

Cowal Gold Operations

Cyanide Management Plan



COWAL GOLD OPERATIONS
CYANIDE MANAGEMENT PLAN



March 2020

Revision Status Register

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1 INTRODUCTION

The Cowal Gold Operations (CGO) is located approximately 38 kilometres (km) north-east of West Wyalong in New South Wales (NSW) (Figure 1). Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of the CGO. Development of the CGO occurs within Mining Leases (ML) 1535 and ML 1791.

Development Consent (DA 14/98) for the CGO (including the Bland Creek Palaeochannel Borefield water supply pipeline) was granted by the NSW Minister for Urban Affairs and Planning under Part 4 of the *NSW Environmental Planning and Assessment Act, 1979* (EP&A Act) on 26 February 1999. Development Consent (DA 2011/64) for the operation of the Eastern Saline Borefield was granted by the Forbes Shire Council on 20 December 2010.

The NSW Minister for Planning's delegate granted approval to modify Development Consent (DA 14/98) for the *Cowal Gold Operations Processing Rate Modification* (herein referred to as the Processing Rate Modification) under Section 75W of the EP&A Act on 4 October 2018.

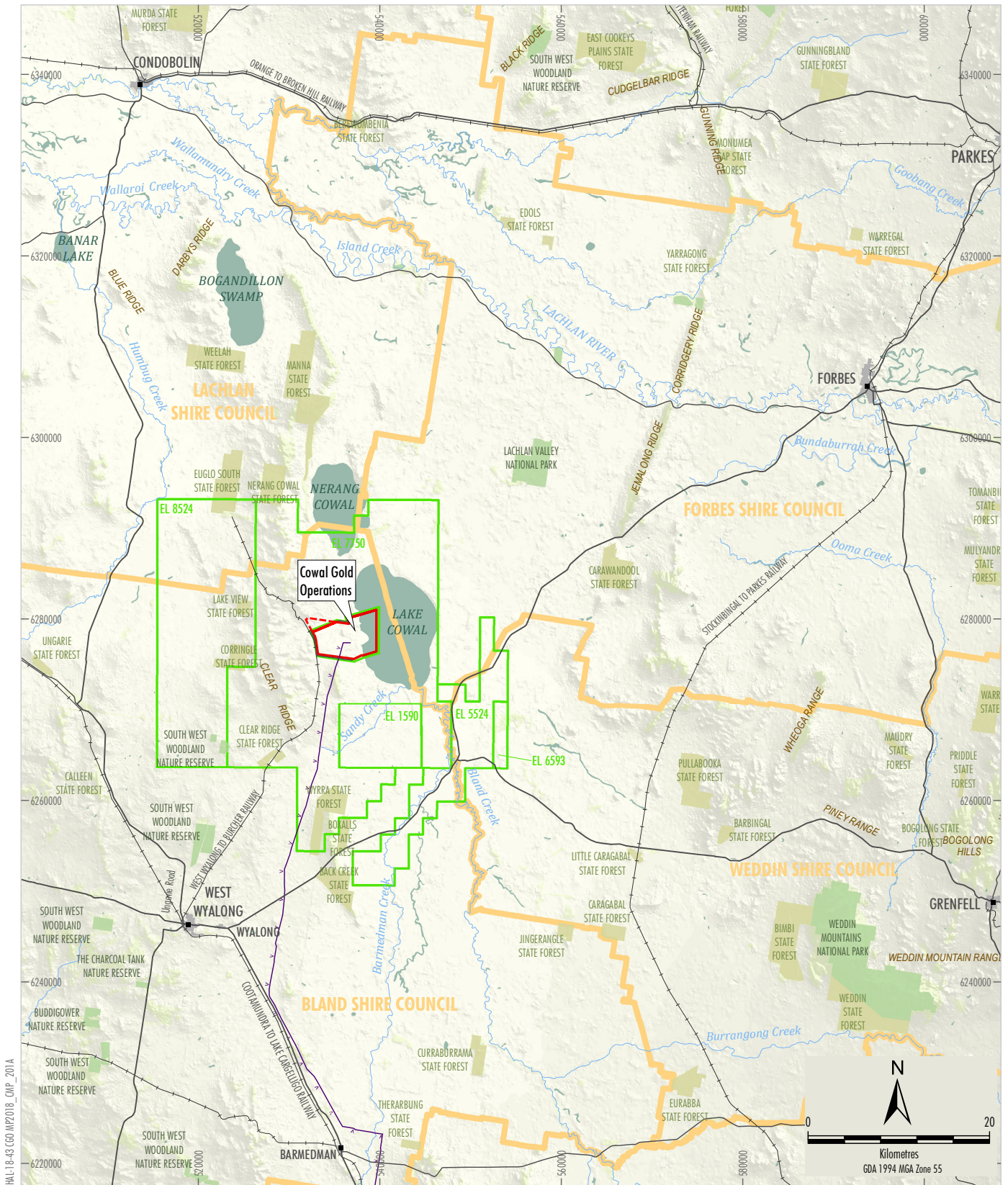
The Processing Rate Modification generally involves:

- an increase to the CGO's ore processing rate from 7.5 million tonnes per annum (Mtpa) to 9.8 Mtpa;
- construction of a secondary crusher to increase throughput rates of the CGO processing plant;
- an increase in annual cyanide consumption for the primary and oxide circuits in the processing plant by approximately 25 percent (%);
- modification/expansion of the existing tailings storage facilities to form the Integrated Waste Landform (IWL) to facilitate storage of tailings over the life of the mine, which also integrates with the existing Northern Waste Rock Emplacement;
- relocation of portions of the Up-catchment Diversion System (UCDS) and Internal Catchment Drainage System (ICDS) around the IWL, including relocation of contained water storage D10;
- duplication of the existing water supply pipeline across Lake Cowal; and
- a new mining lease tenement ML 1791 north-west of ML 1535 to accommodate infrastructure displaced by the IWL (e.g. soil stockpiles).

The general arrangement of the approved CGO is provided in Figure 2.

A copy of the CGO's approved Development Consent (DA 14/98) (as modified on 4 October 2018) is available on Evolution's website (www.evolutionmining.com.au).

This Cyanide Management Plan (CMP) has been prepared to reflect the Processing Rate Modification and the Development Consent (DA 14/98) as modified 4 October 2018 and supersedes all former revisions of the CMP.



HAL-18-43 CGO MP2018_CMP_2014



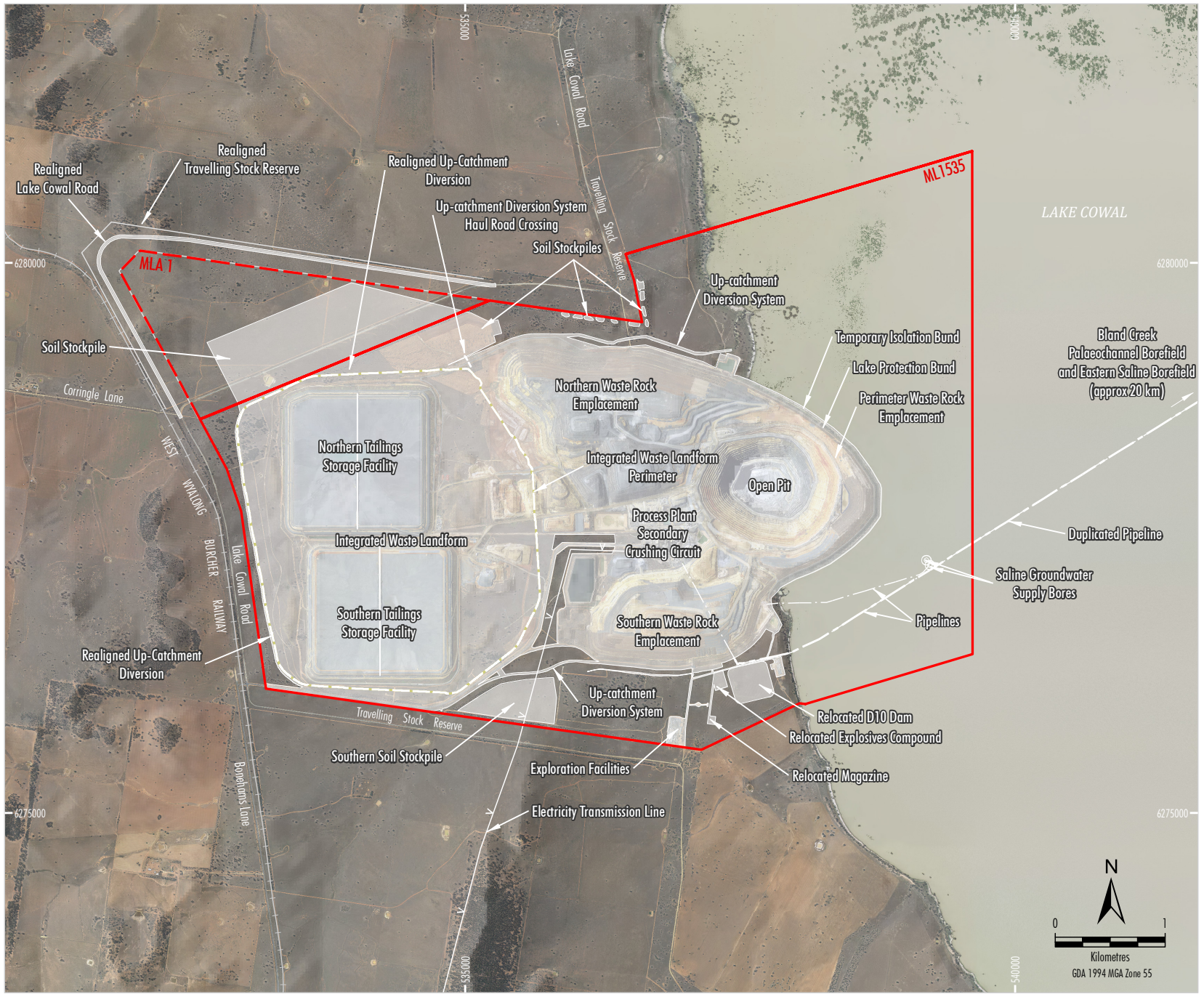
- LEGEND**
- Mining Lease Boundary (ML 1535)
 - Mining Lease Application (MLA 1)
 - Exploration Licence (EL)
 - National Park & Nature Reserve
 - State Forest
 - Local Government Area Boundary
 - Electricity Transmission Line
 - Railway

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




**CYANIDE MANAGEMENT PLAN
CGO Locality**

Figure 1



- LEGEND**
- Mining Lease Boundary (ML 1535)
 - Mining Lease Application Boundary (MLA 1)
 - Approximate Extent of Approved Surface Development

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


Evolution
 MINING
 Cowal

CYANIDE MANAGEMENT PLAN
 General Arrangement
 of Approved CGO

Figure 2

Objectives and SCOPE

Objectives

In accordance with Development Consent Condition 5.3(b) (Section 2.1), the objectives of this CMP are to:

- describe the measures to contain cyanide contaminated waters entirely within the mine site;
- describe the measures to maintain CN_{WAD} (weak acid dissociable cyanide) levels at the process plant to the levels stated in Development Consent Condition 5.3(a);
- detail the contingency measures for cyanide reduction;
- outline the cyanide monitoring programme; and
- detail the procedures for review, assessment and reporting procedures relevant to this CMP.

Scope

This CMP has been prepared to reflect the Processing Rate Modification and the modified Development Consent granted by the NSW Minister for Planning's delegate on 4 October 2018 under Section 75W of the EP&A Act.

In accordance with the requirements of Development Consent Condition 5.3(b), the Department of Resources and Geoscience (DRG) (within the NSW Department of Planning and Environment [DP&E]), NSW Environment Protection Authority (EPA) and NSW Department of Planning, Industry and Environment have been consulted during preparation of this CMP.

The remainder of this CMP is structured as follows:

- | | |
|-------------|--|
| Section 2: | Identifies the Development Consent, ML 1535 Conditions of Authority and Environment Protection Licence (EPL) conditions applicable to this CMP. |
| Section 3: | Outlines the CGO's Environmental Management System, environmental management plans (EMPs) and studies relevant to cyanide management. |
| Section 4: | Describes cyanide containment and management measures. |
| Section 5: | Describes wildlife management in relation to cyanide. |
| Section 6: | Describes the cyanide monitoring programme. |
| Section 7: | Outlines contingency measures for cyanide reduction and the process for EPA review of cyanide levels in the event of wildlife deaths occurring due to cyanide. |
| Section 8: | Summarises stakeholder consultation and complaints receipt. |
| Section 9: | Details reporting requirements for issues related to cyanide management and monitoring. |
| Section 10: | Outlines auditing and review requirements. |
| Section 11: | Lists the references cited in this CMP. |

2 STATUTORY REQUIREMENTS

The Development Consent, EPL No. 11912 and ML 1535 conditions relevant to this CMP are outlined below. A summary of the legislative regime relevant to this CMP is included as Appendix A. A summary of the codes of practice, Australian Standards and other guidelines relevant to this CMP is included as Appendix B.

2.1 DEVELOPMENT CONSENT CONDITIONS

This CMP has been prepared in accordance with the requirements of Development Consent Condition 5.3(b) and includes a description of the CGO cyanide monitoring programme as required by Development Consent Condition 5.3(d). The requirements of Development Consent Conditions 5.3(b) and (d) and other conditions relevant to this CMP are outlined in Table 1 below.

**Table 1
Development Consent Conditions Relevant to this CMP**

Development Consent Condition	Section
5.3 Cyanide Management	
(a) <u>Cyanide Levels</u> The Applicant shall ensure that cyanide levels of the aqueous component of the tailings slurry stream do not exceed: 20 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.	Section 4.2.2
(b) <u>Cyanide Management</u> The Applicant shall prepare and implement a cyanide management plan for the development to the satisfaction of the Secretary. The plan is to be prepared in consultation with DRG, EPA and DoL L&W, and include monitoring and reporting of cyanide use on the site. The plan shall make provision for, but is not limited to: (i) containing cyanide contaminated waters entirely within the mine site; (ii) maintaining weak acid dissociable (WAD) cyanide levels at the process plant to the levels stated in condition 5.3(a); (iii) contingency measures for cyanide reduction.	This CMP Section 4 Section 4 Section 7
(c) <u>Wildlife Deaths</u> In the event of wildlife deaths occurring due to cyanide, review of cyanide levels shall occur by the EPA in consultation with the Applicant and DRG. Any decision to require cyanide reduction shall include, but not be limited to, consideration of the number of fauna deaths, the species involved, antecedent condition of species, methods employed at the time to prevent use of tailings dams by fauna, and antecedent climatic and surface water conditions of the Lake and surrounding area. The Applicant shall notify the CEMCC of any reductions in cyanide levels as soon as practicable.	Section 7.4
(d) <u>Cyanide Monitoring</u> The Applicant shall prepare and implement a cyanide monitoring programme for the development to the satisfaction of the Secretary. The plan must be prepared in consultation with the EPA and DRG, and shall include, but not be limited to, provision for: (i) monitoring of CN _{WAD} levels of the aqueous component of the tailings slurry stream at the process plant twice daily or as otherwise directed by the Secretary, with any increases above 20mg CN _{WAD} /L to be assessed daily to ensure compliance and reported in the Annual Review, unless otherwise agreed by the Secretary. If the CN _{WAD} levels of 30mg/L are exceeded in the liquid at any time, discharge to the tailings dams shall cease until CN _{WAD} levels can be achieved below the levels stated in condition 5.3(a) and such exceedance shall be reported to the EPA within 24 hours; (ii) monitoring CN _{WAD} levels in the decant water of the tailings dams twice daily or as otherwise directed by the Secretary;	Section 6 Sections 6.2 and 7.2 Section 6.2

Table 1 (Continued)
Development Consent Conditions Relevant to this CMP

Development Consent Condition	Section
(iii) an on site laboratory for quickly establishing CN _{WAD} levels in the liquid at the process plant and in the decant ponds for monitoring purposes;	Section 6.2
(iv) on-line monitoring of CN(FREE) at locations where employees are operating;	Section 6.3
(v) establishing a monitoring regime for detection of cyanide movement beneath and adjacent to the tailings impoundments.	Section 6.4
A summary of the cyanide monitoring results shall be provided on the Applicant's website for the development on a regular basis, or as directed by the Secretary.	Sections 6.1 and 9

Further to Development Consent Condition 5.3, additional Development Consent conditions of relevance to the CMP include:

- Development Consent Condition 3.2(b) which requires the preparation of a Flora and Fauna Management Plan including wildlife management measures to identify and report cyanide-related fauna deaths and to provide contingency measures for reducing cyanide levels in the tailings storages/IWL in the event it is established that fauna deaths are occurring from cyanide. This condition is addressed in Sections 5 and 7.3.
- Development Consent Condition 4.4(a) which requires the preparation of a Water Management Plan and Condition 4.5 which requires preparation of a water monitoring program. These conditions are referred to in Section 3.2.
- Development Consent Condition 4.5(c) which requires the preparation of a Monitoring Programme for Detection of Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls. This condition is discussed in Sections 3.2 and 4.2.3.4.
- Development Consent Condition 5.2 which requires the tailings storages/IWL to be constructed in accordance with the requirements of the DRG, EPA, Dams Safety NSW and in consultation with Dol L&W. This condition is addressed in Section 4.2.3.
- Development Consent Conditions 5.4(a) and (b) which require the preparation of a Fire Safety Study, Hazard and Operability (HAZOP) Study, Final Hazard Analysis (FHA) and Safety Management System, and the conduct of a Hazard Audit. This condition is discussed in Section 3.3.
- Development Consent Condition 5.4 (c) which requires the preparation and implementation of a Hazardous Materials Management Plan (HMMP). This condition is discussed in Section 3.2.
- Development Consent Condition 9.1(b) which requires the preparation of an Annual Review. This condition is addressed in Section 9.1.
- Development Consent Condition 9.1(c) which outlines the review requirements for the CGO's EMPs, strategies and programs, including the CMP. This condition is addressed in Section 10.3.
- Development Consent Condition 9.1(d) which requires the establishment of a Community Environmental Monitoring and Consultative Committee (CEMCC). This condition is addressed in Section 8.1.
- Development Consent Condition 9.2(a) which requires Independent Environmental Audits to be conducted, and Development Consent Condition 9.2(b) which requires the establishment of an Independent Monitoring Panel. These conditions are addressed in Section 10.

- Development Consent Condition 9.3 which outlines the notification and reporting requirements for incidents and non-compliances. This condition is addressed in Sections 9.3 and 9.4.
- Development Consent Condition 9.4(a)(v) which requires the maintenance of a complaints register. This condition is addressed in Section 8.2.1.

2.2 ML 1535 CONDITIONS OF AUTHORITY

The Conditions of Authority for ML 1535 also includes a requirement relevant to the use of cyanide, viz.:

- Condition of Authority 28 requires the leaseholder not to use cyanide or any solution containing cyanide without the prior written approval of the former Minister for Mineral Resources and subject to any conditions stipulated by the Minister.

Written approval from the former Minister for Mineral Resources was obtained in correspondence dated 17 January 2006.

2.3 EPL 11912 CONDITIONS

EPL 11912 conditions relevant to cyanide management and monitoring include:

- Limit Condition L2 which requires that cyanide levels in the tailings slurry stream measured at the process plant (i.e. EPL Monitoring Point 48) do not exceed 20 milligrams CN_{WAD} per litre (mg CN_{WAD}/L) (90 percentile over six months), and 30 mg CN_{WAD}/L (maximum permissible limit at any time). This condition is addressed in Section 4.2.2.
- Operating Condition O4.2 which requires the tailings storages and contained water storage facilities to have a basal barrier or impermeable liner with an equivalent permeability of 1x10⁻⁹ metres per second (m/s) over a thickness of 1 metre (m). This condition is addressed in Section 4.2.3.3.
- Monitoring and Recording Condition M1 which outlines requirements for monitoring records for samples collected for the purpose of the EPL. This condition is addressed in Section 6.2.4.
- Monitoring and Recording Condition M2 which requires the monitoring of CN_{WAD} at a number of points within the CGO. This condition is addressed in Section 6.4.
- Monitoring and Recording Conditions M5 and M6 which require the licensee to keep a record of all complaints made in relation to pollution arising from a licensed activity and to provide a telephone complaints line. These conditions are addressed in Section 8.2.2.
- Reporting Condition R1 which requires the licensee to prepare an Annual Return which reports on compliance with the conditions of the EPL. This condition is addressed in Section 9.2.
- Reporting Condition R2 which requires the licensee to notify the EPA of incidents causing or threatening material harm to the environment. This condition is addressed in Section 9.2.

3 ENVIRONMENTAL MANAGEMENT SYSTEM, STRATEGY, PLANS AND STUDIES

Environmental management of the CGO encompasses a range of environmental management strategies, plans, studies and monitoring programmes developed in accordance with the CGO's statutory approvals. Evolution's environmental management system software includes an Environmental Obligations Register (EOR) which tracks the CGO's environmental obligations prescribed by the CGO's approvals, environmental management strategies, plans, studies and monitoring programmes.

The CGO's Environmental Management System has been independently audited and certified as compliant with the *ISO 14001:2015 Environmental Management System* guidelines most recently in September 2018.

This remainder of this Section provides an overview of the CGO's EMS, EMPs and pre-construction and pre-commissioning studies relevant to the management of cyanide at the CGO.

Detail regarding the CGO's certification to the *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold* (the Cyanide Management Code) is described in Section 3.4.

3.1 ENVIRONMENTAL MANAGEMENT STRATEGY

In accordance with the requirements of Development Consent Condition 9.1(a), Evolution has prepared an Environmental Management Strategy (EMS) which provides a strategic framework for environmental management at the CGO.

Evolution's EMS details:

- the requirements of the CGO's statutory environmental approvals;
- the EMPs, strategies, and monitoring programs prepared for the CGO;
- the CGO's site management structure;
- Evolution's corporate environmental policy;
- the internal and external review process for environmental improvement at the CGO;
- the complaints and dispute resolution process implemented at the CGO;
- the process for reporting any non-compliances with the CGO's statutory approvals; and
- the CGO's emergency or incident response procedures.

3.2 ENVIRONMENTAL MANAGEMENT PLANS

In addition to this CMP, a number of EMPs are also relevant to the management of cyanide at the CGO including those summarised in Table 2.

**Table 2
Overview of Other EMPs Relevant to Cyanide Management**

Environmental Management Plan	Description
Mining Operations Plan	MOPs have been regularly prepared since commencement of operations at the CGO. CGO MOPs provide a detailed description of the proposed mining operations and rehabilitation activities at the CGO for set operational terms.
Pollution Incident Response Management Plan	In accordance with the requirements of Part 5.7A of the NSW <i>Protection of the Environment Operations Act, 1997</i> (POEO Act), a Pollution Incident Response Management Plan (PIRMP) has been prepared for the CGO. The plan details emergency response procedures to pollution incidents including procedures for spillage, clean-up, control and protection, and for the rescue of wildlife during the emergency.
Hazardous Materials Management Plan	In accordance with Development Consent Condition 5.4(d) a Hazardous Materials Management Plan (HMMP) will be developed for the CGO. The plan will include details for the onsite handling and storage of sodium cyanide and other toxic chemicals and the transport of hazardous materials to or from the site on the local road network. In accordance with Development Consent Condition 5.4(d), once approved, the HMMP will replace the pre-commissioning studies required by conditions 5.4(b)(i) and (ii) (i.e. Transport of Hazardous Materials and Emergency Response Plan) and the Hazardous Waste and Chemical Management Plan) required by Development Consent Condition 5.7.
Water Management Plan	A Water Management Plan (WMP) has been prepared for the CGO in accordance with Development Consent Condition 4.4(a). The WMP details the measures for management and mitigation of potential water quality and quantity (surface and groundwater) impacts of the CGO and describes the CGO site water management system which is designed to contain all potentially contaminated water generated within the CGO area while directing all other water around the perimeter of the site.
Surface Water, Groundwater, Meteorological and Biological Monitoring Programme	A Surface Water, Groundwater, Meteorological and Biological Monitoring Programme (SWGMBMP) has been developed for the CGO in accordance with the requirements of Development Consent Condition 4.5(b). The SWGMBMP includes details of cyanide monitoring undertaken at relevant CGO surface water and groundwater monitoring sites.
Monitoring Programme for Detection of Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls	The Monitoring Programme for Detection of Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls has been prepared for the CGO in accordance with Development Consent Condition 4.5(c). This plan includes a description of the typical seismicity of Lake Cowal and West Wyalong, an outline of the visual assessment and survey assessment monitoring programmes and procedures to be undertaken in the event of detection of any movement of the tailings structures.
Flora and Fauna Management Plan	The Flora and Fauna Management Plan (FFMP) includes measures to keep fauna and avifauna away from tailings storages, wildlife rescue procedures, methods for monitoring daily and seasonal fauna usage of the tailings dams and contingency measures for reducing cyanide levels in the tailings dams in the event it is established that fauna deaths are occurring from cyanide in tailings dam water. The FFMP also includes measures to protect fauna from interactions with the tailings storage facilities has also been prepared for the CGO. The plan including actions to deter fauna visitation to the tailings storage facilities, actions to apply best available technology and practices for monitoring fauna visitation and actions to apply best available technology and practices for monitoring fauna deaths caused by cyanosis.

3.3 PRE-CONSTRUCTION AND PRE-COMMISSIONING STUDIES

Prior to the construction, commissioning and operations at the CGO, a number of pre-construction and pre-commissioning studies were prepared as required by Development Consent Condition 5.4. The studies that are relevant to cyanide management are described in Table 3.

**Table 3
Overview of Pre-Construction and Pre-Commissioning Studies Relevant to Cyanide Management**

Study	Description
Hazard and Operability Study (Pinnacle Risk Management Pty Ltd, 2004a) and Supplementary Hazard and Operability Study (Pinnacle Risk Management Pty Ltd, 2005a)	A HAZOP Study has been undertaken for the CGO in accordance with Development Consent Condition 5.4(a)(ii). The HAZOP Study was chaired by an independent qualified person approved by the Director-General of the former Department of Infrastructure, Planning and Natural Resources (DIPNR) prior to the commencement of the study. The study included areas of the process which store and/or handle dangerous goods or hazardous materials and/or have the potential for off-site impact in consultation with DIPNR. The HAZOP Study addresses the monitoring, control, alarm and shutdown systems associated with the cyanide process.
Final Hazard Analysis (Pinnacle Risk Management Pty Ltd, 2004b)	A FHA has been undertaken for the CGO in accordance with Development Consent Condition 5.4(a)(iii). The results of the FHA indicated that the risk associated with the proposed development complies with the Hazardous Industry Planning Advisory Papers No. 4 and No. 6 Guidelines for tolerable fatality, injury, irritation and societal risk. Also, the FHA concluded that the risks to the biophysical environment, the risk of propagation and the impact on cumulative risk in the area from releases are generally negligible. Overall, the FHA concluded the proposed facility does not pose any unacceptable levels of risk. Transport risk is separately analysed in the Transport of Hazardous Materials Study.
Safety Management System	Development Consent Condition 5.4(b)(iii) requires the preparation of a safety management system prior to commissioning of the CGO, covering all operations on-site and associated transport activities involving hazardous materials. The document system is to specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to procedures.
Fire Safety Study (Pinnacle Risk Management Pty Ltd, 2005b)	<p>A Fire Safety Study has been prepared for the CGO in accordance with Development Consent Condition 5.4(a)(i). The objective of the Fire Safety Study was to ensure the proposed fire prevention, detection, protection and fighting measures are appropriate for specific fire hazards and are adequate to meet the extent of potential fires at the processing facility.</p> <p>The Fire Safety Study provides:</p> <p>Hydrogen cyanide (HCN) is a product of decomposition from sodium cyanide. HCN is a flammable gas. However, as the acute toxicity effects of HCN present significant hazards then the likelihood of HCN formation to levels where combustion can occur is low. This is due to the nature of the process (i.e. the slurry has relatively low sodium cyanide levels) and HCN analysers will be positioned throughout the plant to alert the operators of potential toxic impact at levels well below the concentrations for flammable concerns.</p> <p>Sodium cyanide is non-flammable although, under certain conditions, it is possible to generate flammable gases from this material (e.g. when decommissioning the cyanide sparge mixing tank, the sludge may dry out and ignite due to the presence of carbides).</p> <p>As described in the Fire Safety Study, the fire hazards are known and there are control measures in place to minimise the risk of fire related incidents involving sodium cyanide. The risks associated with sodium cyanide were reviewed by the HAZOP Study and no further actions to those detailed in the HAZOP were recommended by the Fire Safety Study.</p>

3.4 INTERNATIONAL CYANIDE MANAGEMENT CODE

The *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold* (the Cyanide Management Code) has been developed as a voluntary industry code to encourage improvement in the management of cyanide on an industry-wide basis. The principles of the Cyanide Management Code are as follows:

- *Production* - Encourage responsible cyanide manufacturing by purchasing from manufacturers who operate in a safe and environmentally protective manner.
- *Transportation* - Protect communities and the environment during cyanide transport.
- *Handling And Storage* - Protect workers and the environment during cyanide handling and storage.
- *Operations* - Manage cyanide process solutions and waste streams to protect human health and the environment.
- *Decommissioning* - Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities.
- *Worker Safety* - Protect workers' health and safety from exposure to cyanide.
- *Emergency Response* - Protect communities and the environment through the development of emergency response strategies and capabilities.
- *Training* - Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.
- *Dialogue* - Engage in public consultation and disclosure.

The Cyanide Management Code focuses exclusively on the safe management of cyanide and cyanidation mill tailings and leach solutions (International Cyanide Management Institute [ICMI], 2018). Companies that adopt the Cyanide Management Code must have their mining operations that use cyanide to recover gold and/or silver audited by an independent third party to determine the status of Cyanide Management Code implementation (*ibid.*). Those operations that meet the Cyanide Management Code requirements can be certified. The ICMI was established for the purpose of administering the Cyanide Management Code.

On 17 April 2006, the CGO was the first non-operational gold mine using cyanide in the world to be certified by the ICMI to the Cyanide Management Code. Then on 2 August 2007, the CGO was then also the first operational gold mine using cyanide in the world to be pre-operationally and operationally certified to the Cyanide Management Code.

Annual audits of the CGO (including the CGO's cyanide management processes) by the ICMI against the Cyanide Management Code have been undertaken since 2007. The CGO has been certified as fully compliant with the Cyanide Management Code since 2007 (i.e. CGO operations and cyanide management processes, including this CMP are compliant with the Cyanide Management Code).

4 CYANIDE CONTAINMENT AND MANAGEMENT

Many gold-containing ores comprise finely disseminated gold particles locked up with other constituents of the ore. Gold is separated from the other minerals by chemically extracting it after physical processing (e.g. crushing and grinding) of the ore. After more than 100 years of operational use and research into alternative technologies, cyanide remains the preferred reagent for extracting gold where leaching is required. Cyanide is a potentially hazardous chemical which requires careful management and control.

The focus of this CMP is on the management of cyanide within ML 1535. The Hazardous Materials Management Plan details the management of cyanide transport on the local road network.

4.1 HANDLING AND STORAGE OF CYANIDE

In accordance with the CGO Chemical Management Strategy which is detailed in the HMMP, all raw materials/consumables brought on site for use at the CGO will be recorded in an Inventory Register which is updated (as materials arrive on-site) and available for inspection by the appropriate authorities. Safety Data Sheets (SDSs) for solid sodium cyanide, sodium cyanide solution and Hydrogen Cyanide (HCN) gas are included in the Inventory Register.

In accordance with the Chemical Management Strategy, chemicals such as cyanide, recorded on the Inventory Register that are designated as hazardous substances and/or dangerous goods will also be included in the HSDGR (ChemAlert). The purpose of the HSDGR (ChemAlert) is to facilitate efficient audit functions as well as conform to best practice environmental and safety management.

Delivery and storage of cyanide on-site will take place in a controlled area. Cyanide delivery and storage will be within a concrete-bunded area located away from general work areas and incompatible reagents.

Cyanide will be handled and stored in accordance with HMMP and the requirements of the *AS/NZS 4452:1997 The Storage and Handling of Toxic Substances* and the relevant SDSs.

Section 5 of the abovementioned Standard sets out the requirements for storage and handling of toxic substances in bulk, including:

- design and construction requirements for containers;
- requirements for portable and fixed tanks;
- bunds and compounds;
- locations of bulk containers; and
- filling of bulk containers.

A summary of legislation of relevance to the handling and storage of cyanide is included in Appendix A. For example, the *Work Health and Safety (Mines and Petroleum) Act 2013* and the *Work Health and Safety (Mines and Petroleum) Regulation 2017* require occupiers to notify WorkCover of dangerous goods stored and handled. The requirements for notification of an incident is set out in Schedule 8 to the *Work Health and Safety (Mines and Petroleum) Regulation 2014*.

The drainage provision for the storage area will slope away from the tanks to a sump. A pump will be fitted at the sump and will transfer any rainfall, hose down or spilt liquid collected to the leach tanks, or alternatively back into the cyanide solution tanks. In the event that spillage does occur within the bunded area, the affected area will be ameliorated in accordance with the procedures contained in the HMMP.

Storage areas, tanks, pipelines, pumps and valves will have high visibility labelling and will be inspected regularly for signs of leakage (e.g. monthly planned general inspections, regular bund inspections and annual site bund audit), presence of solution outside of the tanks in the bunded areas and integrity of the containment. Any aspects requiring maintenance or repair will be noted and records documenting the inspection and corrective measures will be kept.

Each solids isotainer that arrives at the CGO may contain up to 40 tonnes of solid cyanide. During cyanide transfer, a pump will circulate water from a mixing tank through the solids isotainer, thereby dissolving the solid cyanide in the isotainer. The solution will be recirculated through the isotainer and mixing tank, resulting in a progressive increase in the concentration of cyanide in the liquor until all the cyanide is dissolved. A pump will be used to remove the remaining solution from the bottom of the isotainer and transfer it to the mixing tank. This process is known as sparging. The liquor in the mixing tank will be transferred to the storage tank, from which it will be distributed to the leach tanks via the cyanide ringmain. Prior to departing the delivery bay, the driver will complete a cyanide driver checklist.

4.2 USE OF CYANIDE IN OPERATIONS

4.2.1 Overview of Cyanide Use

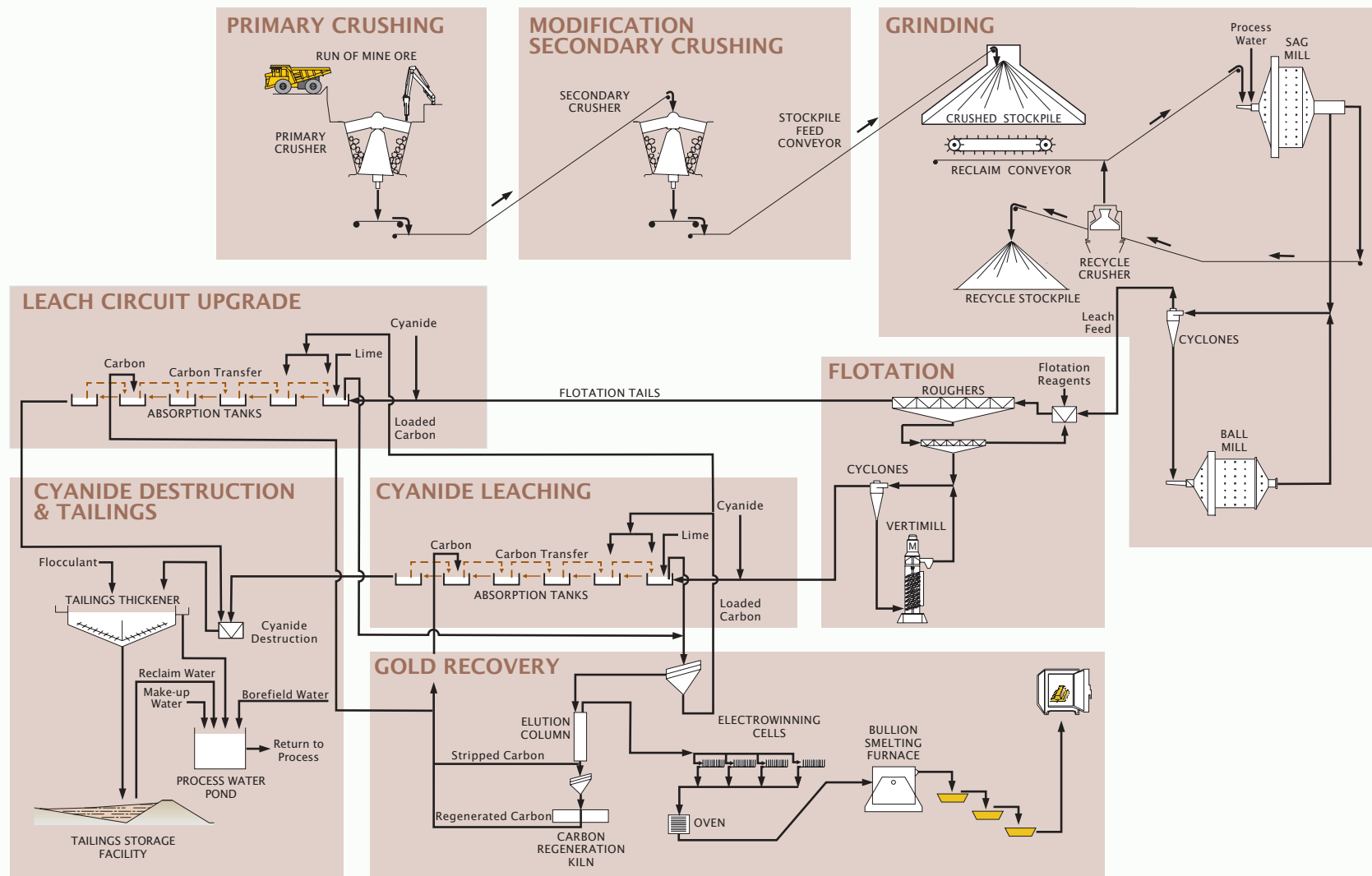
Cyanide will be used at the CGO in the leaching of gold from ore and the elution of gold from carbon. The cyanide solution will be pumped from the storage tank to the dual leaching circuit, where it will be added to the ore slurry. Gold leached from the ore will then be adsorbed onto carbon in the leach tanks. The adsorbed gold will be passed to an enclosed system where the gold will be eluted using a heated cyanide and caustic soda solution. The heated cyanide used in this process will be passed to the electrowinning circuit where it will be recycled.

Following processing, the tailings slurry will pass through a cyanide destruction process before being discharged to the tailings storages/IWL. Cyanide destruction has been incorporated into the process to ensure CN_{WAD} levels at the process plant are maintained at the required levels (as described in Section 4.2.2). The tailings slurry will be deposited peripherally via a spigotted ring main allowing for the progressive development or 'build-up' of tailings around the surface of the tailings storages/IWL. A conceptual primary ore processing flowsheet is provided in Figure 3.

4.2.2 Maintaining CN_{WAD} Levels at the Process Plant to the Required Levels

In accordance with Development Consent Condition 5.3(b)(ii), CN_{WAD} levels of the aqueous component of the tailings slurry stream will be maintained so that they do not exceed 20 mg/L CN_{WAD} (90 percentile over six months) and 30 mg/L CN_{WAD} (maximum permissible limit at any time) at the process plant. Cyanide destruction has been incorporated into the process to ensure CN_{WAD} levels at the process plant will be maintained to the levels stated above. Caro's Acid and the INCO process will be used to destroy cyanide. Caro's Acid is a mixture of sulphuric acid (H_2SO_4) and hydrogen peroxide (H_2O_2). The INCO process involves the introduction of sulphur dioxide (SO_2) as sodium metabisulfite (SMBS). The reaction is catalysed by the presence of copper, which may have to be added (as copper sulphate).

HAL-18-43 GCO MP2018_CMP_001A



Source: Evolution (2018)



CYANIDE MANAGEMENT PLAN
Indicative Primary Ore
Process Flowsheet

Figure 3

Containment of Cyanide-contaminated Waters Entirely within the Mine Site

4.2.2.1 Process Plant Water Management

Tanks holding process solutions (e.g. leach tanks) will be located on bunded concrete containments. The processing plant has been designed such that process water containing cyanide is recycled and therefore kept within the area encompassed by the processing plant run-off collection drain and storage. In the event of spillages, all solutions will be contained within the process plant bunding, and the appropriate spill response procedure will be initiated (as described in the HMMP). Portable pumps will be provided within the processing area for the pumping of spills within the bunded areas back to the storage tanks or emergency holding tanks.

4.2.2.2 Tailings Delivery and Return Water Management

The tailings delivery and return water lines will be contained within a bunded pipeline corridor that will run parallel to the service corridor between the processing plant and tailings storage facilities/IWL. The tailings slurry will be pumped to the tailings storages/IWL at ground level. The bunded corridor will drain back to the processing plant and will contain any spills in the event of pipeline rupture/failure. The service corridor will be located alongside the pipeline to facilitate inspections of the pipelines. Daily inspections of the tailings delivery and water return pipelines will be undertaken for physical integrity and to identify any minor leaks. The drain back to the processing plant will also be visually inspected for integrity and function daily. Opportunistic inspections will also be made by personnel working in the area. In addition, an automatic, pressure activated shut-down mechanism will be provided on the tailings discharge pipeline to enable the early detection and stoppage of significant leaks or failures. The tailings pipeline will be fitted with a low flow alarm linked to the central control room with automatic shutdown capability. In the event that spillage does occur within the bunded area, the affected area will be ameliorated in accordance with the HMMP.

4.2.2.3 Tailings Water Management

The Cowal Gold Operations Water Management Plan (WMP) provides overarching water management strategies associated with the TSFs and places this in the context of the broader water management system for the operation. Both the TSFs are part of the site water management system, with reclaimed tailings water being the preferred source of process water. The WMP requires the CGO to retain and recycle as much tailings water within the water management system as possible.

The tailings storages/IWL have been designed to maintain a minimum freeboard consistent with a 1 in 1,000 average recurrence interval rainfall event (Evolution, 2018). The required free-board will be maintained during the mine life as the tailings storages/IWL fills with tailings via a series of embankment lifts.

The North Tailings Storage Facility and South Tailings Storage Facility Operations and Maintenance Manuals include specific information on:

- decant pond control and water management
- decant tower operation
- decant tower raising
- underdrain operation

Consistent with the existing tailings storages, tailings material would be deposited into the IWL as a slurry under sub-aerial conditions (Evolution, 2018). The supernatant water is pushed towards a central pond and decant towers. The free water is then pumped out to a dedicated contained water storage (D6) for reuse in the processing plant. Additional to this, an underdrainage pipe network drains the tailings mass. This water is also reused in the processing plant.

Consistent with the existing tailings storages, the tailings deposition would be controlled to promote the segregation of the coarse fraction on the perimeter and the fine fraction towards the centre of the IWL (Evolution, 2018). The different particle settling rates would result in a tailings ‘beach’ which slopes towards the central decant pond area (*ibid.*).

An underdrainage system along the eastern perimeter embankment of the IWL would be constructed to assist in water recovery and the mitigation of seepage (CMW Geosciences, 2018). The underdrainage system will recover water at multiple locations through inclined bores or similar (Evolution, 2018).

The underdrainage lines would comprise slotted pipe surrounded by clean aggregate, wrapped in geotextile and stabilised by select rock (Evolution, 2018). The underdrainage lines grade to sumps with water collected in the underdrains to flow under gravity to the sumps (CMW Geosciences, 2018).

Detailed analyses and modelling undertaken as part of the *Cowal Gold Project: Environmental Impact Statement* (EIS) (North Limited, 1998) indicated that limited seepage from the tailings storages would occur through the storage floor. Any seepage flow entering the underlying highly saline aquifers (during mining operations and for a limited time, post-closure) would be permanently diverted to flow towards the final void (North Limited, 1998). Modelling indicated that this seepage would move very slowly and would not reach the open pit during the operating life of the CGO (North Limited, 1998). Any residual contaminants which enter the groundwater system below the tailings storages are expected to either be immobilised or substantially reduced in concentration near the base of the storage (North Limited, 1998). The groundwater modelling indicated residual cyanide concentrations would be reduced by a factor of one thousand (to negligible levels) near the base of the tailings storages (North Limited, 1998).

An assessment of potential impacts to groundwater quality due to seepage from the tailings storages and IWL using an analytical particle tracking approach was undertaken for the Processing Rate Modification by Coffey Services Australia Pty Ltd as a part of their *Cowal Gold Operations Processing Rate Modification (MOD 14) Mine Site Hydrogeological Assessment* (Coffey, 2018a).

Consistent with the findings of previous assessments for the approved CGO, seepage from the tailings storages and IWL to the underlying aquifers was predicted to slowly migrate towards the open pit (i.e. the open pit would continue to act as a sink for seepage flows from the tailings storage facilities/IWL) (Coffey, 2018a).

As the Processing Rate Modification will not change development of the open pit, no change to the geochemistry of tailings is expected, therefore no change to the quality of seepage from the tailings storages and IWL is expected (Coffey, 2018a). Therefore, no additional impacts to groundwater quality associated with seepage from the tailings storages/IWL are expected due to the Processing Rate Modification (Coffey, 2018a).

In addition to the modelling and analyses undertaken by Coffey for the Processing Rate Modification, further modelling of contaminant transport from the IWL at 20, 50, 100 and 200 years post-closure has been undertaken by Coffey (2018b) in accordance with the requirements of Development Consent Condition 4.4(a1). Coffey (2018b) concluded from the additional modelling undertaken that cyanide and dissolved heavy metals within the IWL will not move beyond 2.2 km from the IWL and will ultimately migrate to the mine void.

A number of seepage control measures have been incorporated into the design of the existing tailings storages and would be continued for the IWL, including:

- the pre-stripping of surficial soils beneath the tailings storage footprint;
- construction of a moisture-conditioned and compacted-low-permeability tailings storage floor where necessary, to achieve permeability criteria;

- excavation of a central cut-off trench along the length of the starter embankment to a nominal 2.5 m below surface level or to the depth of a low-permeability clay layer, and backfilled with compacted and moisture-conditioned low permeability clay; and
- installation of an underdrainage and decant network.

As required by Development Consent Conditions 4.4(c)(i) and 5.2(a) the CGO's contained water storages, tailings storages and IWL will continue to be constructed to the requirements of DoI L&W, EPA, DRE and Dams Safety NSW.

As required by Development Consent Condition 5.2(b) and EPL Condition O4.2 the floor of the existing tailings storages and existing contained water storages have been constructed with a basal barrier or impermeable liner with an equivalent permeability of no more than 1×10^{-9} m/s over a thickness of 1 m.. Consistent with the above Development Consent and EPL Conditions, the IWL and contained water storage D10 will be constructed in accordance with this design criteria.

4.2.2.4 *Tailings Storage Movement*

Monitoring will be conducted for any movement of the tailings storage/IWL walls as described in the CGO's Monitoring Programme for Detection of any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls, as follows:

- Visual assessments of the tailings structures will be undertaken routinely (i.e. weekly), following review of surface and groundwater monitoring data and following seismic events to identify the initial signs of movement.
- Survey assessment of the tailings structures will be routinely undertaken at six monthly intervals or following visual assessments that indicate movement of a structure and/or following seismic events to determine and quantify any movement of these structures.

Further detail regarding the visual assessment and survey assessment procedures is provided in the CGO's Monitoring Programme for Detection of any Movement of Lake Protection Bund, Water Storage and Tailings Structures and Pit/Void Walls.

5 WILDLIFE MANAGEMENT

The FFMP outlines a number of measures relevant to cyanide and wildlife management including:

- Mechanisms to keep fauna and avifauna away from the tailings storages/IWL including:
 - minimising the area of open water in the tailings storages/IWL;
 - fencing to prevent both medium and large fauna, terrestrial and amphibians, from entering the area;
 - making the area non-conducive to the establishment of wildlife habitats, as far as possible (e.g. rehabilitation of the embankments of the tailings storages and the IWL during operations will continue to include rock mulch and pasture cover only); and
 - use of current best practice methods for avifauna deterrence.
- Methods for monitoring the daily and seasonal fauna usage of the tailings storages/IWL.
- Plans for the rescue and rehabilitation of wildlife.
- A protocol for investigating and reporting cyanide-related native fauna deaths .
- Provision of fauna autopsy facilities.
- Investigation of whether native fauna death(s) recorded on the mining lease occurred as a result of cyanide in the tailings storages/IWL.
- Contingency measures for reducing cyanide levels in the tailings dams/IWL in the event it is established that fauna deaths are occurring from cyanide in tailings storage water, in accordance with Development Consent Condition 3.2(b)(iv) (refer also Development Consent Condition 5.3(c)).
- Training of CGO Environment Department staff.

5.1 INVESTIGATION OF WHETHER NATIVE FAUNA DEATHS OCCURRED AS A RESULT OF CYANIDE FROM CGO

The following procedure will be implemented to investigate whether recorded native fauna death(s) occurred as a result of cyanide from CGO:

- Step 1** – Conduct autopsy of dead fauna (refer to the FFMP), if the cause of death is unknown.
- Step 2** – If it is determined that cause of death was cyanide-related, report findings to the OEHL, DRG, EPA and CEMCC, and in the case of fish, Fisheries NSW within 24 hours (or the next working day).

6 CYANIDE MONITORING PROGRAMME

In accordance with Development Consent Condition 5.3(d), a cyanide monitoring programme has been prepared in consultation with EPA and DRG and includes:

- monitoring of CN_{WAD} levels of the aqueous component of the tailings slurry stream at the process plant (Section 6.2);
- monitoring CN_{WAD} levels in the decant water of the tailings storages/IWL (Section 6.2);
- an on-site laboratory for quickly establishing CN_{WAD} levels in the liquid at the process plant and in the decant ponds for monitoring purposes (Section 6.2);
- on-line monitoring of HCN (i.e. a form of CN_{FREE}^1 , as discussed in Appendix G of the EIS) at locations where employees are operating (Section 6.3); and
- a monitoring regime for the detection of cyanide movement beneath and adjacent to the tailings storages/IWL (Section 6.4).

6.1 REPORTING OF MONITORING

In accordance with Development Consent Condition 5.3(d) a summary of the cyanide monitoring results will be provided on Evolution's website (<http://www.evolutionmining.com.au>) on a regular basis, or as directed by the Secretary. All monitoring results will also be included in the Annual Review (refer to Section 9 for reporting obligations).

6.2 CN_{WAD} LEVELS AT THE PROCESS PLANT AND IN THE DECANT WATER OF THE TAILINGS STORAGES

Sections 6.2.1 to 6.2.4 describe the monitoring locations and frequency, sample collection, laboratory analysis, and data management for monitoring CN_{WAD} levels at the process plant and for monitoring CN_{WAD} levels in the decant water of the tailings storages/IWL. Section 6.2.5 outlines the review of this monitoring programme.

6.2.1 Monitoring Locations and Frequency

CN_{WAD} levels of the aqueous component of the tailings slurry stream will be monitored at the process plant twice daily (or as otherwise directed by the Secretary of the DP&E), in accordance with Development Consent Condition 5.3(d)(i). In accordance with Development Consent Condition 5.3(d)(ii), CN_{WAD} levels in the decant water of the tailings storages/IWL will be monitored twice daily (or as otherwise directed by the Secretary of the DP&E).

CN_{WAD} levels will also be monitored at several groundwater monitoring bores surrounding the IWL as described in Section 6.4.

¹ CN_{FREE} : Free cyanide, generally includes the cyanide ion (CN^-) and HCN.

6.2.2 Sample Collection

CN_{WAD} samples will be collected at the process plant and in the decant water of the tailings storages/IWL using the following procedures and methodologies.

1. CN_{WAD} samples will be collected twice daily at the process plant and in the decant water of the tailings storages/IWL in accordance with the *AS/NZS 5667:1:1998 Water Quality – Sampling* and preserved in accordance with American Public Health Association (APHA) (2017) *Standard Methods for the Examination of Water and Wastewater* (APHA Standard Methods) (Method 4500-CN-B *Preliminary Treatment of Samples*) for analysis at an off-site laboratory located in West Wyalong.
2. CN_{WAD} samples will also be collected twice daily at the process plant and in the decant water of the tailings storages/IWL (at the same time as the abovementioned samples) in accordance with the *AS/NZS 5667:1:1998 Water Quality – Sampling* and preserved in accordance with APHA Standard Method 4500-CN-B *Preliminary Treatment of Samples* for analysis at the on-site laboratory.
3. Additional CN_{WAD} samples will be collected at the process plant weekly (at the same time as the abovementioned samples) in accordance with *AS/NZS 5667:1:1998 Water Quality – Sampling* and preserved in accordance with APHA Standard Method 4500-CN-B *Preliminary Treatment of Samples* for analysis at a National Association of Testing Authorities (NATA) accredited laboratory.

The sampling programme will be consistent with the quality assurance/quality control measures required by *AS/NZS 5667:1:1998 Water Quality – Sampling* guidelines and APHA Standard Methods. A sample register will be maintained on-site for each sample collected.

Sample collection will be undertaken by appropriately qualified staff and appropriate safety precautions (such as gloves and protective clothing) will be employed.

6.2.3 Laboratory Analysis

6.2.3.1 On-site Laboratory Analysis

In accordance with Development Consent Condition 5.3(d)(iii) an on-site laboratory has been established to quickly establish CN_{WAD} levels in the liquid at the process plant and in the decant ponds for monitoring purposes. CN_{WAD} samples collected twice daily at the process plant and in the decant water of the tailings storages/IWL will be analysed at the on-site laboratory. The samples will be analysed for CN_{WAD} in the on-site laboratory using Picric Acid Colorimetric determination (or any other method considered appropriate in consultation with the DRG, the EPA and the DP&E). The CN_{WAD} samples will then also be analysed at the on-site laboratory using APHA Standard Method 4500-CN-I *Weak Acid Dissociable Cyanide* (except instead of manual distillation, an automated VELP distillation unit will be used and instead of sulphuric acid as the pH modifier, magnesium chloride will be used) and then using the APHA Standard Method 4500-CN-E *Colorimetric Method*. The results of the on-site analysis will be verified by the off-site laboratory analysis set out in Section 6.2.3.2.

An automated CN_{WAD} sampler (i.e. a Cyanoprobe analyser) would also be used on-site to assist with quickly establishing CN_{WAD} levels in the liquid at the process plant and in the decant ponds.

6.2.3.2 Off-site Laboratory Analysis

CN_{WAD} samples will be collected twice daily at the process plant and in the decant water of the tailings storages/IWL in accordance with *AS/NZS 5667:1:1998 Water Quality – Sampling* and will be analysed at an off-site laboratory located in West Wyalong. The samples will be analysed for CN_{WAD} at the off-site laboratory in accordance with APHA Standard Method 4500-CN-I *Weak Acid Dissociable Cyanide* (except instead of manual distillation an automated VELP distillation unit will be used and instead of sulphuric acid as the pH modifier, magnesium chloride will be used) and then using the APHA Standard Method 4500-CN-E *Colorimetric Method*.

The additional weekly CN_{WAD} samples collected at the process plant will be sent as soon as practicable² for analysis at an off-site NATA-accredited laboratory for analysis in accordance with APHA Standard Method 4500-CN-O *Total Cyanide and Weak Acid Dissociable Cyanide by Flow Injection Analysis*. The CN_{WAD} results from the NATA-accredited laboratory will be used to verify the CN_{WAD} results from the on-site laboratory and off-site laboratory in West Wyalong.

For samples sent to off-site laboratories, a sample chain-of-custody (CoC) form will be completed for each sample collected. A copy of the CoC will be provided to the laboratory with the samples. A copy of the CoC will be held on site for the life of the CGO.

6.2.4 Data Management

Data obtained by the monitoring of CN_{WAD} levels at the process plant and in the decant water of the tailings storages/IWL will be maintained on-site by the Metallurgy Manager (or delegate) in accordance with the requirements of EPL Condition M1.

6.2.5 Monitoring Programme Review

The monitoring programme for CN_{WAD} levels at the process plant and in the decant water of the tailings storages/IWL was reviewed subsequent to the first two months of operations in consultation with the EPA, the then DMR and the then Director General for Planning.

The monitoring program was reviewed and updated in 2017 in consultation with the EPA to contemporise the sampling and on-site and off-site laboratory procedures. The monitoring program is also subject to periodic EPA review as a part of the EPA's EPL auditing procedures.

The monitoring programme outlined in Section 6.2 will also be reviewed and revised/updated if necessary, as a result of the review process prescribed by Development Consent Condition 9.1(c) described in Section 10.3.

6.3 ON-LINE MONITORING OF CN_{FREE} AT LOCATIONS WHERE EMPLOYEES ARE OPERATING

Development Consent Condition 5.3(d)(iv) requires the on-line monitoring of CN_{FREE} levels at locations where employees are operating. As cyanide is transported to the CGO in solids isotainers which are then sparged directly as a liquid into an on-site sparge mixing tank, employee contact with solid cyanide (i.e. fine cyanide dust) will not occur during sparging or storage. As a result, on-line monitoring will only be conducted for the HCN gas component of CN_{FREE}. In the event that an emergency brings employees into contact with solid cyanide (e.g. ruptured solids isotainers), the appropriate emergency response will be initiated, in accordance with the HMMP and PIRMP.

This section outlines the on-line (i.e. ambient) monitoring of HCN gas that will be undertaken with regard to employee safety.

² Samples will be sent within a period of time which does not compromise sample integrity.

The on-line monitoring of HCN gas will be carried out at the cyanide sparging and storage area and in the processing plant, as follows:

- at the cyanide sparging and storage area;
- above the leach tanks;
- at cyanide destruct tanks;
- at the leach tail safety screen;
- at the top and bottom of the elution column; and
- at the electrowinning section.

The ambient monitoring units will take continuous readings and display the results in the process control centre. In addition to the ambient monitors, employees may be required to carry personal monitoring units in designated areas.

Both personal and ambient HCN gas monitoring units will trigger alarms at the National Occupational Exposure Limits detailed in the relevant SDS. Ambient monitoring units will be equipped with a flashing light and siren. Personal monitoring units will vibrate and sound a high pitched alarm.

Section 7.1.1 describes the procedure that will be followed in the event the ambient or personal monitoring units trigger an alarm, while Section 7.1.2 outlines the contingency measures available to reduce levels of HCN gas for employee safety.

6.4 DETECTION OF CYANIDE MOVEMENT BENEATH AND ADJACENT TO THE TAILINGS STORAGE/IWL

Development Consent Condition 5.3(d)(v) requires a monitoring programme to be established for the detection of cyanide movement beneath and adjacent to the tailings storages/IWL.

As discussed in Section 4.2.3.3, the existing tailings storage facilities and the IWL have been assessed for their potential seepage impacts on groundwater (quality, flows and levels).

Monitoring of CN_{WAD} levels will be undertaken at a network of groundwater monitoring bores to monitor cyanide movement beneath and adjacent to the tailings storages/IWL. The network comprises of:

- IWL monitoring bores IWL01 A & B, IWL02 A & B, IWL03 A & B, IWL04 A & B, IWL05 A & B and IWL06 A & B;
- down-gradient bores P417 A & B, P418 A & B and P516 A & B; and
- up-gradient bore P555 A-R.

Development of the IWL requires the following bores to be decommissioned:

- down-gradient bores P412 A & P412 A-R, P414 A & B;
- up-gradient bore P558A-R; and
- tailings storage monitoring bores MON01A & MON01B, MON02A & MON02B and TSFA, TSFB and TSFC.

The above monitoring bores will be decommissioned (in approximately June 2019) following a 6-month preliminary co-monitoring period with the new IWL monitoring bores.

A variation to EPL 11912 will be prepared to reflect the revised groundwater monitoring network.

The locations of the groundwater monitoring bores are shown on Figure 4. The groundwater monitoring bores will be sampled for CN_{WAD} quarterly. Sampling of the groundwater monitoring bores will be undertaken using the *AS/NZS 5667:1998 Water Quality – Sampling* series. In accordance with EPL 11912, analysis of the groundwater samples will be conducted using the APHA Standard Methods. Water quality samples will be labelled and placed in a refrigerator within one hour (or chilled on ice and kept in the dark). Samples will be sent by the following working day for analysis at an off-site NATA-accredited laboratory.

A laboratory CoC form will be completed for each batch of samples. A copy of the CoC will be provided to the laboratory along with the water samples. A copy of the CoC will be retained on-site.

The CN_{WAD} results that are obtained for the groundwater bores will be recorded and retained as required by EPL 11912.

6.5 CN_{FREE} AND CN_{WAD} LEVELS IN THE PROCESSING PLANT

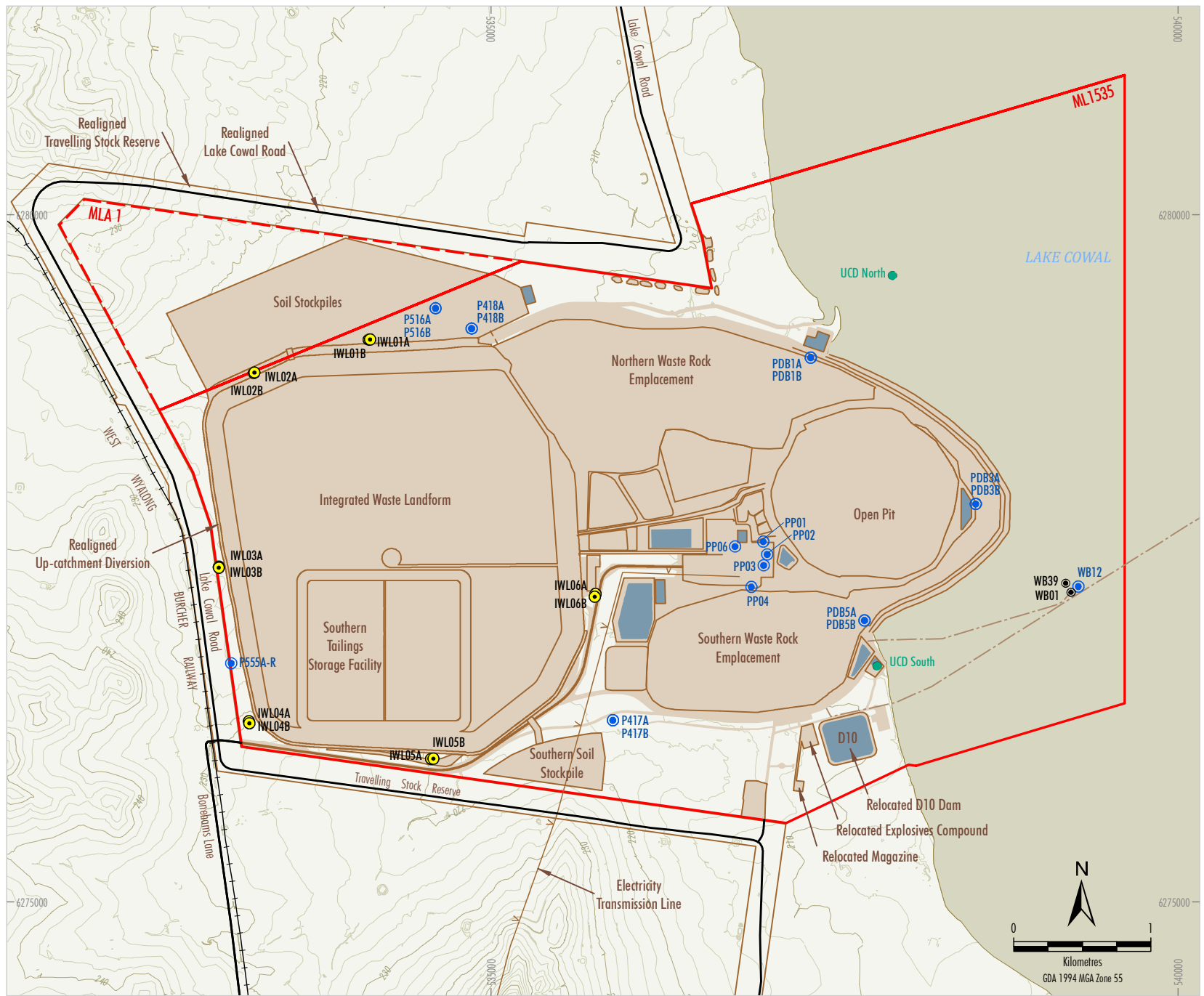
CN_{FREE} and CN_{WAD} levels will be monitored in the processing plant to provide information relevant to process control and/or cyanide destruction, as described below. As described in Section 6.3, on-line monitoring of the HCN gas component of CN_{FREE} will be undertaken at locations where employees are operating.

CN_{FREE} levels in solution will be monitored at a number of locations in the processing plant for process control and cyanide destruction (i.e. to regulate the dosage of Caro's Acid or other approved process reagents and to ensure cyanide in the tailings is destroyed down to the required levels). On-line monitoring of CN_{FREE} levels in solution will be conducted using a Cyanoprobe automated unit (or other instrumentation considered appropriate in consultation with DRG, EPA and the DP&E). Elevated levels of CN_{FREE} will be displayed in the process control centre where corrective actions will be implemented.

On-line monitoring of CN_{FREE} levels in solution will be conducted in the first and/or second leach tanks to control the rate and efficiency of dissolution of the gold in the leach circuit. The rate of cyanide addition will be determined by laboratory test work conducted on the type of ore being treated. Routine geochemical assays of the ore feed will be conducted so that the anticipated cyanide levels can be derived from known concentrations of copper and zinc.

On-line monitoring of CN_{FREE} levels in solution will also be conducted in the final leach tank; the rate of cyanide addition will be fine tuned in the plant to control the level of cyanide in the final leach tank. The aim is for the CN_{FREE} level to be as low as possible. The CN_{FREE} level will determine the quantity of Caro's Acid or other approved process reagents required to be used in the cyanide destruction process.

On-line monitoring of CN_{FREE} levels and pH in solution will also be conducted in the tailings discharge water. In the event this on-line monitoring indicates that CN_{FREE} levels in the tailings discharge water would result in CN_{WAD} levels that would exceed 30 mg/L in the aqueous component of the tailings slurry stream at the process plant at any time, system alarms will be triggered and automated shutdown of the discharge to the tailings storages/IWL will occur.



LEGEND

- Mining Lease Boundary (ML 1535)
- Mining Lease Application Boundary (MLA 1)
- Approximate Extent of Surface Development
- Contained Water Storage
- CGO Production Bore
- Groundwater Level and Quality Monitoring Bore
- IWL Groundwater Level and Quality Monitoring Bore
- Up-catchment Drainage Monitoring Site

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



CYANIDE MANAGEMENT PLAN
Location of Groundwater Bores used to Monitoring CN_{WAD}

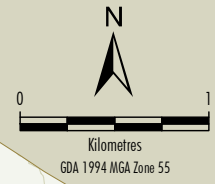


Figure 4

CN_{WAD} levels will also be sampled at a number of locations and analysed at the on-site laboratory. Samples will be taken of the final Carbon-In-Leach tank discharge and the cyanide destruction system discharge, the latter by an automated CN_{WAD} sampler. CN_{WAD} levels will also be sampled in the aqueous component of the tailings slurry stream at the process plant and in the decant water of the tailings storages/IWL, as described in Section 6.2. Samples collected at these points will be analysed at off-site and on-site laboratories. In the event CN_{WAD} levels at the process plant exceed 20 mg/L (90 percentile over six months) or 30 mg/L (at any time), one or more of the contingency measures outlined in Section 7.2.1 will be implemented to reduce CN_{WAD} levels to below these levels.

7 CONTINGENCY MEASURES FOR CYANIDE REDUCTION

Development Consent Condition 5.3(b)(iii) requires the CMP to provide contingency measures for reducing cyanide levels. Section 7.1 provides contingency measures for the reduction of HCN levels in areas where employees are operating. Section 7.2 provides contingency measures for reducing CN_{WAD} levels in the event CN_{WAD} levels exceed 20 mg/L (90 percentile over six months) or 30 mg/L (at any time) at the process plant. Section 7.3 outlines contingency measures for reducing cyanide levels in the tailings storages/IWL in the event it is established that native fauna deaths are occurring from cyanide in tailings storage/IWL water. Section 7.4 describes the process for EPA review of cyanide levels in the event of native fauna deaths occurring due to cyanide.

7.1 CONTINGENCY MEASURES FOR REDUCING HYDROGEN CYANIDE LEVELS AT LOCATIONS WHERE EMPLOYEES ARE OPERATING

7.1.1 Procedure

The following procedure indicates when contingency measures will be used to reduce HCN levels for employee safety:

Step 1 – Personal or ambient monitoring alarms sound indicating HCN levels are at or above 10 parts per million (ppm).

In the case of an ambient monitor, a siren and flashing lights will be activated and HCN levels will be displayed in the process control centre.

In the case of a personal monitor, the monitor will vibrate and emit a high pitched alarm.

Step 2 – Personnel will be evacuated from the alarm-activated area and the appropriate standard operating procedure will be initiated. Personnel will not be permitted to enter the area in question without the correct personal protective equipment.

Step 3 – Process control centre personnel will investigate the possible causes of the alarm and implement appropriate contingency measures where necessary.

7.1.2 Contingency Measures

In the event HCN levels reach 10 ppm in the cyanide sparging and storage area, personnel will be evacuated, and the appropriate standard operating procedure will be initiated. Personnel will not be permitted to return to the cyanide sparging and storage area without the correct personal protective equipment or until safe HCN levels are achieved.

The contingency measures implemented by the process control centre to reduce HCN levels in the processing plant will vary depending on the circumstances (e.g. the particular HCN levels, the cause of the increased levels and the plant location). The following measures are available to reduce HCN levels in the processing plant:

- reduce the amount or rate of cyanide addition;
- increase the pH of the cyanide solution/process stream;
- reduce the rate of ore feed;

- change the blend of the ore; or
- shut down the process plant.

Each of the above measures will take some time to reduce the level of HCN. Employees will not be permitted to access the area in question without the correct personal protective equipment or until safe HCN levels are achieved.

7.2 CONTINGENCY MEASURES FOR REDUCING CN_{WAD} LEVELS DUE TO LEVELS EXCEEDING 20 MG/L (90 PERCENTILE OVER SIX MONTHS) OR 30 MG/L (AT ANY TIME) AT THE PROCESS PLANT

This section provides contingency measures for the reduction of CN_{WAD} levels at the process plant in accordance with Development Consent Condition 5.3(b)(iii). The CGO's processing plant has been designed so that CN_{WAD} levels at the process plant do not exceed 20 mg/L (90 percentile over six months) and 30 mg/L (at any time) (North Limited, 1998). As a result, it is not anticipated that the contingency measures provided below would ever need to be activated.

7.2.1 Contingency Measures

In the event CN_{WAD} levels at the process plant exceed 20 mg/L (90 percentile over six months) or 30 mg/L (at any time), one or more of the following contingency measures will be implemented to reduce CN_{WAD} levels to below these levels:

- in accordance with Development Consent Condition 5.3(d)(i), in the event CN_{WAD} levels exceed 30 mg/L in the aqueous component of the tailings slurry stream at the process plant at any time, discharge to the tailings storages/IWL will cease until CN_{WAD} levels can be achieved below the levels stated in Development Consent Condition 5.3(a);
- increase the amount or dosage rate of cyanide destruction chemicals being used in the cyanide destruction circuit to achieve lower cyanide levels at the process plant;
- reduce the amount or rate of cyanide addition;
- reduce the rate of ore feed;
- change the blend of the ore;
- modify the cyanide destruction circuit being used (e.g. change to the back-up cyanide destruction unit);
- add cyanide destruction chemicals directly to the tailings storages/IWL; or
- add dilution water, if available.

Monitoring of the effectiveness of the contingency measures will be undertaken.

7.3 CONTINGENCY MEASURES FOR REDUCING CYANIDE LEVELS IN THE TAILINGS STORAGE/IWL FOLLOWING NATIVE FAUNA DEATHS

Development Consent Condition 3.2(b)(iv) requires contingency measures for reducing cyanide levels in the tailings storages/IWL in the event it is established that native fauna deaths are occurring from cyanide in tailings storage/IWL water.

The process for determining whether native fauna deaths are occurring from cyanide in the tailings storage water is contained in Section 5.1 of this CMP.

The following are contingency measures that may be implemented to reduce cyanide levels in the tailings storages/IWL in the event it is established that native fauna deaths are occurring from cyanide in the tailings storage/IWL water:

- increase the amount or dosage rate of cyanide destruction chemicals being used in the cyanide destruction circuit to achieve lower cyanide levels within the tailings storages/IWL;
- reduce the amount or rate of cyanide addition;
- reduce the rate of ore feed;
- change the blend of the ore;
- modify the cyanide destruction circuit being used (e.g. change to the back-up cyanide destruction unit);
- add cyanide destruction chemicals directly to the tailings storages/IWL to lower existing cyanide levels; or
- add dilution water, if available.

In the event that one or more contingency measures are implemented, regular monitoring of the effectiveness of the contingency measures will be undertaken.

7.4 REVIEW OF CYANIDE LEVELS FOLLOWING FAUNA DEATHS

As set out in Development Consent Condition 5.3(c), in the event of wildlife deaths occurring due to cyanide, the EPA shall conduct a review of cyanide levels in consultation with Evolution and the DRG. Any decision to require cyanide reduction will include, but not be limited to, the consideration of:

- (a) the number of fauna deaths;
- (b) the species of fauna involved in deaths;
- (c) the antecedent condition of the species;
- (d) methods employed at the time to prevent use of tailings by fauna; and
- (e) antecedent climatic and surface water conditions of the lake and surrounding areas.

Evolution will notify the CEMCC of any reductions in cyanide levels as soon as practicable.

8 STAKEHOLDER CONSULTATION

8.1 COMMUNITY ENVIRONMENTAL MONITORING AND CONSULTATIVE COMMITTEE

A CEMCC has been set up for the CGO in accordance with Development Consent Condition 9.1(d). The condition is reproduced below:

9.1 Environmental Management

(d) *Community Environmental Monitoring and Consultative Committee*

(i) *The Applicant shall establish and operate a Community Environmental Monitoring and Consultative Committee (CEMCC) for the development to the satisfaction of the Secretary. This CEMCC must:*

- *be comprised of an independent chair and at least 2 representatives of the Applicant, 1 representative of BSC, 1 representative of the Lake Cowal Environmental Trust (but not a Trust representative of the Applicant), 4 community representatives (including one member of the Lake Cowal Landholders Association);*
- *be operated in general accordance with the Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects (Department of Planning, 2007, or its latest version).*
- *monitor compliance with conditions of this consent and other matters relevant to the operation of the mine during the term of the consent.*

Note: The CEMCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Applicant complies with this consent.

(ii) *The Applicant shall establish a trust fund to be managed by the Chair of the CEMCC to facilitate the functioning of the CEMCC, and pay \$2000 per annum to the fund for the duration of gold processing operations. The annual payment shall be indexed according to the Consumer Price Index (CPI) at the time of payment. The first payment shall be made by the date of the first Committee meeting. The Applicant shall also contribute to the Trust Fund reasonable funds for payment of the independent Chairperson, to the satisfaction of the Secretary.*

...

As required by Development Consent Condition 9.1(d)(i), the CEMCC comprises an independent chair and representatives of the Bland Shire Council, Lake Cowal Environmental Trust, two Evolution representatives and four community representatives including one from the Lake Cowal Landholders Association. The CEMCC also includes representatives from the Forbes Shire Council and Lachlan Shire Council.

The CEMCC provides an opportunity for members of the community to attend CEMCC meetings to discuss specific issues relevant to them, including any concerns relating to cyanide. A landholder can make a request to the CEMCC regarding a particular issue, or the landowner can register a complaint in the complaints register. Landowners who register complaints may be invited to join in discussion of the issue at the next CEMCC meeting.

The CEMCC meets quarterly and in accordance with Development Consent Condition 9.4(a)(vi) the minutes of the CEMCC meetings are provided on Evolution's website (www.evolutionmining.com.au).

8.2 COMPLAINTS REGISTER AND RECORDS

8.2.1 Complaints Register

A process for the handling of complaints is provided below in accordance with the requirements of the CGO's EPL and Development Consent conditions and to facilitate prompt and comprehensive responses to any community concerns.

As required by EPL Condition M6.1, a dedicated Community Complaints Line has been established (via phone [02] 6975 3454 or email community.cowal@evolutionmining.com.au) that is available 24 hours, seven days a week for community members who have enquiries or who wish to lodge complaints in relation to Evolution's activities at the CGO.

A complaints register will be maintained by the CGO Sustainability Manager in accordance with EPL Condition M5 and will be made available on Evolution's website in accordance with Development Consent Condition 9.4(a)(v).

Information recorded in the complaints register with respect to each complaint will include:

- date of complaint;
- the method by which the complaint was made;
- nature of complaint; and
- response action taken to date (if no action was taken, the reasons why no action was taken).

An initial response will be provided to the complainant within 24 hours. Preliminary investigations into the complaint will commence within 48 hours of complaint receipt.

8.2.2 Complaints Records for EPL 11912

Condition M5 of EPL 11912 includes specific requirements for recording of all complaints made in relation to pollution arising from any activity to which EPL 11912 applies. The record will include details of the following:

- the date and time of the complaint;
- the method by which the complaint was made;
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
- the nature of the complaint;
- the action taken by Evolution in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by Evolution, the reasons why no action was taken.

The record of a complaint will be kept for at least four years after the complaint was made. The record will be available for inspection by the EPA.

9 REPORTING

9.1 ANNUAL REVIEW

In accordance with Condition 9.1(b) of the Development Consent, Evolution will prepare an Annual Review to report on the environmental performance of the CGO by the end of July each year, or other timing as may be agreed by the Secretary of the DP&E. The Annual Review will be made publicly available on Evolution's website (www.evolutionmining.com.au) in accordance with Development Consent Condition 9.4(a)(vii). The Annual Review will also address the Annual Environmental Management Report requirements of ML 1535 Condition of Authority 26.

The Annual Review will report on cyanide management and use and the cyanide monitoring programme. Cyanide monitoring results collected in accordance with Development Consent Condition 5.3(d)(i) will be reported in the Annual Review (Section 9.3).

9.2 ANNUAL RETURN

In accordance with Condition R1 of the EPL 11912, Evolution will prepare an Annual Return for submission to the EPA, which reports on compliance with the conditions of the EPL. The Annual Return will report on compliance with the cyanide management and monitoring requirements of the EPL (Section 2.3).

In addition, in accordance with Section 66(6) of the PoEO Act and written requirements of the EPA, monitoring data collected as a result of an EPL condition will be made publicly available on Evolution's website (www.evolutionmining.com.au).

9.3 INCIDENT NOTIFICATION AND REPORTING

An incident is defined in the CGO Development Consent as:

A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in this Consent.

In accordance with Development Consent Condition 9.3(a) Evolution will notify the DP&E in writing to compliance@planning.nsw.gov.au, and any other relevant agencies immediately after becoming aware of any incident related to the CGO. Evolution will provide the DP&E and any other relevant agencies with a detailed report on the incident, and any further reports that may be requested.

In addition, in accordance with EPL 11912 Condition R2, Evolution will notify the EPA (and all other relevant authorities) of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident. Evolution will provide written details of the notification to the EPA within seven days of the date on which the incident occurred. Evolution will maintain a record of/and report on any cyanide-related incidents

9.4 NON-COMPLIANCE NOTIFICATION AND REPORTING

A non-compliance is defined within the Development Consent as:

An occurrence, set of circumstances, or development which is a breach of the development Consent but is not an incident.

In accordance with Development Consent Condition 9.5(b), Evolution will notify the DP&E in writing to compliance@planning.nsw.gov.au within seven working days after becoming aware of any non-compliance with the Development Consent Conditions. Evolution will provide in writing to the DP&E a detailed report of the non-compliance which identifies, the development application number for the CGO, the Development Consent Condition of which the CGO is non-compliant, the way in which the CGO does not comply and the reason for the non-compliance. The CGO will also provide details around any actions which have been or will be taken to address the non-compliance.

9.5 CN_{WAD} REPORTING

In accordance with Development Consent Condition 5.3(d)(i), any CN_{WAD} measurements of the aqueous component of the tailings slurry stream at the process plant verified by the off-site laboratory in West Wyalong as exceeding 20 mg/L CN_{WAD} will be assessed daily (to ensure that CN_{WAD} levels do not exceed 20 mg/L [90 percentile over six months]) and reported in the Annual Review, unless otherwise agreed by the Secretary of the DP&E.

As required by Development Consent Condition 5.3(b)(i), in the event CN_{WAD} levels are verified by the off-site laboratory in West Wyalong as exceeding 30 mg/L in the aqueous component of the tailings slurry stream at the process plant at any time, discharge to the tailings storages/IWL shall cease until CN_{WAD} levels can be reduced to below the levels stated in Development Consent Condition 5.3(a), and the exceedance will be reported to the EPA within 24 hours.

In accordance with Development Consent Condition 5.3(d) a summary of the cyanide monitoring results will be provided on Evolution's website on a regular basis, or as directed by the Secretary of the DP&E.

10 AUDITING AND REVIEW

10.1 HAZARD AUDIT

In accordance with Development Consent Condition 5.4(c), a comprehensive hazard audit of the proposed development was conducted (by a duly qualified independent person or team approved by the then Department of Planning [DoP]) 12 months after the commencement of operations and an audit report submitted to the then Director-General for Planning.

As required by Development Consent Condition 5.4(c) Evolution will continue to conduct audits every three years or as determined by the Secretary and a report of each audit will be submitted to the Secretary within a month of the audit. Hazard audits will be carried out in accordance with the DP&E's *Hazardous Industry Planning Advisory Paper No. 5, Hazard Audit Guidelines*.

10.2 EXTERNAL AUDITS

10.2.1 Independent Environmental Audit

An Independent Environmental Audit will be conducted in accordance with Development Consent Condition 9.2(a) and will include auditing of the CGO's compliance with the conditions of the Development Consent, EPL 11912 and the Conditions of Authority for ML 1535. Development Consent Condition 9.2(a) is reproduced below:

9.2 *Independent Auditing and Review*

(a) *Independent Environmental Audit*

(i) *By the end of July 2016, and every 3 years thereafter, unless the Secretary directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:*

- *Be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;*
- *Include consultation with relevant regulatory agencies, BSC and CEMCC;*
- *Assess the environmental performance of the development and assess whether it is complying with the requirements in this consent and any other relevant approvals (such as environment protection licences and/or mining lease (including any assessment, plan or program required under this consent);*
- *Review the adequacy of any approved strategy, plan or program required under this consent or the abovementioned approvals; and*
- *Recommend measures or actions to improve the environmental performance of the development, and/or strategy, plan or program required under this consent.*

Note: This audit team must be led by a suitably qualified auditor, and include ecology and rehabilitation experts, and any other fields specified by the Secretary.

(ii) *Within 3 months of commissioning this audit, or as otherwise agreed by the Secretary, the Applicant shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report, and a timetable for the implementation of these recommendations as required. The applicant must implement these recommendations, to the satisfaction of the Secretary.*

This process provides a mechanism by which management and monitoring of cyanide at the CGO can be assessed against relevant Development Consent, mining lease and licence conditions, legislation and Australian Standards.

10.2.2 Cyanide Management Code Audit

As described in Section 3.2, a requirement of the Cyanide Management Code certification process includes annual audits by the ICMI against the requirements of the Cyanide Management Code.

The CGO will continue to be subject to annual audits against the Cyanide Management Code requirements while it is a signatory to the Code.

10.2.3 Independent Monitoring Panel

In accordance with Development Consent Condition 9.2(b), an Independent Monitoring Panel (IMP) has been established to review the CGO's Annual Reviews, Independent Environmental Audits and all environmental management procedures including cyanide monitoring procedures and results required by Development Consent Condition 9.2(b). The requirements of Development Consent Condition 9.2(b) relevant to the IMP are provided below:

- (i) *The Applicant shall at its own cost establish an Independent Monitoring Panel prior to commencement of construction. The Applicant shall contribute \$30,000 per annum for the functioning of the Panel, unless otherwise agreed by the Secretary. The annual payment shall be indexed according to the Consumer Price Index at the time of payment. The first payment shall be paid by the date of commencement of construction and annually thereafter. Selection of the Panel representatives shall be agreed by the Secretary in consultation with relevant government agencies and the CEMCC. The Panel shall at least comprise two duly qualified independent environmental scientists and a representative of the Secretary.*
- (ii) *The panel shall:*
 - *provide an overview of the annual reviews and independent audits required by conditions 9.1(b) and 9.2(a) above;*
 - *regularly review all environmental monitoring procedures undertaken by the Applicant, and monitoring results; and*
 - *provide an Annual State of the Environment Report for Lake Cowal with particular reference to the on-going interaction between the mine and the Lake and any requirements of the Secretary. The first report shall be prepared one year after commencement of construction. The report shall be prepared annually thereafter unless otherwise directed by the Secretary and made publicly available on the Applicant's website for the development within two weeks of the report's completion.*

Recommendations from the IMP's Annual Statement of the Environment Report and Evolution's responses to the report will be included in the Annual Review and also provided on Evolution's website.

10.3 REVIEW OF THIS CMP

In accordance with Condition 9.1(c) of the Development Consent, this CMP will be reviewed within three months of:

- the submission of an Annual Review under Condition 9.1(b);
- the submission of an incident report under Condition 9.3(a);
- the submission of an audit under Condition 9.2(a);
- the submission of an Annual State of the Environment Report under Condition 9.2(b);
- the approval of any modification to the conditions of the Development Consent; or
- any direction of the Secretary under Condition 1.1(c).

Where this review leads to revisions of the CMP, then within four weeks of the review, the revised CMP will be submitted for the approval of the Secretary of the DP&E (unless otherwise agreed with the Secretary). The revision status of this CMP is indicated after the title page of this CMP.

This CMP will be made publicly available on Evolution's website (www.evolutionmining.com.au) in accordance with Condition 9.4(a)(iii) of the Development Consent. A hard copy of the CMP will also be kept at the CGO.

11 REFERENCES

- American Public Health Association (2012) *Standard Methods for the Examination of Water and Wastewater*, 21st Edition, 4500-CN. American Public Health Association, Washington.
- Australian Heritage Commission (1992) *Register of the National Estate. Detailed Place Report for Lake Cowal*. Australian Heritage Commission, Canberra.
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- Coffey Services Australia Pty Ltd (2018b) *Cowel Gold Operations Processing Rate Modification (MOD 14) – Additional Post Mine Closure Groundwater Modelling at the Integrated Waste Landform*.
- Department of Mineral Resources (2002) *Minerals Industry Safety Handbook*.
- Environment Australia (2003) *Best Practice Environmental Management in Mining – Cyanide Management*. Best Practice Environmental Management in Mining Series. Commonwealth of Australia.
- Environment Protection Authority (1999) *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-liquid Wastes*. Department of Environment and Conservation (NSW).
- Evolution Mining (Cowel) Pty Limited (2018) *Cowel Gold Operations Processing Rate Modification Environmental Assessment*.
- International Cyanide Management Institute (2018) *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold*.
- North Limited (1998) *Cowel Gold Project: Environmental Impact Statement*. Prepared by Resource Strategies Pty Ltd.
- Pinnacle Risk Management Pty Ltd (2004a) *HAZOP Study Report Cowal Gold Project, NSW*. Report prepared for Barrick Australia Limited.
- Pinnacle Risk Management Pty Ltd (2004b) *Final Hazard Analysis Cowal Gold Project, NSW*. Report prepared for Barrick Australia Limited.
- Pinnacle Risk Management Pty Ltd (2005a) *Supplementary HAZOP Study Report Cowal Gold Project, NSW*. Report prepared for Barrick Australia Limited.
- Pinnacle Risk Management Pty Ltd (2005b) *Fire Safety Study Cowal Gold Project, NSW*. Report prepared for Barrick Australia Limited.

APPENDIX A
LEGISLATIVE REGIME

The following sections identify major requirements in the areas of dangerous goods, pollution and mining which may be of relevance to cyanide management at the CGO.

Dangerous Goods Laws

Work Health and Safety Act 2011 (NSW), Work Health and Safety Regulation 2017 (NSW)

The *Work Health and Safety Act 2011* and the supporting *Work Health and Safety Regulation 2017* regulates the storage, handling and processing of dangerous goods (apart from explosives) in NSW.

Dangerous Goods (Road and Rail Transport) Act 2008, Dangerous Goods (Road and Rail Transport) Regulation 2014,

The *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW) and the *Dangerous Goods (Road and Rail Transport) Regulation 2014* (NSW) regulates the transport of dangerous goods (other than explosives) by road and rail in NSW. It enables the making of regulations in relation to all aspects of the transportation of dangerous goods, including importing, loading, consigning, marking and placarding of goods and driving of vehicles. It creates a number of offences, including the offence of failing to ensure, as far as practicable, that dangerous goods are transported in a safe manner.

Pollution Laws

Protection of the Environment Operations Act 1997 (NSW)

This Act creates a number of offences relevant to the management of cyanide, including:

- non-compliance with EPL licence conditions;
- the wilful or negligent disposal of waste in a manner that harms or is likely to harm the environment;
- the wilful or negligent causing of a substance to leak, spill or otherwise escape in a manner that harms or is likely to harm the environment;
- the unlawful transporting of waste;
- the pollution of waters; and
- the proposed new offence of land pollution.

Mining Laws

Work Health and Safety (Mines and Petroleum Sites) Act 2013, Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

The *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and the supporting *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* regulates the safety of persons and workers at mine and petroleum sites, and ensures effective provisions for emergencies are in place.

APPENDIX B

CODES OF PRACTICE, AUSTRALIAN STANDARDS AND OTHER GUIDELINES

CODES OF PRACTICE

A number of industry codes of practice have been developed to provide practical guidance for employers required to meet occupational health, safety and welfare provisions of relevant legislation. Codes of practices relevant to the management of cyanide at the CGO are summarised below.

Model Work Health and Safety Regulations (28 November 2016)

The *National Model Regulations* apply to all workplaces in which hazardous substances are used or produced, and to all persons with potential exposure to hazardous substances in those workplaces. The two principal components of the regulations are:

- information provisions - which address the delivery of specific information, for example, labels and SDSs, that the supplier of a workplace hazardous substance has to provide through the employer to employees. These provisions ensure that employee representatives, relevant public authorities and emergency services are also provided with access to relevant information; and
- assessment and control provisions - which require employers to identify hazardous substances in the workplace, make an assessment of those hazards, which arise out of the work activity and then take appropriate control action.

The *National Model Regulations* require employers to obtain SDSs for all substances from suppliers and ensure these are readily accessible to employees. Employers must also ensure all substances are labelled properly and must keep and maintain a register for all hazardous substances used or produced in the workplace. The register must contain a list of all hazardous substances used or produced at the workplace and the SDSs for all hazardous substances for which SDSs are required by these national model regulations. The model regulations also require employers to provide induction and on-going training to all employees with the potential for exposure to hazardous substances in the workplace. It also provides for health surveillance, record keeping and employees duties to comply with the model regulations.

Model Code of Practice – Managing Risks of Hazardous Chemicals in the Workplace

The *Model Code of Practice – Managing Risks of Hazardous Chemicals in the Workplace* provides a practical guide on how to manage health and safety risks associated with hazardous chemicals.

Model Code of Practice – Labelling of Workplace Hazardous Chemicals

The *Model Code of Practice – Labelling of Workplace Hazardous Chemicals* is a national standard for determining whether a chemical is a hazardous chemical, and provide guidance for labelling hazardous chemical labels in the workplace.

Model Code of Practice – Preparation of Safety Data Sheets for Hazardous Chemicals

This code provides practical guidance on meeting the requirements for SDSs under the *Work Health and Safety Act, 2011*.

Hazardous Chemical Information System

The *Hazardous Chemical Information System* contains information on hazardous chemicals that have been classified in the Model Work Health and Safety Regulations.

The database provides hazardous chemical (including cyanide) information and exposure standards.

AUSTRALIAN STANDARDS

Where applicable, Evolution or its contractors will comply with the requirements of the following Australian Standards. The Australian Standards will be available to Evolution employees and contractors on site.

AS/NZS 4452:1997 The Storage and Handling of Toxic Substances

AS/NZS 4452:1997 The Storage and Handling of Toxic Substances sets out requirements and recommendations for the safe storage and handling of toxic substances that are classified as Class 6.1 in the *Australian Code for the Transport of Dangerous Goods by Road and Rail* and also applies to other dangerous goods that are assigned a Class 6.1 subsidiary risk by the *Australian Code for the Transport of Dangerous Goods by Road and Rail*, except where they are of Class 2, or where more stringent requirements apply under another relevant Standard or applicable regulation.

AS/NZS 5667 Water Quality – Sampling Series

The *AS/NZS 5667 Water Quality – Sampling* series provides principles to be applied in the design of water and waste water sampling programmes, guidance on sampling techniques and guidance on the procedures to be followed to preserve and transport samples. The series includes guidelines for the selection of containers, quality control measures and tables that provide details of preservation techniques.

OTHER GUIDELINES

A number of guidelines outlining best practice principles, procedures and assessments for the hazardous materials and mining industries have been developed. A summary of these guidelines is provided below.

Leading Practice Sustainable Development Program for the Mining Industry – Cyanide Management Handbook (Commonwealth of Australia, 2008)

Produced by the Australia Government this booklet outlines principles and procedures of cyanide management so that it is used effectively, safely, economically and with no adverse effects on the environment. The aim of best practice cyanide management is “*to ensure that the risk of adverse health and environmental impacts is negligible and maintained at levels acceptable to the community and, therefore, to regulators*”.

Minerals Industry Safety Handbook (DMR, 2002)

The *Minerals Industry Safety Handbook* has been developed by the NSW Government (DMR, 2002) with the contribution and commitment of industry stakeholders and other government mining authorities throughout Australia. The handbook has been produced specifically to assist miners in the metalliferous and extractive industries to attain and maintain a safe and healthy workplace.

Section 4.14.4 (Cyanide) of the safety handbook is of particular relevance to the management of cyanide and includes recommendations for control strategies, storage, procedures following exposure, protective clothing, workplace assessment and monitoring.