

Cowal Gold Operations Underground Development Project/Modification 16

Submissions Report

Prepared for Evolution Mining (Cowal) Pty Limited
February 2021

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Evolution
MINING

Cowal Gold Operations Underground Development & Modification 16

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Cowal Gold Operations Underground Development & Modification 16

Submissions Report

Report Number

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Client

Evolution Mining (Cowal) Pty Limited

Date

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26 February 2021

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26 February 2021

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1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) is seeking development consent for the construction and operation of an underground mine (the Project) at Cowal Gold Operations (CGO) in the Central West Region of New South Wales (NSW).

CGO is an existing open-cut gold mine currently mining the E42 mineral deposit. It has been operating since 2005 under Development Consent DA 14/98 and within mining leases (ML) 1535 and ML 1791. Under its development consent, Evolution has approval to mine approximately 167 million tonnes (Mt) of ore over a period of 28 years. It is also approved to process the ore at an on-site processing plant at a rate of up to 9.8 million tonnes per annum (Mtpa).

CGO is owned and operated by Evolution Mining Limited, which is a publicly listed company on the Australian Stock Exchange (ASX:EVN). Evolution Mining Limited operates five wholly owned mines; four mines in Australia and one mine in Canada and has an economic interest in a mine in Australia that is operated by a Joint Venture partner.

The Project will provide access to as much as 27 Mt of ore in the GRE46 mineral deposit, which will be extracted at a rate of up to 1.8 Mtpa until 2039. It is expected that around 1.8 million ounces of gold will be produced over the life of the Project.

To facilitate the Project, two separate consents are required under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act):

- a State significant development (SSD) application under section 4.38(2) of the EP&A Act for the new **underground** components, as described in the Environmental Impact Statement (EIS) (EMM 2020a); and
- an application for modification of DA 14/98 under section 4.55(2) of the EP&A Act for the ancillary **surface facilities** required to support the Project, referred to as Mod 16 and the subject of a separate Modification Report (EMM 2020b).

Evolution is also considering a range of options to accommodate and support the required construction and operational workforces for the Project. Its preferred option is the development of a purpose-built accommodation village in West Wyalong which, if selected, would require a separate development application to Bland Shire Council (BSC) under Part 4 of the EP&A Act.

1.2 Existing operations

Evolution owns and operates CGO, an open-cut gold mine located approximately 38 kilometres (km) north-east of West Wyalong, in the central west region of NSW (refer Figure 1.1).

In general, DA 14/98 allows Evolution to:

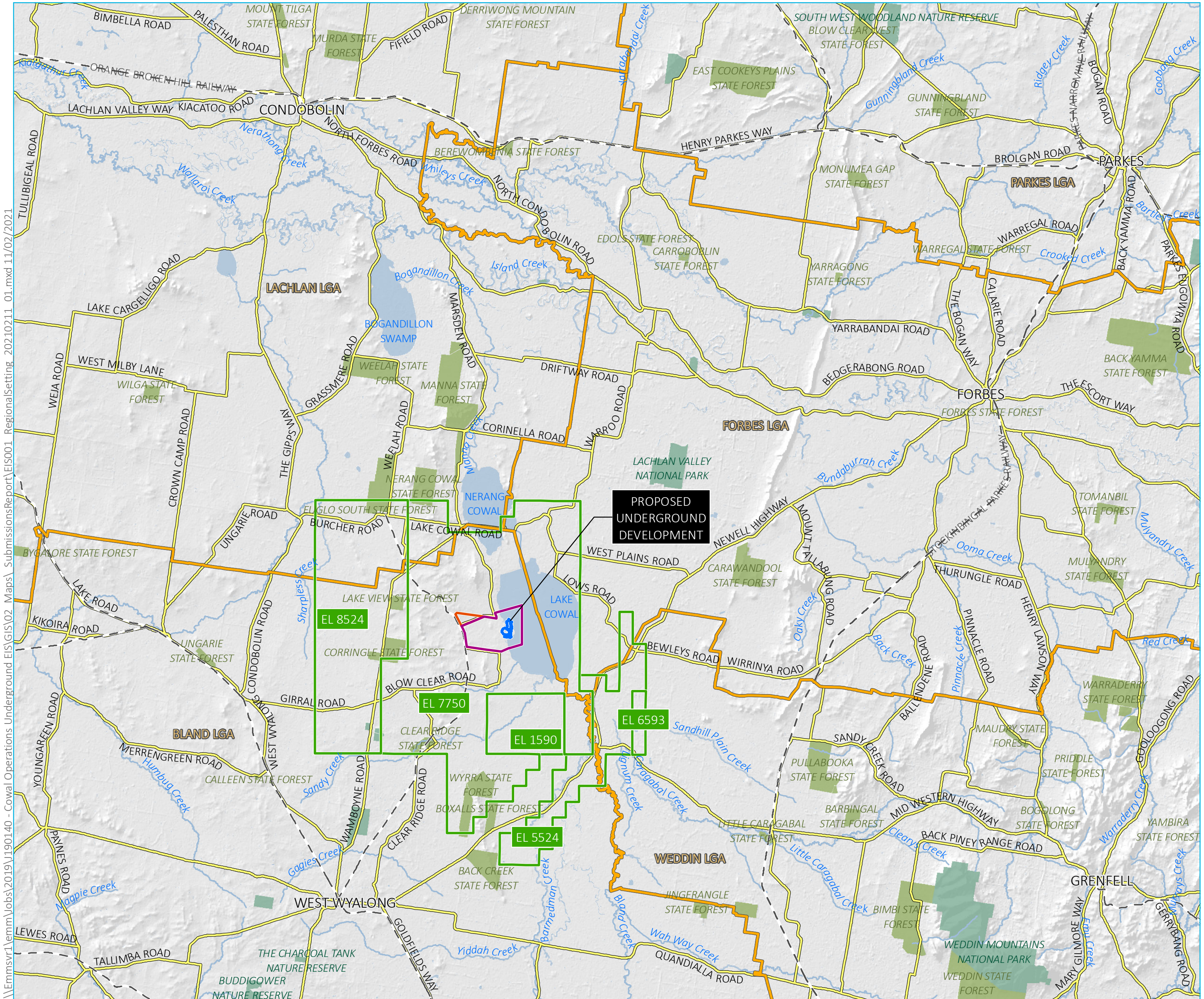
- extract 167 Mt of ore by open-cut methods until 2032;
- process this ore on-site at a rate of 9.8 Mtpa;
- produce up to 6.1 million ounces (oz) of gold;

- emplace tailings and waste rock on site in an Integrated Waste Landform (IWL) – which includes the current Northern and Southern Tailings Storage Facilities, and in waste rock emplacement areas;
- operate a water supply pipeline from the Bland Creek Palaeochannel Borefield (BCPB); and
- progressively rehabilitate the site.

DA 2011/64, issued by Bland Shire Council (BSC), provided approval to develop and operate the Eastern Saline Borefield that also supplies process water to the mine.

The CGO site hosts a range of ancillary infrastructure to support the open-cut mine. This includes an ore processing plant, the IWL, waste rock emplacements, ore stockpiles, workshops, offices, reagent storage and explosives magazine.

The site is directly adjacent to Lake Cowal in the Lachlan Catchment, which is an ephemeral inland wetland system. Lake Cowal is the largest natural inland lake in NSW and when full, is approximately 21 km long (north to south) and 9.5 km wide (east to west) covering an area of over 13,000 hectares (ha).



KEY

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

Source: EMM (2021); Evolution (2020); DFSI (2017); GA (2011); ASGC (2006)

0 10 20 km

GDA 1994 MGA Zone 55

N

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Regional setting

Evolution Mining
Cowal Gold Operations
Underground development/Mod 16
Submissions report
Figure 1.1

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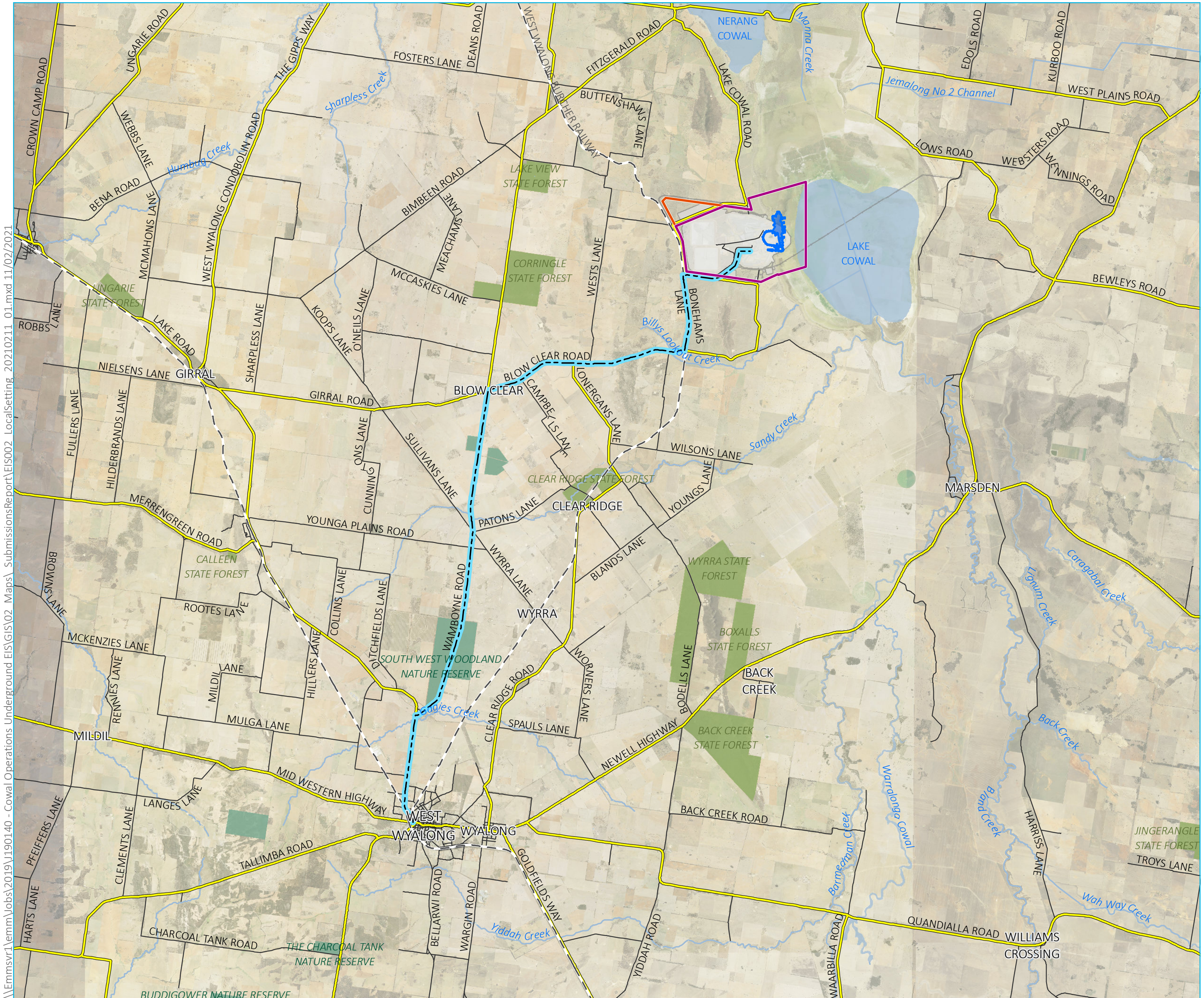

Source: EMM (2021); Evolution (2020); DFSI (2017)

0 2.5 5 km

GDA 1994 MGA Zone 55

N

KEY

- Proposed underground development
- Mining lease (ML1535)
- Mining lease (ML1791)
- Approved surface disturbance
- West Wyalong preferred transport route
- Rail line
- Main road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest

Local setting

Evolution Mining
Cowal Gold Operations
Underground development/Mod 16
Submissions report
Figure 1.2

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1.3 Cowal Gold Underground Development

Evolution is seeking approval to construct and operate an underground mine at CGO, known as the Underground Development Project (the Project). The reference number for the Project is SSD 10367. The Project will involve mining around 27 million tonnes of ore, which will be processed to produce 1.8 million ounces (Moz) of gold.

The Project is shown conceptually in Figure 1.3 and includes the following key components:

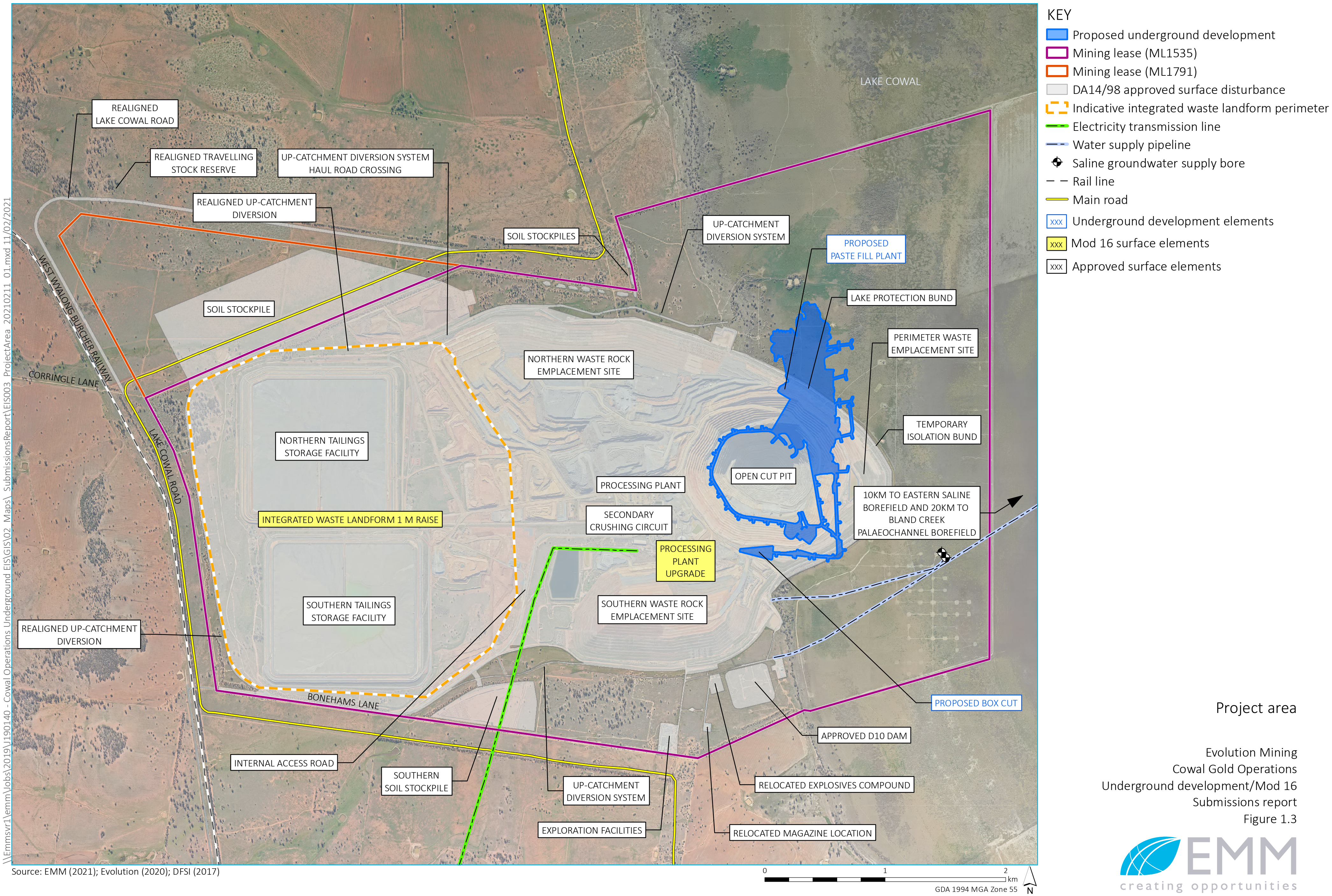
1.3.1 Key elements of the Project

Table 1.1 Underground Development Project – key elements

Aspect	Description
Tenement	The underground mine is located within ML 1535.
Development application area	The development application area is shown in Figure 1.3.
General description	Construction and operation of an underground mine at the Cowal Gold Mine which includes: • 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-cut 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; • a network of underground tunnels to provide access to the ore, transportation to the surface and ventilation; • use of SLOS to extract the ore; • 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 infrastructure to support the underground operation, including dewatering infrastructure, ventilation system, electrical reticulation.
Project duration	A Project life of 19 years comprising: • 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.
Estimated Resource	As at 30 April 2020, the Cowal Underground Mineral Resources and Ore Reserves were estimated as follows (ASX announcement 23 July 2020): • Underground Mineral Resources of 36.5 Mt grading 2.48 grams per tonne (g/t) for 2.912 Moz gold; and • Underground Ore Reserve of 10.0 Mt grading 2.51 g/t for 804,000 oz gold. Total Cowal Mineral Resources and Ore Reserves at 30 April 2020 (inclusive of open-cut and underground) were estimated at: • Mineral Resources of 264.6 Mt grading 1.06 g/t for 9.0 Moz gold; and • Ore Reserves of 142.2 Mt grading 0.97 g/t for 4.4 Moz gold. In the April 2020 geological model update, 1.5 Moz of the total 2.9 Moz Underground Mineral Resource have been classified as Indicated category under JORC (2012) code.

Table 1.1 Underground Development Project – key elements

Aspect	Description
Mining method	• Top down SLOS to a depth of -850 m AHD with approximately 1,106 stopes developed over the life of the mine. • Backfilling of stopes with cemented paste.
Mine development layout and progression	• The underground mine layout is shown in Figure 1.1, Figure 1.2 and Figure 1.3. • The underground mine will be developed progressively, as the decline is excavated laterally and to depth. • Development of the underground mine with six access points to the decline off the existing open-cut pit. These will provide access for personnel and maintenance, ore haulage, ventilation and emergency egress.
Stope backfill	• 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 pastefill plant.
Annual mine extraction rate	Up to 1.8 Mtpa of ore to be extracted over the Project life.
Underground mining fleet	Underground mining equipment includes, but is not limited to: • development drills; • production drills; • load-haul-dump vehicles; • trucks; • integrated tool carriers; • graders; • explosives machine; • ground support installation equipment; and • agitator trucks for shotcrete.
Workforce	• Construction: estimated workforce of up to approximately 160 full time equivalent (FTE) employees and contractors, which will be used to develop the underground mine Project and the supporting surface infrastructure. Operations: estimate additional workforce of up to approximately 230 FTE employees working over two shifts
Hours of operation	The underground mine will operate 24 hours a day, 7 days a week, except for periods of scheduled maintenance.

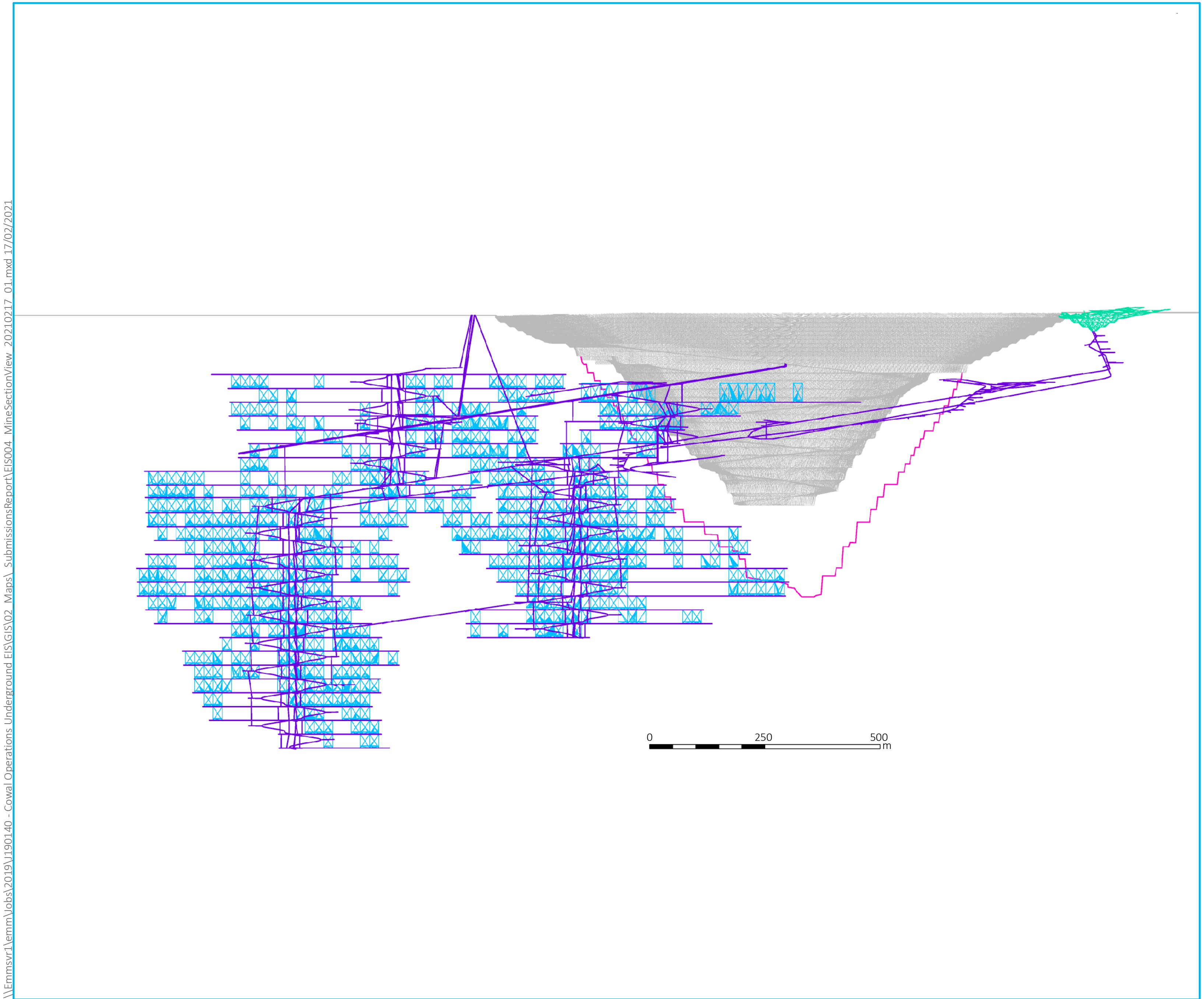


Source: EMM (2021); Evolution (2020); DFSI (2017)

Project area

Evolution Mining
Cowal Gold Operations
Underground development/Mod 16
Submissions report
Figure 1.3

EMM creating opportunities



KEY

- Existing E42 open-cut pit
- Currently approved final open-cut pit shell
- Proposed underground access infrastructure
- Proposed stopes
- Proposed box-cut

Source: EMM (2021); Evolution (2020)

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Proposed underground development (section view)

Evolution Mining
Cowal Gold Operations
Underground development/Mod 16
Submissions report
Figure 1.4

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1.4 Mod 16 to DA14/98

Evolution is seeking approval to modify its existing development consent (DA14/98 Mod 16) due to proposed changes to the existing surface infrastructure to facilitate underground mining. The proposed modification involves extending the life of the existing operations through the approval to extract and process underground ore and augmenting the existing processing infrastructure with a tailings de-slimer plant and a minor change to the final height of the IWL to accommodate the anticipated tailings produced from underground ore.

The Modification Report for DA14/98 Mod 16 was exhibited concurrently with the EIS for the Project.

1.4.1 Key elements of DA14/98 Mod 16

The key elements of proposed Mod 16 are described in detail in Chapter 3 of the Modification Report (EMM 2020b), which in Table 1.2 below for summary purposes are narrowed to the aspects to which Evolution seeks approval. Note that Table 1.2 does not include aspects of the approved mine that would not change.

Table 1.2 Proposed modification

Development Component	Approved CGO	Proposed Modification
Life of mine	The mine is approved to operate to the end of 2032.	Extension to the end of 2040, to align with the operations of the proposed underground mine development and its ore processing requirements.
Gold production	Production of approximately 6.1 Moz of gold over the life of the CGO.	Production of a further 1.8 Moz of gold (approximate), totaling 7.9 Moz over the life of the CGO.
On-site ore transportation	Ore is transported from the open-cut pit by truck to a temporary stockpile prior to rehandling to the primary crusher.	No change. Underground ore will also be trucked from the underground run-of-mine stockpile in the vicinity of the box-cut to the temporary ore stockpile.
Ore processing facility	Ore processing is undertaken at the ore processing facility at a rate up to 9.8 Mtpa. A secondary ore crushing circuit within existing process plant is approved to be constructed.	No change to ore processing rate. The existing processing facility will be modified to include: • a tailings de-slimer; • an ore receival bin and mill feed conveyor; and • an upgraded elution circuit.

Table 1.2 Proposed modification

Development Component	Approved CGO	Proposed Modification
Site water management infrastructure	The existing CGO water management infrastructure is comprised of the following key components: • Up-catchment Diversion System (UCDS) and • the ICDS (including the contained water storages); • lake isolation system (comprising the temporary isolation bund, lake protection bund and perimeter waste rock emplacement); • integrated erosion, sediment and salinity control system; and • open pit sump and dewatering borefield. Water storage D5 is approved to be modified to accommodate the extension of the open-cut pit (known as D5A). A new contained water storage/sediment dam for the soil stockpile catchment area located in the north of ML 1535. Relocation of pit dewatering bores as the open pit extends beyond the currently installed bores around its perimeter. Relocation of a portion of the UCDS and ICDS around the IWL (within ML 1535 and MLA 561) and relocation of approved contained water storage D10 (within ML 1535).	No change to UCDS and ICDS. Construction of a pipeline from the tailings deslimer to the paste fill plant to send tailings to the paste fill plant and a return water pipeline from the paste fill plant to the processing facility. Augmentation of dam D5A to allow the ore receival hopper and ore feed mill conveyor to be developed. This augmentation will not change the overall catchment area of the dam. Augmentation of other on-site water storages from time to time depending on water supply and on-site requirements.
Waste Rock	Approximately 299 Mt of waste rock would be produced over the life of the approved CGO.	Approximately 5.74 Mt of additional waste rock produced by the underground mine over the life of the underground mine.
Tailings storage	Tailings are deposited in two TSFs (Northern and Southern). NTSF and STSF are approved to be constructed to approximately 240 mAHD and 248 mAHD, respectively. These TSFs are also approved to be combined with the northern waste rock emplacement to form the IWL, which will provide a life of mine tailings strategy. The IWL is approved to be developed to a final height of 245 mAHD.	A height increase of one vertical metre, from 245 mAHD to 246 mAHD is required to the final rehabilitated height of the IWL, as a result of emplacing the residual tailings from the processing of the underground ore.

Table 1.2 Proposed modification

Development Component	Approved CGO	Proposed Modification
Ancillary surface infrastructure	A range of ancillary surface infrastructure is operated to support open-cut mining operations, including that related to administration, water management, maintenance, pipelines, magazines and other functions.	Development of additional surface infrastructure and augmentation of existing infrastructure, all within the existing approved disturbance areas, including (but not limited to): administration facilities, offices and car parking, warehouses and stores, vehicle washdown facilities, heavy vehicle and light vehicle maintenance workshop and maintenance bays, control room, fuel farm, core yards and drill sheds, hard stands and go lines, ablutions and changerooms, communications infrastructure, access roads, water storages and other minor ancillary infrastructure.
Employment	During peak periods, the CGO employs up to 500 people.	No change to the open-cut pit workforce. A peak construction workforce of up to approximately 230 full time equivalent (FTE) employees and contractors is currently anticipated for the development of the underground mine and changes to the surface infrastructure. The operational workforce for the underground mine is estimated to be up to approximately 160 FTE additional employees.

1.5 Purpose of this report

The Department of Planning, Industry and Environment (DPIE) wrote to Evolution on 30 November 2020 requesting responses to the matters raised by NSW Government agencies, local government authorities and the community that were received during the public exhibition of the EIS and Modification Report.

This Submissions Report addresses the issues raised in advice and submissions received on the Project (SSD 10367), and Mod 16 (DA14/98 Mod 16).

This report also documents the additional activities undertaken relating to the applications since the conclusion of the exhibition, including further technical studies undertaken and stakeholder and community engagement activities that Evolution has carried out.

The Submissions Report forms part of the Environmental Impact Statement and Modification Report documentation and is submitted to DPIE to assist its merit assessment of the SSD 10367 and Mod 16 applications.

The purpose of this Submissions Report is to:

- accurately summarise the issues raised in submissions for SSD 10367 and DA14/98 Mod 16;
- provide meaningful responses to the submissions;
- summarise any additional assessment and management commitments; and
- update the evaluation of the Project as a whole, having regard to any relevant issues raised in submissions and the responses.

Accordingly, this Submissions Report has been prepared by EMM Consulting Pty Limited (EMM) in accordance with the draft DPIE guideline *Preparing a Submissions Report State Significant Development Guide* (DPIE 2020).

2 Submissions analysis

2.1 Exhibition details

The EIS and Modification Report were publicly exhibited concurrently from 26 October 2020 to 22 November 2020 at the following locations:

- BSC;
- Forbes Shire Council (FSC);
- Lachlan Shire Council (LSC);
- DPIE Major Projects Portal;
- NSW Service Centres; and
- Nature Conservation Council.

Hard copies and USBs of the EIS and Modification report were made available at the Councils' offices, with electronic copies made available at the other locations.

2.2 Submissions received

2.2.1 SSD 10367 submissions

During the exhibition period advice was received from 11 NSW Government agencies and 3 local government authorities, and 11 submissions were received from community members (all in support of the Project). Following the exhibition period, advice was received from a further 2 NSW Government agencies.

The advice and submissions received on SSD 10367 can be viewed on the DPIE Major Projects Portal at:

https://www.planningportal.nsw.gov.au/major-projects/project/21361

Table 2.1 Summary of submissions received on SSD 10367

Source/type	Support	Object	Comment	Total
State Government	-	-	13	13
Local Government	3		-	3
Community	11	-	-	11
Total	**14**	**-**	**13**	**27**

2.2.2 DA14/98 Mod 16 submissions

During the exhibition period advice was received from 11 NSW Government agencies and 3 local government authorities, and 6 submissions were received from community members (5 in support of the modification and 1 objection). Following the exhibition period, advice was received from a further 2 NSW Government agencies.

The advice and submissions received on DA14/98 Mod 16 can also be viewed on the DPIE Major Projects Portal at:

https://www.planningportal.nsw.gov.au/major-projects/project/25011

Table 2.2 Summary of submissions received on DA14/98 Mod 16

Source/type	Support	Object	Comment	Total
State Government	-	-	13	13
Local Government	3		-	3
Community	5	1	-	6
Total	**8**	**1**	**13**	**22**

2.3 Independent peer review

i DPIE Resource Assessments

DPIE Resource Assessments engaged Hydrogeologic Pty Limited (Hugh Middlemis) (Hydrogeolgic) to undertake a review of the *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a) and the *Groundwater Impact Assessment for the Bland Creek Paleochannel Borefield* (Coffey 2020b). The review is documented in *Cowal Gold Underground Development Groundwater Assessment Peer Review* (Hydrogeologic 2020), which Evolution received from DPIE on 10 December 2020.

The review found the mine site model to be fit for purpose. The review also found that both the mine site and borefields modelling reports provided reasonable explanations for the conceptual model and the numerical model design and execution. It found that the conceptualisation basis for both models is sound and they are based on a range of investigations over many years.

For the mine site model, the review found a good history match to data records and aquifer parameters that are adequately benchmarked although it found issues with the model water balance, suggesting that the model may be affected by model non-uniqueness which may lower confidence in the results as presented.

For the borefield model, the review found it had an adequate history match calibration to data records, good water balance performance and aquifer parameters that are adequately benchmarked, and noted that the model predictions are more sensitive to private bore pumping rates which indicates data uncertainty rather than model uncertainty.

The review asked for:

- Documentation on the updated mine site model performance with an improved water balance error term (<1% for all times).
- Information on modelled and measured groundwater levels for observation bores near the eastern edge of the lease, including: GW704031, GW704252, GW703223, GW703225 (Figure 6-7 of Coffey 2020a).
- Further detail on the components of the water balance, notably components of discharge via dewatering bores, and via seepage faces at the pit walls and floor, and via horizontal drains, and leakage from the lake that is captured by the mine, including differences during lake full and empty periods.
- If still relevant given the above, improved justification of the very steady mine inflow rate predictions compared to the high variability in reported inflows, and why it is acceptable for the model to be benchmarked to ‘groundwater inflows’ only during dry periods.

- Correct the arithmetical error in the statement on the maximum rate of inflow to the mine being 100,000 times less than the estimated evaporation from Lake Cowal.
- Updated post-mining simulations, along with related final void water balance modelling, including confirmation that the recovery simulation started from the base of the underground dewatered stopes at around -700 mAHD.
- Rationalisation of the inconsistencies between the mine site and the borefields models in relation to the Upper Cowra unit having a more limited westwards extent over the CGO site area in the borefields model, and it having quite different values for its key properties (Kh and Sy).
- An objective assessment of the magnitude and extent of cumulative drawdown impacts (mining and borefields, possibly using the principle of superposition), noting that this reviewer does not believe that the effort required for an integrated modelling of cumulative impacts is commensurate with groundwater-related risks and uncertainties predicted for the proposed underground development, despite low confidence in the mine site model results.
- If the previous assessment information on the final void lake water quality (Gilbert and Sutherland, 1997) is considered not adequate in relation to the current proposal, then detailed information is required on the long-term prediction of final void lake hydro-geochemistry, including the influence of the backfilled underground voids, with comprehensive justification on the sustainability of the rehabilitation plan.
- Provide updated contaminant migration assessments, based on the updated flow model.

An addendum to Coffey 2020a and Coffey 2020b has been prepared to address the matters raised in Hydrogeologic (2020) (refer Chapter 5 and Appendix E (Coffey 2021c)).

2.4 Evolution's approach in this response

The submissions have been reviewed by Evolution and the key matters raised in each submission have been identified. Where possible, and in accordance with the submissions report guideline, responses to issues raised in submissions have been categorised in themes.

Responses have been prepared to each matter by Evolution and EMM, with additional input from relevant EMM technical specialists, and from Coffey who prepared the groundwater impact assessment for the EIS and Modification Report. The study team was the same team that prepared the EIS and Modification Report.

2.5 Summary of submissions

2.5.1 NSW Government agency advice

i DPIE Water and Natural Resources Access Regulator

DPIE Water and the Natural Resources Access Regulator (NRAR) provided combined advice dated 22 January 2021. The advice comprised a cover letter with two attachments.

The cover letter detailed key concerns about the groundwater model, the potential groundwater impacts and surface water impacts. The first attachment made a range of recommendations for Evolution to address in both the pre-approval and post-approval stages of the assessment process. The second attachment provided an aide memoire for discussion of specific numerical model issues, which contained 5 requests for information, 15 points of clarification, 35 assessment issues and 13 report presentation preferences.

The key issues summarised in the cover letter were as follows:

- Groundwater model – DPIE Water and NRAR considered that the groundwater model was based on limited field data and required improvement. There are several conceptual and numerical issues that DPIE Water considered needed clarification and/or resolved prior to determination. It commented that based on the scale of the Project, the presence of nearby sensitive receptors, lack of independent peer review and issues raised in its review, it did not consider the groundwater model to be fit for purpose.

- Groundwater impacts – DPIE Water and NRAR asked for clarification on key potential groundwater impacts. It considered that its requested improvements to the groundwater numerical model would affect the model results and asked for the re-assessment of groundwater impacts (including the minimal impact considerations).

- Surface water – DPIE Water and NRAR asked for surface water impacts (including minimal impact considerations) to be further considered following the revision of the numerical model. This relates to the way water would be managed on site post closure of the mine.

Following the receipt of the DPIE Water/NRAR advice, Evolution, EMM and Coffey met with DPIE Water/NRAR to discuss key issues and proposed response approaches.

Coffey has provided detailed responses to the groundwater matters raised by DPIE Water/NRAR, which is attached as Appendix B and summarised in section 4.1 and Chapter 5. Hydro-Engineering Consultants (HEC) has provided detailed responses to surface water issues, which is attached at Appendix C and summarised in section 4.2.

ii Environment Protection Authority

EPA remarked that:

- all limit conditions in DA 14/98 will remain in any development consent issued for the Cowal Gold Mine, excepting that the IWL will increase from a maximum height of 245 to 246 m AHD;

- no additional air, noise, surface water, groundwater and waste impacts are predicted from the underground development; and

- if development consent is granted, the mine’s environmental management plans will require updating and the EPA should be consulted on the preparation of these plans.

iii DPIE Biodiversity Conservation Division

The Biodiversity Conservation Division (BCD) commented for the Project that if the lake is inundated and chimneying occurs between the stopes and the surface, it would impact on threatened species through loss of surface water and wetland habitat. It recommended that pending advice from relevant agencies/technical experts on the risks associated with subsidence related impacts such as chimneying, the design and mitigation measures are to be revised in the BDAR and EIS.

BCD also requested that all plans required as a condition of approval that relate to biodiversity should be developed in consultation with, and to the satisfaction of BCD.

It further commented that a BDAR was not required for Mod 16 as it recognised that there would not be any additional impact to biodiversity values as a result of the proposed site changes.

iv NSW Resources Regulator

Resources Regulator did not identify any specific concerns regarding mine safety or mine rehabilitation matters in relation to the proposals. It also noted that a revised Mining Operations Plan (MOP) would be required prior to the commencement of the activities described in the Modification.

Resources Regulator further noted that as part of the submission of the MOP it would assess the risk associated with rehabilitation of the TSF/IWL in relation to the chemical and physical suitability of materials used in construction and capping to achieve the final landform and associated land-use.

v Department of Regional NSW – Mining, Exploration and Geoscience

The Department of Regional NSW – Mining, Exploration and Geoscience (MEG) commented that the proposed mine design should achieve satisfactory resource extraction. It also commented that the mine site infrastructure proposed under Mod 16 is not expected to significantly sterilise any resources.

MEG is satisfied that, should the operational outcomes be achieved, the proposed mine design and mining method submissions adequately recover resources and will provide an appropriate return to the state.

MEG considers that the Project satisfies the objects of the *Mining Act 1992* and clause 15 of *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* which deal with the efficient use of resources.

MEG also provided a detailed Resource and Economic Assessment for the Project. This assessment confirms that the Project will be an efficient use of resources and will ensure an appropriate return to the NSW Government including:

- $124 million royalties (current dollars) ie around $8 to $9 million per year; and
- $3.9 billion total revenue (current dollars).

MEG also commented that Evolution holds the appropriate titles for mining operations as required for mineral extraction and mineral exploration.

Overall, MEG determined that should the Project be approved, that efficient and optimised resource outcomes can be achieved, and any identified risks or opportunities can be effectively regulated through the conditions of mining authorities issued under the NSW *Mining Act 1992*.

vi Transport for NSW

Transport for NSW (TfNSW) noted that the proposals would increase mine-related traffic movements during both the construction and operational phases. This includes light vehicle movements and heavy vehicle movements including the existing shuttle bus service between the mine and nearby regional centres.

TfNSW noted that the Project would continue to use the approved preferred access route from Forbes to the mine and raised a concern that the intersection of Newell Highway and West Plains Road does not meet current standards as a turning intersection with a passing lane for through traffic. It commented that the Newell Highway is a road train route within a 110 km/h speed zone and considered it appropriate that it is constructed to provide a Basic Right Turn (BAR) and Basic Left Turn (BAL) intersection treatment for road safety reasons.

TfNSW recommended that Evolution upgrades the intersection of the Newell Highway with West Plains Road to a BAR and BAL intersection treatment.

Following receipt of the TfNSW submission, further analysis of the intersection was undertaken. The results of this assessment are summarised in Section 4.4.

vii DPIE Crown Lands

Crown Lands commented that landowner's consent would be required before undertaking activities on Crown Land. Crown Lands also made comments in relation to access agreements required in accordance with the NSW *Mining Act 1992.*

viii DPI Fisheries

DPIE Fisheries noted the findings of the Biodiversity Development Assessment Report (BDAR) that no impacts from the Project will require offsets. It advised that in the event that direct and indirect impacts occur to Key Fish Habitat and/or Endangered Ecological Communities then they are to be offset by environmental compensation and in consultation with DPI Fisheries.

ix DPI Agriculture

DPI Agriculture made no comment on the proposals.

x Heritage NSW

Heritage NSW noted that the Aboriginal cultural heritage assessment was undertaken in line with the due diligence code, inclusive of field inspection on 06 June 2020, with no Aboriginal objects being located. It noted that the location of the underground footprint is covered by two existing Aboriginal Heritage Impact Permits.

Heritage NSW concluded that based on the information provided, there are no known Aboriginal cultural heritage constraints. It also noted that consultation is ongoing with Registered Aboriginal Parties as per the conditions of consent and in accordance with the existing Indigenous Archaeology and Cultural Heritage Management Plan.

xi Rural Fire Service

The Rural Fire Service (RFS) asked that a Fire Management Plan is prepared for the site, which includes emergency contact details, details of the site and infrastructure, a firefighting water supply plan, and mitigation measures designed to prevent a fire occurring within the site, and prevent fire from escaping the site and developing into a bush/grass fire risk to the surrounding area.

2.5.2 Local Government Authority submissions

i Bland Shire Council (BSC)

The BSC commented that Evolution is an excellent corporate citizen. BSC's expressed strong support for the Project and for Mod 16.

ii Forbes Shire Council

FSC made two submissions. In its first submission it requested conditions of consent to require:

- the upgrade of the intersection of Newell Highway and West Plains Road;
- bitumen sealing of West Plains Road and Bogies Island Road from the Newell Highway to the mine; and
- that at least 50% of the construction and operational workforce reside in the local area, with 10% of the operational workforce being locally employed trainees.

It also requested that a Voluntary Planning Agreement with FSC should be negotiated.

Its supplementary submission expressed that the mine is an integral part of the Forbes community and is a significant contributor to the local and regional economies. It expressed support for the project and commented that Council had applied for State funding to undertake the sealing of West Plains Road.

iii Lachlan Shire Council.

LSC is generally supportive of the proposed development and recognises the benefits that it will bring the shire and wider community. LSC noted that the proposals will result in additional traffic being generated on LSC roads and it asked that the current road maintenance undertakings for mine's operations should be continued for the Project.

2.5.3 Community Submissions

The were 11 supporting submissions made by community members in relation to SSD 10367 and 5 supporting submissions made by community members in relation to DA14/98 Mod 16. No objections were received from the community on the Project. One community member made a submission objecting to Mod 16.

i Key comments from community members in support of the Project and Mod 16

- This project will be fantastic for the future of West Wyalong, Cowal and Evolution. It will provide significant economic and job opportunities for the local community.
- Evolution is a proven community supporter and environmentally responsible miner.
- The Project will provide multiple benefits to the local community, businesses and suppliers as well as the state of NSW. Regional projects like this are vital in providing opportunities for regional communities to thrive and prosper.
- The Project provides not only career opportunities and longevity with an extension to life of mine, but it also benefits individuals, families and the wider community.
- Evolution provides critical economic support to the many towns, families and individuals in the region. Without this support, people living in these areas would not enjoy the many positive flow-on effects from the operation.
- They also provide assistance to our sporting and community groups. A great opportunity to further our already promising future for what once was almost a ghost town.
- Evolution's high standards for protecting the environment are to be commended.
- Projects like these provide longevity and opportunities to regional communities. Not only do residents from the region see direct employment opportunities there are many more benefits through contracting to small businesses, donations and partnerships with the local councils.
- Cowal Gold Mine is one of the most heavily regulated sites in Australia and continues to perform well both environmentally and commercially.

ii Key comments from the community objection to Mod 16

- Evolution Mining should restructure their plans so that there is no increase in water taken from bores and the Irrigation Channel, and preferably so that less is taken. This could be done by postponing the commencement of the extraction of ore from the underground mine.
- The water in the Lachlan Valley is considerably over allocated. The Wyangala Dam has not been able to carry the valley through this three-year drought, due to the pressure on it to keep the river flowing. The dam depleted more quickly than in previous longer droughts. There were reduced inflows to the river from groundwater along its length.

- Evolution say that they have a higher approved rate of water use but this does not take into account the needs of other water users in the valley. If everyone used their full allocation it would be an even greater disaster than this drought has been. The Consultant Coffey in the Application only considers the needs of 2 near farming neighbours. If the ground water is not extracted it will flow down to the Lachlan, having some of the salinity filtered along the way.

- Coffey does not give sufficient attention to the differing contexts of the neighbouring farms and the mine's way of using of water. The farms use water only in particular seasons and years, and the mine uses water 24/7/365. The total ML per annum for each would be more useful for comparisons. Coffey does not at all consider the effects of the CGO's use of groundwater, from inflows (seepage) and from bores, on the region and on the creeks and the Lachlan River, and on the other users of the Jemalong Irrigation Channel.

- All Lachlan users from Jemalong downriver, particularly the Lower Lachlan users, will lose some water to CGO, and to the major mines upriver. The environment also loses. There is no consideration of the downriver effects on Lachlan River flow levels. The groundwater from CGO borefields flows to the Lachlan unless extracted. Likewise the inflows to the mine.

3 Actions undertaken since exhibition

3.1 Stakeholder engagement

3.1.1 Introduction

Evolution has actively engaged with the community throughout the design phase of the Project and during the preparation of the EIS. The purpose of this engagement has been to obtain further feedback, and inform and update stakeholders about the Project. This engagement continued throughout the public exhibition period and remains ongoing. Evolution's stakeholder engagement has been comprehensive to date and reflects the importance Evolution places on this aspect of its business and the Project. This section describes the additional consultation that has taken place since the public exhibition of the EIS.

3.1.2 Community engagement

Evolution has actively sought to inform the local communities about the applications in a number of ways. The CGO Community and Environment Management Consultative Committee (CEMCC) was established for the existing operations and it has facilitated opportunities for community participation in the Project as well as the existing CGO operations. It has allowed Evolution to develop productive working relationships with the local community and stakeholder groups. The CEMCC generally meets every two months and minutes from these meetings are published on the Evolution website. Meetings of the CEMCC have continued since the public exhibition of the EIS.

Evolution has provided regular updates on the Project through its newsletters, the last of which was provided to the community in December 2020. Evolution has also been in regular contact with neighbouring landowners to keep then informed of the process and to seek the necessary landowner consents to lodge the SDD and modification applications.

Evolution has actively engaged with accommodation providers in West Wyalong about potential partnership opportunities as it pursues its accommodation strategy which will include the development of a mine village in West Wyalong.

3.1.3 Government agency and local government authority consultation

Consultation with government agencies has also been ongoing since the public exhibition of the EIS. Key agency consultation is summarised in Table 3.1. It is noted that two agency submissions were received in January 2021 which required consultation with those agencies in February 2021.

Table 3.1 Summary of Government agency and local government authority consultation

Stakeholder	Consultation method	Key matters discussed
BSC	Ongoing consultation through face-to-face meetings	• Discussions concerning the terms of the Voluntary Planning Agreement. • Regular Project updates. • Accommodation strategy and the progress of studies.
FSC	via Community Environmental Monitoring and Consultative Committee	• Update on the Project. • Discussion on road maintenance issues.

Table 3.1 Summary of Government agency and local government authority consultation

Stakeholder	Consultation method	Key matters discussed
LSC	via Community Environmental Monitoring and Consultative Committee	• Update on the Project.
NSW Department of Planning, Industry & Environment – Resource Assessments	Meetings, telephone Ongoing consultation through face-to-face meetings and email correspondence.	• Meeting held with DPIE Resource Assessments and Hugh Middlemis to discuss the recommendations from the independent peer review. • Discussion on process post submission of the Submissions Report.
NSW Department of Planning, Industry and Environment – Division of Water (DPIE-Water formally DoI Water)	Online Meeting.	• DPIE Water/NRAR submission. • Approach to groundwater modelling of the underground mine development. • Response methodology.
Department of Regional NSW, Minerals Exploration and Geosciences Group	Online meeting	• The results of the economic impact assessment, to provide inputs to MEG's Resource Economic Assessment.
Transport for NSW	Letter to TfNSW	• Newell Highway/West Plains Road intersection.

3.2 Further technical assessments and investigations

3.2.1 Groundwater

In response to the water issues raised by DPIE Water Group and NRAR, the Hydrogeologic (2020) review and by the objector to Mod 16, Coffey has prepared detailed responses (Coffey 2021). The assessment included additional groundwater modelling, to clarify the assumptions made and results provided in the groundwater assessments provided with the EIS (EMM 2020a) and Modification Report (EMM 2020b).

The further assessment clarified the following matters in detail, and the assessment is summarised in section 4.1 and the assessment report is at Appendix B:

- summary of key issues requiring clarification in the DPIE/NRAR submission;
- field evidence of local connectivity between Lake Cowal and the groundwater system;
- summary of existing field testing for the transported unit;
- contaminant migration predictions and potential risk to Lake Cowal and groundwater users near the mine site;
- groundwater take from the Upper Lachlan Alluvial groundwater source;
- cumulative groundwater pressure decline at water supply works in the Lachlan Fold Belt water source;
- groundwater inflow and drawdown due to the Project;
- potential for increased fracturing above and around stopes/tunnels;
- numerical model details, including:

- steady state model;
- lateral boundaries;
- TSF/IWL foundation parameters and boundary conditions;
- Lake Cowal boundary conditions; and
- effect of using confined conditions;

- recommendations for future monitoring and model verification/updates.

3.2.2 Surface water

In response to surface water issues raised by DPIE Water and NRAR, HEC has provided detailed responses. The responses clarified the predicted annual Bland Creek Paleochannel Borefile usage and the water balance results. HEC's responses are detailed in section 4.2 and at Appendix C.

3.2.3 Traffic

In response to issues raised by TfNSW and FSC about the potential traffic impacts of the Project on the Newell Highway/West Plains Road intersection and by FSC about mine traffic on West Plains Road and Bogies Island Road, EMM undertook a supplementary traffic assessment on Wednesday 16 and Thursday 17 December 2020. The results of the supplementary traffic assessment and recommendations are detailed in section 4.4.

3.3 Other activities

3.3.1 Accommodation village studies

During and since the EIS and Mod 16 exhibition, Evolution has been actively progressing the design of its proposed accommodation village in West Wyalong in consultation with BSC, which will be the consent authority for a separate development application.

The preferred site for the mine village is the same site as the workers accommodation that was developed for the initial development of CGO. The village will accommodate the construction and operational workforces for the Project. In this regard Evolution has:

- undertaken field studies of the proposed site for ecology, Aboriginal cultural heritage, land contamination, bushfire risk and traffic impacts;
- engaged a project manager, designer and architect to develop the preferred design of the village; and
- undertaken consultation with BSC about the proposal and to seek feedback on the design and to report the progress of the studies.

4 Response to submissions

Responses to the issues raised by the various stakeholders are provided in the sub-sections below. For reporting simplicity, and given that both applications are reliant on one another, the issues raised in submissions for both applications and the responses to the issues are summarised holistically in the following sections.

4.1 Groundwater

4.1.1 Response to DPIE – Water/NRAR groundwater advice

DPIE Water/NRAR provided advice on *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a) and the *Groundwater Impact Assessment for the Bland Creek Paleochannel Borefield* (Coffey 2020b). This section provides a summary of Coffey's response (Coffey 2021a) to DPIE's review of those documents, which is provided in full in Appendix B.

As detailed below, Coffey's response (Coffey 2021a) provides further details on the following key items raised in the DPIE's review:

- field evidence showing poor connectivity between Lake Cowal and the groundwater system;
- a summary of existing field-testing data;
- solute migration predictions and the potential risk to Lake Cowal and groundwater users near the mine site;
- groundwater take from the Upper Lachlan Alluvial groundwater source;
- groundwater pressure decline at water supply works in the Lachlan Fold Belt Murray Darling Basin groundwater source due to mining;
- groundwater inflow and drawdown due to the proposed CGO Underground Development only;
- potential for increased fracturing above and around the stopes / tunnels;
- numerical model details:
    - steady state model;
    - lateral boundaries;
    - TSF/IWL foundation parameters and boundary conditions; and
    - Lake Cowal boundary conditions;
- effect of using confined conditions on model layer 6 to layer 20; and
- recommendations for future monitoring and model verification/updates.

i Field evidence showing poor connectivity between Lake Cowal and the groundwater system

Field evidence to show poor connectivity between Lake Cowal and the groundwater system has been demonstrated through CGO open pit dewatering records, evaporation from Lake Cowal, seepage into the GRE46 exploration decline, observed flows from the Glenfiddich Fault and pit monitoring piezometer responses.

Of note, Lake Cowal has experienced two significant flood events between October 2010 and November 2014 and between July 2016 and November 2017. As shown in Figure 4.1, the level of water has remained below the monitoring points during non-flooding events.

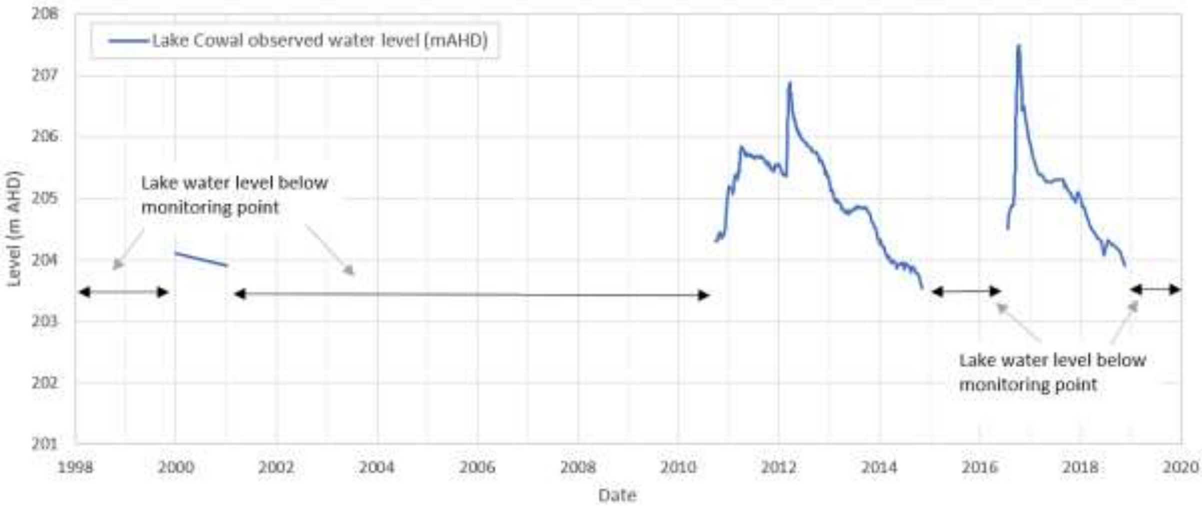

Figure 4.1 Observed water level at Lake Cowal between 1998 and 2020 (Coffey 2021a)

a CGO open pit dewatering records

The CGO open pit is a significant groundwater sink and is the dominate influence on groundwater at the western part of Lake Cowal. Groundwater is drawn toward the open pit, in particular from the fractured rock aquifer in which the majority of the open pit is excavated. Coffey's response (2021a) notes that if there was a significant connection between Lake Cowal and the underlying fractured rock aquifer, it should be possible to observe an increase in groundwater inflow to the open pit during periods when Lake Cowal is in flood.

Historical daily dewatering records show the total daily volume dewatered from the open pit, which includes seepage from the pit walls, floor and dewatering bores, and surface water runoff that reaches the open pit. Figure 4.2 shows daily watering records from 2007 to 2020, with periods of when Lake Cowal is in flood and rainfall circled in yellow.

The dewatering rate during these time periods is consistent with pit dewatering rates during 2007 to 2010, 2015 and 2019 when Lake Cowal was dry. Additionally, the period from mid-2018 to mid-2019 during which Lake Cowal became dry and there was no observed decrease in pit dewatering rates. The observations show that for periods of low rainfall (when pit dewatering can be considered representative of groundwater inflow) and pit dewatering rates during periods when Lake Cowal is dry are approximately equal to pit dewatering rates when Lake Cowal contains water. Therefore, open pit dewatering observations show that the rate of groundwater inflow to the open pit is independent of whether or not Lake Cowal is full.

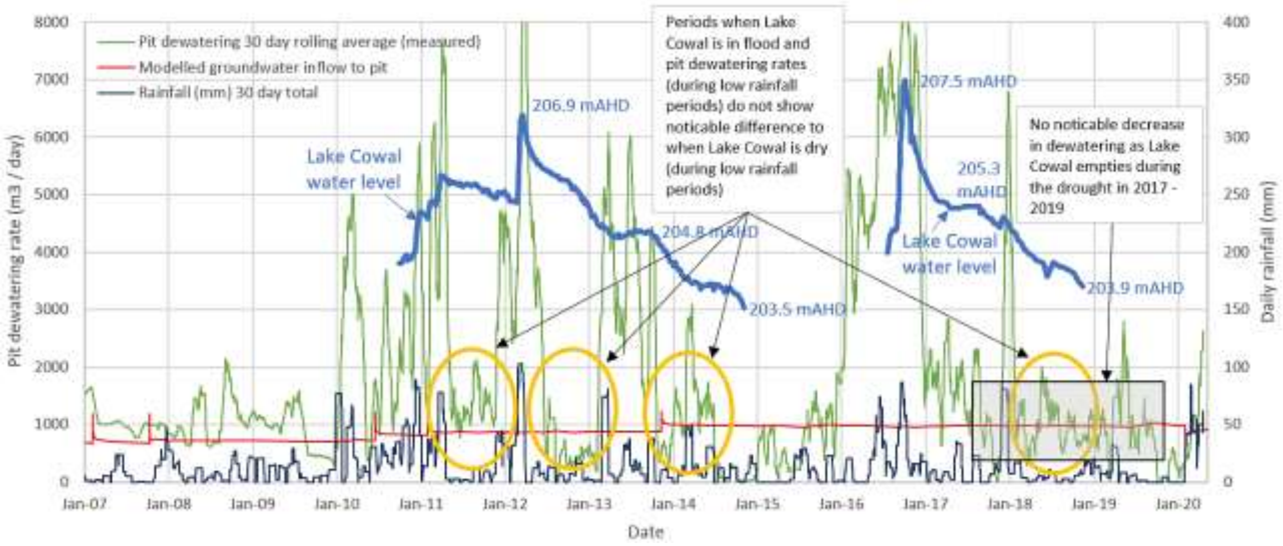

Figure 4.2 Pit dewatering and Lake Cowal levels (Coffey 2021a)

b Evaporation from Lake Cowal

Figure 4.3 shows available lake water level observations compared to flow at the gauge 412103 (Bland Creek at Morangarell, now disused). When the lake is draining, water levels show a quasi-logarithmic fall. Below the full storage level, the rate of water level fall is approximately linear with time. An analysis of eight recession events was undertaken. For each event, the time period was selected such that other data suggest negligible inflows to the lake from creeks and surface runoff were occurring. For each event, pan evaporation and direct rainfall to the lake water body were taken into account. The average fall in lake water level (accounting for rainfall) from the events was equal to 80% of pan evaporation. This is similar to recorded rates of water level fall for large shallow lakes that contain suspended and dissolved solids in a semi-arid climate. Results indicate that transfer of groundwater to or from Lake Cowal is low, with the precision of the results being less than that required to quantify the transfer.

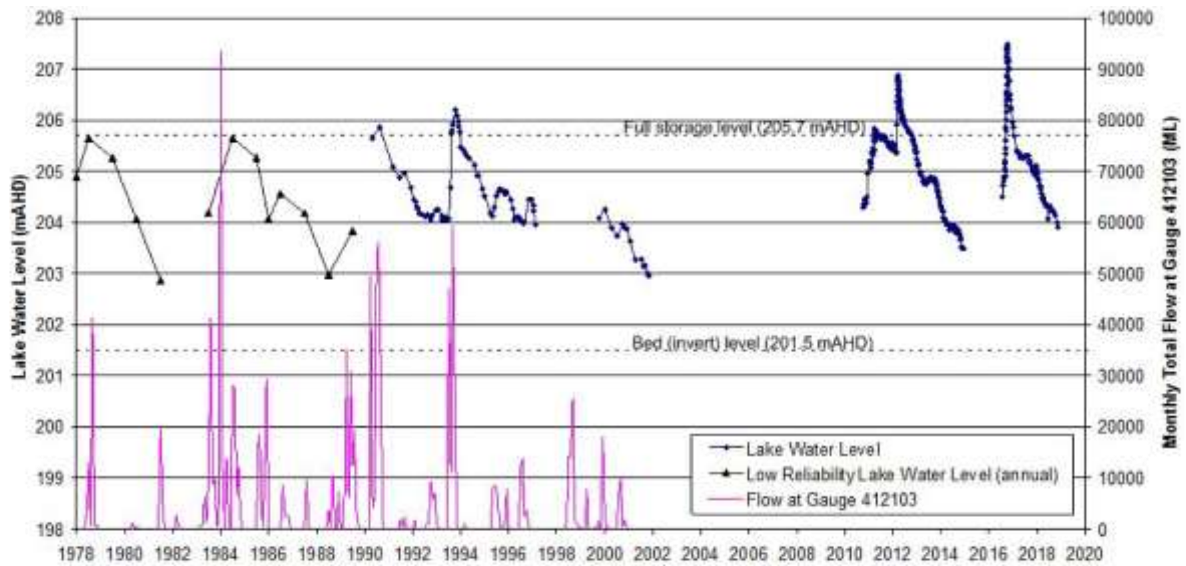

Figure 4.3 Observed water levels in Lake Cowal and flow at gauge 412103 (Bland Creek at Morangarell, now disused) (Coffey2021a)

c Seepage into the GRE46 exploration decline

In 2020, Coffey measured the seepage rate of groundwater into the GRE46 exploration decline. Observed areas of seepage or dampness on the exposed tunnel face were measured including the whole tunnel apart from where drilling was occurring and the tunnel floor (refer Figure 7 of Appendix B for the mapped seepage of the GRE46 exploration decline (Coffey 2021a)). Approximately one third of the tunnel floor was unmeasured. To account for this area, the inflows were doubled in order to reduce the risk of underestimating the inflows. The assessed groundwater inflow was based upon an analytic solution for steady state groundwater inflow to a tunnel.

The results are summarised in Table 4.1, which showed that the highest observed inflow rate can be considered a modest seepage inflow, with the total aggregate observed flow into the decline being approximately 1.4 litres per second (L/s). The hydraulic conductivity was found to be close to 5.5 x 10^{-9} m/s.

Table 4.1 Observed seepage in exploration decline (Coffey 2021a)

Category	Approximate flow rate (L/min)	Number observed	Total flow (L/min)	Total flow (L/s)
Very high flow	25	1	25.0	0.42
Very high flow	7.5	3	22.5	0.38
High flow	3	6	18.0	0.30
Light flow	1.5	7	10.5	0.18
Minor seepage	0.2	47	9.4	0.16
TOTAL	-	-	**85.4**	**1.42**

d Observed flows from the Glenfiddich Fault

Near its entrance from the open pit, the GRE46 exploration decline crosses the Glenfiddich fault. Combined flows from the high flowing exploration drill holes which are interpreted to intersect the fault was in the order of approximately 1 L/s. These flows account for the majority of the observed seepage into the decline. The flows observed were all modest with the largest flow rates from individual features of the order of 20 L/min (0.3 L/s).

Therefore, the Glenfiddich Fault is not considered to significantly affect the groundwater flow regime of the area, as the observed total flow rate of the decline shows similar hydraulic conductivity to the surrounding rock and the inflow rate of drill holes which intersect the Glenfiddich Fault.

e Pit monitoring piezometer responses

There are six piezometers in the pit area:

- PDB1A - Saprock screen from 82 to 88 m below ground level;
- PDB3A - Saprock screen from 94.5 to 100.5 m below ground level;
- PDB5A - Saprock screen from 76.5 to 82.5 m below ground level;
- PDB1B - Transported screen from 14 to 20 m below ground level;
- PDB3B - Transported screen from 23.6 to 29.6 m below ground level; and
- PDB5B - Saprolite screen from 23.8 to 29.8 m below ground level.

The following observations regarding groundwater can be made from piezometer results:

- Substantial fluctuations in groundwater level have been recorded in the Saprock as a result of changes in the rate of dewatering and changes associated with pit development. Fluctuations are dampened in the Transported unit.

- Groundwater levels show a response to rainfall (and possibly inundation of Lake Cowal) for shallow monitoring piezometers PDB1B, PDB3B and PDB5B screened in the Transported unit; with a limited response in deeper monitoring piezometers PDB1A and PDB5A screened in the Saprock unit.

- No response to rainfall is observed at Saprock piezometer PDB3A, which shows the greatest drawdown due to pit dewatering.

This provides further evidence of poor connectivity between Lake Cowal and the fractured rock groundwater system beneath Lake Cowal.

ii Summary of existing field-testing data

The existing field-testing data is listed below:

- Historic in-situ hydraulic conductivity testing at the mine site and BCPB area has resulted in a large database of hydraulic conductivity measurements (refer to Figure 9 of Appendix B for a summary of the hydraulic conductivity database for CGO site and BCPB area (Coffey 2021a)), including:
  - 26 single rate pump tests conducted at the CGO site;
  - three packer tests in volcanic rocks conducted at the CGO site;
  - two long-term single rate pump tests conducted at the two saline borefields (at other sites);
  - six long-term single rate tests conducted at the BCPB; and
  - 102 estimates of hydraulic conductivity from specific capacity data in government records for private water bores, with 45 estimates for the Lachlan Floodplain (north of the Corinella Constriction).

- Field testing of the hydraulic conductivity of the transported sediments at the CGO site, including nine large differential slug tests and one pit bore pumping analysis.

- Field investigations including packer testing of the Primary Rock in the proposed Project area and measurement of the rate of groundwater seepage into the proposed GRE46 exploration decline. The results of this investigation were consistent with parameters adopted based on calibration of the mine site numerical groundwater model (EMM 2020a) to groundwater monitoring at 22 monitoring piezometers over the period 2005 to 2020.

iii Solute migration predictions and the potential risk to Lake Cowal and groundwater users near the mine site

The predicted extent of solute/contaminant transport from the TSF/IWL in 200 years following the end of mining is shown on Figure 4.4. The figure also shows the existing registered groundwater users identified around the mining lease. Considering the distance of registered groundwater users to the extent of solute/contaminant movement over a 200-year period post mining, there is no evidence of any risk to existing registered groundwater users from predicted solute/contaminant transport in groundwater.

The treatment of contaminant transport in the mine site report adopted conservative retardation factors and chemical reactions. Field evidence that the contaminant transport predictions in the mine site model are conservative are provided by the lack of continuous detection of solute above detection limits in monitoring piezometers immediately adjacent to the TSFs during 15 years of operations.

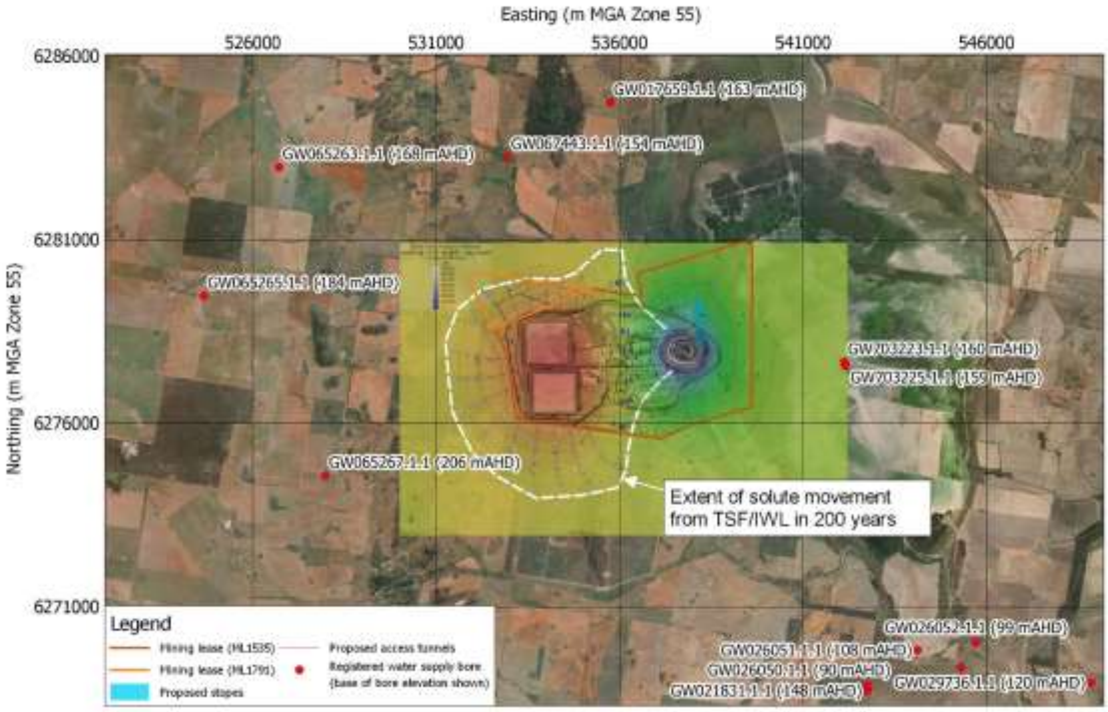

Figure 4.4 Predicted extent of solute movement in 200 years (Coffey 2021a)

The water in the completed mine workings beneath Lake Cowal will remain below 85 m AHD, which is well below the level of the bed lake of Lake Cowal (201.5 m AHD). Therefore, there is no prospect of seepage from the mine entering Lake Cowal. Additionally, due to the absence of new deep groundwater works in the area, the open pit void will act as a groundwater sink which will draw groundwater towards it from all directions, including from groundwater beneath the western part of Lake Cowal. Figure 11 and Figure 12 of Appendix B (Coffey 2021a) show the modelled groundwater streamlines starting from the TSF/IWL and from Lake Cowal based on modelled groundwater head conditions 200 years after the end of mining. The presence of the groundwater sink caused by the open pit void makes it physically impossible for water to seep from the TSF/IWL and emerge at the Lake Cowal area.

iv Groundwater take from the Upper Lachlan Alluvial groundwater source

CGO currently holds 3650 ML/year in the Upper Lachlan Alluvial Zone 7 Management Zone within the Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012.

Table 3 and Table 4 of Appendix B (Coffey 2021a) provide a breakdown of the components of seepage into the open pit and underground development at selected times for the model cases of a dry Lake Cowal and a full Lake Cowal, respectively. Groundwater inflows during 2037 are representative of the period just prior to the end of underground mining, when groundwater inflows are predicted to be at or close to their highest values.

The predicted total groundwater inflow into the mine originating from the Upper Lachlan Alluvium is approximately 11% of the total inflow into the mine for both dry Lake Cowal and full Lake Cowal scenarios from 2019 to 2022.

This reduces to 6% in 2026 and 3% in 2037 for both dry Lake Cowal and full Lake Cowal scenarios towards the end of mining when substantially more inflow to the mine originates from the Primary Rock at elevations below -700 m AHD.

v Groundwater pressure decline at water supply works in the Lachlan Fold Belt Murray Darling Basin groundwater source due to mining

Modelled groundwater head drawdown around the mine site due to the open pit and underground development increases with depth below ground.

Figure 4.5 shows that for public bores around the mine site with an elevation above 150 m AHD, the combined groundwater head drawdown from Mod 14 and the proposed underground development would be less than 2 m in January 2038 when compared to the groundwater head since 2004. The date is representative of the period immediately before the end of underground mining. Figure 4.6 shows that for public bores around the mine site with an elevation of less than 150 m AHD, the combined groundwater head drawdown from Mod 14 and the proposed underground development would be less than 2 m in January 2038.

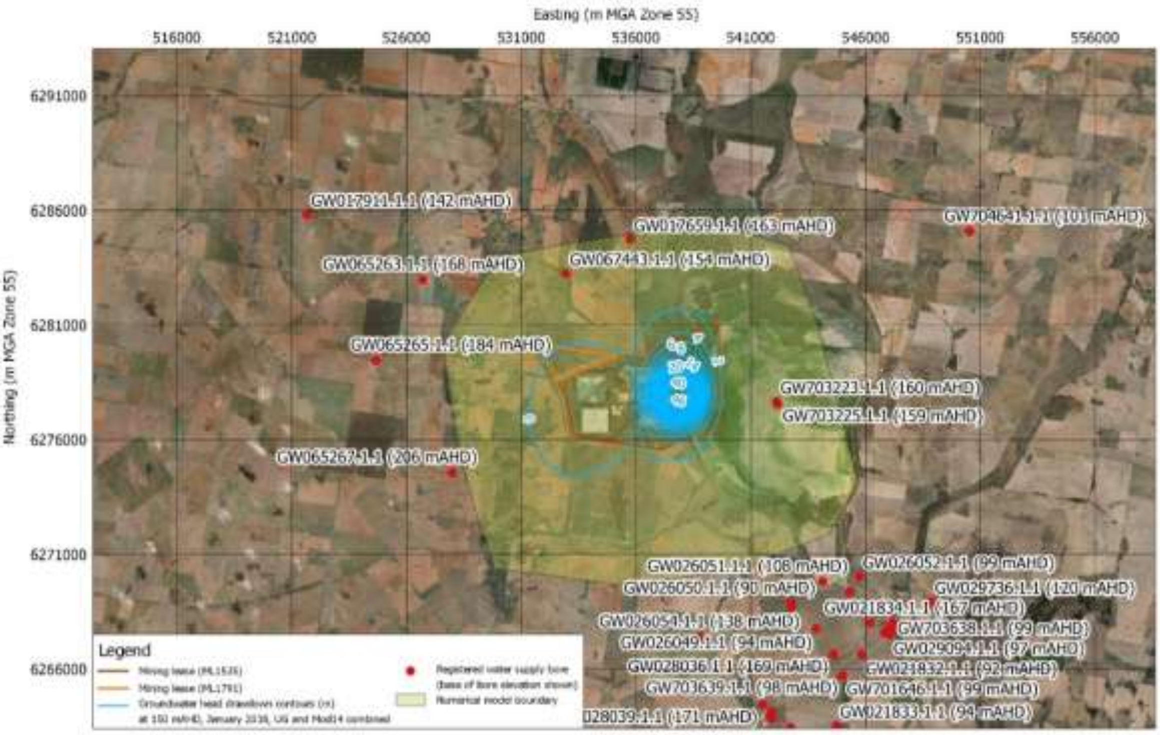

Figure 4.5 Combined (Mod 14 and proposed underground development) drawdown at 150 mAHD, January 2038 (Coffey 2021a)

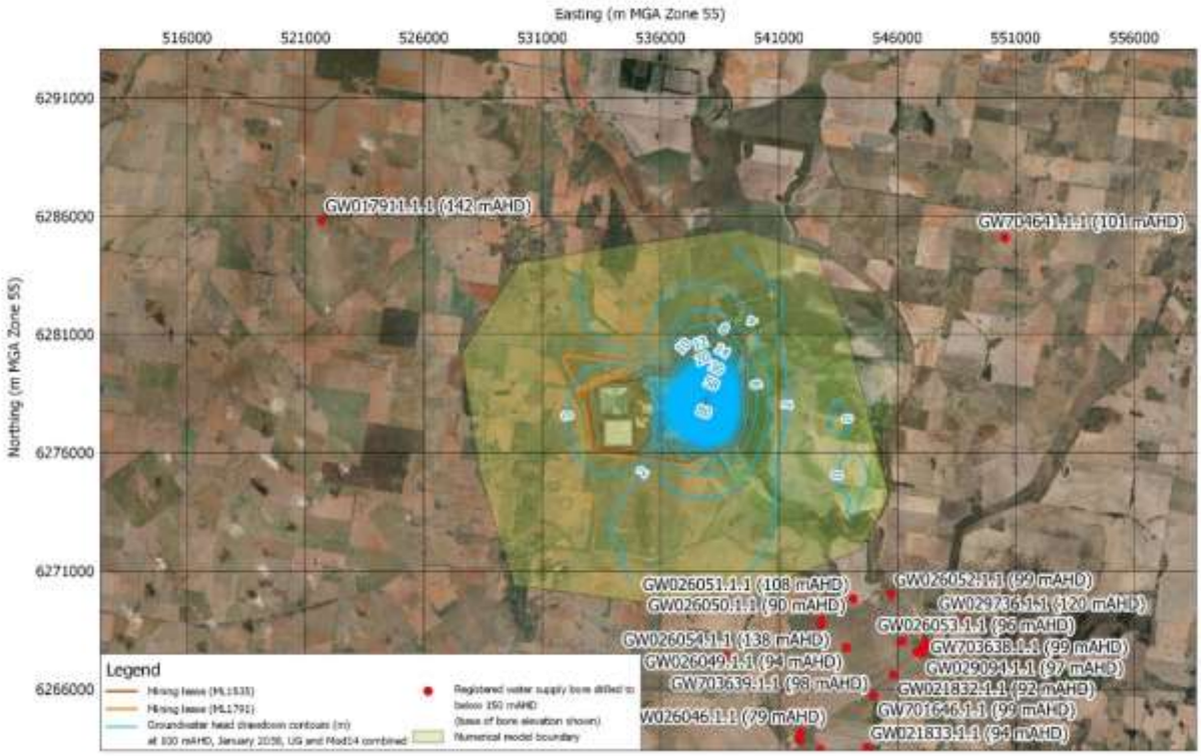

Figure 4.6 Combined (Mod 14 and proposed underground development) drawdown at 100 mAHD, January 2038 (Coffey 2021a)

vi Groundwater inflow and drawdown due to the proposed CGO Underground Development only

Groundwater inflow due to the underground development only is predicted to increase from zero at the commencement of the underground development in 2022 to a peak of approximately 1,800 m^3/day in 2031, and then continue at approximately this rate until the end of mining in mid-2039. Between mid-2039 and approximately 2066, groundwater infiltration to the paste backfilled stopes and access tunnel voids occurs. After this time, there is no additional groundwater inflow from the underground development compared to the approved Mod 14 open pit development. Figure 4.7 shows that if the approved Mod 14 effects are excluded, the underground development is predicted to result in groundwater extraction from aquifers surrounding the mine site only between the years 2022 and approximately 2066.

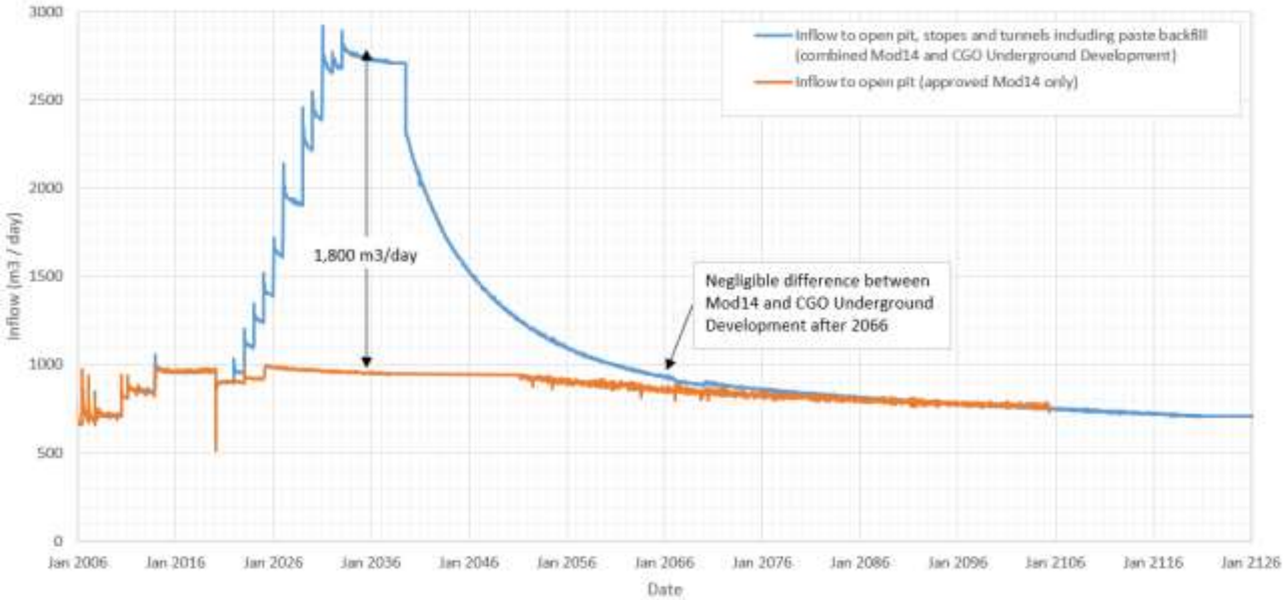

Figure 4.7 Inflow to the proposed underground development and Mod 14 (Coffey 2021a)

Modelled groundwater drawdown around the mine site for the groundwater table and groundwater heads at January 2038 from the underground development only are shown in Figure 17, Figure 18 and Figure 19 of Appendix B (Coffey 2021a).

Figure 17 shows that the 2 m groundwater table drawdown contour resulting from the underground development only is contained within the mining lease in January 2038. This includes groundwater head drawdown in the Transported, Saprolite and Saprock units as shown in Figure 18 and Figure 19 of Appendix B (Coffey 2021a).

As shown in Figure 19 of Appendix B (Coffey 2021a), drawdown in the Primary Rock at 0 m AHD (approximately 200 m depth below ground) is noticeably more than the shallower units above. This is a result of stope mining as part of the proposed underground development, which is to be carried out in the Primary Rock at elevations below approximately 80 m AHD. Potential for increased fracturing above and around the stopes/tunnels

An assessment of predicted surface subsidence due to the proposed underground development is provided in *Geotechnical Assessment of Surface Impacts for Proposed Underground Mining at Lake Cowal* (Beck Engineering 2020), which found:

- vertical displacement forecasts on the surface above the proposed underground mine are generally less than 15 mm and considered negligible; and
- the model does not forecast significant rockmass damage or major instability above the upper stopes, however, local geological conditions encountered may be different from the current understanding.

Predicted rockmass damage in the horizontal direction is limited to a zone within 10 m – 20 m in from the stopes (refer Figure 4.8). In the vertical direction, negligible rockmass damage is predicted to occur in the Primary Rock above the upper stopes, although a zone of rockmass damage is predicted in the Saprolite and Transported units immediately adjacent to the open pit (refer Figure 4.9). There is negligible predicted rockmass damage adjacent to the top of the stopes in this area.

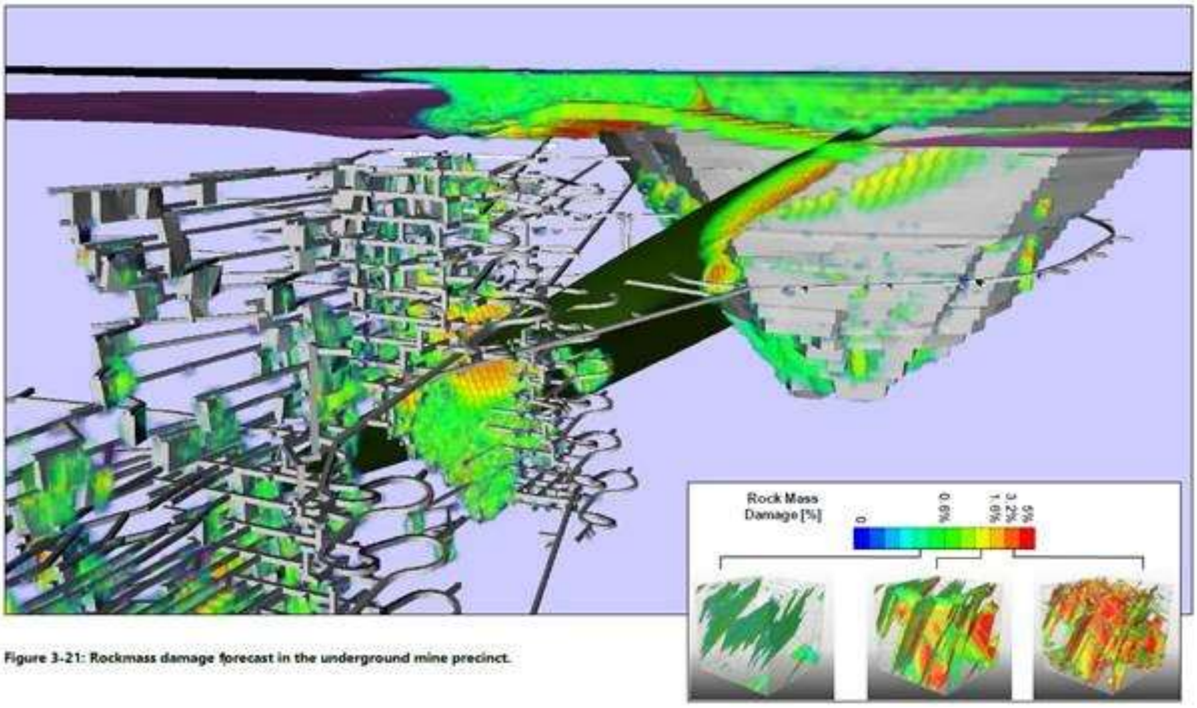

Figure 4.8 **Predicted rockmass damage around the proposed underground development (Beck Engineering 2020)**

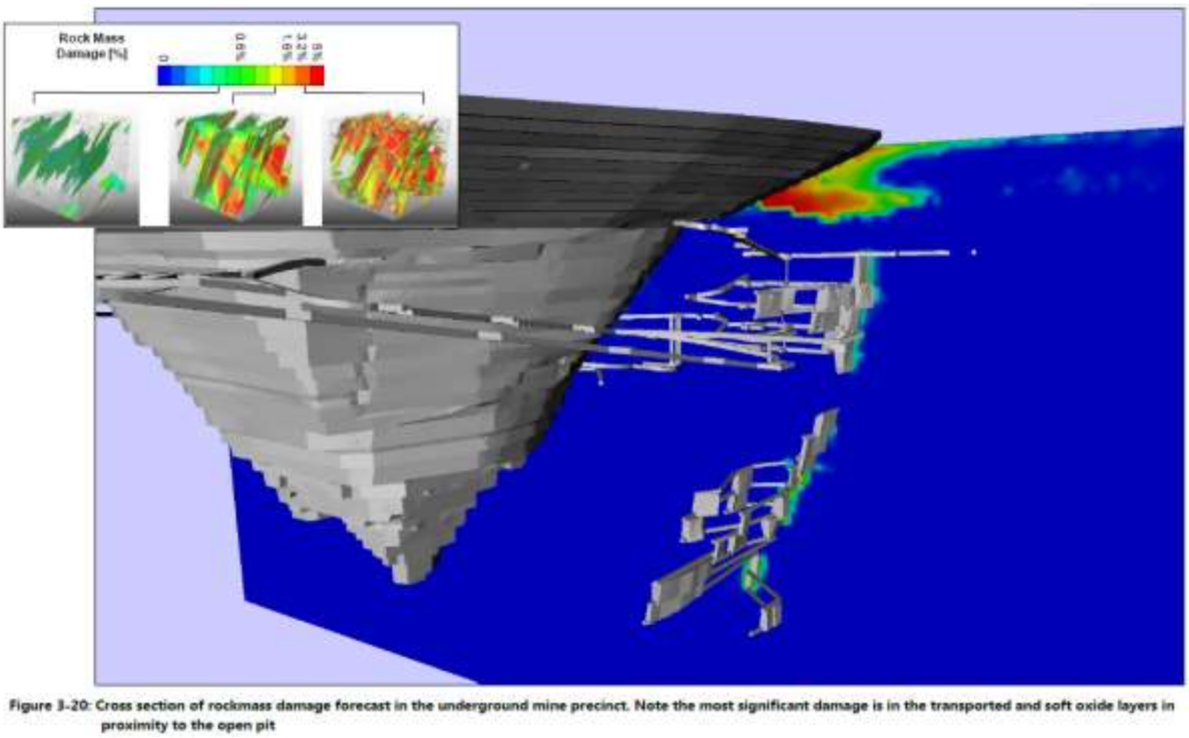

Figure 4.9 **Predicted rockmass damage in the soft oxide (Saprolite) and Transported units near the open pit (Beck Engineering 2020)**

To assess the impacts on predicted groundwater inflows to the underground development as a result of the potential for increased fracturing above the stopes, two sensitivity cases were assessed as part of *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a).

In the first case, the model was run with the horizontal and vertical hydraulic conductivity of the Primary Rock in the area of the stopes, from the level of the base of highest level of stoping up to the interface with the Saprock unit, increased by a factor of 10. In the second case, an assessment of the effects on inflows resulting from a higher hydraulic conductivity in the Transported Unit was carried out by factoring the horizontal and vertical hydraulic conductivity of the Transported Unit up by a factor of 10. The maximum predicted increase in inflow during the period 2020 to 2056 was less than 2% for both cases.

For the purposes of Coffey's response (Coffey 2021a), a third sensitivity case was carried out with the horizontal and vertical hydraulic conductivity of the Primary Rock, Saprock, Saprolite and Transported units in the area of the stopes, from the level of the base of highest level of stoping up to the interface with the Saprock unit, increased by a factor of 10. The results show a difference in predicted inflows of less than approximately 100 m^3/day throughout the life of the underground development (refer Figure 22 of Appendix B (Coffey 2021a)). This difference is less than 5% of the predicted maximum inflow to the open pit, stopes and access tunnels and is considered negligible.

Beck Engineering (2020) forecast that the Glenfiddich fault may become slightly mobilised due to nearby underground mining, which may lead to increased hydraulic conductivity in a small area adjacent to the fault. As noted in Section i above, groundwater inflow rates from the Glenfiddich Fault are considered moderate. In the event that increased flows associated with the Glenfiddich Fault occur during the construction of the underground development, these are likely to occur over a relatively small zone of rock around the fault. This area can be grouted during mining operations if these flows are of a sufficiently high magnitude.

vii Numerical model details

Numerical modelling was completed to provide information on several parameters as detailed below.

- A steady state model.
- Lateral boundaries.
- Effect on predicted inflows to the mine.
- Effect on assessed impacts to existing groundwater users.
- TSF/IWL foundation parameters and boundary conditions.
- Lake Cowal boundary conditions.
- Predictive modelling of dry lake and full lake conditions.
- Local groundwater flow regime at Lake Cowal.

Details of this numerical modelling is provided in Section 4.9 of Appendix B (Coffey 2021a).

viii Effect of using confined conditions on model layer 6 to layer 20

Based on observations of seepage around the existing CGO open pit in 2020, seepage into the open pit is occurring from elevations above the top of the Primary Rock. This indicates that confined, or fully saturated conditions, exist in the Primary Rock around the open pit in 2020.

The modelled groundwater table drawdown in 2038 (refer Figure 4.10) is generally less than about 60 m at the edges of the open pit, which is above the level of the top of the Primary Rock. Groundwater table drawdown decreases rapidly away from the open pit. In the area where the southern end of stopes and access tunnels pass close to the open pit, the Primary Rock may become unsaturated. The effect of adopting fully saturated conditions for the Primary Rock in the model results in a higher hydraulic conductivity for the Primary Rock in this area compared to unsaturated conditions. This means the model may slightly over-estimate flows in that area. Considering the much larger groundwater head gradients at the lower compared to the upper elevations of the stopes, and associated larger inflows, the effects of adopting fully saturated conditions for the Primary Rock are considered to be negligible with respect to predicted inflows to the mine.

As there are no existing groundwater users in the area near the open pit where there is a slight potential for unsaturated conditions in the Primary Rock, the effects of adopting fully saturated conditions for the Primary Rock are considered to be negligible with respect to the assessment of impacts to existing groundwater users.

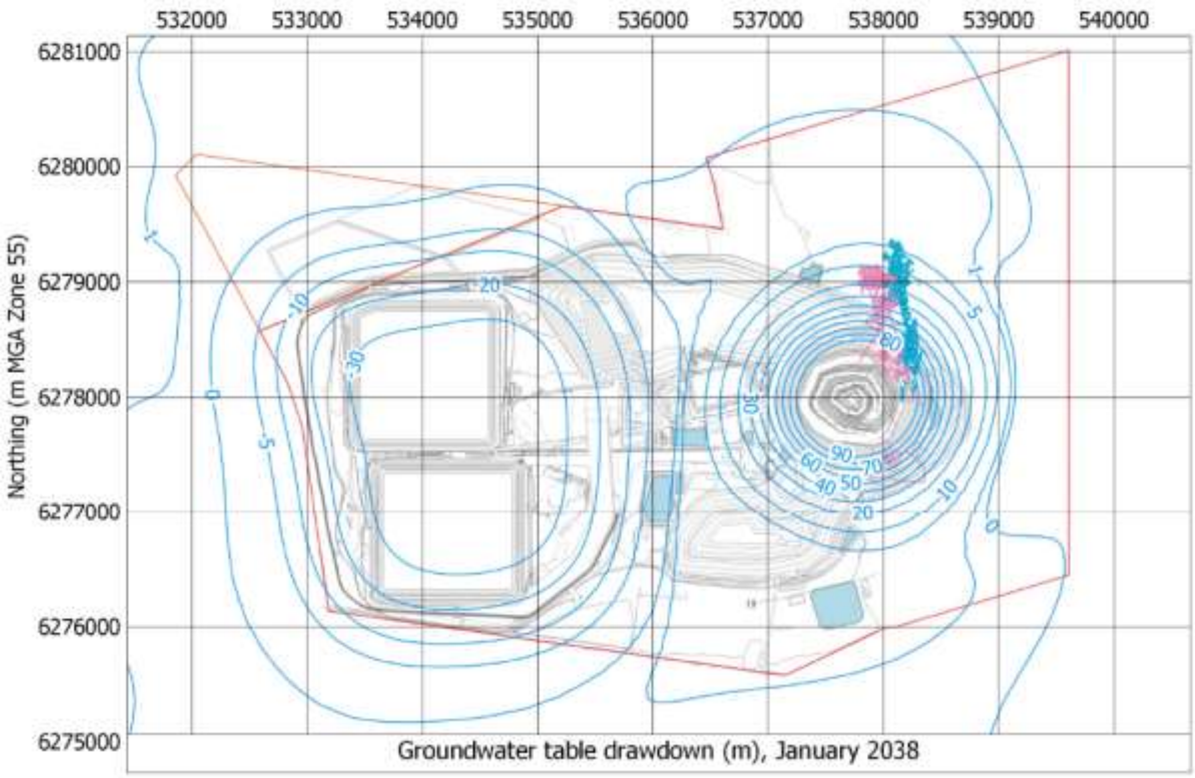

Figure 4.10 Modelled groundwater table drawdown, January 2038 (Coffey 2021a)

ix Recommendations for future monitoring and model verification/updates

Recommendations provided in Coffey (2021a) are listed below.

- The CGO annual groundwater monitoring review be expanded to include groundwater level monitoring at fully grouted piezometers: UG-BH-01, UG-BH-02, UG-BH-03, UG-BH04 and PZ13 (refer Table 9 of Appendix B (Coffey 2021a)).
- Groundwater level monitoring is to continue at the existing monitoring piezometers around the CGO site (refer Figure 38 and Table 9 of Appendix B (Coffey 2021a)) and the BCPB area.
- If existing monitoring wells are impacted by the IWL construction, replacement monitoring wells will require installation.
- The CGO annual groundwater monitoring review should report groundwater inflow volumes into the underground development, according to each underground area of the stopes and access tunnels, in a similar way that open pit dewatering volumes are currently reported. A groundwater model can benefit greatly from segregation of flow rates from each component of pumping as it allows a calibration dataset. This data should be collected during mining operations and provided to Coffey.
- Lake Cowal water levels will be continuously monitored.

Following commencement of underground mining, when continuous inflow and groundwater level observation records are available for a period of at least one year, the following should be carried out by a hydrogeologist:

- comparison of observed inflows to the open pit, stopes and access tunnels against predicted values of Figure 10-6 of *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a);
- comparison of groundwater level observations above the stopes and access tunnels against predicted values using the numerical model; and
- assessment and reporting on the significance of differences between modelled and observed values.

If observed inflows are outside the range shown in Figure 10-6, of *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a) or if groundwater levels are showing trends away from predicted values, the numerical model for the mine site is to be revised. This will include updating the model according to the final underground mine design, model re-calibration and preparation of revised inflow and groundwater level predictions.

4.1.2 Response to community submission on groundwater

Coffey (2021b) has provided a response to a community member objection received regarding the impacts of the project on groundwater as discussed in *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a) and the *Groundwater Impact Assessment for the Bland Creek Paleochannel Borefield* (Coffey 2020b). This is provided in full in Appendix B.

Key issues noted in the objection are detailed below and include:

- water use;
- groundwater level recovery;
- groundwater users; and

- regulatory considerations.

i Water use

The regional groundwater modelling work conducted by Coffey for the underground development resulted in a decrease in the maximum daily groundwater extraction rate for the CGO BCPB to 4.0 ML/day (Coffey 2020b) from 4.4 ML/day in the Modification 14 model (Coffey 2018). The decrease in groundwater extraction was required to maintain groundwater levels above the government trigger level (discussed further below) for an eight-year extension in mine pumping from 2032 to 2040. Groundwater extraction from the CGO ESB remains at 1.5 ML/day for the underground development.

Table 11.2 of the main report EIS (EMM 2020a) details site water demand, shown below. Water use of 7,340 ML/year (20.1 ML/day) is listed for the median rainfall case.

The main consumers of water at CGO are the process plant, construction and haul road dust suppression. Since 2007, the CGO ore processing rate (total) has averaged 7.4 Mtpa and the water demand (total) has averaged 17 ML/day, of which up to approximately 7.6 ML/day (around 45%) on average was supplied by on-site recycled and incident rainfall water. Monitoring records show that water consumption for haul road dust suppression averages 0.62 ML/day.

For the underground development the paste fill plant will require water usage in the order of 1.2 ML/day which will be sourced from internal sources. Water will also be required for dust suppression and ventilation requirements, in the order of approximately 2.5 ML/day, also from internal sources.

As discussed above, the long-term average daily groundwater extraction rate for the CGO BCPB for the underground development cannot exceed 4.0 ML/day and continued monitoring of groundwater levels will remain part of the groundwater management strategy for the mine.

The BCPB report (Coffey 2020b) includes more than two private bore irrigators. The report focuses on the Billabong and Maslin farming operations due to the large groundwater extraction rates at these locations as discussed below. Groundwater extraction in the area covered by the model domain occurs from Evolution and private bores. Appendix E of the BCPB report lists the 18 active pumping bores in the model, and contains a map showing their locations (refer to Figure 4.11). The list excludes basic rights bores (registered for stock and domestic use) which have no associated entitlement. Basic rights bores are not active in the model.

Large groundwater extraction rates are concentrated in three main areas and are the focus of the BCPB report. One of the areas encompasses the CGO, BCPB and ESB. The other two areas encompass private bores. These areas are identified on the map in Appendix B (refer to Figure 4.11). Each area also has a monitoring piezometer used by the NSW government to monitor groundwater levels in the Lachlan Formation (at the request of the Bland Palaeochannel Groundwater Users Group) for groundwater management purposes. These piezometers have associated triggers defined by bore water levels where, should the bore water level fall to the trigger, various management actions are initiated.

If the investigation trigger level is breached, the effects on nearby users will be investigated and measures to mitigate impacts on water supply for existing stock and domestic use will be put in place for affected bores. If the mitigation trigger level is breached one or both of the following measures would be put in place in consultation with DPIE:

- alter the pumping regime to maintain the water level in the impacted stock and domestic bores; and
- maintain a water supply to the owner/s of impacted stock and domestic bores.

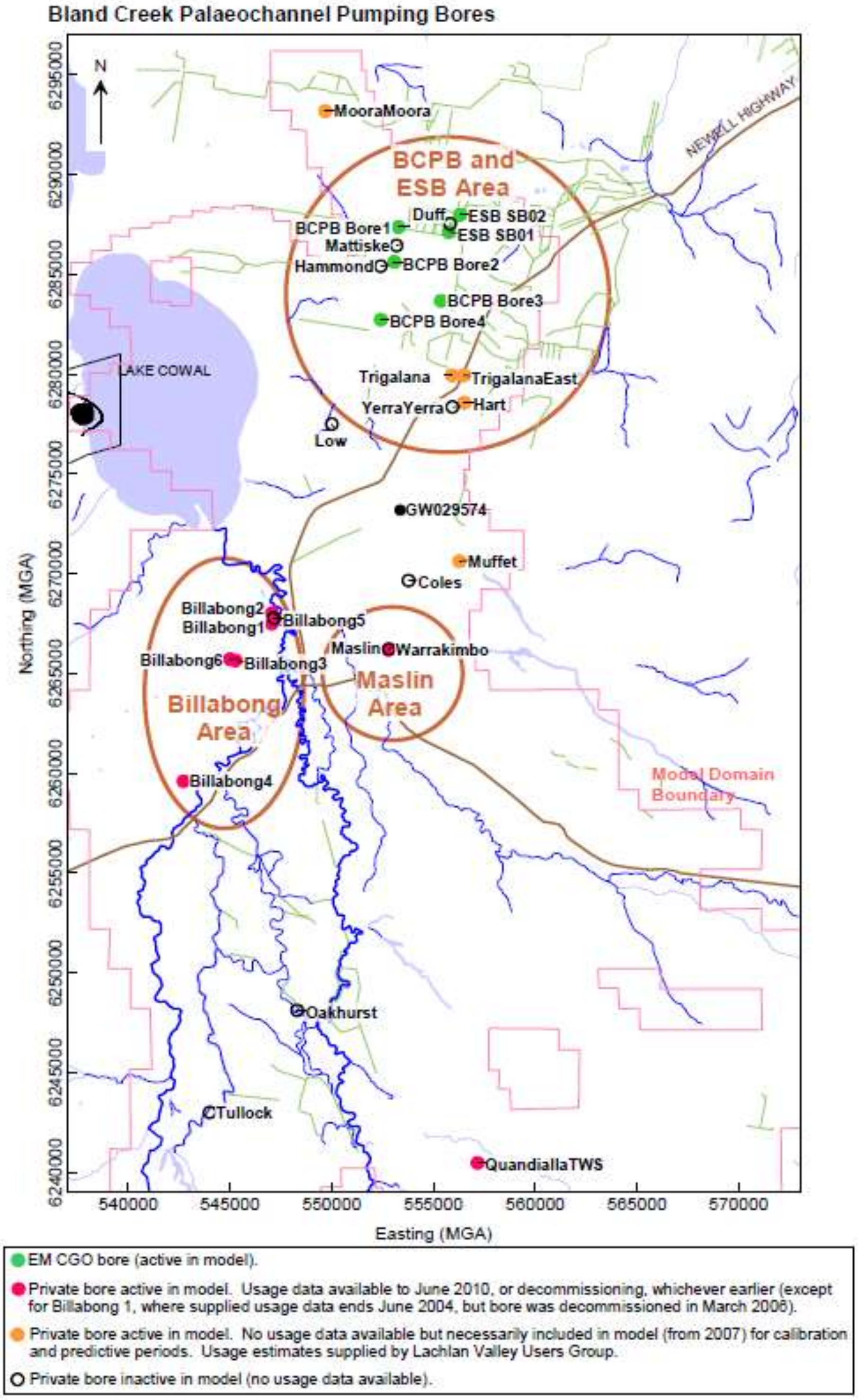

Figure 4.11 Bland Creek Palaeochannel model pumping bores

Table 4.2 lists the main pumping areas and associated pumping bores and trigger piezometers. The pumping bores listed in Table 4.2 account for about 96% of the known groundwater extraction from the Lachlan and Cowra Formations in the model area. All bores in Table 4.2 pump from the Lachlan Formation except the ESB which pumps from the Cowra Formation.

The operation of the BCPB and ESB is managed through the monitoring of water levels at piezometer GW036553. Predicted groundwater levels at monitoring piezometer GW036553 due to the BCPB and ESB pumping for the underground development is illustrated in Figure 4.12.The long-term average daily groundwater extraction rate for the CGO BCPB for the underground development cannot exceed 4.0 ML/day and continued monitoring of groundwater levels will remain an integral part of the groundwater management strategy for the mine.

Water levels at piezometers GW036597 and GW036611 do not govern the operation of the BCPB and ESB.

Trigger piezometer locations are illustrated in Figure 4.13.

Table 4.2 High-extraction pumping areas in the regional area

Area	Pumping Bores	DPIE Trigger Piezometer	
		Registration No.	Trigger Level (m AHD)*
BCPB and ESB	BCPB: Evolution Bores 1 to 4. ESB: Evolution bores SB01 and SB02*	GW036553	137.5 (Investigation) 134.0 (Mitigation)
Billabong	Billabong 4 and Billabong 6	GW036597	143.7
Maslin	Maslin Bore	GW036611	145.8

* ESB pumping bores SB03 to SB05 are currently not used for pumping.

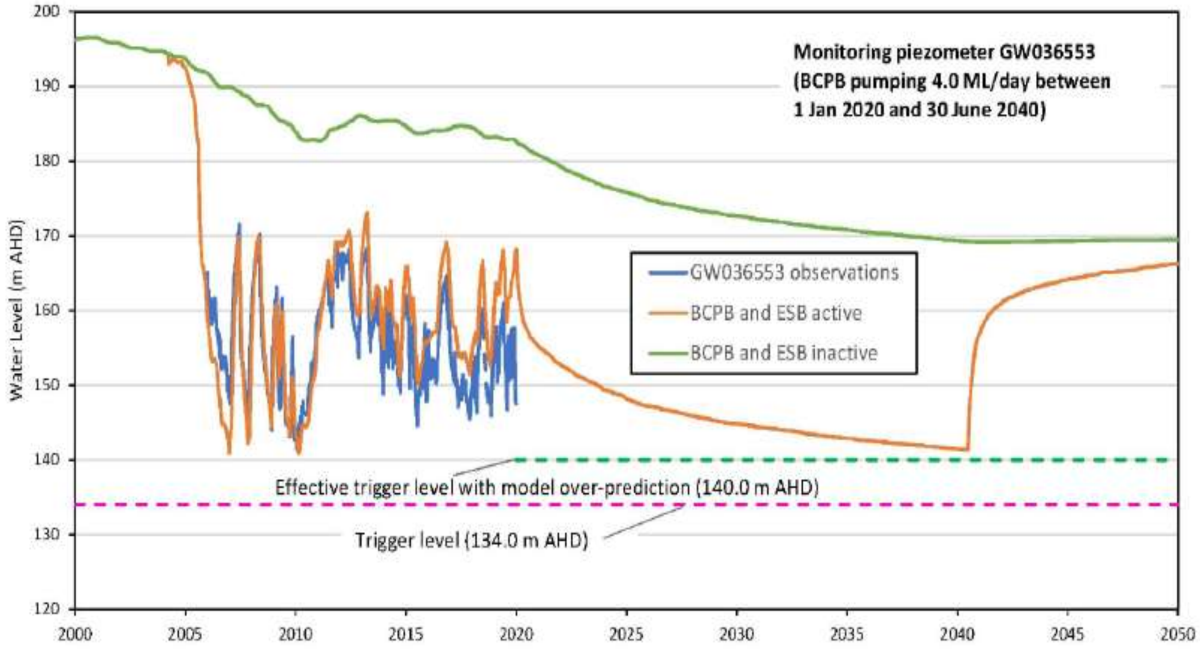

Figure 4.12 Predicted groundwater levels at trigger piezometer GW036553

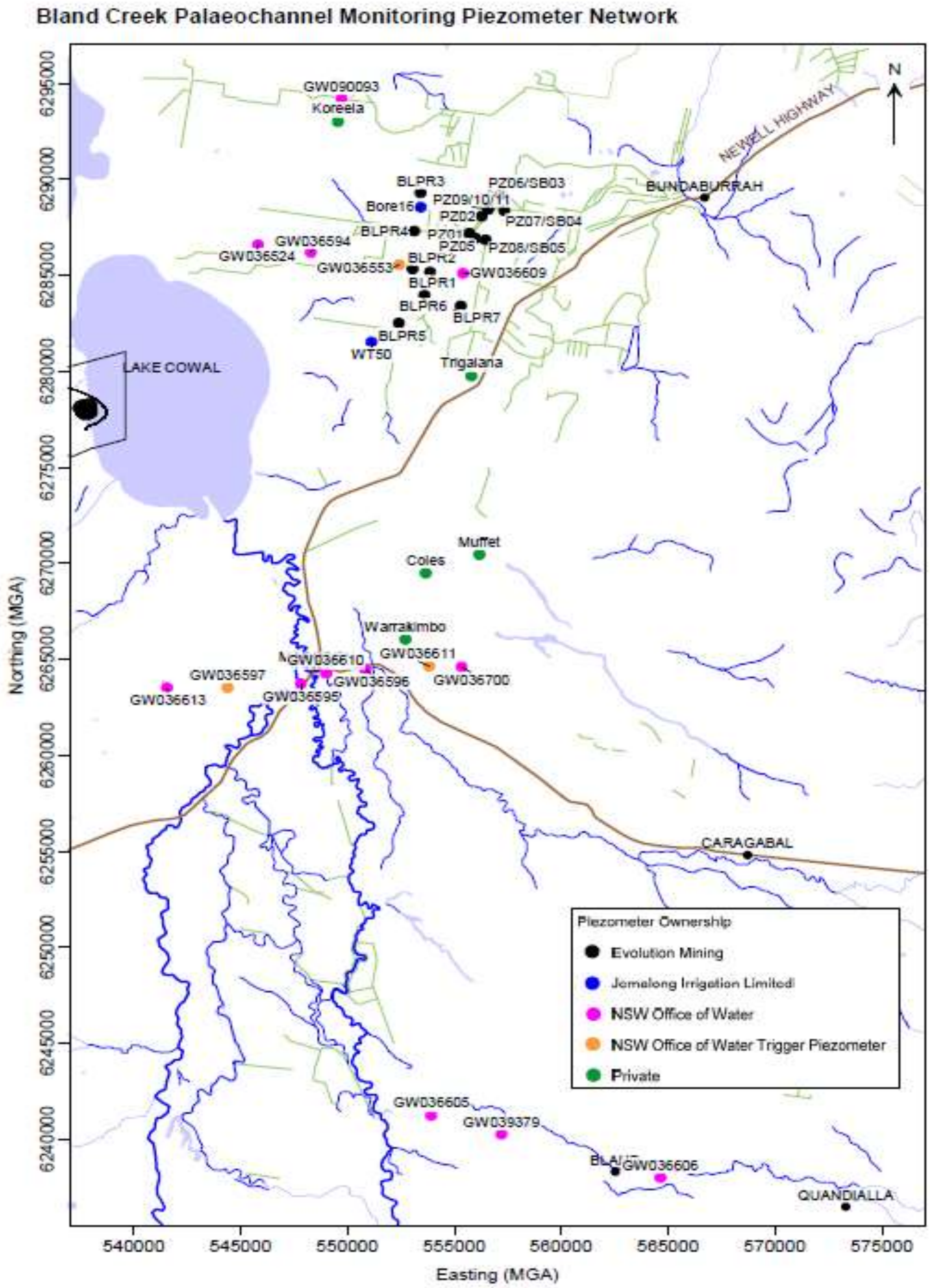

Figure 4.13 Bland Creek Palaeochannel monitoring piezometer network

ii Groundwater level recovery

Coffey (2021b) agrees that the groundwater table is unlikely to return to levels recorded in the late 1990s assuming that extensive pumping for mining, agriculture and other water supplies continues in this area following CGO mine closure.

Groundwater level recovery following CGO mine closure is dependent on the volume historically pumped, private bore usage following mine closure, and climatic conditions.

Management of groundwater extraction in this area needs to consider water use for all groundwater users including both mining and agriculture, as discussed further below.

iii Groundwater users and regulatory recovery

Coffey (2021b) agrees that drought conditions exacerbate conflicting demands for water, particularly between large groundwater users such as mining and large-scale irrigation operations.

Over the period 1 July 2004 to 31 December 2019, the average total pumping rates at the largest groundwater extraction bores were as follows:

- 4.1 ML/day (1496.5 ML/year) at the BCPB supplying CGO; and
- 5.5 ML/day (2007.5 ML/year) at the two largest farming operations (2.8 ML/day at the Billabong bores, and 2.7 ML/day at the Maslin bore).

This pumping resulted in groundwater levels above the trigger levels at each of the NSW government monitoring piezometers. The lowest observed groundwater levels over the period 1 July 2004 to 31 December 2019 were as follows:

- BCPB Area - GW036553: 7.5 m above trigger (141.5 m AHD on 15 January 2010).
- Billabong Area - GW036597: 1.5 m above trigger (145.2 m AHD on 21-23 November 2019).
- Maslin Area - GW036611: 1.6 m above trigger (147.4 m AHD on 16 December 2019).

It is noted that pumping rates for the Billabong and Maslin bores, as used in model verification analysis, involve significant assumptions.

Nine private bores are active during the predictive model simulations. These bores all pump from the Lachlan Formation. Actual past usage is available for four of the bores up to June 2010. Usage is also available for the Billabong bores between 2014 and 2017.

For the purpose of verification of the hydrograph for GW036597, usage for the two Billabong bores was estimated from 2010 to 2013 and 2017 to 2019 using a pump capacity of 5 ML/day, and on/off times interpreted from the GW036597 hydrograph. To match the observed GW036597 hydrograph troughs in March and November 2019, both Billabong bores were estimated to be pumping at 5 ML/day, a total rate of 10 ML/day. Previous modelling assumed a pump capacity of 4 ML/day.

For the purpose of verification of the hydrograph for GW036611, usage for Maslin was estimated using a pump capacity of 12 ML/day, and on/off times interpreted from the GW036611 hydrograph. To match the observed GW036611 hydrograph troughs in November and December 2019, the Maslin bore was estimated to be pumping at 12 ML/day. Previous modelling assumed a pump capacity of 7 ML/day.

No usage information has ever been received for five of the bores. In 2007 the Lachlan Valley Water Group (LVWG) supplied future usage estimates for all nine bores, listed in Table 4.3, for use in predictive simulations.

The combined LVWG estimate for the Billabong bores is 4.62 ML/day, which compares with an estimated average actual pumping (from significant assumptions) of 2.8 ML/day used in the verification modelling. The LVWG estimate for the Maslin bore is 4.52 ML/day, which compares with an estimated average actual pumping (from significant assumptions) of 2.7 ML/day used in the verification modelling. The LVWG estimates were used in the current Underground Development modelling for predictive simulations (applied from 1 January 2020).

Table 4.3 Private bore future average annual pumping rates for modelling

Bore	Estimated future average annual usage as at 2007 (Lachlan Valley Water Group)^ (ML/day)
Billabong 3/6*	2.22
Billabong 4	2.40
Maslin	4.52
Quandialla TWS	0.10
Hart	0.02
Moora Moora	0.13
Muffet	0.02
Trigalana	0.08
Trigalana East	0.13
Total	9.62

* Billabong 3 was replaced by Billabong 6 in 2008.
^ Used for predictive simulations (applied from 1 January 2020).

Modelling of the responses in this area is hampered by the lack of data available regarding historic and planned irrigator pumping. Coffey has recommended that irrigator pumping rates are provided for model verification and that the future usage provided in 2007 be reassessed and updated accordingly in future revisions of the groundwater model.

Regulatory and licensing considerations

The Murray-Darling Basin Authority (MDBA) is the principal government agency in charge of managing the Murray-Darling basin in an integrated and sustainable manner. The cap on water use has been incorporated in both the regional BCPB model report and the mine site report by reporting of the groundwater take and consideration of licensed shares, as described below.

Lachlan unregulated plan

The *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012* (the Lachlan Unregulated Plan) covers 22 unregulated surface water sources that are grouped into one extraction management unit (EMU) and two alluvial groundwater sources.

A summary of the Lachlan Unregulated Plan is provided below:

- the CGO Project is located within the Upper Lachlan Alluvial Zone 7 Management Zone;
- the Upper Lachlan Alluvial groundwater source has a total of 177,277 entitlements (shares) made up of 5,595 licences;

- trade is prohibited between the eight groundwater management zones because the sustainable level of extraction for each zone is unknown;
- the Long-Term Average Annual Extraction Limit (LTAAEL) for the whole Upper Lachlan Alluvial groundwater source is 94,196 ML/year and has been based on previous average usage;
- entitlements are higher than the LTAAEL. Therefore the "growth-in-use" response could be triggered. Available Water Determination (AWD) is measured in ML/unit share, which can decrease to less than 1 ML/unit share if the growth-in-use response is triggered; and
- licence holders can carry over up to 20% of their entitlement from one year to the next.

CGO currently holds 3650 ML/year of shares in the Upper Lachlan Alluvial Zone 7 Management Zone within the Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012. Evolution will continue to extract groundwater from the Upper Lachlan Alluvial Water Source in accordance with existing licence entitlements, and in accordance with the contingency strategy as described in Section 9.2.3 of the BCPB report.

The contingency strategy is to ensure groundwater levels at the BCPB remain above the government piezometer trigger level. A maximum long-term average groundwater extraction rate of 4.0 ML/day at the BCPB and 1.5 ML/day at the ESB has been adopted for the Underground Development (Coffey 2020b), which is an annual groundwater take from the Upper Lachlan Alluvium of 2007.5 ML/year.

Table 4.4 and Table 4.5 provide a breakdown of the components of seepage into the open pit and underground development at selected times for the model cases of a dry Lake Cowal and a full Lake Cowal, respectively. These two cases were modelled by applying fixed head boundary conditions of 201.5 mAHD (dry lake case) or 206.5 mAHD (full lake case) to the surface of the mine site model in the Lake Cowal area. Groundwater inflows during 2037 are representative of the period just prior to the end of underground mining, when groundwater inflows are predicted to be at or close to their highest values.

Table 4.4 and Table 4.5 also show the predicted total groundwater inflow into the mine (open pit, stopes and access tunnels) originating from the Upper Lachlan Alluvium. This includes all groundwater originating from the Transported unit over an area encompassing the open pit and underground development and extending east to beyond the Lake Protection Bund and west to an area just outside the open pit. The predicted total groundwater inflow into the mine originating from the Upper Lachlan Alluvium is approximately 10% of the total inflow into the mine, reducing towards the end of mining when substantially more inflow to the mine originates from the Primary Rock unit at elevations below – 700 m AHD.

The BCPB regional model does not extend to the Lachlan River. The northern boundary of the model is the Corinella Constriction, therefore flow budgets with respect to Lachlan River are not reported in the BCPB report (Coffey 2020b). The northern boundary of the model was chosen at a point where narrowing of the Bland Creek Palaeochannel is interpreted to occur in the Lachlan Formation. Assuming the full volume extracted at the CGO borefields (BCPB and ESB) and seepage to the open pit and underground from the Upper Lachlan Alluvium would otherwise flow north through the Corinella Constriction and not flow south towards drawdown induced by other large groundwater users, the decrease in groundwater discharging to the Lachlan River would be up to around 2050 ML/year, within the licence limit of 3650 ML/year.

Seepage component	Date			
	2019-11-17	2022-11-06	2026-11-18	2037-10-05
Pit walls	584	624	407	300
Pit floor	262	197	215	141
Dewatering bores	124	0	0	0
Total pit	970	821	622	441
Access tunnels	0	115	512	722
Stopes	0	16	476	1555
TSF / IWL foundation	-447	-545	-602	-849
Western model boundary	-9	-10	-13	-100
Eastern model boundary	190	128	96	-198
Lake Cowal	1243	280	53	-104
Total inflow to mine	970	952	1609	2718
Total inflow to mine from Upper Lachlan Alluvial groundwater source	107	101	102	78
Total inflow to mine from Lachlan Fold Belt Murray Darlin Basin groundwater source	863	851	1507	2640
Percentage of total inflow to mine from Upper Lachlan Alluvium	11%	11%	6%	3%

Table 4.4 Components of modelled groundwater seepage (m^3/ day) at selected times - dry Lake Cowal case (a negative number indicates seepage into the model)

Seepage component	Date			
	2019-11-17	2022-11-06	2026-11-18	2037-10-05
Pit walls	584	624	407	300
Pit floor	262	197	215	141
Dewatering bores	124	0	0	0
Total pit	970	821	622	441
Access tunnels	0	115	512	722
Stopes	0	16	476	1555
TSF / IWL foundation	-447	-545	-602	-849
Western model boundary	-9	-10	-13	-100
Eastern model boundary	190	128	96	-198
Lake Cowal	1243	280	53	-104
Total inflow to mine	970	952	1609	2718
Total inflow to mine from Upper Lachlan Alluvial groundwater source	107	101	102	78
Total inflow to mine from Lachlan Fold Belt Murray Darlin Basin groundwater source	863	851	1507	2640
Percentage of total inflow to mine from Upper Lachlan Alluvium	11%	11%	6%	3%

Table 4.5 Components of groundwater seepage (m^3/ day) at selected times - full Lake Cowal case (a negative number indicates seepage into the model)

MDB fractured rock plan

Groundwater seepage to the open pit and underground results primarily in extraction of groundwater from the Lachlan Fold Belt Murray Darling Basin (MDB) groundwater source.

The background document for the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2012* indicates that the LTAAEL for the Lachlan Fold Belt MDB groundwater source is 875,652 ML/year.

In the study area only the Lachlan Fold Belt MDB groundwater source within the WSP for the NSW Murray Darling Basin Fractured Rock Groundwater Sources had unassigned water available as part of the controlled allocation process. The controlled allocation order for 2020 indicated 3,618 shares were available for purchase.

The numerical modelling predicts dewatering rates due to inflow to the open pit, stopes and tunnels, as described in detail in the mine site report (Coffey 2020a). The equivalent average annual groundwater take modelled from 2020 to the end of mine life is approximately 796 ML/year.

Peak predicted flow from 2031 to 2039 is 1,022 ML/year.

The groundwater is predominantly sourced from the rock hydrogeological units. It is assessed that 90% of groundwater inflow originates from the fractured rock aquifer with the remaining 10% from the overlying sediments.

Existing mine groundwater inflows are assessed as 365 ML/year (1 ML/day).

A letter from DPI Water to Barrick (then the owners of CGO) titled “Cowal Gold Mine – Request for reallocation of water access licence under the Water Management Act 2000” dated 7 January 2014, states that the CGO holds licences to access 366-unit share components in the Lachlan Unregulated and Alluvial water sources (Upper Lachlan Alluvial Zone 7 Management Zone) and another 3,294 unit share components in the NSW Murray-Darling Basin Fractured Rock Groundwater Sources.

These include allowance for pumping of 256 ML/year from the saline borefield (Upper Lachlan Alluvial Zone 7) and allowing 10% (37 ML/year) of the pit groundwater inflow rate from the Upper Lachlan Alluvial Zone 7 sediments with the remaining 90% (329 ML/year) from the fractured rock aquifer.

Peak predicted inflow from the fractured rock aquifer for the Underground Development including the open pit is less than the 3,294 unit share components in the Lachlan Fold Belt MDB groundwater source.

4.2 Surface water

Surface water impacts were assessed in the EIS by Hydro-Engineering Consultants Pty Limited (HEC), at Appendix G of the EIS.

DPIE Water/NRAR also commented on surface water matters in its advice. It made the following comments:

- 90^{th} percentile rainfall sequence (Dry) annual demand from the Bland Creek Paleochannel Bores to be approximately 3,700 ML/year (in year 2022). The proponent currently holds a licence with an entitlement of 3,650 ML/year.
- A difference (shortfall) of 109 ML/year between inflow and outflow for the dry rainfall sequence (90^{th} percentile) shown in EIS Appendix G is without any explanation.
- Use the dry rainfall sequence (90^{th} percentile) instead of median sequence for prediction of the Project water requirements throughout the EIS Report and appendices where water requirements are mentioned.

4.2.1 BCPB demand

Figure 10.5 of the EIS, references Figure 19 of the *Cowal Gold Operation Underground Mine Project Hydrological Assessment* (HEC 2020) which is included as Appendix G of the EIS. However, Figure 10.5 of the EIS was copied from a draft version of the *Cowal Gold Operation Underground Mine Project Hydrological Assessment* (HEC 2020) and is inconsistent with Figure 19 of the final version of *Cowal Gold Operation Underground Mine Project Hydrological Assessment* (HEC 2020).

Figure 19 of Appendix G of the EIS (reproduced as Figure 4.14 below) presents the water balance simulated 10th percentile, median and 90th percentile annual water demand/usage from the Bland Creek Paleochannel Borefield.

The 90th percentile annual volume is the demand/usage that was predicted not to be exceeded in 90% of the simulated 131 climatic sequences and the 10th percentile annual volume is the demand/usage that was predicted not to be exceeded in 10% of the simulated 131 climatic sequences.

The percentile plots indicate predicted annual volume ranges between the 10th and 90th percentile risk or confidence limits/levels within which the predicted annual volumes could vary.

The 90th percentile annual demand does not represent the annual demand/usage for the 90th percentile rainfall sequence, rather the 90th percentile annual demand/usage based on all 131 climatic sequences (model realisations) simulated. This is stated in Section 6.2.2 of Appendix G of the EIS.

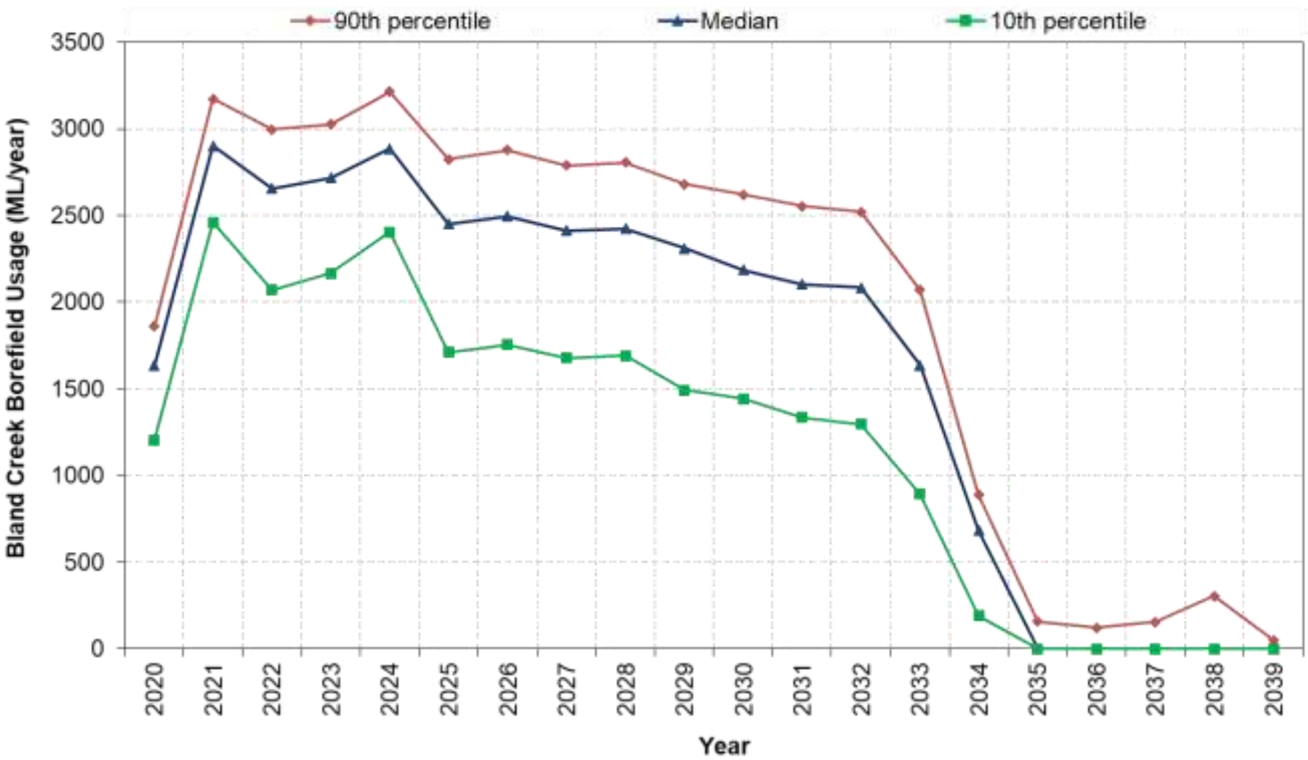

Figure 4.14 Predicted Annual Bland Creek Palaeochannel Borefield usage

Figure 4.14 illustrates that the annual demand from the Bland Creek Paleochannel Borefield is predicted to peak at 3,215 ML in 2024 based on the 90th percentile model results (calculated from all 131 simulated climatic sequences) and at 2,901 ML/year in 2024 based on the median model results (calculated from all 131 simulated climatic sequences). These annual volumes are therefore well within the 3,650 ML/year entitlement held by the proponent, and no additional entitlement is required for the Project.

The results presented in the plots included in Section 6.2 of Appendix G of the EIS are not to be confused with the water balance model results (averaged over the remaining mine life) presented in Table 17 of Appendix G. The results presented in Table 17 of Appendix G of the EIS are from the model realisation representing the 10th percentile rainfall sequence (representative of low 19-year rainfall conditions – totalled over the full model simulation period of 7,061 days), median rainfall sequence (representative of median 19-year rainfall conditions – totalled over the full model simulation period of 7,061 days) and the 90th percentile rainfall sequence (representative of high 19-year rainfall conditions – totalled over the full model simulation period of 7,061 days).

Table 17 of the surface water assessment presents the water balance model results averaged over the proposed remaining mine life based on 19-year low, median and high rainfall conditions while the plots in Section 6.2.2 of Appendix G of the EIS present the 10th percentile, median and 90th percentile statistical model results calculated from all 131 climatic sequences simulated and are therefore a more conservative estimate of demand/usage in each year.

The water balance model has been developed such that the maximum annual simulated supply from the Bland Creek Paleochannel Borefield cannot exceed 3,650 ML ie, an annual supply from the BCPB of 3,700 ML cannot be simulated by the model.

4.2.2 Water balance

Table 17 of Appendix G of the EIS presents a simulated total inflow of 7,399 ML/year and total outflow of 7,290 ML/year, averaged over the remaining mine life, for the 10th percentile rainfall sequence (representative of low 19-year rainfall conditions – totalled over the full model simulation period of 7,061 days). This equates to an increase in simulated total site stored water volume of approximately 2,107 ML over the full simulation period or 109 ML/year on average. Note that as the 2,107 ML volume has been calculated from an average annual volume assuming 365.25 days per year on average, the actual simulated volume over the full simulation period may be slightly higher or lower than 2,107 ML.

For the model realisation which equates to the 10th percentile rainfall sequence (representative of low 19-year rainfall conditions – totalled over the full model simulation period of 7,061 days), the initial total site stored water volume was set at 961 ML on 30 April 2020 (commencement of model simulation) based on data supplied by Evolution (refer first paragraph of Section 6.2 of Appendix G of the EIS). The simulated total site stored water volume on the last date of the model simulation (30 August 2039) was 3,200 ML equating to a simulated increase in total site stored water volume of 2,239 ML (approximately equal to the estimated 2,107 ML volume calculated based on an average increase of 109 ML/year).

The increase in simulated total site stored water volume over the model simulation period is due to 'rules' that are simulated in the model for each site water storage regarding storage operating volumes, particularly for storage D9 / D10. For storage D9 / D10, the model rules specify that water is to be supplied to storage D9/D10 to retain the stored water volume at 97.5% of the storage capacity in order to ensure supply reliability.

Note that the model was simulated for two scenarios, with storage D10 simulated as operational from January 2024 providing an increase in capacity of 1,500 ML without simulation of storage D10.

Without simulation of D10, the predicted total inflows average 7,232 ML/year while total outflows average 7,209 ML/year, for the median rainfall sequence (refer Section 6.2.1 of Appendix G of the EIS). The reduction in total inflow is largely due to a reduction in external water supply requirements necessary to maintain a high-water storage volume in D10. The reduction in total outflow is largely due to a reduction in water surface evaporation associated with water storage D10. This equates to a simulated increase in total site water storage of 23 ML/year (approximately 445 ML over the full model simulation period).

It should further be noted that the estimated increase in total site stored water volume is based on the rules that are simulated in the model. In actuality, the management of total site water storage will vary on day-to-day and year-to-year basis, particularly towards the end of the mine life when the stored water volume may be drawn down.

4.2.3 Surface water model simulations

As stated above, Appendix G of the EIS presents model results for water requirements as either:

- simulated average annual volume over the remaining mine life based on 19-year low (10th percentile), median and high (90th percentile) rainfall conditions; or

- the 10th percentile, median and 90th percentile model results calculated from all 131 simulated climatic sequences.

For all model results, the simulated volumes predicted based on both of these two approaches are presented in Appendix G of the EIS.

4.3 Biodiversity

The BCD noted that the Project will be unlikely to result in direct impacts on biodiversity. It commented that if chimneying was to occur between the underground mine and the surface while Lake Cowal was holding water, that this would result in significant impacts to wetland habitats.

Evolution recognises that it is developing its underground mine near to and beneath Lake Cowal, which is a nationally important wetland, and home to a range of migratory bird species. It is therefore committed to protecting the Lake, as it has shown it has been able to do since the mine was first developed.

As clearly stated in the EIS, there is a risk of chimneying in all underground stoping operations. For this reason, Evolution has made significant commitments in the EIS in relation to the design of the underground mine and will put in place a range of mitigation measures to limit the risk of this impact occurring.

The principal mitigation measure is to develop the stopes in the deeper fresh rock layers and avoid mining in shallower softer oxide layers and lake bed sediments.

The underground mine layout includes careful stope sequencing to minimise the risk of stope failure, in order to retain the integrity of the shallower fresh rock layers. The Project will also involve the rapid backfilling of stopes with a paste material made from waste rock and tailings. Evolution will ensure the pastefill plant and paste lines are operational before it fires stopes that are in the proximity to major faults or have the potential for instability. Further structural mapping of the mining area will continue to be undertaken to determine the appropriate dimensions of the stopes to limit chimneying risks.

During the development due diligence stage, Evolution removed 19 stopes from the upper layer of the mine plan which were seen to have an elevated risk of chimneying in the absence of other mitigation measures.

The BDAR reported that the hydrogeological assessment has shown that Lake Cowal is isolated from underlying aquifers. The deep (10.6 to 20.5 metres thick), very low permeability lake-bed sediments act as an impeding layer (aquitard) to vertical leakage from the lake.

This is known because the open cut pit, which lies on the edge of the lake separated by two bunds, has received a minor, stable and consist flow of groundwater from August 2005 through to the current day, despite Lake Cowal becoming inundated in 2010 and 2016. If there was a hydraulic connection between the lake and underlying aquifers, the mine would have seen steep rises in groundwater inflows during these inundation events.

Studies and monitoring have also shown that the groundwater in areas around the open cut pit have generally been dewatered. Recent monitoring results from the exploration decline beneath Lake Cowal show that groundwater pressures within 10 m from the exploration decline are generally dry or in an unsaturated condition. Coffey has been studying the hydrogeological conditions around CGO since 1995, concluded that '*Groundwater impacts to Lake Cowal are predicted to be negligible*' Coffey (2020a).

Given the operational knowledge and data from CGO regarding groundwater, and data from the exploration decline there is a high degree of certainty over these conclusions. Future work should focus on continuing with existing groundwater monitoring and expanding this to include recently installed bores for the underground mine, to continue to validate the predictions.

There will also be comprehensive monitoring program that will be undertaken as mining progresses. The mine will install monitoring equipment to see if there is any cracking in the layers above the mine. This serves two purposes: first it ensures the ongoing safety of the underground mine workforce, and second it protects the Lake.

Fisheries NSW made comments about indirect impacts to key fish habitat, and asked to be consulted on measures to limit impacts to fish species.

Lake Cowal is not listed as key fish habitat under the NSW *Fisheries Act 1994.* The Project is not anticipated to result in any change to the current wetting and drying processes at the Lake or affect any watercourses that may assist flows into and out of the Lake. Therefore, it is unlikely that the Project would have any effect on fish species or their abundance.

Nonetheless, Evolution will consult with DPI Fisheries to seek its advice if in the unlikely event that the Project has an impact on fish species.

4.4 Traffic

4.4.1 Road upgrades

Comments were raised in submissions from TfNSW and FSC regarding traffic matters, and in particular the proposed route that will be used for mine-related traffic from Forbes to the mine.

To address these comments, EMM has completed an additional intersection performance assessment of the Newell Highway and West Plains Road.

i TfNSW comments

TfNSW made a number of specific comments relative to the Newell Highway West Plains Road intersection:

- The TIA indicates that the additional peak hourly traffic movements as a result of both the underground development and Mod 16 to the existing operation are predicted to be mostly to and from West Wyalong therefore this report restricts its assessment to the route from West Wyalong. Notwithstanding this, the TIA acknowledges that the other preferred routes will experience increases in traffic volumes but claims that the increased traffic volumes can be accommodated by the current Local and State road network and no road upgrades are required.

- The preferred route from Forbes includes the intersection of West Plains Road with the Newell Highway. This intersection is located on the Newell Highway, which is a road train route, within a 110 km/h speed zone. The submitted report does not address the current standard of this intersection.

- The intersection of the Newell Highway with West Plains Road shall be constructed as a BAR and BAL intersection treatment within the Newell Highway. The design and construction of the intersection treatment shall be in accordance with the Austroads Guide to Road Design (Austroads 2017) as amended by the supplements adopted by TfNSW for the posted speed limit and be designed for a road train route. The pavement standards are to be in accordance with the requirements of TfNSW for the proposed turning traffic.

- An audit of the existing intersection treatment as constructed is to be undertaken by an appropriately qualified person to assess the compliance of the existing intersection with the required treatment and the integrity of the existing pavement to cater to the expected turning traffic volumes and the through traffic along the Newell Highway. Should the intersection not comply with these requirements the intersection and pavement treatment are to be designed and constructed to comply with the adopted standards.

- Should the audit ascertain that works are required to be undertaken then the following additional requirements will apply.

- The Newell Highway is part of the State Road network. For works on the State Road network the developer is required to enter into a Works Authorisation Deed with TfNSW before finalising the design or undertaking any construction work within or connecting to the road reserve.

- Any works associated with the development shall be at no cost to TfNSW.

ii Forbes Shire Council comments

FSC also raised the following traffic related comments:

- Prior to the commencement of any onsite construction work the intersection of the Newell Highway and West Plains Road are to be upgraded to provide a BAR treatment and BAL treatment to the satisfaction of TfNSW and FSC and in accordance with Austroads Guide to Road Design (Austroads 2017).

- A Section 138 Approval (NSW *Roads Act 1993*) from Council with TfNSW's concurrence is required for this work and an application must be received prior to the commencement of works accompanied by detailed engineering design.

- Prior to the commencement of any onsite construction work upgrade the entire length of both West Plains Road and Bogies Island Road to a bitumen sealed two-way, two-lane road to the satisfaction of Council and in accordance with Austroads Guide Road Design (Austroads 2017).

- A Section 138 Approval (NSW *Roads Act 1993*) from Council is required for this work accompanied by detailed engineering design. The application shall be received and approved prior to the commencement of works commencing on the road or within the road reserve.

4.4.2 Route from Forbes to CGO

The proposed traffic route from Forbes to the mine is shown in Figure 4.15. As shown in the figure, light vehicles and worker buses would travel from Forbes to the mine via Newell Highway, West Plains Road and Bogies Island Road. Heavy vehicles, including construction material deliveries would travel to and from Forbes to the mine via Newell Highway and Lake Cowal Road.

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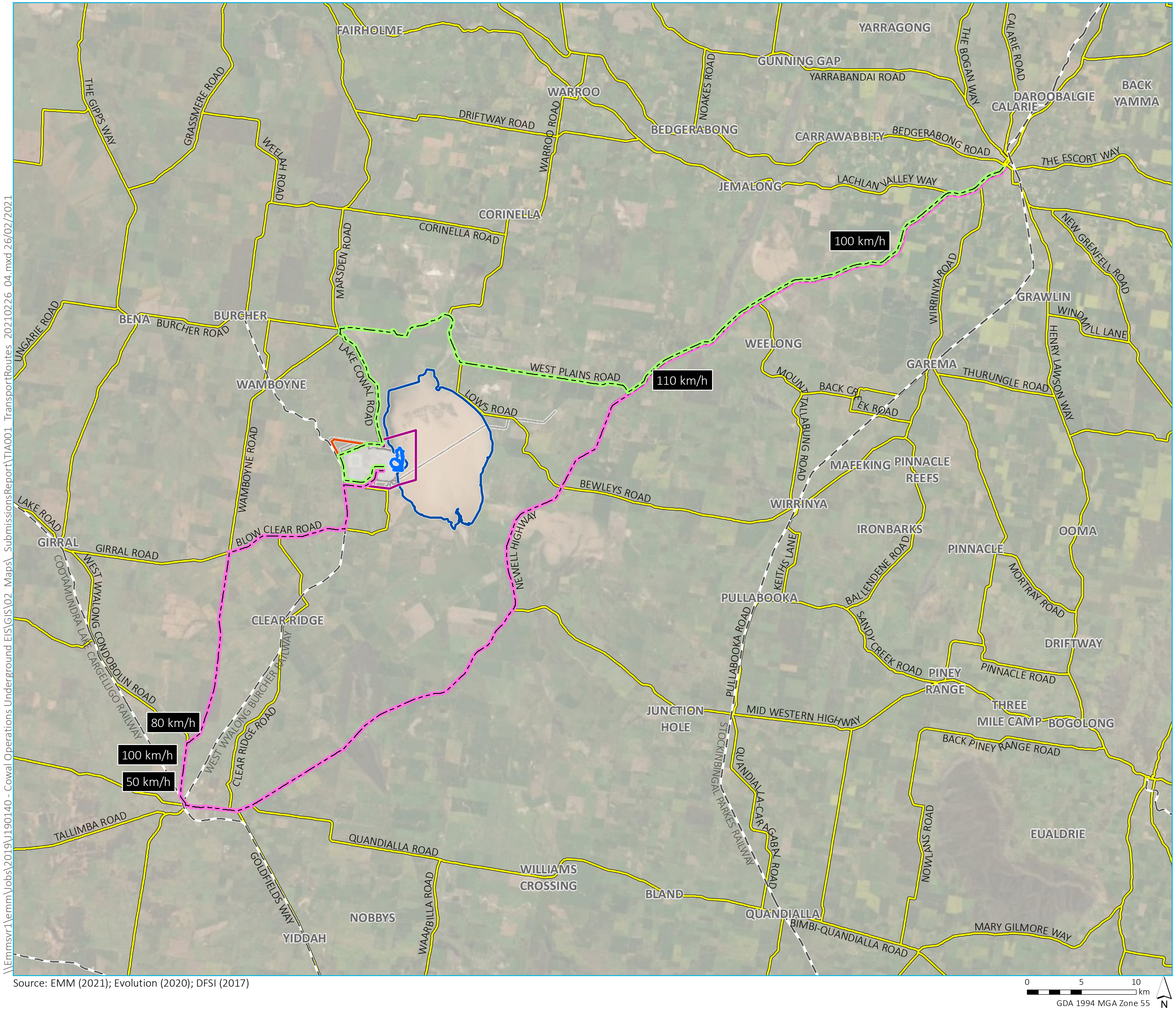


Source: EMM (2021); Evolution (2020); DFSI (2017)

KEY

- Proposed underground development
- Mining lease (ML1535)
- Mining lease (ML1791)
- DA14/98 approved surface disturbance
- Rail line
- Main road
- Extent of Lake Cowal

Transport routes

- Heavy vehicle
- Light vehicle and worker bus

Route from Forbes to CGO

Evolution Mining
Cowal Gold Operations
Underground development/MOD 16
Submissions report
Figure 4.15

EMM
creating opportunities

4.4.3 Warrants for BA, AU and CH Turn Movements

i Existing traffic volume

EMM has undertaken an audit of the Newell Highway/West Plains Road intersection. The audit included a survey of the Newell Highway/West Plains Road intersection on 16 and 17 December 2020.

Traffic counts were undertaken between the periods 4.30 pm to 6.30 pm on 16 December and 5.00 am to 7.00 am on 17 December 2020. These time periods were selected as they are the busiest periods due to the mine related traffic movements at this intersection, in addition to general traffic. Based on the count data, the AM and PM peak hours are determined as follows:

- 6.00 am to 7.00 am; and
- 4.45 pm to 5.45 pm.

The surveyed traffic volumes for these two peak hours are presented in Figure 4.16. The traffic count location is shown in Figure 4.17.

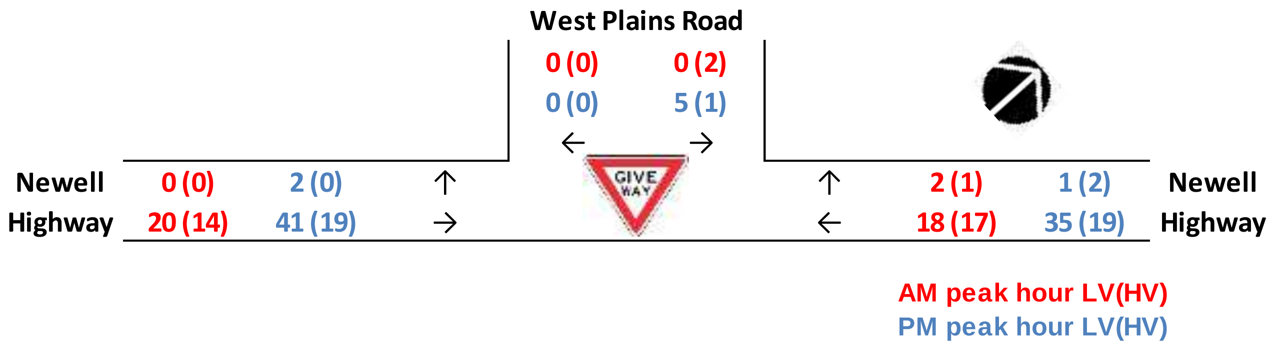
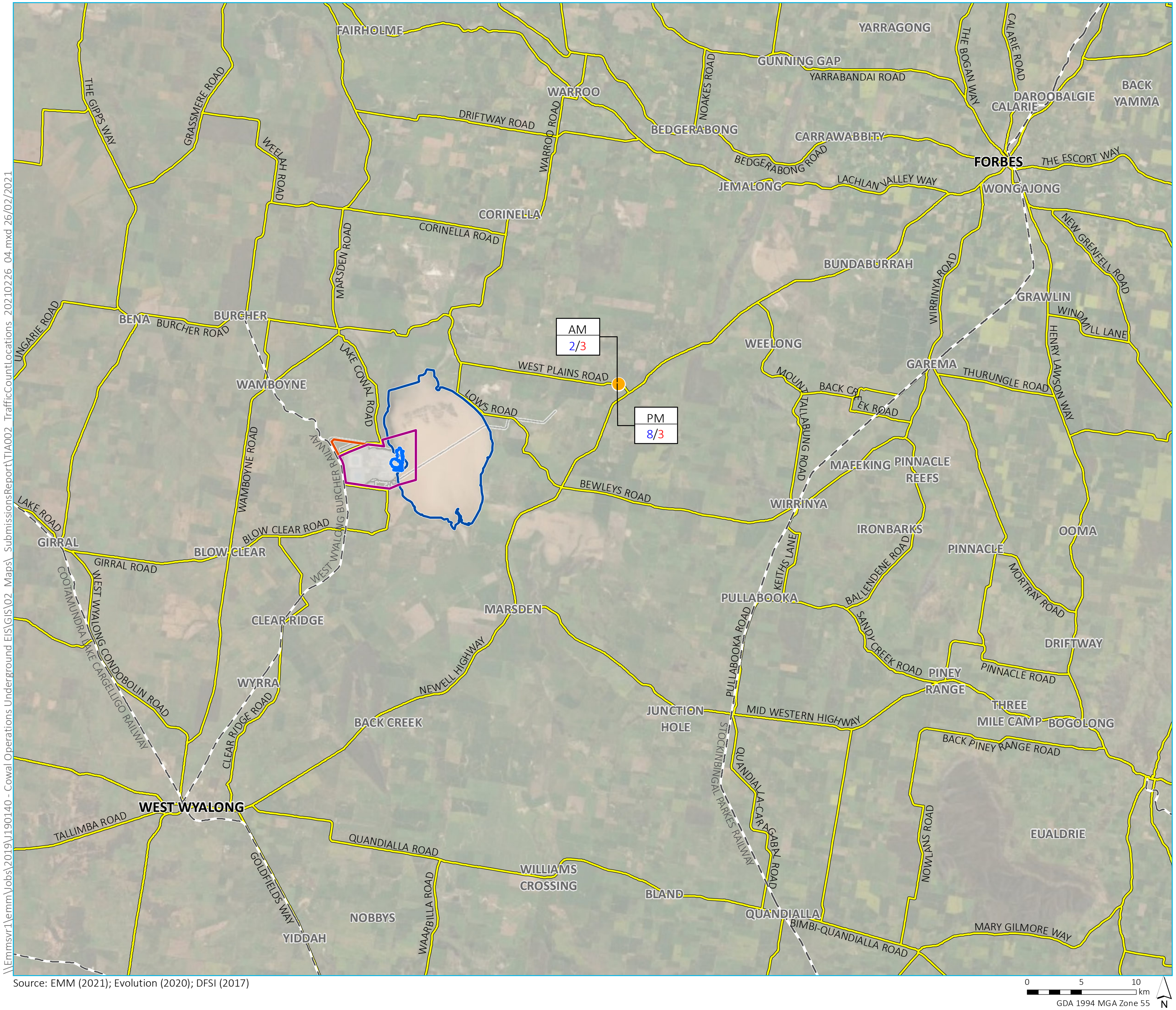


Figure 4.16 Surveyed peak hourly traffic volumes

Figure 4.16 shows that during the surveyed AM peak a total 3 vehicles arrived from the direction of Forbes and during the PM peak 6 vehicles exited to that direction. There were no mine related vehicles from the direction of West Wyalong during these times. Turning volumes to/from the north which were most likely to be mine related and represents around 7% of the total traffic counted during both the peak hours.



Traffic count location

Evolution Mining
Cowal Gold Operations
Underground development/MOD 16
Submissions report
Figure 4.17

EMM
creating opportunities

ii Project traffic volumes

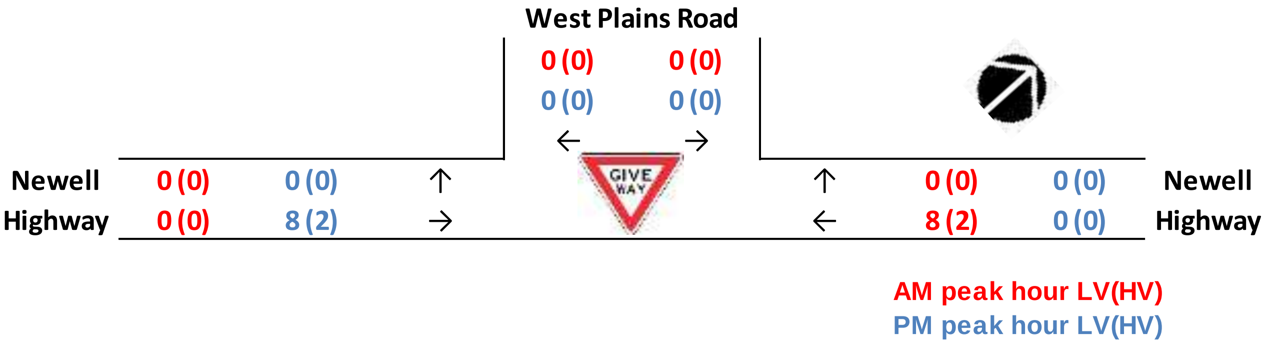


Figure 4.18 Additional peak hourly traffic volumes during construction

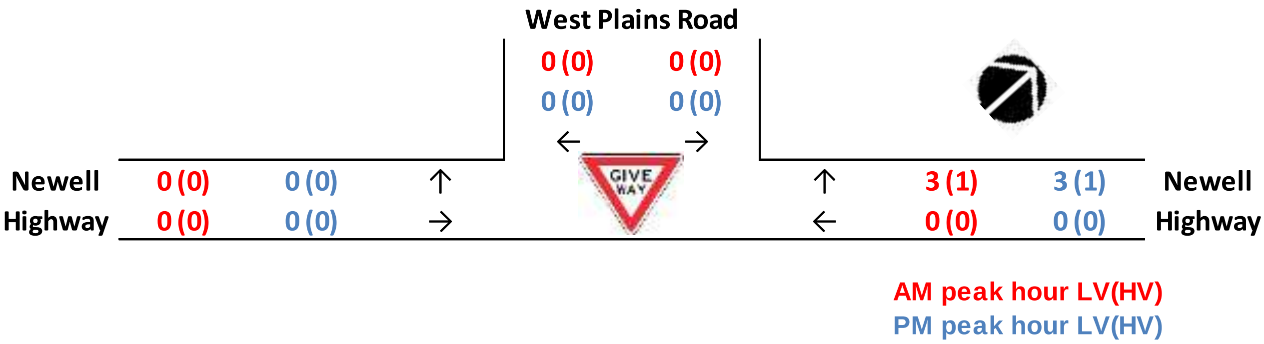


Figure 4.19 Additional peak hourly traffic volumes during operation

During operations, the mine will continue to operate 12-hour shifts, starting at 6.00am and 6.00pm. Due to the travel distance between the mine and Forbes, inbound (ie from Forbes to the mine) and outbound (ie from the mine to Forbes) traffic movements stretch over more than one distinct peak hour at the beginning and end of each shift. As such the TIA (EMM 2020c) undertook two separate traffic analyses – one for each peak hour. For the turn volume warrant assessment, out of the two separate peak periods (refer Table 3.2 of the TIA, EMM 2020c), the highest right turn volume from Newell Highway to West Plains Road has been used.

The development traffic volumes are calculated by combining the surveyed traffic volumes and the additional traffic volumes, as presented in Figure 4.20 and Figure 4.21 for the construction and operational stages, respectively.

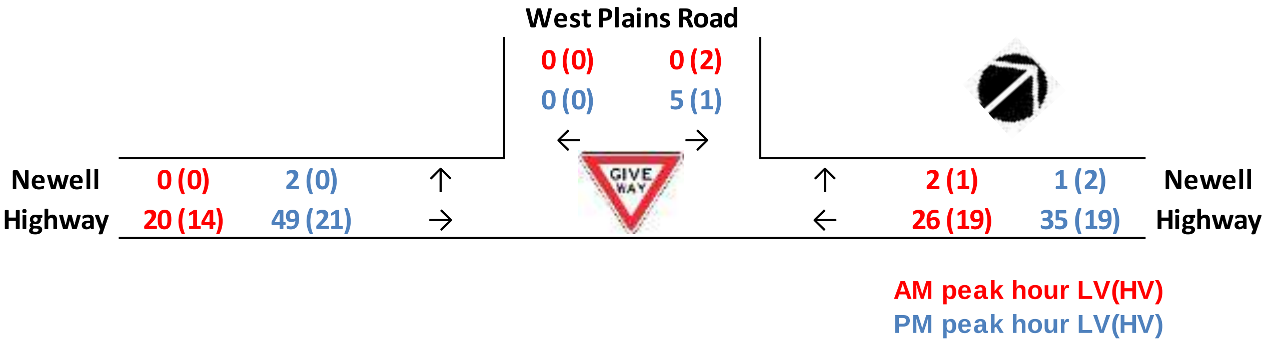


Figure 4.20 Development peak hourly traffic volumes during construction

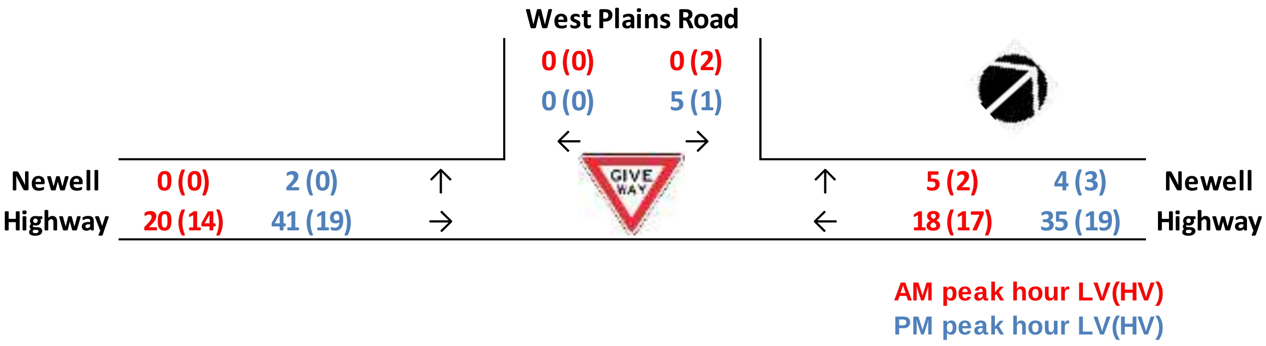


Figure 4.21 Development peak hourly traffic volumes during operation

iii Turn treatment warrant

Intersection operations are assessed by combining the peak hourly through and turning traffic movements that occur at each intersection. This determines the need for additional intersection turning lanes (e.g basic, auxiliary lane and channelised) in accordance with *Guide to Road Design* (Austroads 2017) where (refer Figure 4.22):

- Curve 1 (red line) represents the boundary between a basic right turn (BAR) and a channelised short right turn (CHR(S)) turn treatment and between a basic left turn (BAL) and an auxiliary short left turn (AUL(S)) turn treatment; and

- Curve 2 (blue line) represents the boundary between a CHR(S)and a full length channelised right turn (CHR) treatment and between an AUL(S) and a full length auxiliary left turn (AUL) or channelised left turn (CHL) treatment. The choice of CHL over an AUL will depend on factors such as the need to change the give way rule in favour of other manoeuvres at the intersection and the need to define more appropriately the driving path by reducing the area of bitumen surfacing.

If a particular turn from a major road is associated with some geometric minima (e.g limited sight distance, steep grade), consideration should be given to the adoption of a turn treatment of a higher order than that indicated by the warrants.

For example, if the warrants indicate that a BAR turn treatment is acceptable for the relevant traffic volumes, but there is limited visibility to the right-turning vehicle is available, consideration should be given to the adoption of a CHR(S) or CHR turn treatment instead.

Another example is a major road on a short steep downgrade where numerous heavy vehicles travel quickly down the grade, in which case it would not be appropriate to adopt a BAL turn treatment. Instead, an AUL(S) or an AUL would be a preferred treatment. The subject intersection is located at a straight section of Newell Highway with long distance visibility (see Section 4.4.5) and no crest or gradient. Therefore, in this circumstance traffic volume would determine the treatment type, as there are no other geometric constraints at this intersection.

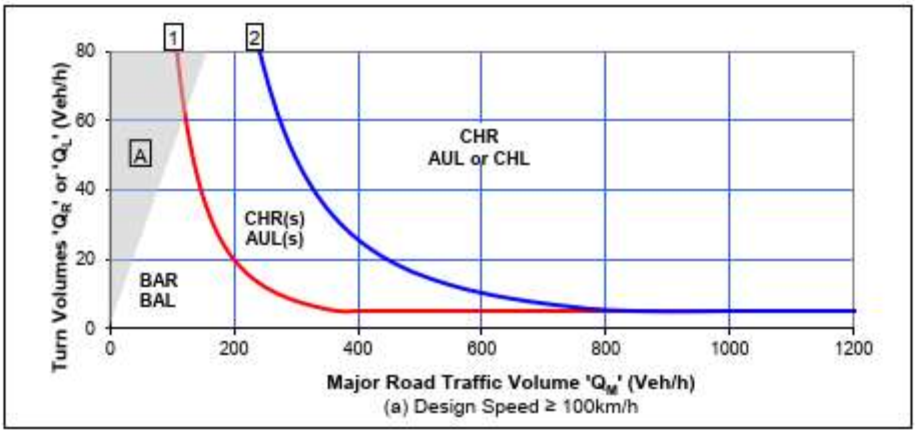


Figure 4.22 Austroads warrant design charts for rural intersection turning lanes

There are separate design charts for roads with different design speeds. TfNSW recommends intersections should be designed for a travel speed 10 km/h greater than the posted speed limit. As Newell Highway has a posted speed limits of 110 km/h, its intersection with West Plains Road should be designed for 120 km/h.

For a design speed of 100 km/h or greater, the requirements for additional left or right turn traffic lanes are measured from Chart (a) (refer Figure 4.22).

Table 4.6 Turning treatment warrant

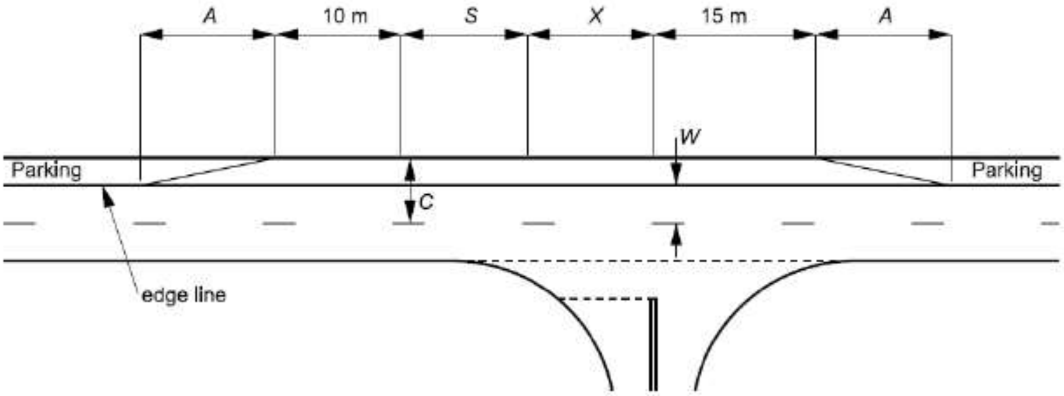
Scenario	Turning movement	Major road traffic volume	Turning volume	Warrant
Existing	Left turn	34 (AM)/60 (PM)	0 (AM)/2 (PM)	BAL
	Right turn	69 (AM)/116 (PM)	3 (AM)/3 (PM)	BAR
Development (construction)	Left turn	34 (AM)/70 (PM)	0 (AM)/2 (PM)	BAL
	Right turn	79 (AM)/126 (PM)	3 (AM)/3 (PM)	BAR
Development (operation)	Left turn	34 (AM)/60 (PM)	0 (AM)/2 (PM)	BAL
	Right turn	69 (AM)/116 (PM)	7 (AM)/7 (PM)	BAR

Based on the traffic data, the intersection would require both BAL and BAR turns to be developed.

4.4.4 Current intersection condition

The subject intersection currently has a BAR which is approximately 115 m long (refer attached Photographs in Appendix D). There is no existing BAL treatment.

Using the appropriate formula in the following figure reproduced from the Austroads standard[1], the BAR should be approximately 157.5 m (where A=55m, S=12.5m, X=10m). This equates to a current shortage (against the standard) of approximately 43 m.



Notes: This diagram does not show any specific bicycle facilities. Where required bicycle facilities should be provided in accordance with this Part.

The dimensions of the treatment are defined thus:

W = *Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.*

C = *On straights* – *6.0 m minimum*
– *6.5 m minimum for 19 m semi-trailers and B-doubles*
– *7.0 m minimum for Type 1 and Type 2 road trains*
On curves – *widths as above + curve widening (based on widening for the design turning vehicle plus* – *widening for the design through vehicle).*

$$A = \frac{0.5V(C-W)}{3.6}$$

Increase length A on tighter curves (e.g. where side friction demand is greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer, the minimum speed used to calculate A is 80 km/h.

V = *Design speed of major road approach (km/h).*

S = *Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).*

X = *Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).*

The existing road width is considered adequate. However, the pavement condition of the existing passing lane could be improved to match the existing pavement condition. In addition, the taper on both ends of the passing lane should be a minimum of 55 m (A in the above formula) and the current taper lengths are inadequate (ie they do not meet the minimum Austroads requirement). As the location of the intersection is at a straight section of Newell Highway, the sight distance on both sides of Newell Highway are considered adequate. Further discussion on sight distance and crash history at this intersection are set out below.

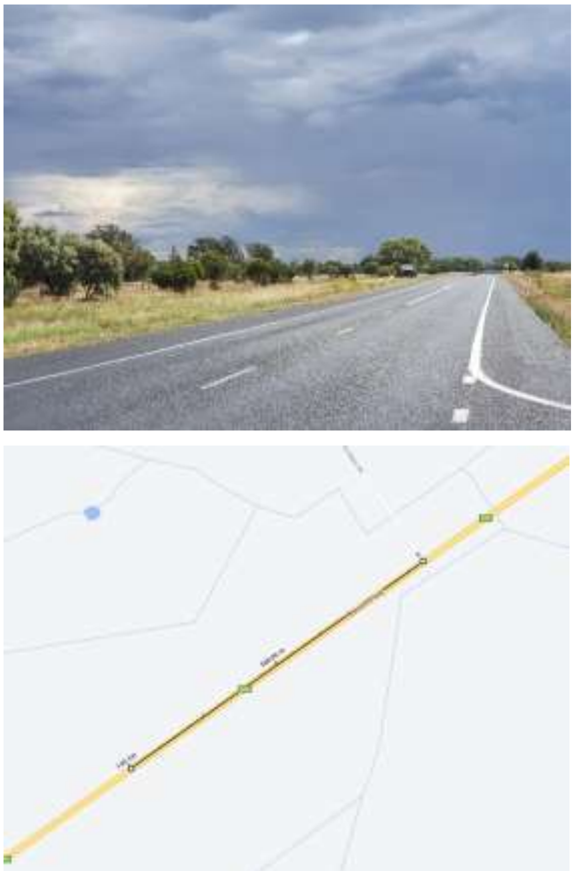
[1] Figure 7.6 - *Guide to Road Design Part 4A Unsignalised and Signalised Intersections* (Austroads 2010)

4.4.5 Sight distances

The Newell Highway at West Plains Road is a straight section, hence there are no sight distance issues for turning vehicles to and from West Plains Road. In accordance with Austroads Guide to Road Design (Austroads 2017), for a road with a design speed of 120 km/h (design speed is generally 10 km/h higher than the speed limit), the minimum safe intersection sight distance (SISD) required for a minimum 2 second driver reaction time is 324 m.

The sight distances on Newell Highway at West Plains Road have been estimated based on the line of sight and observation, as shown in Plate 4.1. Based on the sight distance analysis, the sight distances to the left and right are well in excess of the minimum requirement (324 m) as stipulated in the Austroads Guide to Road Design (Austroads 2017).

Sight distance to the left (1,010 m)



Sight distance to the right (1,000 m)

Plate 4.1 Sight distance from West Plains Road on Newell Highway

4.4.6 Crash data

Crash data from the TfNSW Centre for Road Safety interactive history database for the period - between 2015 and 2019 has been studied in the vicinity of the site and is presented in Figure 4.23.

There are no recorded crashes within 500 m of the Newell Highway/West Plains Road intersection. The nearest recorded crash is 1.3 km to the southwest and the second nearest is 2.8 km to the northeast.

Figure 4.23 Crash data between 2015 and 2019

4.5 Intersection upgrade contribution

Evolution acknowledges that the existing BAR at the Newell Highway/West Plains Road intersection is inadequate when measured against the current Austroads standard. Evolution is committed to ensuring the safety of the local community and its workers, which includes journey to/from work safety.

Evolution's contribution to traffic flows at this intersection in the context of total traffic, as recorded by the audit, is very minor and on its own would not warrant the mine contributing the full cost of intersection upgrade works Further, Evolution considers it should not bear the cost for the BAL treatment at the intersection, given that there is no mine related traffic coming from West Wyalong that would turn left at this intersection.

Notwithstanding the minor contribution to total traffic volumes, and given that mine related construction and operational traffic will continue to use this intersection to/from Forbes, and to effectively manage safety risks for the local community and mine-related traffic turning right from the Newell Highway into West Plains Road at the intersection, Evolution is prepared to enter into discussion with TfNSW in relation to an appropriately weighted contribution to assist TfNSW to upgrade the intersection so that it meets the Austroads standard and has written to TfNSW to request a meeting to discuss the matter further. Any contribution made by the mine would be based on the percentage of mine related traffic against total volumes of traffic passing this intersection.

As stated earlier, currently there is approximately 7% of mine related traffic utilising this intersection, compared to total traffic passing this intersection. This proportion will increase to about 12% of the total traffic volume during construction and operation of the proposal, which by its nature would not warrant Evolution funding all works to upgrade the intersection.

Any contribution to the intersection upgrade, as well as the timing of payment, could be formalised under conditions of consent for the Project.

4.6 Upgrade of West Plains Road and Bogies Island Road

As there will be no construction material delivery heavy vehicles using West Plains Road and Bogies Island Road, it is unlikely that the estimated mine-related traffic on these roads would cause substantial road damage that would warrant Evolution fully upgrading the roads as recommended by FSC.

It should be noted that there will be 5 mine related heavy vehicles, however, these are all 24-seater mini buses which transport mine workers, and which result in reduced overall traffic volumes on the public road network.

Further, It is understood that FSC has sought State Government funding to upgrade a 4 km section of West Plains Road. Based on the rationale described above, it is not considered reasonable that Evolution funds the road upgrades as proposed by FSC. Evolution already has an agreement in place with FSC for road maintenance contributions. Evolution will continue to honour this agreement for the life of the mine.

4.6.1 Road maintenance

LSC commented about road maintenance funding, stating that as the Project will result in additional construction and operational traffic, existing monitoring of impacts on local roads and maintenance undertakings associated with the current operations should continue as part of the approved Transport Management Plan (TMP).

Notwithstanding, the monitoring of road quality and subsequent maintenance works of the existing transport routes will continue to be completed and managed under the existing TMP. This includes dilapidation surveys and road repairs. The TMP will be updated to consider additional Project-related traffic.

The Project will result in a temporary increase in traffic movements, particularly during the construction phase of the Project and Mod 16. However, the increase is unlikely to be significant in the context of current traffic volumes in the local and regional areas.

Evolution will continue to limit its impacts on local roads by operating its worker shuttle bus service from the mine to West Wyalong, Forbes and Condobolin. There will be a small increase in the number of shuttle buses required to transport workers to and from CGO. This further limits the number of mine-related vehicles on regional roads and addresses issues of worker fatigue. Overall, the impacts on roads in Lachlan Shire are not expected to materially increase as a result of the Project or Mod 16.

Notwithstanding, Evolution notes LSC's comment about continuing the current undertakings associated with the existing operations. Evolution has a long-standing road maintenance funding mechanism for each of the three local government areas that CGO operates within. This funding will continue to be honoured for the life of the Project.

Monitoring of road conditions will continue in accordance with the approved TMP for the site and assessments are undertaken as to whether maintenance works are required.

Evolution will revise its existing monitoring programs in the TMP to take into account any increase of mine-related vehicles on local roads as a result of the Project.

Evolution will also continue to operate the CEMCC for the mine, which involves all three local government authorities. The CEMCC will continue to meet regularly (ie every 2 months) to discuss the operations of the mine and any areas of concern for the community. This includes issues relating to traffic and transportation operations.

4.7 Land tenure

4.7.1 Crown Land

Crown Lands commented on landowner consent, land access agreements and compensation agreements, including the following comments:

- Considering significant modifications to DA 14/98 are proposed, it is recommended that an application for landowners consent is made for any works proposed on Crown Land.
- All Crown Land and Crown Road within the mining lease must be subject to a Section 81 Consent under the NSW *Mining Act 1992* where surface activities are proposed and to be agreed and executed prior to surface activity taking place.
- All Crown land and Crown roads within the Exploration Licence, subject to exploration activity, must be subject to an access arrangement under Section 141 of the NSW *Mining Act 1992* and to be agreed and executed prior to any exploration activity taking place.
- All Crown Land and Crown Road within the mining lease must be subject to a compensation agreement under Section 265 of the NSW *Mining Act 1992* and to be agreed and executed prior to mining activity taking place.

As the Project is "public notification development" in accordance with Section 49 of the EP&A Act, Evolution is not required to seek landowners consent to lodge the SSD application. It is however required to seek landowners consent from the Crown to lodge the Mod 16 application. Accordingly, Evolution has written to Crown Lands to seek its consent to lodge the modification application.

There are three parcels of land which are owned by the Crown that would be used for activities relating to the Project and to Mod 16. This land is situated within the existing CGO site, and Evolution already has in place an existing landowner agreement with Crown Lands for surface activities on those lots.

Only minor modifications will occur to existing surface infrastructure located within the Crown Land parcels.

Evolution already holds an access arrangement with Crown Lands to permit access to and use Crown Land. Evolution will consult with Crown Lands if any necessary revisions to the agreement are required.

4.8 Rehabilitation

Rehabilitation of on-site infrastructure was raised by the community, particularly in relation to the remediation of dams on site prior to transferring the dams to local farmers after mine closure.

Appendix K of the EIS included a detailed Rehabilitation and Mine Closure Strategy (EMM 2020d). Rehabilitation would be guided by the conditions of consent, the approved Rehabilitation Management Plan (RMP) and the Mining Operations Plan (MOP). The conditions of consent for the existing operations require the site to be rehabilitated so that it is safe, stable and non-polluting. This includes any remaining landforms and water storages left in the landscape after the mine is closed.

Some infrastructure may be retained and transferred to local landholders for use once mining is completed and the mining lease is relinquished. This may include electricity infrastructure, water storages pipelines, bores and associated pump stations. However, infrastructure that is agreed in principle to be retained and transferred to local landowners for use, would require agreement from the Resources Regulator, who would consider the appropriateness of the proposed end use by each of the respective landowners.

Evolution will not be able to relinquish its mining leases until the NSW Government is satisfied that the site does not result in land contamination or represents a risk to the public and livestock.

Given that the approved disturbance area of the surface facilities would not change as a result of the Project or Mod 16, the general rehabilitation principles in place for the site would not change.

Nevertheless the existing approved RMP for CGO will be reviewed and updated to include the rehabilitation of the Project and the additional infrastructure components relating to Mod 16. The Mining Operations Plan for the site will also be updated to cover any obligations relating to rehabilitation. If a standalone rehabilitation management plan is required to be prepared for the Project, Evolution will seek to incorporate the plan into the existing approved RMP so that a wholistic management plan for rehabilitation and closure is in place for the mine.

4.9 Bushfire management

RFS requested that Evolution prepares a draft Fire Management Plan (FMP) and provides it to the local RFS District Office for comment.

The Project will be undertaken underground and Mod 16 will be undertaken within the existing approved disturbance areas. Therefore the bushfire risk resulting from the proposals would not increase the current risk ratings, which are already considered to be low.

Evolution is already required under the existing conditions of consent for the mine to ensure it is suitably equipped to respond to any fires on site and assist the RFS in any way possible with fighting local fires. Evolution has a sophisticated firefighting management system in place at the mine and is well equipped to respond in the unlikely event that a fire was to start at the site.

There are a number of dams on site that can be used to provide water for firefighting, and Evolution has employees who are well trained to respond to fire in the first instance and to assist the emergency services and the RFS if necessary.

Evolution's approach to firefighting is already detailed in its Emergency Response Plan (ERP) which is in place for the site. The plan describes the procedures and actions that would be undertaken in the event of an emergency, including fires.

Notwithstanding the low bushfire risk associated with the Project and Mod 16, the ERP will be reviewed and updated as necessary in accordance with the matters identified by RFS. Consultation will be undertaken with the RFS District Office in reviewing and updating the ERP in relation to fire management. Evolution will also update its existing bushfire management strategy to consider the effect of the Project on bushfire risk in consultation with RFS.

4.10 Voluntary Planning Agreement

FSC requested that Evolution enters into a Planning Agreement with FSC and asked DPIE to assist with this process.

Evolution has entered into discussions with BSC on an appropriately weighted Planning Agreement in accordance with Section 7.4 of the EP&A Act. The general terms of the agreement will be provided to DPIE when further detail on the content is known.

Evolution considers that a formal agreement with FSC is not warranted for the Project. This is because the Project area is wholly situated within the Bland Shire LGA and as such, this is where the direct impacts of the mine will continue to be concentrated.

Therefore a VPA with FSC in accordance with Section 7.4 of the EP&A Act does not strictly apply to any indirect impacts that may result from the Project in Forbes Shire LGA. The indirect impacts from the Project are mainly transport related. Traffic impacts within Forbes Shire were assessed in the EIS and Modification Report, with mitigation strategies detailed and additional measures proposed (refer section 4.4).

Further, Evolution has an established funding mechanism for road maintenance upgrades with FSC, which will be continued for the life of the extended mine. Evolution has also provided private funding in the Forbes area, which includes a grant to the Forbes Childcare Centre.

Evolution is committed to encouraging its workers to reside in local towns, including those in Forbes Shire Local Government Area. Should its workers choose to reside in Forbes Shire, this would result in a range of flow-on socio-economic benefits to the Forbes community.

4.11 Socio-economic benefits

The socio-economic benefits were assessed in the EIS at Appendix N in the Economic Assessment (AEC 2020) and at Appendix M in the Social Impact Assessment (Elton 2020).

MEG commented on the economic benefits to the State that would accrue from the Project. It noted that from the Economic Assessment prepared by the Proponent's economic consultant (AEC) that the Project would deliver an estimated net economic benefit to NSW of $314 million in net Project value (NPV) terms.

MEG used a slightly higher gold price in its royalty calculations of around A$2,100 per ounce. MEG believes that although the current surge in the US dollar gold price has peaked, gold prices will remain buoyant due to global economic conditions being somewhat unstable going forward.

It further commented that the estimate of around 1.8Moz of gold mined from the Project is a reasonable total based on a rigorous analysis of the geological information available. Using the above parameters, MEG has calculated that the State will receive around $124 million in 2020 dollars, and around $61 million in NPV terms (at a real discount rate of 7 percent) in royalties from the Project. In a typical year at full production the NSW Government would receive around $8 to $9 million in royalties from the Project based on the assumed gold price.

MEG further noted that if approved, the Project, would provide an average of 230 full-time operational jobs from 2024 to 2040. Without the Project, the existing Cowal open cut mine would close at the end of 2031. MEG estimates that these direct mine jobs would result in around an additional 900 indirect jobs in both mine and non-mine related services.

The three local government authorities made comments in support of the Project, due to the resulting ongoing socio-economic benefits to the region.

Supporting submissions from community members also highlighted the benefits of the mine in terms of the maintenance of the existing workforce and that the mine provides employment opportunities for young people in the local areas.

The Project will continue to provide a range of socio-economic benefits to the regional area, including the creation of around 160 new jobs during construction and over 200 new jobs during operations of the Project. It will allow Evolution to continue its contributions to local initiatives, which in 2020 included the following:

- partnering with BSC to ensure the restoration of the Tivoli Theatre in West Wyalong;
- major sponsorship of the large-scale sculptures on the Lachlan River Trail;
- contribution to the "Why Leave Town Cards" economy boosting giftcards scheme;
- a grant to the Forbes Childcare Centre;

- donation of a LUCAS chest compression system to West Wyalong Hospital; and
- continued sponsorship of the West Wyalong Rugby League Football Club.

Evolution notes and appreciates the comments made by the Councils and in supporting community submissions. Evolution has forged strong partnerships with the local government authorities and the community and will continue to strengthen the partnerships it has developed during the operation of the project.

5 Response to groundwater model independent peer review

5.1 Background

As noted in section 2.5.1, DPIE Resource Assessments engaged Hydrogeologic (2020) to undertake a review of the *Groundwater Impact Assessment for the Mine Site* (Coffey 2020a) and the *Groundwater Impact Assessment for the Bland Creek Paleochannel Borefield* (Coffey 2020b). The review is documented in *Cowal Gold Underground Development Groundwater Assessment Peer Review* (Hydrogeologic 2020).

Coffey's (2021c) response to the matters raised by Hydrogeologic (2020) (refer section 2.5.1(i)) are provided below. This response is an addendum to Coffey (2020a) and Coffey (2020b) and is provided in Appendix E.

5.2 Matters raised

Documentation on the updated mine site model performance with an improved water balance error term (<1% for all times).

The numerical groundwater model was updated to have a reduced maximum time step, in order to reduce the model mass balance error. Figure 5.1 shows the resulting model mass balance error for the updated model. This can be seen to be below 1% throughout the model calibration (to 2020) and predictive periods. The original model mass balance error is also shown in Figure 5.1. Figure 5.2shows the model time steps for the original and updated models.

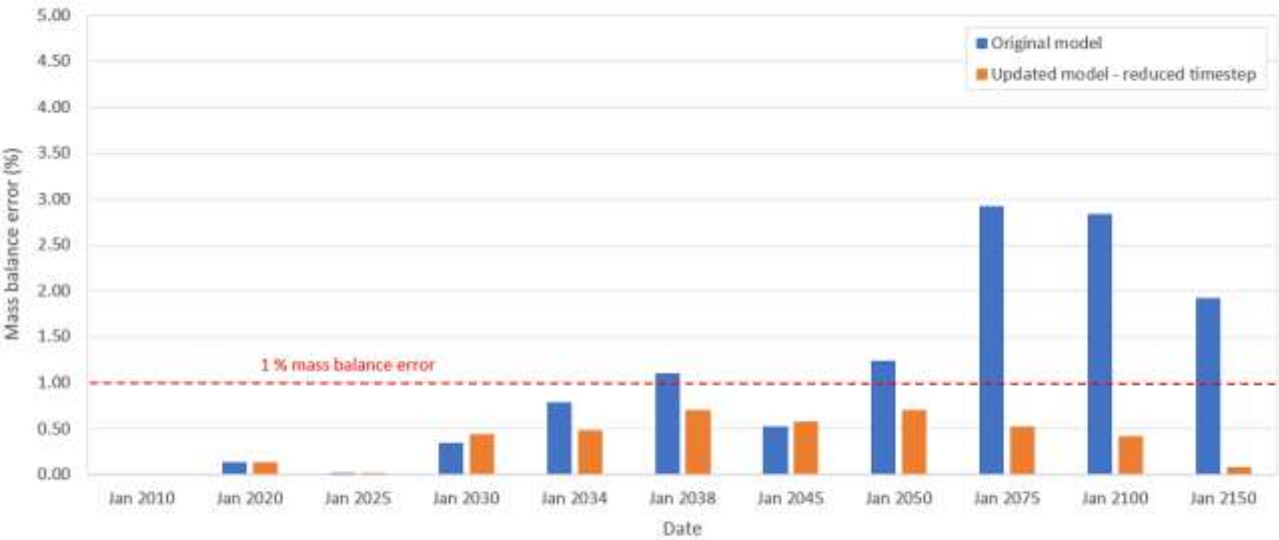


Figure 5.1 Model mass balance error for the updated and original models (Coffey 2021c)

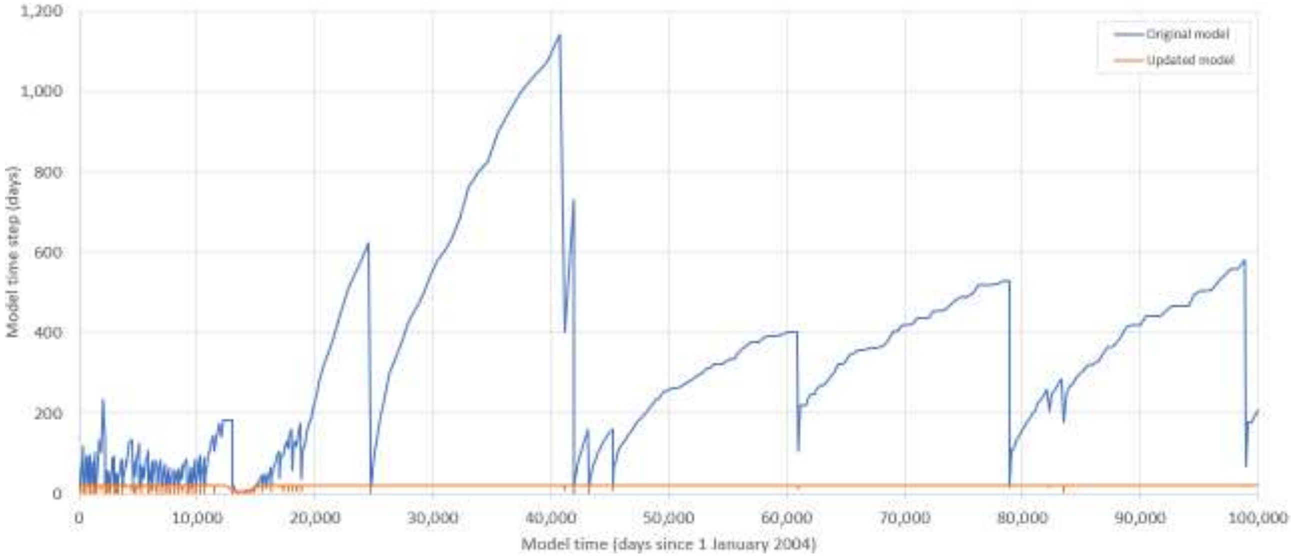


Figure 5.2 Model time step size for the updated and original models (Coffey 2021c)

Figure 5.3 presents the predicted inflow to the open pit, stopes and tunnels and the post mining infiltration to the paste backfill and tunnels for the updated and original models. The two models can be seen to produce very similar results, although there is a noticeable reduction in oscillations after approximately 2050.

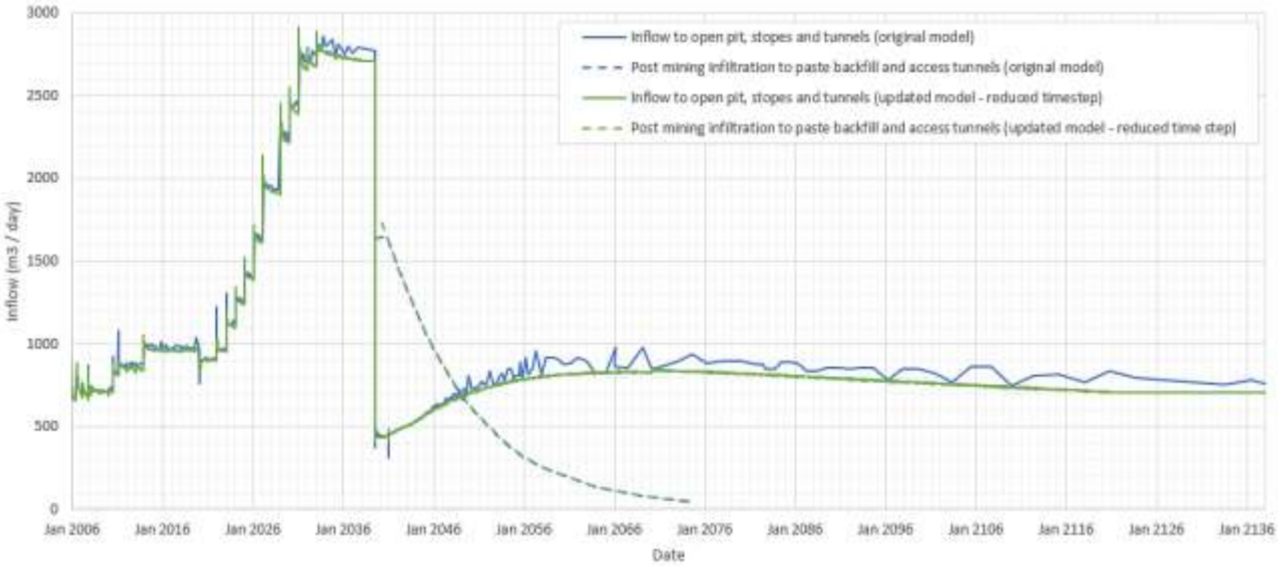


Figure 5.3 Updated modelled groundwater inflows (Coffey 2021c)

Figure 5.4 presents a comparison of groundwater head contours for the original and updated models in 2076, when the mass balance error in the original model was well over 1%. The contours are nearly indistinguishable.

From this point forward, unless where referring to results directly from the mine site report, the updated model with reduced timestep size and mass balance error below 1% will be used.

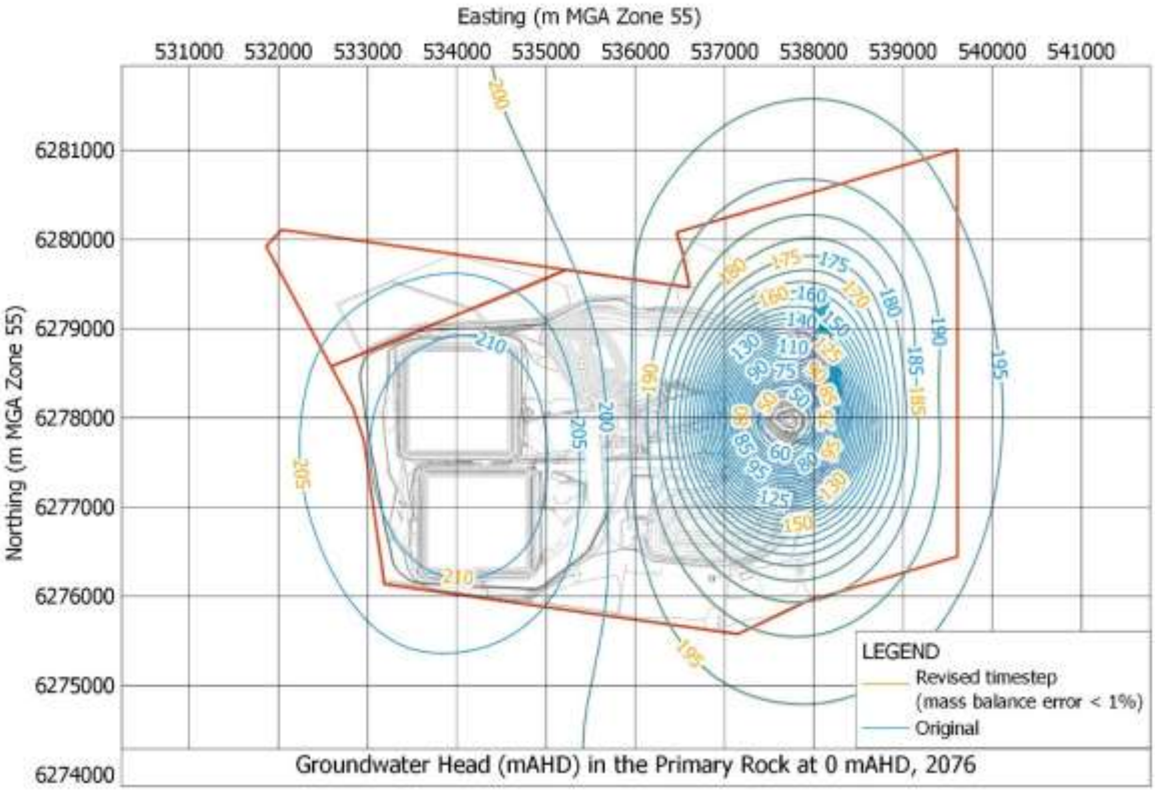


Figure 5.4 Comparison of groundwater head contours in the Primary Rock at 0 mAHD for the original and updated models (update to achieve mass balance < 1%) (Coffey 2021c)

Provide information on modelled and measured groundwater levels for observation bores near the eastern edge of the lease, including: GW704031, GW704252, GW703223, GW703225 (Figure 6-7 of Coffey 2020a).

The records for the publicly available bores GW704031, GW704252, GW703223 and GW703225 (as provided on http://www.bom.gov.au/water/groundwater/explorer/map.shtml) were used to assess the stratigraphic profile east of the mine site to provide a calibration to the gravity survey. Groundwater level observations at these bores were not publicly available at the time of writing the mine site report in September 2020. A search of these bores to confirm this was carried out on 21 December 2020. At that time no groundwater level information was available at those bores.

Provide further detail on the components of the water balance, notably components of discharge via dewatering bores, and via seepage faces at the pit walls and floor, and via horizontal drains, and leakage from the lake that is captured by the mine, including differences during lake full and empty periods.

CGO currently holds 3650 units (ML) / annum in the Upper Lachlan Alluvial Zone 7 Management Zone within the Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012.

Table 5.1 and Table 5.2 provide a breakdown of the components of seepage into the open pit and underground development at selected times for the model cases of a dry Lake Cowal and a full Lake Cowal respectively. These two cases were modelled by applying fixed head boundary conditions of 201.5 mAHD (dry lake case) or 206.5 mAHD (full lake case) to the surface of the model in the Lake Cowal area. The overall model water balances for the dry Lake Cowal case and the full Lake Cowal case in 2037 are shown in Table 5.3 and Table 5.4, respectively. Groundwater inflows during 2037 are representative of the period just prior to the end of underground mining when groundwater inflows are predicted to be at or close to their highest values.

Table 5.1 and Table 5.2 also show the predicted total groundwater inflow into the mine (open pit, stopes and access tunnels) originating from the Upper Lachlan Alluvium. This includes all groundwater originating from the Transported unit over an area encompassing the open pit and underground development and extending east to beyond the Lake Protection Bund and west to an area just outside the open pit. The predicted total groundwater inflow into the mine originating from the Upper Lachlan Alluvium is approximately 10% of the total inflow into the mine, reducing slightly towards the end of mining when substantially more inflow to the mine originates from the Primary Rock at elevations below -700 m AHD. The balance of the inflow to the mine comes from the fractured rock of the Lachlan Fold Belt Murray Darlin Basin (MDB) groundwater source.

Table 5.1 Components of groundwater seepage (m^3/day) at selected times for the dry Lake Cowal case (a negative number indicates seepage into the model)

Seepage component	Date			
	17/11/2019	06/11/22	18/11/26	05/10/37
Pit walls	584	624	407	300
Pit floor	262	197	215	141
Dewatering bores	124	0	0	0
Access tunnels	0	115	512	722
Stopes	0	16	476	1555
TSF/IWL foundation	-447	-545	-602	-849
Western model boundary	-9	-10	-13	-100
Eastern model boundary	190	128	96	-198
Lake Cowal	1243	280	53	-104
Storage	-370	793	463	159
Rainfall infiltration	-1577	-1577	-1577	-1577
Total inflow to mine	970	952	1610	2718
Total inflow to mine from Upper Lachlan Alluvium groundwater source	107	101	102	78
Total inflow to mine from Lachlan Fold Belt MDB groundwater source	863	851	1508	2640
Percentage of total inflow to mine from Upper Lachlan Alluvium	11%	11%	6%	3%

Table 5.2 Components of groundwater seepage (m^3/day) at selected times for the full Lake Cowal case (a negative number indicates seepage into the model)

Seepage component	Date			
	17/11/19	09/09/22	18/11/26	03/12/37
Pit walls	584	625	409	287
Pit floor	262	198	215	141
Dewatering bores	124	0	0	0
Access tunnels	0	115	512	717
Stopes	0	16	476	1556

Table 5.2 Components of groundwater seepage (m³/day) at selected times for the full Lake Cowal case (a negative number indicates seepage into the model)

Seepage component	Date			
	17/11/19	09/09/22	18/11/26	03/12/37
TSF / IWL foundation	-447	-548	-603	-854
Western model boundary	-9	-10	-13	-100
Eastern model boundary	190	222	219	-73
Lake Cowal	1244	-1482	-284	-408
Storage	-371	2406	686	321
Rainfall infiltration	-1577	-1577	-1577	-1577
Total inflow to mine	970	954	1612	2701
Total inflow to mine from Upper Lachlan Alluvium groundwater source	107	101	102	78
Total inflow to mine from Lachlan Fold Belt MDB groundwater source	863	853	1510	2623
Percentage of total inflow to mine from Upper Lachlan Alluvium	11%	11%	6%	3%

Table 5.3 Model mass balance, 5 October 2037 – dry Lake Cowal case

Component	Out (m³/day)	In (m³/day)
Fixed head and seepage face boundary conditions	2904.4	5401.4
Rainfall recharge	0	1577.4
Storage	5422.9	1290.5
Total	8327.3	8269.3
Absolute error	58.1	-
Percentage error	0.70%	-

Table 5.4 Model mass balance, 3 December 2037 – full Lake Cowal case

Component	Out (m³/day)	In (m³/day)
Fixed head and seepage face boundary conditions	2992.6	5719.1
Rainfall recharge	0	1577.4
Storage	5542.2	1207.9
Total	8534.8	8504.4
Absolute error	30.4	-
Percentage error	0.36%	-

Figure 5.5 and Figure 5.6 present inflows into the model from the fixed head western and eastern boundaries, and from the Lake Cowal time varying fixed head nodes, excluding rainfall recharge. These figures show the dry Lake Cowal and full Lake Cowal cases respectively. The results divide the eastern boundary into an upper and lower level. This was done to separate localised outflow at the top of the eastern model boundary which occurs due to the interaction of the Lake Cowal fixed head nodes and the eastern boundary fixed head nodes. This flow to the east from the eastern part of Lake Cowal has a negligible impact on inflows to the mine site. This can be seen more clearly in Figure 5.7**Error! Reference source not found.**, which shows the typical groundwater head contours along a west to east section through the mine in 2024.

Figure 5.5 shows a small amount of flow into the model from the Lake Cowal nodes for a dry Lake Cowal case. This is a result of a fixed head boundary condition of 201.5 mAHD being applied to these nodes for the dry Lake Cowal case. The rate of inflow to the model from the Lake Cowal nodes is under 5% of the total inflow to the mine and is not considered to affect the predicted inflow to the mine.

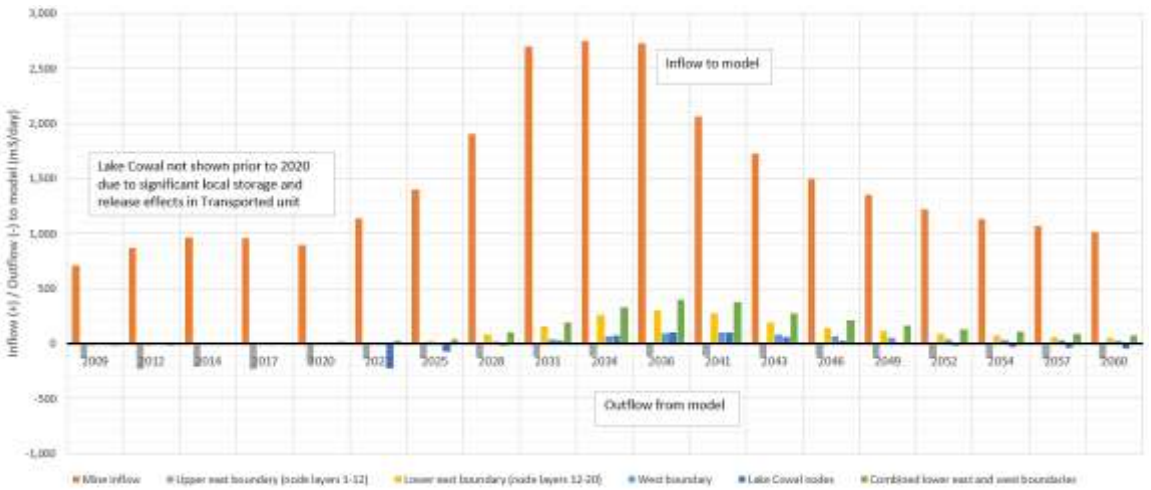


Figure 5.5 Inflow / outflow at model boundaries and Lake Cowal nodes for the dry Lake Cowal case (Coffey 2021c)

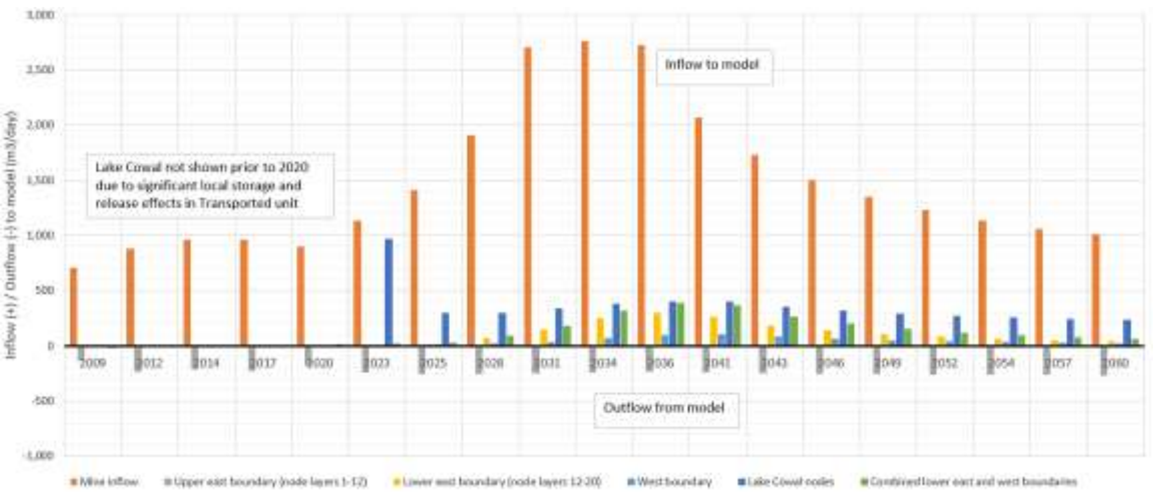


Figure 5.6 Inflow/outflow at model boundaries and Lake Cowal nodes for the full Lake Cowal case (Coffey 2021c)

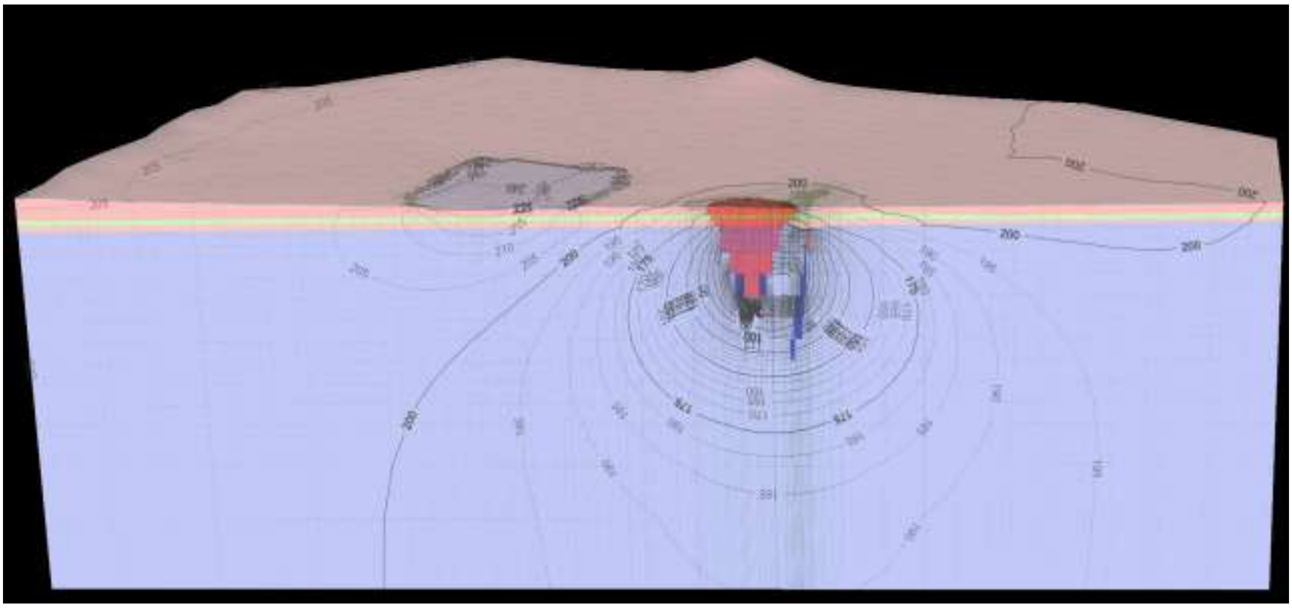


Figure 5.7 West to east section showing 5 m head contours, July 2024 (Coffey 2021c)

It is important to note that the combined inflow from the western and lower eastern boundaries of approximately 18% of the total inflow to the mine just after the end of mining in 2041 does not imply that the model over-estimates the inflow to the mine by 18% at this time. If the model eastern and western boundaries were located further away from the mine, groundwater head drawdown would still influence flow towards the mine.

The northern and southern no flow boundaries lead, in a similar way, to a slight under-estimation of flows. These boundaries are located at similar distances from the underground development to the western and eastern boundaries, and their effect will tend to cancel out the over-estimation due to the western and eastern boundaries. The combined effect on the predicted inflow to the underground mine from all of the model lateral boundaries is assessed to be insignificant.

It is noted that there are very similar predicted total inflows to the mine for the dry Lake Cowal and the full Lake Cowal cases, however the inflow to the model from the Lake Cowal nodes for the flood case is notably higher than for the dry case, as shown in Figure 5.5 and Figure 5.6. This additional inflow is either captured by storage or exits the model as outflow from the eastern boundary.

A key parameter for modelling the speed of groundwater particles in the rock is the effective porosity of the soil/rock medium. Based on our experience with materials of similar nature, an effective porosity of 0.01% is considered to be reasonable for the modelling of the velocity at which water travels through the rock/soil medium.

Figure 5.8 presents four figures for illustrative qualitative purposes only. These show the predicted distance groundwater particles would travel in a 5-year period starting from in the Transported unit beneath Lake Cowal. It is assumed for simplicity that the heads for those 5 years remain as they were at the start of the movement. The results are assuming the full Lake Cowal case with a constant fixed head of 206.5 mAHD at Lake Cowal. The figures illustrate that only a small proportion of the water originating beneath Lake Cowal on the western lake boundary reaches the underground mine, and that it may take several years to do so due to low permeability formations.

Over the last 40 years Lake Cowal has generally not remained full for continuous periods of over five years duration, as shown in Figure 5.9. It is therefore considered that only a small amount of groundwater originating from directly beneath Lake Cowal has reached the existing CGO open pit mine between 2005 and 2020.

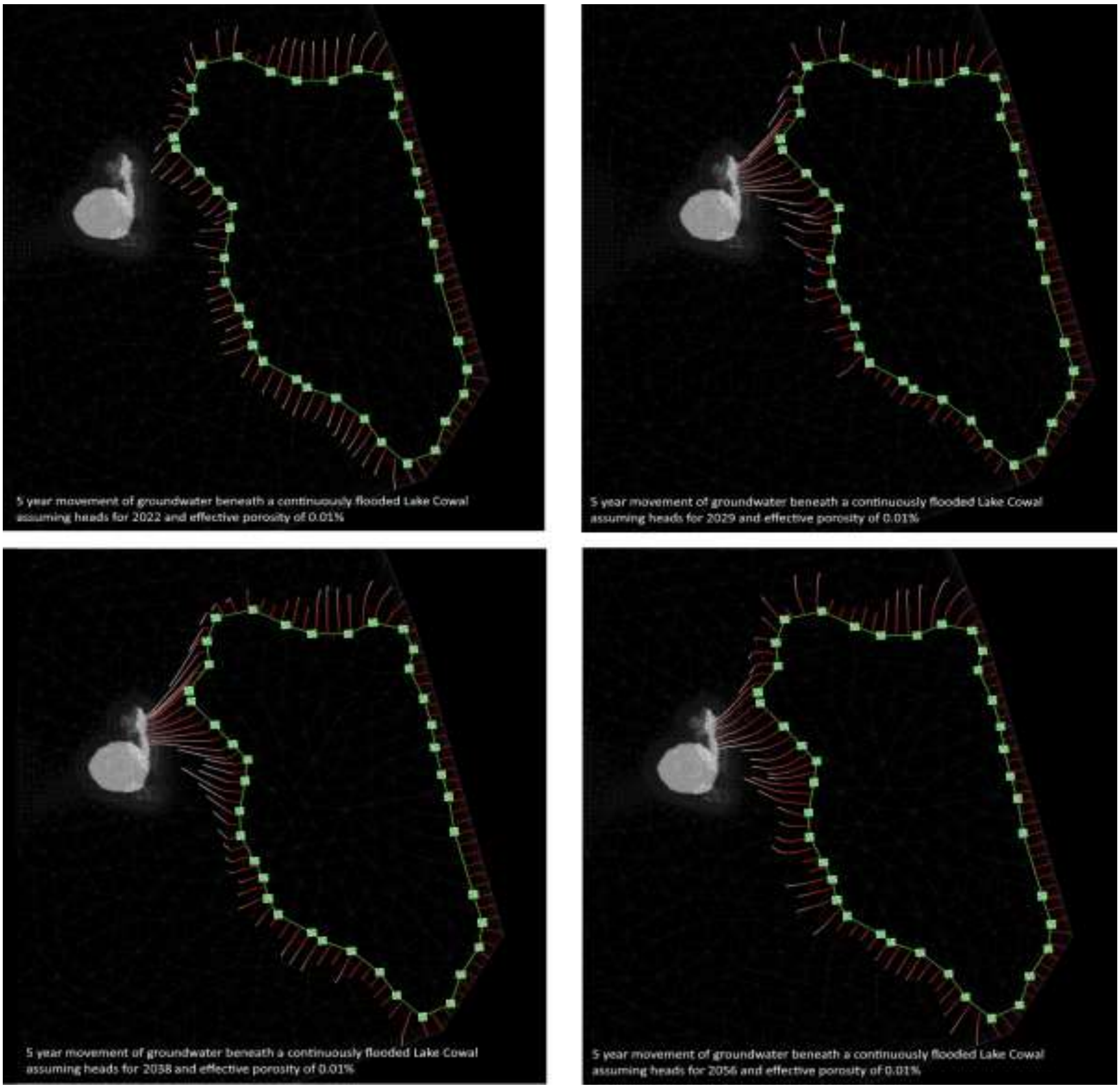


Figure 5.8 Illustration of the distance travelled by groundwater particles in a 5-year period beneath Lake Cowal, with the simplifying assumption that heads remain as they were at the start of the travel time (Coffey 2021c)

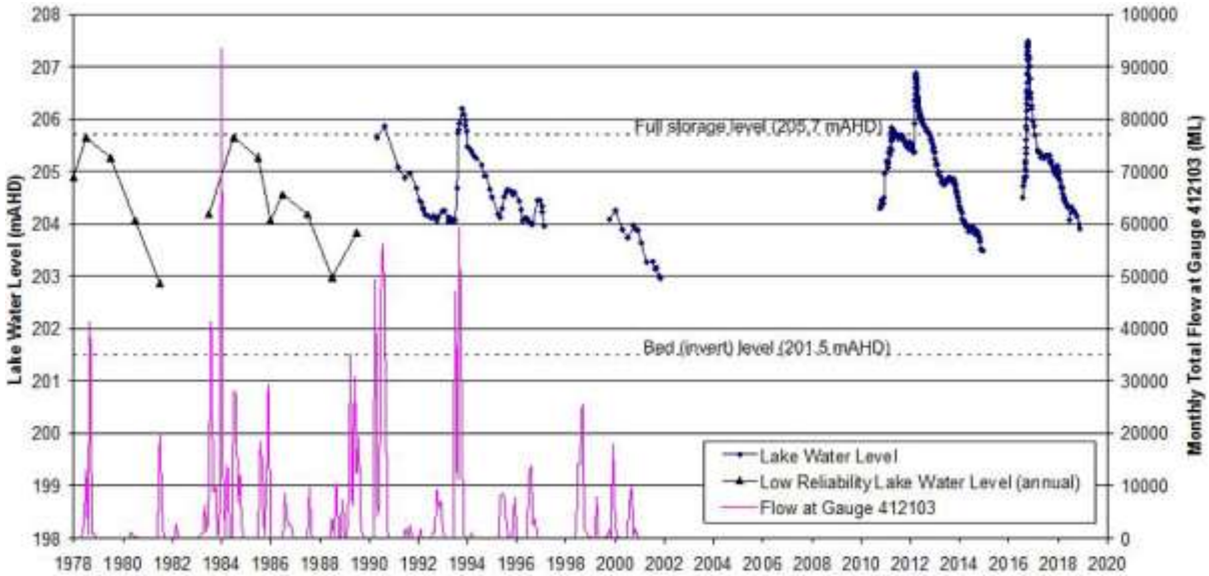


Figure 5.9 Observed water levels in Lake Cowal and flow at gauge 412103 (Bland Creek at Morangarell, flow data available from 1978 - 2003 only) (Coffey 2021c)

During periods of alternate flooding and drying of Lake Cowal, the groundwater model indicates that a localised regime of storage and release of groundwater in the sediments and weathered rock beneath Lake Cowal occurs. Figure 5.10 presents modelled inflow to the Lake Cowal nodes (including rainfall recharge which is indicated by the dashed black line) and resulting net inflow to the model accounting for storage in layers 2 to 5, representing the Transported and Saprolite units, beneath Lake Cowal. Storage in the Lake Cowal nodes themselves is omitted from the calculations.

Note that Figure 5.10 shows a small amount of flow into the model from the Lake Cowal nodes for a dry Lake Cowal case above the rate of rainfall infiltration (rainfall infiltration is indicated by a dashed black line). This is a result of a fixed head boundary condition of 201.5 mAHD being applied to these nodes for the dry Lake Cowal case. The rate of inflow to the model from the Lake Cowal nodes is under 5% of the total inflow to the mine and is not considered to affect predicted inflow to the mine.

Whilst it is not the purpose of the hydrogeological assessment to provide a detailed discussion on the dynamic local effects related to Lake Cowal drying and flooding, the results are included here to provide an illustration of the surface-groundwater interchange associated with the filling and emptying events within Lake Cowal which is independent of mine related seepage.

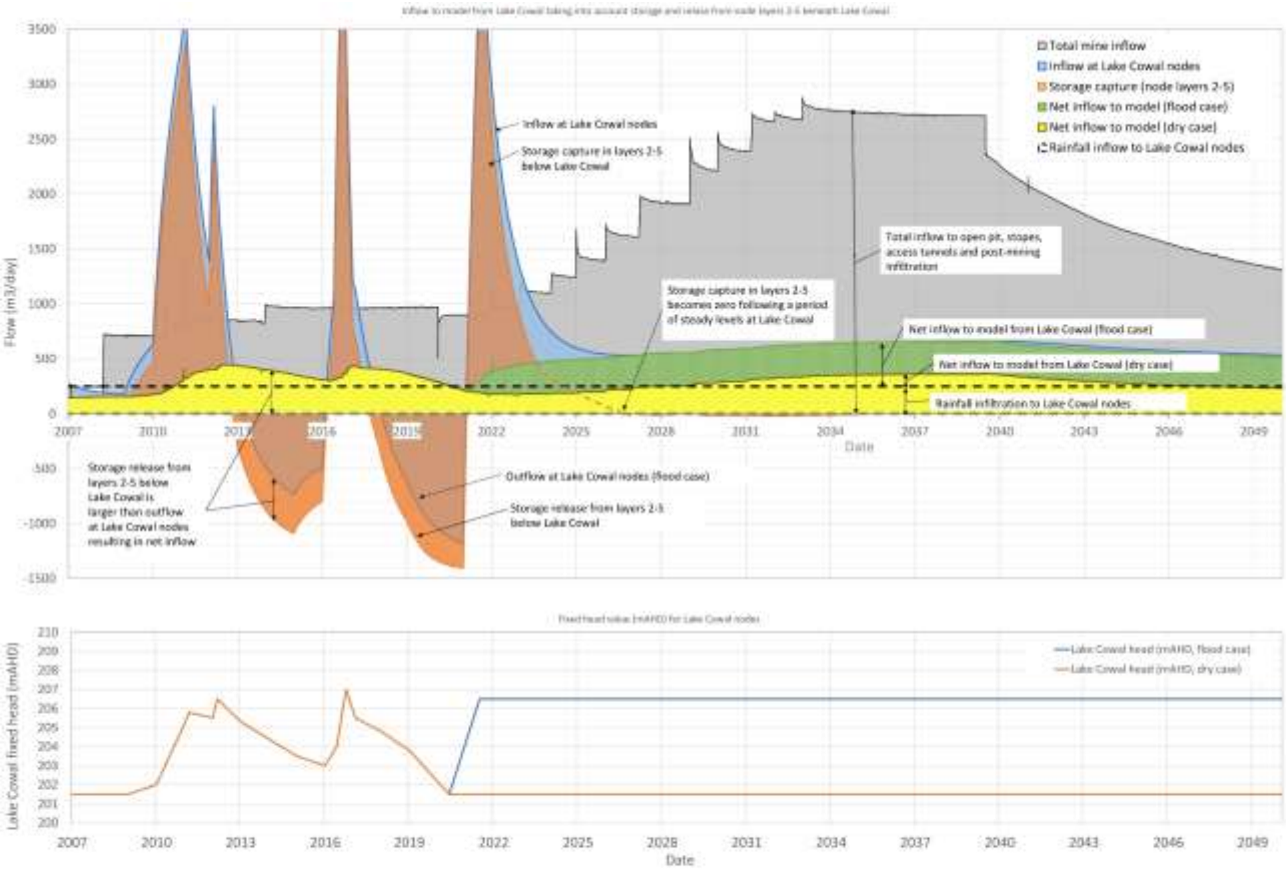


Figure 5.10 **Inflow to the model from Lake Cowal accounting for storage capture and release from model layers 2-5 (Transported and Saprolite units) beneath Lake Cowal (Coffey 2021c)**

If still relevant given the above, improved justification of the very steady mine inflow rate predictions compared to the high variability in reported inflows, and why it is acceptable for the model to be benchmarked to 'groundwater inflows' only during dry periods.

Modelled groundwater inflow rates are much less variable than recorded pit dewatering volumes, as shown in Figure 5.11 below. The spikes in recorded pit dewatering volumes are likely related to surface water runoff into the open pit and not groundwater inflow. This is due to groundwater flow being proportional to gradients in groundwater head. These do not suddenly change by factors of 5 over the space of a month, which recorded pit dewatering volumes sometimes do. Surface water runoff is removed from the pit relatively quickly, and it is not considered to significantly affect groundwater levels in the area around the open pit, and so has been excluded from the groundwater model.

It is considered that during drier periods, such as 2018, recorded pit dewatering rates are more representative of actual groundwater inflows rather than surface water inflows. For this reason, it is considered acceptable to use such periods as a basis for comparison, or benchmarking, of modelled versus observed groundwater inflow to the open pit.

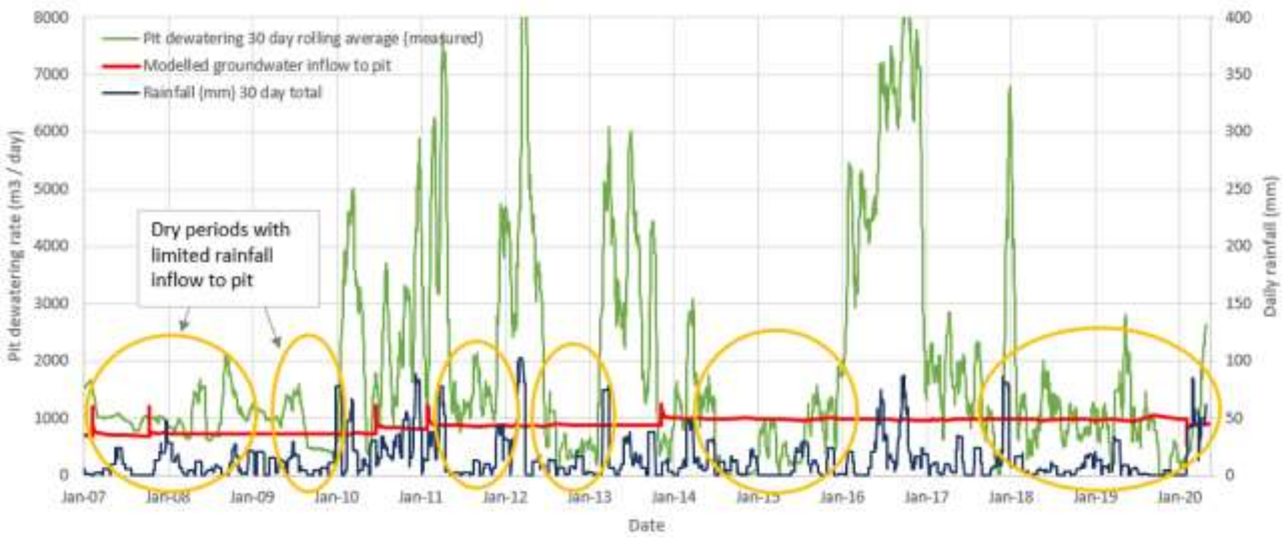


Figure 5.11 **Pit dewatering records, rainfall and modelled groundwater inflow to the open pit (mine site report Figure 8-18) (Coffey 2021c)**

Correct the arithmetical error in the statement on the maximum rate of inflow to the mine being 100,000 times less than the estimated evaporation from Lake Cowal.

The last paragraph of Section 10.5 of the mine site report contains an arithmetical error. The corrected paragraph should read:

> *When Lake Cowal is full it occupies an area of 13,000 hectares and would thus lose on aver-age 534,000 m3/day to evaporation (assuming 1.5 m net annual pan evaporation, refer to Table 4-1). This means that the average rate of evaporation from the surface of Lake Cowal is approximately 300 times the predicted maximum rate of groundwater inflow due to the CGO Underground Development alone (1,800 m3/day, as discussed in Section 10.3). As such, the impact of mine groundwater inflow on the water levels of Lake Cowal is considered to be negligible.*

Updated post-mining simulations, along with related final void water balance modelling, including confirmation that the recovery simulation started from the base of the underground dewatered stopes at around -700 m AHD.

An error in the assessment of total stopes volume based on the provided total mass of extracted ore resulted in an incorrect total stopes volume of 64,739,000 m^3. The correct total stopes volume is 9,242,038 m^3 (reference: GRE-46_UG_SSD Design - Final - Capped at 1.8.xlsx).

With the volume of the access tunnel voids being 1,326,000 m^3, and assuming a paste fillable porosity of 0.1, the total volume to be filled with groundwater during the post-mining recovery is:

- 2,250,204 m^3 (0.1 x paste backfill volume plus 1 x tunnels volume)

The original (incorrect) model resulted in a modelled inflow of 6,186,000 m^3 to the paste fill and tunnel voids. This corresponds to a paste fillable porosity of approximately 0.5 for the corrected total stopes volume.

To correct this discrepancy, the specific storage parameter for the paste backfill in the model was revised to a value of 1.07 x 10^{-4} /m. With the updated paste backfill specific storage parameter, the modelled inflow to the paste fill and tunnel voids was 2,038,750 m^3. This corresponds to a paste fillable porosity of approximately 0.08 for the correct total stopes volume.

Figure 5.12 presents the predicted total inflow into the open pit, stopes, access tunnels and paste backfill for the two cases of paste fill porosity of 0.08 and 0.5. It can be seen from the figure that the recovery time for a paste fillable porosity of 0.08 is approximately 10 years earlier compared to that for a paste fill porosity of 0.5.

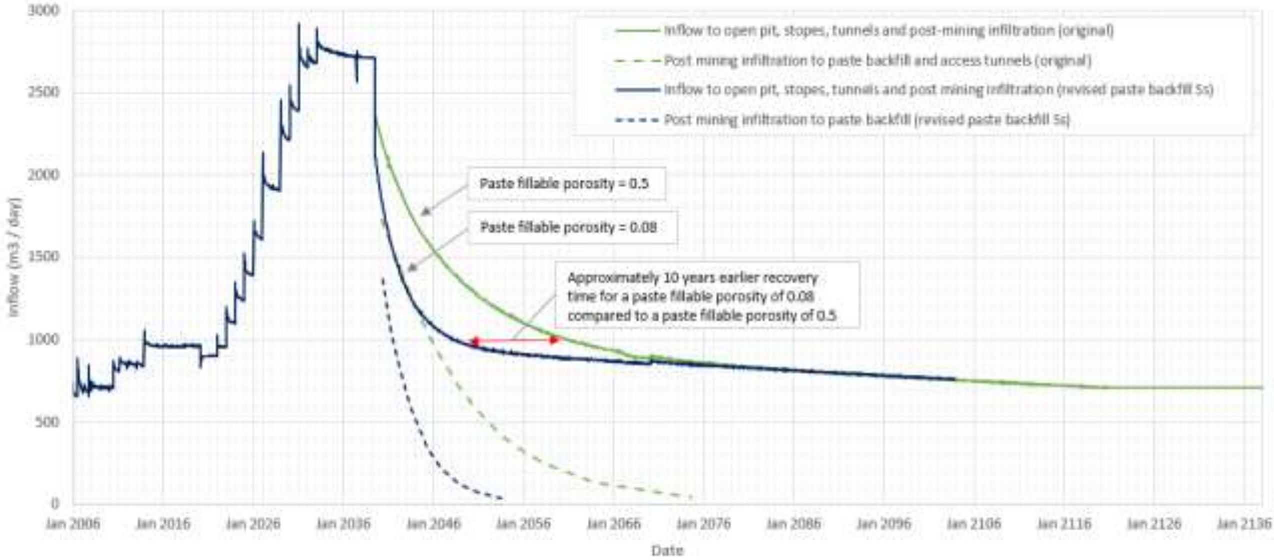


Figure 5.12 Sensitivity to paste backfill porosity of predicted inflow to open pit, stopes, access tunnels and post-mining infiltration (Coffey 2021c)

Figure 5.13 shows the predicted difference in groundwater head contours at the base of the Transported unit for the two cases in 2046. The effect of the different paste fill porosities can be seen to have a minor effect on groundwater head contours in the Transported unit during the post-mining recovery. Notice that the groundwater levels are slightly higher in 2046 for a paste fill porosity of 0.08 compared to a paste fill porosity of 0.5.

The case presented in the mine site report (which is for a paste fill porosity of 0.5) is conservative in terms of recovery time and groundwater head drawdown. It is considered that due to the results being on the more conservative side, those presented in the mine site report (Coffey 2020a) Figure 10-5 remain valid and, in reference to the results shown in Figure 5.12, illustrate the sensitivity of the results to paste fill porosity.

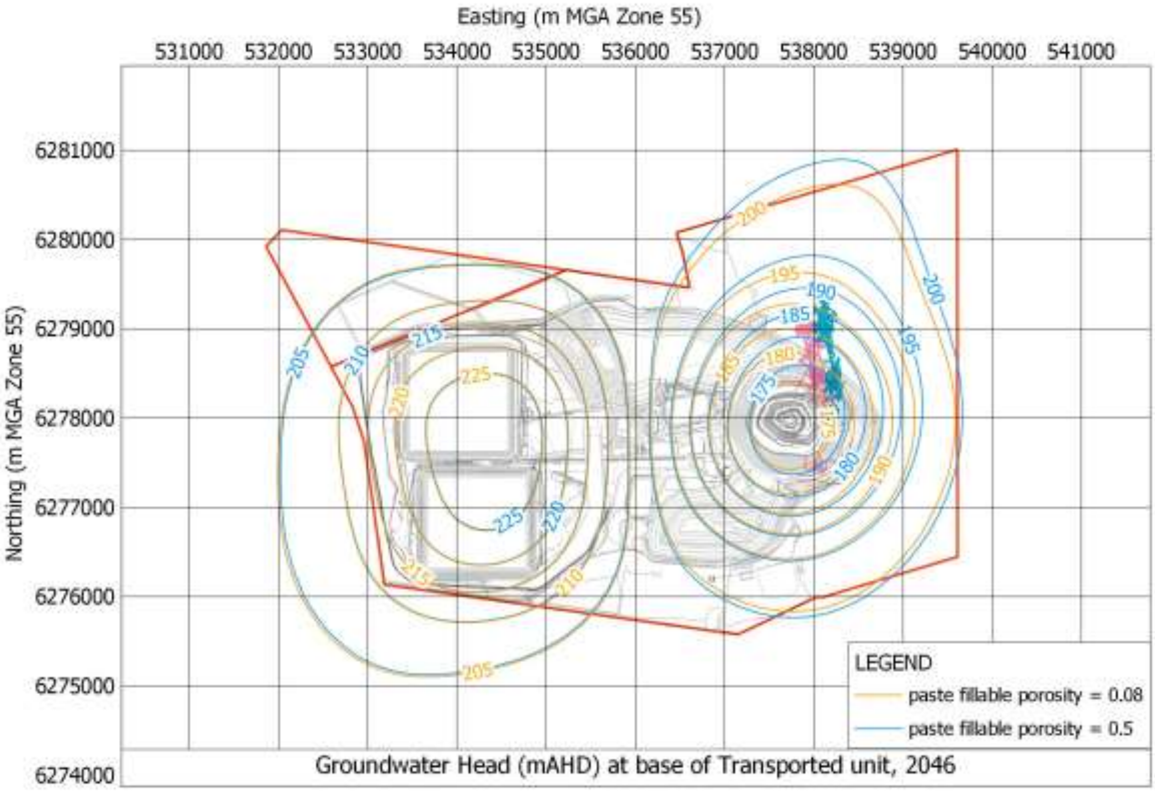


Figure 5.13 Groundwater head at base of Transported unit in 2046 for paste fill porosities of 0.08 and 0.5 (Coffey 2021c)

Figure 5.14 presents modelled inflow rates for each stopes level for the case of a paste backfill porosity of 0.08. Note that during the first 6 months while the model (which assumes confined / fully saturated conditions in the Primary Rock) re-equilibrates following the reactivation of the stopes elements, there is some internal transfer of water. This is an artifact of the modelling process and is not predicted to occur in reality. The key points to note are:

- The modelled total inflow or volume captured by storage is 2,038,750 m^3. This represents a paste backfill porosity of 0.08.
- Model results show groundwater flowing into each layer of stopes throughout the recovery period, from the base of stopes at approximately -700 mAHD to the top of layer 8 at 50 mAHD.
- The modelled post-mining infiltration shows the rate of inflow into each of the stopes layers declining with time at an approximately equal rate. Figure 5.15 shows that the impact of this on modelled groundwater head contours above the stopes is almost negligible. There can be seen to be little observed difference in the 180 mAHD head contour from the time immediately prior to backfilling, when the stopes are all modelled as voids, compared to 10 months after backfilling when groundwater pressures inside the stopes have approximately equalised.
- It is noted that since the modelled total volume of groundwater infiltration to the stopes is consistent with the physical fillable void space volume in the backfill (assuming a paste fill porosity of 0.08) and the total void space in the access tunnels, the model provides a reasonable representation of groundwater recovery times, including a consistent representation of the volume of groundwater that will be taken from the environment during the recovery period.

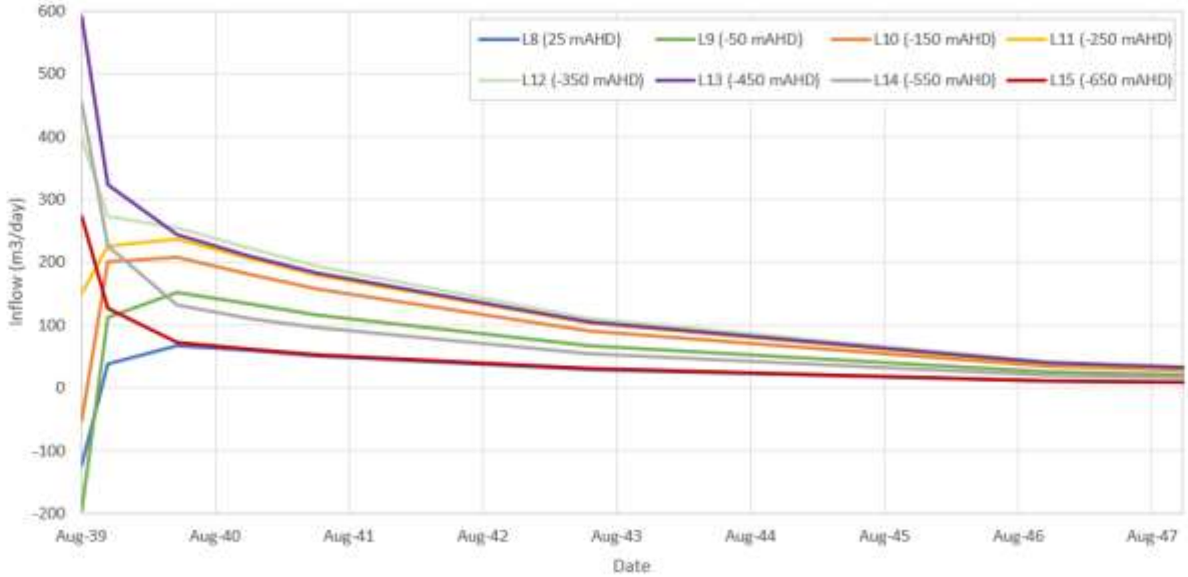


Figure 5.14 Post-mining infiltration into each layer of stopes (showing midpoint of layer in mAHD) (Coffey 2021c)

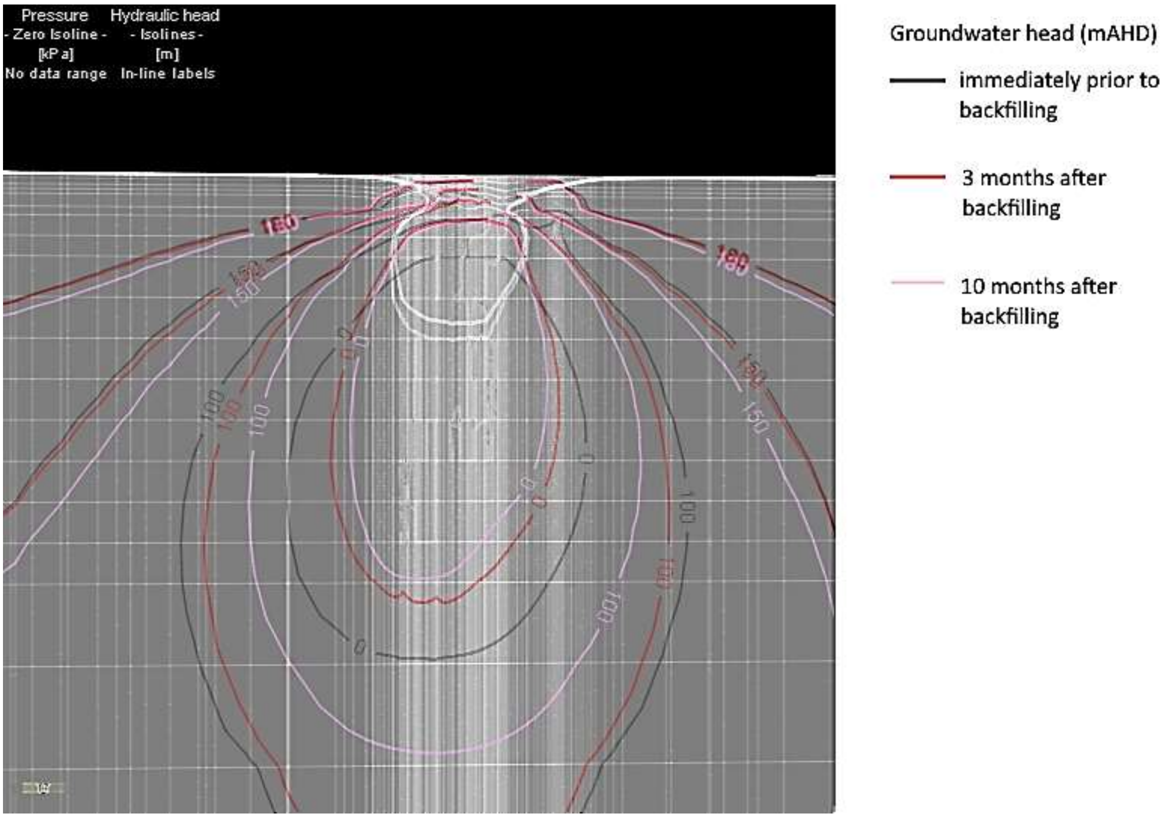


Figure 5.15: Modelled groundwater head during the initial period after backfilling of the stopes (Coffey 2021c)

Rationalisation of the inconsistencies between the mine site and the borefields models in relation to the Upper Cowra unit having a more limited westwards extent over the CGO site area in the borefields model, and it having quite different values for its key properties (Kh and Sy).

The Transported Unit in the mine site model is modelled as extending over the whole model domain compared to in the BCPB model where the upper Cowra Unit extends to approximately 1 km west of the open pit. The effect on the BCPB model of the upper Cowra Unit within the zone of influence of the CGO mine site is assessed to be negligible because this is a low yielding aquifer at distance from the offsite borefield. The purpose of the BCPB model is for modelling the effects of drawdown in the Lachlan Formation due to pumping from borefields located in the Bland Creek Palaeochannel over 13 km to the north west of the CGO site.

For the mine site model, the effects of the Transported unit extending west of the mining lease to the western model boundary are considered to be minimal. The calibrated parameters for the Transported, Saprolite and Saprock units are similar, as shown in mine site report Table 8-1. Groundwater head contours to the west of the TSF/IWL in 2038 can be seen to not be significantly influenced by the boundaries between the Transported, Saprolite and Saprock units, as shown in Figure 5.16.

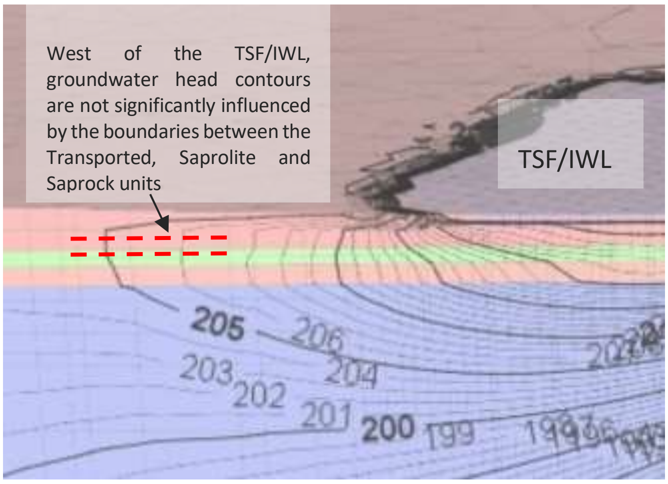


Figure 5.16 Groundwater head contours (mAHD) west of the TSF/IWL in 2038 (Coffey 2021c)

The hydrogeological parameters adopted for the mine site model and the BCPB model are shown in Table 5.5. The differences in the adopted parameters between the two models are a result of the mine site model calibration taking account of mining activities and monitoring around the existing CGO open pit, compared to the BCPB model which was calibrated over a much larger area and with limited groundwater stresses modelled on the Upper Cowra unit.

Relative calibration sensitivities for hydraulic conductivity parameters for the BCPB model are shown in Figure 5.17 below. The figure shows that the BCPB model calibration is almost insensitive to the horizontal hydraulic conductivity (K_{xy}) parameters in the Upper Cowra and Lower Cowra units. On the other hand, the mine site model calibration shows comparable calibration sensitivities among the hydraulic conductivity and specific storage parameters.

It is considered that, due to its low calibration sensitivity in the BCPB model, the calibrated horizontal hydraulic conductivity of the Upper Cowra unit in the BCPB model is not applicable to the mine site area. The BCPB model, developed to assess groundwater impacts from drawdowns in the Bland Creek Palaeochannel, did not account for mining activities and monitoring at the mine site and this has led to the difference in the assessment of parameters between the two models.

The BCPB model was calibrated to provide assessment of conditions within the high yielding aquifers of the Bland Creek Palaeochannel while the Mine Site Model was calibrated against the observations in the low yielding ground around the mine site.

Table 5.5 Hydrogeological parameters for the Transported / Upper Cowra unit for the mine site and BCPB models

Model	Hydrogeological unit	Horizontal hydraulic conductivity (m/day)	Vertical hydraulic conductivity (m/day)	Specific storage (m^{-1})	Specific yield
Mine site	Transported / Upper Cowra	2.2×10^{-2}	3.4×10^{-4}	4.8×10^{-4}	0.2
BCPB	Transported / Upper Cowra	1	6×10^{-5}	n/a	0.04

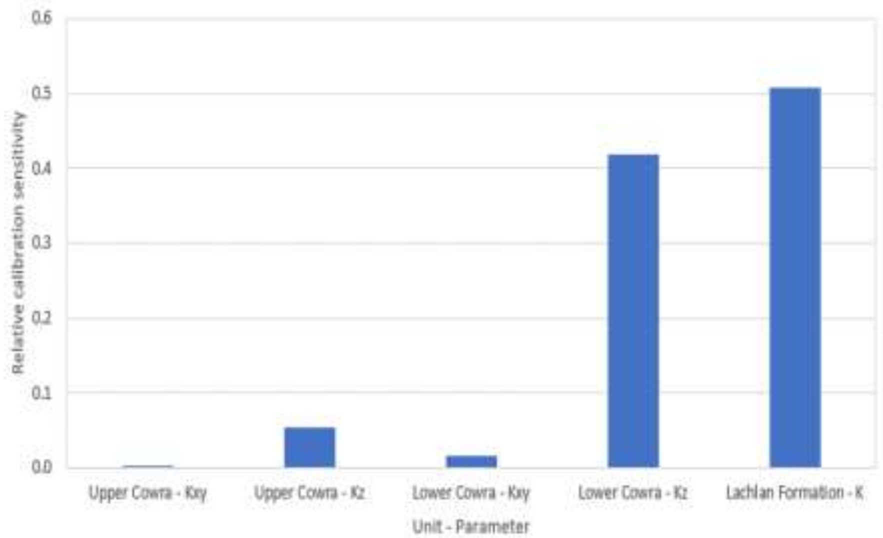


Figure 5.17 BCPB model calibration sensitivity to hydraulic conductivity parameters (after BCPB report, Figure 6-6) (Coffey 2021c)

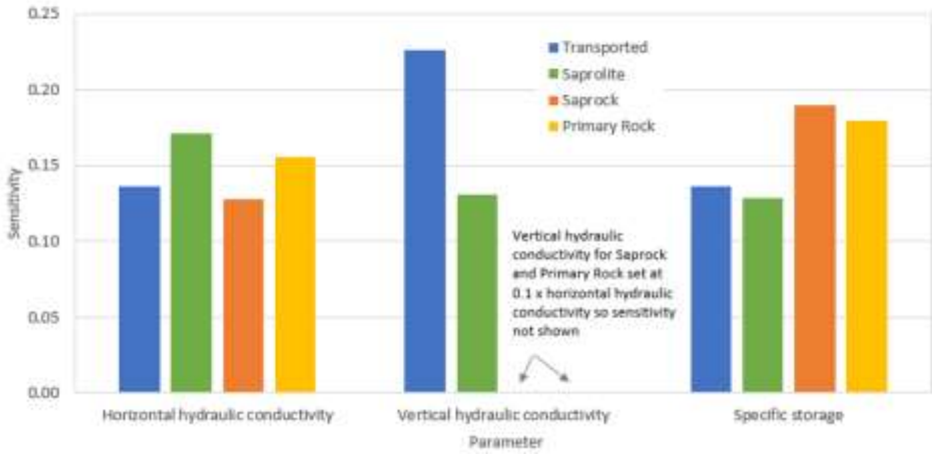


Figure 5.18 **Mine site model calibration sensitivity to hydraulic conductivity parameters (after mine site report, Figure 8-17) (Coffey 2021c)**

Specific yield was not calibrated in the mine site model. A value of 0.2 was adopted for the Transported unit in the mine site model (consistent with the approved Mod-14 assessment which adopted a value of 0.15) and a value of 0.04 was adopted for the BCPB model.

Figure 5.19 shows a comparison of modelled groundwater inflow to the open pit, stopes and access tunnels for specific yield values of 0.04 and 0.2 in the Transported unit. It can be seen from Figure 5.19 that the impact is relatively minor on inflows.

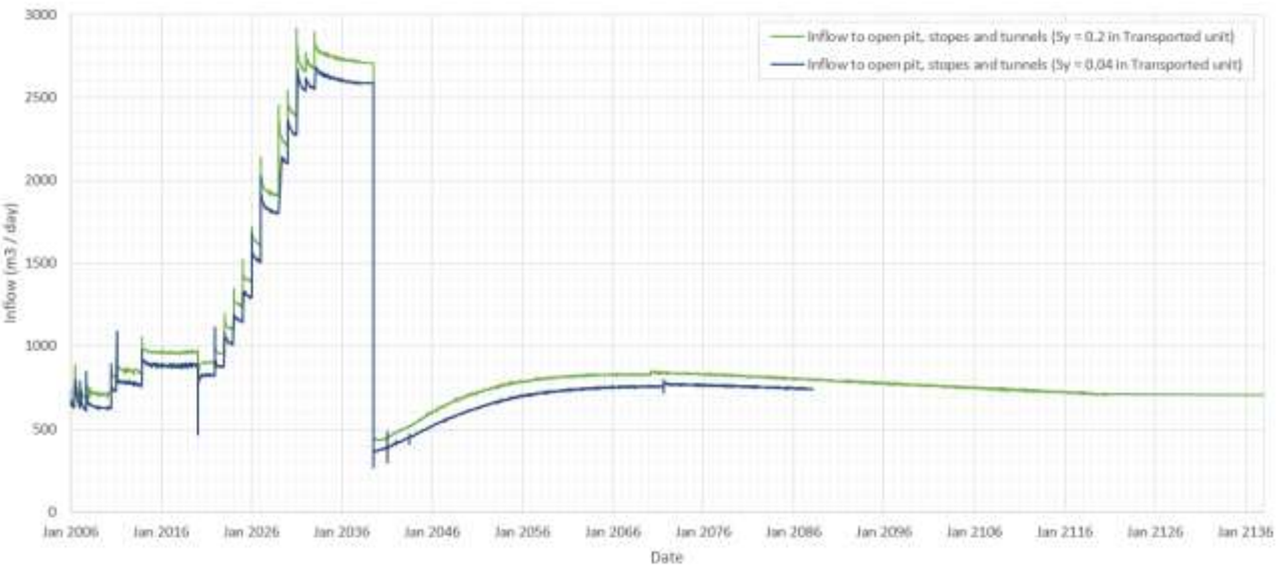


Figure 5.19 **Effect of the specific yield parameter of the Transported unit on modelled groundwater inflows (Coffey 2021c)**

Figure 5.20 shows the difference in groundwater head contours at the base of the Transported unit and in the Primary Rock at 0 mAHD in January 2038, just prior to the end of underground mining, for specific yield values of 0.04 and 0.2 in the Transported unit.

At the base of the Transported unit, the 200 mAHD head contour for the Sy = 0.04 case can be seen to extend out approximately 300 m to the east and approximately 500 m to the north and south compared to the Sy = 0.2 case.

The 205 mAHD contour around the TSF/IWL can be seen to extend up to approximately 300 m further out for the Sy = 0.04 case compared to the Sy = 0.2 case. The overall shape of the contours is similar for the two cases.

In the Primary Rock at 0 mAHD the difference between the two cases is much smaller, although still noticeable.

The differences in groundwater head contours between the cases of specific yield values of 0.04 and 0.2 in the Transported unit do not change by an amount significant enough to affect nearby groundwater users, the closest one to the mining lease being located over 2 km east of the mining lease.

As the shape of the contours are very similar for the two cases, and the groundwater head gradients are slightly smaller for the case of Sy = 0.04 around the TSF/IWL, contaminant transport predictions are considered to be slightly more conservative for the case of Sy = 0.2 adopted in the mine site report. The differences considered to be minimal.

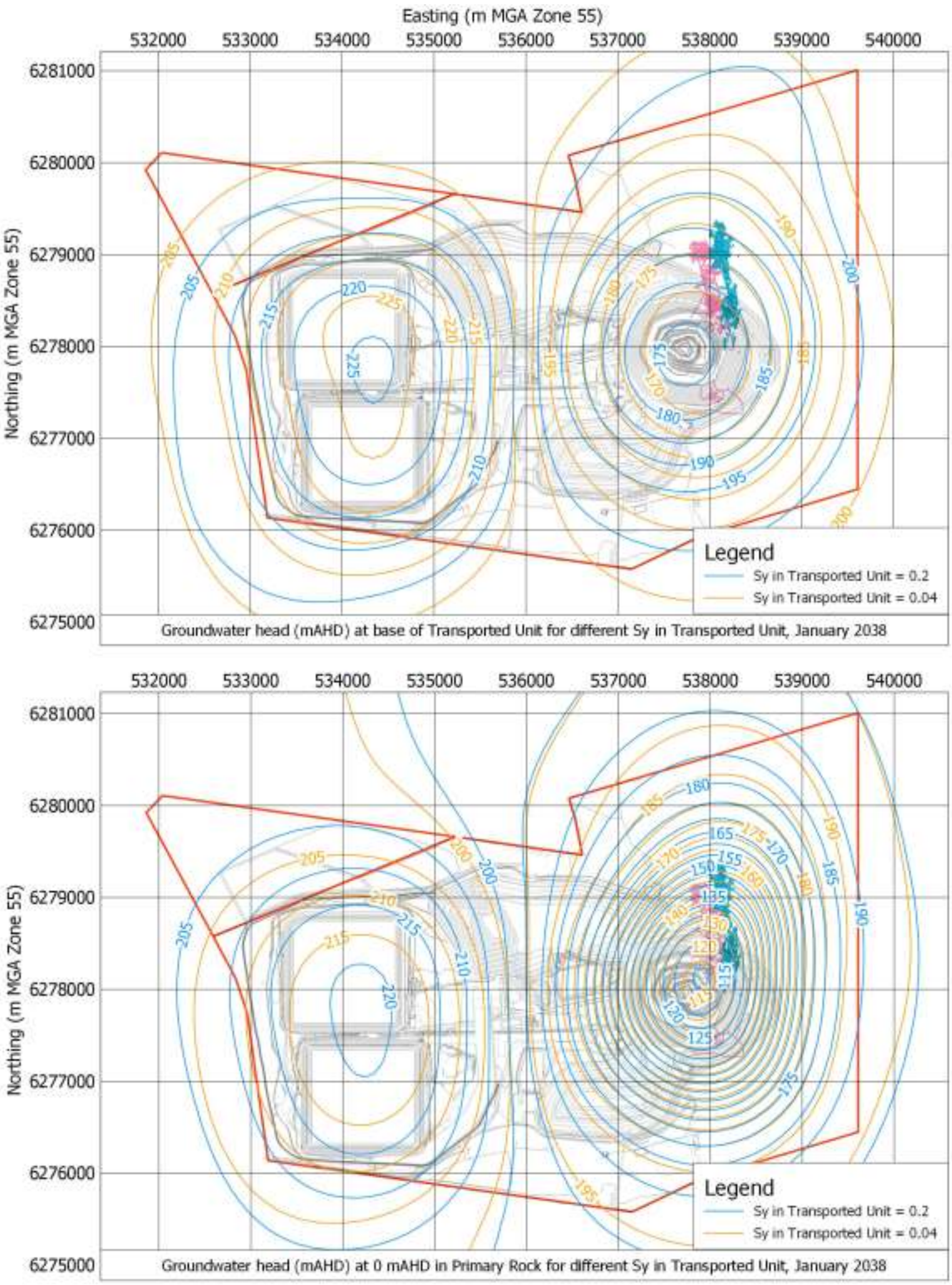


Figure 5.20 Effect of the specific yield parameter of the Transported unit on groundwater heads in 2038 (Coffey 2021c)

In summary, the BCPB and the mine site models were calibrated separately. The parameters adopted for each were based on information relevant to each of the model domains, bearing in mind the purpose of each of the models. The BCPB model was calibrated to provide overall representation of regional conditions as a result of pumping from the Bland Creek Paleochannel, while the mine site model was calibrated against local conditions affected by the CGO mine operations. This resulted in a difference in the adopted parameters for the Upper Cowra Formation / Transported unit between the models. An assessment was provided on the effect on the results of the mine site model if the specific yield parameters adopted for the BCPB model were used, and this was shown to not affect the model results significantly.

An objective assessment of the magnitude and extent of cumulative drawdown impacts (mining and borefields, possibly using the principle of superposition), noting that this reviewer does not believe that the effort required for an integrated modelling of cumulative impacts is commensurate with groundwater-related risks and uncertainties predicted for the proposed underground development, despite low confidence in the mine site model results.

The maximum drawdown modelled in the BCPB model in the Upper Cowra Formation (approximately representative of groundwater table drawdown in that model) is 2.7 m, occurring in the central part of the Eastern Saline Borefield (ESB) in 2040. At the mine site, Figure 10-3 of *Groundwater Impact Assessment for the mine site* (Coffey 2020a) shows groundwater table drawdowns are predicted to be contained approximately within the CGO mining lease in 2040.

Figure 5.21 presents the combined groundwater table drawdowns from the mine site model and the BCPB model using the principal of superposition. It can be seen that there are no significant cumulative effects on the groundwater table.

Note that the BCPB report does not provide a figure showing the relatively minor drawdown in the Upper Cowra Formation, however, Figure 4-6 of the BCPB report provides an example illustrating the very minimal drawdown of the water table that has been observed at bore GW036594 in the BCPB area.

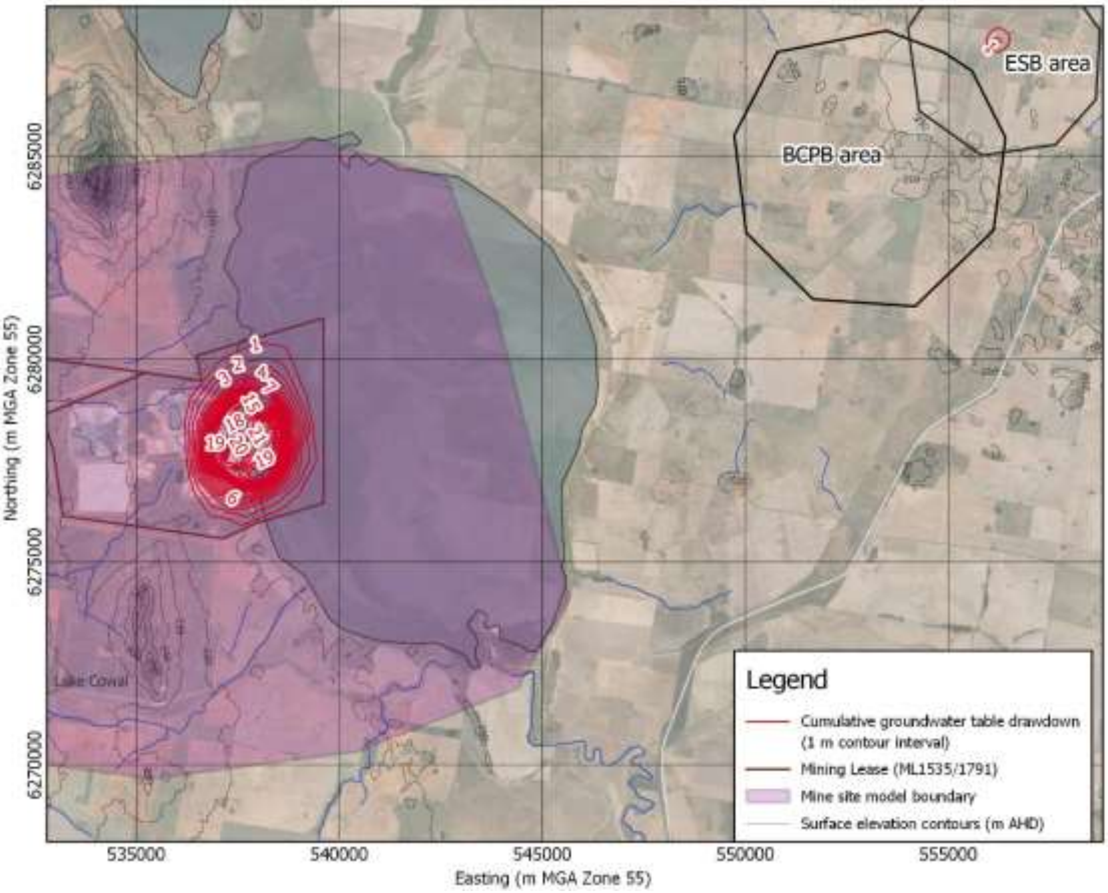


Figure 5.21 Cumulative groundwater table drawdown in 2040 from the mine site and BCPB models (Coffey 2021c)

If the previous assessment information on the final void lake water quality (Gilbert and Sutherland 1997) is considered not adequate in relation to the current proposal, then detailed information is required on the long-term prediction of final void lake hydro-geochemistry, including the influence of the backfilled underground voids, with comprehensive justification on the sustainability of the rehabilitation plan.

A previous hydrogeological assessment (Cowal Gold Mine E42 Modification - Hydrological Assessment, Gilbert & Associates Pty. Ltd ref: J0616-1.rg1b.doc, dated: July 2008) (the Gilbert & Associates report) provides discussion on the final void lake water quality. This is considered adequate in relation to the current proposal, which does not propose changes to the final open pit void shape from the previous approval (Mod 14). The presence of stopes paste backfill from the proposed underground development is not expected to significantly affect the chemistry of the groundwater flowing into the open pit post mining.

The following extract from the Gilbert & Associates report discusses final void lake water quality, in particular salinity:

> *The void water quality would reflect the influence of the high salinity in the groundwater. Predictions of average void salinity based on a solute balance between inflows and outflows confirm that salt concentrations in void waters would slowly increase. However, the lower groundwater inflow rates mean that salinity would increase more slowly than was originally predicted for the approved CGM – reaching about 67,000 mg/L after about 200 years – refer Figure B-6. Salinity is predicted to continue to increase trending to hyper-salinity.*

Figure B-6 from the Gilbert & Associates report is shown as Figure 5.22 below.

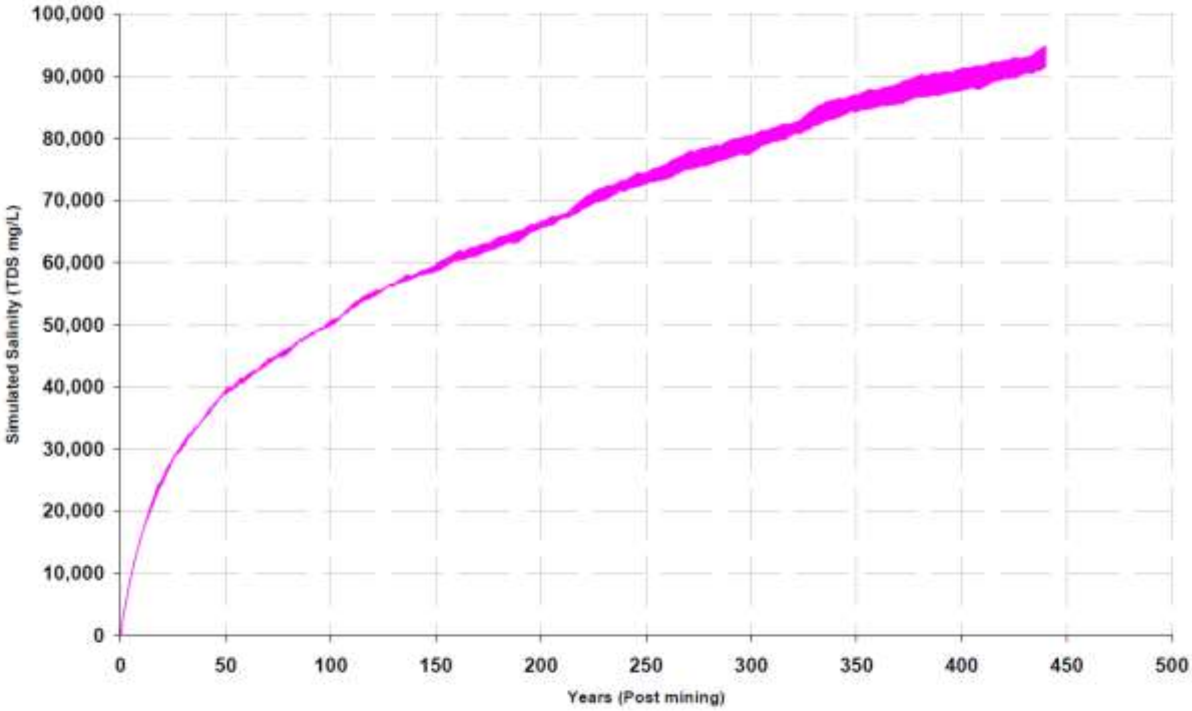


Figure 5.22 Predicted Final Void Water Quality (Salinity TDS mg/L) (after Gilbert & Associates, 2008) (Coffey 2021c)

Provide updated contaminant migration assessments, based on the updated flow model.

As a result of the items identified for clarification and correction by the HydroGeoLogic report, the mine site groundwater flow model was updated with a reduced timestep to bring the model mass balance error below 1%. This was shown to have a minimal effect on groundwater head contours during the period where the original model's mass balance error was above 1%. In addition, corrections to the assessment of the paste backfill volume and a sensitivity assessment on the specific yield parameter in the transported unit were shown to have a very limited and short-term effect on groundwater head contours in the case of the paste backfill volume correction, and to result in slightly lower groundwater head gradients around the TSF/IWL in the case of the specific yield sensitivity assessment.

The results of the model corrections and sensitivity studies described in this addendum have shown that the effects on the modelled groundwater head contours compared to the original model are either very limited to negligible, or would result in slightly lower head gradients around the TSF/IWL leading to a less conservative assessment of contaminant transport times from the TSF/IWL. As such, it is considered that the contaminant migration assessment provided in the mine site hydrogeological report Section 10.7 remains valid.

6 Updated evaluation and conclusion

6.1 Evaluation

Australia is the second largest producer of gold in the world, and therefore it plays an essential part in meeting the global demand for gold.

Gold demand and price are projected to continue rising over the next five years, as gold's status as a safe haven asset boosts investor demand over the short term, and at the same time as world mine supply declines as some long and large established mines in Australia and other major gold producing countries reach the end of their mine life.

To offset this decline in production, new mines and extensions to existing mines will be needed. The continuation of operations at CGO and the introduction of the Project will assist in meeting global gold demand well into the future.

Evolution is a publicly listed gold, silver and copper production mining company trading on the ASX. In addition to CGO, Evolution's wholly owned assets include:

- Mount Carlton Open Pit and Underground Gold Operation (QLD);
- Mount Rawdon Open Pit Gold Operation (QLD);
- Mungari Open Pit and Underground Gold Operation (WA); and
- Red Lake Underground Gold Operation in Western Ontario, Canada.

Evolution also partly owns the Ernest Henry Copper-Gold Operation in QLD, operated by Glencore.

Since its inception, the CGO has made sustained and broadly-based positive contributions to our host communities. This has continued since Evolution because the owner and will continue to do so for the foreseeable future.

As a result of investment in community infrastructure and services made possible through a Voluntary Planning Agreement with Bland Shire, investment in education and training will also continue as Evolution explores ways to build local skills to support local labour supply for the Project. Project procurement spend in the local area will also continue throughout the life of the Project as Evolution is committed to supporting local businesses to participate in the Project procurement process.

The Project and Mod 16 therefore represent significant socio-economic opportunity for the local, regional and State economies. There will be a range of benefits that would result from the proposed activities, which relate to employment generation and demand for local and regional services.

The mine will continue to pay royalties to the State. The submissions in support of the Project (and the absence of objections) show Evolution's standing in the community as a responsible corporate citizen that will continue to provide direct funding to local government authorities for road maintenance and indirect economic benefit to local and regional towns.

The Project is expected to create around 160 construction jobs and around 200 long-term mining jobs. It plans to accommodate the majority of this workforce in the short to medium term in a purpose-built accommodation village in West Wyalong. Evolution will continue to encourage its workers to reside in the region and expects to be an active participant in the community over the life of the mine.

6.2 Public interest

The Underground Development Project EIS and Mod 16 has shown that the Project will provide a range of direct and indirect benefits to the local, regional and State economies over its 19-year life. The Project is estimated to bring significant net social benefits to NSW and direct employment for an average of 260 people during operations. Including flow-on effects, it is estimated that the Project operation will contribute up to 200 direct and 900 indirect jobs and $67M in annual direct and indirect household income to the regional economy.

To enable a balanced comparison of the overall merits of the Project, an economic assessment was prepared, and updated to consider the amended Project. This assessment includes a cost benefit analysis (CBA), which assesses the net production benefits of the Project in NPV terms that accrue to NSW. If approved, these benefits will be distributed to numerous stakeholders including the NSW Government via royalties and tax, local councils via rates and the local community through wages and local expenditure.

The Project will extend the life of mine to approximately 2039-40, providing a range of direct and indirect socio-economic benefits to the region and State over its life. The Project is expected to bring significant economic benefits to NSW of $314.4M (net present value at 7% discount rate). The Project is estimated to support an additional $38.9 million in gross regional product (GRP) per annum in the Catchment during construction and $106.3 million GRP per annum in the Catchment during operations. At its peak, the Project is estimated to result in an average annual increase in GRP of 5.0% compared to what would be expected to occur without the Project (2024-25 to 2031-32).

Demand for gold, and hence its price, is expected to continue to be strong in the coming decade, particularly in light of recent global uncertainty and the fact that gold is a safe haven asset in uncertain times.

The latest *National Resources Statement* by the Australian Government (2019) reported that demand is forecast to rise by 16 percent compared to 2018 levels to 172,906,000 ounces in 2030.

In reference to economic efficiency, there is no evidence that residual environmental impacts of the Project are valued greater than the total net production benefits that will accrue to NSW. Through the implementation of proposed comprehensive suite of impact, avoidance, mitigation and management measures, the EIS clearly demonstrates that the Project can be undertaken without significant long-term impacts on the local environment. As such, the Project is in the public interest and should be approved.

6.3 Conclusion

Evolution owns and operates an open-cut gold mine known as Cowal Gold Operations near West Wyalong, in the central west region of NSW. Evolution now seeks approval for the construction and operation of underground mining to gain access to a deeper orebody containing approximately 1.8 Moz of gold. The Project will require Evolution to invest $281m during construction, over $1B in operating and closure costs, creating 159 FTE jobs per annum during construction and 236 FTE jobs per annum during operations, during an expected life of 19 years. Without the project, existing operations at the mine will cease in 2032. The CGO Underground Project will extend the life of mine until 2040, which will therefore secure existing jobs for an additional 8 years in addition to providing opportunity for new jobs to be created at the mine.

The Project is being developed beneath and adjacent to the existing CGO open-cut and will utilise the existing processing facility, IWL for tailings and waste rock dumps. The underground mine lies partly underneath Lake Cowal, a nationally important, ephemeral wetland.

The EIS for the Project and the Modification Report for Mod 16 were concurrently exhibited between 26 October 2020 – 22 November 2020. There were no public objections received on the EIS and only one objection received on Mod 16 which raised concerns about water security in the region.

The key issues raised mostly relate to whether the mine would have a significant impact on the groundwater regime in the local area near the mine and if there will be a hydraulic connection between Lake Cowal and the underground mine.

The proposed mine plan and overall Project design were progressively optimised over two years based on detailed investigations of geological, environmental, engineering and financial considerations. The baseline environmental investigations began in June 2019 and have included groundwater, surface water, ecology, noise, heritage, visual, social and economic conditions. Potential risks have been assessed and taken into account in designing the Project.

The Project planning process included multiple rounds of design, assessment and review to avoid or minimise impacts. Importantly, the principle of minimising direct and indirect impacts on Lake Cowal have been addressed by reducing the scope of the mine plan and reducing stope development in the upper levels of the orebody closest to the bed of the lake.

A key focus the studies undertaken to date has been on those environmental aspects that could potentially affect Lake Cowal: groundwater, surface water, water quality and subsidence.

In response to issues raised by an independent review commissioned by DPIE assessments, and issues raised by DPIE Water and NRAR about the groundwater model and the potential for a hydraulic connection between the lake and the proposed underground mine, further studies have been undertaken. This additional work has confirmed the findings of the initial studies: that with appropriate management, Lake Cowal will be unaffected by the Project.

The Project has been studied from many perspectives and its final design is considered the most sustainable response to economic, social, environmental and cultural values that exist in the area. It is considered that the predicted economic and social benefits will strongly outweigh primarily minor and manageable adverse impacts in the region.

Abbreviations

AHD	Australian Height Datum	Km/h	Kilometres per hour
ASX	Australian Stock Exchange	LHD	Load haul dump
AULS	Auxiliary short left turn	LSC	Lachlan Shire Council
BAL	Basic Left Turn	m	Metres
BAR	Basic Right Turn	MDBA	Murray Darling Basin Authority
BCS	Biodiversity Conservation Division	MEG	Mining, Exploration and Geoscience
BDAR	Biodiversity Development Assessment Report	ML	Megalitres
BSC	Bland Shire Council	ML	Mining lease
CBA	Cost benefit analysis	ML/year	Megalitres per year
CEMCC	Community and Environment Management Consultative Committee	Moz	Million ounces
CGO	Cowal Gold Operations	MOP	Mining Operations Plan
CHRS	Channelised short right turn	Mt	Million tonnes
DPIE	Department of Planning, Industry and Environment	Mtpa	Million tonnes per annum
EIS	Environmental impact statement	NPV	Net Project value
EMM	EMM Consulting Pty Limited	NSW	New South Wales
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*	NRAR	Natural Resources Access Regulator
ERP	Emergency Response Plan	Oz	Ounces
Evolution	Evolution Mining (Cowal) Pty Limited	RFS	Rural Fire Service
FMP	Fire Management Plan	SLOS	Sub-level open stoping
FSC	Forbes Shire Council	SISD	Safe intersection sight distance
Gl	Gigalitre	SSD	State significant development
Ha	Hectares	TMP	Transport Management Plan
HEC	Hydro-Engineering Consultants Pty Limited	The Project	The Underground Development Project
ICDS	Internal catchment drainage system	UCDS	Up-catchment Diversion System
IWL	Integrated Waste Landform	WAD	Works Authorisation Deed
Km	Kilometres	WALs	Water access licences

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