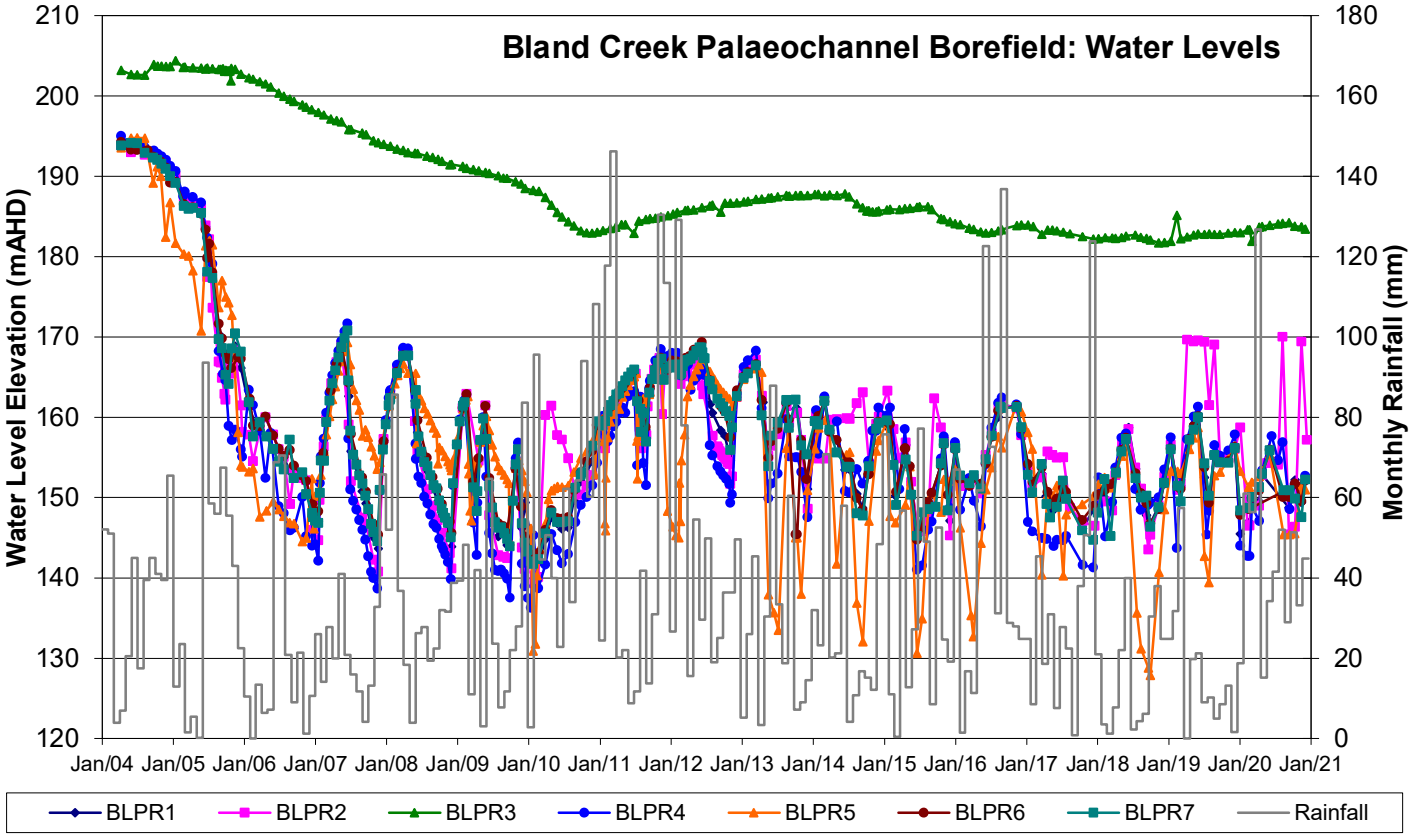
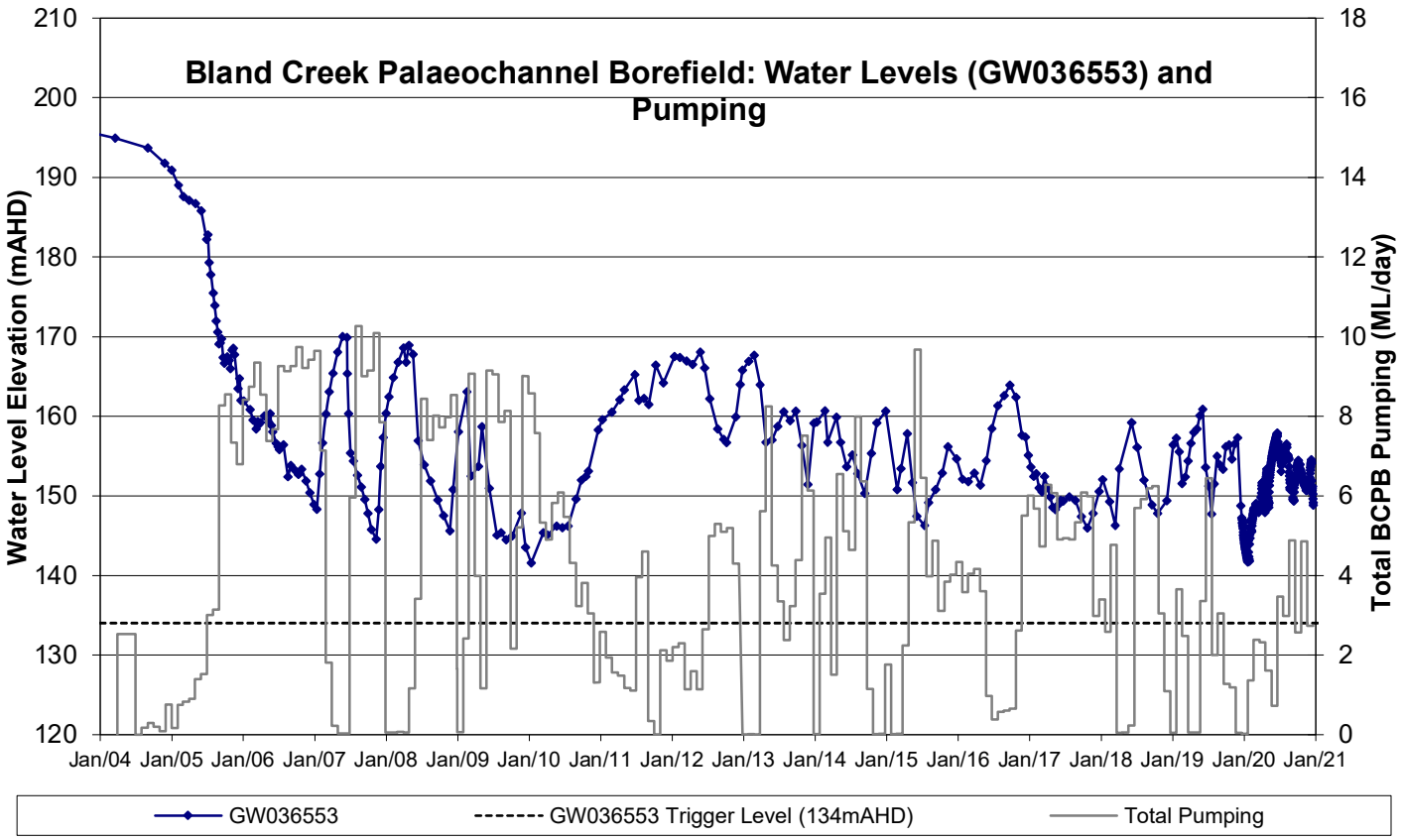
FIGURE 13b

Deep Groundwater Contours

Evolution MINING Cowal





Source: Coffey Geotechnics Pty Ltd (2021)

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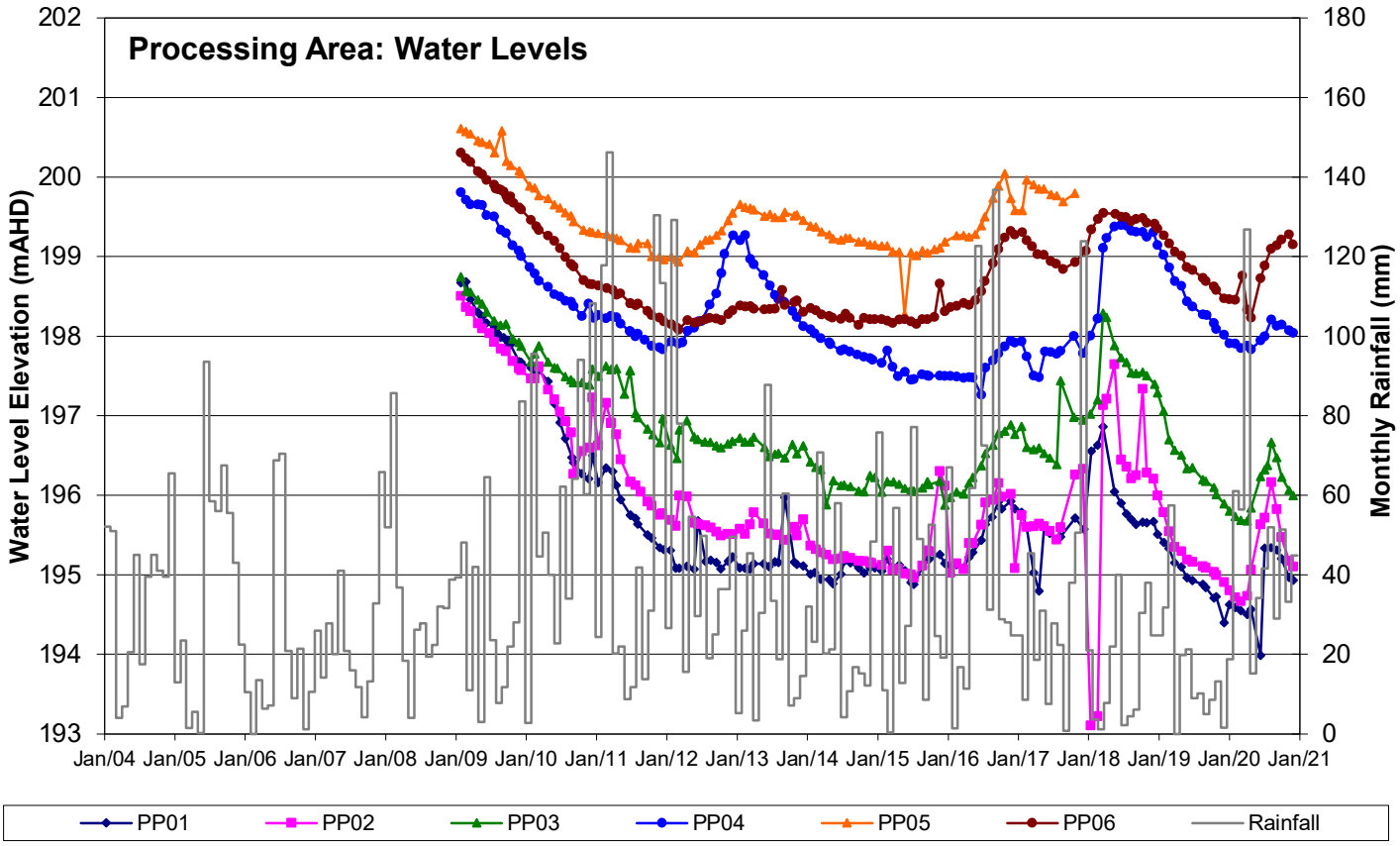
FIGURE 14a

Standing Water Levels Measured During the Reporting Period

Evolution MINING Cowal



Source: Coffey Geotechnics Pty Ltd (2021)

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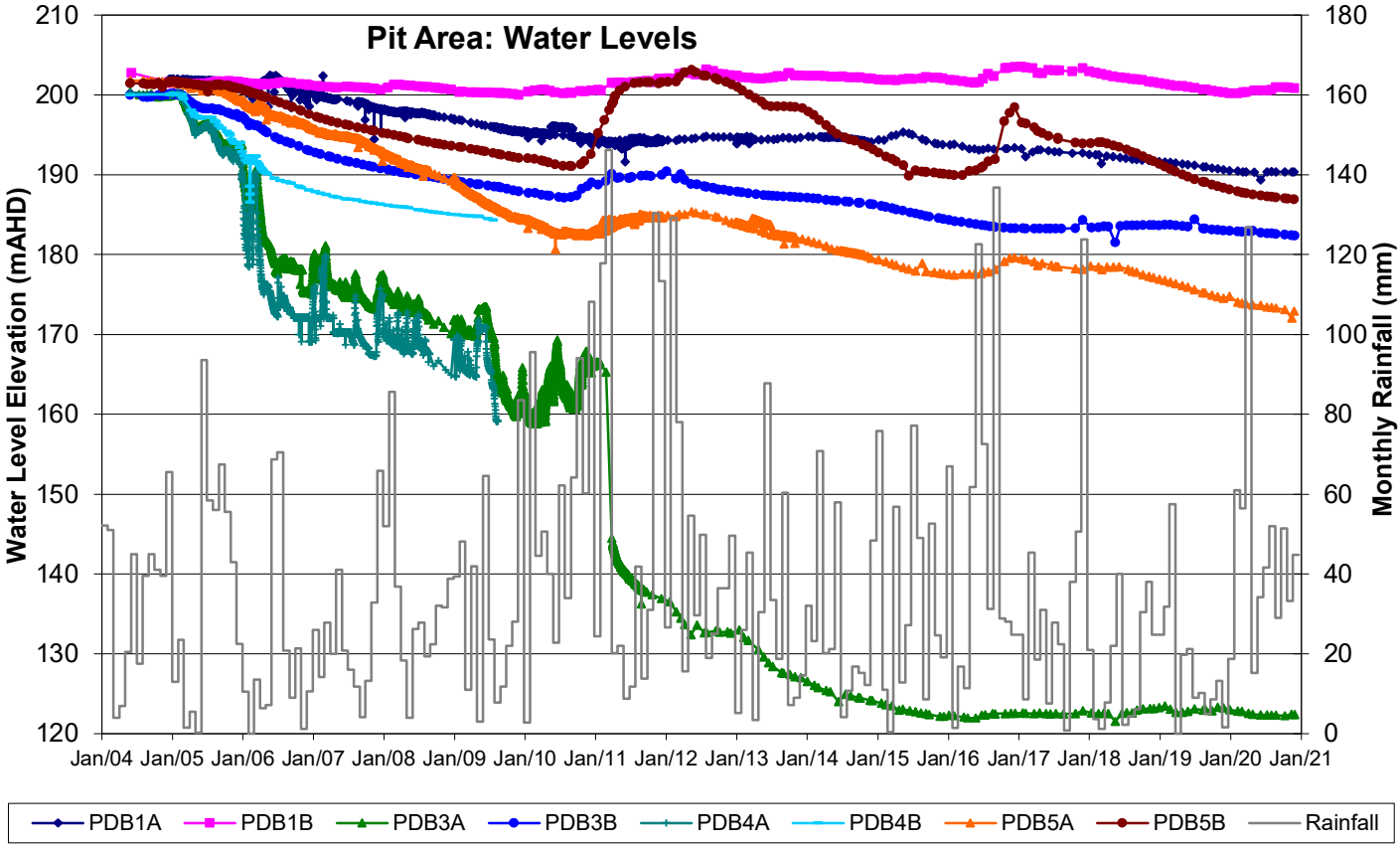
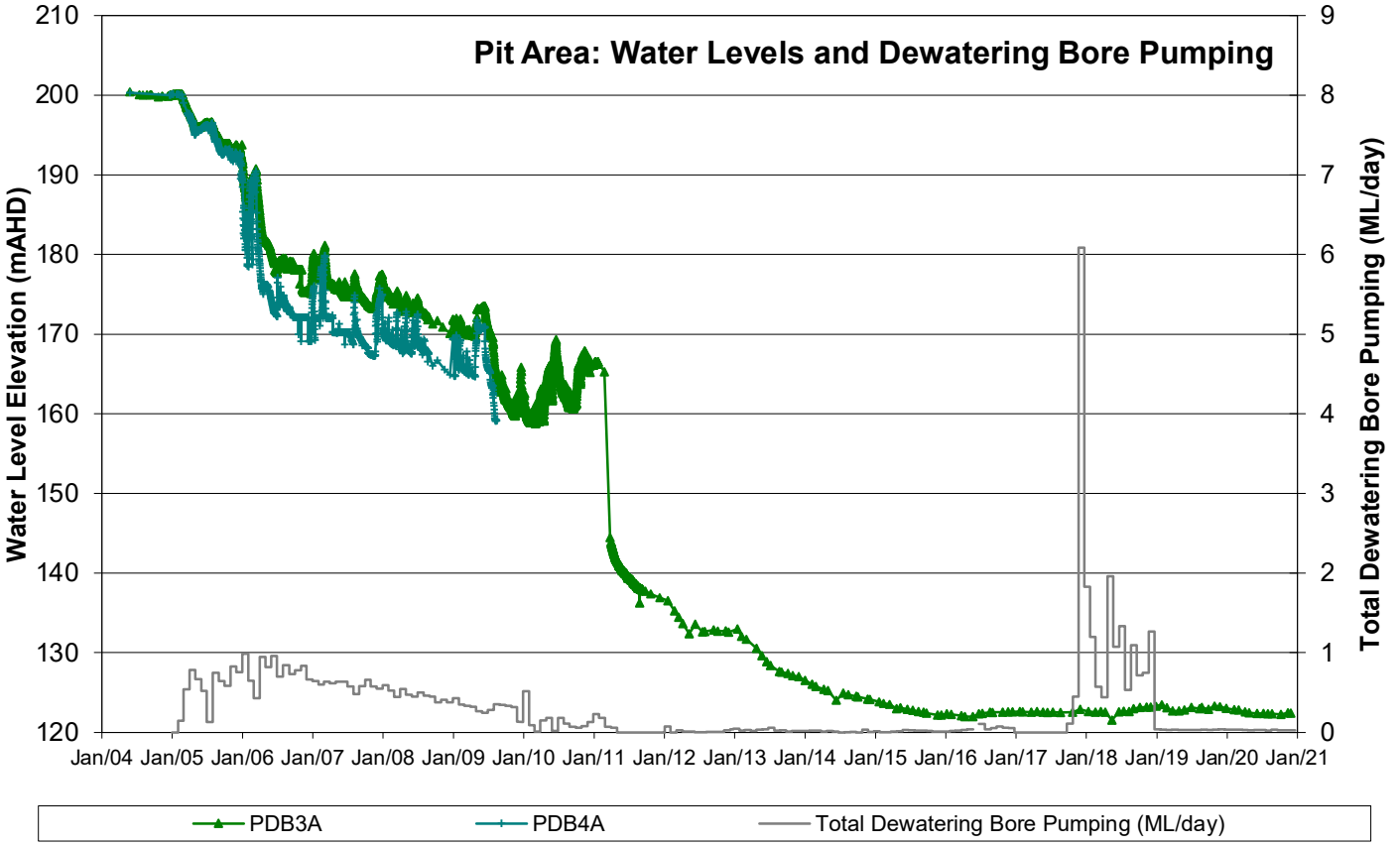
FIGURE 14b

Standing Water Levels Measured During the Reporting Period

Evolution MINING Cowal





Source: Coffey Geotechnics Pty Ltd (2021)

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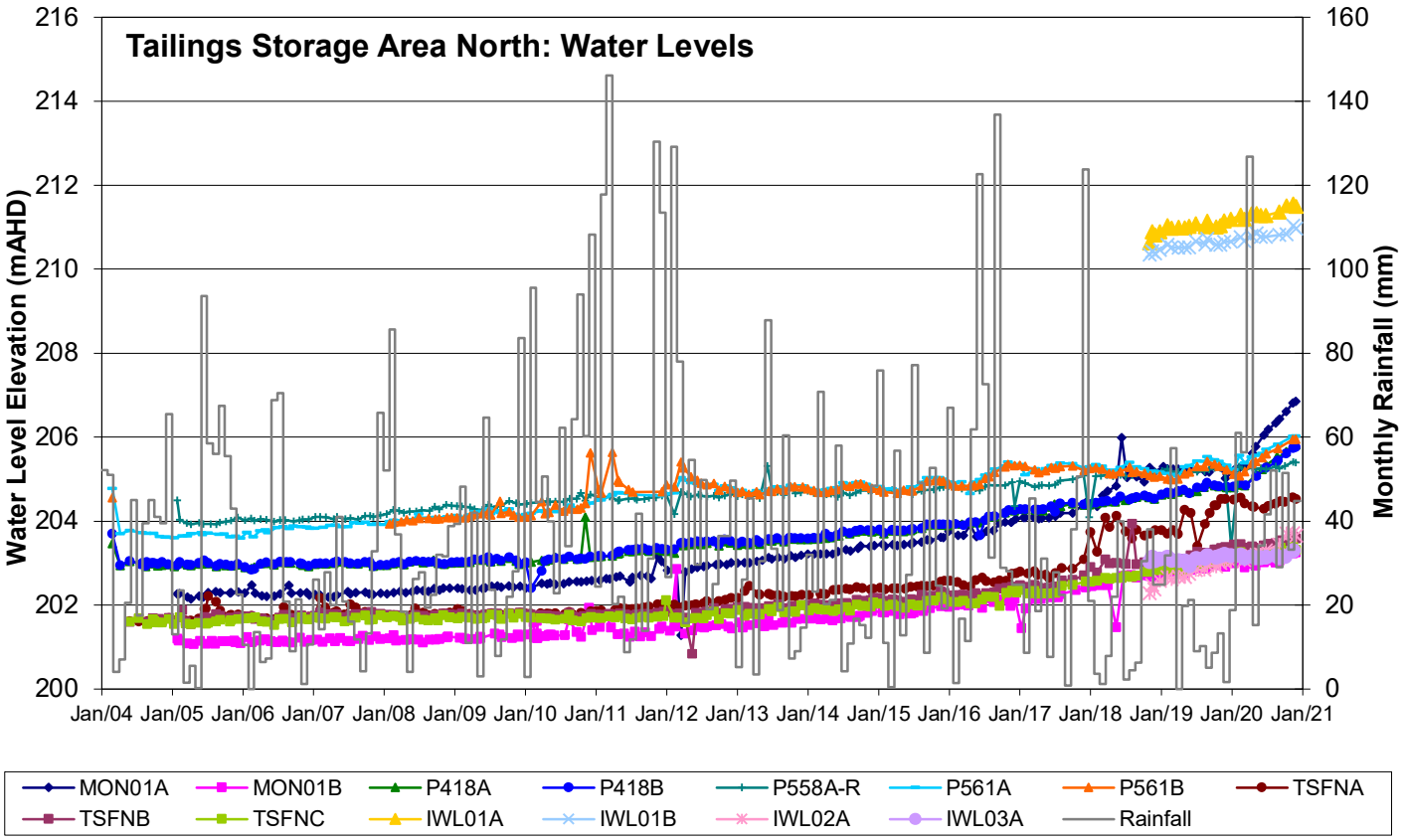
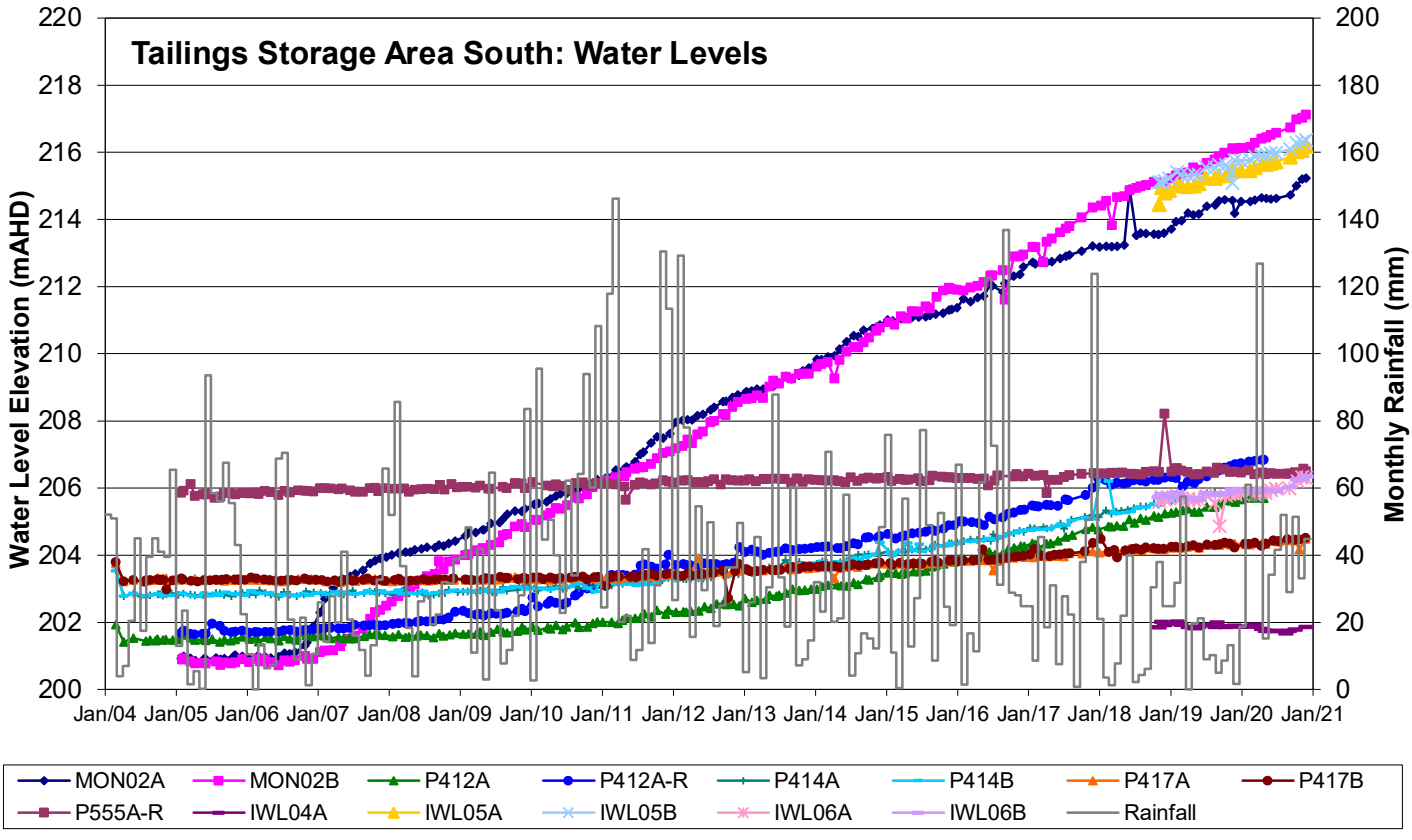
FIGURE 14c

Standing Water Levels Measured During the Reporting Period

Evolution MINING Cowal





Source: Coffey Geotechnics Pty Ltd (2021)

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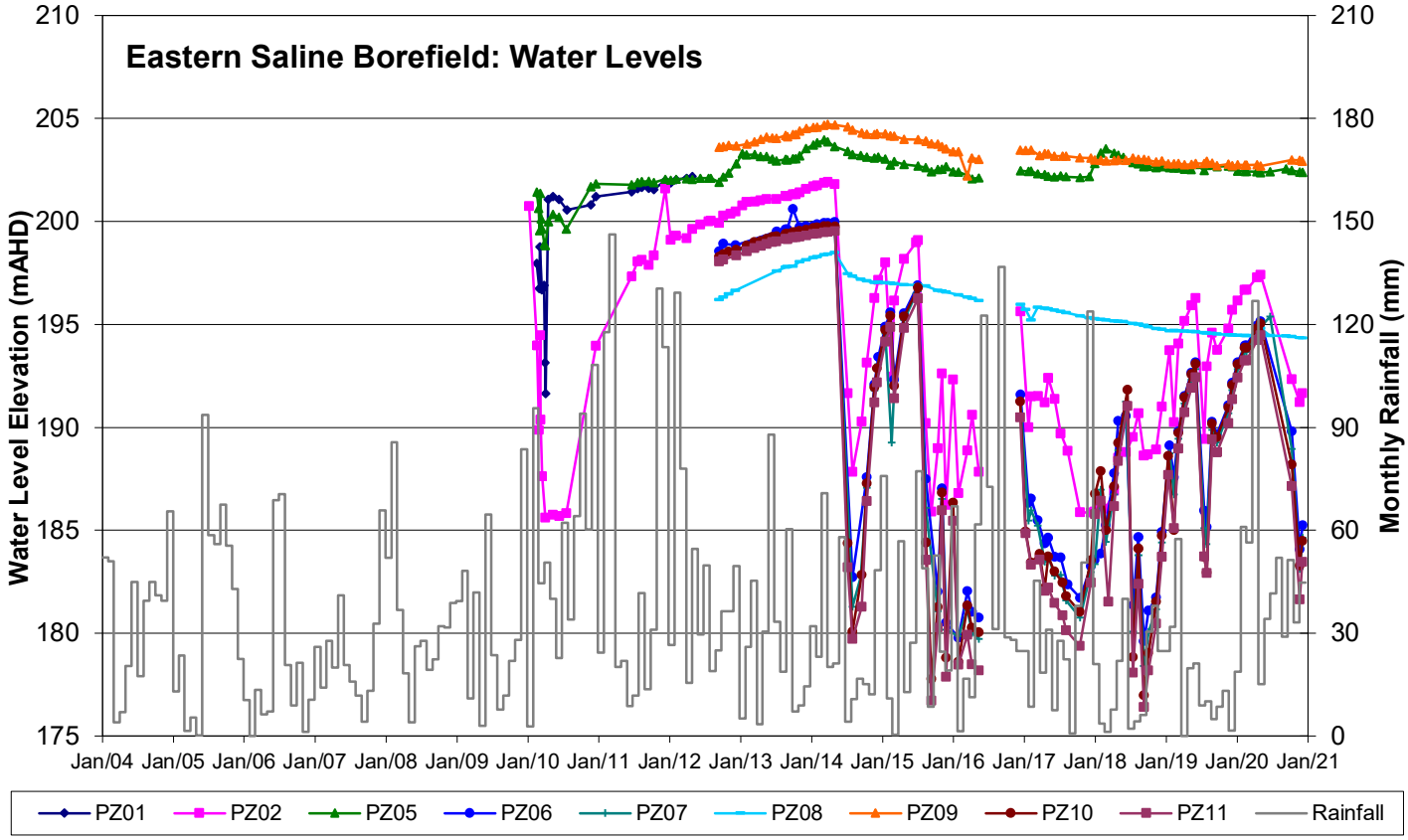
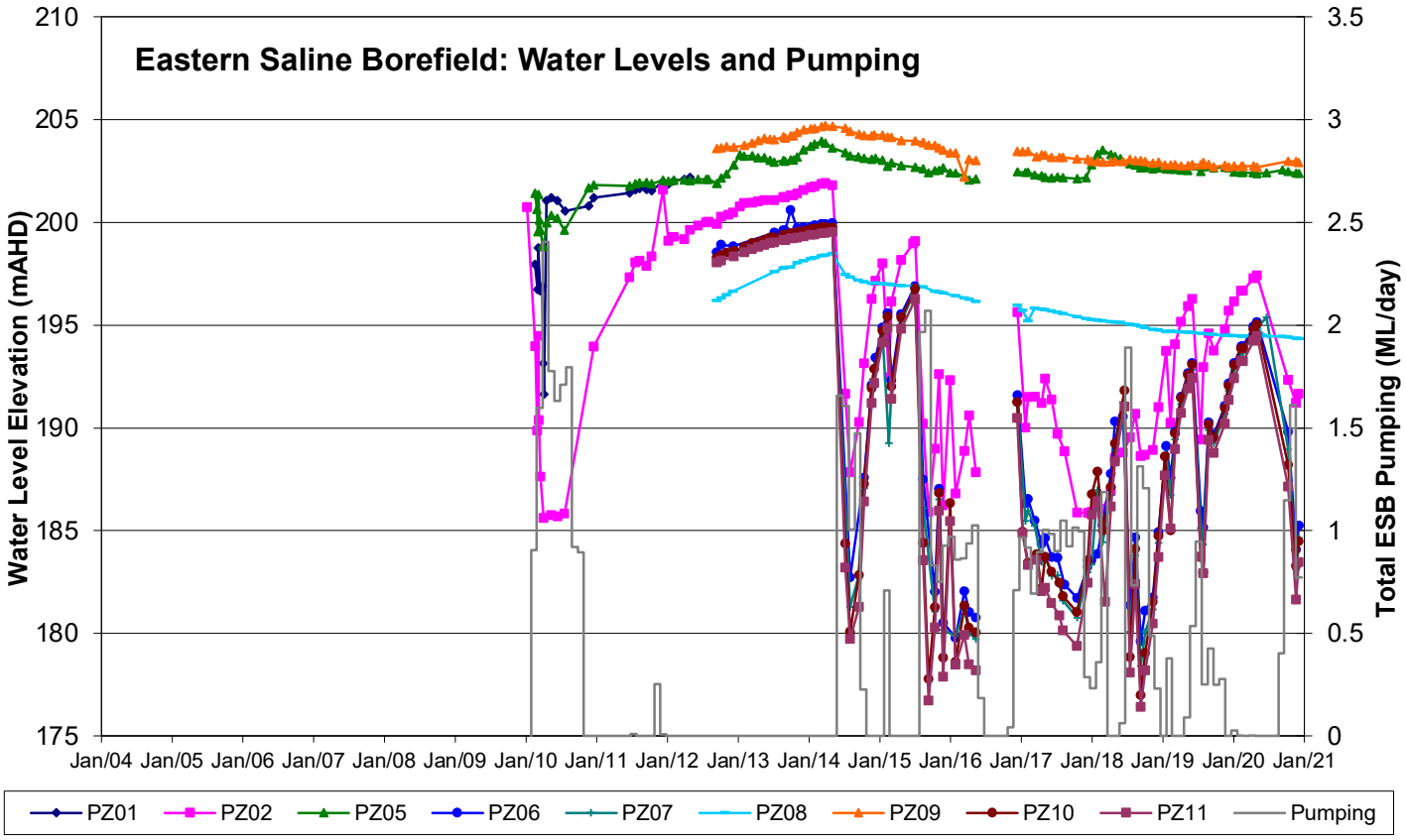
FIGURE 14d

Standing Water Levels Measured During the Reporting Period

Evolution MINING Cowal





Source: Coffey Geotechnics Pty Ltd (2021)

ANNUAL REVIEW 2020

FIGURE 14e

Standing Water Levels Measured During the Reporting Period

Evolution MINING Cowal

Trends in major ions have generally remained stable, though statistical analyses suggest slight increases in sodium concentrations for one of the seven Bland Creek Paleochannel bores (BLPR2) and one of the monitoring bores in the TSF area (P417B). In general, a broad trend of increasing sodium concentrations is seen between 2004 and 2010, beyond which sodium concentrations begin falling. This trend is stronger for the mine site than for the Bland Creek Paleochannel bore field, suggesting the cause may be related to severe drought conditions between 2004 and 2010. Groundwater with higher TDS, in high evaporation climates, is more prone to impact by drought conditions.

Mine site sulphate concentrations appear to show an inverse correlation with annual rainfall at Station 50017 (West Wyalong Airport), with increasing concentrations during sustained dry conditions. Sulphate concentrations reduced in 2010, when about double the annual rainfall fell, compared to average annual rainfall since 2000.
Fluctuations in pH, EC, sodium, sulphate and iron levels at the Bland Creek Paleochannel bore field at bore BLPR2 may be related to bore completion or localised ground conditions, as the trend is not reproduced in other monitoring bores.

Fluctuations in pH, EC, sodium, sulphate and bicarbonate levels at MON01B to the east of the northern TSF may reflect a response to increased rainfall recharge over this period.

Variations in metal concentrations are assessed to reflect the natural heterogeneity in ground conditions, rather than direct impacts from mining. Regional groundwater is in a metalliferous geological terrain in which iron and manganese naturally dominate the metal concentrations. Local fluctuations in manganese and iron concentrations were evident in the pit area and this may be related to ground disturbance and proximity to the pit.

There were no cyanide detections in the groundwater monitoring network from 2013 to 2018. During the 2019 reporting period total cyanide was detected above the DGV of 0.007 mg/L on 15 October 2019 at two bores east of the northern TSF, TSFNB (0.252 mg/L) and TSFNC (0.027 mg/L). These bores were resampled on 25 October 2019 and results were below the laboratory detection limit. During the 2020 reporting period there were no cyanide detections in the groundwater monitoring network.

Monitoring of cyanide concentrations across the mine site will be continued.

7.3.3 Reportable Incidents

There were no reportable incidents during the reporting period.

7.3.4 Further Improvements

No further improvements are proposed for the next reporting period.

8 REHABILITATION

Condition 2.4(c) of the Development Consent requires Evolution to prepare a Rehabilitation Management Plan (RMP). The RMP was revised to reflect Development consent as modified on 7 February 2017 and was approved by the DRG via the MOP approval on 1 April 2020.

CGO operated in accordance with the approved RMP. In accordance with Development Consent Condition 2.4(c)(vii), 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

The total active disturbance area for ML 1535 and ML (1791) was 1,668 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. 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 – 18ha rock armoured, topsoiled, gypsum spread and was direct seeded via aerial application during the reporting period.
- 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 – shaped oxide layer to design of approximately 6ha.
- Temporary Isolation Bund and Lake Protection Bund – road and weed maintenance; and

Table 25 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 repor**t.**

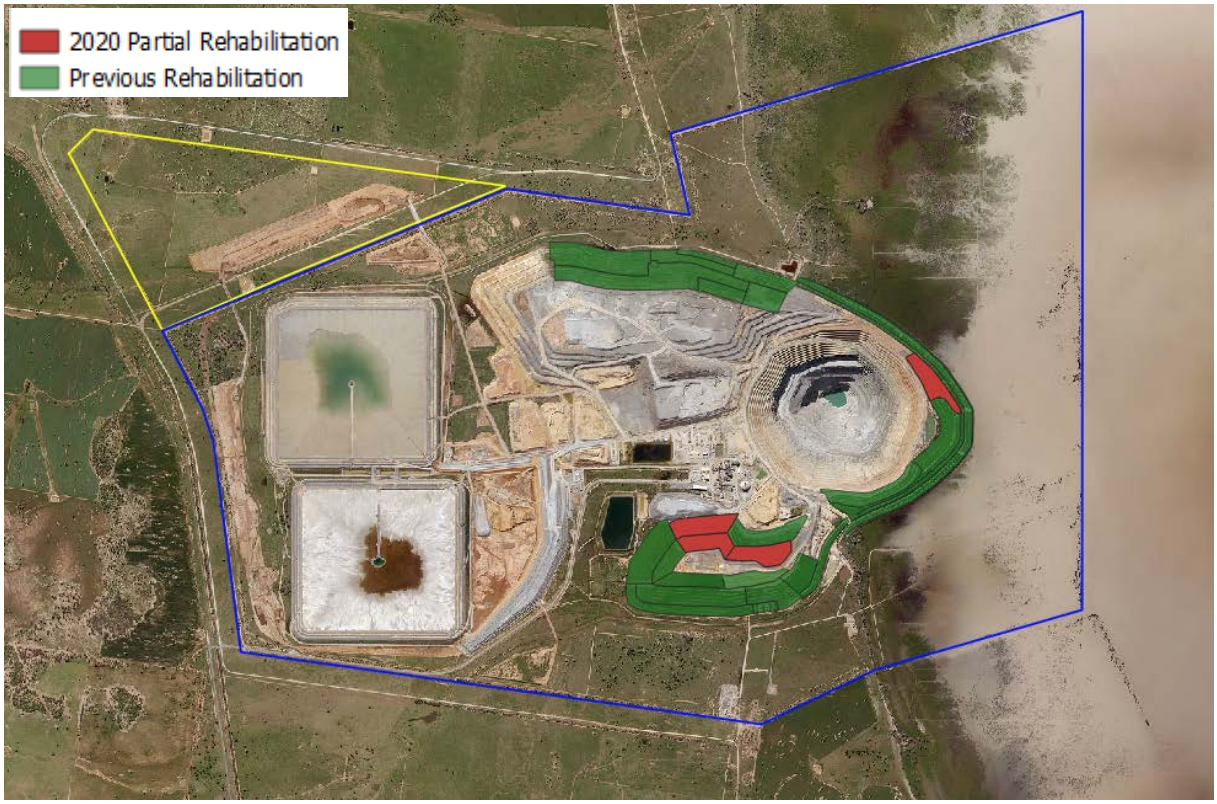
Table 25: Rehabilitation Summary

		Area Affected/Rehabilitated (hectares)		
		Previous Reporting Period (2019)	**Current Reporting Period (2020)**	**Next Reporting Period (estimated) (2021)**
A	Total Mine Footprint	1,668	1,668	1668
B	Total Active Disturbance	1,360	1,668	1668
C	Land being prepared for Rehabilitation	46	0	0
D	Land under active Rehabilitation	20	17.6	10
E	Completed Rehabilitation	0	0	0

During the next reporting period, rehabilitation activities at the CGO will continue in accordance with the approved MOP and RMP.

Table 26 provides details of the nature of disturbance and the rehabilitation status for areas that have been disturbed up to and including the reporting period. Plate 3 shows the areas rehabilitated during the reporting period.

Plate 3: Conceptual View of Rehabilitated Areas During the 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.

No major building renovations or removal occurred during the reporting period; however, some smaller minor construction works were undertaken including additional demountable structures and storage shipping containers.

Table 26: 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	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	24	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	32	Not yet rehabilitated
• 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	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	32	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	40	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	48	Not yet rehabilitated
• Upstream lift	N/A	N/A	✓	Complete	56	Not yet rehabilitated
IWL						
• Stage 1	✓	✓	✓	Commenced		Not yet rehabilitated
• Stage 2	✓	✓	✓	Commenced		Not yet rehabilitated
• Stage 3	✓			Not Commenced		Not yet rehabilitated

Open Pit	✓	✓	✓	Commenced	120	Not yet rehabilitated
PWE	✓	✓	✓	Commenced	60	All sections shaped and covered
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	45	Some sections shaped and covered
Ore Stockpiles	✓	✓	✓	Commenced	74	Not yet rehabilitated
Tailings service corridor	✓	✓	✓	Complete	5	Not yet rehabilitated

Table 26 (Continued): 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*		
Soil stockpiles	✓	✓	✓	Commenced	91	Not yet rehabilitated
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	Not yet rehabilitated
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
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
Internal catchment drainage system (permanent catchment divide)	✓	✓	✓	Complete	2	Rehabilitated and under maintenance
BCPC water supply pipeline	✓	✓	✓	Complete	2	Not yet rehabilitated

Table 26 (Continued): 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*		
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.

The following text provides detail of the rehabilitation of each key final landform at the CGO that was undertaken during the reporting period.

Annual rehabilitation (and visual) monitoring of revegetated landforms is conducted to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the 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, the RMP and the MOP.

Perimeter Waste Emplacement

The PWRE has been constructed to approximately 223 m RL and surrounds the pit to the north, east and south (Figure 3). 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) between the open pit and Lake Cowal. The emplacement elevation has been designed to reduce potential noise and light impacts of mining and processing on the surrounding environment and sensitive receptors.

Approximately 6ha of the inner and outer perimeter wall was reshaped and rock armour was positioned ready for shaping in the reporting period.

Plate 4: South Eastern Side of Perimeter Waste Rock Emplacement (September 2020)

Northern Waste Rock Emplacement – Outer Batters

The NWRE is approved to be constructed to approximately 308 m AHD and will occupy an area of approximately 269 ha northwest of the pit (Plate 5).

No additional rehabilitation was conducted on the NWRE during the reporting period.

Approximately 47.9ha of the entire NWRE was re ripped and direct seeded with native species in the previous reporting periods and was monitored during this reporting period.

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

Plate 5: North Side of Northern Waste Rock Emplacement (September 2020)

Southern Waste Rock Emplacement – Outer Batters

Area of approximately 18ha on the SWRE batters were rock armoured, topsoiled, gypsum spread and were direct seeded via aerial application during the reporting period.

Plate 6: West End of Southern Waste Rock Emplacement (May 2019)

Northern and Southern Tailings Storage Facility – Starter Embankments and Lifts

No rehabilitation occurred on the NTSF and the STSF during the reporting period due to the requirement for buttressing on subsequent lifts in future years (i.e. active landforms) and due to construction of the IWL. The outer face of the lift was constructed with primary waste rock and therefore will be protected from erosion.

The long-term rehabilitation objectives for the tailing's storage facilities include the re-establishment of woodland communities and will commence following the cessation of tailings deposition.

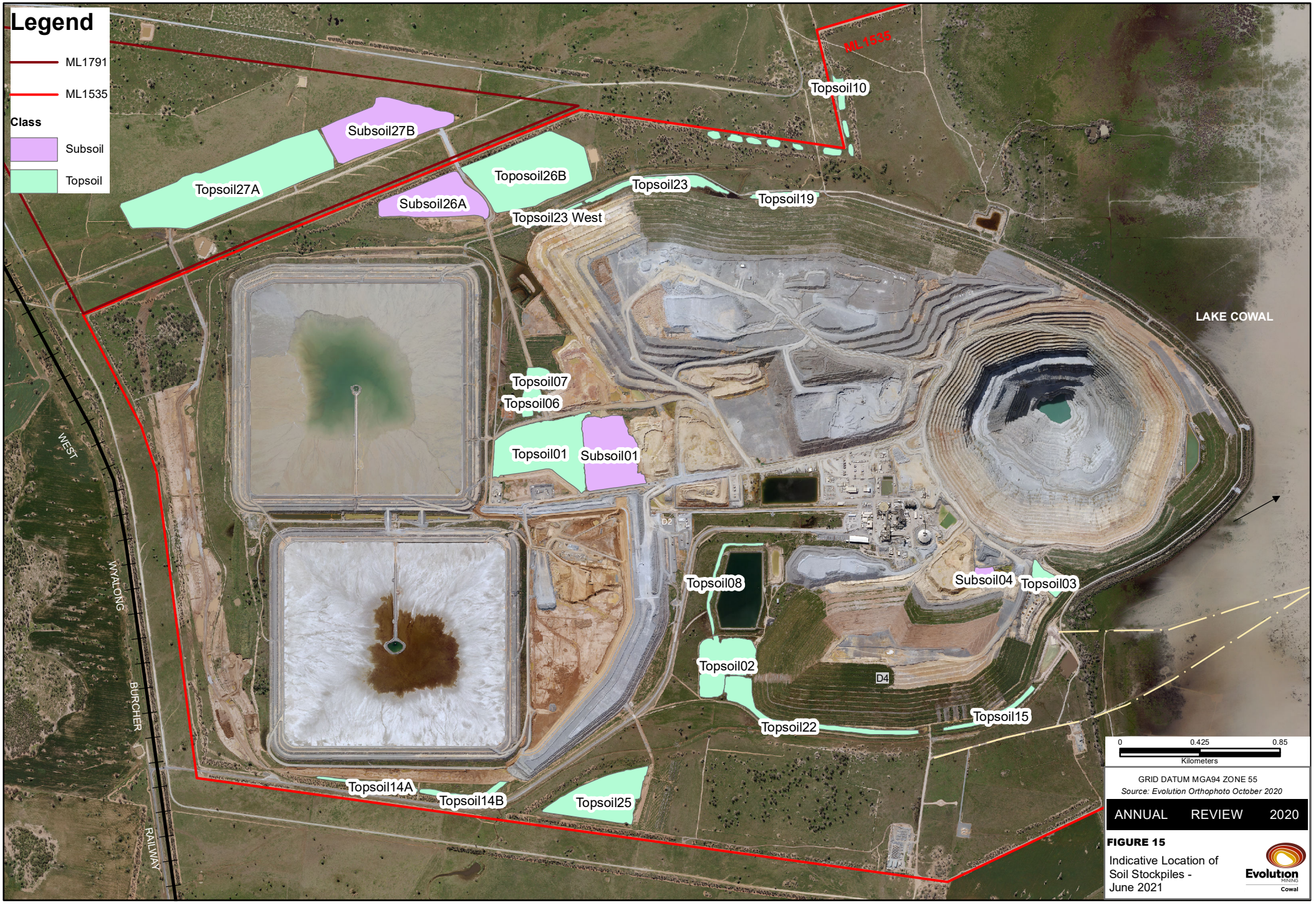
Any emergent deeper-rooted species that germinate in the walls of the TSF structures continued to be poisoned by stump paste with glyphosate. As per ongoing TSF fauna protection practices, no trees shall be encouraged to grow until after the final capping is completed on the TSFs.

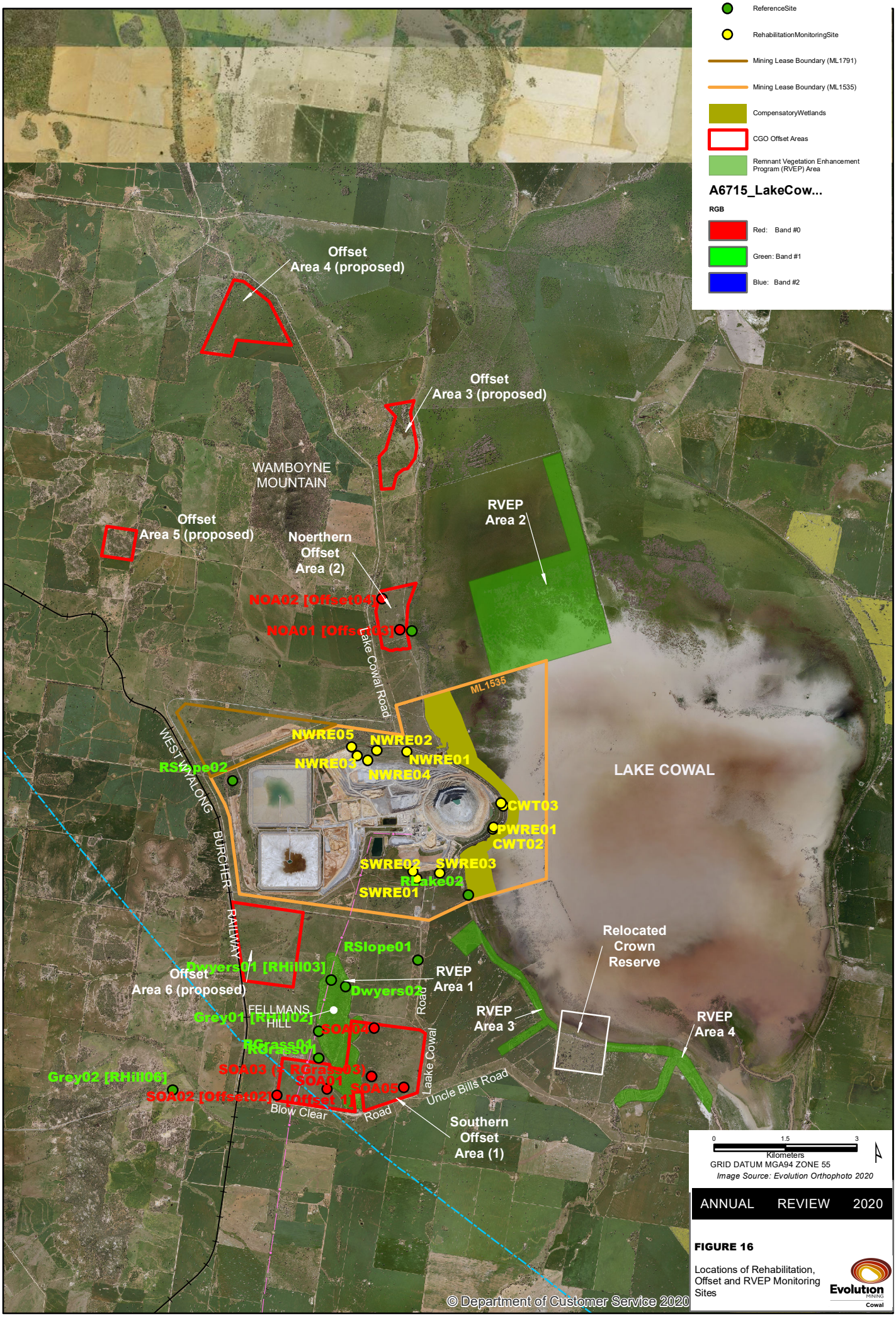
Boundary Amenity Plantings

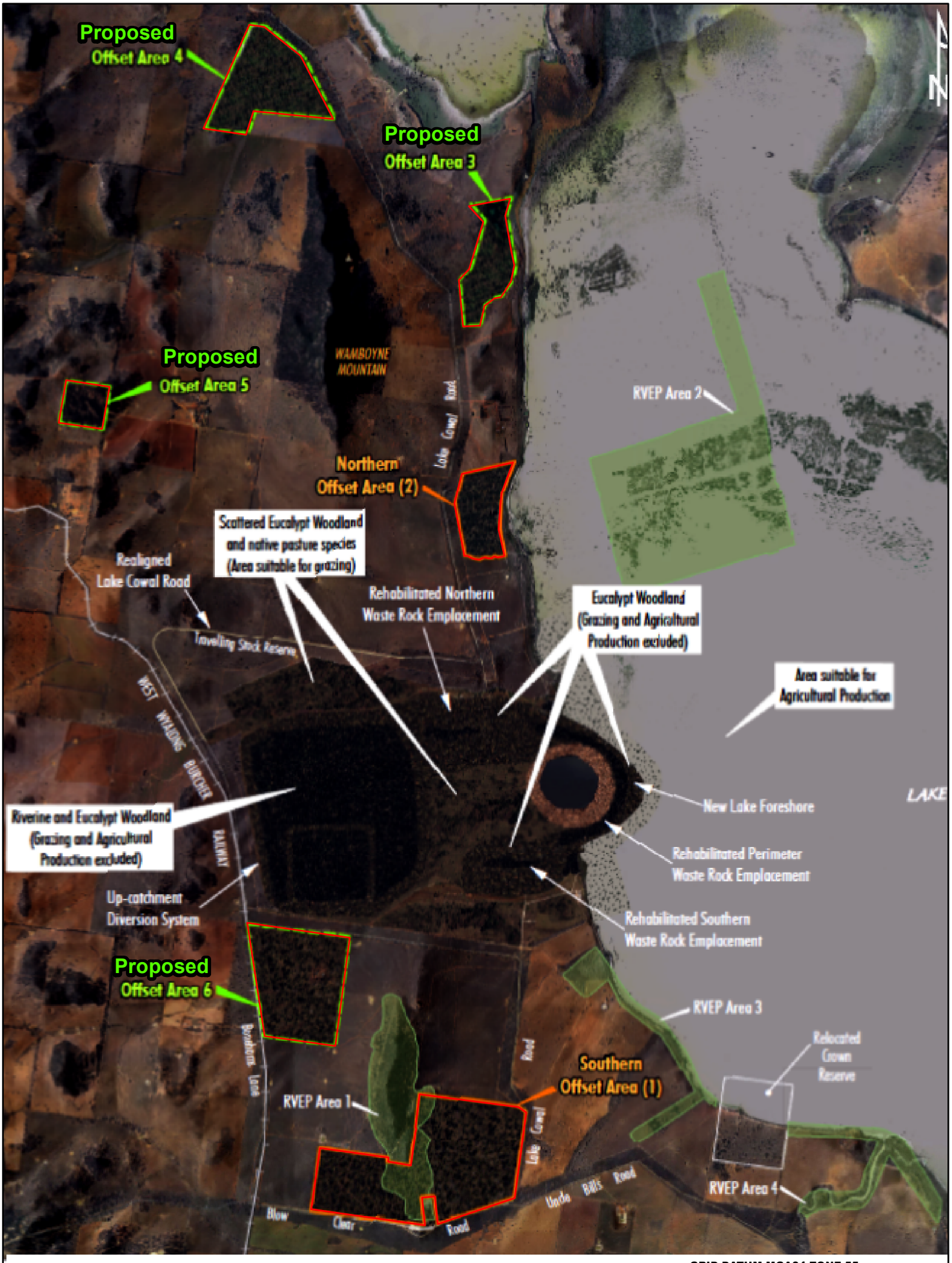
Inspections of the vegetation screening surrounding the CGO identified that no additional tube stock was required to be planted during the reporting period.

8.2 REHABILITATION MONITORING RESULTS

Monitoring within the active rehabilitation areas was undertaken by DnA Environmental (2020) 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. Final landforms and final land use areas are presented on Figure 17.


Legend
ML1791
ML1535
Class
Subsoil
Topsoil
ML1535
Topsoil10
Subsoil27B
Topsoil27A
Subsoil26A
Toposoil26B
Topsoil23
Topsoil19
Topsoil23 West
LAKE COWAL
Topsoil07
Topsoil06
Topsoil01
Subsoil01
WEST
WYALONG
BURCHER
RAILWAY
D2
Topsoil08
Subsoil04
Topsoil03
Topsoil02
D4
Topsoil22
Topsoil15
Topsoil14A
Topsoil14B
Topsoil25
0
0.425
0.85
Kilometers
GRID DATUM MGA94 ZONE 55
Source: Evolution Orthophoto October 2020
ANNUAL REVIEW 2020
FIGURE 15
Indicative Location of Soil Stockpiles - June 2021
Evolution MINING Cowal


OffsetandRVEPAreaMonitoringSite
ReferenceSite
RehabilitationMonitoringSite
Mining Lease Boundary (ML1791)
Mining Lease Boundary (ML1535)
CompensatoryWetlands
CGO Offset Areas
Remnant Vegetation Enhancement Program (RVEP) Area
A6715_LakeCow...
RGB
Red: Band #0
Green: Band #1
Blue: Band #2
Offset Area 4 (proposed)
Offset Area 3 (proposed)
WAMBOYNE MOUNTAIN
Offset Area 5 (proposed)
Noerthern Offset Area (2)
RVEP Area 2
NOA02 [Offset04]
NOA01 [Offset03]
Laake Cowal Road
ML1535
NWRE05
NWRE02
NWRE03
NWRE01
NWRE04
RSlope02
LAKE COWAL
CWT03
PWRE01
CWT02
SWRE02
SWRE03
RLake02
SWRE01
WEST WALONG
BURCHER
RAILWAY
RSlope01
Dwyers01 [RHill03]
Offset Area 6 (proposed)
RVEP Area 1
Dwyers02
Relocated Crown Reserve
FELLMANS HILL
Grey01 [RHill02]
SOA04
RGrass01
RVEP Area 3
RVEP Area 4
Laake Cowal Road
Uncle Bills Road
Grey02 [RHill06]
SOA03 (RGrass03)
SOA01
SOA05
SOA02 [Offset02]
Offset 1
Blow Clear Road
Southern Offset Area (1)
0 1.5 3
Kilometers
GRID DATUM MGA94 ZONE 55
Image Source: Evolution Orthophoto 2020
ANNUAL REVIEW 2020
FIGURE 16
Locations of Rehabilitation, Offset and RVEP Monitoring Sites
Evolution MINING Cowal
© Department of Customer Service 2020



GRID DATUM MGA94 ZONE 55

Source: Evolution Orthophoto October 2017

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FIGURE 17

Conceptual Final Landform and Proposed Final Land Use Areas

Evolution MINING Cowal

8.2.1 Waste Rock Emplacement Monitoring Results

The older NWRE rehabilitation sites have undergone significant transformation over the past few years, largely due to the voluntary establishment of *Lolium rigidum* (Wimmera Ryegrass) and on the SWRE, *Avena fatua* (Wild Oats). Due to the increase in protective litter cover and slight to moderate levels of litter decomposition there has been a decrease in surface crusting, increased soil coherency and there was less evidence of resources being mobilised across the sites. In 2018, many of the older sites on the NWRE, PWRE and SWRE01 had been re-ripped and seeded, exposing bare soil and scattered rocks and subsequently reducing the patch area and LOI in these sites.

Over the past few years, there has tended to be a decline in ecological function in most monitoring sites due to the prolonged dry conditions combined with heavy grazing and disturbance by macropods. The effects of grazing and disturbance were more apparent on most sites on the NWRE as they tended to have increased grass cover and shade especially in the older sites which were close to the NWRE trials, and in this area, there was much less mining activity thus being more attractive to resident macropod populations. This year the improved seasonal conditions resulted in an increase in ground covers and subsequently all monitoring sites had improved ecological function, with all sites except NWRE04 and NWRE05 having a total ecological function greater than the Grey Box woodland reference site, Grey02.

While measurements of the tree and mature shrub populations were not undertaken this year, no trees or mature shrubs (>5cm dbh) were recorded in any WRE rehabilitation areas in 2019. In 2019 and into 2020, the drought had continued to affect the health of the mature tree populations in the reference sites and there was high mortality of shrubs and juvenile trees (<5cm dbh) especially in Dwyers02. By the end of May 2020, 90.8% of NSW was still classified as drought affected by the Department of Primary Industries even after receiving higher than average rainfall for the preceding two months. On the rehabilitation areas, a small number of seedlings continue to be recorded in NWRE02 and NWRE03 with 22 and 11 seedlings, while one or two were recorded in SWRE03 and SWRE04 this year. Compared to the hill woodland reference sites there continues to be a low density of trees and/or juvenile shrubs on the WRE rehabilitation areas except in NWRE02 and NWRE03.

Rehabilitation sites on the WRE were dominated by dead leaf litter which provided up to 80% cover and there were increased levels of annual plants in most sites with up to 29% cover being recorded this year. Scattered rocks were common in most sites and there were increased levels of perennial plants in most sites, with up to 45% recorded in PWRE01 this year. All rehabilitation sites except NWRE03, SWRE01 and SWRE03 had perennial ground cover levels which were comparable to the reference sites, however these levels continued to be particularly low in the remnant Dwyer's Red Gum woodlands this year.

Floristic diversity has typically fluctuated with changes in seasonal conditions and this year all sites had a higher diversity of species than was previously recorded due to the improved rainfall conditions. No total floristic diversity assessments in the 20 x 50m quadrats were undertaken this year, however there was a significant increase in the diversity of native plant species along the transects and all reference sites had the highest diversity of species since monitoring began. On average native species were more common per m^2 than exotic species in all rehabilitation monitoring sites and all rehabilitation sites except NWRE02, SWRE02 and SWRE04 had an acceptable diversity of exotic species compared to the reference sites.

Native plants provided 53 – 87% cover in the rehabilitation areas, however sites NWRE02, SWRE02, SWRE03 and SWRE04 had a higher percentage cover of exotic species than the reference sites and were weedier than desired.

Few species provided sufficient levels of live ground cover to meet the minimum criteria (i.e. >8/30) in several monitoring sites, including NWRE04, SWRE01, SWRE03 and the woodland reference site Grey01. This year *Einadia nutans* subsp*. nutans* (Climbing Saltbush) had significantly increased in abundance in both sites on the PWRE and in SWRE02. While the most abundant species varied across the rehabilitation areas, native species such as *Chloris truncata* (Windmill Grass), *Euphorbia drummondii* (Caustic Weed), *Convolvulus erubescens* (Australian Bindweed), *Enchylaena tomentosa* (Ruby Saltbush) and *Walwhalleya proluta* (Rigid Panic) were often relatively abundant. In one of the Grey Box reference sites, *Enchylaena tomentosa* was the most abundant species, while in the Dwyer's Red Gum woodland abundant species were *Gonocarpus tetragynus* (Raspwort) and *Einadia hastata* (Berry Saltbush).

One deep but apparently stable rill was recorded at NWRE02 and PWRE02 and should continue to be monitored. At SWRE02, a relatively new area of rehabilitation, there were previous many rills exceeding the minimum for

concern recorded. While the number and extent of rills has declined this year, much of the wider rehabilitation area was also noted to have minor to major rills which may require amelioration.

The soils in the rehabilitation sites are moderately to strongly alkaline, low in organic matter and while ESP has been slowly declining in some sites, they continued to exceed the sodic thresholds and there was a significant and increasing trend in NWRE05 with the soils now classed as highly sodic.

In the older rehabilitation sites, Sulfur (S) concentrations appear to have been variable but typically S concentrations have been demonstrating a declining trend and are now significantly lower than when they were first measured in 2014. NWRE05 and PWRE01 showed an increase in S concentrations this year. High levels of S can result in a depression of pH. This is not evident on site as the pH ranges from a low of 8.1 to a high or 8.8. S levels in the soil should continue in a decreasing trend as vegetative layers continue establish and further develop. S is a common treatment to lower the pH of soils as the optimum pH for plant growth is between 6.0 to 7.0 which provides the best chemical environment for plants. Monitoring of soil pH and S concentrations should continue.

In 2020 there continued to be elevated levels of iron in all four of the hill woodland reference sites, suggesting that Iron occurs naturally at elevated levels around Lake Cowal.

8.2.2 Rehabilitation Trial Monitoring Results

Due to the various issues associated with the implementation of the rehabilitation trial and difficulties in the timing and applying uniformity to the experimental design, there was high variability within and across the experimental treatments, therefore all results should be treated with caution.

Most trial treatments have been demonstrating positive ecological succession, with significant improvements in function, ground cover and structure being recorded during the first few years. Since 2018 however, ecological function has declined in all trial treatments as a result of the drought and this was also recorded in the local woodland reference sites. The dry conditions combined with increased grazing and disturbance by macropods has resulted in the loss of perennial ground covers and a deterioration of the litter layers, across most trial treatment sites. Sites that had a higher level of grass cover and higher levels of shade provided by the establishing trees tended to have a higher levels of animal disturbance.

The Dwyer's Gum woodland reference sites were the most ecologically functional sites in 2019 with total scores of 157 and 143. These were followed by 14-300Straw and 200Nil rehabilitation treatments with a total of 138 and 131 respectively. Despite the decline in ecological function at all sites this year, there was no topsoil depth or mulching type that consistently outperformed any other, but mulching was beneficial. Mulching with either straw or NPH tended to enhance the ecological function of the sites and assisted in the development of the sites compared to those without a mulch treatment especially in the early developmental stages. All treatments with an application of straw of NPH in both trial areas had functional patch areas that were comparable to the local woodlands on Hills and so did 150Nil02, but patch areas in the Grey Box woodlands were particularly low this year.

It is also apparent that the age of the rehabilitation area must also be considered as the older sites have had more developmental time, especially for the voluntary establishment of *Lolium* (and other ground covers) to have an effect of the stability and function of the sites. The 200Nil treatment was very slow to develop, but there has been a significant improvement in function since 2015 largely due to the voluntary establishment of *Lolium*. It is also observed that there has been less disturbance by macropods as grass cover was lower and tube stock were much smaller and provided limited shade. Subsequently this site overall performed well this year compared to the many others, but most other Nil treatments did not, and this is likely to be implicated with adverse soil chemistry. The topsoil used in the 200mm trial area was from different origin making comparison of results difficult.

In the short to medium term, it appears all trial areas regardless of topsoil depth or mulching technique were improving in ecological function and were developing in structure and composition. Despite the drought, there has been an increase in growth in the tube stock populations with trees and mature shrubs >5cm dbh now being recorded in all but one trial plot and are indicative of good growth rates. The maturing trees and shrubs are likely to have an impact on the diversity and composition of the grassy understorey which are likely to undergo significant change over time as mature canopy covers. This was already being observed this year as macropods congregated under trees that provided high levels of shade, thus reducing the integrity of the ground covers. In previous years, there has been an increase in diversity and abundance of native perennial grasses and ground covers and many of the planted acacias and some eucalypts are of reproductive age and setting seed.

It appears that even with some undesirable soil attributes such as high Electrical Conductivity (EC), ESP and sulfur (S) it has not had a significant effect on the ecological development of the area as the data indicate there have been significant improvements in most of the treatment sites during the early developmental phases. Over the past two years a reduction in ecological function was apparent in the trial sites due to the drought, however many ecological attributes remain comparable to the woodlands occurring on the local hills and ridges which have also been negatively affected by the drought. Results up to 2019 have typically indicated positive successional trends are occurring, despite some experimental setbacks and the extreme climatic conditions experienced since the trials commenced.

These trials will continue during the next reporting period.

Plate 7: NWRE – Pond D1 North Trial Tube stock (May 2019)

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 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 email are advertised quarterly in the following local newspapers, The West Wyalong Advocate, The Forbes Advocate and The Condobolin Argus. and also features within the Cowal Update community newsletter, released by Evolution and distributed to all 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 27.

Table 27: Summary of Community Complaints during the Reporting Period

Summary of Community Complaints 2020	
Record No 1	
Details	Business owner of Wyalong
Complaint/Concern	Community
Date	03/01/2020
Outcome	1. Complaint – Business owner called Community Line to advise that Evolution employees were currently parking in areas that were affect business operations. 2. Site communications went out to notify employees 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 – 03/01/2020 Complaint closed – 10/01/2020
Record No 2	
Details	Business owner of Wyalong
Complaint/Concern	Community
Date	11/02/2021
Outcome	1. Complaint – Business Owner as per previous complaint again notified the Cowal Community Line that the parking issues affect business access had continued to occur. 2. Community Team met with business owner to discuss concerns and further ways to mitigate the situation. 3. Site communications went out to notify employees 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. Written notices also placed on vehicles involved.
Date of Response	Initial response – 11/02/2020 Complaint closed – 18/02/2020
Record No 3	
Details	Resident of West Wyalong
Complaint/Concern	Community
Date	10/03/2020
Outcome	1. Complaint – Anonymous community member called and alleged a company vehicle was speeding 2. Outcome: on further investigation, it was established that the work vehicle was not and Evolution employee but a contractor. The contractor was contacted and made aware of the incident. Site comms went out about safety driving practices.
Date of Response	Initial response – 10/03/2020 Complaint closed – 13/03/2020
Record No 4	
Details	Nearby landowner
Complaint/Concern	Community
Date	11/05/2020
Outcome	1. Complaint: Near neighbour notified Community Relations that noise particularly in the last few months and mainly mid-morning had increased 2. 2. Outcome: Near Neighbour advised additional monitoring had been scheduled to assess the situation.
Date of Response	Initial response – 11/05/2020 Complaint closed – 31/05/2020
Record No 5	
Details	Nearby landowner
Complaint/Concern	CGO operations concern

Date	18/08/2020
Outcome	1. Complaint: Local landholder advised of excessive water in and around bore 4 pump station – bore fields. 2. Outcome: Investigation indicated water from surface run-off after recent rains with pump station in low lying areas. EPA & FSC given approval to remove water and then Cowal maintenance will install permanent pump to address the water build up.
Date of Response	Initial response – 18/08/2020 Complaint closed – 19/08/2020
Record No 6	
Details	Resident of Wyalong
Complaint/Concern	Community
Date	14/10/2020
Outcome	1. Complaint: Local resident of Northcott Street of West Wyalong called to advise EVN employees were parking in front of house inhibiting access and clear line of site when leaving adjacent laneway. 2. Outcome: Communications went out to all EVN staff notifying them of the issue and of parking etiquette to avoid these complaints. Continue to liase with resident. – Environment and Social Responsibility commenced investigation.
Date of Response	Initial response – 14/10/2020 Complaint closed – 28/10/2020

9.2 COMMUNITY LIAISON

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 BSC website and also on the Cowal Gold Mine website (http://www.evolutionmining.com.au/cowal/).

Community Consultation

The "Cowal Update" is the CGO community newsletter that is distributed to all households in West Wyalong, Condobolin, and Forbes, and via insert within the four local newspapers covering the Bland, Lachlan and Forbes Shires. The Cowal Update was released in January 2019 during the reporting period.

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

- Bland, Forbes and Lachlan Shire Councils.
- various community and charity groups from neighbouring towns and villages; and
- various primary and secondary schools.

A Schools open day was planned for 2020, but unfortunately could not go ahead due to Covid restrictions that were in place,

In addition, CGO regularly hosts school and community group visits. Stakeholder meetings are carried out on-site 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.

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.

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.

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 meet as required, some meetings are held via teleconference.

In addition to housing the LCCC on Evolution-owned property ‘Hillgrove’, Evolution has also provided the LCF with considerable freehold property to undertake conservation and research projects. Evolution also provides secretariat services to the LCF.

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 was conducted in 2019, as addressed in the 2018 Annual Review. With the removal of the Independent Monitoring Panel from Development Consent 14/98 conditions during Modification 15, the requirement to conduct an annual IEA is no longer valid. The next triennial IEA will be conducted in 2022.

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 this AR report.

11.2 INCIDENTS DURING THE REPORTING PERIOD

No reportable incidents were recorded during the reporting period.

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.

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GLOSSARY OF TERMS

AR	Annual Review
ANZECC	Australian New Zealand Environmental Conservation Council
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
DP&I	Department of Planning and Infrastructure
DPIE	Department of Planning Industry and Environment
DECCW	Department of Environment, Climate Change and Water (now EPA)
DPI	Department of Primary Industries
DRE	Department of Resources and Energy
DRG	Division of Resources and Geoscience
EC	Electrical Conductivity
ECCC	Evolution Cowal Consultation Centre
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Authority
EPL	Environment Protection License
ESB	Eastern Saline Bore field
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
IEA	Independent Environmental Audit
LMP	Land Management Plan
ML	Mining Lease
MOP	Mining Operations 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
RMP	Rehabilitation and Offset Management Plan
RVEP	Remnant Revegetation Enhancement Programme
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
WAD	Weak Acid Dissociated
WIRES	Wildlife Information Rescue and Education Service
WMP	Water Management Plan