



Cowal Gold Operations Underground Development Project Optimisation Modification (SSD 10367 Mod 1) Modification Report

Prepared for Evolution on Mining (Cowal) Pty Limited
July 2022



Cowal Gold Operations Underground Development Project Optimisation Modification (SSD 10367 Mod 1)

Modification Report

Evolution Mining (Cowal) Pty Limited

E210776 RP#1

July 2022

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Executive Summary

ES1 Background

This modification report supports a State significant development modification application for the Cowal Gold Operations Underground Development Project Optimisation Modification (SSD 10367 Mod 1).

Cowal Gold Operations (CGO) is an open pit and underground mining operation approximately 38 kilometres (km) north east of West Wyalong, New South Wales (NSW). Open pit mining has been undertaken at CGO since 2005. Underground mining was approved in 2021.

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of CGO, which is regulated under two Ministerial development consents - DA14/98 which regulates open pit mining and ore processing operations and SSD 10367 regulates underground mining.

ES2 CGO Underground Development Project

The Underground Development Project (hereafter referred to as the Project) involves:

- developing and operating an underground stope mine and entry to the underground mine;
- extracting 27 million tonnes (Mt) of ore from the underground mine at a rate of 1.8 million tonnes per annum (Mtpa), until 2040;
- operating a pastefill plant, and backfilling the extracted stopes with cement and tailings paste;
- delivering ore and waste rock from the underground mine to the surface; and
- producing up to 1.8 million ounces (Moz) of gold over the life of the underground mine.

ES3 Proposed modification

Evolution has State-significant development approval to develop an underground mine at CGO. Through its detailed mine design planning, it has determined that an optimised mine plan will allow it to extract ore more efficiently from the GRE46 resource.

The proposed mine plan and overall Project design have been progressively optimised based on detailed investigations of geological, environmental, engineering and financial considerations. Potential environmental risks that were taken into consideration during the development of the EIS for the Project have been re-assessed and taken into consideration for the proposed modification. Importantly, the principle of minimising direct and indirect impacts to Lake Cowal that were satisfied in the original EIS and approval of the Project has been reconfirmed in the assessments for the proposed modification.

The proposed modification to the Project is pursuant to Section 4.55(2) of the NSW *Environmental Planning & Assessment Act 1979* (EP&A Act) and involves:

- changing how the underground workings are accessed from the surface;
- minor changes to the location of access tunnels to the underground stopes; and
- increasing the annual production rate from 1.8 million tonnes per annum to 2.6 Mtpa.

No changes are proposed to the approved underground mining method, the stoping areas, or the operation of the approved pastefill plant.

The proposed modification will not require any change to the approved existing open pit mining, processing plant and integrated waste landform operations. These activities will continue to be regulated under DA14/98, which does not require modification.

ES4 Benefits

There is a range of operational benefits that would result from these changes. The approved box-cut entry to the underground mine will be replaced with a new portal within the E42 pit, which will provide an efficient and stable access point for personnel and equipment and ore trucks to enter and exit the mine.

The locations of secondary access points (ie those used to provide ingress and egress in the event of emergencies, and for mine ventilation) are also proposed to be changed, to provide further operational efficiency and for safety reasons.

The change to access tunnel locations takes the access tunnel development from the hanging wall (ie located predominantly above the orebody) on the western side, to the footwall, below the orebody on the eastern side. This will reduce the risk of access tunnel instability and preserves the potential for the future expansion of the current E42 pit. It also allows for more efficient and independent haulage options for the underground Regal and Dalwhinnie and Endeavour orebodies.

The increase in the allowable annual ore production from 1.8 Mtpa to 2.6 Mtpa gives Evolution the ability to realise production efficiency and flexibility of ore production throughout the life of the underground mine.

ES5 Assessment

The proposed modification is very minor in the context of the Project as a whole. The changes to the access tunnels will not result in materially different impacts on groundwater and surface water resources. The access tunnels will remain safe and stable throughout the development and operation of the Project.

The changes to the underground development project do not result in impacts materially different from that previously assessed and approved and the project remains in the public interest due to the significant social and economic benefits that would accrue over its life.

A comprehensive groundwater impact assessment was undertaken, which shows that the changes to the underground access tunnels result in very similar impacts to those previously assessed and approved for the project. Importantly, the effect of mine groundwater inflow on Lake Cowal for the proposed modification is still considered to be negligible.

A surface water assessment confirms that the proposed modification does not affect the site water balance undertaken for the approved project. The strict conditions of consent for water impacts, which include compliance with a detailed Water Management Plan for the CGO site will continue to apply to the proposed modification.

Noise and air quality emissions associated with increased truck movements due to the proposed increase of the production rate will be indistinguishable when compared to existing and concurrent operations on-site.

The proposed change to access tunnels aids their stability due to their location in more competent rock and the proposed modification does not change the approved stability profile of the underground mining area.

All other impacts previously assessed and approved for the project will not change as a result of the proposed modification. Therefore the conditions of consent for the project do not need to change to accommodate the proposed modification.

ES6 Conclusion

The proposed modification is necessary to allow the efficient operation of the project. The environmental impacts of the proposed modification have been comprehensively assessed and the impacts of the project as modified will continue to be effectively regulated under the existing conditions of consent. The economic benefits of the CGO Underground Development Project will continue to be significant for the local area and the region with the proposed modification. The project as modified will continue to meet all statutory requirements and the project remains in the public interest.

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1 Introduction

1.1 Background

This report details the assessments undertaken to support a proposed modification to the Cowal Gold Operations (CGO) Underground Development Project (SSD 10367 Mod 1).

The CGO is an open pit and underground gold mine, approximately 38 kilometres (km) north-east of West Wyalong in the Bland Shire local government area (refer Figure 1.1 and Figure 1.2). CGO is owned and operated by Evolution Mining (Cowal) Pty Limited (Evolution). The site is directly adjacent to Lake Cowal in the Lachlan Catchment, which is an ephemeral inland wetland system.

CGO operates under two Ministerial development consents. DA14/98, which was granted in 1999, regulates open pit mining, ore processing at a rate of 9.8 million tonnes per annum (Mtpa) and waste and tailings emplacement on site. The development consent for SSD 10367, which was granted in 2021, allows underground stope mining, backfilling of stopes and delivery of ore from the underground mine to the processing plant.

Evolution is seeking to modify SSD 10367, pursuant to Section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to change the access points to the underground mine, to change the geometry of access tunnels and to increase the annual production rate.

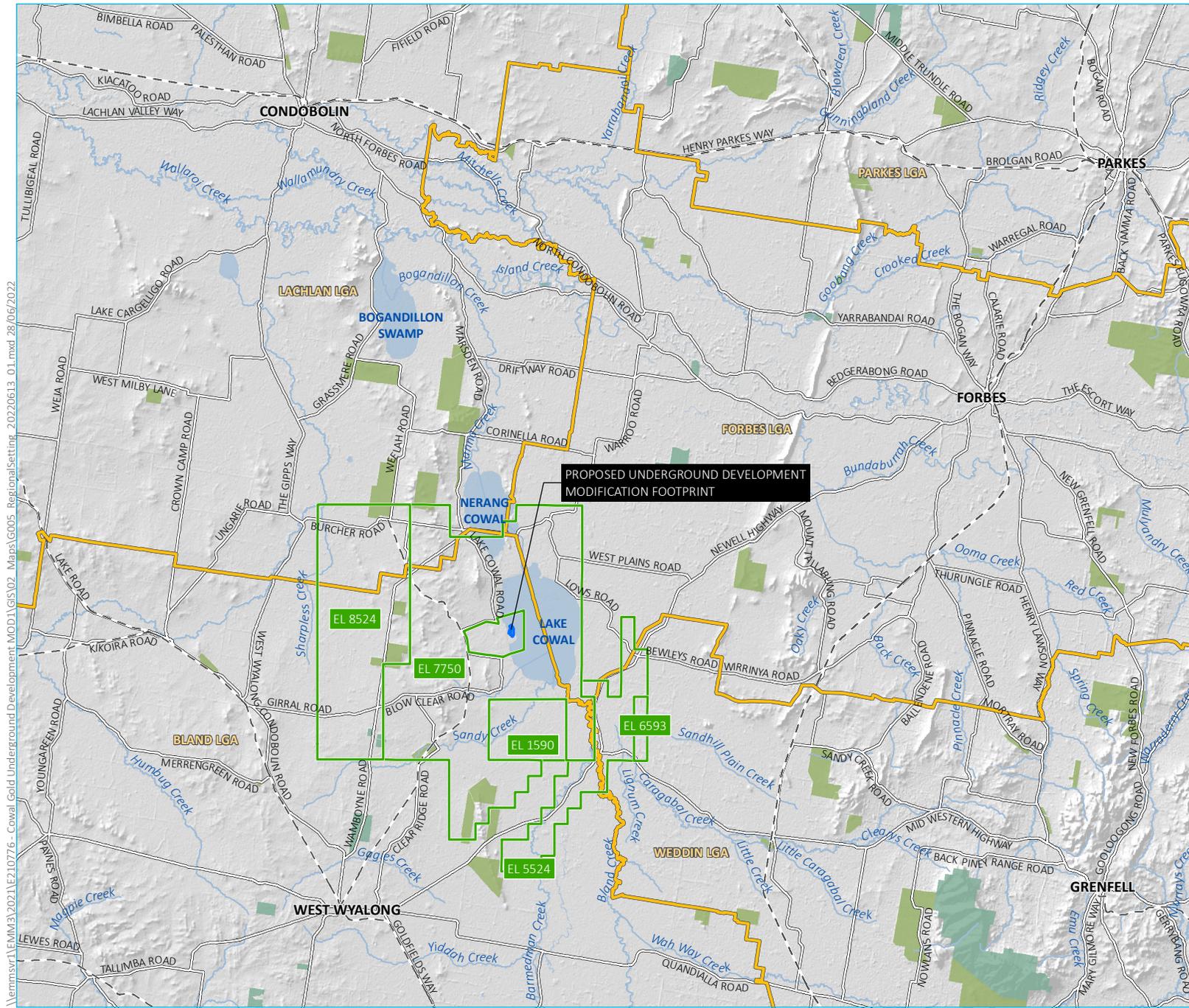
The CGO site also hosts a range of ancillary infrastructure to support the mine which are regulated under DA14/98. This includes an ore processing plant, the integrated waste landform (IWL), waste rock emplacements, ore stockpiles, workshops, offices, reagent storage and explosives magazine. Ancillary infrastructure regulated under SSD 10367 are the box-cut entry, pastefill plant and in-wall ramp.

1.2 Approved project

In September 2021, The Minister's delegate approved the CGO Underground Development Project (SSD 10367) (herein referred to as 'the Project'). The development consent allows:

- underground stope mining at a rate of up to 1.8 Mtpa, until the end of 2040;
- delivering ore from the underground mine to the CGO processing plant;
- developing a paste fill plant to make cemented paste from tailings, and backfilling the stopes with the paste; and
- developing primary and secondary access points to the underground mine, including a box-cut entry, to provide personnel, materials, ore and waste rock haulage and ventilation services.

The layout of the CGO site including the Underground Development Project is shown in Figure 1.3.



- KEY**
- Proposed underground development (Mod 1)
 - Exploration licence (EL)
 - - - Rail line
 - Main road
 - Named watercourse
 - Named waterbody
 - Local government area
 - NPWS reserve
 - State forest

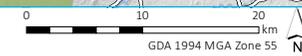
Regional setting

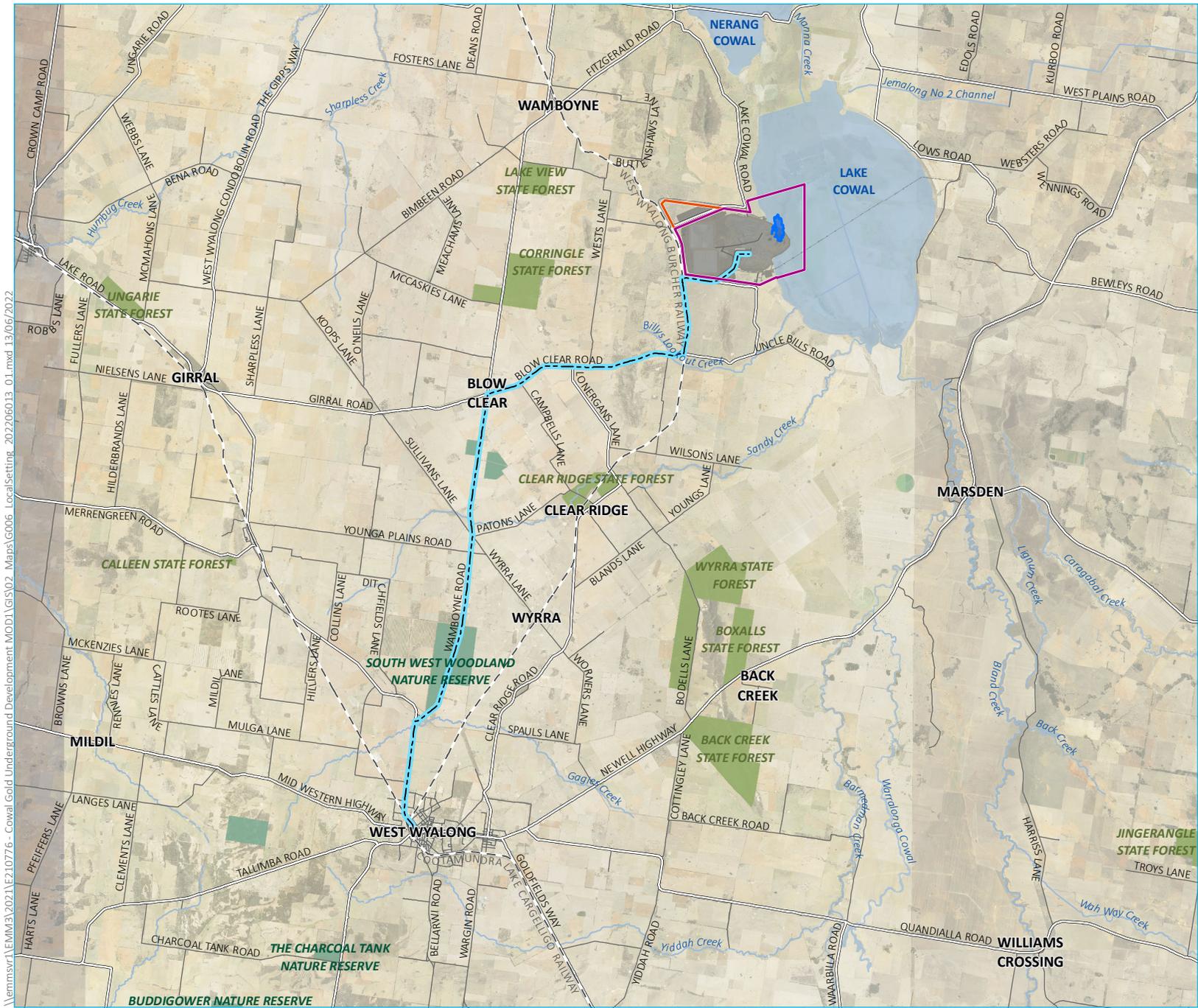
Cowal Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 1.1



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Source: EMM (2022); Evolution (2022); DFSI (2017); GA (2011); ASGC (2006)





- KEY**
- Proposed underground development (Mod 1)
 - DA14/98 approved surface disturbance
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - West Wyalong preferred transport route
 - Rail line
 - Major road
 - Minor road
 - Named watercourse
 - Named waterbody
 - NPWS reserve
 - State forest

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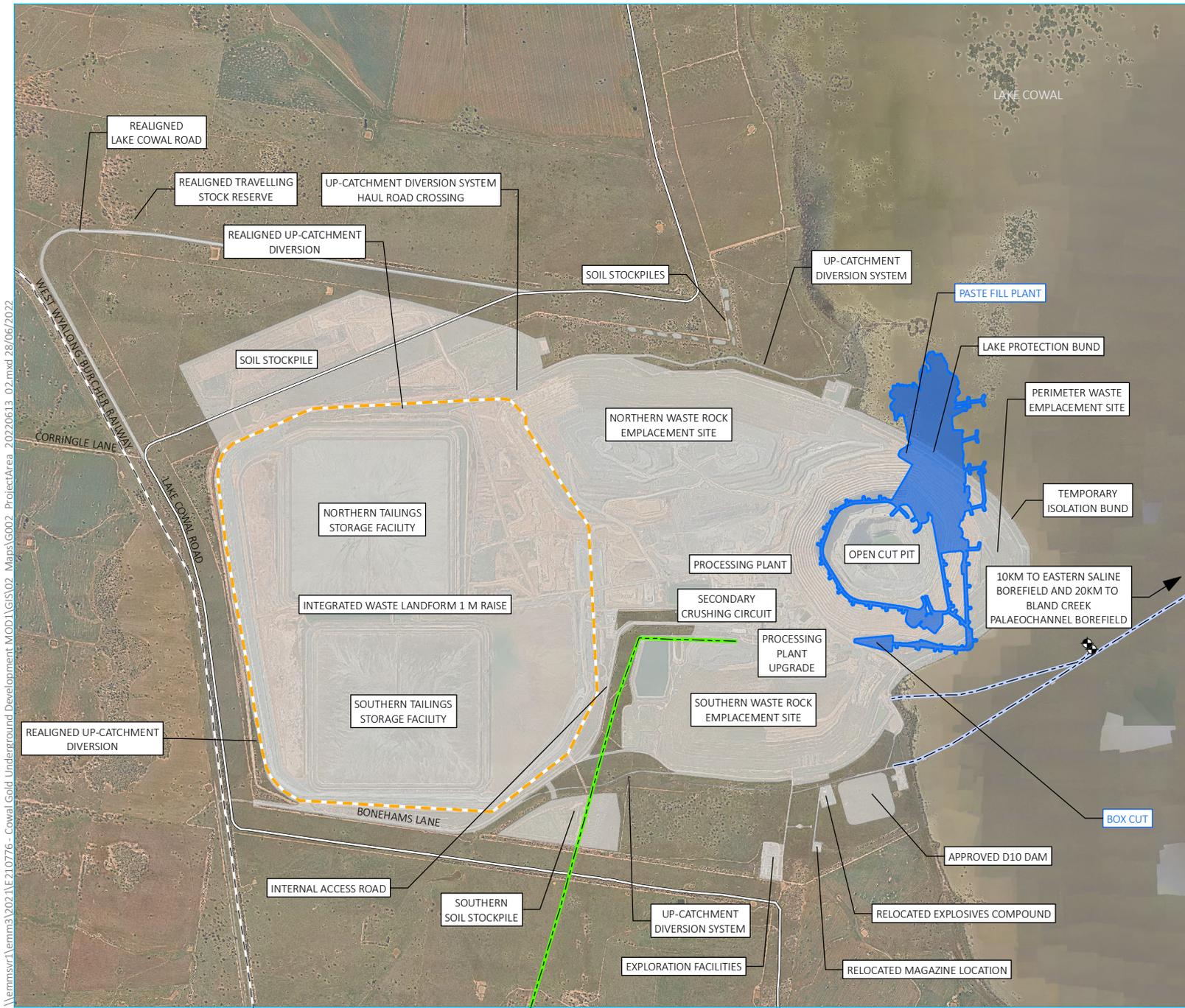
Source: EMM (2022); Evolution (2022); DFSI (2017)



Local setting

Cowl Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 1.2





- KEY**
- Approved underground development
 - DA14/98 approved surface disturbance
 - Indicative integrated waste landform perimeter
 - Electricity transmission line
 - Water supply pipeline
 - Saline groundwater supply bore
 - Rail line
 - Main road
 - xxx Approved underground development elements
 - xxx Approved surface elements

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Source: EMM (2022); Evolution (2020); DFSI (2017)

Approved layout of CGO

Cowl Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 1.3



1.2.1 Approved activities

The activities approved under SSD 10367 are detailed in general in Table 1.1.

Table 1.1 SSD10367 Underground Development Project approved activities

Aspect	Description
General description	<p>Construction and operation of an underground mine at the CGO to extract the GRE46 mineralisation, which includes:</p> <ul style="list-style-type: none"> • production of up to 27 Mt of ore at a rate of 1.8 Mtpa; • production of approximately 5.74 Mt of waste rock; • delivery of extracted ore to the surface by truck; • development of a paste fill plant, and the delivery of paste fill via a borehole and the backfilling underground stopes with the paste; and • development of ancillary underground infrastructure to support the underground operation, including dewatering infrastructure, ventilation system, electrical reticulation.
Mine access	<p>Access to the underground mine will include:</p> <ul style="list-style-type: none"> • a box-cut entry to the underground workings; • two declines to provide underground access and ventilation: one decline via a portal on the existing open pit and the other via a box-cut, providing access for personnel and maintenance; • six access points to the main decline for access, ore haulage, ventilation circuit, underground services and emergency egress; and • a network of underground tunnels to provide access to the ore, transportation to the surface and ventilation.
Project duration	<p>A project life of 19 years comprising:</p> <ul style="list-style-type: none"> • construction of the decline and development drives over a period of up to two years; and • ore production of the currently known economic resource over 17 years.
Mineral deposit	The mine would develop the GRE46 Mineral Deposit.
Mining method and backfilling	<ul style="list-style-type: none"> • Top down sub-level open stoping to a depth of -850 m Australian Height Datum (AHD) with approximately 1,106 stopes developed over the life of the mine. • Backfilling of stopes with cemented paste.
Mine development layout and progression	<p>The underground mine will be developed progressively, as the decline is excavated laterally and to depth.</p> <p>Development of the underground mine with six access points to the decline off the existing open pit. These will provide access for personnel and maintenance, ore haulage, ventilation and emergency egress.</p>
Stope backfill	<ul style="list-style-type: none"> • Stopes to be fully backfilled with paste material made from dewatered tailings and cement. • Paste material to be produced in a purpose-built paste plant on the surface. • Paste material will be delivered to the underground workings via a borehole near the paste fill plant.
Annual mine extraction rate	Up to 1.8 Mtpa of ore to be extracted from the underground mine.
Gold production	Up to 1.8 Moz of gold produced from the ore produced in the underground mine.
Ore transport	Ore transported by truck to the processing plant on the surface.
Workforce	<ul style="list-style-type: none"> • Construction: estimated peak workforce of approximately 225 full time equivalent employees (FTE) employees and contractors, which will be used to develop the underground mine and the supporting surface infrastructure. • Operations: an average of around 160 FTE employees working over 2 shifts.

Table 1.1 **SSD10367 Underground Development Project approved activities**

Aspect	Description
Hours of operation	The underground mine will operate 24 hours a day, 7 days a week, except for periods of scheduled maintenance.

1.3 Applicant's details

The applicant for the proposed modification is:
Contact: Mr Simon Coates – Superintendent Environment
Evolution Mining (Cowal) Pty Limited
Lake Cowal Road
Lake Cowal NSW 2671
ABN: 75 007 857 598

2 Description of modification

2.1 Overview

Since gaining approval for the Project in September 2021, Evolution has redesigned its underground access tunnel locations, principally for safety and efficiency reasons. The method of access to the underground mine and the ore production schedule have also been reviewed.

No changes are proposed to the approved mining method, stoping areas or operation of the pastefill plant.

It is important to note that the above modifications will not require any change to the approved existing open pit mining, processing plant and IWL operations. These supporting activities will continue to be regulated under DA14/98. Therefore DA14/98 will not require to be modified.

2.2 Mine access

2.2.1 Approved access points

Six access points were approved for the Project (refer Figure 2.1). This included three primary access points and three secondary access points, each having connecting drives to the main underground decline.

The approved primary access points are the Main Portal, the Box-cut and the Fresh Air Intake/Haulage Decline. The secondary access points are the Fresh Air Adit 1, Fresh Air Adit 2 and the Exhaust Adit.

The Main Portal and Box-cut were planned as the main access points to the underground mine for personnel and vehicles and to transport ore and waste rock to the surface. The intention was for the Main Portal to be located in the south of the existing E42 pit and for the Box-cut to be located just outside the southern extent of the pit.

The Fresh Air Intake/Haulage Decline was intended to provide ventilation and an alternative haulage pathway. The Fresh Air Adit 1, Fresh Air Adit 2 and the Exhaust Adit form the ventilation system for the underground mine as approved.

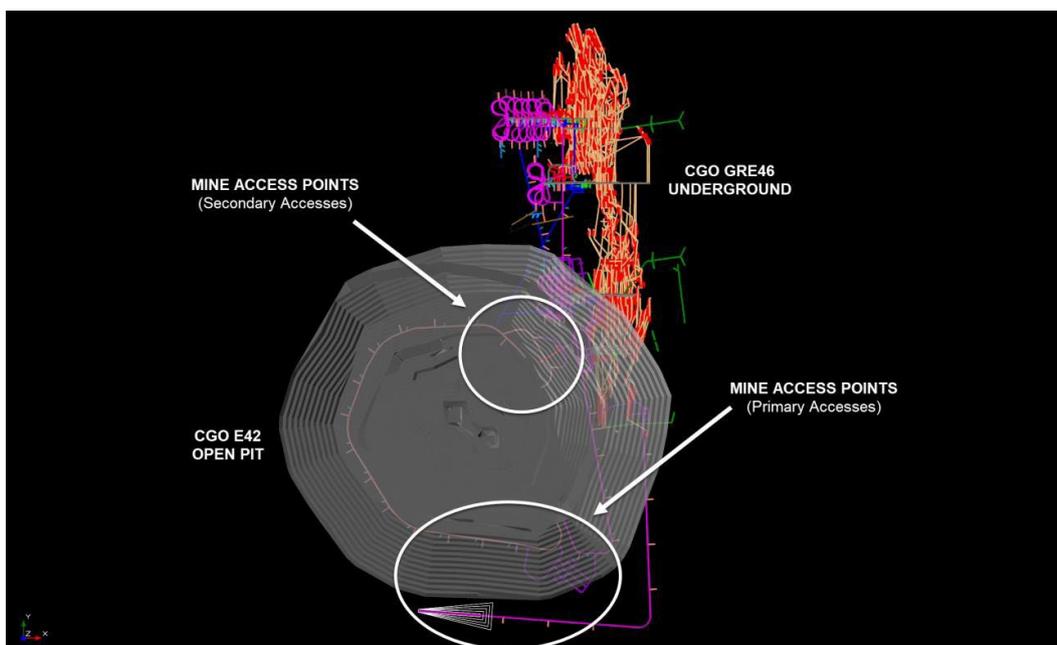


Figure 2.1 Approved underground access points

2.2.2 Proposed modification to access points

The proposed modification seeks to make changes to the approved access points to the underground mine (Figure 2.1 and Figure 2.2). The Box-cut is now not proposed to be developed. An alternate access point to the underground mine would be developed as a portal which would be located in the north wall of Stage H of the E42 open pit. This new access portal will allow the functions that would have been facilitated by the Main Portal and Box-cut, including:

- personnel access;
- maintenance vehicle access;
- alternate ore haulage to the processing facility at the surface;
- alternate waste haulage to the surface waste emplacements;
- providing a fresh air connection for lower working areas; and
- providing an emergency egress route from underground workings.

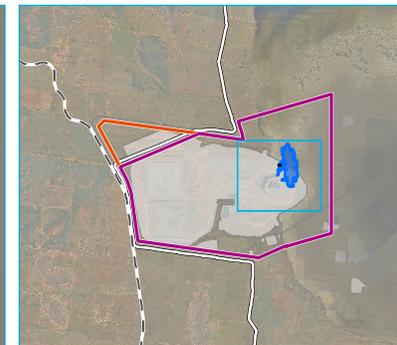
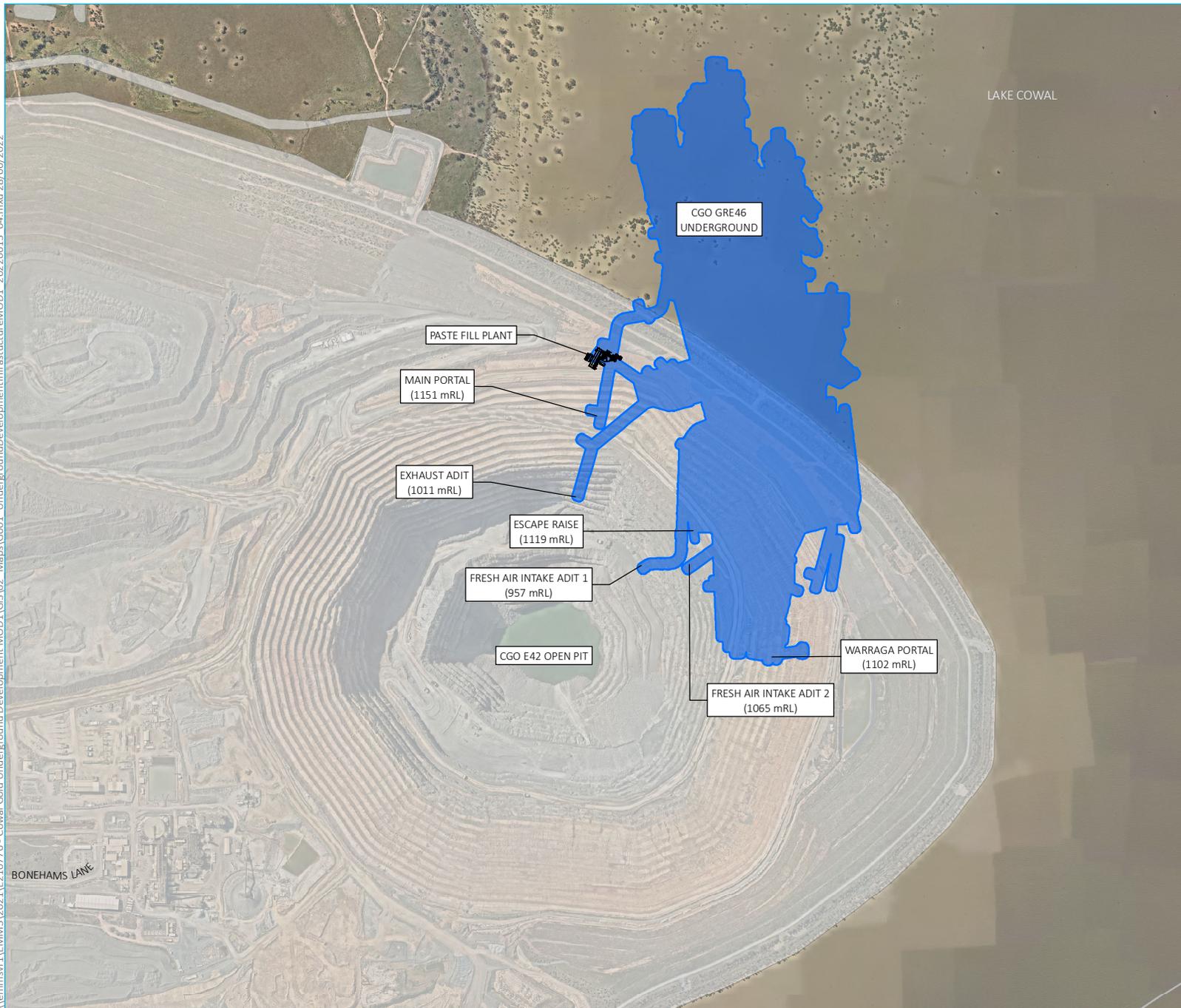
The new portal will involve substantially less disturbance and movement of material than that which was previously proposed to construct the box-cut. Its use as a component of the ventilation system and haulage route means that it would also replace the need to develop the approved Fresh Air Intake/Haulage Decline portal.

The new portal would provide a more efficient way of accessing the underground workings for personnel and equipment and ore trucks to enter and exit the mine using existing haul roads in the open pit to transport ore from the underground mine to the processing plant. It will also allow a more efficient access pathway to the Endeavour deposit.

The new portal will take around 2-6 months to construct. It will be excavated using standard earthmoving and tunnelling plant and equipment. Construction will involve standard excavation and tunnelling techniques to create the portal.

A comparison and overlay of the proposed modification and approved underground development footprints are shown on Figure 2.2, Figure 2.3 and Figure 2.4.

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- KEY**
- Proposed underground development (Mod 1)
 - Paste fill plant layout
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - DA14/98 approved surface disturbance
 - - Rail line
 - Main road

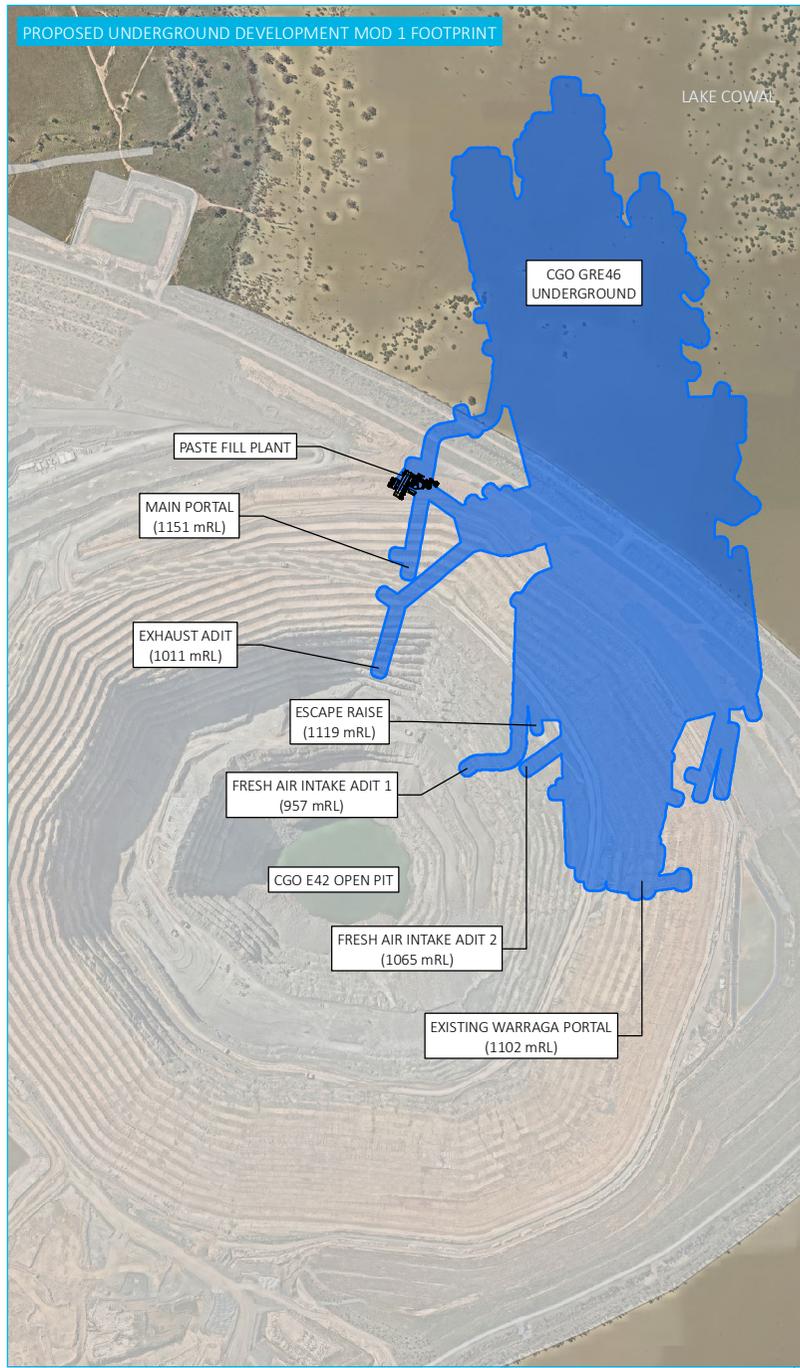
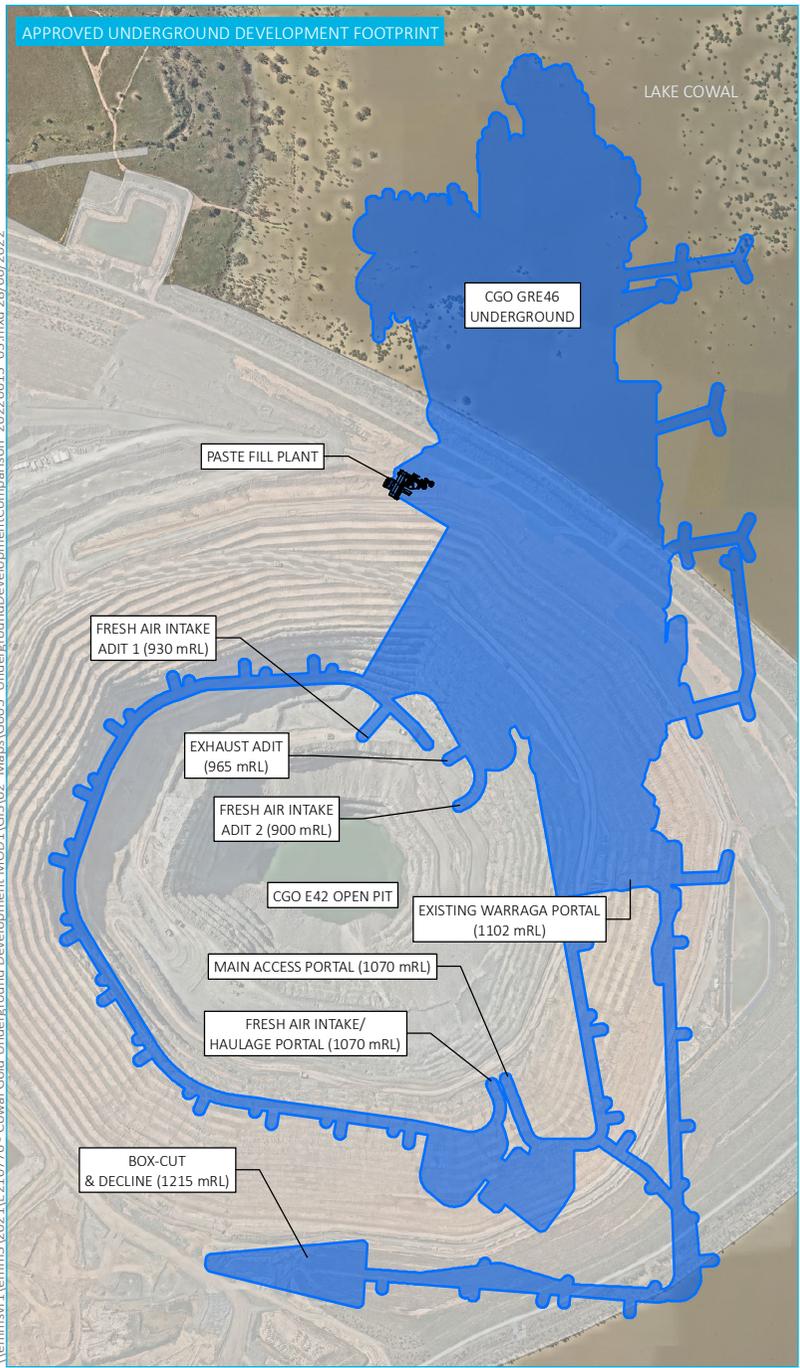
Footprint of the modification

Cowal Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 2.2

Source: EMM (2022); Evolution (2022); DFSI (2017)



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- KEY**
- █ Underground development footprint
 - Paste fill plant layout
 - DA14/98 approved surface disturbance

Comparison of the approved underground development and modification footprints

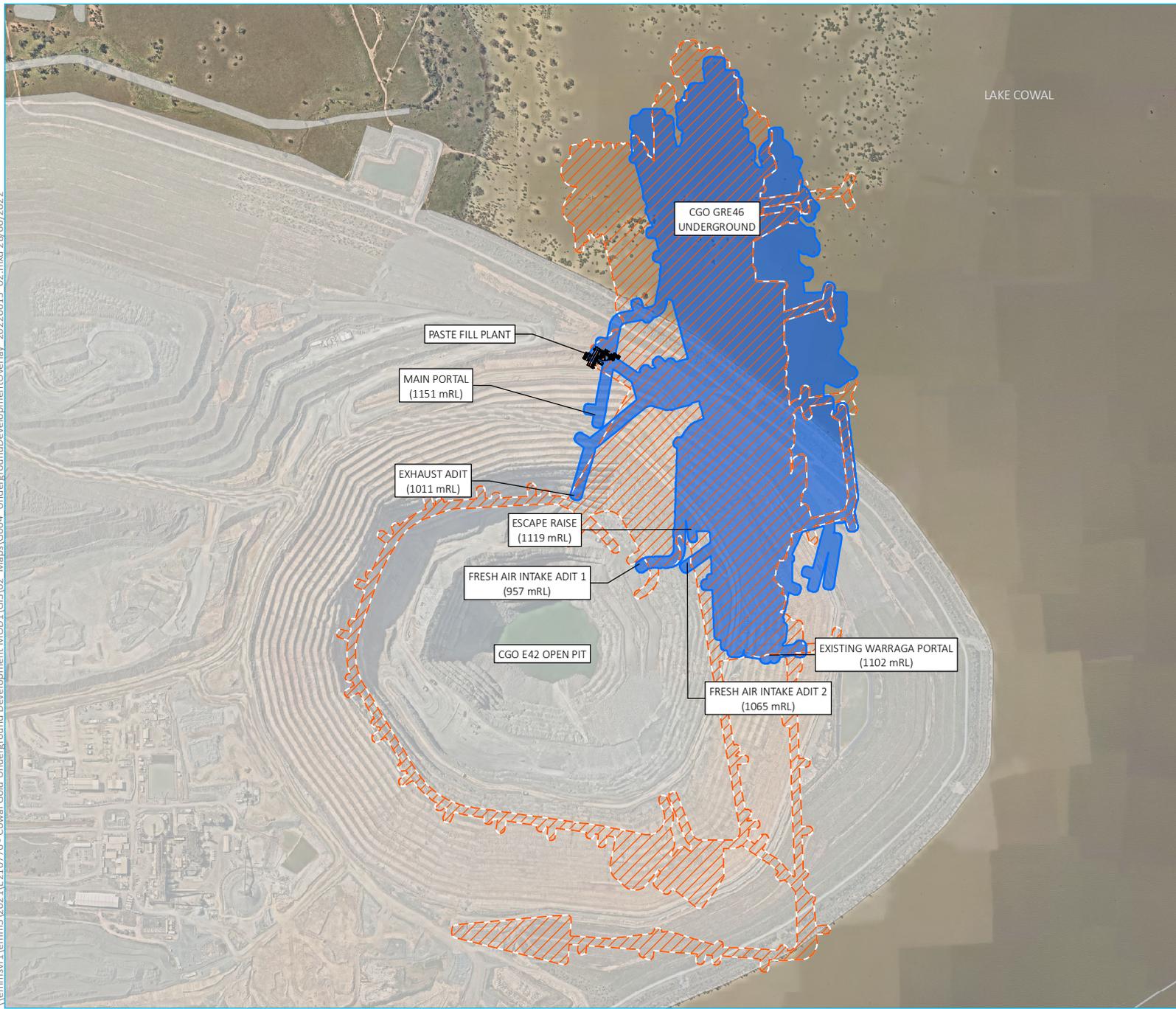
Cowl Gold Operations
Underground Development SSD 10367
Optimisation Modification Mod 1
Figure 2.3



Source: EMM (2022); Evolution (2022); DFSI (2017)



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- KEY**
- Proposed underground development (Mod 1)
 - Approved underground development
 - Paste fill plant layout
 - DA14/98 approved surface disturbance

Overlay of the approved underground development and modification footprints

Cowal Gold Operations
Underground Development SSD 10367
Optimisation Modification Mod 1
Figure 2.4



2.2.3 Secondary access points

The secondary access points also provide ingress and egress in the event of emergencies, and their main purpose is to ventilate the mine and provide egress in the event of emergency. The locations of the secondary access points to the mine will remain within the open pit. The indicative locations of the secondary access points are shown in Figure 2.5.

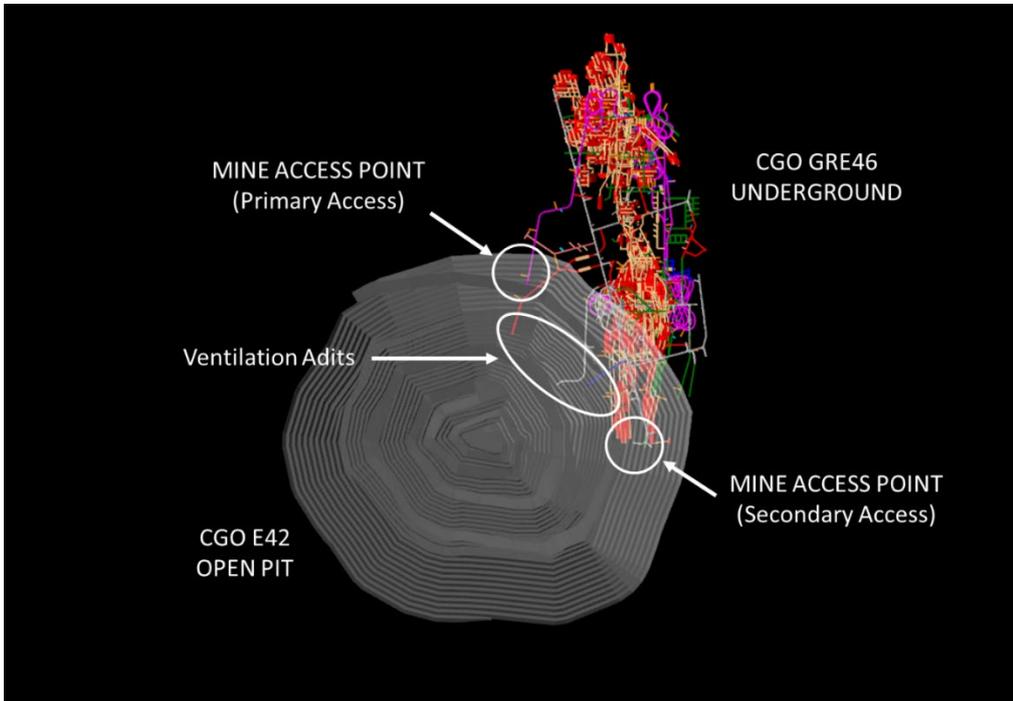


Figure 2.5 Proposed primary and secondary access points

2.2.4 Warraga Decline

The Warraga Decline is the current access point to the underground exploration drives. It provides personnel and services access to the exploration workings. The Warraga Decline surfaces at a portal located in the eastern wall of the E42 pit (refer Figure 2.3 and Figure 2.4).

It is now proposed to also use the existing Warraga Decline Portal as an alternate access to the underground mine. This will allow for worker access, maintenance access, ore haulage and waste haulage. Using the Warraga Decline Portal for these uses will allow separation of vehicles that are producing ore in the north and south of the mine respectively.

2.2.5 Summary of change to access points

The proposed changes to the mine access points are summarised in Table 2.1.

Table 2.1 Summary of change to access points

Name	Purpose	Proposed optimisation modification
Main Portal	The main service entry for the underground mine for personnel and vehicles.	Replaced by a new primary access portal in the north of E42 pit which will provide worker access, ventilation, maintenance access, ore haulage and waste haulage.
Box-cut	Provides personnel and material access to the mine and provide access for maintenance light vehicles.	No longer planned to be developed to access the underground workings. Access to the underground workings will be provided via the new primary access portal and the existing Warraga portal.
Fresh Air Intake/Haulage Decline Portal	Provides a fresh air connection for lower working areas, an emergency egress route from underground workings and an alternate haulage route.	No change – precise locations to be determined during detailed design.
Fresh Air Intake Adit 1	Provides a fresh air ventilation for the lower stope working areas.	
Fresh Air Intake Adit 2	Provides a fresh air ventilation for the material transfer points and for atmospheric dust control.	
Exhaust Adit	Provides exhaust air connection for material transfer points and for atmospheric (dust and air quality) control.	
Warraga Decline Portal	Access to the exploration decline and provision of services and ventilation.	Now proposed to also be used for worker access, maintenance access, ore haulage and waste haulage. This will allow separation of vehicles that are transporting ore in the north and south of the mine respectively.

2.3 Change to access tunnel geometry

The proposed modification seeks to modify the location of access tunnels between the development declines and the stoping areas (refer Figure 2.6). The key change will result in development tunnels being relocated from the western side of the ore body to the eastern side. This means that the drives and tunnels would be sitting below the ore body where previously the drives and tunnels were sitting above the ore body.

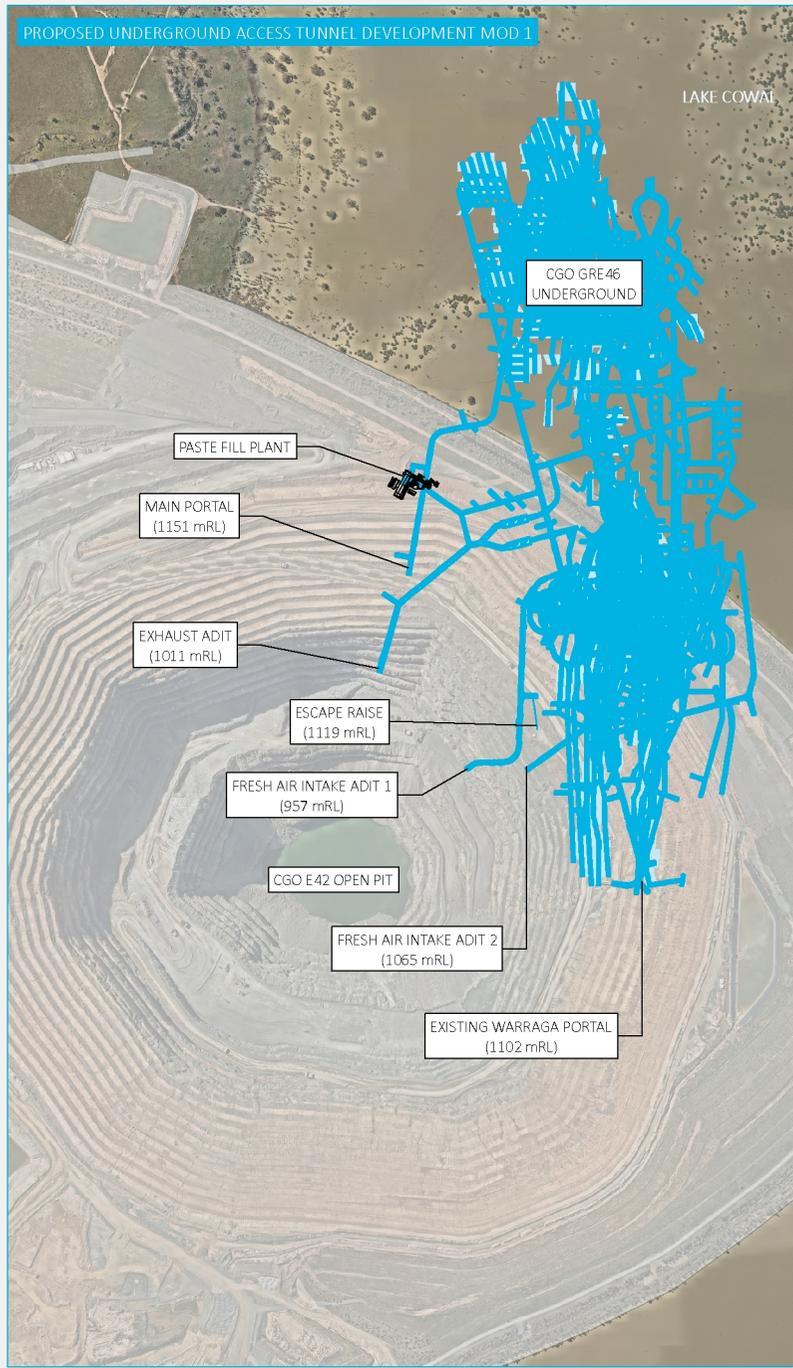
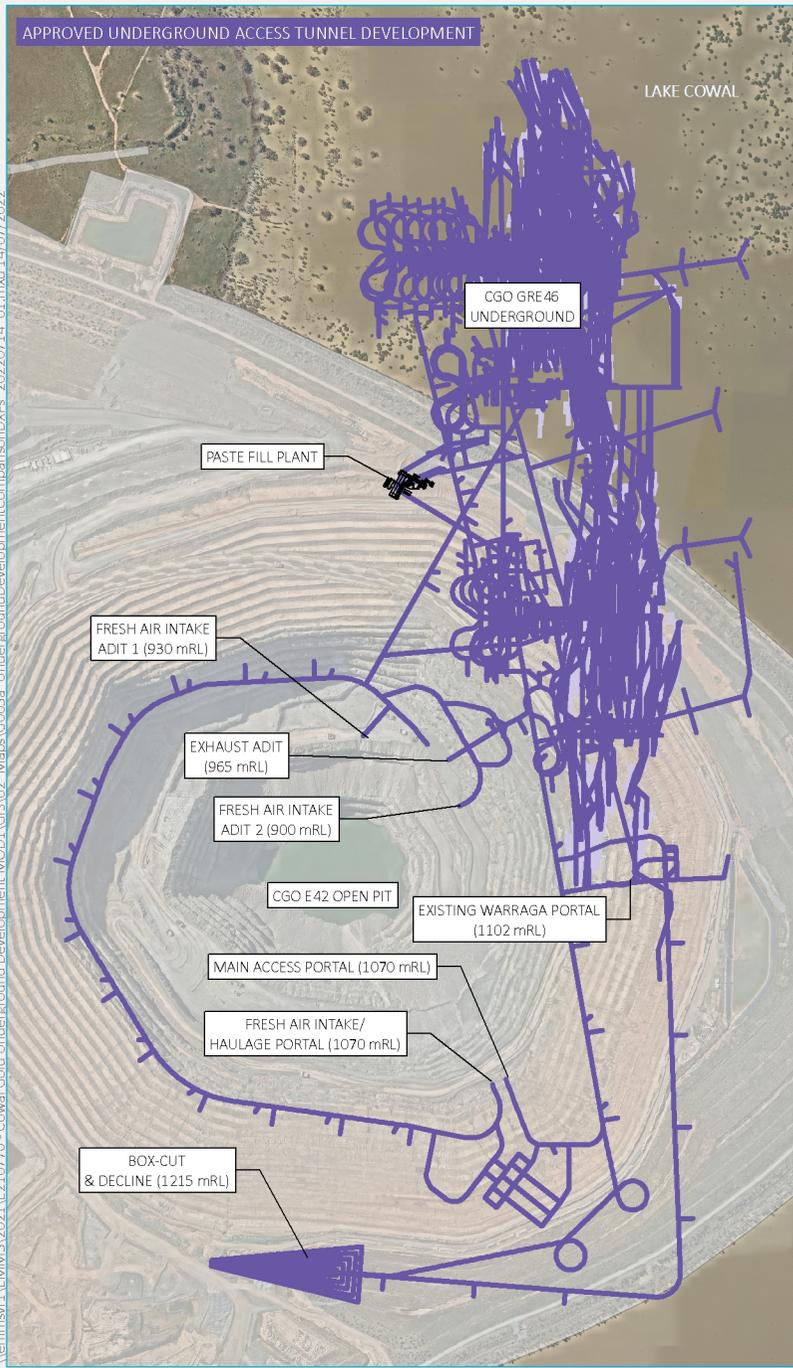
The change to the geometry of the access tunnels would allow greater safety due to improved stability of the mine workings during production activities. It will also result in greater efficiency in orebody extraction and would reduce the amount of development required overall.

The benefits of the changed position of the access tunnels are as follows:

- **Safety** – the approved positions of the access tunnels would have been exposed to less favourable rock mass conditions once production commenced. The proposed location of the optimised design reduces geotechnical risk to the tunnels and significantly reduces likelihood of corrective maintenance.
- **Future operations** – the changes do not jeopardise the potential for the future expansion of the current open pit design, as the relocation increases the distance between the access tunnels and the current open pit.

- **Efficiency** - allows for more efficient and independent haulage options for the underground Regal and Dalwhinnie and Endeavour orebodies.
- **Impacts** – the changes can be implemented without materially changing the approved impacts of the Project.

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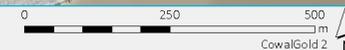


- KEY**
- Approved underground access tunnel development
 - Proposed underground access tunnel development Mod 1
 - Paste fill plant layout
 - DA14/98 approved surface disturbance

Comparison of the approved and proposed underground access tunnel development

Cowl Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 2.6

Source: EMM (2022); Evolution (2022); DFSI (2017)



2.4 Ore production rate

The approved ore production rate is 1.8 Mtpa. The proposed modification seeks to increase the ore production rate to 2.6 Mtpa. Despite this increase in the annual production rate, there would be no change to the total resource that would be that could be extracted for the Project (ie 27 Mt).

2.5 Approved operations that will not change

2.5.1 Mining method and extent

The Sublevel Open Stopping (SLOS) mining method will not change as a result of the proposed modification. This method is best suited to mining of the GRE46 mineral deposit, given its geological characteristics.

The design of the stoping domain will not change, with the uppermost stopes remaining located around -80 m AHD and the lowermost stopes remaining around -850 m AHD. The lateral extent of stoping will also not change from that presented in the EIS for the Project.

As described in the EIS for the approved Project, SLOS is a large scale, yet still selective mining method easily adapted to ore bodies between 6–30 m wide and with near-vertical dips of between 70–90 degrees (as is the case of the GRE46 Mineral Deposit). The advantages of using SLOS include:

- the ability to extract higher amounts of ore, which maximises economic recovery;
- the ability for stopes to be backfilled;
- easy adaptation by using other geotechnical controls (ie the use of pillars);
- it allows extraction to be highly mechanised; and
- it is a proven, highly safe method of extraction.

Development of the underground mine will be staged, as the main declines are progressively extended and the mine progresses deeper. The orebody is generally narrow in shape, and the overall footprint of the underground mine is therefore also relatively narrow.

Stoping will occur in a strip approximately 1.6 km long and 100 m wide that extends north from the eastern edge of the open pit to a point approximately 800 m past the northern edge of the lake protection bund. The network of access tunnels will extend approximately 200 m both west and east from the edges of the stopes.

The subsurface footprint of the underground mine will not materially change as a result of the proposed modification and is estimated to remain at approximately 135 hectares (ha) (refer Figure 2.2).

2.5.2 Waste rock management

Approximately 5.74 Mt of waste rock is approved to be produced from the underground mine over its life. This limit to waste rock production is not proposed to be changed, as the majority of this waste rock will be produced during the excavation of the decline and development drives that provide access to the stopes. As stoping is a highly selective process and most rock removed from stopes will be classified as 'ore' and sent for processing, there would be negligible amounts of waste rock produced as a direct result of underground mining.

The surface handling and emplacement of waste rock would continue to be regulated under DA14/98. The handling and emplacement aspects are therefore not part of the Project and do not form part of the modification application.

2.5.3 Life of mine

The proposed modification does not change the approved life of the Project, which is intended to operate until the end of 2040. The increase in annual ore production rate from underground mining operations could result in underground mining being completed earlier than previously anticipated. However, all other aspects of the Project other than underground mining, including rehabilitation of the access points will be undertaken to the end of 2040.

2.5.4 Open pit mining and ore processing

DA14/98 allows open pit mining in the E42 deposit, ore processing at a rate of 9.8 Mtpa, tailings and waste rock emplacement and the operation of ancillary mining facilities at CGO.

These approved activities are not affected by the proposed modification. Therefore DA14/98 does not require to also be modified to facilitate the proposed modification.

2.6 Approved SSD 10367 and SSD 10367 Mod 1 summary

The proposed changes to the CGO Underground Development Project are compared to the approved activities, in Table 2.2.

Table 2.2 SSD 10367 Mod 1 summary

Aspect	Approved SSD 10367	Proposed SSD 10367 Optimisation Mod 1
Life of mine	To 31 December 2040	No change
Resource	Approximately 27 Mt	No change
Annual ore production rate	1.8 Mtpa	2.6 Mtpa
Total waste rock production	5.74 Mt	No change
Gold production	1.8 Moz	No change
Mining method	Production of ore via mechanised long hole open stoping.	No change
Declines	Excavation of two declines (in addition to the existing Warraga Decline) to provide underground access and ventilation: one decline via a portal on the existing open pit and the other via a box-cut. The declines will be approximately 6 m wide by 6m high and will extend approximately 1.5 km to the point at which the first production drive commences.	Excavation of one decline (in addition to the existing Warraga Decline) via a portal in the north of E42 pit that will extend approximately 2 km to the point at which the first production drive commences.
Decline access	Six access points to the main decline for access, ore haulage, ventilation circuit, underground services and emergency egress.	Change to the locations of access points to the declines. Removal of Fresh Air Intake/Haulage Decline portal and ventilation drive Use of the Warraga Decline portal for access and ore and waste rock haulage
Mining extent	Development of the underground mine will be in stages, as main decline is progressively extended at depth. The underground footprint is estimated to be approximately 135 ha and final depth of approximately - 850 m AHD.	No change

Table 2.2 **SSD 10367 Mod 1 summary**

Aspect	Approved SSD 10367	Proposed SSD 10367 Optimisation Mod 1
Box-cut	Development of a box-cut entry adjacent to the open pit, which will be the main access for personnel and materials to the underground mine and will be used to transport ore to the surface for processing.	Box-cut entry replaced by a portal in the north of E42 pit.
Paste backfill	Development of a paste fill plant, and backfilling excavated stopes with cemented paste fill made from cement and tailings.	No change
Workforce	<p>Construction: estimated peak workforce of approximately 225 FTE employees and contractors, which will be used to develop the Project and the supporting surface infrastructure.</p> <p>Operations: an average of around 160 FTE employees working over 2 shifts.</p>	No change

3 Strategic context

3.1 Need for the proposed modification

Mining at CGO produces metallic gold, in the form of unrefined gold bars. Gold has an economic significance almost worldwide that has existed for millennia aided by its colour, rarity and unusual physical properties (corrosion resistance, malleability, ductility and heat conduction). As a result, the demand for gold is shared across virtually all nations and sustains the value of most major currencies and it is the prospect of profitable sales of gold that is the main economic motivator for CGO.

The Project has strong economic justification due to the net economic benefits and the economic stimulus it will provide locally and to NSW. These stimuli were comprehensively canvassed in the EIS for the Project (EMM 2020). Importantly, the Underground Development Project involves a mining operation that will extract a State-owned resource for the benefit of the State of NSW.

The proposed modification proposes a more efficient way of accessing the underground mine which continues to ensure the safe operation of the mine and minimises the environmental impacts. It will allow the economic benefits of the Project to be developed and delivered safely and efficiently.

3.2 Strategic planning considerations

The *Riverina Murray Regional Plan 2036* and the *Central West Orana Regional Plan 2036* acknowledge the importance of the resource sector to the socio-economic stability of these regions whilst seeking 'sustainably managed resources'. Both plans state 'the sustainable management of mineral resources must consider and balance varying impacts to produce long-term economic, social and environmental outcomes.' The Project is designed to find the right balance between protecting the environmental values of the local area, whilst providing inputs to assist social and economic stability to local and regional communities. The Project was approved in 2021 on this basis and the proposed modification would not change these outcomes.

Local strategic planning statements, including the *Bland Shire Community Strategic Plan* and the *Forbes Community Strategic Plan* also acknowledge the importance of CGO to the economic prosperity and diversity in development, and hold that it continues to play a key role in the ongoing prosperity of the region, through Evolution's support of local initiatives, employment opportunities and housing of workers in local towns.

The initiatives are supplemented by the established road maintenance agreements with local Councils, and a Planning Agreement that Evolution has entered into with Bland Shire Council to provide funding for local initiatives over the life of the mine. These agreements would continue to operate for the life of the modified Project.

One of the most significant aspects of the Project is that it will continue to support economic diversity to local government areas (LGAs) which are strongly dependent on agriculture. Since CGO commenced in 2005, the area has been affected by drought for lengthy periods and CGO represents a significant viable alternative for local jobs, investment, purchase of goods and services and taxes. Compared to its physical impact, CGO also has a disproportionately large beneficial economic influence in the region.

4 Statutory context

4.1 Approval pathway

Under Section 4.55 of the EP&A Act, a consent authority may modify an SSD development consent provided the development to which the consent as modified relates is substantially the same as the development for which the consent was originally granted.

The proposed changes to the Project can be classified as a modification, given that:

- the mining method would not change;
- the total ore resource approved to be produced would not change; and
- the other approved operating functions, including the paste backfill plant would not change.

Therefore, the modified development will remain substantially the same development for which consent was originally granted, and the proposed modification can be considered under Section 4.55 of the EP&A Act.

4.2 Consent authority

The Minister for Planning is the consent authority for the modification application. However, the Minister has delegated this authority to officers within the Department of Planning and Environment (DPE) where no reportable political donations disclosures have been made. Evolution has not made reportable political donations.

4.3 Pre-conditions to exercising power to grant approval

The relevant pre-conditions that must be satisfied before the consent authority may grant approval to the proposed modification are listed in Table 4.1.

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
EP&A Act	Section 1.3 - Objects	Relevant objects of the Act	The relevant objects of the EP&A Act have been considered in the technical assessments undertaken for the proposed modification (refer Chapter 6), and are considered in the justification of the proposal (refer Chapter 7)
	Section 4.15(1) – Matter for Consideration	Matters for consideration—general In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application—	
		(a) the provisions of— (i) any relevant environmental planning instruments, and ... (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), ... That apply to the land to which the development application relates,	The provisions of relevant environmental planning instruments have been considered in the technical studies undertaken for the proposed modification.
		(b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	Chapter 6 of this modification report clearly describes and assesses the potential impacts of the proposed modification on the natural environment. The proposed modification does not impact the built environment. The social and economic impacts on the locality were comprehensively canvassed in the EIS for the original Project and the proposed modification would not change the outcomes.
		(c) the suitability of the site for the development	The proposed modification would be undertaken on the same site as the approved Project. The site is suitable for the development.
		(e) the public interest	Public interest was determined by the consent authority in the approval of the original Project.

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
State Environmental Planning Policy (Resources and Energy) 2021	Section 2.17 - Compatibility of proposed mine, petroleum production or extractive industry with other land uses	Before determining an application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:	
		(a) consider;	
		(i) the existing uses and approved uses of land in the vicinity of the development;	The underground mine is an approved land use. Land in the vicinity is the lake and CGO. The proposed modification would not affect other approved land-uses in the vicinity of the mine.
		(ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development;	The proposed modification will not change the approved environmental impacts on land in the vicinity of the mine (refer Chapter 6)
		(iii) any ways in which the development may be incompatible with any of those existing, approved or preferred likely uses;	The proposed modification will not alter the approved mine in a way that may be incompatible with any of those existing, approved or preferred likely uses.
		(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a)(i) and (ii), and	The evaluation of the public benefits of the approved Project were determined by the consent authority in approving the Project. The proposed modification will not affect the public benefits and the land uses referred to.
		(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).	The proposed modification is not incompatible with other land-uses.

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
	Section 2.18 - Consideration of voluntary land acquisition and mitigation policy	<p>(2) Before determining an application for consent for State significant development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider any applicable provisions of the voluntary land acquisition and mitigation policy and, in particular—</p> <p>(a) any applicable provisions of the policy for the mitigation or avoidance of noise or particulate matter impacts outside the land on which the development is to be carried out, and</p> <p>(b) any applicable provisions of the policy relating to the developer making an offer to acquire land affected by those impacts.</p>	<p>The proposed modification does not trigger any provisions of the VLAMP. The mine has effective monitoring programs in place for noise and air quality impacts which will continue to operate for the proposed modification to ensure compliance with relevant criteria.</p>
	Section 2.20 - Natural resource management and environmental management	<p>(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:</p> <p>(a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable;</p> <p>(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable;</p> <p>(c) that greenhouse gas emissions are minimised to the greatest extent practicable.</p>	<p>Comprehensive and strict conditions to manage water-related impacts are provided in the existing consent.</p> <p>There will be no material changes to potential groundwater or surface water impacts as a result of the proposed modification. The assessments are detailed in Chapter 6.</p>
			As above.
			The original There will be no changes to potential biodiversity impacts as a result of the proposed modification (refer Chapter 6).
			The proposed modification does not materially change the greenhouse gas (GHG) emissions approved for the Project (refer Chapter 6). The current GHG emission management measures will continue to apply to the proposed modification.

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
		(3) Without limiting subclause (1), in determining a development application for development for the purposes of mining, the consent authority must consider any certification by the Chief Executive of the Office of Environment and Heritage or the Director-General of the Department of Primary Industries that measures to mitigate or offset the biodiversity impact of the proposed development will be adequate.	No vegetation clearing will be required as a result of the proposed modification (refer Chapter 6).
	Section 2.21 – Resource recovery	<p>(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.</p> <p>(2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.</p>	<p>Efficiency of resource recovery was determined in the original approval process. Mineral Exploration and Geosciences provided a detailed report which agreed that the target resource would be extracted efficiently.</p> <p>The proposed modification further assists the efficient extraction of the E46 resource increasing the annual production rate from 1.8 Mtpa to 2.6 Mtpa.</p> <p>The existing conditions of consent provide a framework which allows the efficient extraction of the resource while minimising the environmental impacts.</p>
	Section 2.23 – Rehabilitation	<p>(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.</p> <p>(2) In particular, the consent authority must consider whether conditions of the consent should:</p> <p>(a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or</p> <p>(b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or</p>	<p>Conditions related to rehabilitation are provided in the existing development consent.</p> <p>The proposed modification does not change the rehabilitation aspects of the approved Project. Rehabilitation of the Project will continue to be regulated under the NSW <i>Mining Act 1992</i>.</p> <p>Rehabilitation of the Project will continue to be regulated under the Rehabilitation Management Plan as guided by the NSW <i>Mining Act 1992</i>.</p> <p>There will be no additional waste generated as result of the proposed modification.</p>

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
		(c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under clause 3 of Schedule 6 to the Act and the Contaminated Land Management Act 1997), or	There will be no soil contamination as a result of the proposed modification.
		(d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.	Rehabilitation of the Project will be regulated under the NSW <i>Mining Act 1992</i> . The Rehabilitation Management Plan for the CGO site contains details of how rehabilitation at its completion would not jeopardize public safety.
State Environmental Planning Policy (Resilience and Hazards) 2021	Section 3.7	Consideration of Departmental guidelines In determining whether a development is: (a) a hazardous storage establishment, hazardous industry or other potentially hazardous industry; or (b) an offensive storage establishment, offensive industry or other potentially offensive industry. Consideration must be given to current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development.	The approved mine is not a hazardous storage establishment, hazardous industry or other potentially hazardous industry, or an offensive storage establishment, offensive industry or other potentially offensive industry. This will not be changed by the proposed modification.
	Section 4.6	(1) A consent authority must not consent to the carrying out of any development on land unless: (a) it has considered whether the land is contaminated; and (b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out; and (c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.	The mine is an approved operation and is not located on contaminated land.

Table 4.1 Pre-conditions to exercising power to grant approval

Statutory document	Section	Mandatory matter	Consideration
Bland Local Environmental Plan 2011	Section 2.3(2)	The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.	The consistency of the Project with the relevant objectives of the zone was determined in the original development application. The proposed modification remains a permissible land-use and is consistent with the relevant zone objectives.
<i>Biodiversity Conservation Act 2016</i>	Section 7.14	(2) The Minister for Planning, when determining in accordance with the Environmental Planning and Assessment Act 1979 any such application, is to take into consideration under that Act the likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.	As was determined in the Project EIS and approval, the Project is unlikely to have a significant impact on biodiversity values. The proposed modification does not change this conclusion. There will be no changes to biodiversity impacts as a result of the proposed modification and consequently no impact to biodiversity values (refer Chapter 6).

5 Stakeholder engagement

Evolution has been actively engaging with and supporting the surrounding community since the commencement of operations at CGO in 2005. A range of stakeholders were consulted in relation to the Project, including members of the local community, neighbouring landowners, local councils and CGO's existing Community Environmental Management Consultative Committee (CEMCC).

The CEMCC is well established and has been operating since 2014. It provides the opportunity for Evolution to regularly report on its operations to the community and to discuss issues of importance to the community. Over the years the CEMCC has provided continual and increased opportunity for community participation and the establishment of productive working relationships between Evolution and the participating community members.

An extensive consultation program was completed on the Project during the technical studies and the social impact assessment undertaken for the EIS. This has been complemented with further targeted information on the proposed modification provided to key stakeholders, including Councils and NSW Government agencies and the CEMCC. The engagement process has been guided by Evolution's core values of accountability, excellence, respect and safety.

Letters explaining the proposed modification were sent to Bland Shire Council, Forbes Shire Council, Lachlan Shire Council with offers to brief Council. Briefing letters were also sent to Resources Regulator, DPE Water and the CEMCC. The letters introduced the proposed modification and provided sufficient detail to give each agency a good understanding of the proposal. In its response to the letter, DPE Water commented that existing consent conditions require to be complied with and any relevant management plans are as clear as possible.

6 Impact assessment

6.1 Overview

The proposed modification is relatively minor in the context of the Project. A suite of relevant technical assessments has been undertaken to support the application. These assessments include:

- noise assessment;
- air quality assessment;
- groundwater impact assessment;
- surface water impact assessment; and
- geotechnical/subsidence assessment.

These assessments are attached in the Appendices to this Modification Report and are summarised in the following sections.

6.2 Noise

A noise and vibration impact assessment (NVIA) has been prepared by EMM for the proposed modification and the assessment is included in full as Appendix A.

To assess whether the proposed modification will change the approved noise and vibration impacts of the Project, an assessment has been completed in accordance with *Noise Policy for Industry* (EPA 2017) and *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZEC 1990). The NVIA includes:

- a summary of the findings of the original NVIA (EMM 2020a);
- a qualitative assessment to identify if there is any change in overall operational noise levels between the approved and proposed operations; and
- a qualitative assessment to identify if there is any change in air blast overpressure and ground vibration levels.

6.2.1 Existing environment

The original NVIA was completed as a cumulative assessment for the Project and for Modification 16 to DA 14/98. The underground operations could not proceed without the changes to surface operations approved under Modification 16. Due to the relative complexity of separating out the inputs to the noise modelling for the underground operations and Modification 16, the original NVIA cumulatively considered the noise and vibration impacts for both applications.

i Construction and operational noise

Noise from construction and operational activities were modelled at all assessment locations (refer Table 2.3 of the original NVIA) during noise-enhancing meteorological conditions. Findings of the noise assessment were as follows:

- Noise levels during the Box-cut construction were assessed for the day, evening and night periods. Cumulative noise levels at CGO during construction were predicted to satisfy the relevant construction criteria at all assessment locations for all assessment periods.
- Operational noise levels were assessed for the day, evening and night periods. Cumulative noise levels at CGO were predicted to satisfy the relevant operational criteria at all assessment locations.
- Night-time maximum $L_{Aeq,15min}$ and L_{Amax} noise levels were predicted to satisfy the relevant sleep disturbance screening criteria at all residential assessment locations.
- Road traffic noise at the nearest residences was predicted to satisfy relevant road noise criteria during the day and night periods. Noise impacts from road traffic noise associated with underground operations were predicted to be unlikely.

ii Blasting

The original NVIA included a blasting and vibration assessment for the underground operations. This considered air blast overpressure and ground vibration resulting from the use of explosives to develop the underground mine.

There were no significant restrictions to the maximum instantaneous charge (MIC) for blasts proposed to occur during the early stages of the underground access decline development during the day and evening periods Monday to Saturday.

For Sundays and public holidays and the night period of Monday to Saturday, a 520 kg MIC limit was recommended to achieve the relevant 95% air blast overpressure and ground vibration limits at the nearest residential receiver during the early stages of the underground access decline development.

During the operational stage of the underground operations, no further control of MIC values is considered necessary to achieve the relevant 95% ground vibration limits at the nearest residential receivers.

6.2.2 Impact assessment

The potential noise and vibration impacts associated with the proposed modification are summarised in Table 6.1.

Table 6.1 Potential noise and vibration impacts of the proposed modification

Element of proposed modification	Activity	Potential noise or vibration impact
Production rate increase (1.8 to 2.6 Mtpa)	Ore haulage movements to the surface	The increase in annual production rate would result in a commensurate increase in underground truck movements to the surface. Any increase would however be temporary and limited in the context of overall life of the mine haulage.
	Unloading (waste) at dump areas	The modelled source locations for this activity do not change.
	Unloading (ore) at the processing area	The modelled source locations for this activity do not change.
Box-cut entry	Construction of the box-cut	The construction of the approved Box-cut is no longer required, and noise emissions associated with this activity would no longer occur.

Table 6.1 Potential noise and vibration impacts of the proposed modification

Element of proposed modification	Activity	Potential noise or vibration impact
Declines and underground access	Construction of new portal (primary access)	<p>The construction of the new primary access portal to the north of the E42 pit will replace the approved Box-cut. Noise emissions during the construction of the approved Box-cut were predicted to satisfy the relevant limits at all assessment locations in the original NVIA. Noise emissions from the construction of the new primary access portal are expected to be much lower than those predicted for the approved box-cut construction. Therefore, this change is inconsequential to the proposed modification.</p>
	Hauling (waste) from new underground mine access points to dump areas	<p>Waste material would be hauled from the new mine access points located within the E42 pit. The haul distance from the new mine access points would be less than or similar to that from the approved Box-cut, resulting in similar or potentially minor reduction in noise emissions from underground truck movements on the surface. Furthermore, the majority of this haul route would be confined to greater depth (ie at a lower elevation within the E42 pit), which will result in similar or potentially minor reduction in noise emissions from underground truck movements on the surface.</p> <p>However, this would be offset by the increase in production rate (1.8 to 2.6 Mtpa), which as noted above, would result in an increase in underground truck movements to the surface.</p>
	Hauling (ore) from new underground mine access points to processing area	<p>Ore material would be hauled from the new mine access points located within the E42 pit. The haul distance from the new mine access points would be greater than from the approved box-cut, resulting in similar or potentially minor increase in noise emissions from underground truck movements on the surface. However, parts of this haul route would be confined to greater depth (lower elevation within the E42 pit), negating any potential increase in noise emissions from the underground truck movements on the surface.</p> <p>The increase in production rate (1.8 to 2.6 Mtpa) increases in underground truck movements to the surface at peak production with a decrease in later years of the project.</p>
Change to access tunnel geometry	Underground blasting	<p>The relocation of the access tunnels between the development declines and the stoping areas would not materially change the distance between blast locations and receivers. There is no change to the MIC restrictions for blasts recommended in the original NVIA (where relevant) to achieve the air blast overpressure and ground vibration limits at the nearest residential receivers.</p>
Transport of material offsite	Offsite transport vehicle movements	<p>No increase in offsite transport movements is proposed and road traffic noise at nearest residences will satisfy relevant road noise criteria during both the day and night periods.</p>

As outlined in Table 6.1, noise impacts may result from increased truck movements associated with the proposed increased annual production rate of 1.8 Mtpa to 2.6 Mtpa.

The modelling presented in the NVIA also considered total material handling (ore and waste) associated with the approved open pit operations to represent a combined worst-case scenario. When assessed in the context of a worst-case combined scenario, the increase from 1.8 Mtpa to 2.6 Mtpa represents a 1% increase in total material handled (ie ore and waste) across the site (refer Figure 2.2 of Appendix A).

The cumulative operational noise levels for the proposed modification and open pit operations approved under DA 14/98 were modelled for the day, evening and night periods. This considered the worst-case scenario of 14 underground haul trucks operating at the same time. All other assumptions (ie assessment locations, modelled meteorological conditions and sound power levels) are consistent with those adopted in the original NVIA (refer to Chapter 4 of the original NVIA for the assessment method and Figure 6.1 of this modification report for the assessment locations).

The results of the model are summarised in Table 4.2 of Appendix A, including a comparison of the predicted cumulative operational noise levels (including noise limits predicted for open pit operations as approved under DA 14/98 and predicted noise levels associated with the proposed modification) and the noise limits approved under DA 14/98. The predicted cumulative noise levels with the proposed modification will not exceed approved noise limits. From a noise and vibration perspective, the impacts of the Project with the proposed modification are considered to be materially the same as those which were accepted and approved for the Project. The potential for overall noise levels at CGO to increase due to the proposed modification is therefore relatively low.

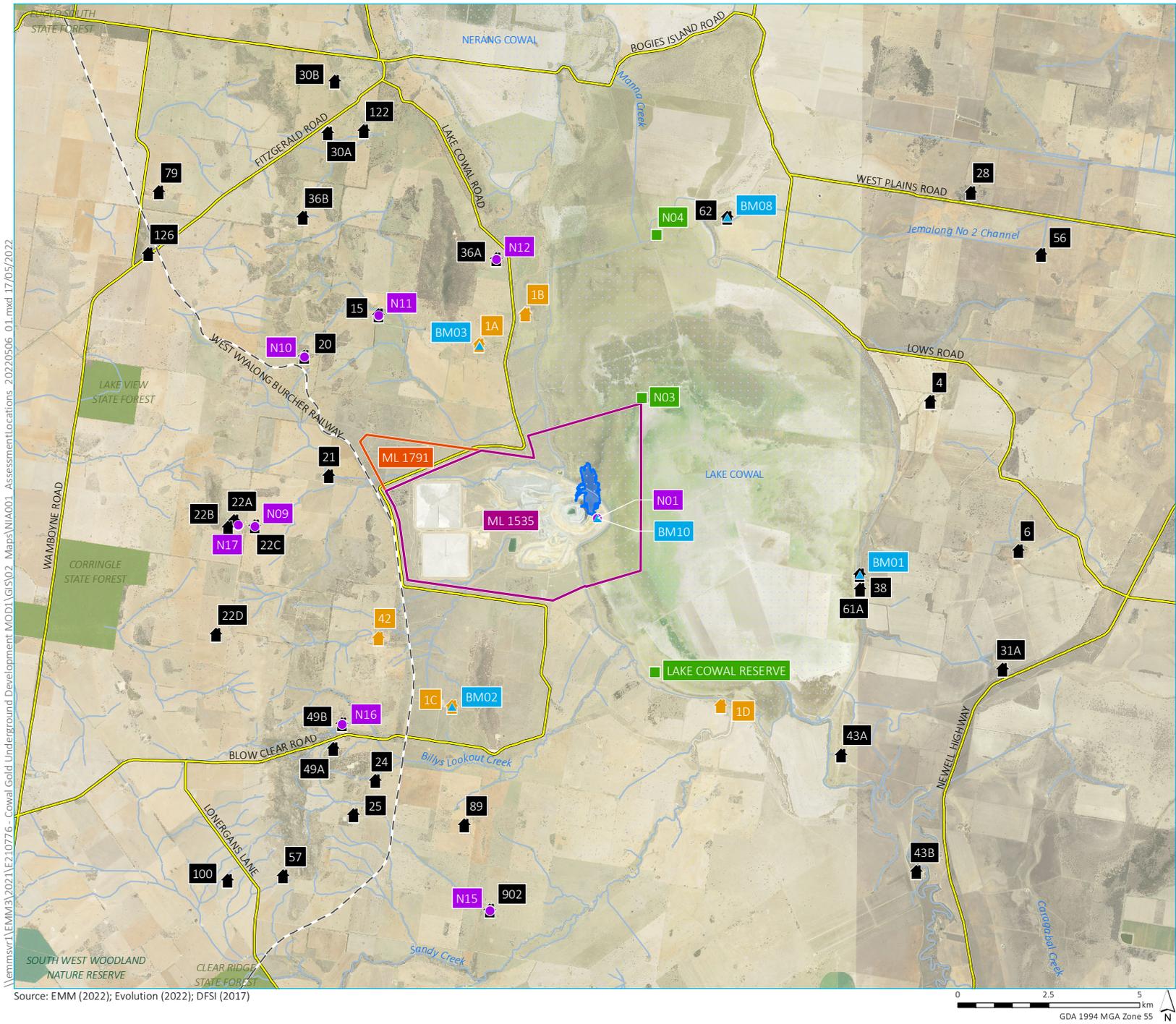
6.2.3 Management and mitigation

As the noise and vibration impacts associated with the proposed modification are unlikely to be any different to the approved impacts, they will continue to be effectively managed in accordance with the strict noise and vibration limits in development consent DA 14/98, *Cowal Gold Operations Noise Management Plan (NMP)* (Evolution 2022), and *Cowal Gold Operations Blast Management Plan (BMP)* (Evolution 2015).

The NMP describes the noise monitoring program, protocols for identification and notification of noise incidents, existing implementation of noise mitigation measures, noise complaints management system, community consultation and independent environmental audit processes in place at CGO. The NMP was updated in March 2022 to consider the cumulative noise impacts and subsequent management and mitigation measures outlined in the original NVIA for the Underground Development Project and Modification 16 to DA14/98.

The BMP describes the blast design and controls, blast management and mitigation measures, blast safety and infrastructure protection measures, blast monitoring program, protocols for identification and notification of blast incidents, blast complaints management system, community consultation and independent environmental audit processes in place at CGO.

The mitigation and management measures outlined in the NMP, BMP and consent documents for DA 14/98 and SSD 10367 are considered appropriate to address potential noise and vibration impacts associated with the proposed modification. Therefore, no additional noise management and mitigation measures or conditions of consent are required to be implemented to manage the impacts associated for the proposed modification.



- KEY**
- Proposed underground development (Mod 1)
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - Rail line
 - Main road
 - Watercourse/drainage line
 - Waterbody
 - NPWS reserve
 - State forest
 - Monitoring locations**
 - Noise monitoring
 - ▲ Blast monitoring
 - Assessment locations**
 - Residential (Evolution-owned)
 - Residential (privately-owned)
 - Non-residential

Monitoring and assessment locations

Cowl Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 6.1



\\lemmsvr1\EMM3\2021\E210776 - Cowl Gold Underground Development MOD1\GIS\02_AssessmentLocations_20220506_01.mxd 17/05/2022

Source: EMM (2022); Evolution (2022); DFSI (2017)

6.2.4 Conclusion

The NVIA for the proposed modification shows that the proposed modification will result in no additional noise or vibration impacts and is substantially the same as the Project as approved under SSD 10367.

The key findings of the NVIA are as follows:

- Noise emissions from the proposed construction of the primary access portal are expected to be much lower than those predicted for construction of the approved Box-cut. Therefore, noise emissions associated with this change are inconsequential in relation to the proposed modification.
- There will be no increase in noise emissions resulting from the longer haul distance between the proposed primary access portal and the processing area. This is because parts of the haul route will now be confined to a greater depth negating any potential increase in noise emissions from truck movements.
- The proposed relocation of the access tunnels between the development declines and the stoping areas would not change the distance between blast locations and residential receivers. There will be no change to the MIC restrictions outlined in the original NVIA in order to achieve the air blast overpressure and ground vibration limits at residential receivers.
- There will be no increase in the overall transport movements and therefore road traffic noise at residential receivers will likely be consistent with findings of the original NVIA (refer section 5.2 of the original NVIA).
- Noise emissions associated with increased truck movements due to the proposed increase of the production rate will be indistinguishable when compared to existing and concurrent operations on-site. Noise level modelling completed as part of the NVIA show that cumulative noise levels will remain consistent with those approved under DA 14/98.

6.3 Air quality

6.3.1 Overview

An air quality impact assessment (AQIA) has been prepared by EMM for the proposed modification and included in full as Appendix B. To assess the potential change to air quality impacts, a qualitative desktop assessment has been completed and includes:

- a summary of the findings of the original air quality and greenhouse gas assessment (AQGHGA) (EMM 2020b) completed for underground operations;
- a qualitative desktop assessment to identify the potential change in overall construction and operational dust levels between the approved and proposed operations; and
- a quantitative desktop assessment to identify the potential change in scope 1, 2 and 3 GHG emissions associated with the proposed modification.

6.3.2 Existing environment

This section provides a summary of the AQGHGA completed for the underground operations and Modification 16 to DA 14/98, as summarised in *Cowal Gold Operations Underground Development Environmental Impact Assessment* (EMM 2020). The underground operations could not proceed without the changes to surface operations approved under DA14/98 Modification 16. Due to the relative complexity of separating out the inputs to the Project and Modification 16, the original AQIA cumulatively considered the air quality and GHG impacts for both applications.

The results of the modelling completed for the Project showed that the predicted concentrations and deposition rates for incremental particulate matter, including total suspended particles, particulate matter less than 10 µm (PM₁₀), particulate matter less than 2.5 µm (PM_{2.5}) and dust deposition, were well below the applicable impact assessment criteria at all assessment locations (refer Figure 2.3 of AQGHGA). For all pollutants and averaging periods, the underground operations and Modification 16, represented a minor change from the existing open pit operations.

When background concentrations were added to the predicted emissions from the Project and from Modification 16 activities, the cumulative annual average concentrations for all pollutants were predicted to be below the relevant impact assessment criteria. However, the predicted cumulative 24-hour average PM₁₀ level was found to be greater than the impact assessment criterion (50 µg/m³) at a number of assessment locations, but only on two additional days.

Further cumulative analysis was presented with an extended background dataset, for the assessment locations with the highest predictions. This analysis showed that the probability of days where the 50 µg/m³ limit would be exceeded was low, with less than one additional day of exceedance predicted for each assessment location. The maximum predicted 24-hour PM_{2.5} concentrations were predicted to be below the impact assessment criterion at all assessment locations. There are no assessment locations where criteria of the *Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (DPE 2018) was triggered.

6.3.3 Impact assessment

i Overview

A summary of each dust emission source identified in the AQGHGA, and how this would change due to the proposed modification, is provided in Table 6.2.

Table 6.2 Potential air quality impacts of the proposed modification

Dust emission sources identified in the AQGHGA	Change associated with proposed modification
Construction of the box-cut for mine access	As construction of the Box-cut is no longer required, dust emissions associated with material handling from this activity would no longer occur. It is noted that construction of the Box-cut was not part of the modelled scenario in the AQGHGA, therefore there would be no change associated with the proposed modification.
Hauling of waste rock from box-cut to northern waste dump	The haul distance between the new mine access point and the northern waste dump is less when compared to the haul distance from the Box-cut. This will result in less wheel generated dust per trip. However, the proposed increased production rate will result in increased haul truck movements. The changed haul route would also change the modelled source locations for this activity.
Unloading of waste rock at northern waste dump	The proposed production rate increase will accelerate the deposition of waste rock unloaded at the northern waste dump and associated dust emissions. The modelled source locations for this activity do not change.
Hauling of ore from box-cut to temporary stockpile	Ore material would be hauled from the new mine access point. There would be a minor increase in the haul distance from the new mine access point to the run-of-mine (ROM) pad The changed haul route would also change the modelled source locations for this activity.

Table 6.2 Potential air quality impacts of the proposed modification

Dust emission sources identified in the AQGHGA	Change associated with proposed modification
Unloading of ore at temporary stockpile	The proposed production rate increase will increase the maximum peak yearly amount of ore handled from the underground mine onsite and associated dust emissions, however it will not change the total amount of ore handled on site which will decrease later in the project when the open-pit operations are reduced. The modelled source locations for this activity do not change.
Rehandling of ore at crusher/ROM pad	
Crushing of ore	
Screening of ore	
Loading of ore at coarse ore stockpile	
Blasting to develop underground operations	The proposed production rate increase will increase the amount of dust generated underground. Dust emissions generated underground would be released from the Exhaust Adit, for which the location does not materially change.
Mining of material underground	
Trucking of ore and waste rock to surface	

ii Adit location

The precise locations for the ventilation adits are to be determined during detailed design of the Project. However, modelling completed as part of the original AQGHGA considered the Exhaust Adit to be located at the ‘mine access points (secondary accesses)’ as shown on Figure 2.1 of Appendix B.

This is consistent with the location of the ventilation adits associated with the proposed modification. Therefore, there will be no significant change to the location of the ventilation adits.

iii Assessment of change

The AQIA has considered the combined worst-case cumulative scenario of the proposed modification and the approved open pit operations.

The proposed increased annual production rate of 1.8 to 2.6 Mtpa will represent a potential maximum 44% increase in material hauled from the underground operations to the surface per year in peak years, with a subsequent reduction in later years. However, when assessed in the context of a worst-case combined scenario across all operational activities at the CGO site, the increase from 1.8 Mtpa to 2.6 Mtpa represents just a 1% increase in total material handled across the site (ie all ore and all waste rock handled).

This increase would however be balanced by the shorter haulage distances from the proposed new mine access points to the waste dumps. Therefore, on balance, the proposed modification does not result in a discernible change to the predicted ground level concentrations of dust provided in the AQGHGA.

iv Greenhouse gas assessment

Increases to the annual ore production rate as part of the proposed modification will result in additional diesel combustion and, to a lesser extent, an increase in electricity use, relative to that which was assessed in the AQGHGA. However the GHG emissions were in the previous assessment dominated by the construction of the box-cut, which will not go ahead. This results in lower GHG emissions across the whole of the project. Revised estimates for annual GHG emissions due to proposed modification are provided in Table 6.3.

Table 6.3 Revised average annual GHG emission estimates for modification (t CO₂-e/year)

GHG emission scope	AQGHGA estimate	Modification estimate	FY2019 NGERs data
Scope 1 - Diesel	13,275	13,152	70,741
Scope 1 - Explosives	201	236	
Scope 2 - Electricity	42,134	39,814	202,168
Scope 3 - Diesel	681	674	NA
Scope 3 - Electricity	4,682	4,424	

The annual average GHG emissions for the proposed modification are effectively the same (or slightly lower) as those presented in the AQGHGA (excluding the first year of box-cut entry construction).

Although the annual ore production rate increases as part of the proposed modification, the total ore production and waste rock production over the life of the Project does not increase. Therefore, the average emission across all years remains the same. When compared against data reported under the *National Greenhouse Energy Reporting Act 2007* (NGER Act) for existing open pit operations in FY2019, the proposed modification does not change what was reported in the AQGHGA (refer Chapter 9 of the AQGHGA).

6.3.4 Management and mitigation

As the air quality impacts associated with the proposed modification do not result in increased impacts to that previously assessed and approved, they will continue to be effectively managed in accordance with *Cowal Gold Operations Air Quality Management Plan (AQMP)* (Evolution 2015a) and relevant conditions outlined in the consent documents for DA 14/98 and SSD 10367.

The AQMP includes an overview of the management measures to mitigate dust generation (refer Table 4.1 of Appendix B) and also the existing air quality monitoring network, which includes a meteorological monitoring station, 12 dust deposition gauges, High Volume Air Sampler (HVAS) and continuous monitoring for PM₁₀ and PM_{2.5} at three locations.

The mitigation and management measures outlined in the AQMP and development consents DA 14/98 and SSD 10367 are considered adequate to address any air quality impacts associated with the proposed modification. Therefore, no additional air quality management and mitigation measures or monitoring is required for the proposed modification.

6.3.5 Conclusion

The AQIA shows that the proposed modification will not result in additional impacts at any residences near the mine, and the impacts of the Project with the proposed modification will be substantially the same as the underground Project as approved.

The key findings of the AQIA are as follows:

- Dust emissions predicted in the AQGHGA and associated with construction of the box-cut would not occur.
- Any additional dust impacts associated with the proposed increased annual production rate will be partially offset by the shorter haulage route distance between the proposed new mine access points and waste dumps. This will represent an insignificant change to predicted ground level dust concentrations provided in the AQGHGA.

- There will be no change to scope 1, 2 or 3 GHG emissions provided in the AQGHA due to the proposed increased ore production rate.
- There is the potential for a shorter duration of impacts due to the increased annual ore production rate and potential for lower cumulative impacts later in the project life as the open-pit operations are reduced.

6.4 Surface water

6.4.1 Overview

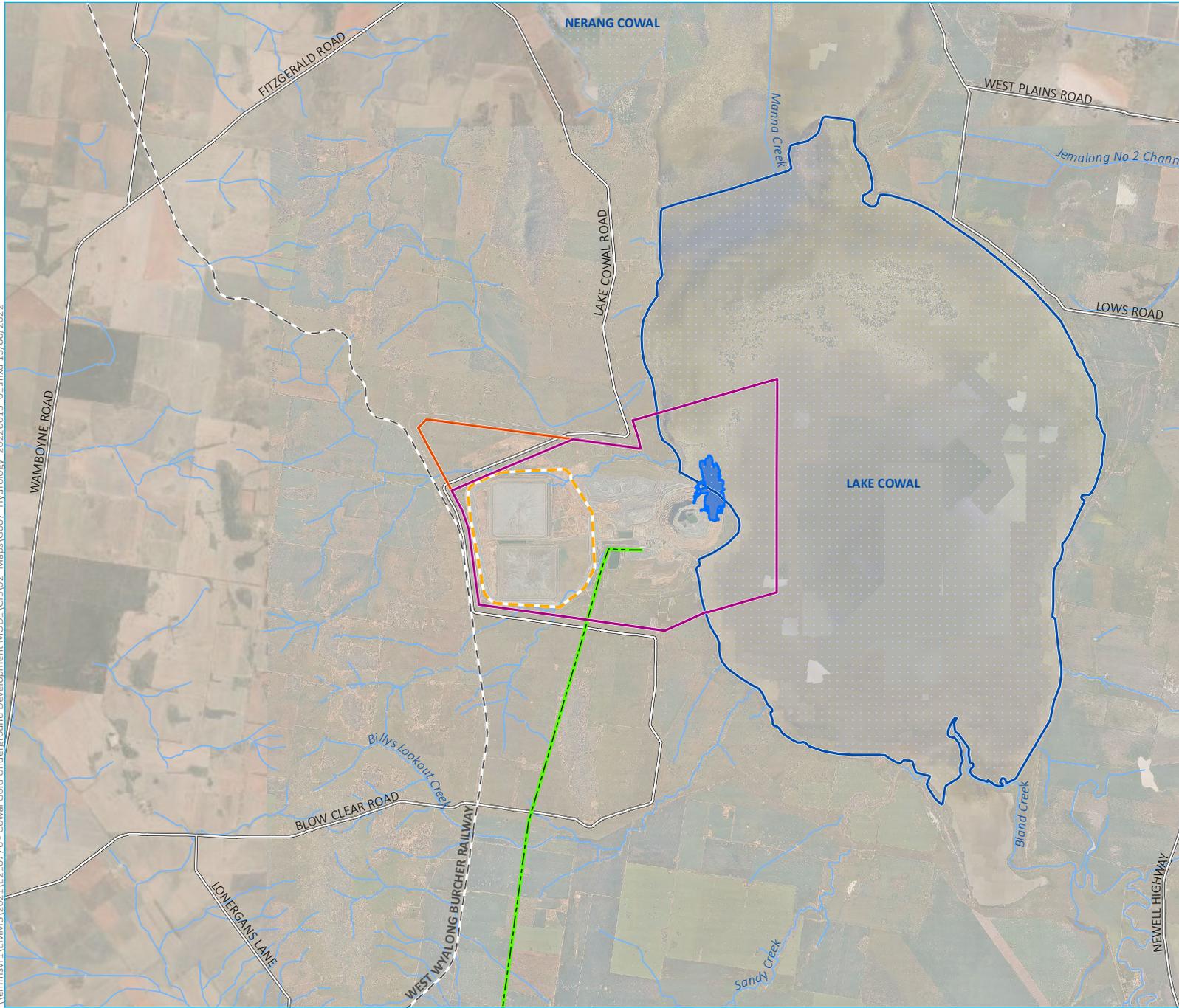
A surface water assessment (SWA) has been prepared by ATC Williams Pty Ltd for the proposed modification and included in full as Appendix C. The SWA has been prepared in accordance with the relevant statutory planning instruments and assess:

- potential impacts to the site water balance and water supply security associated with the proposed change in the maximum annual production rate;
- underground inrush risk associated with the proposed in-pit access; and
- potential surface water impacts, specifically relating to Lake Cowal, associated with the modification.

6.4.2 Existing environment

This section provides a summary of the SWA completed for the Project, as summarised in *Cowal Gold Operations Underground Development Environmental Impact Assessment* (EMM 2020). The underground operations could not proceed without the changes to surface operations approved under DA14/98 Modification 16. Due to the relative complexity of separating out the inputs to the Project and Modification 16, the original SWA cumulatively considered the surface water impacts for both applications. An overview of the hydrological setting is provided in Figure 6.2.

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- KEY**
- Proposed underground development (Mod 1)
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - Indicative integrated waste landform perimeter
 - Electricity transmission line
 - Rail line
 - Main road
 - Watercourse/drainage line
 - Waterbody
 - Extent of Lake Cowal

Source: EMM (2022); Evolution (2022); DFSI (2017)



Hydrology

Cowlal Gold Operations
 Underground Development SSD 10367
 Optimisation Modification Mod 1
 Figure 6.2



Findings of the SWA are as follows:

- additional water outflows associated with the Project included groundwater seepage pumped to the surface from the underground mine and the use of water in the pastefill plant, dust suppression and cooling;
- construction of the box-cut and pastefill plant would require minor drainage control works;
- no impacts on the inflows to Lake Cowal were expected to occur as a result of the Project;
- no apparent link between water quality of Lake Cowal and the existing open pit mining operations, therefore the Project was deemed to have a low risk of anything more than a negligible hydrological impact on Lake Cowal; and
- post-closure surface water impacts included the potential for structural instability of final mine landforms that could lead to impacts on Lake Cowal's water quality (as salinity and turbidity/sedimentation), however this was considered unlikely due to the majority of the site draining to the open pit which would act as a groundwater sink with long-term pit water levels below the spill level.

6.4.3 Impact assessment

The SWA has re-run the site water balance model to consider changes associated with the proposed modification. The model considers inflows, outflows, transfers and changes in the storage of water on-site.

The model simulates the changes in stored water volumes of water in all site storages (including contained water storages, tailing storage facility (TSF), IWL and open pit and underground mine voids) in response to inflows (including rainfall runoff, groundwater inflow, tailings water, groundwater bore extraction and licenced extraction from the Lachlan River) and outflows (including evaporation and water usage for processing and dust suppression). The model included 133 different simulations each representing variable climate conditions as recorded in historic climate data between 1892 and 2021.

A summary of the site's updated water balance model, including the average inflows and outflows, is provided in Table 3 of Appendix C. The total inflow is modelled to be 7,076 megalitres per year (ML/year). The total outflow is modelled to be 7,014 ML/year.

The demand from external sources (including the Eastern Saline Borefield, Bland Creek Palaeochannel Borefield and licensed extraction from Lachlan River water entitlements) is predicted to average 2,524 ML/year. This compares with an average of 2,744 ML/year predicted based on the site water balance model completed for the Project. The reduction in predicted demand from external sources relates predominately to changes in the proposed processing rates and predicted groundwater inflow rates. The modelled annual demand from each external source for the period 2022 to 2035 is shown in Figure 6.3, Figure 6.4 and Figure 6.5.

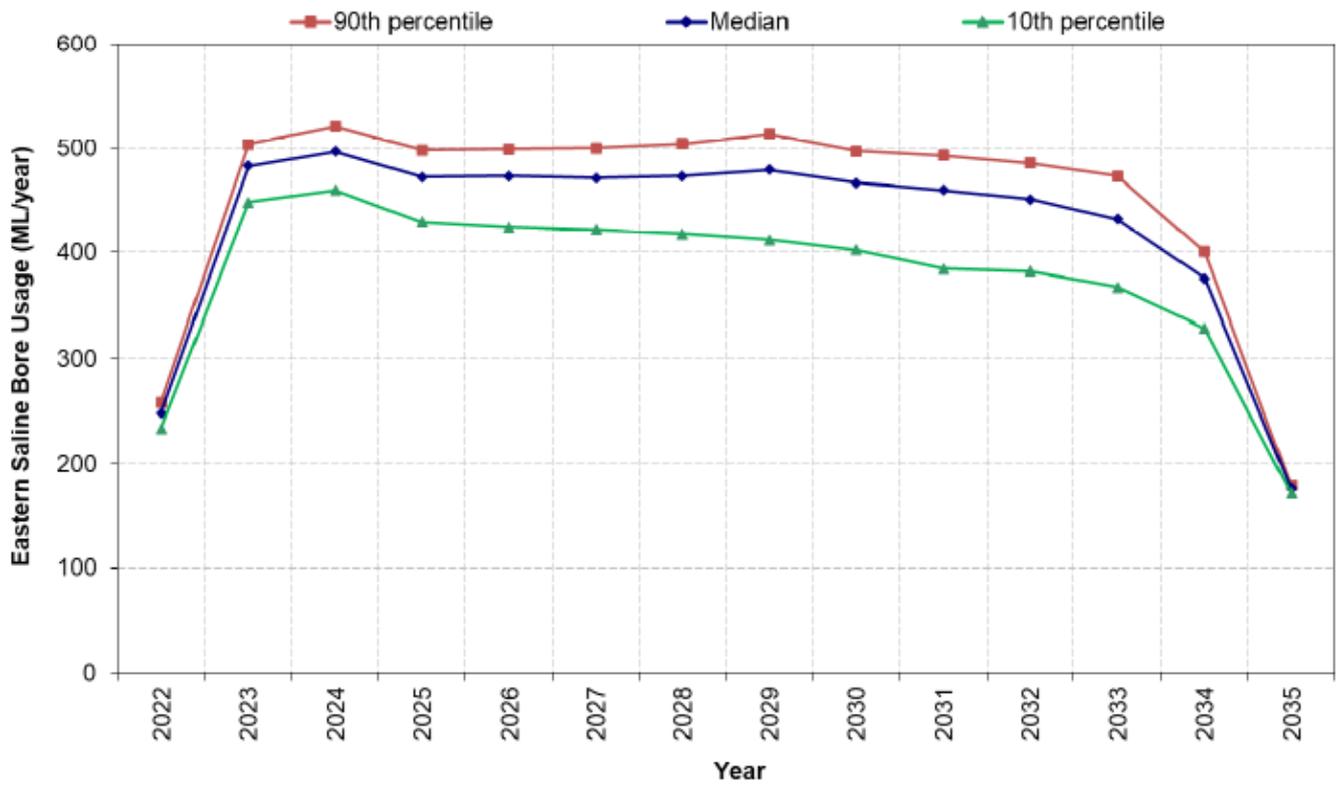


Figure 6.3 Predicted annual Eastern Saline Borefield usage from 2022 to 2035

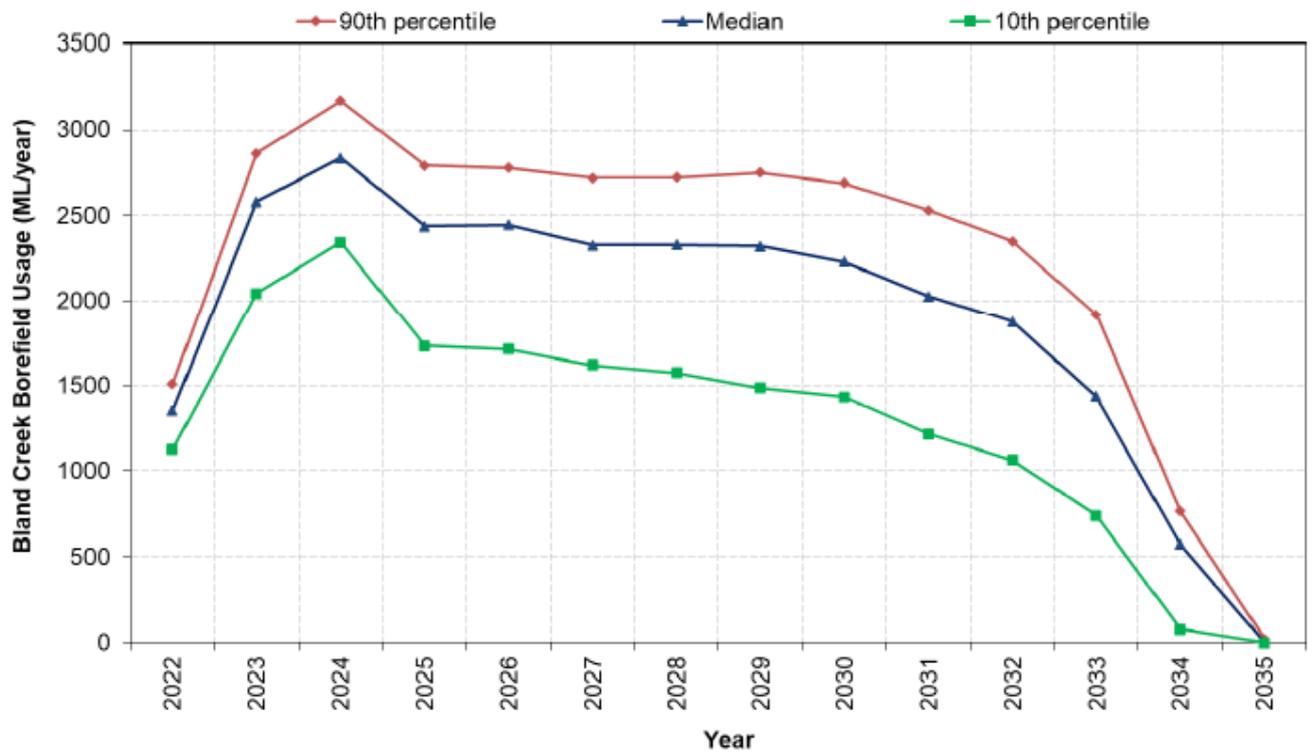


Figure 6.4 Predicted annual Bland Creek Palaeochannel Borefield usage from 2022 to 2035

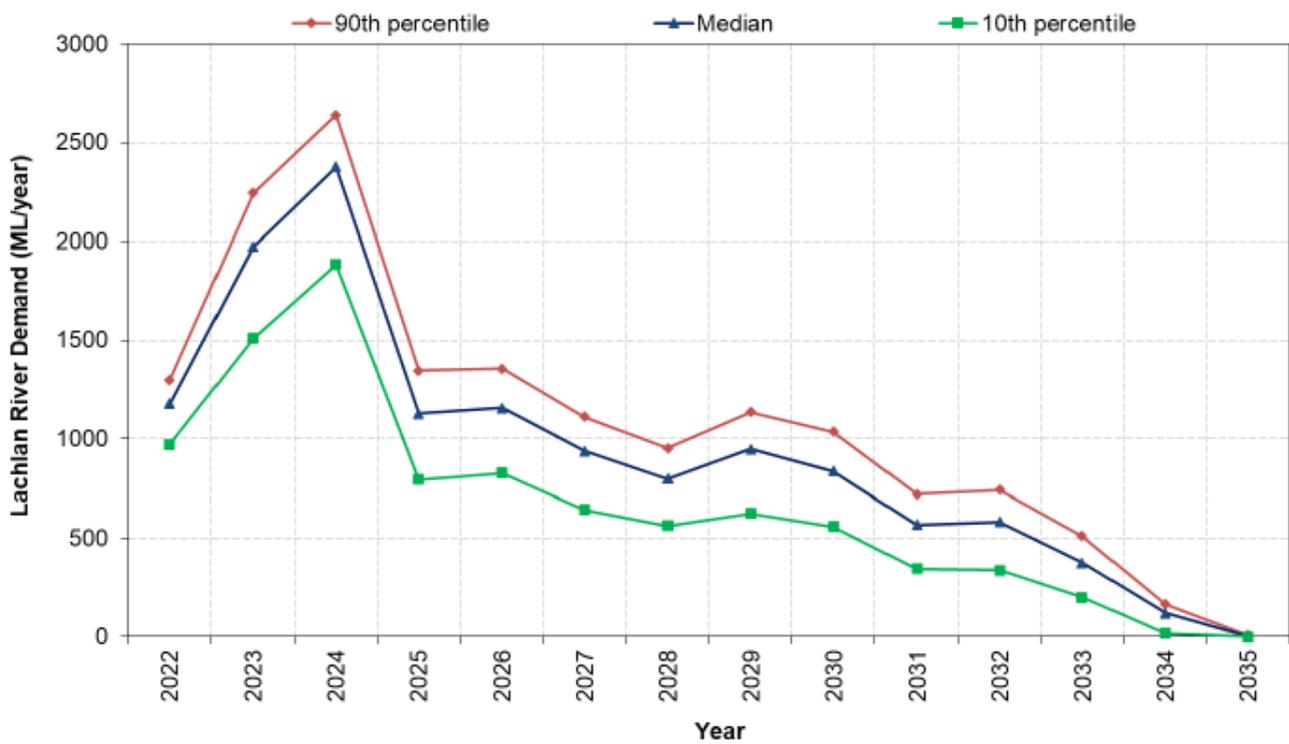


Figure 6.5 Predicted annual demand from Lachlan River entitlements from 2022 to 2035

As shown on Graph 5 of Appendix C, the stored water volume in the open pit is modelled to increase towards the year 2035 when the ore production rate and water demand associated with the proposed modification decreases. The maximum water volume modelled for the open pit is 2,396 ML. The 5th percentile, median and 95th percentile model results are shown on Graph 5 of Appendix C.

Based on the 90th percentile modelling results, the annual water demand from the Bland Creek Palaeochannel Borefield is predicted to peak at 3,171 ML in 2024, which is less than the approved existing annual extraction rate of 3,650 ML. The maximum predicted annual water demand from the Lachlan River is approximately 2,639 ML. The WIA notes that there has been adequate allocation assignment water available on the market from this source in previous years to meet this predicted demand requirement.

There is negligible risk of underground inrush associated with the proposed underground access points and the existing Warraga Portal. The predicted maximum water volume for the open pit (2,396 ML) corresponds with the maximum pit water level of 806 m mine datum (MD) which is significantly lower than the elevation of the lowest proposed access point, which is the fresh air intake adit 1 at 957 m MD.

The proposed underground access points will require substantially less surface disturbance and movement of material for construction in comparison to the requirements of the box-cut and decline approved as part of the Project.

6.4.4 Management and mitigation

The SWA recommends that future water demand is met by continuing to source water from the BCPB in addition to purchasing water from the regulated flows of Lachlan River (licensed extraction purchased on the open market). This will manage groundwater levels of the BCPB and provide flexibility with extraction rates and availability of water for purchase via the Lachlan River. The SWA identifies any impact from purchasing water from Lachlan River to be neutral, as this water would likely be purchased by other users or extracted by existing licence holders.

Considering the low risk of hydrological impact to Lake Cowal from the proposed modification, no additional management and mitigation measures are considered necessary to manage impacts.

6.4.5 Conclusion

The SWA shows that the proposed modification will not result in additional hydrological impacts to Lake Cowal, and the impacts of the Project with the proposed modification will be substantially the same as the Project as approved.

The key findings of the SWA are as follows:

- the total demand of water from external sources is predicted to average 2,524 ML/year for the proposed modification, in comparison to an average of 2,744 ML/year previously predicted for the Project;
- the maximum annual water demand from the BCPB is predicted to be 3,171 ML in 2024 which is allowable within the existing and approved extraction rate of 3,650 ML;
- the maximum annual water demand from the Lachlan River is 2,639 ML which can likely be sourced from licenced extraction purchased on the open market; and
- there is a negligible risk of underground inrush associated with the proposed underground access points.

6.5 Groundwater

6.5.1 Overview

A groundwater impact assessment (GWIA) has been prepared by EMM for the proposed modification and included in full as Appendix D. The GWIA included updates to the groundwater model to consider the proposed modification and assess whether there are any:

- differences in drawdown associated with the optimised underground mine plan; and
- potential changes to the mine inflow volumes.

6.5.2 Existing environment

The original GWIA for the Project was completed by Coffey Services Australia Pty Ltd (Coffey) in September 2020 (Coffey 2020). It used results from the predictive three-dimensional numerical modelling based on an existing mine site numerical groundwater flow model which was completely re-worked to consider the Project. The assessment also used a numerical groundwater model for the palaeochannel borefield for mine water supply. This model was not used in this assessment due to this modification proposing no changes to mine water supply. Two further addendums were also prepared as part of the assessment of the Project (Coffey 2020a and Coffey 2020b).

A summary of the findings of these assessments are provided in Chapter 2 of Appendix D.

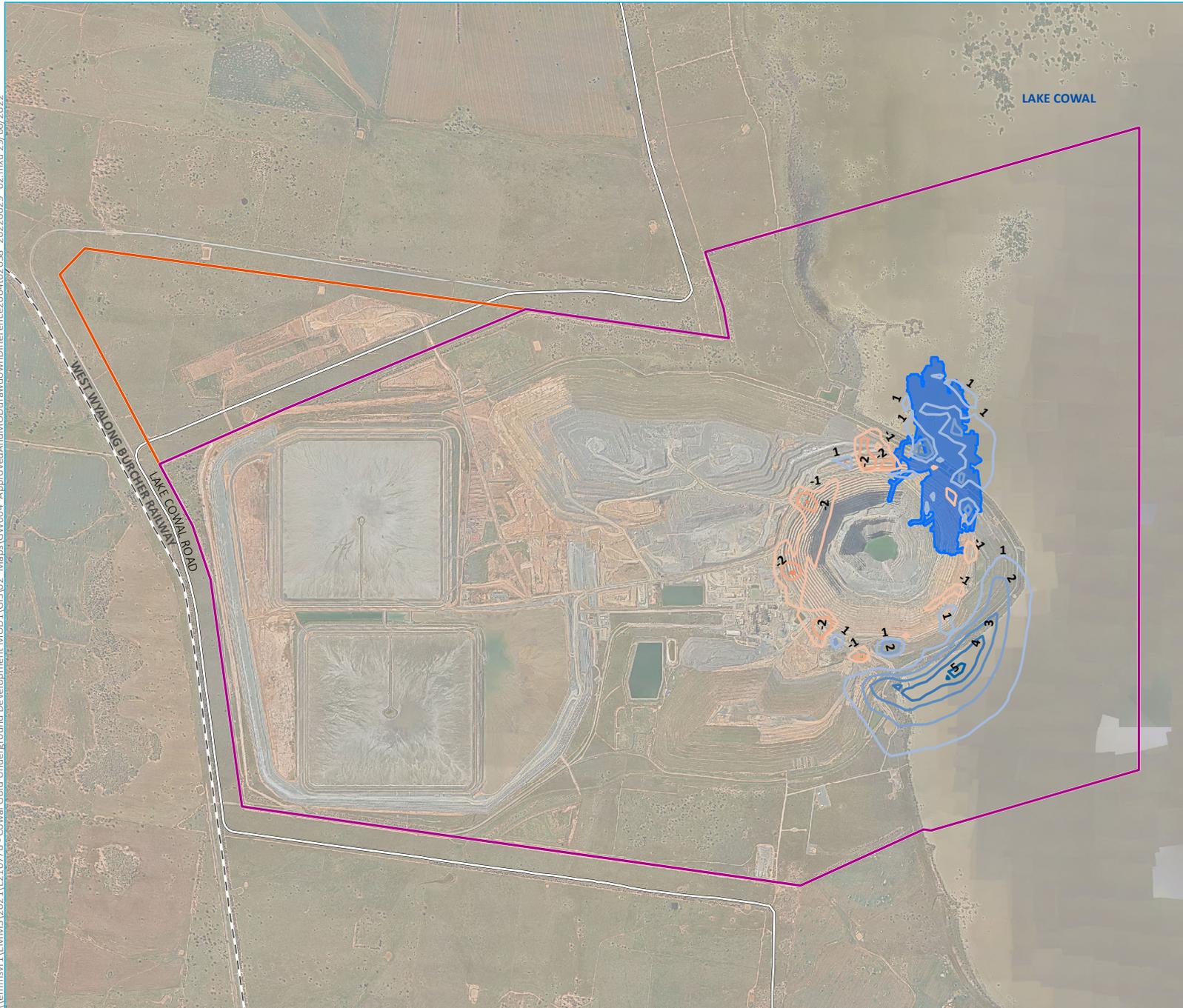
6.5.3 Impact assessment

The difference between the Project and proposed modification modelled groundwater table drawdown in 2038, 2058 and 2138 are shown in Figure 6.6, Figure 6.7 and Figure 6.8.

The updated modelling shows that impacts to groundwater levels during operation and post closure will be very similar to the impacts predicted for the Project (refer Section 3.2.1 of Appendix D). The key findings of the updated modelling include:

- groundwater drawdown is unlikely to be as pronounced in the south-east section of Mining Lease (ML) 1535 with the proposed modification;
- the water table drawdown in the south-east and western areas of the open pit are due to the removal of the box-cut and underground access points to the east of the open pit;
- during both mining and post-mining, differences in drawdown depth between the approved Project and proposed modification are mostly contained within ML 1535 and ML 1791 and all drawdown variations are within +/- 5 m; and
- during post-mining, most of the differences in the modelled groundwater table drawdown are shown to occur around the existing open pit and underground mines themselves, extending to the eastern section of ML 1535.

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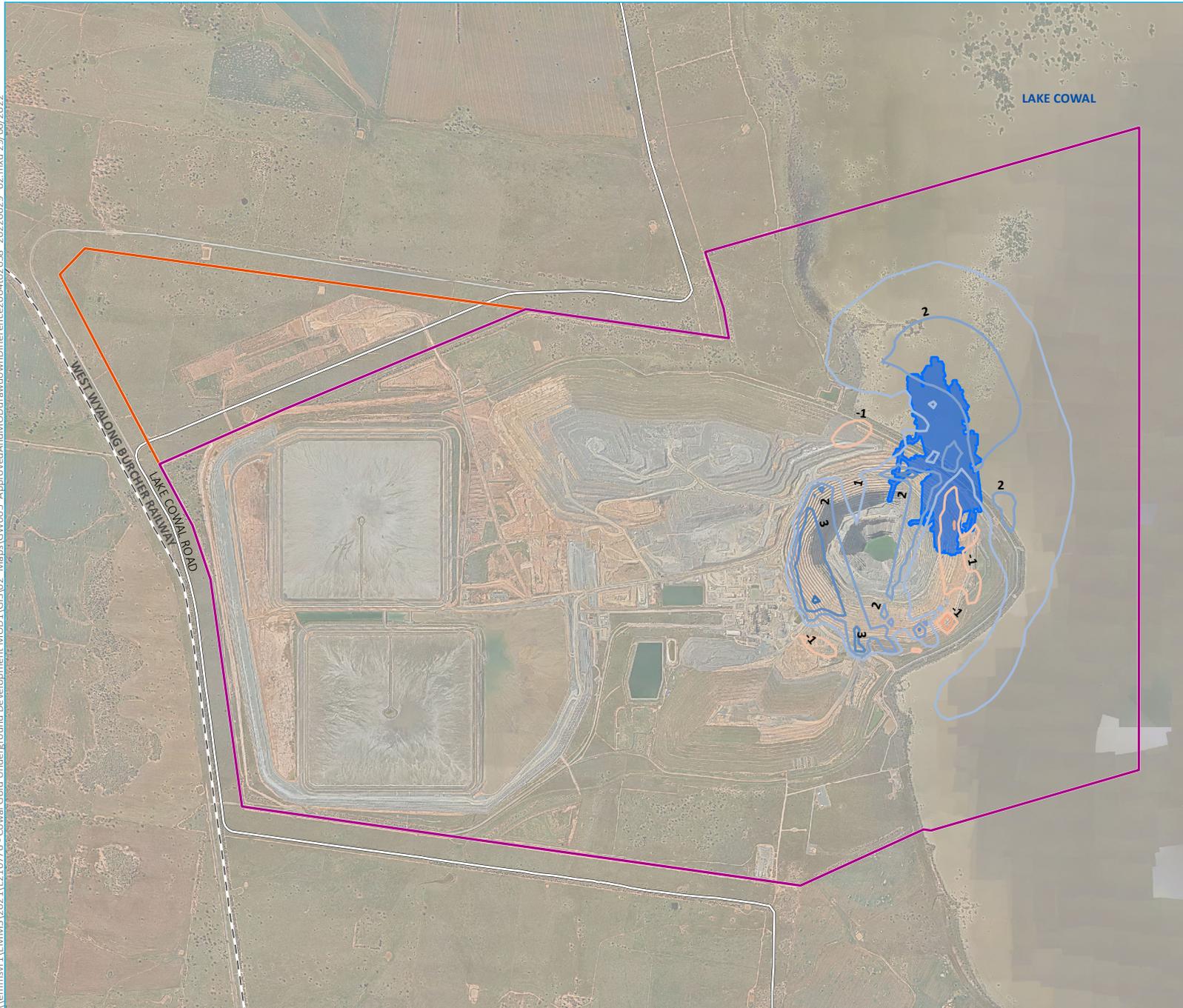
- KEY**
- Proposed underground development (Mod 1)
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - - Rail line
 - Main road
- Predicted watertable drawdown difference (m)**
- -3
 - -2
 - -1
 - 1
 - 2
 - 3
 - 4
 - 5

Predicted watertable change
between approved project and
proposed modification
(2004 - 2038)

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Optimisation Modification Mod 1
Figure 6.6



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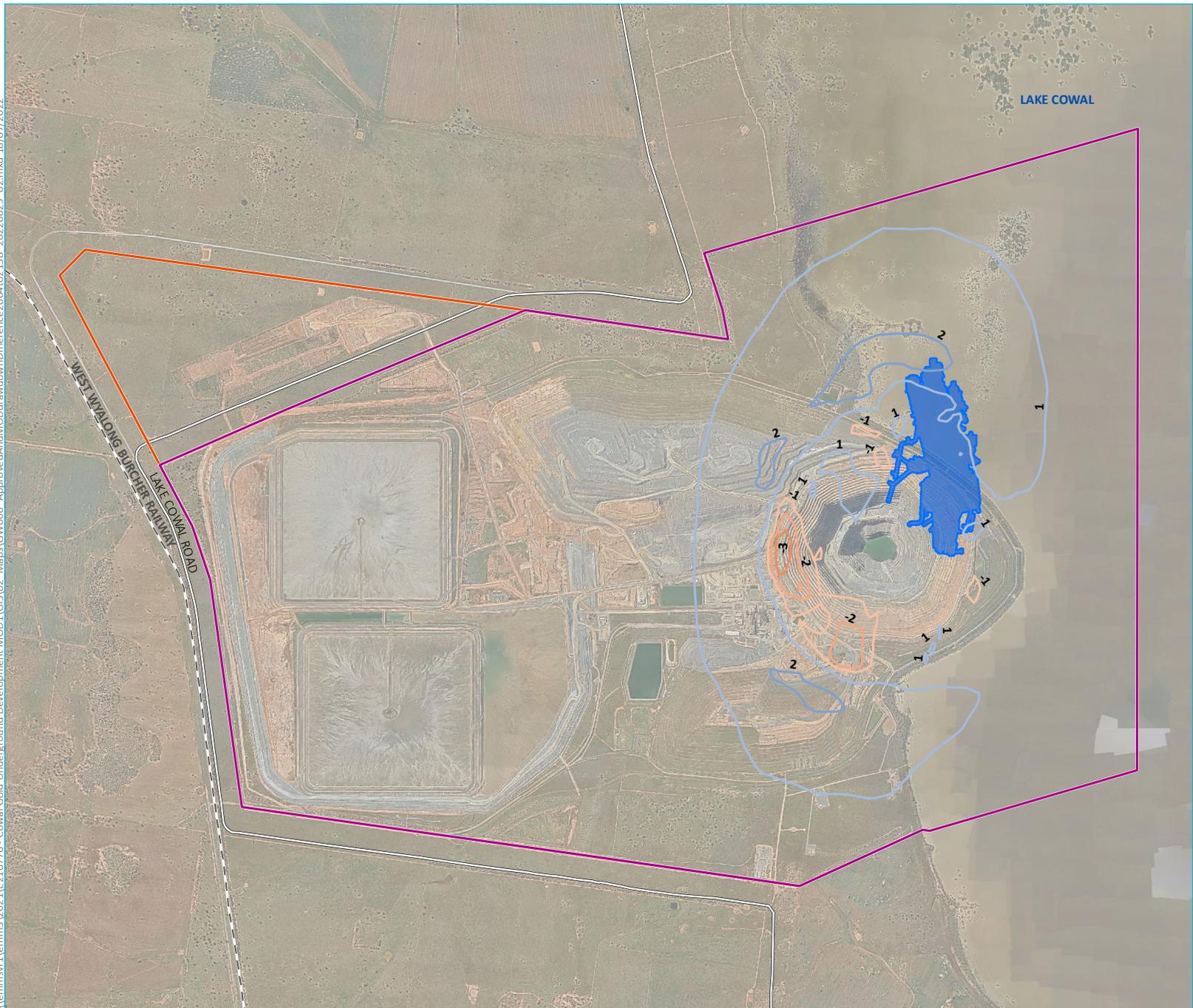
- KEY**
- Proposed underground development (Mod 1)
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - - - Rail line
 - Main road
- Predicted watertable drawdown difference (m)**
- -2
 - -1
 - 1
 - 2
 - 3
 - 4

Predicted watertable change
between approved project and
proposed modification
(2004 - 2058)

Cowl Gold Operations
Underground Development SSD 10367
Optimisation Modification Mod 1
Figure 6.7



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- KEY**
- Proposed underground development (Mod 1)
 - Mining lease (ML1535)
 - Mining lease (ML1791)
 - - Rail line
 - Main road
- Modelled groundwater table drawdown difference (m)
- -3
 - -2
 - -1
 - 1
 - 2

Predicted watertable change between approved project and proposed modification (2004 - 2138)

Cowl Gold Operations
Underground Development SSD 10367
Optimisation Modification Mod 1
Figure 6.8

Source: EMM (2022); Evolution (2022); Nearmap (2021); DFSI (2017)



The groundwater inflow to the open pit, stopes and access tunnels between 2006 and 2134 is shown on Figure 3.7 of Appendix D. The changes to groundwater inflows are summarised below:

- Combined groundwater inflows into the open pit, proposed stopes and access tunnels have been predicted to peak at 3.2 ML/day in 2031, which is a minor increase to the previous prediction and remains dominated by the open-pit inflows.
- Inflow to the open pit on its own has been predicted to be peak at 0.5 ML/day in 2035 which is similar to what was modelled for the Project.
- Following mine closure, groundwater inflow to the open pit is still expected to be approximately 0.5 ML/day in the mid-2030s and 0.9 ML/day by the mid-2060s. It will then decrease slower in comparison to the Project to approximately 0.65 ML/day over time until 2120.
- Groundwater inflow into the stopes is predicted to fall to less than 0.1 ML/day by the mid-2060s which is the same as modelled for the Project.

The average rate of evaporation from the surface of Lake Cowal (ie 534,000 m³/day) is approximately 165 times the predicted maximum rate of groundwater inflow due to the proposed modification (ie 3,212 m³/day). As such, the impact of mine groundwater inflow on the water levels of Lake Cowal for the proposed modification is still considered to be negligible.

The water in the completed mine workings beneath Lake Cowal and within the open pit void are predicted to remain at similar levels to those predicted for the Project 200 years after the end of mining. The levels are therefore still below the level of the bed of Lake Cowal and seepage from the mine to Lake Cowal is considered unlikely. The GWIA notes that by this time the underground mine workings may no longer be acting as a sink and may be returning to a more natural state of groundwater flow.

The predicted drawdown for the proposed modification shows that the 2 m drawdown contour interval (refer Figure 3.8 and Figure 3.9 of Appendix D) to be very similar to the Project with no third-party bores to be within 2,100 m of the contour. The two-metre drawdown contour of the proposed modification is closer to the mine site due to the removal of the box-cut, therefore reducing the potential for impacts to off-site third-party water users.

The proposed modification does not change the operation of the IWL, which will continue to be regulated under DA 14/98. Nonetheless, the groundwater modelling completed for the proposed modification simulated whether the proposed changes to the underground mine would change the predictions made in the Project's EIS in relation to the potential long-term groundwater movement from the IWL.

The assessment shows that the outcomes predicted for the approved Project do not change as a result of the proposed modification despite a predicted minor change to the extent of seepage from the IWL (ie from 2 km to 2.3 km -refer Figure 3.10 and Figure 3.11 of Appendix D). Registered water supply bores are predicted to remain unaffected by this potential change.

The GWIA included an assessment of the proposed modification against the minimal impact considerations of the NSW Aquifer Interference Policy (AIP) for a less productive groundwater source, as summarised in Table 3.1 of Appendix D. The assessment found that the proposed modification meets the minimal impact considerations of the AIP for less productive groundwater sources.

The updated predicted annual groundwater volumes required to be licensed are summarised in Table 3.2 of Appendix D.

This includes approximately 285 ML/year from *Lachlan Alluvial Groundwater Sources 2020* and an average of 802 ML/year or maximum of 1,152 ML/year from *NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*.

6.5.4 Management and mitigation

As the groundwater impacts associated with the proposed modification will be unlikely to be materially different to the impacts previously assessed and approved, they will continue to be effectively managed in accordance with the existing Surface Water, Groundwater, Meteorological and Biological Monitoring Programme (SWGMBMP) and relevant conditions outlined in the consent documents for DA 14/98 and SSD 10367 as listed in Chapter 4 of Appendix D.

No additional groundwater management and mitigation measures are recommended for the proposed modification.

6.5.5 Conclusion

The GWIA shows that the proposed modification will not result in additional groundwater impacts and the impacts of the Project with the proposed modification will be substantially the same as the Project as approved.

The key findings of the GWIA are as follows:

- impacts to groundwater levels including mounding of the groundwater table and groundwater table drawdown are still anticipated to be minor, within +/- 5 m of those modelled for the Project and mostly contained within ML1535 and ML 1791;
- similar results for groundwater inflows were modelled for the proposed modification, which shows an increase of 0.4 ML/day on the predicted peak groundwater inflows modelled for the Project;
- the impact of mine groundwater inflow on the water levels of Lake Cowal are still considered to be negligible and remain at similar levels to those modelled for the Project 200 years post mining;
- the 2 m drawdown contour of the proposed modification is closer to the mine site due to the removal of the box-cut, therefore reducing the potential to have impacts to third-party private water supply users;
- the proposed modification meets the minimal impact considerations of the AIP for less productive groundwater sources; and
- there will be minor changes to the amount of water requiring licencing under the relevant water sharing plans.

6.6 Subsidence/Geotechnical

6.6.1 Overview

A review of the overall CGO underground mine plan which includes the changes to the access declines and tunnels has been undertaken by Beck Engineering Pty Limited (Beck 2022) and is provided in full in Appendix E

6.6.2 Existing environment

i Geology

There are four distinct geological units where the underground mine will be developed. These are the:

- transported unit – sedimentary and surface layers which form the lake floor, containing clay deposits;
- soft-oxide unit – which has been weathered by oxygen and moisture;
- hard-oxide unit – a smaller unit also weathered by oxygen and moisture; and

- fresh rock – deeper igneous units containing the orebody.

The transported unit has low permeability and is not hydraulically connected with the underlying units. This is demonstrated by the uniform inflows to the existing open pit irrespective of whether the lake is full or dry.

As the lake is hydraulically separate from the fractured rock aquifer, its water levels are not influenced by changes in groundwater and instead are controlled by rainfall and surface water run-off.

ii Summary of EIS assessment

A detailed subsidence assessment was completed for the Project (Beck 2020). The key findings of that original assessment were that:

- vertical displacement forecasts on the surface above the proposed underground mine are generally less than 15 mm and considered negligible;
- forecast surface movement is slightly upwards due to displacement along the Glenfiddich fault, which becomes slightly mobilised due to nearby underground mining;
- the underground mine design and layout is appropriate for minimising (potential) surface subsidence. This is because of the planned sequence, relatively small stope dimensions with planned paste backfill, 20-30 m crown pillar thickness in fresh rock and planned cablebolt ground support; and
- potential impacts to Lake Cowal were considered to be negligible with the implementation of the control measures proposed for the underground mine (ie backfilling stopes with consolidated paste material) and the strict conditions of consent which require subsidence monitoring throughout the life of the Project;

iii Summary of proposed modification assessment

For the proposed modification, the numerical modelling (Beck, 2022) included the complete life of mine and current geological/structural model, comprising the following:

- main decline, production level accesses, ore drives and other miscellaneous tunnel development;
- stopes;
- ventilation shafts; and
- major geotechnical/lithological domains and major geological structures.

All mine development was included within the model to follow the extraction sequence defined by Evolution. The model takes account of the gradual process of void creation and filling with paste material as the mineral extraction progresses.

iv Mine plan optimisation

The proposed modification changes the location of some of the access tunnels to the underground mine. The access tunnels are designed to be stable and non-subsiding. The stoping areas would remain generally as approved in terms of the depth of mining and the number of stopes that would be developed. There may be minor changes to the sequence of stoping as more geological information is gathered, however any changes would remain generally in accordance with the approved Project and as described by Beck (2022). The optimised mine plan is shown on Figure 6.9.

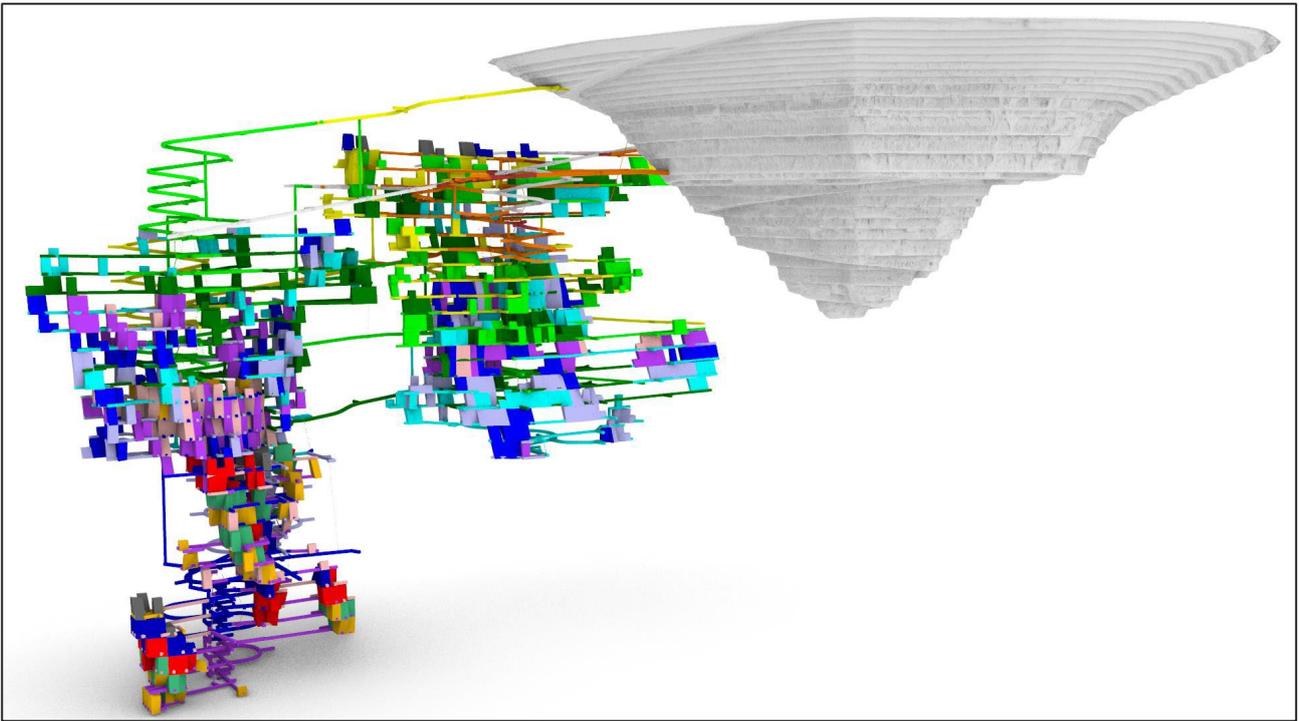


Figure 6.9 Optimised mine plan including the proposed modification, facing east (source: Beck 2022)

Relevant to the proposed modification, the stability and deformation for the underground mine was reviewed, including underground infrastructure and ventilation shafts using the existing numerical model (refer Appendix E). The review recommends minor adjustments to mine sequencing in order to maximise the production potential (referenced as Option 4 in Appendix E).

v Changes to decline configuration

The optimised mine plan proposes a 'Figure 8'-type decline access which is more geotechnically favourable, as it results in a lower local excavation ratio and subsequently provides greater stability. The change therefore poses no stability concerns as there is no adverse stress concentration forecast due to the favourable geological conditions. Some stopes scheduled to be mined in the middle of the north panel are close to the main access and to mitigate any stability risk, these stopes would be mined in retreat to the access and footwall drive, so that production is not significantly affected, and stability is maintained.

vi Benefits of the optimised mine plan and updated decline configuration

The optimised mine plan includes additional footwall drive connections, which has productivity and stability benefits. The rock mass conditions are favourable to allow this development. Overall stability is maintained for the central retreat stoping sequence.

The optimised mine plan has large barrier pillars in the production panels. This enables the central decline to be positioned with a large pillar near the level access without significant ground control or stability problems developing.

The decline access proposed in the optimised mine plan in combination with the planned retreat sequence will maintain or improve stability.

The original EIS assessment determined there would be negligible subsidence impacts at the surface and numerical modelling of the mine plan changes specific to this proposed modification demonstrates overall stability in support of this.

vii Numerical Modelling Key Findings and Recommendations

The keys findings of Beck (2022) show that:

- the optimised mine layout and sequence is very similar to the approved mine plan;
- no major rock mass impacts are predicted at all for the optimised layout;
- stress concentration in the stoping areas is limited due to the orientation of the major principal stress and depth of mining;
- moderate damage is restricted in the secondary stopes in the thicker mid-section of the North panel (ie the pillars between the primary stopes); and
- where stopes have elevated potential for crown instability, any failure would be limited to the overlying paste fill mass.

Beck (2022) has recommended a range of controls to further manage the risk of impacts in the optimised mine plan in addition to those already proposed in the original EIS assessment. This includes recommendations for stope design of upper stopes and stope sequencing (refer Appendix E). These recommendations will be incorporated in the mine plan as required in conjunction with the ongoing collection and analysis of geological and geotechnical data.

viii Conditions of consent

The current conditions of consent require a Subsidence Monitoring Program (SMP) to be prepared in consultation with the Resources Regulator which requires the collection of detailed baseline data, details the measures and controls to avoid and minimise subsidence, contains a risk assessment and trigger action response plan (TARP) for subsidence and validation of subsidence predictions. This would continue to apply to the proposed modification.

The consent also includes strict performance measures in terms of rehabilitating the stopes to reduce the ongoing risk of surface subsidence. These conditions remain appropriate to manage the risks associated with the optimised mine plan, and no additional conditions of consent are required to manage subsidence risks.

6.6.3 Conclusion

A comprehensive review of the optimised mine plan recognises that the changes to the access drives and tunnels are unlikely to result in stability impacts. This supports the finding that the subsidence risks of the stoping operations remain as approved.

The changes associated with the proposed modification are very minor in the context of the overall Project. Any minor changes to the stoping area and its sequencing as mining progresses will be based on the ongoing collection and analysis of geological and geotechnical data and are unlikely to change the results of the subsidence assessment and the conclusions reached previously.

The current conditions of consent are considered appropriate and comprehensive and do not require revision as a result of the proposed modification.

6.7 Other issues

Evolution has undertaken a screening assessment of other issues which may be relevant to the proposed modification. The result of this assessment is summarised in Table 6.4.

Table 6.4 Summary of other issues

Aspect	Consideration	Management and Mitigation
Biodiversity	<p>The biodiversity impacts of the Project were comprehensively assessed in the EIS. The assessment found that there would be negligible impacts to threatened species or their habitats as a result of the Project, as it is a low impact underground mine and its surface ancillary facilities are located on land cleared of vegetation.</p> <p>The proposed modification is unlikely to be any different in term of biodiversity impacts than the Project, for the same reasons.</p> <p>As the proposed modification deals with changing the way the underground mine is accessed from the pit wall of the existing E42 pit which is separated from Lake Cowal by the substantial lake protection bund, it will have no impact on Lake Cowal or the abundance of aquatic species which occur in the lake when it holds water.</p> <p>There is no vegetation clearing required or proposed for the modification. Therefore, the proposed modification will not increase the impact on biodiversity values at the site in accordance with section 7.17 of the NSW <i>Biodiversity Conservation Act 2016</i>.</p>	<p>No additional mitigation measures are required to manage and mitigate biodiversity impacts.</p> <p>The existing Land Management Plan (Evolution 2015b) for the CGO site includes sufficient management measures to manage and mitigate any unforeseen impacts resulting from the development of the proposed modification.</p>
Traffic	<p>Traffic impacts for the Project would not affect the operation of any local or State roads which service the site.</p> <p>The proposed modification will have no effect on the traffic levels assessed and approved for the Project.</p> <p>CGO will continue to use its shuttle bus service to commute its workers to site and reduce the potential traffic impacts</p> <p>The current road maintenance agreement will continue to operate between Evolution and the three neighbouring councils. This provides agreed funding to the councils and is based on Evolution's use of local roads.</p>	<p>No additional management and mitigation measures are warranted for the proposed modification. This is because the current regulatory regime is considered sufficient to manage and mitigate any unforeseen impacts.</p> <p>Traffic impacts would continue to be managed under the Transport Management Plan (Evolution 2022a) for the CGO site, which details the way the shuttle bus operates, onsite and off-site traffic controls and community notification protocols.</p>
Rehabilitation	<p>The proposed modification will not affect the approved rehabilitation objectives for the site, which in general are to ensure public safety and to minimise the adverse socio-economic effects associated with mince closure</p> <p>The Rehabilitation Management Plan (Evolution 2017) for the site sets out the objectives and completion criteria for the site following rehabilitation. For the final void where the access portals would be located, the rehabilitation measures include sealing the portals and making them safe in the long term.</p>	<p>Rehabilitation would continue to be regulated under the Rehabilitation Management Plan (Evolution 2017), prepared in accordance with the conditions of the mining leases and under the NSW <i>Mining Act 1992</i>.</p> <p>The current conditions of consent describe the rehabilitation objectives for the site. These objectives will not change as a result of the proposed modification.</p>

Table 6.4 Summary of other issues

Aspect	Consideration	Management and Mitigation
Socio-economic	<p>The proposed modification does not result in any difference to the economic impacts that were considered in the EIS for the Project.</p> <p>The Project will still provide significant social and economic benefits to the Central West region over its life through its employment of a large workforce and the flow on benefits from local supply contracts.</p> <p>The Project will continue to provide significant State and Australian government taxation revenues through a variety of taxes and duties. Overall, the Project is estimated to deliver up to:</p> <ul style="list-style-type: none"> • \$556.6 million in additional revenue to the Australian Government, through personal income tax, fringe benefits tax, company tax and GST, compared to what would occur without the Project; and • \$174.8 million in additional revenue to the NSW Government compared to what would occur without the Project, primarily through royalty payments. <p>These additional revenues can be used by Government to provide additional infrastructure and services to support business and households across the State and Australia.</p> <p>Evolution will also continue to make significant investment in the local economy through its ongoing community funding initiatives, and through the continued operation of the Planning Agreement with Bland Shire Council.</p>	<p>Evolution will continue to manage the socio-economic impacts of the Project by continuing to provide a significant economic stimulus to local and regional economies.</p> <p>The current conditions of consent are sufficient to manage the socio-economic impacts of the proposed modification.</p>

7 Justification and Conclusion

7.1 Evaluation

Evolution has State-significant development approval to develop an underground mine at CGO. Through its detailed mine design planning, it has determined that an optimised mine plan will allow it to more efficiently extract ore from the GRE46 resource.

The proposed mine plan and overall Project design have been progressively optimised based on detailed investigations of geological, environmental, engineering and financial considerations. Potential environmental risks that were taken into account during development of the EIS for the Project have been re-assessed and taken into account for the proposed modification. Importantly, the principle of minimising direct and indirect impacts to Lake Cowal that were satisfied in the original EIS and approval of the Project have been reconfirmed in the assessments for the proposed modification.

The proposed modification is very minor in the context of the Project as a whole. The changes to the access tunnels will not result in materially different impacts to groundwater and surface water resources. The access tunnels will remain safe and stable throughout the development and operation of the Project.

The increase in annual ore extraction will not result in greater noise and air quality impacts, which are well managed across the CGO site.

The proposed modification will be able to be undertaken to comply with the strict regulatory framework already in place under development consent SSD 10367.

7.2 Benefits

There are a range of operational and social benefits that would result from the proposed modification. The new portal within the E42 pit will provide an efficient and stable access point for personnel and equipment and ore trucks to enter and exit the mine.

The locations of secondary access points (ie those used to provide ingress and egress in the event of emergencies, and for mine ventilation) will provide operational efficiency.

The change to access tunnels geometry will reduce the risk of access tunnel instability and preserves the potential for the future expansion of the current E42 pit. It also allows for more efficient and independent haulage options for the underground Regal and Dalwhinnie and Endeavour orebodies.

The increase in the allowable annual ore production from 1.8 Mtpa to 2.6 Mtpa gives Evolution the ability to realise production efficiency and flexibility of ore production throughout the life of the underground mine.

The Project will continue to provide significant social and economic benefits to the Central West region over its life through its employment of a large workforce and the flow on benefits from local supply contracts. The Project as modified will continue to create significant State and Australian government taxation revenues through a variety of taxes and duties. The proposed modification therefore does not diminish the economic benefits that the mine will accrue to the local, regional and State economies.

7.3 Conclusion

Evolution is seeking to modify its SSD consent under Section 4.55(2) of the EP&A Act. The proposal will improve the efficiency and development of the CGO underground mine.

A range of assessments have been undertaken to support the proposed modification. These assessments show that the proposal will be able to be undertaken to meet the strict conditions of consent set down for the Project when it was approved in 2021.

Importantly, the assessments confirm that the modified Project will remain substantially the same as the Project as approved. The modified Project will continue to comply with all relevant government legislation, plans, policies and guidelines.

As described within this report and its technical assessments, the benefits of the proposed modification far outweigh the potential environmental impacts. It is therefore considered that the proposed modification should be approved.

References

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Evolution 2022a, *Cowal Gold Operations Transport Management Plan*.

Evolution 2015, *Cowal Gold Operations Blast Management Plan*.

Evolution 2015a, *Cowal Gold Operations Air Quality Management Plan*.

Evolution 2015b, *Cowal Gold Operations Land Management Plan*.

Evolution 2017, *Cowal Gold Operations Rehabilitation Management Plan*.

Abbreviations

µg/m ³	Micrograms per cubic metre air
AHD	Australian Height Datum
AQGHGA	Air quality and greenhouse gas assessment
BCPB	Bland Creek Paleochannel Borefield
Beck	Beck Engineering Pty Limited
BMP	Blast management plan
CEMCC	Community Environmental Management Consultative Committee
CGO	Cowal Gold Operations
DPE	Department of Planning and Environment
EIS	Environmental impact statement
EP&A Act	<i>NSW Environmental Planning & Assessment Act 1979</i>
Evolution	Evolution Mining (Cowal) Pty Limited
FTE	Full time equivalent
GHG	Greenhouse gas
GWIA	Groundwater impact assessment
Ha	Hectares
HVAS	High Volume Air Sampler
IWL	Integrated waste landform
Km	Kilometres
LGAs	Local government areas
MD	Mine datum
MIC	Maximum instantaneous charge
ML	Megalitres
ML	Mining Lease
ML/year	Megalitres per year
Moz	Million ounces
Mt	Million tonnes
Mtpa	Million tonnes per annum
NGER Act	<i>National Greenhous Energy Reporting Act 2007</i>
NMP	Noise management plan
NSW	New South Wales
NVIA	Noise and vibration impact assessment
PM ₁₀	Particulate matter less than 10 µm
PM _{2.5}	Particulate matter less than 2.5 µm

ROM	Run-of-mine
SLOS	Sublevel Open Stopping
SMP	Subsidence Monitoring Program
SSD	State significant development
SWA	Surface water assessment
SWGMBMP	Surface Water, Groundwater, Meteorological and Biological Monitoring Programme
TARP	Trigger action response plan
TSF	Tailings storage facility
VLAMP	Voluntary Land Acquisition and Mitigation Policy