McPhillamys Gold Project
Amendment Report

Prepared for LFB Resources NL
September 2020

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McPhillamys Gold Project

Amendment Report

Report Number

J180395 RP10

Client

LFB Resources NL

Date

3 September 2020

Version

Final

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3 September 2020	3 September 2020

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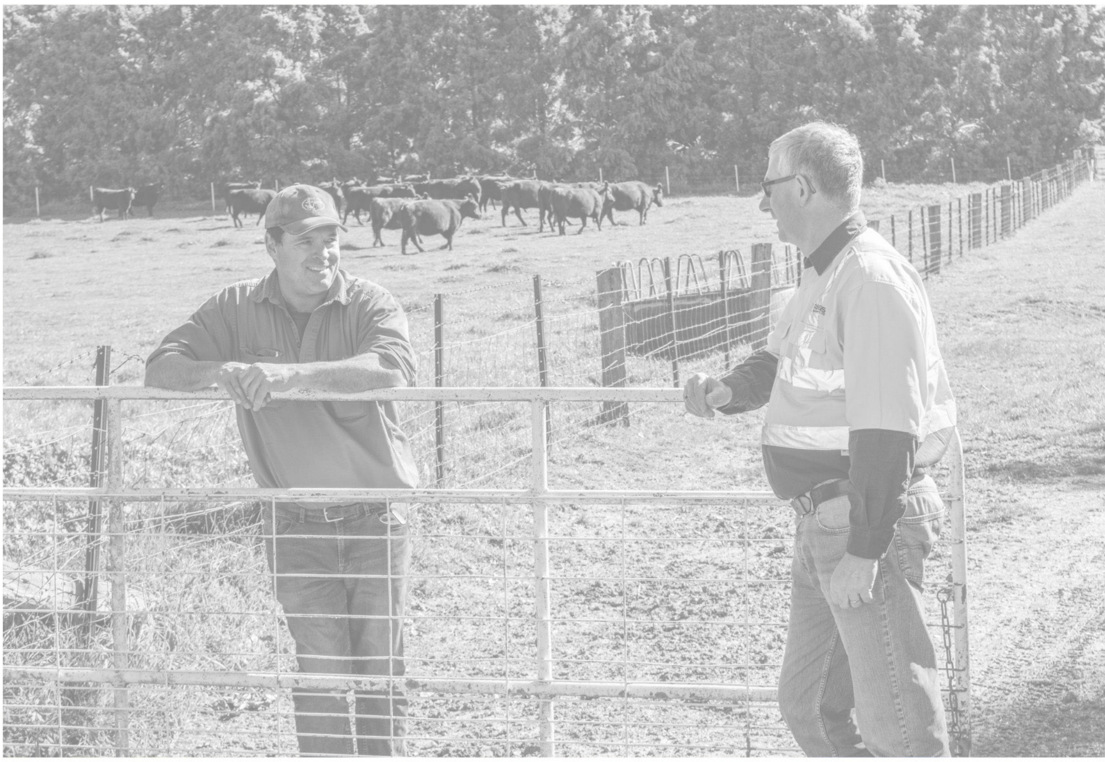
Executive summary



Executive Summary

ES1 Background

LFB Resources NL is seeking development consent for the construction and operation of the McPhillamys Gold Project (the project), a greenfield open cut gold mine and associated water supply pipeline in the Central West of New South Wales (NSW), as shown in Figure ES1. The project is comprised of two key components:

- the mine site where the ore will be extracted and processed (ie the mine development); and
- an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (ie the pipeline development).

The proponent, LFB Resources NL, is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis). Regis is an Australian gold miner with a proven record of developing gold mining operations and is one of the top five Australian gold companies by market capitalisation and production. Regis acquired Exploration Licence (EL) 5760 in November 2012 and has since conducted detailed geological, environmental, financial and other technical investigations to define the McPhillamys resource and to identify and address environmental and other constraints. The large investment proposed to construct and operate the project will provide substantial economic stimulus and benefits to the Australian, NSW and local economies.

ES2 The project

The project is State significant development (SSD) pursuant to Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011*.

The key components of the project as described in the environmental impact statement (EIS) (EMM 2019a), and for which Regis is seeking development consent, include:

- development and operation of an open cut gold mine and associated infrastructure to support the mine over a 15 year project life, including ore processing, stockpiling, tailings management and on-site water management infrastructure;
- extraction of up to 8.5 Million tonnes per annum (Mtpa) of ore over the project life, and the use of a conventional carbon-in-leach processing facility with a processing rate of up to 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold;
- construction and use of an engineered Tailings Storage Facility (TSF), consistent with leading practice, to store tailings material;
- establishment of mine site access via a new intersection off the Mid Western Highway;
- development of ancillary infrastructure, including a mine site access road, internal haul roads, workshop, stores, administration buildings, explosives magazine and storage, soil stockpiles and other minor site infrastructure;
- progressive rehabilitation of the mine development; and
- construction and use of a water supply pipeline between the mine development and the Western Coalfields (ie the pipeline development).

ES3 Project amendments

A development application (DA) and an environmental impact statement (EIS) (EMM 2019a) were submitted to the NSW Department of Planning, Industry and Environment (DPIE) in 2019 under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS were subsequently publicly exhibited from 12 September 2019 to 24 October 2019.

During the public exhibition of the EIS, 671 submissions were received by DPIE, including submissions from government agencies, special interest organisations and the general community. Of these, 624 submissions were received from the community (consisting of 474 unique submissions and 150 form letters), 27 from organisations, and 20 from public authorities. The majority of unique submissions and form letters came from the Blayney Local Government Area (LGA), specifically 52% of the unique submissions and 42% of the form letters. Of the unique submissions received from Blayney LGA, 52% were in support of the project. The remaining community submissions came predominantly from the Bathurst Regional LGA, Orange LGA and Cabonne LGA. A Submissions Report (EMM 2020a) has been prepared to respond to the matters raised in these submissions, in conjunction with this Amendment Report.

In response to matters raised in submissions from the community, government agencies, businesses and other organisations, as well as a result of further detailed mine planning and stakeholder engagement, Regis has made a number of amendments to the project since the public exhibition of the EIS. By amending the project, Regis has sought to address and resolve matters raised in submissions to reduce the overall impacts of the project. The amended project will result in direct and indirect economic benefits to the local community and has been considered in accordance with the principles of ecologically sustainable development (ESD).

The main amendments relate to the following aspects:

- **Site access** – a new location for the site access intersection off the Mid Western Highway is proposed, approximately 1 km east of the original location assessed in the EIS, in response to feedback from Transport for NSW (TfNSW, formerly Roads and Maritime Services) and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

- **Mine and waste rock emplacement schedule** – revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement, in particular consideration of predicted noise levels in Kings Plains, has reduced early activity (and therefore, noise generation) in the southern end of the mine development project area near Kings Plains while extending the construction timeframe for the southern amenity bund to maintain these reduced noise levels.

- **Pit amenity bund** – optimisation of the open cut pit design and the improved location of the primary exit ramps for haul trucks (which will reduce noise emissions for neighbouring properties) allowed the size of the pit amenity bund to be reduced.

- **TSF** – amendments to the design include changes to the embankment design and construction timing, the TSF footprint and the TSF post closure landform to facilitate improved water management around the TSF.

- **Water management system –** the secondary water management facility (WMF) has been removed from the water management system which avoids impacts to a potential item of historic heritage (MGP 23 - Hallwood Farm Complex (Hallwood)). The size of the WMFs has also been revised to further optimise the nil discharge design of the operational water management system during wet weather events.

- **Mine administration and infrastructure area** – the layout of this area has been revised and optimised to further integrate into the surrounding natural topographical shielding in the area, reducing its visibility.

- **Mine development project area** – a very small change has been made to the mine development project area along the eastern boundary (an additional 1 hectare (ha), or 0.04% change), to accommodate the required clean water management system. The change takes the project area from 2,513 ha to 2,514 ha (refer to Figure ES2).

Some amendments to the pipeline development have also been made, as follows:

- **Pipeline route** – the pipeline route has been amended for a section of the corridor west of Bathurst, primarily in consideration of land access. Two options for the amended pipeline route have been included and assessed in the amended project; the northern option and the southern option, as shown in Figure ES3.

- **Pipeline corridor/disturbance footprint** – the pipeline corridor has been differentiated from the pipeline disturbance footprint, with small changes made to both the pipeline corridor and the disturbance footprint. While the alignment of pipeline sections outside the realigned northern and southern options has not changed, there have been minor variations in the width of the corridor to provide flexibility in the detailed design and subsequent construction phases of the project.

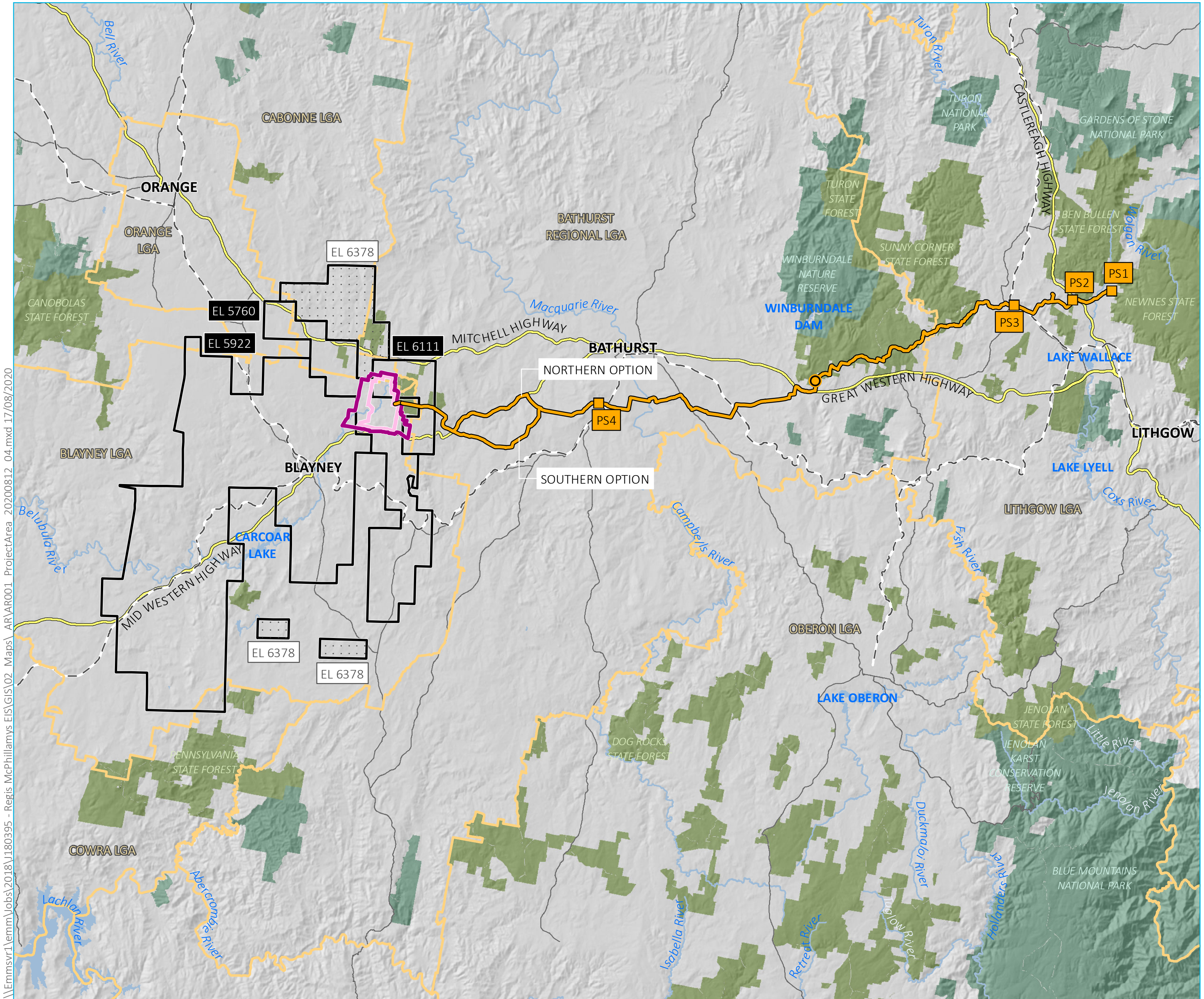
- **Pumping station facilities** – pumping station facility No.3 has been relocated from the vicinity of Energy Australia's Mount Piper Power Station (MPPS), to approximately 4.3 km to the west and adjacent to Pipers Flat Road.

The amended mine development layout, compared to that assessed in the EIS, is shown in Figure ES2 and the amended pipeline development layout is shown in Figure ES3. A full description of the amendments to the project is provided in Chapter 2.

No material amendments have been made to other key aspects of the project as presented in the EIS for which approval is sought, such as the proposed mining method, operating hours, annual ore extraction rate of up to 8.5 Mtpa, annual ore processing rate of up to 7 Mtpa, employee numbers, and rehabilitation methods and outcomes.

ES4 Impact assessment

Revised technical studies have been conducted to assess the impacts of the project amendments. A summary of the findings of these technical studies, compared to the EIS, is provided in Table ES1.



KEY

Project application area

- Mine development project area (2,514.06 ha)
- Mining lease application area (1,806.17 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline

Existing environment

- Rail line
- Primary road
- Arterial road
- River
- Waterbody
- NPWS reserve
- State forest
- Local government area

Exploration lease boundaries (of interest)

- Held by LFB Resources NL (Regis)
- Held by others

Regional setting – project application area

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Figure ES1

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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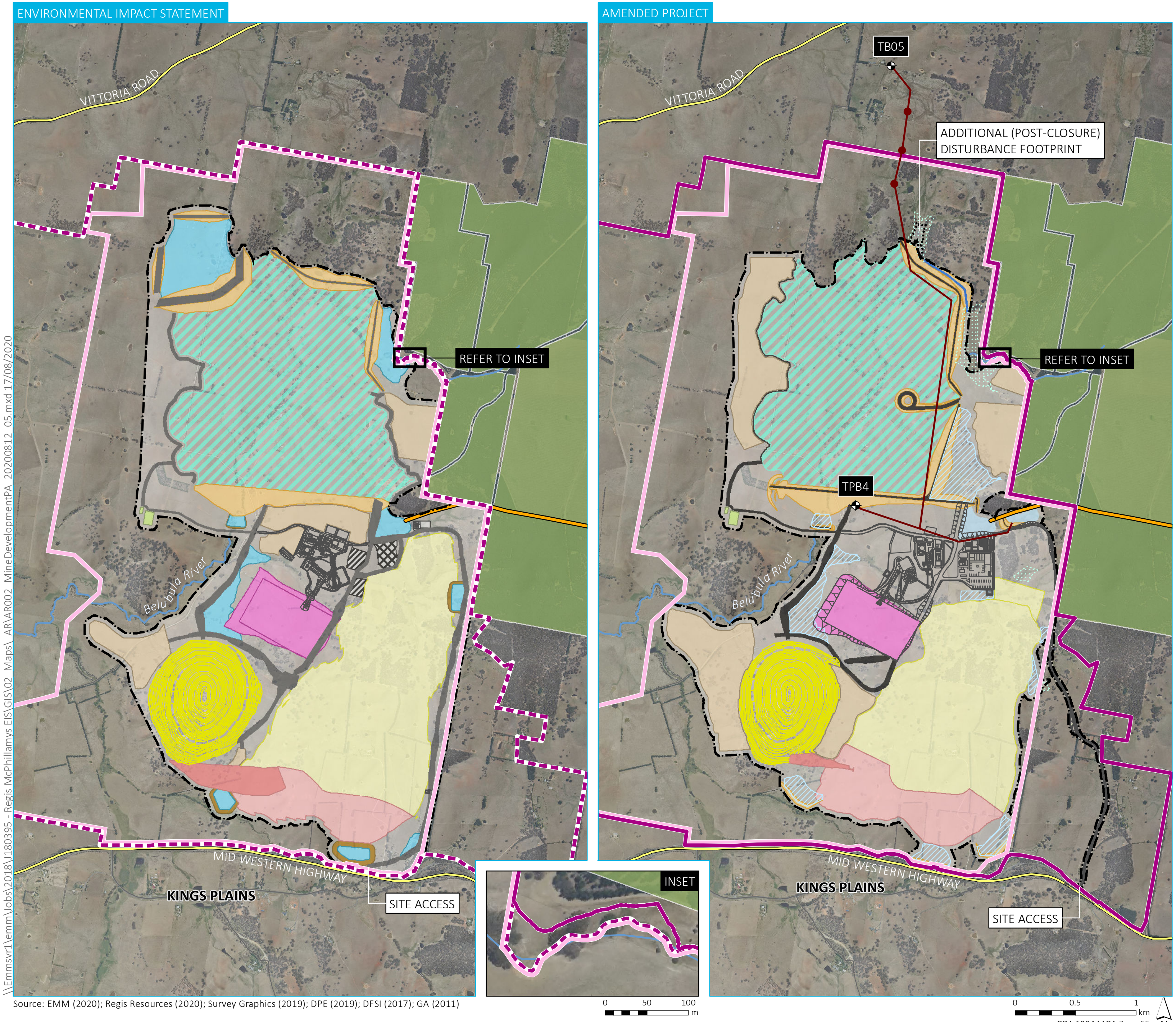

KEY

Project application area
- Mine development project area (EIS)
- Mine development project area (amended project)
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Project general arrangement
- Construction groundwater bore
- Indicative construction groundwater bore
- Indicative construction groundwater pipeline
- Open cut mine
- Site infrastructure
- Belubula River
- Road
- Mine administration (EIS)
- Workshop (EIS)
- Mining equipment areas (EIS)
- Magazine and ammonium nitrate emulsion storage
- Southern amenity bund
- Pit amenity bund
- ROM pad
- Soil zone
- Embankment
- Sediment basin structure (EIS)
- Waste rock emplacement
- Tailings storage facility (TSF)
- Water management area (EIS)
- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Existing environment
- Major road
- Minor road
- Vittoria State Forest

Amended mine development conceptual layout compared to EIS

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Figure ES2

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DPE (2019); DFSI (2017); GA (2011)

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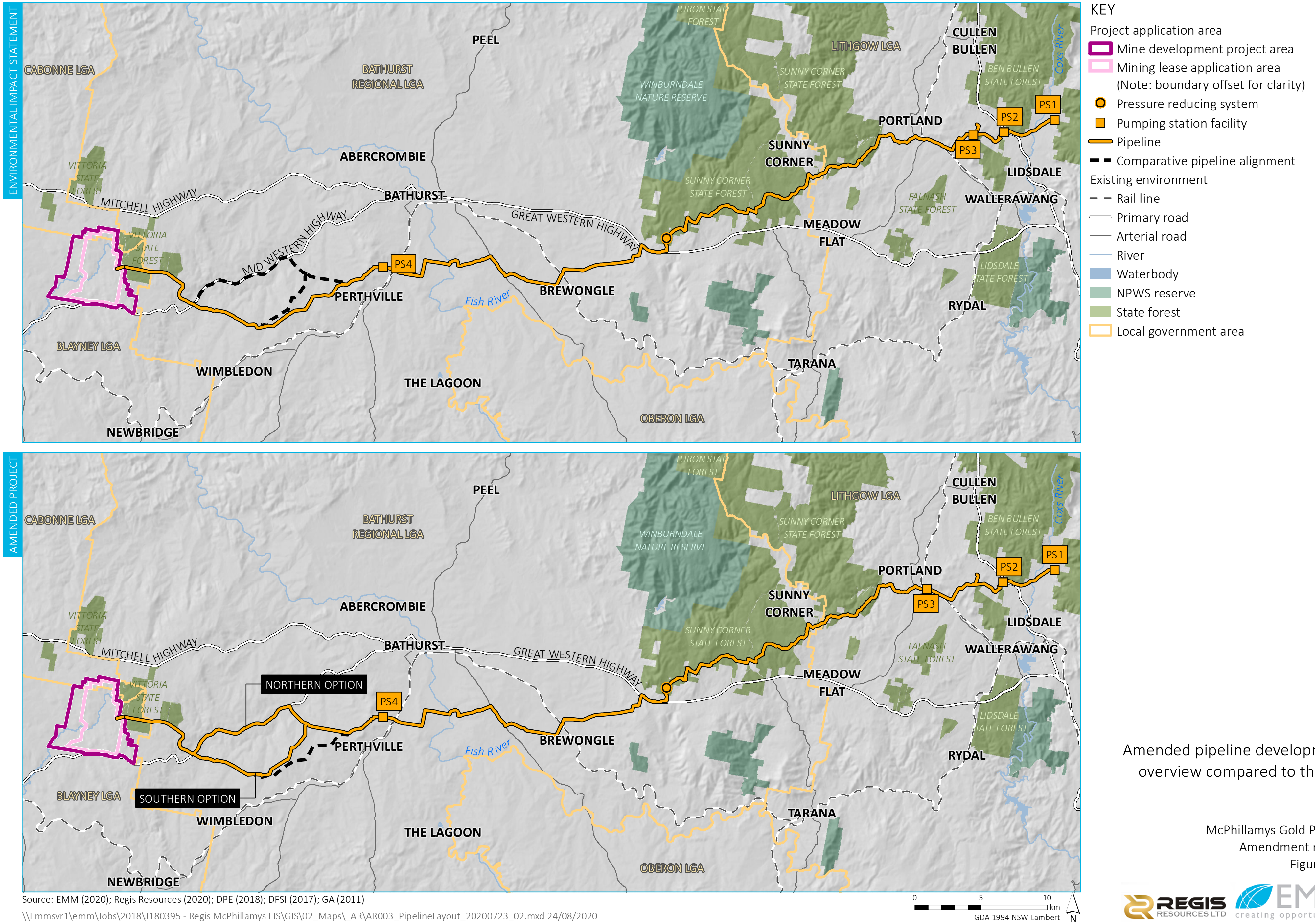

Amended pipeline development overview compared to the EIS

McPhillamys Gold Project
Amendment report
Figure ES3

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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Table ES1 Summary of key impacts as a result of project amendments

Aspect	EIS	Amended project	Comments on change
Soil resources and agriculture	Disturbance footprint of 1,135 ha. The change in land and soil capability classes in the mine project area post-mining is as follows: • a reduction in LSC class 4 by 12 ha; • a reduction in LSC class 5 by 411 ha; • an increase in LSC class 6 by 336 ha; • an increase in LSC class 7 by 17 ha; and • an increase in LSC class 8 by 71 ha (associated with the open cut void). There will be no permanent change to the LSC class throughout the pipeline corridor, apart from the pumping station facilities and access tracks.	Reduction in disturbance footprint by about 20 ha, to 1,116 ha. The change in land and soil capability classes in the mine project area post-mining is as follows: • a reduction in LSC class 4 by 3 ha; • a reduction in LSC class 5 by 411 ha; • an increase in LSC class 6 by 323 ha; • an increase in LSC class 7 by 25 ha; and • an increase in LSC class 8 by 66 ha (associated with the open cut void). As per the EIS, there will be no permanent change to the LSC class throughout the pipeline corridor, apart from the pumping station facilities and access tracks	The amended project will result in 9 ha more of LSC class 4 land post-mining, 13 ha less of LSC class 6, 8 ha more of LSC class 7, and 5 ha less of LSC class 8 land compared to the EIS design. The amended project represents some improvements to soil resources and agriculture outcomes presented in the EIS.
Surface water	A temporary reduction in the inflow to Carcoar Dam (4%) was predicted to occur as a result of construction and operation of the mine. Following mine-closure and rehabilitation, the reduction in flows would be much smaller (0.5% reduction). This level of change is expected to be within the current natural variability in catchment conditions.	The reduction in flow to Carcoar Dam on a percentage basis is predicted to be the same for the amended project.	Further detailed design of the post-closure drainage system has improved post-closure outcomes.
Groundwater	The inflow rate to the open cut pit is predicted to peak in Year 2 at 890 megalitres per year (ML/year). Groundwater levels at existing privately-owned bores predicted to experience little to no change as a result of the mine development and will not trigger the AIP[1] impact criteria for “make good” requirements.	The inflow rate to the open cut pit is predicted to peak in Year 2 at 580 ML/year. As per the EIS, privately-owned bores will experience little to no change as a result of the mine development. Construction water supply has been further investigated and will primarily be sourced from groundwater bores.	The amended project results in a reduction in the peak groundwater interception compared to that presented in the EIS. This is due primarily to the steadier development profile scheduled over the first years of the amended project.

Table ES1 Summary of key impacts as a result of project amendments

Aspect	EIS	Amended project	Comments on change
Noise	15 privately owned residences (plus one under option purchase) would be entitled to voluntary noise mitigation measures upon request in Kings Plains due to predicted exceedances of the noise criteria in the first few years of the mine development (Year 1 up to Year 4), due to exceedances of 3-5 decibels (dB).	Levels are predicted to exceed the noise criteria by up to 3 dB for a period in Year 1 at only one property, where there is development approval to build a residence.	The amended project represents a significant reduction in predicted noise emissions to neighbouring properties.
Air	Concentrations and deposition rates for particulate matter (TSP, PM_{10}, $PM_{2.5}$, dust deposition, metals and metalloids) and gaseous pollutants (NO_2 and HCN) predicted to be below the applicable impact assessment criteria at all neighbouring sensitive receptors, with the exception of one property, for which Regis has negotiated an option to purchase.	No exceedances predicted of any relevant air quality criteria.	The isolated exceedance predicted in the EIS in Year 4 is no longer forecast to occur under the amended project.
Greenhouse gas (GHG)	GHG emissions from the mine development are predicted to be minimal and make only minor contributions to the total GHG emissions for NSW and Australia. Annual average total GHG emissions (Scope 1, 2 and 3) to be generated by the mine represent approximately 0.095% of total GHG emissions for NSW and 0.023% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2016. The GHG emissions as a result of the pipeline development are so minor that they will make negligible contributions to the GHG emissions from the project as a whole.	Annual average total GHG emissions (Scope 1, 2 and 3) predicted for the mine development represent approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018. The GHG emissions as a result of the pipeline development are so minor that they will make negligible contributions to the GHG emissions from the project as a whole.	There is a small increase in predicted annual average GHG emissions associated with the amended project from that calculated in the EIS. This is primarily due to the fact that fuel and energy consumption is projected to be higher for the amended mine development relative to the original mine development, because of a slightly longer operating schedule (from around 10 years to 11 years) and the proposed use of larger equipment. Notwithstanding, the outcomes of the amended project are consistent with those presented in the EIS.

Table ES1 Summary of key impacts as a result of project amendments

Aspect	EIS	Amended project	Comments on change
Terrestrial biodiversity	The following credits will be required for the mine development: • 5,927 ecosystem credits; • 1,970 species credit for the Koala; and • 2,845 species credit for the Squirrel Glider. The following credits will be required for the pipeline development: • 139 ecosystem credits; and • 293 species credits.	The following credits will be required for the amended mine development: • 2,541 ecosystem credits; • 2,431 species credits for the Koala; and • 2,651 species credits for the Squirrel Glider. The following credits will be required for the amended pipeline development: • 363 ecosystem credits (if the southern pipeline alignment is constructed); or • 331 ecosystem credits (if the northern alignment is constructed); and • 968 species credits (southern pipeline option); or • 833 species credits (northern pipeline option).	Project amendments have reduced the amount of native vegetation to be cleared by approximately 2 ha. The changes to the amount of credits required for the amended mine development is largely a result of the adoption of the Biodiversity Assessment Method for the amended mine development (rather than the former Framework for Biodiversity Assessment). The method for calculating Koala impacts has changed since the EIS, with the introduction of *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala Habitat Protection SEPP). Using the Koala Habitat Protection SEPP, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project. Accordingly, provision for offsetting the loss of koala habitat as a result of the project is included in the proposed offset strategy. The area of native vegetation and Koala habitat north of the waste rock emplacement area, in the area between the site access road, the mine infrastructure area and the waste rock emplacement will be retained and protected.

Table ES1 Summary of key impacts as a result of project amendments

Aspect	EIS	Amended project	Comments on change
Aboriginal heritage	Up to 33 identified Aboriginal cultural heritage sites may be impacted by the mine development, and up to 7 within the pipeline corridor.	The amended mine development will result in up to 30 identified Aboriginal cultural heritage sites being impacted (27 directly impacted and 3 indirectly impacted). The amended mine development will result in the direct disturbance of six additional Aboriginal cultural heritage sites (previously assessed in the EIS as being potentially subject to harm). Two Aboriginal cultural heritage sites previously assessed as being subject to direct harm, are now subject to indirect harm. A further three Aboriginal cultural heritage sites will now be avoided by the amended project (previously assessed in the EIS as being potentially subject to harm). An additional site may be impacted by the amended pipeline corridor, if the southern pipeline option is constructed.	The number of Aboriginal heritage sites impacted directly has increased by four and the number of sites indirectly impacted has reduced by seven. For the amended pipeline corridor, if the southern pipeline option is constructed there will be one additional Aboriginal site impacted.
Historic heritage	Within the mine project area, there are: • no listed historic heritage items; • 7 sites deemed to be of local significance in the direct disturbance footprint of the mine development; • 4 sites also deemed to be locally significant were found within buffer areas around the direct disturbance footprint, and therefore may be subjected to some level of disturbance; and 1 site of potentially higher significance (Hallwood) pending further research, was also identified in the direct footprint of the mine development.	Items previously identified as indirectly disturbed, or adjacent to the disturbance footprint, have been conservatively classified as directly disturbed, resulting in: • 13 sites deemed to be of local significance with the potential to be directly disturbed. • 1 site deemed to be of local significance with the potential to be indirectly impacted. Hallwood is no longer in the direct disturbance footprint of the mine.	The amended project avoids direct impacts to Hallwood. This is due to the removal of the secondary water management facility.
Traffic	Mine development-related traffic will result in a minor increase to traffic volumes on the surrounding road network; however, the impacted roads have sufficient capacity to cater for the combined background traffic and project-related traffic over the 15-year project life.	No change in traffic movements. The site access intersection with the Mid Western Highway has been moved approximately 1 km to the east.	No material change in impacts.

Table ES1 Summary of key impacts as a result of project amendments

Aspect	EIS	Amended project	Comments on change
Visual amenity	There will be significant visual impacts to sensitive receptors in Kings Plains and other rural residences to the south of the mine project area, as well as to vehicles travelling along the Mid Western Highway, up to Year 4 of the mine development when construction and progressive rehabilitation of the southern amenity bund will be complete. A number of rural residences to the east and west will also experience high levels of visual impact during the initial stages of the mine development.	The significant impacts associated with the southern amenity bund extend to around Year 6 as a result of project amendments to reduce the noise impacts to neighbouring properties.	The extension of time to construct the southern amenity bund, which will be seen by residents directly south of the mine development project area, is due to the improvements made to the project design to reduce noise impacts to neighbouring properties. Regis continues to progress negotiated agreements (totalling 20) with potentially affected residents, which will include tailored landscape plans (including tree planting) to mitigate this impact.

Note: 1. NSW Aquifer Interference Policy (DPI 2012)

ES5 Justification and conclusion

The project involves a mining operation that will, consistent with the objects of the NSW *Mining Act 1992*, extract a State-owned resource for the benefit of the State of NSW, and will provide an estimated $56 million in royalties over the life of the mine.

World gold demand continues to be strong; a reflection of the fact that gold is a safe haven asset, particularly in uncertain times. World gold consumption is projected to rise at an annual rate of 2.1 per cent, to 4,712 tonnes in 2025, as lower gold prices boost jewellery demand and retail investment (Office of the Chief Economist March 2020). In the shorter term, as demand continues to adjust to current global circumstances, gold consumption is presently forecast to grow at a higher average annual rate of 4.2 per cent in 2021 and 2022, to 3,892 tonnes in 2022.

At a local level, the *Central West and Orana Regional Plan 2036* (DPE 2017) highlights the important role the mineral resources sector plays in underpinning many local economies in the region. Priorities of the regional plan include continuing to grow and support the mining sector in the Blayney and Cabonne LGAs, where mining is identified as one of the top three economic opportunities.

A number of amendments have been made to the project in response to submissions. The EIS recognised that the residual impacts of the project will mostly accrue to residences closest to the mine development project area, particularly in the settlement of Kings Plains, and many of the submissions received on the project reflected this. As described above, significant improvements have therefore been made to the project to specifically address these concerns and reduce the potential impacts on this community. Notably, predicted noise levels have substantially reduced compared to those associated with the EIS design.

Notwithstanding, Regis is committed to, and is actively progressing, the negotiation of agreements with the landholders identified in the EIS in Kings Plains. In addition, two more negotiated agreements are being progressed with landholders identified since submission of the EIS; a landholder in Kings Plains where the property owner has development consent to build a residence and is predicted to experience noise levels up to 3dB above the relevant noise criteria for a brief period in Year 1; and a property in proximity to the proposed mine site access intersection. The negotiated agreements include tailored landscape plans and/or building alterations for individual properties, as well as the inclusion of a clause granting the landholder the option to request Regis purchase their property within five years of the date of development consent. Five additional landholders are also being offered negotiated agreements in Kings Plains in consideration of visual impacts, excluding the option to purchase.

The net social benefit of the amended project, based on the 2019 gold price assumption used in the EIS, is estimated at $139 M present value (at 7% discount rate) ($231 M with employment benefits included), compared to $141 M for the EIS project ($232 M with employment benefits included). The net social benefit of the amended project to NSW is not materially different to the EIS project.

However, with recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be significantly greater than estimated. Adoption of conservative, contemporary gold price forecasts, results in the net social benefit of the amended project increasing to $244 M present value (at 7% discount rate) ($336 M with employment benefits included).

Regis is an Australian listed gold miner with a proven record of developing gold mining operations and is one of the top five Australian gold companies by market capitalisation and production. Regis has established a local office in Blayney and is committed to making a positive contribution to the local community. The Blayney LGA in particular will benefit from the project as a result of investment in community infrastructure and services made possible through a VPA, investment in education and training as Regis seeks to build and augment a local skills base to support labour supply for the project, and project procurement spend as Regis is committed to supporting local businesses to participate in the project procurement process.

This Amendment Report demonstrates that the project can be undertaken without any significant long term impacts on the local environment, and will provide a range of direct and indirect benefits to the local, regional and State economies over its 15 year life. As such, the project is considered to be in the public interest.

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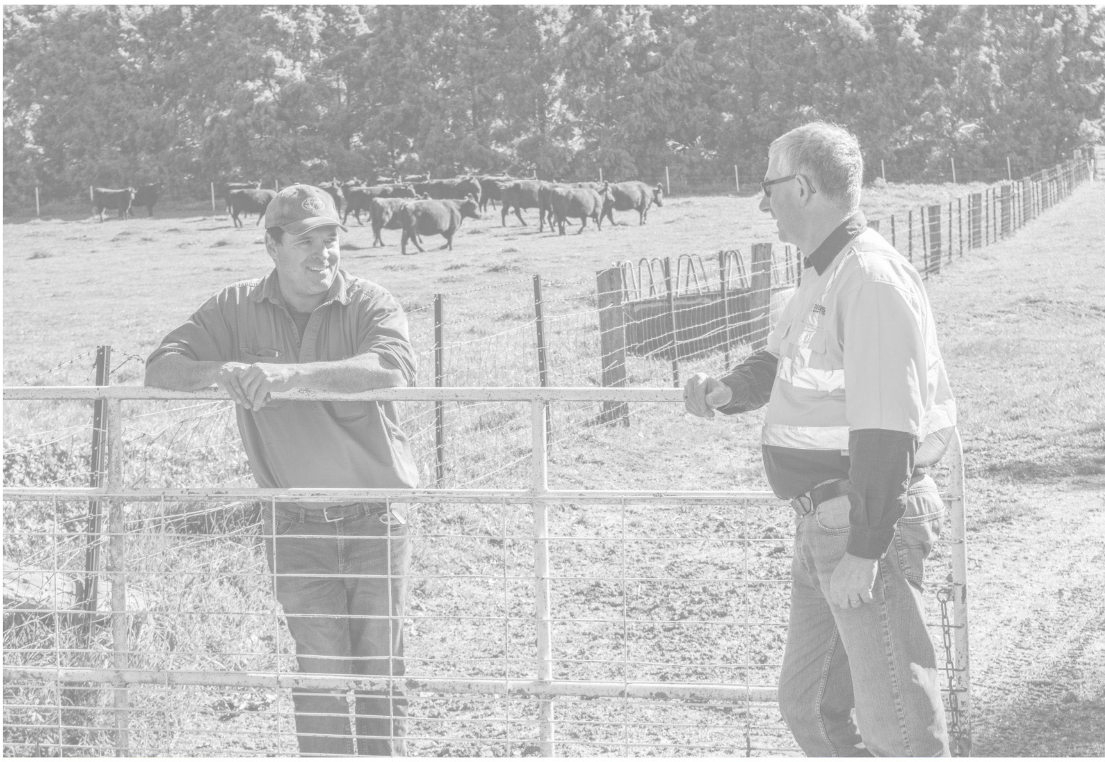
Chapter 1

Introduction



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1 Introduction

1.1 Background

LFB Resources NL is seeking development consent for the construction and operation of the McPhillamys Gold Project (the project), a greenfield open cut gold mine and associated water supply pipeline in the Central West of New South Wales (NSW). The project application area is illustrated at a regional scale in Figure 1.1 and a local scale in Figure 1.2. As shown in Figure 1.1, the project is comprised of two key components:

- the mine site where the ore will be extracted and processed (ie the mine development); and
- an associated water pipeline which will enable the supply of water from near Lithgow to the mine site (ie the pipeline development).

The proponent, LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis).

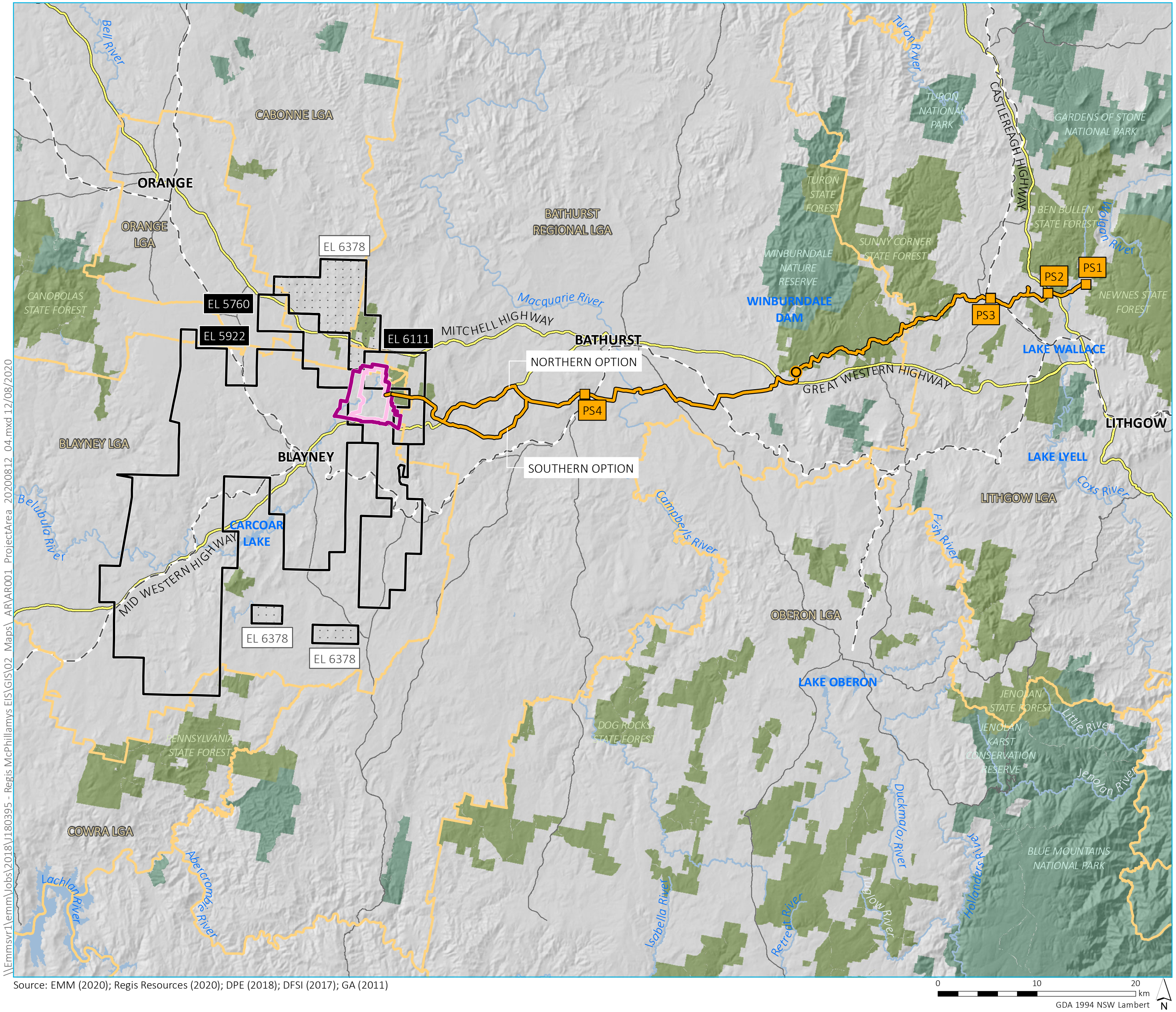
The project is State significant development (SSD) pursuant to Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP). A development application (DA) and an environmental impact statement (EIS) (EMM 2019a) were submitted to the NSW Department of Planning, Industry and Environment (DPIE) in 2019 under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The DA and EIS were subsequently publicly exhibited from 12 September 2019 to 24 October 2019.

During the public exhibition of the EIS, 671 submissions were received by DPIE, including submissions from government agencies, special interest organisations and the general community. Of these, 624 submissions were received from the community (consisting of 474 unique submissions and 150 form letters), 27 from organisations, and 20 from public authorities. The majority of unique submissions and form letters came from the Blayney Local Government Area (LGA), specifically 52% of the unique submissions and 42% of the form letters. The remaining community submissions came from the Bathurst Regional LGA, Orange LGA and Cabonne LGA. A Submissions Report (EMM 2020a) has been prepared to respond to the matters raised in these submissions, in conjunction with this Amendment Report.

As a result of feedback received in the submissions, as well as additional work undertaken to further optimise the mine layout and design and ongoing discussions with government agencies, the local community and other stakeholders; Regis has made a number of amendments to the project that was the subject of the DA and EIS. Changes have deferred activity in the southern waste rock emplacement area and smoothed the level of activity occurring, with the aim of further reducing the potential noise related impacts to the residences of Kings Plains, adjacent to the southern boundary of the mine development project area. To achieve a reduction in predicted noise levels, detailed optimisation of the mine schedule and associated construction sequence of the waste rock emplacement and the southern amenity bund has been completed.

Other changes made to the project include amendments to the layout of the tailings storage facility (TSF), the water management system, the location of the site access intersection with the Mid Western Highway, and the layout of the mine infrastructure and administration area. Some amendments to the pipeline development have also been made, including a change in the alignment of a short section to accommodate land access requirements.

This Amendment Report has been prepared to outline the changes to the project that have been made since the public exhibition of the EIS and to provide a summary of the potential impacts associated with the amended project. An overview of the amendments is provided in Section 1.2, with a detailed description presented in Chapter 2.



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Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

KEY

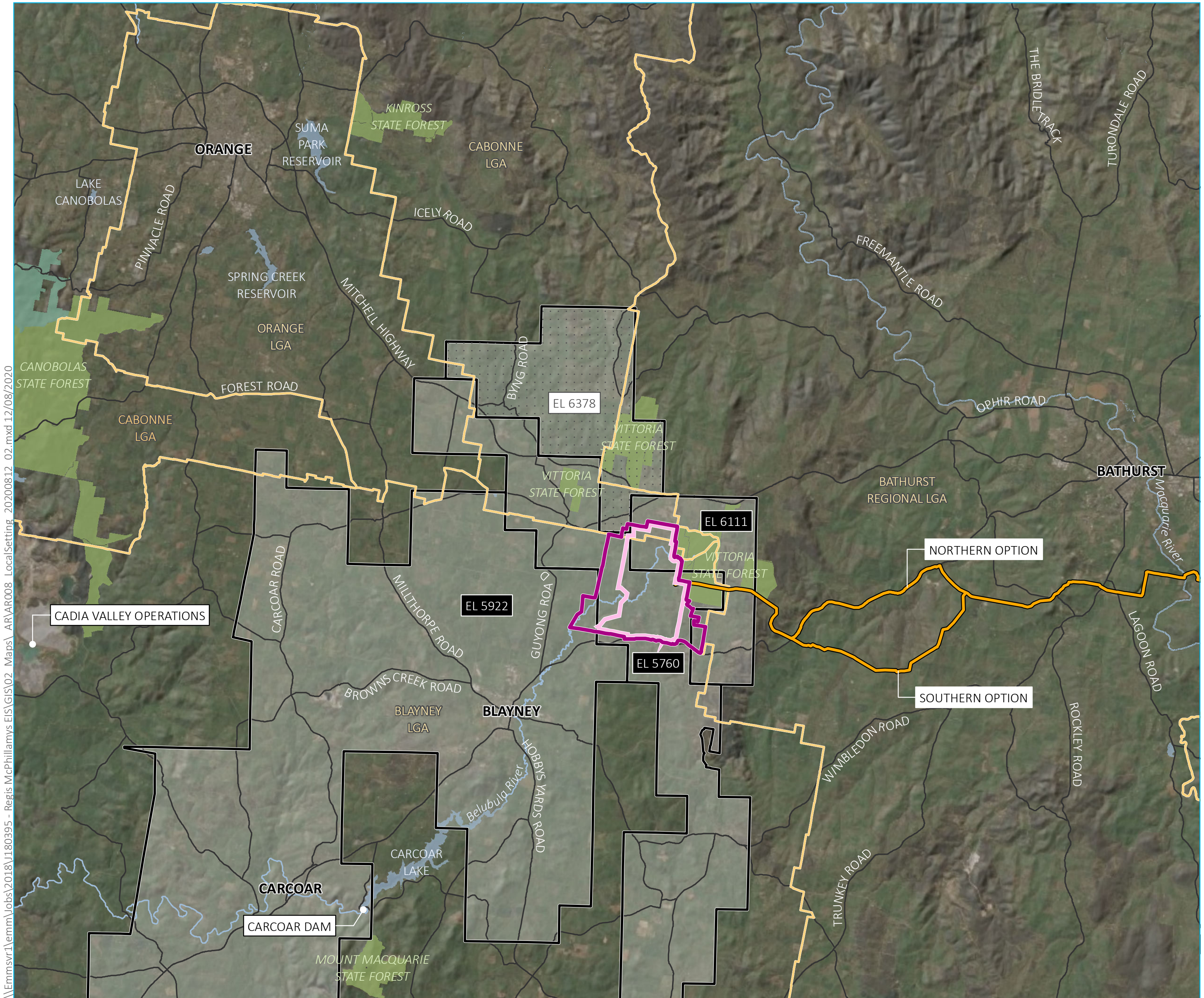
Project application area
- Mine development project area (2,514.06 ha)
- Mining lease application area (1,806.17 ha) (Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline

Existing environment
- Rail line
- Primary road
- Arterial road
- River
- Waterbody
- NPWS reserve
- State forest
- Local government area

Exploration lease boundaries (of interest)
- Held by LFB Resources NL (Regis)
- Held by others

Regional setting – project application area

McPhillamys Gold Project
Amendment report
Figure 1.1



Source: EMM (2020); Regis Resources (2020); DFSI (2017); GA (2011)

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KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline

Existing environment

- Main road
- Named watercourse
- Named waterbody
- NPWS reserve
- State forest
- Local government area

Exploration lease boundaries (of interest)

- Held by LFB Resources NL (Regis)
- Held by others

Local setting of the mine development

McPhillamys Gold Project
Amendment report
Figure 1.2

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While a number of changes have been made to the project, the development for which approval is sought remains substantially the same as was presented in the EIS. No amendments have been made to a number of key aspects of the project, including mining and processing methods, employee numbers, operating hours and the overall project life. While some small adjustments have been made to the site layout and disturbance footprint through the process of design optimisation, the general layout remains essentially the same to that presented in the EIS, such that the key elements of the open cut pit, the TSF and the waste rock emplacement remain in the same location. The amendments to the TSF design are mainly to facilitate improved water management during operations and the post-closure phase.

As described in the EIS, the project will provide a range of direct and indirect socio-economic benefits over its 15 year life. The project will provide a significant net social benefit of between $244 million (M) and $336 M to the state of NSW, when recent, conservative gold price assumptions are adopted (refer to Section 6.15). At a more local level, a number of long-term jobs (an average of approximately 260 full time equivalent positions throughout the mine life) will be created, the majority of which will be filled by persons residing in the local area. The project will add an additional $67 M in annual direct and indirect household income to the regional economies of Blayney, Bathurst, Orange and Cabonne local government areas (LGAs). Investments in community facilities will also occur through a Voluntary Planning Agreement (VPA), which will be established between Blayney Shire Council and Regis. It is proposed that Regis community donations will also continue.

1.2 Project overview

The key components of the project as described in the EIS (EMM 2019a), and for which Regis is still seeking development consent, include:

- development and operation of an open cut gold mine and associated infrastructure to support the mine over a 15 year project life, including ore processing, stockpiling, tailings management and on-site water management infrastructure;
- extraction of up to 8.5 Million tonnes per annum (Mtpa) of ore, and the use of a conventional carbon-in-leach processing facility with a processing rate of up to 7 Mtpa to produce approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold;
- construction and use of an engineered TSF to store tailings material;
- establishment of mine site access via a new intersection off the Mid Western Highway;
- development of ancillary infrastructure, including a mine site access road, internal haul roads, workshop, stores, administration buildings, explosives magazine and storage, soil stockpiles and other minor site infrastructure;
- progressive rehabilitation of the mine development; and
- construction and use of a water supply pipeline between the mine development and the Western Coalfields (ie the pipeline development).

As explained in Chapter 6 of the EIS (EMM 2019a), numerous alternative designs were evaluated for both the mine and pipeline developments during the pre-feasibility and environmental impact assessment phases of the project, based on extensive geological, environmental, financial and other technical investigations undertaken over a number of years. This process facilitated the development of a considered, well-designed project to efficiently recover a highly valuable resource, while minimising environmental impacts, potential land use conflicts and delivering socio-economic benefits.

Notwithstanding, in response to issues raised in submissions from the community, government agencies, businesses and other organisations, as well as a result of further detailed mine planning and stakeholder engagement, Regis has made a number of amendments to the project since the public exhibition of the EIS. The main amendments relate to the following aspects:

- **Site access** – a new location for the site access intersection off the Mid Western Highway is proposed, approximately 1 kilometre (km) east of the original location assessed in the EIS, in response to feedback from Transport for NSW (TfNSW, former Roads and Maritime Services) and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

- **Mine and waste rock emplacement schedule** – revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement has been undertaken, in particular consideration of predicted noise levels in Kings Plains, resulting in reduced early activity in the southern end of the mine development project area while extending the construction timeframe for the southern amenity bund.

- **Pit amenity bund** – optimisation of the open cut pit design and the improved location of the primary exit ramps for haul trucks (particularly from a noise perspective) allowed the size of the pit amenity bund to be reduced.

- **Tailings Storage Facility (TSF)** – amendments to the design include changes to the embankment design and construction timing, the TSF footprint and the TSF post closure landform to facilitate improved water management around the TSF.

- **Water management system –** the secondary water management facility (WMF) has been removed from the water management system resulting in an avoidance of impacts to a potential item of historic heritage (MGP 23 - Hallwood Farm Complex (Hallwood)). The size of the WMFs has also been revised to achieve a reduced likelihood of discharge from the storages within the operational water management system as part of a revised nil discharge design.

- **Mine administration and infrastructure area** – the layout of this area has been revised and optimised.

- **Mine development project area** – a very small change has been made to the mine development project area along the eastern boundary (an additional 1 hectare (ha), or 0.04% change), to accommodate the required clean water management system. The change takes the project area from 2,513 ha to 2,514 ha (refer to Figure 1.3).

Some amendments to the pipeline development have also been made, as follows:

- **Pipeline route** – the pipeline route has been amended for a section of the corridor west of Bathurst, primarily in consideration of land access. Two options for the amended pipeline route have been included and assessed in the amended project; the northern option and the southern option. As shown in Figure 1.5, the pipeline alignment changes approximately 3 km west of pumping station facility No. 4. The new alignment continues for around 3 km, where it then splits into two options before re-joining the original route. The northern option is approximately 11 km long from where the two options split and the southern option is approximately 6 km long, before re-joining the original alignment. The amended section of the pipeline route is therefore around 14 km long if the northern option is adopted, and approximately 9 km if the southern option is constructed.

- **Pipeline corridor/disturbance footprint** – the pipeline corridor has been differentiated from the pipeline disturbance footprint, with small changes made to both the pipeline corridor and the disturbance footprint. While the alignment of pipeline sections outside the realigned northern and southern options has not changed, there have been minor variations in the width of the corridor to provide flexibility in the detailed design and subsequent construction phases of the project. See also the definition of pipeline corridor in Figure 1.5.

- **Pumping station facilities** – pumping station facility No.3 has been relocated from the vicinity of Energy Australia's Mount Piper Power Station (MPPS), to approximately 4.3 km to the west and adjacent to Pipers Flat Road.

The amended mine development layout, compared to that assessed in the EIS, is shown in Figure 1.4 and the amended pipeline development layout is shown in Figure 1.5. A full description of the amendments to the project is provided in Chapter 2.

No material amendments have been made to other key aspects of the project as presented in the EIS for which approval is sought, such as the proposed mining method, operating hours, annual ore extraction rate of up to 8.5 Mtpa, annual ore processing rate of up to 7 Mtpa, employee numbers, and rehabilitation methods and outcomes.

1.3 Purpose of this report

Clause 55 of the NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) states that:

> (1) A development application may be amended or varied by the applicant (but only with the agreement of the consent authority) at any time before the application is determined, by lodging the amendment or variation on the NSW planning portal.
>
> (2) If an amendment or variation results in a change to the proposed development, the application to amend or vary the development application must include particulars sufficient to indicate the nature of the changed development.

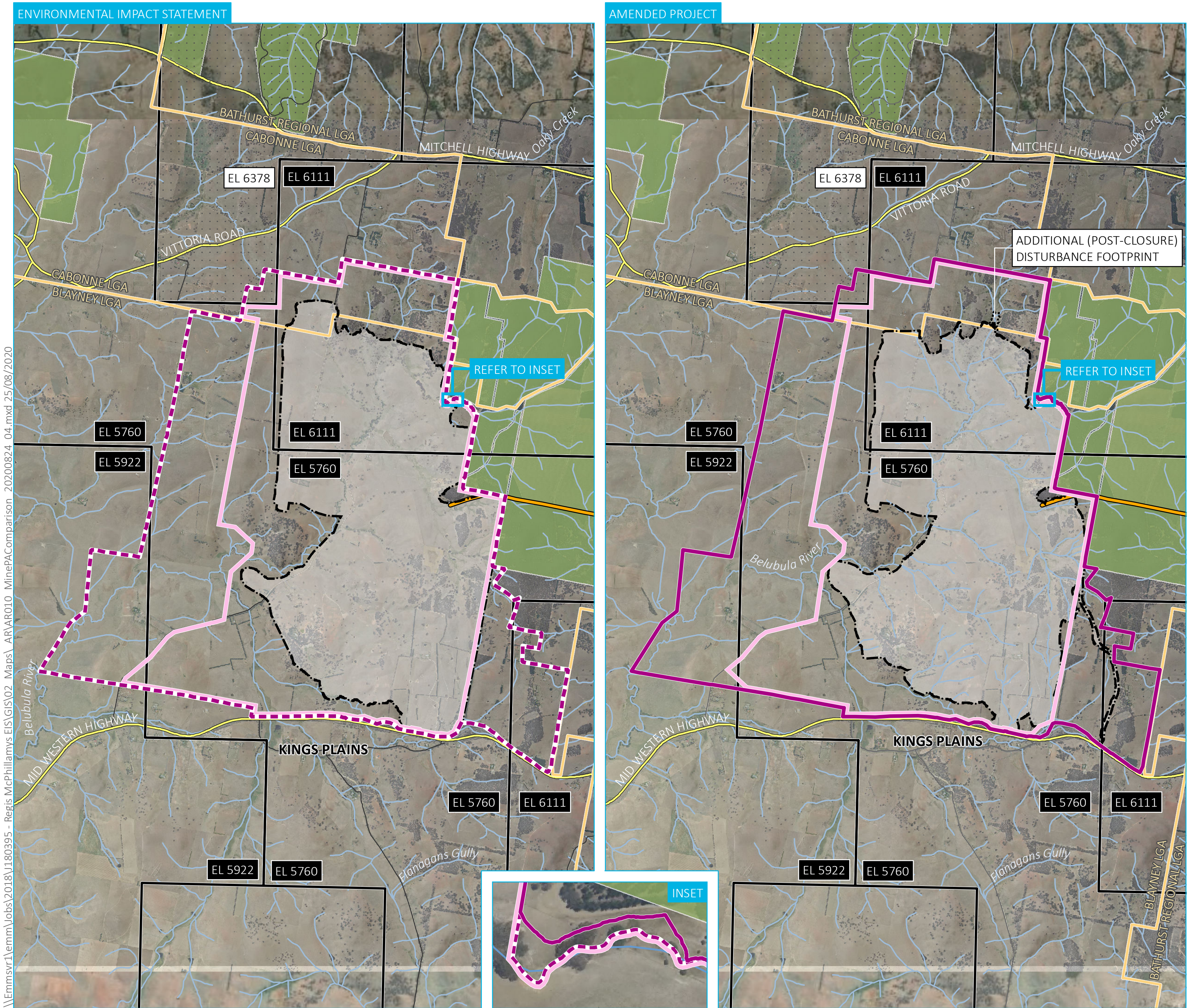
The NSW Independent Planning Commission (IPC) is the consent authority for the project under section 4.5(a) of the EP&A Act and clause 8A of the State and Regional Development SEPP because:

- the project is declared to be SSD under section 4.36 of the EP&A Act; and

- more than 50 submissions have been made by way of objection under the mandatory requirements for community participation in Schedule 1 to the EP&A Act.

Pursuant to clause 55 of the EP&A Regulation, a delegate of the IPC has agreed to the amendment of the development application for the project. This report supports the amended development application for the project, describing in detail the nature of the changed development. It accompanies the Submissions Report for the project and describes the amended project for which approval is now sought, providing a summary of the impacts associated with the amended project compared to those presented in the EIS, and presents an updated evaluation of the merits of the project.

This Amendment Report has been prepared by EMM Consulting Pty Ltd (EMM) on behalf of Regis, and in consideration of DPIE's draft guidance series *Guideline 5: Guidance for State Significant Projects - Preparing an Amendment Report* (DPE 2019).



KEY

Project application area
- Mine development project area (EIS)
- Mine development project area (amended project)
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Exploration lease boundaries (of interest)
- Held by LFB Resources NL (Regis)
- Held by others

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest
- Local government area

Source: EMM (2020); Regis Resources (2020); ESRI (2020); Survey Graphics (2019); DPE (2019); DFSI (2017); GA (2011)

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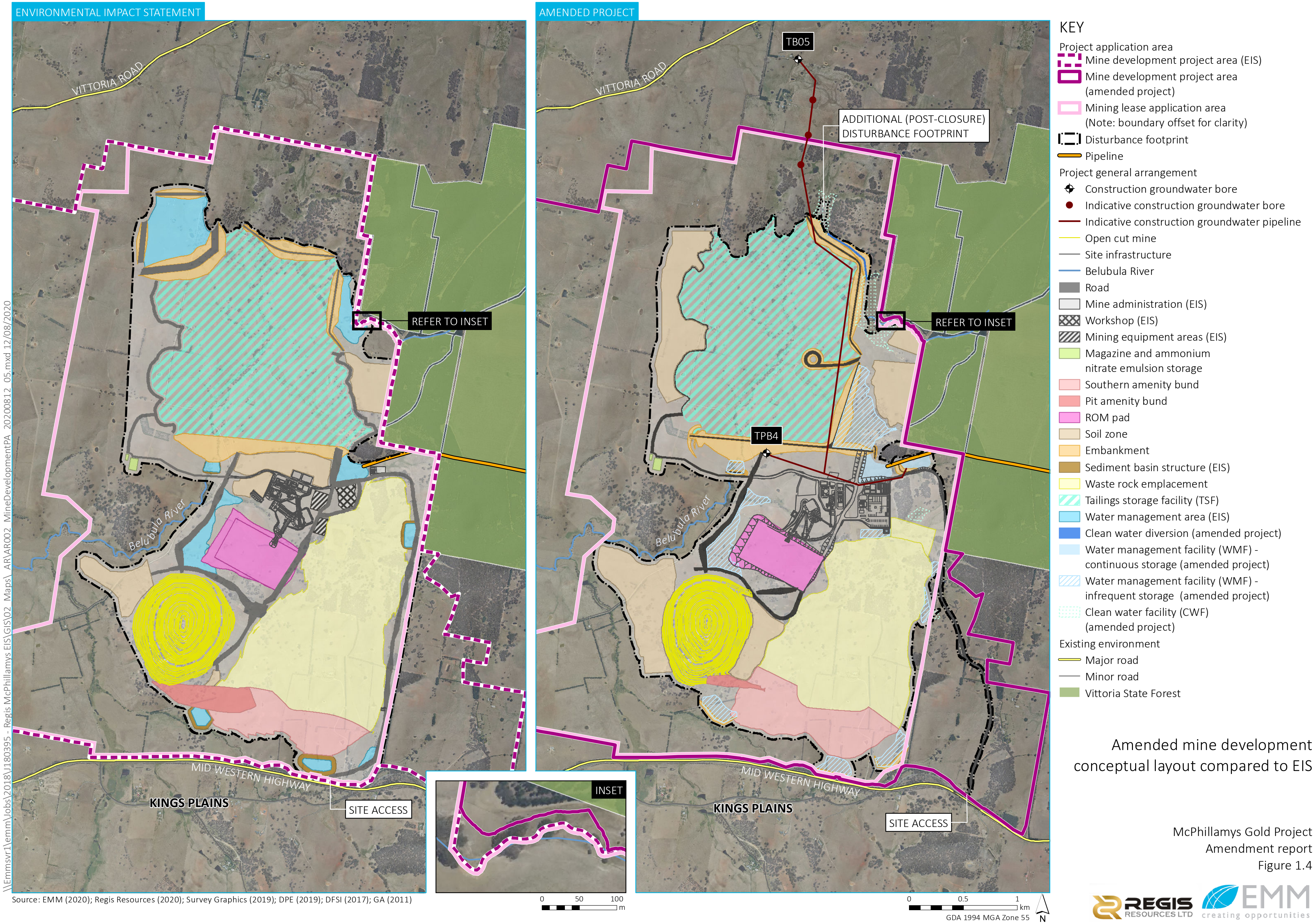
Amended mine development project area and MLA area compared to EIS

McPhillamys Gold Project
Amendment report
Figure 1.3



Amended mine development conceptual layout compared to EIS

McPhillamys Gold Project
Amendment report
Figure 1.4

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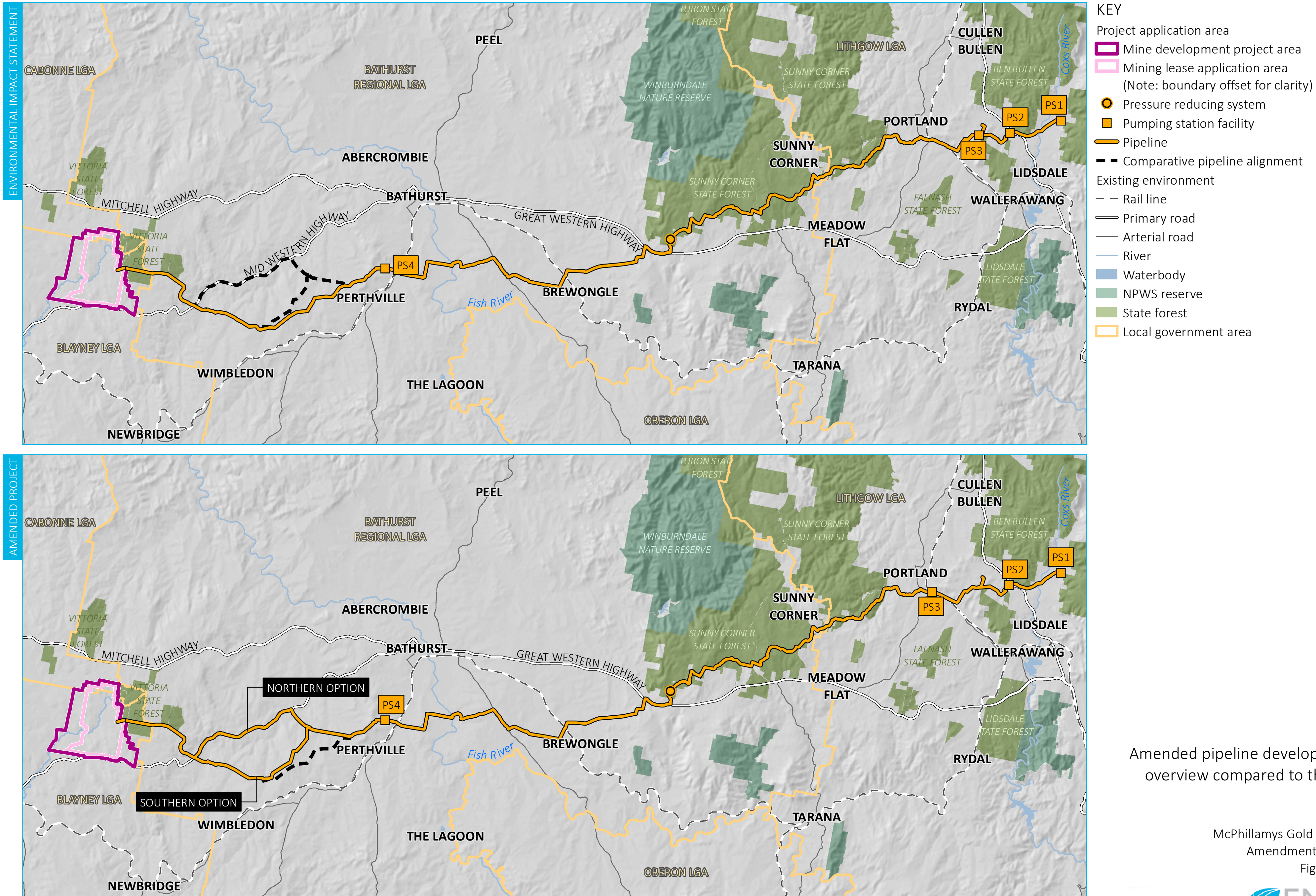

Source: EMM (2020); Regis Resources (2020); DPE (2018); DFSI (2017); GA (2011)

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Amended pipeline development overview compared to the EIS

McPhillamys Gold Project
Amendment report
Figure 1.5

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1.4 Structure of the report

This Amendment Report consists of the main document and supporting appendices and is structured as follows:

- **Chapter 1 – Introduction**: Introduces the project, including an overview of the project and project amendments, and the purpose and structure of this report.
- **Chapter 2 – Description of amendments**: Describes the amendments to the project, outlining the changes to the project description set out in the EIS.
- **Chapter 3 – Strategic context**: Reiterates the strategic justification for the project in the context of Commonwealth and State Government policies, initiatives and regional plans.
- **Chapter 4 – Statutory context:** Provides an update to the legislative framework and approval process for the project, particularly with reference to the proposed amendments to the project.
- **Chapter 5 – Engagement**: Provides an overview of the engagement activities undertaken during and following completion of the public exhibition period for the EIS (particularly in relation to the amendments to the project and the outcomes of updated technical studies) and a summary of the results of this engagement.
- **Chapter 6 – Assessment of impacts:** Presents a summary of the impacts associated with the amended project, including consideration of any additional management measures to be implemented.
- **Chapter 7 – Evaluation of merits and conclusion**: Provides an updated evaluation of the merits of the amended project.
- **Appendices:** The appendices supporting the main document are:
  - Appendix A – Revised schedule of lands;
  - Appendix B – Amended project description;
  - Appendix C – Updated summary of mitigation measures; and
  - Appendix D to Appendix X – Revised technical studies.

1.5 Terminology

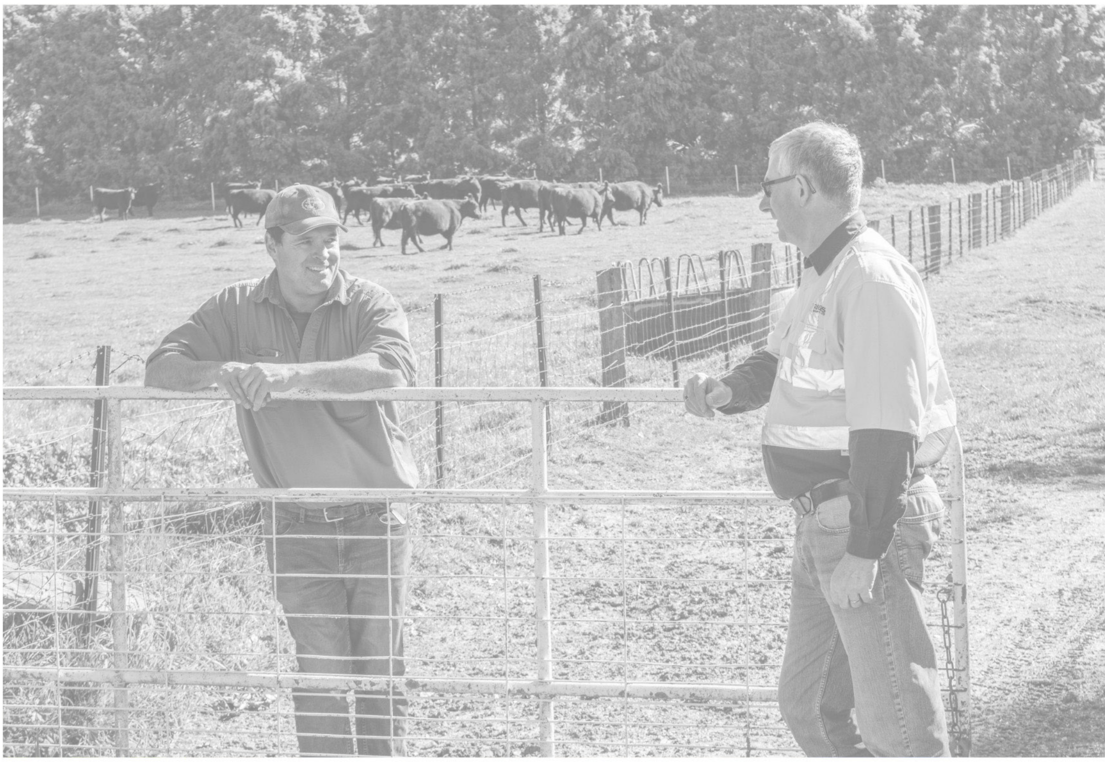
The following terms are used throughout this Amendment Report to describe the project. These terms are consistent with the terminology used in the EIS (EMM 2019a):

- **The project** – the project in its entirety; encompassing both the mine development and pipeline development. In this report, the term 'the project' refers to the amended project for which approval is now sought. Where the original project design as presented in the EIS is being discussed, this will be clarified.
- **Project application area** – the area in its entirety to which the development application (SSD 9505) relates; comprising both the mine development project area and the pipeline corridor as illustrated in Figure 1.1. In this report, the term 'the project application area' refers to the amended area that relates to the development for which approval is now sought. Where the original project application area, as presented in the EIS, is being discussed, this will be clarified.

- **Mine development project area** – refers to the mine development project area as illustrated in Figure 1.3.
- **Pipeline corridor** – an approximate 20 m wide, 90 km long pipeline alignment to which the development application (SSD 9505) relates; from Centennial's Angus Place Colliery (Angus Place) and Springvale Coal Services Operations (SCSO); and Energy Australia's MPPS near Lithgow to the mine development project area, as illustrated in Figure 1.1. Direct disturbance is not proposed across the entire 20 m corridor for construction of the pipeline, as described further in Section 2.13.
- **Mine development** – construction and operation of the mine and associated mine infrastructure within the mine development project area.
- **Pipeline development** – construction and operation of the pipeline and associated infrastructure to transfer water to the mine development within the pipeline corridor.

Chapter 2

Description of amendments



2 Description of amendments

2.1 Overview

Regis is seeking SSD consent under Part 4 of the EP&A Act to develop and operate an open cut gold mine, associated mine infrastructure and a water supply pipeline in the project application area shown in Figure 1.1.

As described in Chapter 1, the project has been amended in response to submissions received and further engagement undertaken with stakeholders, as well as ongoing project optimisation. The amended project has been designed to maximise the extraction and processing of the resource in the mine development project area within identified environmental constraints as efficiently and economically as possible, while minimising adverse impacts to the environment and neighbouring landholders and delivering socio-economic benefits to the local community. Similarly, the pipeline corridor alignment has been amended, as far as practicable, to further avoid environmental and potential land access constraints.

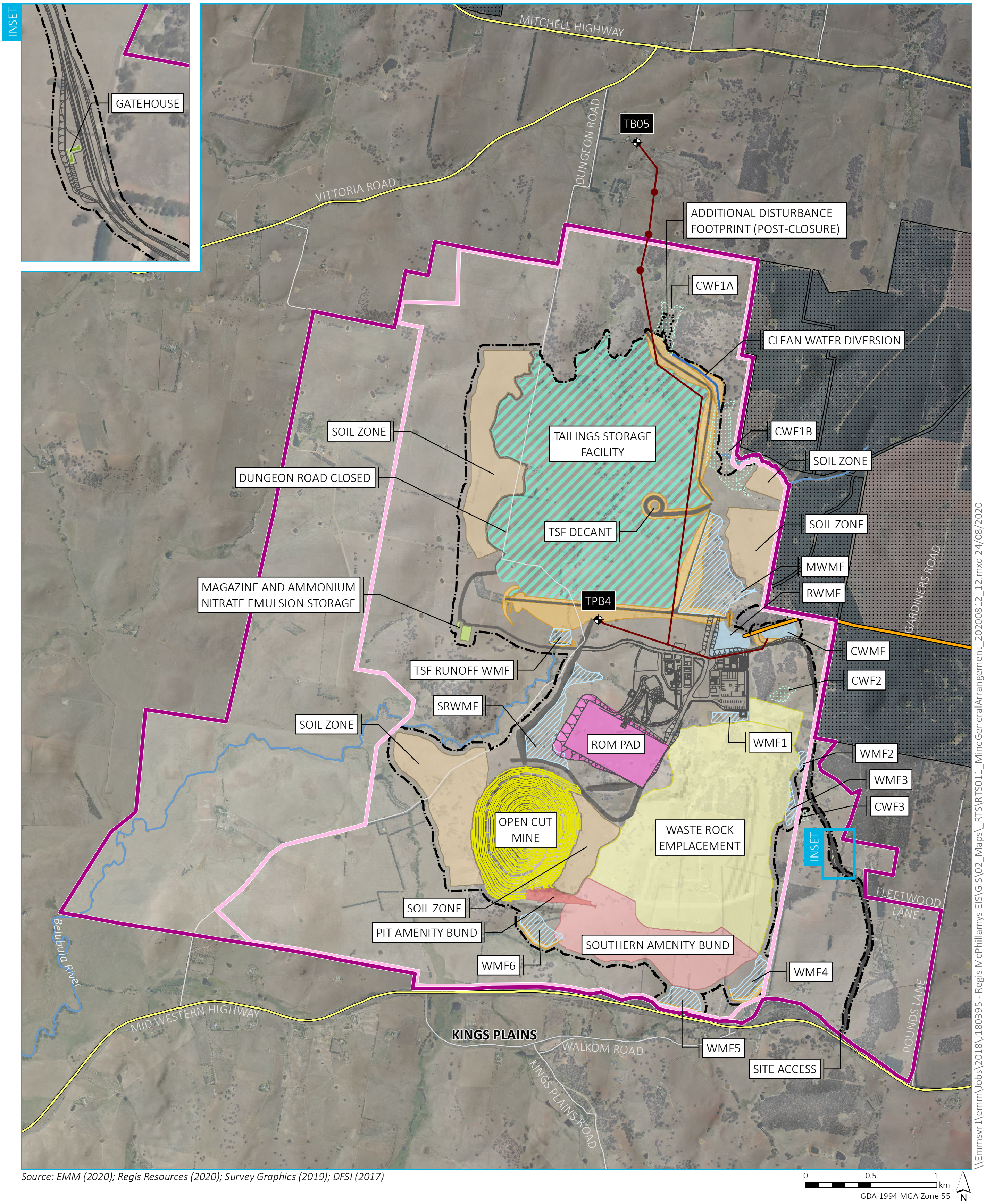
The amended indicative mine development layout; including the open cut pit, processing area, TSF, waste rock emplacement and ancillary mining infrastructure areas, is shown in Figure 2.1. A comparison of the amended mine development arrangement with the layout presented in the EIS is provided in Figure 1.4.

As described in the EIS, the pipeline development will supply the majority of water required for the mine development, transferring approximately 13 megalitres per day (ML/day) (up to a maximum of 15.6 ML/day) from Centennial's Angus Place and SCSO; and Energy Australia's MPPS operations near Lithgow to the mine development. The amended pipeline alignment is shown in Figure 1.5.

Some small changes have been made to the project application area, comprising the pipeline corridor and the mine development project area, as a result of project amendments. The schedule of lands originally presented in Appendix A of the EIS to which the development application applies has been updated to account for:

- the small change to the pipeline corridor alignment (both the northern and southern option);
- the extent of inundation associated with clean water facility (CWF) 1B. This has added an additional lot (7003 DP 1020650) and a section of public road to the mine development project area on the eastern side; and
- the addition of groundwater bores and associated indicative pipeline alignment for the purpose of construction water supply, adding three lots (Lot 1 DP801034, Lot 1 DP820991, Lot 102 DP750414) to the schedule of lands to the north of the mine development project area.

The updated schedule of lands is presented in Appendix A of this Amendment Report.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

KEY

Existing environment
- Major road
- Minor road
- Belubula River
- Vittoria State Forest

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Project general arrangement
- Construction groundwater bore
- Indicative construction groundwater bore
- Indicative construction groundwater pipeline
- Open cut mine
- Site infrastructure
- Site access roads
- Gatehouse
- Magazine and ammonium nitrate emulsion storage
- Soil zone
- Embankments
- ROM pad
- Southern amenity bund
- Pit amenity bund
- Waste rock emplacement
- Tailings storage facility (TSF)
- Clean water diversion
- Water management facility (WMF) - continuous storage
- Water management facility (WMF) - infrequent storage
- Clean water facility (CWF)

Mine development amended general arrangement

McPhillamys Gold Project
Amendment report
Figure 2.1

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EMM creating opportunities

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Project application area	The project application area is illustrated in Figure 1.1 of the EIS and totals approximately 2,640 ha comprising: • 2,513 ha for the mine development project area; and • 127 ha for the pipeline corridor/disturbance footprint.	A small change to the mine development project area along the eastern boundary has been made (additional 1 ha), to accommodate the required clean water management system (as shown in Figure 1.4). A section of the pipeline corridor has been realigned as a result of land access issues. Approval is sought for two options for a section of the alignment, as shown in Figure 1.5. The indicative location of groundwater bores and associated pipeline for the purpose of construction water supply alignment has been identified, adding three lots to the schedule of lands. The pipeline corridor from Springvale is generally 20 metres (m) in width and has been differentiated from the pipeline disturbance footprint. Direct disturbance is not proposed across the entire 20 m corridor for construction of the pipeline and has been delineated based on the nature of the vegetation or existing disturbance the pipeline travels through. The area that will be directly impacted by construction activities within the pipeline corridor will range in width from 6-8 m in areas of native vegetation, and up to 20 m in open farmland areas. If the northern pipeline option is constructed, then the project application area is 2,727 ha, comprising: • 2,514 ha for the mine development project area; and • 213 ha for the pipeline corridor. If the southern pipeline option is constructed, then the project application area is 2,708 ha, comprising: • 2,514 ha for the mine development project area; and • 194 ha for the pipeline corridor.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Mining lease application area	The total mining lease (ML) application area (MLA574) is illustrated in Figure 1.2 of the EIS and is approximately 1,813 ha.	There has been a minor refinement to the southern boundary of the MLA area to provide appropriate separation to residences on neighbouring land. The revised boundary is shown in Figure 1.3 and covers approximately 1,806 ha (ie a reduction of 7 ha). In addition, a number of clean water management facilities will be required as part of the mine's water management system. The inundation area associated with clean water facility CWF1B and CWF3 extends outside the MLA area. The embankment associated with CWF3 and some clean water diversions on the eastern side of the waste rock emplacement also extend outside the MLA area. These facilities meet the definition of a 'designated ancillary mining activity' under the NSW *Mining Act 1992*, and therefore it is anticipated that approval will be sought for a condition to be imposed on the mining lease, once granted, to regulate the clean water inundation area that extends outside of the MLA area. In addition, it has been identified that the native title status of a small area of Belubula River within MLA574 is uncertain (refer to Section 4.2.4). This area is within the proposed TSF, and will therefore be excised from MLA574, and an ancillary mining activity mining lease application (AMA MLA) lodged over the excluded area. It is anticipated that the AMA MLA will be granted following compliance with the mining infrastructure process under s 24MD(6B) of the *Native Title Act 1993* (Cth).
Disturbance footprint	Approximately 1,135 ha will be disturbed within the mine development project area to accommodate the mine development, including the open cut pit, TSF, waste rock emplacement, run-of-mine (ROM) pad, processing plant, administration area, ablutions and workshops, water management areas, soil stockpiles, roads and ancillary areas. Approximately 127 ha will be temporarily disturbed for the construction of the pipeline, and to accommodate construction of pumping stations and ancillary support infrastructure associated with the operation of the pipeline.	Approximately 1,116 ha will be disturbed within the mine development project area to accommodate the mine development, representing a 1.7% reduction from the EIS. An additional 1.64 ha will be disturbed at closure, north of the TSF, to accommodate water management works. Additional work has been undertaken to refine the area of native vegetation anticipated to be disturbed within the pipeline corridor. Approximately 18.5 ha of native vegetation will be disturbed by construction of the pipeline if the northern alignment option is adopted, and around 15.9 ha if the southern option is constructed. Additional disturbance of non-native vegetation or in existing disturbed areas (such as roads and tracks) will also be required.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Project duration	A project life of 15 years comprising: • construction: around one to two years, including pre-construction activities; • mine operating life: around 10 years of ore extraction and processing; • rehabilitation: will progress during operations and will extend around three to four years after the end of mining and processing, after which environmental monitoring will continue until lease relinquishment in accordance with the relevant approval conditions. There will be some overlap of these phases. Figure 2.3 of the EIS shows an indicative schedule over the project life.	The project life of 15 years is unchanged. Revision of the mine schedule has resulted in a small increase to the mine operating life within these 15 years, from 10 to approximately 11 years. An updated indicative schedule over the project life is included as Figure 2.2.
Mine development layout and progression	The anticipated mine layout for years 1, 2 ,4, 8, 10 is illustrated in Figures 2.4a to 2.4e of the EIS. These indicative general arrangements show the expected progress of the mine development over time.	The amended mine layout for years 1, 2, 4, 6, 8, 11, compared to the original layout, is illustrated in Figures 2.3a to 2.3f. These indicative general arrangements show the expected progress of the mine development over time. Year 6 has been included in the series of mine layout figures as this is when completion of the southern amenity bund is now anticipated (compared to around Year 4 as described in the EIS).
Resource	Mineral Resource Estimate (indicated + inferred) – 68.9 Mt @1.04 g/t gold for 2.3 million ounces. Ore Reserves Estimate (probable) – 60.1 Mt @1.05 g/t gold for 2.0 million ounces.	Mineral Resource Estimate – Updated to 69.8 Mt @ 1.02 g/t gold for 2.3 million ounces. Ore Reserves Estimate – Updated to 60.8 Mt @1.04 g/t gold for 2.0 million ounces.
Annual mine extraction rate	Up to 8.5 Mtpa of ore per annum will be extracted over the project life.	No change.
Annual processing rate	Processing rate of up to 7 Mtpa to produce on average 200,000 ounces and up to 250,000 ounces per annum of product gold.	No change.
Mining method	A single, approximately circular two stage open cut with a diameter of approximately 1,050 m and a final depth of approximately 460 m below ground level will be developed by conventional open cut mining encompassing drill, blast, load and haul operations.	The pit design has been modified to incorporate improved pit exit locations to facilitate reduced noise impacts to the local community. This has resulted in a small change to the pit shape as shown in Figure 1.4, while remaining approximately circular. The final depth of the open cut pit is approximately 450 m. Mining methods are unchanged.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Processing method	A carbon-in-leach (CIL) gold processing plant, comprising a ROM pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening and cyanide destruction, will be developed to the north east of the open cut pit as shown in Figure 2.1 of the EIS. The process flow diagram is shown in Figure 2.7 of the EIS.	No change.
Waste rock emplacement	A waste rock emplacement will be developed in the south-eastern portion of the mine development project area up to an approximate height of 1,065 m AHD (and up to around 1,075 m AHD including areas of microrelief) to accommodate overburden material from the open cut pit. The emplacement has also been designed to encapsulate potentially acid forming material (PAF) from the open cut.	Changes have been made to the construction sequence of the waste rock emplacement to reduce potential noise impacts on the nearby residents of Kings Plains. Establishment of the waste rock emplacement will now start at the northern end of the emplacement footprint, rather than the southern end. The intention of this change is to allow early mining of the top of the pit to be carried out without the overlapping noise generated by the hauling and dumping of waste rock in the south end of the waste rock emplacement, as was the case in the EIS. Work will therefore commence on the southern amenity bund at a later stage than anticipated in the EIS. There is a small change in the total volume of waste anticipated to be produced, from a total of 87.8 million bank cubic metres (Mbcm) described in the EIS, compared to 84.5 Mbcm for the amended project (noting some of this material will be used in the construction of embankments, such as for the TSF and WMFs). A small reduction in the footprint of the emplacement at the northern end to avoid impacts to native vegetation. No change to the height of the final landform of the waste rock emplacement.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Amenity bunds	The southern portion of the waste rock emplacement (southern amenity bund) and the pit amenity bund (refer to Figure 2.1 of the EIS) will be constructed and rehabilitated in the early years of the mine development to provide noise and visual bunds for the remainder of operations.	The size of the pit amenity bund has been reduced due to the optimisation of the open cut pit design and ramp exit points, including lowering the level of the south-eastern pit exit. This lowering of the ramp (via a keyway cut), combined with the smaller pit amenity bund, and with trucks also exiting from the north-east, will help shield local residents from haul truck noise. The pit amenity bund will still be constructed in the first year of the project life. Larger mining equipment will be used to construct the pit amenity bund as quickly as possible during the first six months, after which time equipment with reduced noise output will be used as required as the higher portion of the bund is completed to reduce noise emissions associated with the bund construction. As noted above, the construction sequence of the waste rock emplacement has been amended to further reduce noise impacts in Kings Plains, resulting in a more gradual and therefore extended construction timeframe for the southern amenity bund. This bund will be completed in around Year 6 of the project, rather than Year 4 as described in the EIS.
Tailings storage facility	An engineered TSF will be progressively developed in the north-eastern portion of the mine development project area as shown in Figures 2.1, 2.4a-e and 2.10 of the EIS.	Amendments to the TSF design have been made, including changes to the embankment design along the northern and eastern sides of the TSF to provide for improved water management post-closure of the mine, small changes to the TSF footprint, and a change to the location of the tailings decant structure.
General infrastructure	Construction and operation of ancillary infrastructure including: • administration buildings; • workshops and store facilities; including associated plant parking, laydown and hardstand areas; • internal road network; • explosives magazine; and • on-site laboratory.	General changes to the conceptual mine infrastructure and administration area layout, as shown on Figure 2.1. Changes include: • the processing plant has moved slightly to the east and realigned in a south – north orientation; • erosion and sediment control measures have been revised; • staff and visitor carpark expanded to 210 bays and addition of bus drop off area and turning circle; and • addition of a boom gate and turnstile for security. As described in the EIS, the infrastructure and administration area layout is conceptual only and has been designed to capture required work areas and traffic flows in a safe and efficient manner. This will be further optimised within the proposed footprint during the detailed design phase prior to construction.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Site access	The mine development project area will be accessed via a new intersection off the Mid Western Highway (as shown in Figure 2.1 of the EIS), which will be constructed during the initial construction phase of the project. Existing property access gates from Dungeon Road and the Mid Western Highway will also be used during the construction phase. Dungeon Road, an unsealed public road, will be used for initial access to the mine development project area during construction, after which it will be closed (or realigned as per Blayney Shire Council requirements) to the public at the mine development project boundary once the new site access intersection is constructed off the highway.	An alternative location has been identified for the intersection of the site access road with the Mid Western Highway, in response to submissions by TfNSW and the community. This new intersection is located approximately 1 km east of the original location assessed in the EIS, and as a result there has been a subsequent change to the alignment of the site access road to the mine infrastructure area. Utilisation of Dungeon Road for initial construction access to the mine development project area for approximately the first six months. Dungeon Road will be closed from the mine development project area to within approximately 800 m of Vittoria Road.
Product transport	Product gold will be taken off-site via road transport.	No change.
Construction and operating hours	<u>Construction</u>: The first six months of construction of the mine development will generally be carried out during standard construction hours as per the *Interim Construction Noise Guideline* (ICNG) (DECC 2009): • Monday to Friday – 7:00 am to 6:00 pm; • Saturday – 8:00 am to 1:00 pm; and • No work on Sundays or public holidays. Outside of these hours, some works will be carried out as required (such as limited construction activities, environmental management such as dust control, delivery of oversized equipment and servicing of equipment). In these circumstances, works will be undertaken in accordance with the noise criteria for outside of recommended standard hours in the ICNG. After six months, construction and mine development activities will be carried out 24 hours per day, 7 days per week. For the pipeline development, construction will be undertaken generally in accordance with the standard construction hours as per the ICNG. <u>Operation</u>: 24 hours per day, 7 days per week.	No change.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Workforce	Construction: estimated peak workforce during Year 1 of approximately 710 FTE employees and contractors, of which around 120 FTE will construct the pipeline development. Operation: an average workforce of around 260 FTE employees will be required during the 10 year operational mine life, peaking at approximately 320 FTEs in around years four and five of the project.	No change to the required workforce. The operational life has been extended from 10 to approximately 11 years, primarily as a result of adopting a smoother mining schedule with less peak movements (and subsequent improvements in noise levels) in the early years of the project.
Water management	The mine development is proposed to be a nil discharge site. The water management system will divert clean water around the mine site and control the volume of water from disturbed areas by maximising its reuse on-site. The water management system will comprise clean water management facilities including piped diversions, water management facilities for operational water (including raw water storage) and development and construction water management facilities.	The water management system has been revised to account for changes in the site layout and to maintain the mine development as a nil discharge site. Key changes include: • the removal of the Secondary WMF which was originally proposed in the north-west corner of the TSF, which avoids impacts on the potential heritage item Hallwood; • a new Main WMF is now proposed in the south-east corner of the TSF; • change in the size and renaming of the Primary WMF to Site Runoff WMF (to better describe its function); • increased capacity of WMFs collecting runoff from the waste rock emplacement area to ensure these WMFs do not spill; • refinements to the clean water diversion system including improvements to the design of the post closure clean water diversions; and • renaming of the different WMFs in accordance with their function.
Water supply	A pipeline approximately 90 km in length will transfer water from Centennial's Angus Place and SCSO; and Energy Australia's MPPS operations near Lithgow to the mine site. The pipeline will deliver approximately 13 ML per day (up to a maximum of 15.6 ML per day) to the mine.	There is no change to the volume and rate of water supply. Some changes have been made to the pipeline corridor alignment west of Bathurst, primarily due to changes in land access arrangements with private landholders. Approval is sought for two options along this amended section, the northern option and the southern option, pending the negotiation of landholder access agreements, as shown in Figure 1.5. Pumping station facility No.3 has been relocated from the vicinity of Energy Australia's MPPS, to approximately 4.3 km to the west and adjacent to Pipers Flat Road. Further investigations have been undertaken into options for the supply of water prior to commissioning of the pipeline development, as recommended in the EIS. This investigation found that the anticipated construction water demand can primarily be met by production bores in and to the north of the mine development project area. The indicative location of the bores and associated pipeline is shown in Figure 2.1.

Table 2.1 Amended project overview

Element	EIS	Amended project (this report)
Electricity supply	The mine development will have an electricity requirement of 26 megawatts (MW) to 28 MW. The project is currently exploring two separate options for the mine development's primary power supply. The first option is the duplication of the existing 66 kV line from Bathurst. The second option under assessment is to supply the site from the TransGrid 132 (kilovolts) kV system Line 948, which passes between Bathurst and Orange approximately 14 km north of the processing plant. Separate approval under Part 5 of the EP&A Act will be sought to construct either option. Part 5 approval will also be sought for the electricity supply for the pipeline development.	The second option to utilise the TransGrid system is progressing. As described in the EIS, approval for this powerline will be sought under Part 5 of the EP&A Act.
Rehabilitation	Rehabilitation will occur progressively throughout the project life. At the end of mining and processing, all infrastructure will be removed from the mine development project area and all disturbed areas will be rehabilitated to integrate with natural landforms as far as practicable. The conceptual final landform is illustrated in Figure 2.14 of the EIS. The pipeline corridor will be rehabilitated progressively as construction proceeds with disturbed areas being reinstated rapidly as work proceeds along the pipeline corridor. At the end of the project life, subject to the necessary approvals, there may be the opportunity for the pipeline infrastructure to continue to supply water to the region for future public benefit. Following the end of water transfer for the mine development, it is expected that the pipeline will remain in the ground. If after a reasonable time period, no additional users for the pipeline are identified, above ground components will be removed.	No change to rehabilitation methodology. The rehabilitation schedule of the waste rock emplacement has been amended to reflect the changed construction sequence. Some amendments to the final landform of the mine development have been made, particularly the final shape of the ROM pad area to achieve a more sympathetic final landform with the surrounding landscape, as well as changes to the design of the post-closure clean water diversions to facilitate a stable, self-sustaining final landform.

2.2 Indicative project schedule

Amendments have been made to the material extraction and processing schedule as a result of further work on the detailed mine design, primarily to further reduce the project's potential noise impacts. The EIS stated that extraction would take place over approximately 10 years. The 'open cut development and mining' components of the project are now projected to extend into year 11 (ie an additional year). This is primarily due to the adoption of a more consistent mining schedule and a smoother waste production profile, which has resulted in less material being moved in the early years rather than the initial high volumes of waste rock movements proposed in the EIS. Figure 2.5 (in Section 2.5.1) illustrates the volume of material anticipated to be moved each year in the EIS compared to the amended project. As shown, while the mining operation is now proposed to continue for an extra year, the volume of waste rock to be moved in the final years substantially decreases as the mine transitions to closure; less than 2 Mbcm is anticipated to be moved in Year 11 compared to the peak of over 16 Mbcm earlier in the project life, and all material is being moved to the north at this time, away from residences in Kings Plains.

The smaller volume of waste rock scheduled to be moved in the early years of the amended project is primarily due to a reduced fleet now proposed to operate in the initial stages of the project to reduce noise levels. Two excavators rather than three will be used in these initial stages, with associated less haul trucks, until the open cut pit benches are in place to shield earthworks in the pit. The reduced fleet means that it will take slightly longer to move material.

No change is proposed to the overall project life of 15 years.

The indicative project schedule presented in Figure 2.3 of the EIS has been updated to reflect these refinements in the mining and processing schedule (refer to Figure).

As noted in the EIS, over the life of the mine development, the project schedule may vary from the indicative schedule shown in Figure 2.2 to account for detailed mine design, mine economics, geological conditions, market conditions or relevant approval conditions.

2.3 Mine development general layout and progression

As described in Section 1.2 and Table 2.1, in response to issues raised in submissions, as well as a result of further detailed mine planning and design, Regis has made a number of amendments to the project which have resulted in changes to the mine development general arrangements presented in Figures 2.4a to 2.4e of the EIS.

This includes amendments to the:

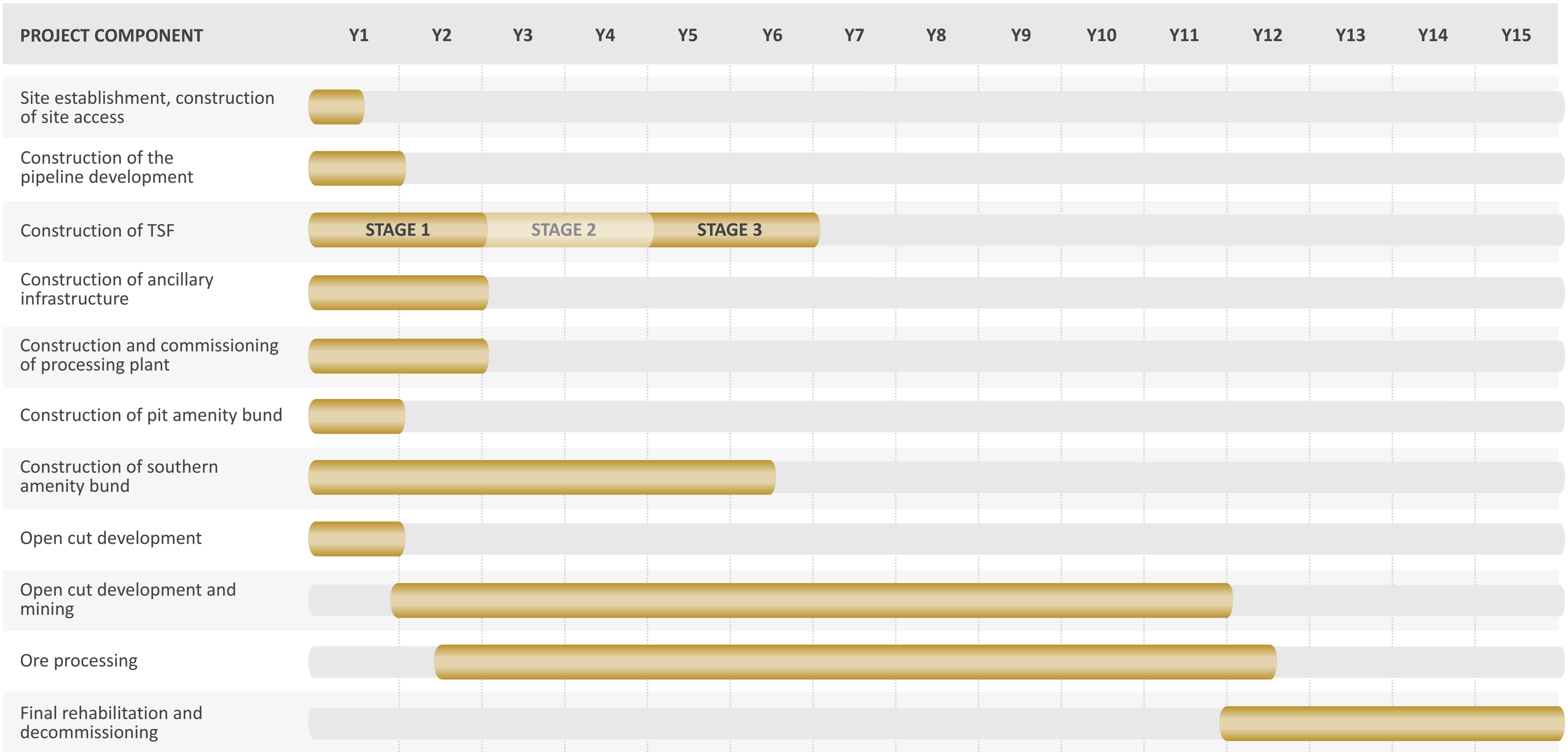
- location of the site access intersection off the Mid Western Highway and the alignment of the internal site access road;
- layout of the mine administration and infrastructure area;
- dimensions of the pit amenity bund;
- waste rock emplacement and southern amenity bund scheduling;
- design of the TSF (including changes to the embankment design to facilitate clean water diversion, tailings footprint and location of the tailings decant structure);
- design of the water management system; and
- location of soil stockpile zones.

The required extent of soil stripping and TSF liner preparation works have been further investigated since the preparation of the EIS and have now been included in the staged plans for the amended project. It is also noted that further detail is shown in the amended project staged plans to distinguish between WMFs that will be used as infrequent storages (ie to collect and store runoff after rainfall events) and WMFs that will be used for continual storages, such as the RWMF and CWMF. WMF1-WMF6 will store water only following rainfall events and will be dewatered during and immediately after rainfall events to maintain the design capacity of these storages.

The extent of the mine development project area remains largely unchanged as a result of the project amendments. A small change has been made to account for the inundation area associated with CWF1B, as shown in the inset in Figure 1.4. This change has added approximately 1 ha to the mine development project area.

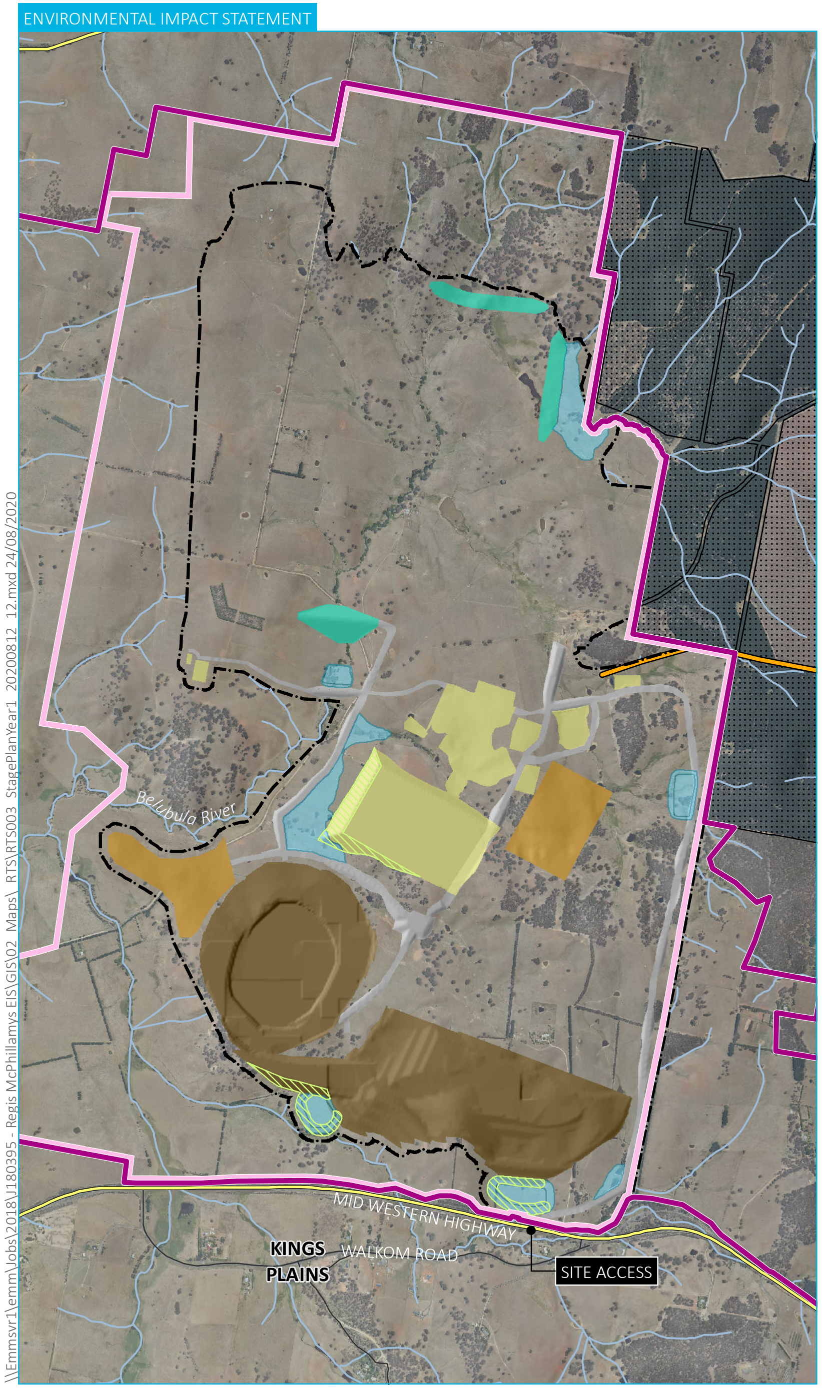
In relation to the MLA area, a small section in the south-east and the south-west corner of the MLA area boundary has been adjusted to provide appropriate separation to residences on neighbouring land. The amended sections of the MLA area are within the original application area, and therefore remains covered by the Site Verification Certificate which was issued for the project by DPIE on 18 June 2019.

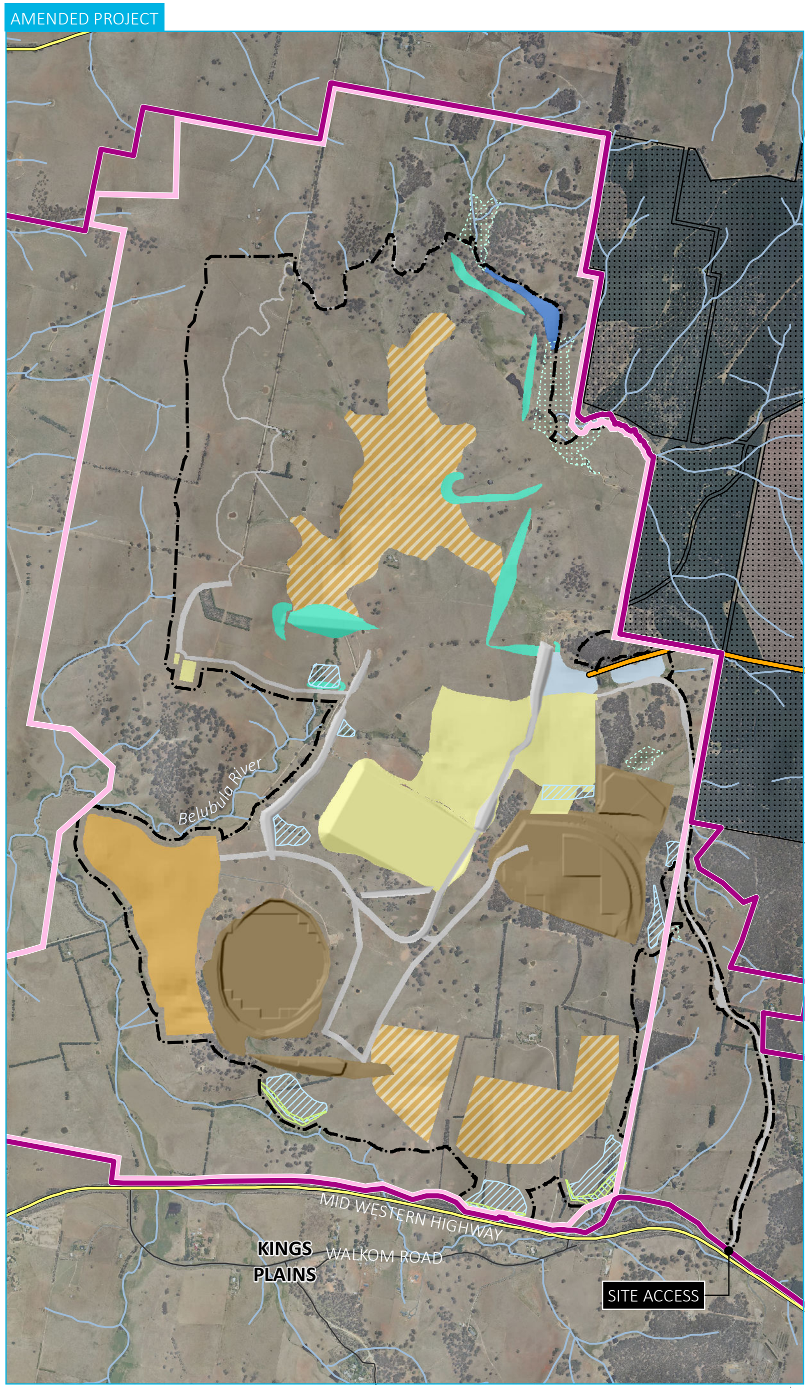
Indicative general layouts of the amended mine development over the project life are illustrated for Years 1, 2, 4, 6, 8 and 11, in Figures 2.3a to 2.3f. The final landform is shown in Figure 2.4. Where applicable, the corresponding figures from the EIS have been provided to highlight the amendments that have been made. An additional staged plan has been included for Year 6 to show the revised timeframe for the completion of the southern amenity bund to its final height (refer to Section 2.4.3 for further discussion on this aspect). As per the project schedule, this indicative mine development sequencing may also vary to account for detailed mine design, mine economics, geological conditions, market conditions or relevant approval conditions.



Indicative project schedule

McPhillamys Gold Project
Amendment Report
Figure 2.2





KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Completed works
- Mine infrastructure area (under construction)
- Mining operations (open cut & waste rock emplacement)
- Road
- Tailings storage facility construction
- Soil zone
- Soil stripping
- Water management area (EIS)
- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Mine rehabilitation
- Hydromulched/grass

Comparison of mine development general arrangement – Year 1

McPhillamys Gold Project
Amendment report
Figure 2.3a

0 0.5 1 km
GDA 1994 MGA Zone 55
N

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

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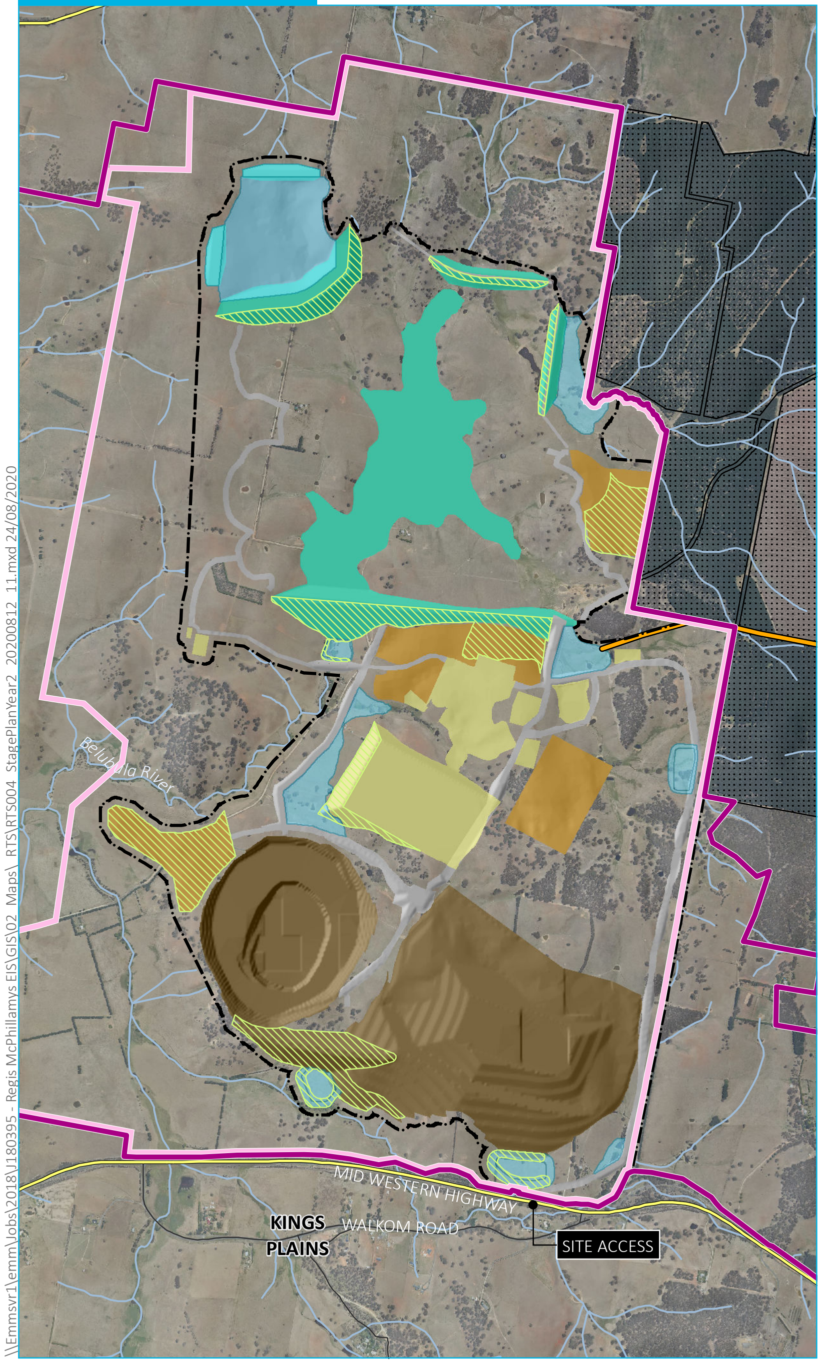
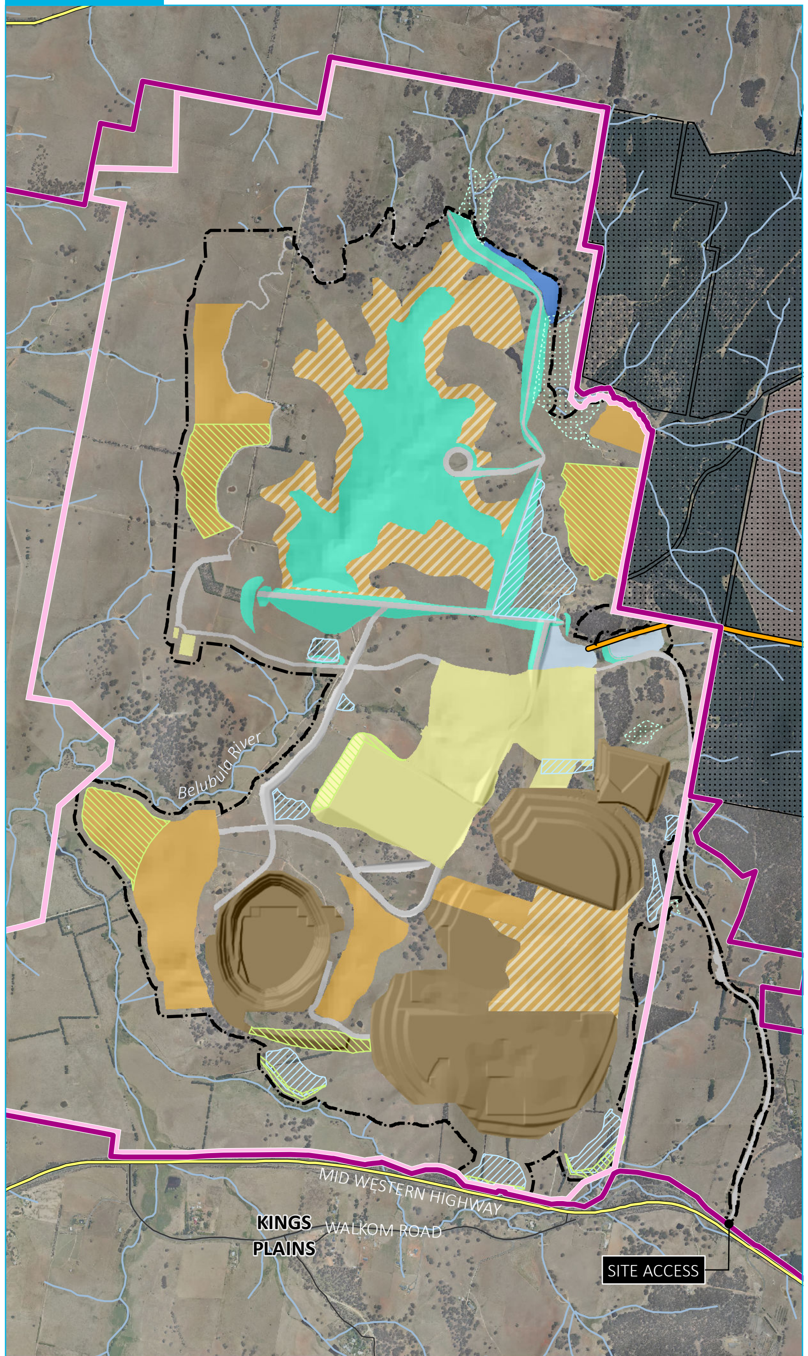
ENVIRONMENTAL IMPACT STATEMENT



AMENDED PROJECT



KEY

Project application area
- Mine development project area
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- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Mine rehabilitation
- Hydromulched/grass

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

Comparison of mine development general arrangement – Year 2

McPhillamys Gold Project
Amendment report
Figure 2.3b

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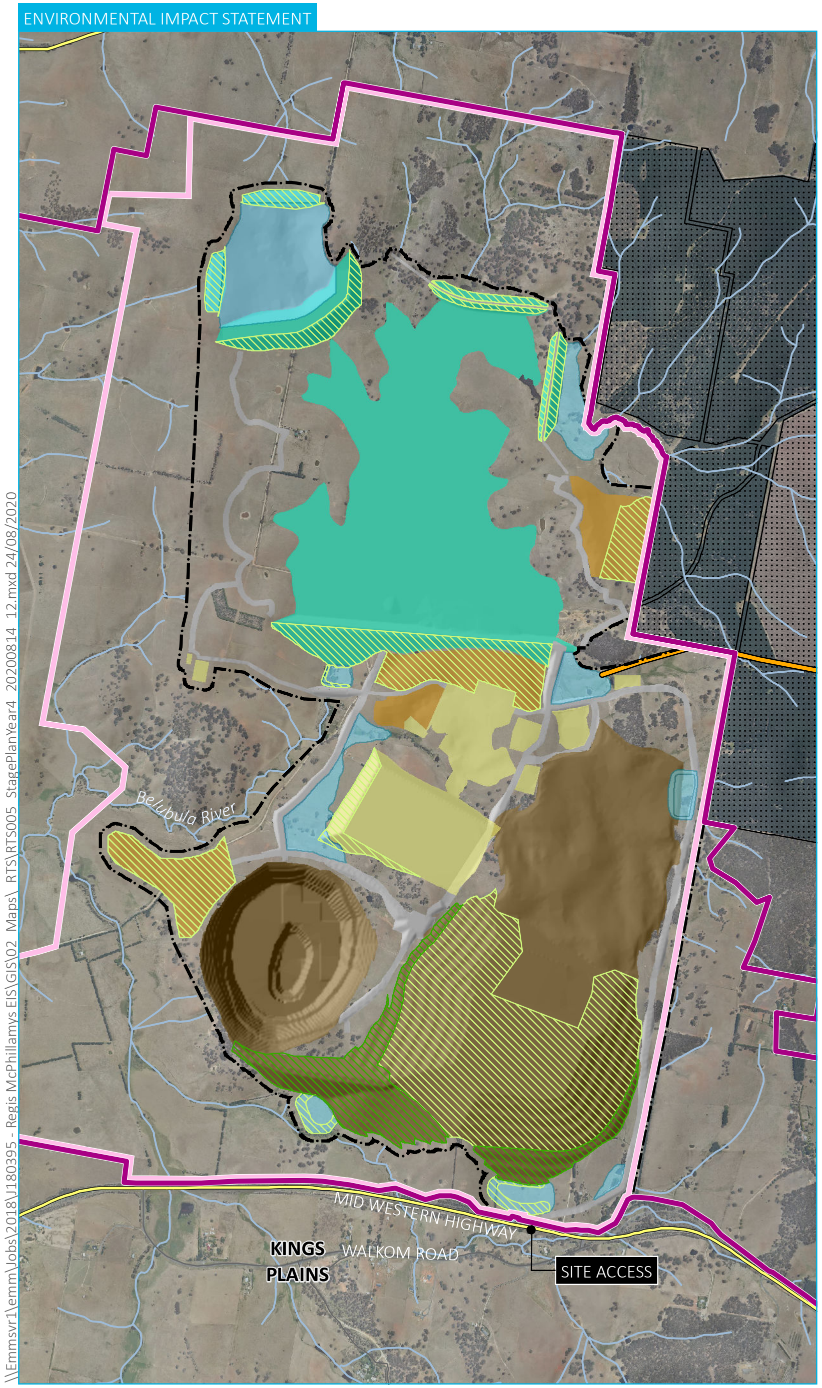

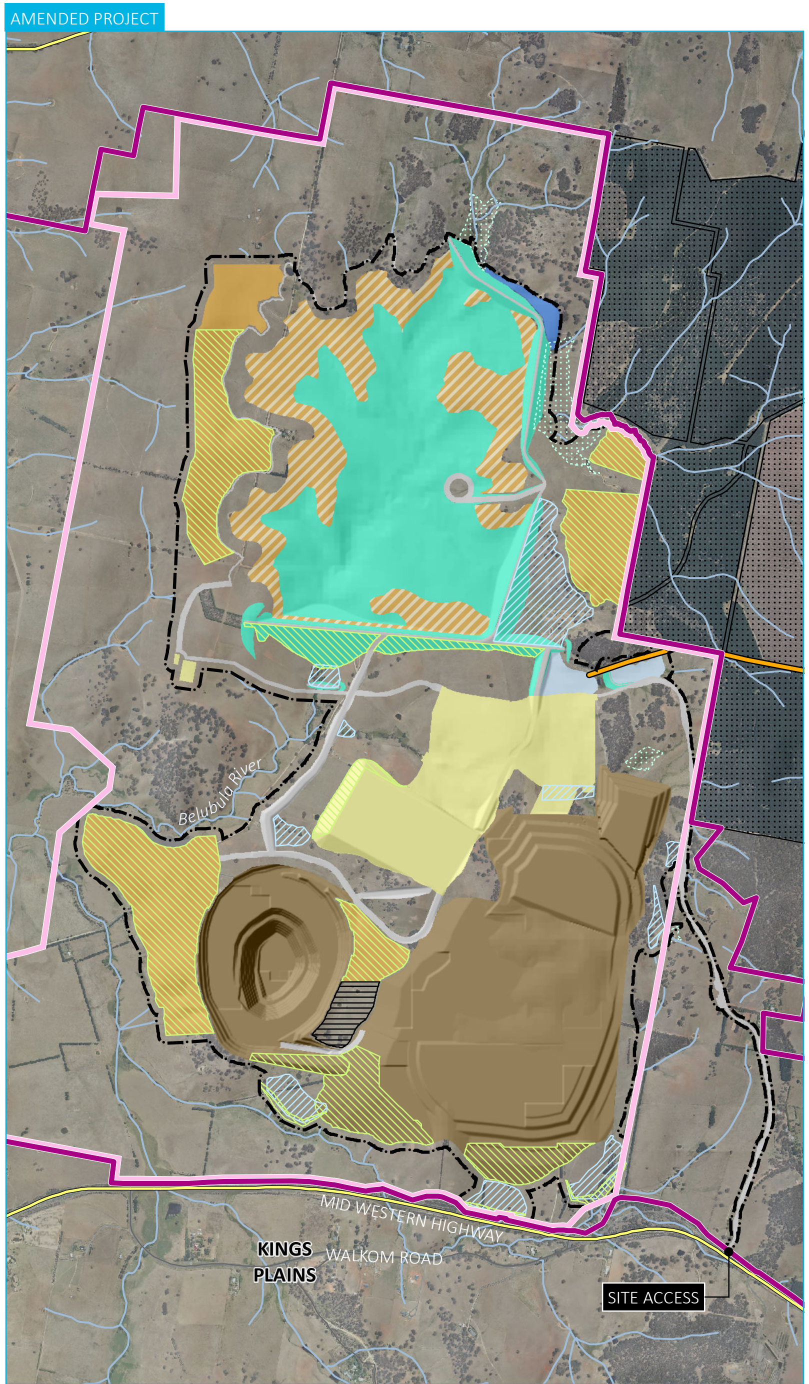

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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

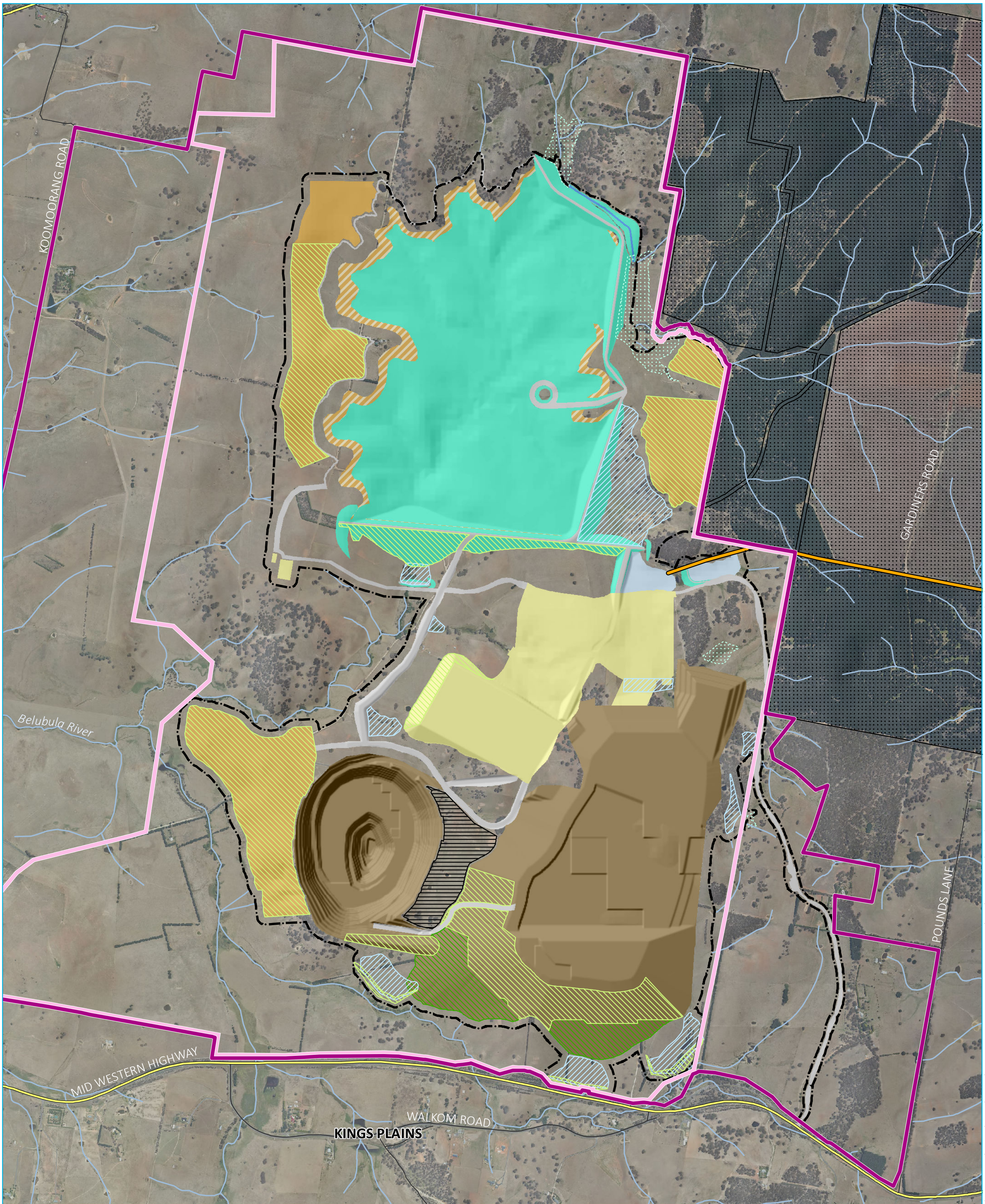
Completed works
- Mine infrastructure area
- Mining operations (open cut & waste rock emplacement)
- Road
- Tailings storage facility
- Soil zone
- Soil stripping
- Water management area (EIS)
- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Mine rehabilitation
- Hydromulched/grass
- Decommissioned topsoil zone (amended project)
- Early stages of open woodland establishment

Comparison of mine development general arrangement – Year 4

McPhillamys Gold Project
Amendment report
Figure 2.3c

REGIS RESOURCES LTD
EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

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KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

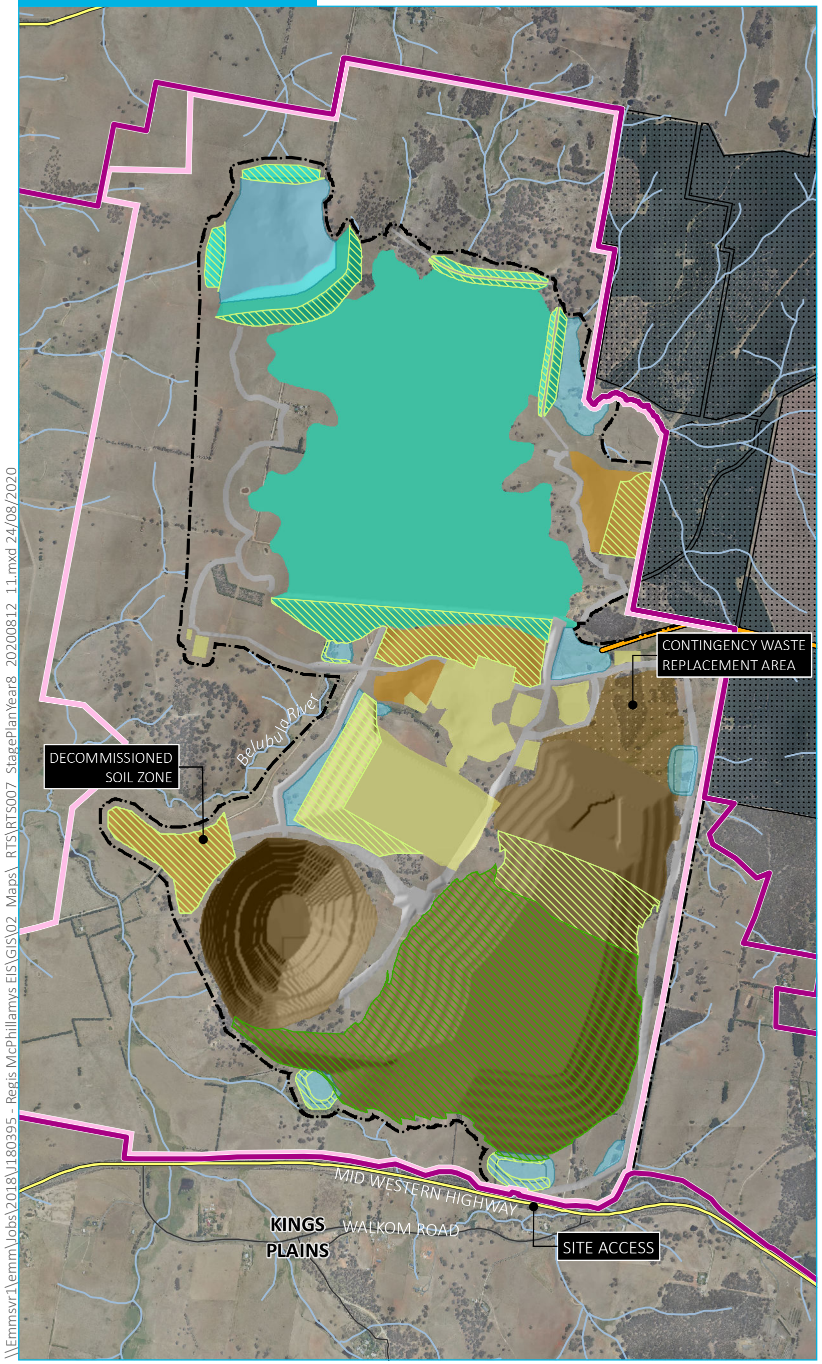
Completed works
- Mine infrastructure area
- Mining operations (open cut & waste rock emplacement)
- Road
- Tailings storage facility
- Soil zone
- Soil stripping
- Clean water diversion
- Water management facility (WMF) - continuous storage
- Water management facility (WMF) - infrequent storage
- Clean water facility (CWF)

Mine rehabilitation
- Hydromulched/grass
- Decommissioned topsoil zone
- Early stages of open woodland establishment

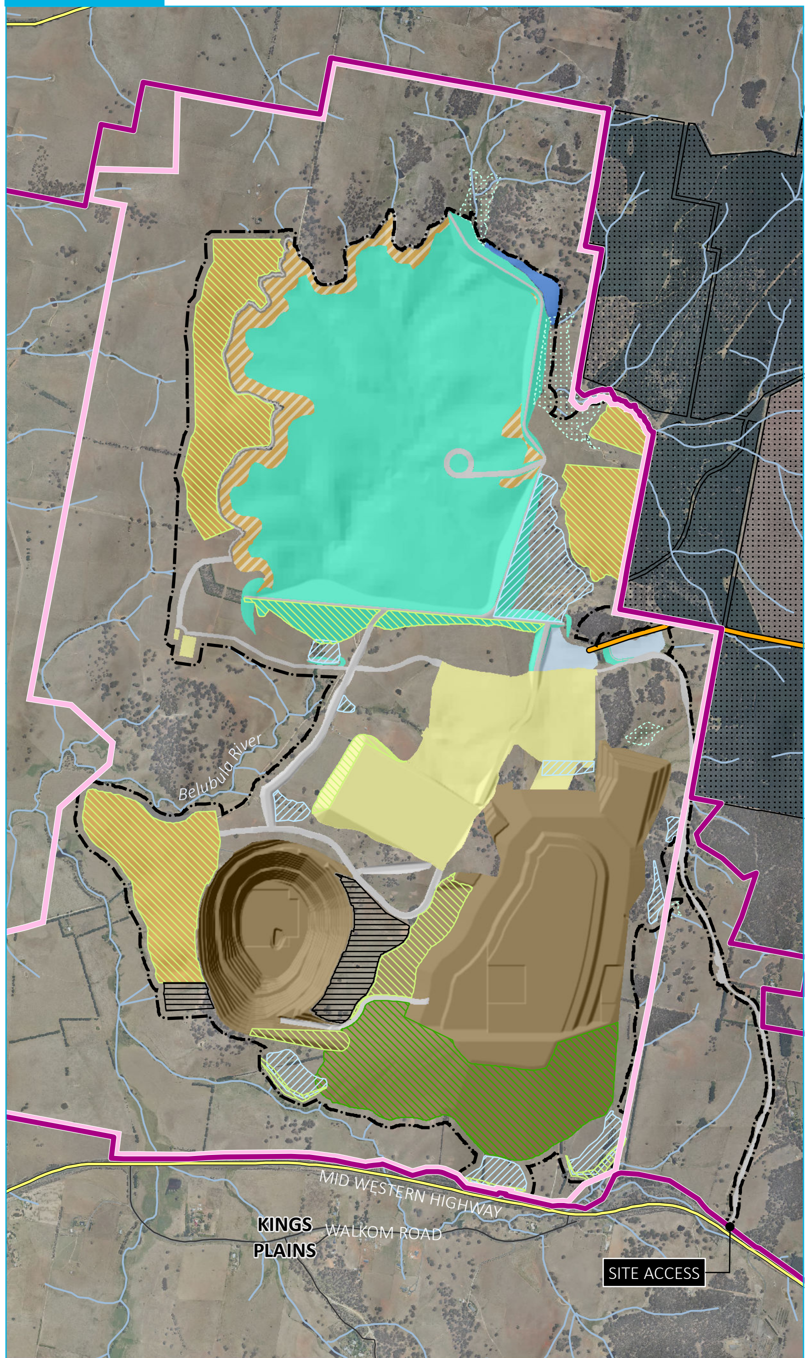
Mine development general arrangement – Year 6

McPhillamys Gold Project
Amendment report
Figure 2.3d

ENVIRONMENTAL IMPACT STATEMENT



AMENDED PROJECT



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Completed works
- Mine infrastructure area
- Mining operations (open cut & waste rock emplacement)
- Road
- Tailings storage facility
- Soil zone
- Soil stripping
- Water management area (EIS)
- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Mine rehabilitation
- Hydromulched/grass
- Decommissioned topsoil zone (amended project)
- Early stages of open woodland establishment

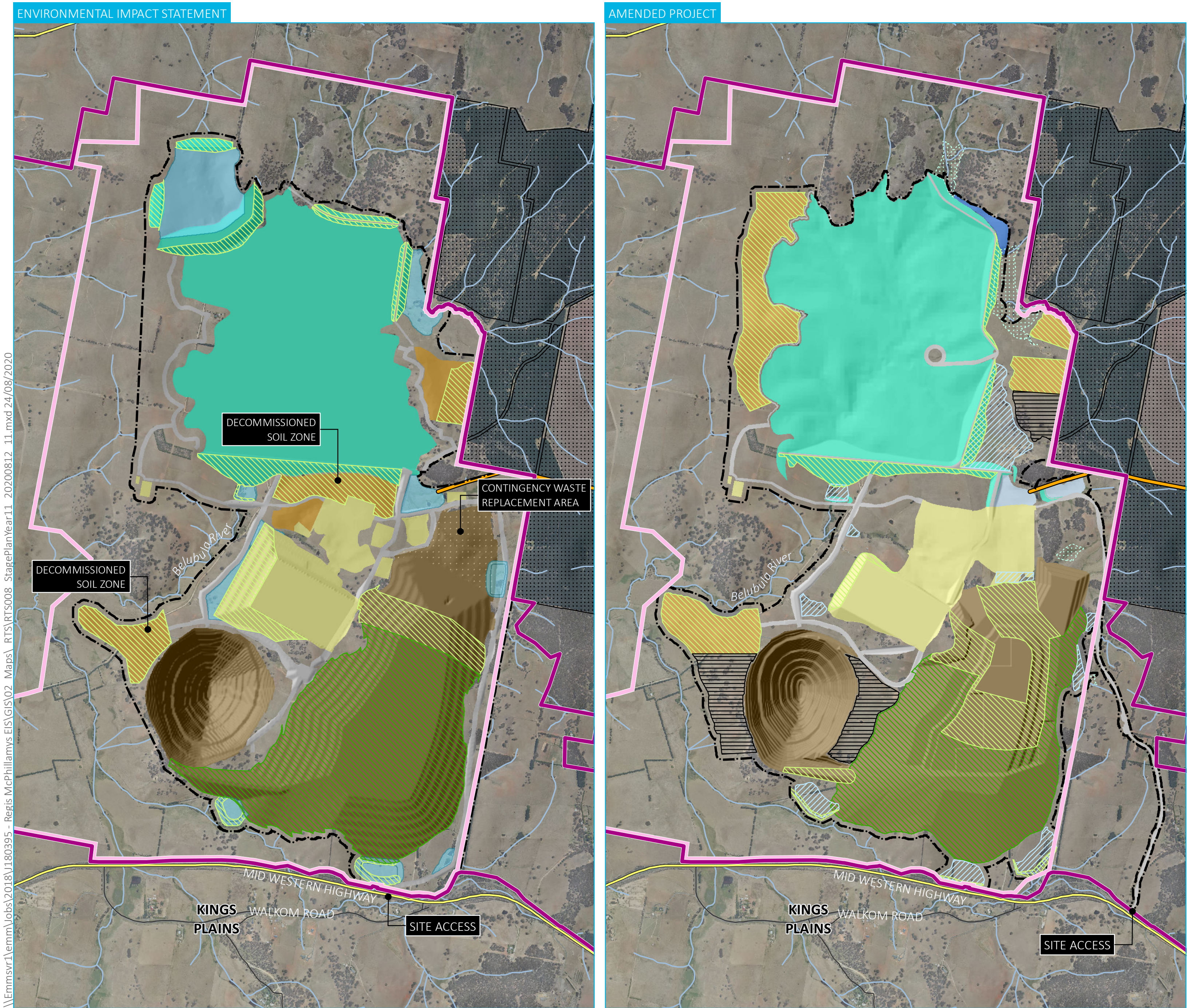
Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

Comparison of mine development general arrangement – Year 8

McPhillamys Gold Project
Amendment report
Figure 2.3e

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps\RTS\RTS007_StagePlanYear8_20200812_11.mxd 24/08/2020



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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

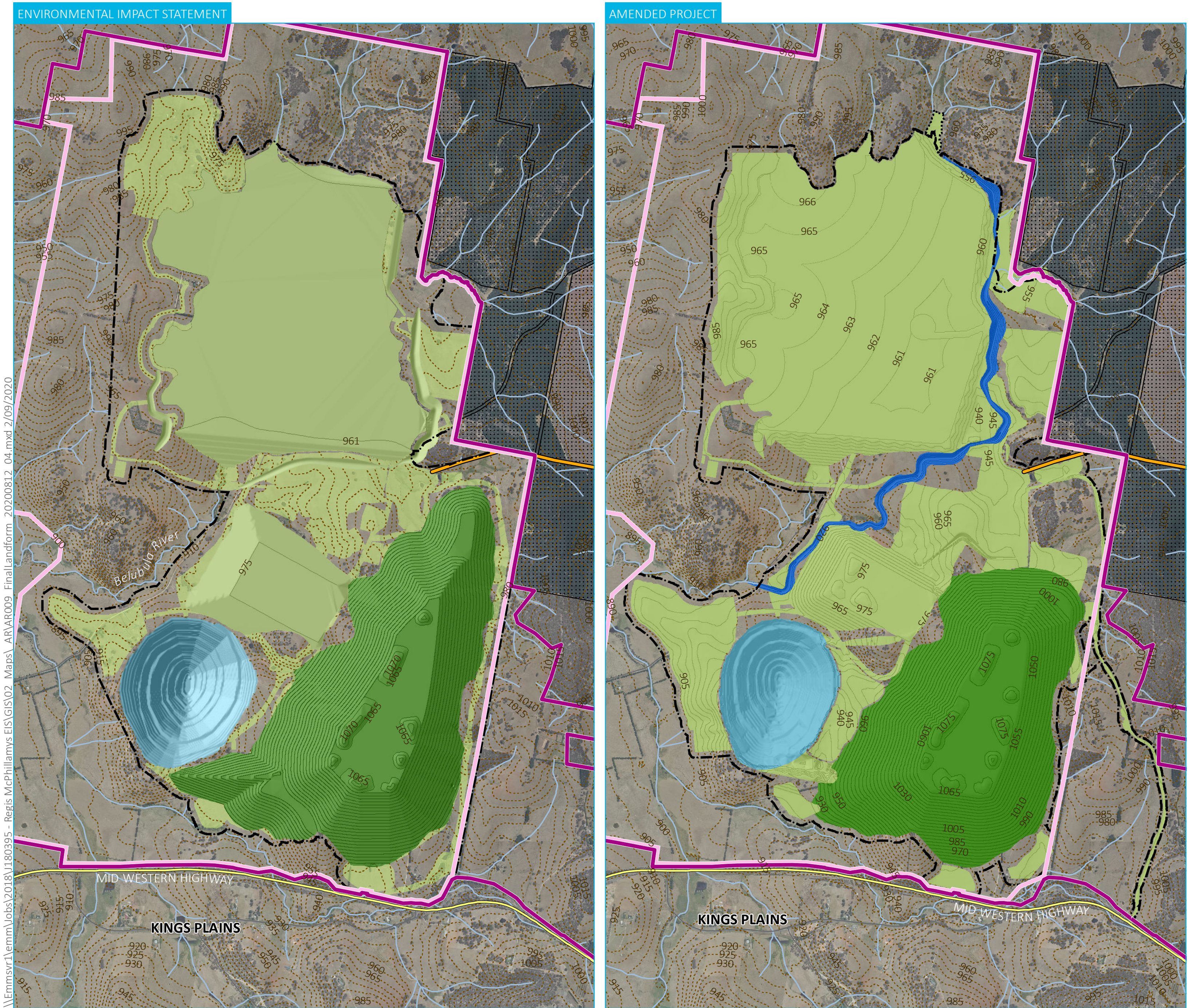
Completed works
- Mine infrastructure area
- Mining operations (open cut & waste rock emplacement)
- Road
- Tailings storage facility
- Soil zone
- Water management area (EIS)
- Clean water diversion (amended project)
- Water management facility (WMF) - continuous storage (amended project)
- Water management facility (WMF) - infrequent storage (amended project)
- Clean water facility (CWF) (amended project)

Mine rehabilitation
- Hydromulched/grass
- Decommissioned topsoil zone (amended project)
- Early stages of open woodland establishment

Comparison of mine development general arrangement – Year 10 (EIS)/ Year 11 (amended project)

McPhillamys Gold Project
Amendment report
Figure 2.3f

REGIS RESOURCES LTD
EMM creating opportunities



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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DPE (2019); DFSI (2017); GA (2011)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine plan contour (5 m); TSF contour (1 m)

Conceptual final landform elements
- Rehabilitated area (grazing)
- Rehabilitated area (open woodland)
- Clean water diversion
- Void

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Existing contour (5 m)
- Vittoria State Forest

Amended mine development conceptual final landform compared to EIS

McPhillamys Gold Project
Amendment report
Figure 2.4

REGIS RESOURCES LTD
EMM creating opportunities

2.4 Mine development – construction phase

2.4.1 Site establishment and soil stockpiles

The indicative soil stockpile zones have been revised as a result of the amendments to the project and are shown in Figure 2.1. The main reason for this change is the loss of ability to initially stockpile soil in the centre of the waste rock emplacement, as was proposed in the EIS, because the emplacement will now be constructed in both the north and the south progressively. In the EIS, soil was proposed to be stockpiled north of the advancing face (from the south) and then placed on the landform as areas become available. As noted in Section 2.5.2 of the EIS, detailed topsoil and subsoil stripping and scheduling will be completed during detailed design.

During the early stages of construction, some existing farm buildings/houses will be demolished within the mine development project area in accordance with the applicable Australian Standard to allow establishment of mine infrastructure.

2.4.2 Development of the open cut

The open cut will be developed as described in Section 2.5.3 of the EIS. The overall geometry of the open cut pit remains essentially the same as that described in the EIS, with the exception of:

- the location of exit and entry ramps to the open cut, which have been revised to reduce potential noise emissions from trucks exiting and entering the pit. The location of the ramps for the amended project compared to the EIS can be seen in Figure 1.4; and
- the final depth of the open cut pit, which will be around 450 m rather than 460 m as described in the EIS. Refinement in the design, including the change in pit exits to reduce noise emissions, has resulted in a small decrease in ore mined at the base of the open cut.

As described in the EIS, suitable waste rock obtained from the development of the open cut pit will be in demand early in the mine life as a construction material for site earthworks. As part of the amended project, the Secondary WMF has been removed from the water management system resulting in an avoidance of impacts to the potential historic heritage item Hallwood. Subsequently, waste rock material that would have been used to construct this infrastructure can be used elsewhere within the mine development project area, particularly for the construction of the revised TSF embankments.

2.4.3 Pit amenity bund and southern amenity bund

The pit amenity bund and southern amenity bunds are shown in Figure 2.1. The pit amenity bund runs alongside the ramp exit keyway from the south of the open cut, connecting to the southern amenity bund to the east. The southern amenity bund forms the southern extent of the waste rock emplacement. Both amenity bunds have been designed to mitigate noise and visual impacts on the residents of Kings Plains to the south of the mine development project area. Amendments to the dimensions and construction timeframe of the pit amenity bund and the timeframe for the construction of the southern amenity bund are proposed and have been developed as a result of iterative mine design and noise modelling.

i Pit amenity bund

The pit amenity bund was included in the EIS project design to reduce noise from haul trucks exiting the pit via a southern exit ramp. This bund remains part of the project but has been reduced in size due to redesign of the haul roads, including the lowering of the exit ramp from the open cut pit, facilitated by a keyway. That is, the south exit for the pit has been cut into the ground for some distance, reducing the height in the vicinity of the pit bund in this area. The final height of the pit amenity bund has decreased by around 20 m from that proposed in the EIS, from 970 m to approximately 950 m AHD, and decreased in size by approximately 90%, from approximately 4.5 million m^3 (as presented in the EIS) to 0.46 million m^3 (refer to Figure 2.1). The pit amenity bund will continue to be optimised during the detailed design phase to further minimise impacts to the south of the mine development project area.

As a result of amendments to the mine and waste rock emplacement schedule, in the early stages of the open cut development the haulage fleet will exit the pit from ramps on both the northern side and eastern side of the open cut, primarily heading north to place waste rock in the northern footprint of the waste rock emplacement. This change in haul truck movements has contributed to the reduction in predicted noise impacts on residents in Kings Plains in the early years of the project.

The results of the noise model were used to help inform the proposed sequence of initial construction activities in the southern-most part of the mine development project area, given the proximity of this area to Kings Plains. As shown in Figure 2.1, the components to be constructed in the south of the project area include the pit amenity bund, WMF4, WMF5 and WMF6 (which are required to capture runoff from disturbed areas) and the southern amenity bund. The pit amenity bund will still be constructed in Year 1, with its construction prioritised in the first six months of the project so that it is constructed as soon as possible. To achieve acceptable noise emissions, it was determined that the pit amenity bund and the three WMFs cannot all be constructed at the same time due to the resulting higher noise levels from the intensity of activity. Therefore, the WMFs will be constructed in sequence, rather than in parallel, in the following order; WMF6, WMF4, and WMF5. Construction of the pit amenity bund will start once WMF6 is constructed (which will capture runoff from disturbed areas as this bund is constructed).

Further, the revision of the pit amenity bund design included a detailed review of the equipment to be used during the bund construction, in consideration of the potential noise predictions in Kings Plains. The larger mining fleet will be used in the first six months of the project during the construction phase (daytime activity only) to enable the bund to be established as soon as possible. From around month 7 onwards, equipment with reduced noise output will be used to complete construction of the bund, as the work on the bund moves to a higher elevation and to satisfy the relevant operational noise criteria which will then apply as the mine moves into 24 hour operations. Equipment with reduced noise output will also be used to construct the WMFs associated with the pit and southern amenity bunds in the first six months of the project.

ii Southern amenity bund

The construction sequence of the southern amenity bund has been revised as part of the amended project. Due to changes in the waste rock emplacement schedule, which have been made to reduce noise impacts on Kings Plains compared to those predicted in the EIS, the timeframe for construction of the southern amenity bund has increased, with construction to begin in around Year 2 and continue until approximately Year 6. In the EIS the southern amenity bund was scheduled to be constructed between Year 1 and Year 4. This extended construction timeframe is shown in the indicative general layouts of the amended mine development over the project life (Figure 2.3a to 2.3f) and the revised indicative project schedule (Figure 2.2). No amendments to the final height of the southern amenity bund have been made, which is 1,065 m Australian Height Datum (AHD) for the majority of the landform and up to 1,075 m AHD in areas where micro-relief elements have been incorporated into the design.

The waste rock emplacement will now start in the northern end of its footprint, rather than the south as presented in the EIS. Waste rock will be placed at the northern end until pit benches are in place in the open cut to shield pit activities, when work will then commence on the southern amenity bund (around the start of Year 2). This avoids the concentration of activity during site establishment and the initial construction phase at the southern end of the mine development project area that was originally proposed in the EIS, which included the southern amenity bund and initial works above ground developing the open cut scheduled at the same time. In the EIS the southern amenity bund was scheduled to be constructed so that it could shield activities in the rest of the mine development project area from the residents of Kings Plains as soon as possible. However, this meant some higher noise levels were modelled due to this concentration of activity occurring simultaneously at the top of the pit and the amenity bund.

In addition to a change in the timing of construction, a reduced mining fleet will be used in the initial years of the project, with associated less haul trucks, until the open cut pit benches are in place to shield earthworks in the pit. The reduced mining fleet means that it will take longer to move material, which is another reason for the extended construction timeframe of the southern amenity bund. Work on the southern face of the southern amenity bund will also only occur during the daytime period.

Further discussion on the change in noise, air quality and visual amenity related impacts associated with the construction of the southern amenity bund are discussed in Sections 6.5, 6.6 and 6.13 respectively.

2.4.4 Site access and internal roads

The location of the site access off the Mid Western Highway has been amended to address issues raised in submissions from the local community and TfNSW. The new location for the intersection of the access road with the Mid Western Highway is approximately 1 km east of the location presented in the EIS, as shown in Figure 1.4. Subsequently, a new alignment is required for the site access road to connect to the mine administration and infrastructure area, as also shown in Figure 1.4. Construction of the intersection and site access road are anticipated to be completed within the first six months of the project.

The design of the site access intersection has not changed from that presented in the EIS, consisting of an auxiliary left turn lane, channelised right turn lane and eastbound acceleration lane. The proposed intersection has been designed to cater for the worst-case scenario of peak background traffic and project-related traffic. A concept design for the new site access is contained in the traffic impact assessment addendum in Appendix Q.

Consistent with the EIS, construction traffic will initially access the mine development project area via Dungeon Road, anticipated to be for approximately the first six months of the project. Once the new site access is complete the Dungeon Road access will be formally closed in due course; however, access via locked gates will be maintained via Dungeon Road for emergency vehicles, environmental monitoring, mine inspections or in the event of an unplanned blockage of the new site access. Dungeon Road will become a no-through road during construction activities. In addition, the section of Dungeon Road from the intersection with the Mid Western Highway and the mine development area will be sealed.

Internal all-weather graded access roads will be established where required to provide access to mine infrastructure areas including to the TSF, processing plant, open cut pit and ancillary areas. The approximate locations of the internal access roads have been revised to account for the amendments to the site layout and are shown in Figure 2.1.

Further detail regarding the proposed new intersection and site access is provided in Section 6.12. It is noted that discussions with TfNSW regarding the final layout of the revised site access concept design are ongoing and minor amendments to the intersection design and location may be made prior to finalising the detailed design of the intersection (for example, the intersection may be shifted further east to provide greater separation from the existing curve on the Mid Western Highway to the west). This may also require refinements to the internal road layout.

2.4.5 TSF construction

While the design principles to which the TSF have been designed remain the same to those presented in the EIS, some amendments have been made including changes to the embankment design and construction timing, the TSF footprint and the TSF post closure landform to facilitate improved water management around the TSF. The main embankment is now proposed to be constructed in a number of stages in a series of downstream lifts, as shown in Figure 2.8. This differs from the construction described in the EIS, which was a pyramid type construction. The embankment will still comprise the key elements of an upstream clay fill core, internal rock fill transition zone and downstream rock fill shell/buttress.

Changes have also been made to the eastern embankments around the TSF, to facilitate clean water diversions during operations and post closure.

The changes to the waste rock schedule and the use of a reduced mining fleet in the initial stages of the project has resulted in a longer duration of rock fill placement for the TSF embankment construction. In addition, subsequent investigations and geotechnical assessments have further delineated the spatial distribution of clay in the TSF footprint and confirmed the availability of suitable clay fill material to line the TSF, as part of a multi-barrier seepage control approach.

The amendments to the design, staging and operation of the TSF are described in detail in Section 2.8.

2.4.6 Site services

No significant changes to the proposed arrangements for site services during construction, as described in Section 2.5.9 of the EIS, are required as part of the amendments to the project.

The EIS identified a potential shortfall in construction and dust suppression water prior to the commissioning of the pipeline development before the end of Year 1. An investigation has subsequently been carried out to investigate the potential of establishing onsite production bores to supplement the project construction water supply. This investigation included an assessment of potential impacts of onsite production bores on neighbouring properties. The outcome of this investigation is described in Section 2.9.1.

A description of the proposed power supply for the operations is provided in Section 2.10.

2.4.7 Construction equipment

The mining fleet to be used during the development of the mine particularly in the first year has changed as a result of the amendments to the project. The mining fleet anticipated to be used for the amended project, compared to that presented in the EIS, is shown in Table 2.2. As shown, the amended project uses a reduced mining fleet compared to what was considered in the EIS.

Table 2.2 Primary indicative equipment fleet during site establishment/construction

EIS	Amended project
4 excavators	2 excavators
Up to 17-20 primary haul trucks	Up to 10-12 primary haul trucks
3 secondary haul trucks	No secondary haul trucks
3 tracked dozers	2 tracked dozers
2 wheeled dozers	1 wheeled dozer
4 production drills	3 production drills
1 grader	1 grader
1 water cart	1 water cart
1 front end loader	1 front end loader

From approximately month 7, when activities begin to also be conducted at night, the mining fleet will be replaced with equipment that has a reduced noise output to meet noise criteria requirements in the Kings Plains area, as also described in the EIS.

Further, as explained in Section 2.4.3(i), the larger mining fleet will be used on the pit amenity bund construction in the first six months of the project to enable the bund to be established as soon as possible. From approximately month 7 onwards, mining equipment with an overall reduced noise output will be used to complete construction of the bund, as the work on the bund moves to a higher elevation and to enable compliance with the operational noise criteria, which will then apply as the mine moves into 24 hour operations. This reduced noise output fleet will also be used to construct the WMFs associated with the pit and southern amenity bunds in the first six months of the project.

2.4.8 Construction schedule

No changes to the proposed construction hours, as described in Section 2.5.11 of the EIS, have been made as part of the amendments to the project. The first six months of the project will continue to be carried out generally during standard construction hours as per the ICNG; that is, daytime only. Low intensity construction activities, environmental management (eg dust control), delivery of oversized equipment, and equipment servicing, may be carried out as required outside these standard construction hours. In these circumstances, works will be undertaken in accordance with the noise criteria for out of hours works as per the ICNG.

Consistent with the description provided in the EIS, after six months, mine development activities are proposed to be carried out 24 hours per day, 7 days per week.

As discussed in Section 2.4.3, an iterative process of noise modelling and mine and waste rock scheduling has been undertaken to further define the sequence of activities in the initial site establishment phase (ie the first six months) of the project, in particular consideration of noise predictions in Kings Plains. The key outcomes of this are as follows:

- Construction of WMF6, WMF4 and WMF5 will generally be undertaken sequentially, in that order to minimise noise in Kings Plains. Construction of these WMFs will be completed within the first six months. The purpose of these WMFs is to effectively control runoff from disturbed areas associated with the establishment of the pit amenity bund and the southern amenity bund.

- Construction of the pit amenity bund will also be prioritised in the first six months. Construction will continue beyond six months; however, after this time, mining equipment with a reduced noise output will be used on this bund.

- Construction of the waste rock emplacement will now start in the north rather than the south of the emplacement footprint as described in the EIS (refer to Figure 2.3a and 2.3b). Establishment of the southern amenity bund will commence around the start of Year 2.

2.5 Open cut mining operations

2.5.1 Mineral Resource and Ore Reserve

An update of the Mineral Resource Estimate and the Ore Reserves Estimate has resulted in a slight change to what was presented in the EIS. The Mineral Resource Estimate has been updated from 68.9 Mt @ 1.04 g/t gold to 69.8 Mt @ 1.02 g/t gold. The Ore Reserves Estimate has been updated from 60.1 Mt @ 1.05 g/t gold to 60.8 Mt @ 1.04 g/t gold.

i Open cut design and development strategy

No changes to the ore and waste rock extraction methods, or the ore extraction rate of up to 8.5 Mtpa, as described in Section 2.6.2 of the EIS, are proposed as part of the amendments to the project. Mining operations will occur 24 hours a day, seven days per week, and are expected to take place over approximately 11 years, compared to the 10 years described in the EIS, of the total 15 year project life.

As part of the amended project, Regis proposes to extract a total of around 107.5 Mbcm, compared to the 109 Mbcm described in the EIS, from the single open cut pit over the life of the project. This small change is due to a slight alteration in the shape of the open cut pit. While the geometry of the open cut pit remains broadly the same as described in the EIS with a maximum diameter of approximately 1,050 m, the final depth will be around 10 m shallower, at 450 m rather than 460 m, representing a change of 2%. The slight change in pit shape can been seen in Figure 1.4, and this change is primarily due to the optimisation of the ramps; ie the ramp direction, the primary and secondary ramp locations and the ramp exit points, which has slightly changed the shape of the pit at the surface, noting it remains broadly circular. The ramp locations have largely been modified in order to reduce noise impacts from the truck fleet so they exit from an improved location and in a better direction.

The indicative material extraction schedule shown in Figure 2.6 of the EIS has been updated to account for the amendments to the project. As shown in Figure 2.5, the material movements have been ‘smoothed out’ over the life of the mine, particularly to avoid the high volume of material moved in the early years of the project that was originally put forward in the EIS, and the associated higher noise levels associated with this movement of material. Subsequently, the volume of material moved in years 1, 2, 3, 4 and 5 has reduced as a result of the revised mine schedule, with more material moved in later years when equipment movement and waste rock emplacement is occurring further away from Kings Plains. The reduction in the volume of material moved in the early years has been achieved through the use of a reduced fleet in the first few years of the project to reduce noise levels. Material extraction and movement will now peak around Year 6 when an increased mining fleet is utilised (similar to that proposed in the EIS). The base case groundwater model has been revised to assess the potential changes in pit water inflows from this revised extraction schedule (refer to Section 2.5 and Section 6.4).

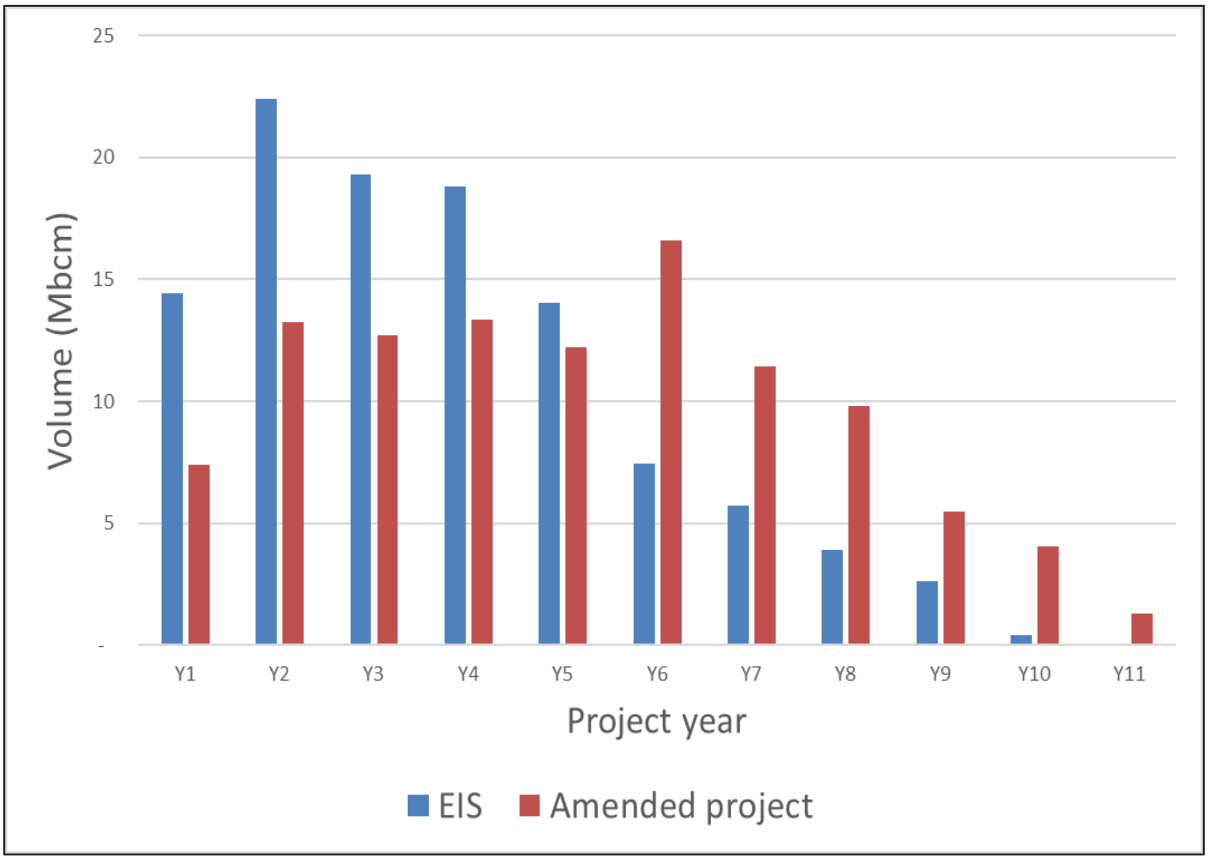


Figure 2.5 Indicative mining material movement schedules (EIS and amended project)

ii Mining fleet

As described in Section 2.4.7, the mining fleet proposed for use has changed as a result of the amendments to the project. It is anticipated that the mining fleet will still need to vary throughout the life of the project depending on the size and depth of the open cut, the volume of material to be moved and waste rock emplacement haul distances. A revised indicative mining fleet (subject to supply by a mining contractor to be engaged post approval) is shown in Table 2.3. As a result of the amendments to the project, the peak mining fleet will be required in around Year 6 of the project; after which point requirements will reduce over time.

Table 2.3 Indicative mining fleet

Equipment	EIS	Amended project
Primary excavator	3	2-3
Secondary excavator	1	1
Primary haul trucks	26	16-21
Secondary haul trucks	3	-
Haul trucks (rehabilitation/prestrip fleet)	3	1
Production drill	4	3
Ancillary drill	2	-
Large tracked dozer	3	2-3
Small-medium tracked dozer	-	1
Wheel dozer	2	1
Grader	2	1-2
Water cart	2	1-2
Front end loader (ROM Pad)	2	2

2.5.2 Open cut pit dewatering

As noted in Section 2.6.4 of the EIS, groundwater will seep into the open cut from the intersected saturated strata. Collection and pumping of this water will be carried out via in-pit sumps and pumps.

The estimates of groundwater inflows into the open cut have been updated to account for the revised extraction schedule (refer to the Groundwater Assessment in Appendix H). The inflow rate is predicted to peak in Year 2 at 580 ML/year (1,600 kilolitres per day (kL/day)), with a second slightly smaller peak in Year 5 at 557 ML/year (1,527 kL/day), declining to around 160 ML/year (438 kL/day) in Year 11. The predicted dewatering volumes are driven by the volume of material mined from the simulated saprock layer (model layer 1), which stores and transmits more groundwater than the underlying fresh rock.

2.6 Waste rock management

2.6.1 Overview

As described in Section 2.7 of the EIS, waste rock and material that has insufficient gold mineralisation for processing will be removed from the open cut during mining operations and will either be used for earthworks within the mine development project area or hauled to the waste rock emplacement.

The indicative waste rock storage volumes for the mine development in million loose cubic metres (Mlcm) have been updated for the amended project (Table 2.4). The total storage volume available is considered sufficient using standard swell factors with a contingency of approximately 10% included in the waste emplacement volume capacity. This contingency accounts for uncertainty over the swell factor pending validation during actual mine operations.

Table 2.4 Updated indicative waste rock storage volumes

Location	EIS (Mlcm)	Amended project (Mlcm)
ROM pad	4.6	5
TSF embankments	5.2	6
Haul roads and administration area	1.7	2
Waste emplacement area including southern amenity bund	102	102
Pit amenity bund	2.7	0.5
WMF embankments	3	0.4
ROM capping (during decommissioning phase)	4.5	4
TSF capping stockpile	-	3
Total	**123.7**	**123**

Note: Mlcm – million loose cubic metres.

As can be seen in Figure 1.4, the amended footprint of the waste rock emplacement does not extend quite as far north as was presented in the EIS. As was shown in the general arrangement figure for Year 8 in the EIS (refer to Figure 2.3e), the area at the northern end of the emplacement was included in the footprint as a contingency, should the swell factor of the waste rock be greater than anticipated. The contingency volume was based on a slightly conservative estimate of waste rock volume, which has been refined by the more detailed mine design undertaken (total waste of 84.5 Mbcm for the amended project compared to 87.8 Mbcm in the EIS). Therefore, the required waste rock storage volume for the amended project, with some contingency still built in, is less than that described in the EIS.

Further, as shown in Figure 1.4, a stockpile of capping material has been included at the northern end of the waste rock emplacement, which will be removed during rehabilitation at the end of the operating mine life to cap the TSF. This area may also be used for the stockpiling and treatment of low grade material at various times to feed into the processing plant, during periods of lower ore production from the open cut. This will in effect smooth out the production profile, with associated air and noise benefits, and is critical to enable a more consistent mining and production schedule throughout the mine life. Low grade ore may also be stockpiled to the east of the ROM pad (between the ROM pad and waste rock emplacement).

2.6.2 Waste rock geochemistry

The description of waste rock geochemistry in Section 2.7.1 of the EIS is applicable to the amended project. However, it should be noted that the calculation of the expected quantity of potentially acid forming (PAF) material presented in the EIS was conservative.

The geochemical characterisation commissioned by Regis and undertaken by SRK (2019) (Appendix G of the EIS) included a robust testing program of material to be excavated during mining in accordance with applicable guidelines. The results were used to interpret what material would potentially generate acid if exposed to air (ie PAF) and what material has capacity to neutralise the acid (ie non-acid forming material, or NAF).

Based on the sampling locations, the laboratory results were used to create a three-dimensional representation of the geochemical properties of material that will be excavated during mining ie PAF, NAF and unclassified (uncertain) material (UC) (due to the material not producing a definitive result during the testing period). This model representation showed that the majority of the acid forming material is spatially and geologically related to the ore body, and that in the eastern and western parts of the open cut the material has capacity to neutralise part or all of the acid.

To help with the mine planning, the central zone from where the majority of the PAF samples were collected were defined as a PAF 'shell' and it was estimated that 42% of the waste rock material would originate from this zone. The material within this PAF 'shell' consists of PAF, UC and some NAF material, but it was conservatively assumed that all material within this zone would be classified as PAF. The resulting material balance showed that sufficient NAF material is available to encapsulate a mixture of acid forming and non-acid forming material from the PAF 'shell' even under this conservative assumption. The laboratory results also suggest that NAF and UC material is present within manageable sub-zones of the PAF 'shell' and there is an opportunity to decrease the amount of excavated waste rock which contains PAF material.

Regis will implement a field-testing program to distinguish PAF material from NAF material during operations, and operational management measures will be implemented to separate the identified PAF material. The testing technique will be designed based on existing laboratory results and will provide results on a rapid turnaround time such that the proportion of PAF material in the waste rock will decrease to less than 42%. This procedure will therefore reduce the volume of PAF material that requires encapsulation and increase the volume of NAF material available to construct the PAF encapsulation cells. Testing of waste rock material will continue progressively throughout the mine life to ensure that all PAF is appropriately managed.

2.7 Ore processing

No significant changes to the proposed ore processing operations, as presented in Section 2.8 of the EIS, have been made as part of the amendments to the project. While the processing plant will still have a nominal throughput of approximately 7 Mtpa, the throughput for which approval is sought is clarified at up to 7 Mtpa. The location and layout of the processing plant have been revised as part of the mine layout optimisation process and is now located further to the east and reorientated north-south as shown in Figure 2.1. The realignment optimises the layout with the natural topography, further improves road access for safer operations and maintenance and allows independent access for the ROM loader to access the crusher floor.

2.8 Tailings storage facility

2.8.1 Overview

The layout of the TSF has been revised as shown in Figure 2.6, which illustrates the amended indicative layout compared to the layout presented in the EIS. The revision of the TSF design has been driven primarily by the revision of the water management system relating to the TSF. The amendments have improved water management around the TSF both during operations and closure and will minimise impacts to native vegetation north of the TSF during the closure period. This revision of the TSF layout and surface water management system has also resulted in the avoidance of Hallwood, a site of potential historic heritage significance.

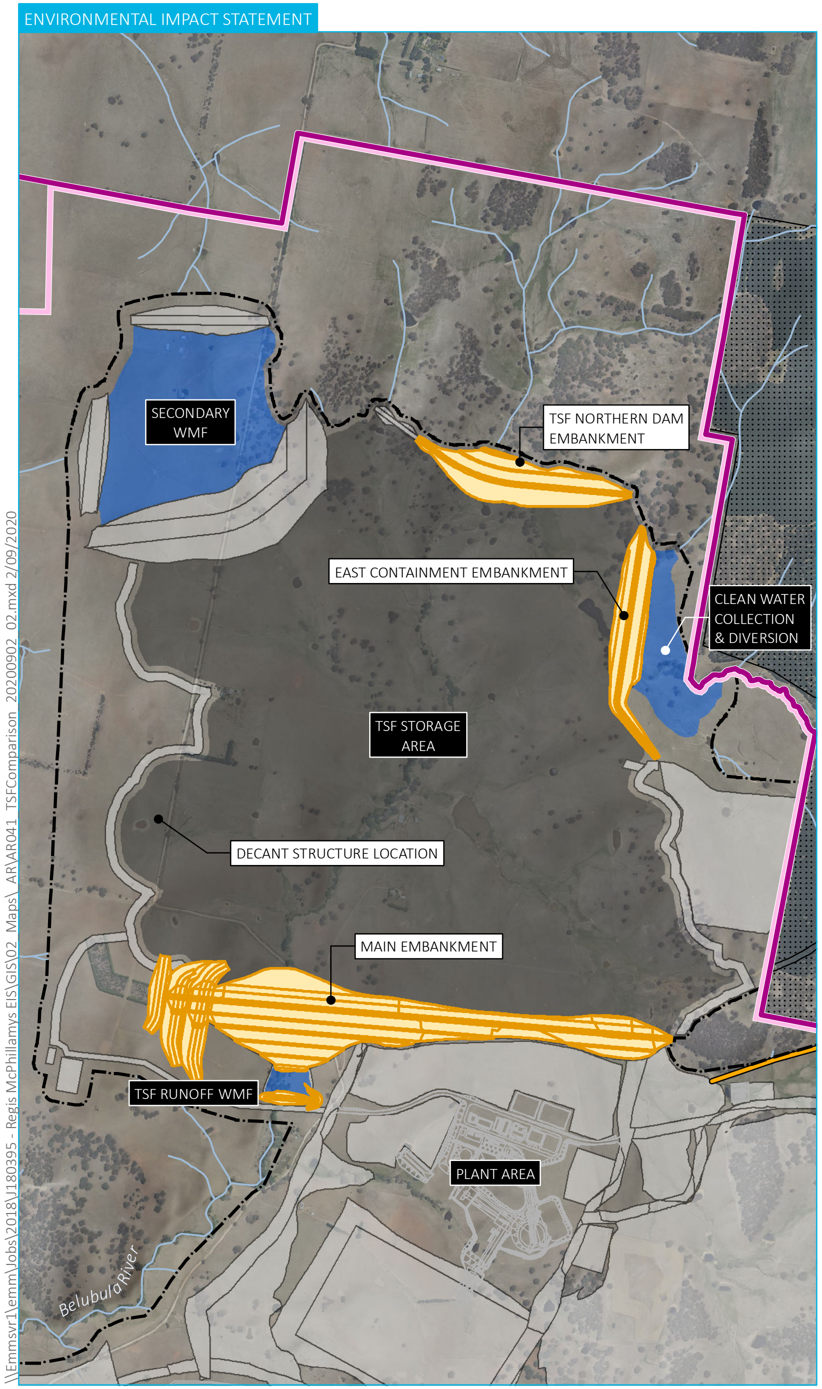
The changes to the TSF are summarised below and are described in detail in the design review report prepared by ATCW 2020 (attached in Appendix D). The revised design of the TSF has also been reviewed by dam safety engineer Chris Hogg of CMW Geosciences. In addition to this, in recognition of the significance of the TSF and the issues raised in this regard in submissions received following the public exhibition of the EIS, the revised TSF design was also reviewed by Dr David Williams, Professor of Geotechnical Engineering and Director of the Geotechnical Engineering Centre at the University of Queensland. Summaries of both expert reviews are included in Appendix C of ATCW 2000 (Appendix D). Both expert reviews concluded that the TSF design is appropriate for the site. Chris Hogg concluded that:

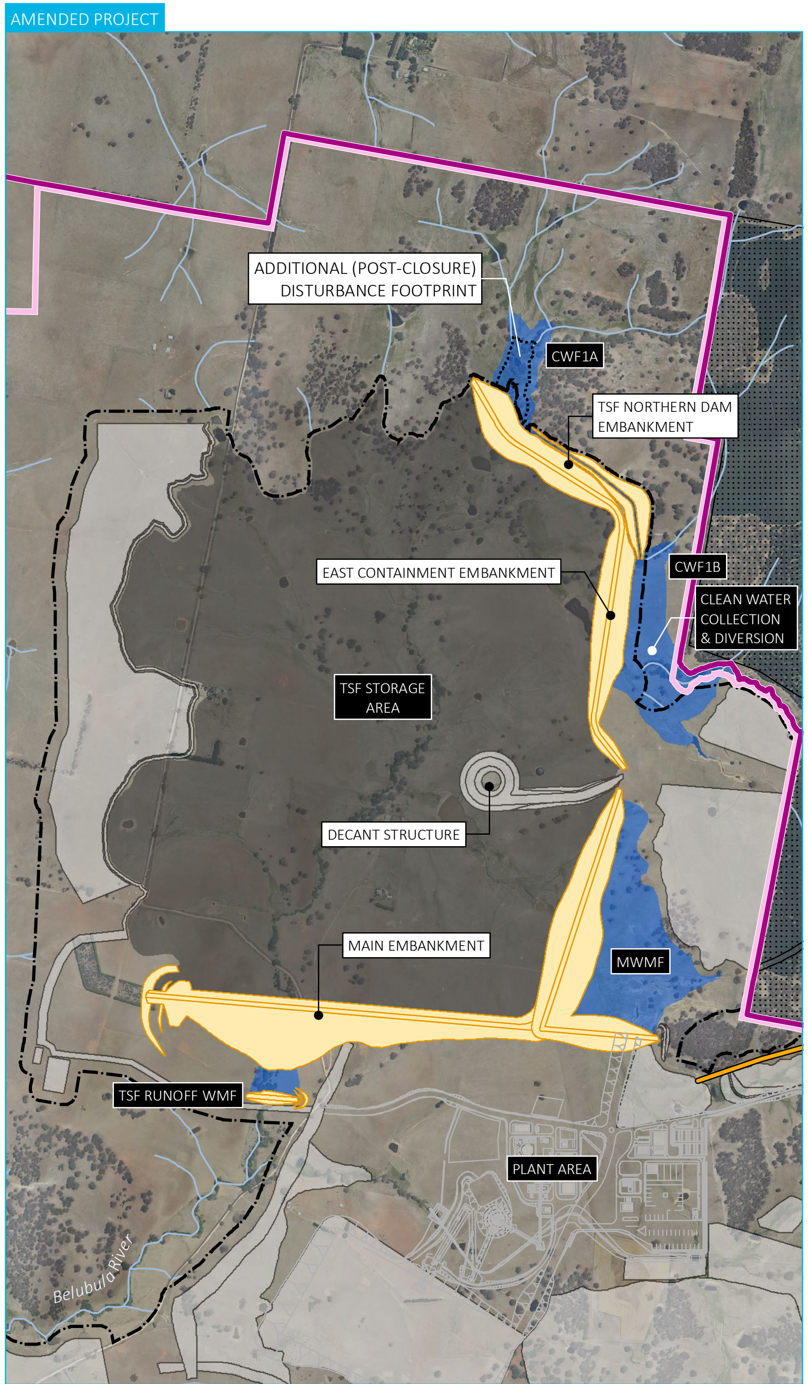
> the McPhillamys TSF design is robust and does not have fatal flaws, and hence can be taken to detailed design and ultimately construction.

Similarly, Dr Williams concluded that the TSF design is consistent with leading practice and the required Australian and International Standards. In the executive summary of his report, Dr Williams states the following:

> Regis and their consultants are commended for having gone beyond leading practice in their very comprehensive Feasibility Study for the Tailings Storage Facility (TSF) of the McPhillamys Gold Project. Their approach has been to select the optimal upper catchment siting for the TSF, and the optimal disposal method for the site of thickened tailings. They have adopted the most conservative 'Extreme' basis of design, conservative design parameters, and downstream construction of the embankment. Under this conservative approach, they have proposed a very stable tailings embankment, with a margin of stability well in excess of that required by the governing Guidelines that will be maintained throughout operations and post-closure. They have proposed a multi-barrier approach to seepage minimisation and capture, including the lining of the TSF inundation footprint and dam equivalent to EPA requirements, plus seepage interception and monitoring, and provision for seepage collection, should it be needed.

Notably, key elements of the TSF as presented in the EIS remain unchanged; in particular the proposed liner system and the multi-barrier seepage control approach. The additional work completed since submission of the EIS on these aspects has further validated the approach presented in the EIS as being robust and in accordance with leading practice.





KEY
- Watercourse/drainage line
- Vittoria State Forest

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- TSF embankments
- Water management area
- Tailings storage facility
- Other mine layout elements

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DPE (2019); DFSI (2017); GA (2011)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AR\AR041_TSFComparison_20200902_02.mxd 2/09/2020

Amended indicative TSF layout compared to the EIS design

McPhillamys Gold Project
Amendment report
Figure 2.6

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A comparison of key elements of the EIS TSF design compared to the amended design is presented in Table 2.5, and a summary of the changes to the TSF design is provided below.

Table 2.5 TSF design elements – amended project compared to the EIS

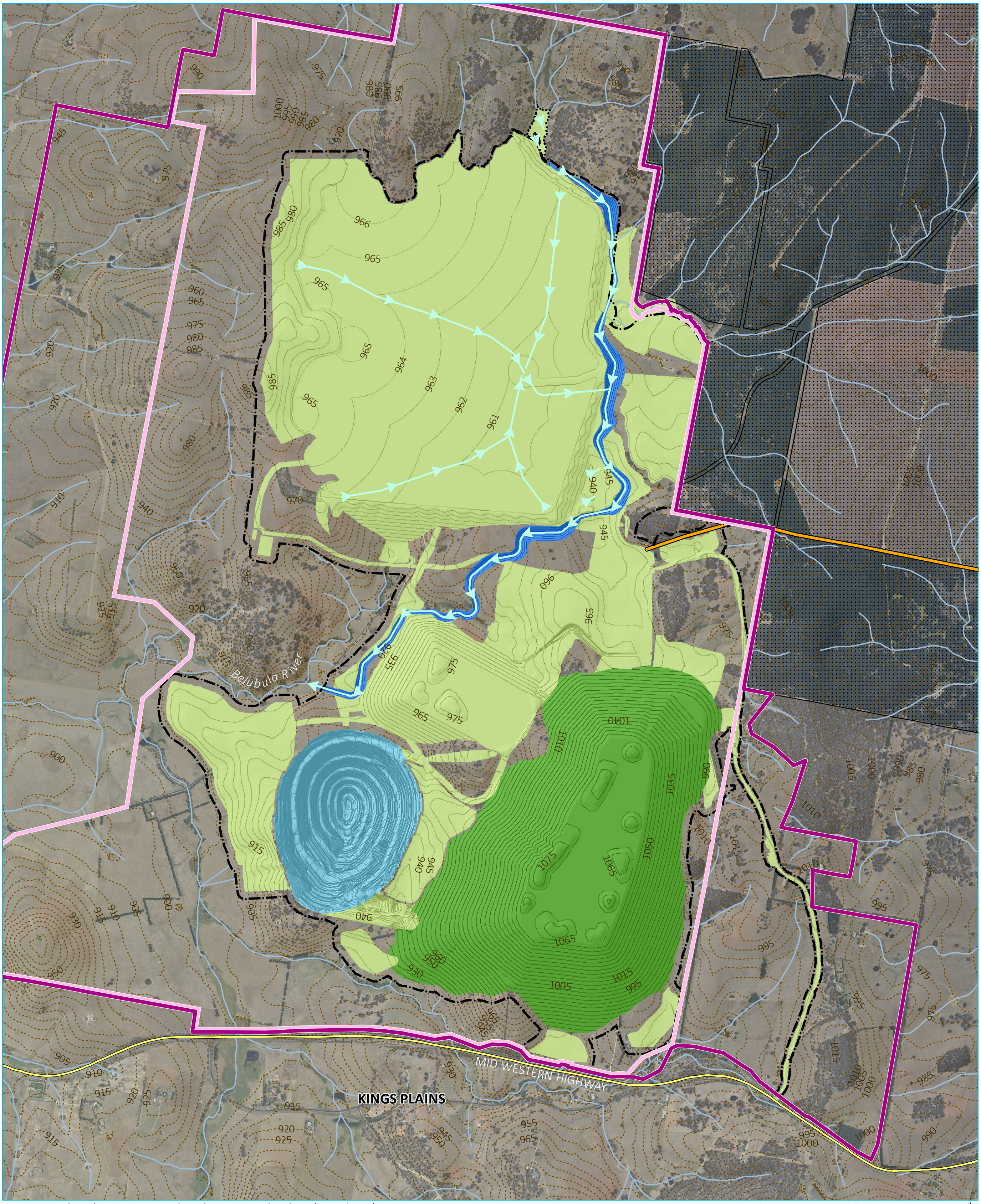
TSF Parameter	EIS	Amended project	Variation
Embankment crest level	RL 962.0 m	RL 962.0 m	No change
Spillway invert level	RL 961.0 m	RL 961.0 m	No change
Spillway base width	15.0 m	15.0 m	No change
Total Embankment length	2,450 m	3,600 m	+1,150 m (47% increase)
Maximum embankment height	49 m	49 m	No change
Embankment crest width	15 m	15 m	No change
Storage area (at full supply level)	270 ha	273 ha	+ 3 ha (1.1% increase)
Embankment base width (at maximum embankment height)	333 m	333 m	No change
LoM[1] Tailings storage capacity available	49,300 ML	46,700 ML	-2,600 ML (5.3% decrease)
LoM TSF total storage capacity (including freeboard)	54,700 ML	50,030 ML	-4,670 ML (8.5% decrease)

Notes: 1. Life of Mine

1. Relocation of the WMF originally proposed to the north-west of the TSF (labelled as the Secondary WMF in the EIS) to the south-east perimeter (now called the Main MWF).

ATCW (2020) note that this relocation provides significant benefit for diversion of clean water post closure. The revised post closure surface water management system can be seen in Figure 2.7. It also minimises the pumping requirements and associated risks during operations by having the Main WMF closer to where the water will be used for the processing plant and waste rock emplacement areas, as well as the TSF decant.

In addition, and as mentioned above, the relocation of this WMF avoids impacting Hallwood, a rural dwelling and associated outbuildings with potential historic heritage value which was in the footprint of the original (ie Secondary) WMF. Hallwood is not listed on local or state heritage registers and Cabonne Shire Council noted that this structure had not been identified in any of the council's heritage studies, in particular the 2003-2006 community-based heritage study and associated thematic study. Notwithstanding, Landskape (2019) and the submission from the NSW Heritage Council recommended that Hallwood be avoided. The redesign of the mine's water management system and the removal of the Secondary WMF as part of the amended project has resulted in an avoidance of impacts to Hallwood. The Secondary WMF has been replaced with the Main WMF in the south-eastern corner of the TSF, and accordingly the layout of the TSF has been revised to accommodate this WMF.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

0 0.5 1 km
GDA 1994 MGA Zone 55 N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- Mine plan contour (5 m); TSF contour (1 m)

- Post-closure drainage pathway

Conceptual final landform elements
- Rehabilitated area (grazing)
- Rehabilitated area (open woodland)
- Clean water diversion
- Void

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Existing contour (5 m)
- Vittoria State Forest

Amended TSF post-closure surface water management

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Amendment report
Figure 2.7

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2. **Refinement of the upstream TSF embankment on the north-eastern side of the TSF, to maximise both the diversion of clean water and the protection of an area containing Box Gum Woodland critically endangered ecological community (CEEC).**

   Since submission of the EIS, further investigation has been conducted into the design of the clean water diversion system around the TSF, including post closure water management. The EIS TSF design, as shown in comparison with the amended TSF design in Figure 2.6, included a northern and eastern embankment. Water that pooled behind these embankments was to be pumped around the eastern side of the TSF, back into the catchment downstream. However, to enable the free draining of this clean water system around the TSF upon closure, a large diversion drain would have been required to be constructed around this north-eastern side of the TSF, involving a significant amount of cut and fill due to the topography in the area and impacting on some of the Box Gum Woodland CEEC present. The revised embankment design around this north-eastern side means that the additional construction of the large diversion drain will not be required. During operations the refinement in embankment design minimises the transfer systems required during operations by enabling diversion of the water to the east and as described ties into the post-closure drainage system which fully drains this eastern catchment. In addition, some minor filling post-closure of the remaining ponded area to the north will permit diversion of 100 percent of the upslope runoff in this catchment.

3. **Amendment to the tailings beach profile.**

   To tie into the post-closure water diversion system, amendments have been made to the deposition locations (noting that the same subaerial deposition approach is proposed) to form the final surface such that it drains towards the east to discharge into the post-closure drainage system.

4. **Relocation of the TSF post-closure discharge point and final diversion channel.**

   As described by ATCW (2020), this change is considered a significant improvement over the design presented in the EIS, as it negates the need for a significant drop structure previously identified as being required on the western abutment to channel water from the TSF to the Belubula River. The initial proposal comprised a drop channel with a grade of the order of 8% over a length of around 770 m. The final clean water diversion included in the amended project is a diversion of over 4,700 m with an average grade of approximately 1%, ranging between 0.5% and 2%, which more accurately represents existing gradients on the site. The diversion channel will be constructed to generally mimic natural geomorphological features consistent with appropriate reference tributaries within the catchment and guided by *A Rehabilitation Manual for Australian Streams* (Rutherford, Jerie & Marsh 2000) and current best practice natural channel design guidance.

5. **Refinement in staging of TSF embankment construction.**

   Since submission of the EIS, refinement of the mining schedule has been undertaken to optimise ore and waste rock extraction and to minimise offsite impacts particularly with respect to noise emissions. As described in Section 2.6, this has resulted in the proposed operation of a reduced mining fleet compared to that presented in the EIS, which subsequently means the rock fill placement for the main TSF embankment construction will take longer. Despite the changes to construction stages and timing, the main TSF embankment final landform remains the same as proposed in the EIS. Williams (2020) notes that the "proposed embankment is designed to have a margin of stability up to twice as high as typical TSF embankments under Australian conditions".

6. **Further analysis of the available clay within the TSF storage area.**

   Based on queries raised with respect to the proposed liner system for the TSF in submissions received following the public exhibition of the EIS, including from the EPA, further examination of the clay availability and suitability within the TSF storage area has been undertaken by ATCW (2020) to further validate the proposed approach to establishing an appropriate TSF liner, as described in Section 2.8.4.

In addition to the above, in the updated TSF design report for the amended project ATCW (2020) note that the following aspects are maintained as per the initial EIS submission:

1. **Seepage control proposed using a robust multi-barrier approach.**

   While queries from the EPA on the TSF focused on the lining system, the modelling outcomes presented in the EIS showed that the combination of the liner, cut-off key and seepage interception system had a significantly greater benefit to the reduction of seepage flows beyond the TSF than a liner only system. It is proposed to continue with this multi-barrier approach as it provides superior short and long-term environmental benefits as well as enhancing the structural integrity of the TSF.

   The proposed seepage management comprises the following:

   - storage liner of equivalence to 1,000 mm of clay at 10^{-9} m/s;
   - clay core on the upstream embankment face;
   - foundation cut-off key;
   - seepage interception system at downstream embankment;
   - TSF Runoff Dam; and
   - monitoring and if required, a seepage collection system.

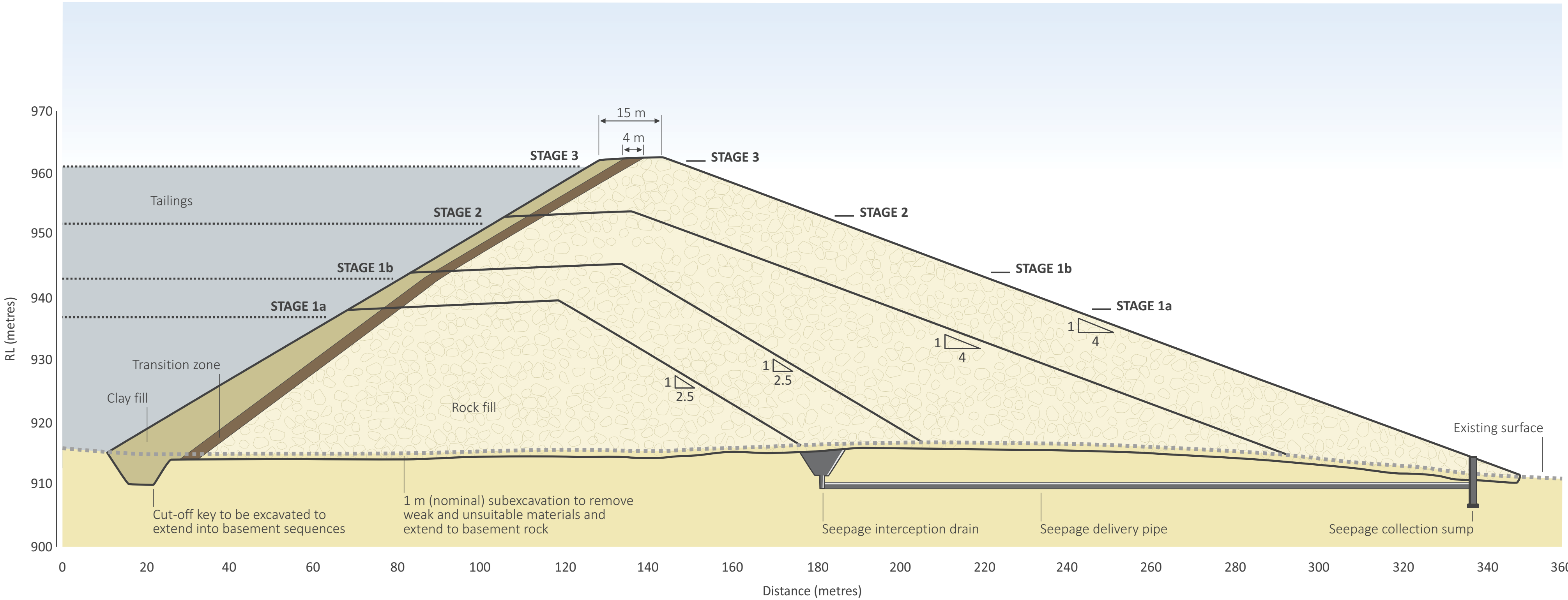
2. **Foundation investigations and understanding to be continued.**

   The EIS outlined further investigations to enhance the knowledge base in terms of geology, geotechnical characteristics and hydrogeological understanding. As part of these works, two additional monitoring bores have been completed (one to the north and one to the south of the TSF), with testing and documenting of these works currently ongoing and the outcomes of which will be used along with current known data to inform detailed design.

A more detailed description of the updates to the TSF design and refinements in the proposed operation of the TSF and seepage management is provided in the sub-sections below. The revised TSF definitive feasibility study for the project is attached in Appendix D. Additional reports describing the TSF disposal options and processing options considered are included in the Submissions Report (EMM 2020a) as Appendix G and H respectively.

2.8.2 Main embankment design

The main TSF embankment will be constructed in a number of stages in a series of downstream lifts, as shown in Figure 2.8. This differs from the construction described in the EIS, which was a pyramid type construction. The embankment will still comprise the key elements of an upstream clay fill core, internal rock fill transition zone and downstream rock fill shell/buttress. Revegetation of the TSF wall will be undertaken after completion of the downstream construction in stage 3.



Amended TSF embankment design

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Figure 2.8

2.8.3 TSF decant

The amended TSF design has incorporated a decant structure within the central extent of the eastern section of the TSF. This structure was on the western side of the TSF in the EIS. The structure will be formed as a perimeter causeway, using coarse mine waste rock, and will allow runoff from the tailings solution to pass while generally retaining the tailings solids. A skid mounted centrifugal pump will pump water directly to the processing plant, or to the Main WMF for use in the processing plant. Towards the completion of the TSF development in stage 3, the decant will be relocated further towards the east, closer to the emergency spillway. This final decant area will assist in developing a final closure landform that can be drained once the surface has been rehabilitated. Further details of the decant design can be seen in the drawings attached to the TSF report (ATCW 2020) in Appendix D.

2.8.4 TSF liner and seepage management

The multi-barrier seepage approach described in the EIS remains applicable to the amended project design, and further review of this system has confirmed its suitability and consistency with best practice. The management of seepage from the TSF will include a liner to meet the EPA's permeability requirements, in addition to a compacted clay cut off key beneath the upstream toe of the TSF embankment, a compacted clay liner on the upstream face of the TSF embankment, an underdrain beneath the TSF embankment to intercept seepage, a seepage collection sump at the downstream toe of the TSF embankment, a lined TSF runoff pond, seepage monitoring bores and, if required, a recovery system.

Modelling by ATCW (2020) demonstrates that a 300 mm thick compacted clay liner with a permeability of 3.3×10^{-10} m/s overlying a minimum 700 mm of natural clay, an engineered geosynthetic clay liner (GCL), and an embankment underdrain, are all found to restrict seepage to the same or a greater degree than the EPA's requirement for a 1,000 mm thick compacted clay liner with a permeability of 1×10^{-9} m/s. Dr Williams (2020) notes in his review that in the modelling results, the embankment underdrain is seen to have more impact on the estimated seepage than the various liners, and the thickness of the liner is seen to have a negligible effect.

Further investigation into the availability and suitability of the clay proposed for the liner system has been undertaken as part of the revised TSF design review report, in response to questions from the EPA relating to this aspect. ATCW (2020) considered two primary aspects for clay:

1. the existence and suitable thickness of clay to use as a storage liner; and

2. whether the material can achieve a suitably low permeability (ie $K < 10^{-9}$m/s).

The purpose of the assessment by ATCW was to define areas that will need to be lined using either in-situ, locally imported clay or an engineered liner (such as a GCL). The work was undertaken at a level to inform the feasibility of the storage lining and will be updated as part of the detailed design. In their modelling of the performance of the proposed liner system, ATCW assumed that where required, the imported lining system would comprise a propriety manufactured product such as a GCL and would be installed in accordance with the manufacturers specifications.

A summary of field investigations into the available in-situ clay material undertaken in the TSF footprint, storage area and immediate surrounds is outlined Table 3 of ATCW (2020). Overall, as a result of the field investigations, the depth of natural clay is expected to be greater than originally assumed, since many test pits did not fully penetrate it. The depth of natural clay is least around the south-western and central northern perimeters of the ultimate inundation footprint of the TSF, where the final depth of tailings will be minimal, and hence the source of seepage in these areas will also be minimal.

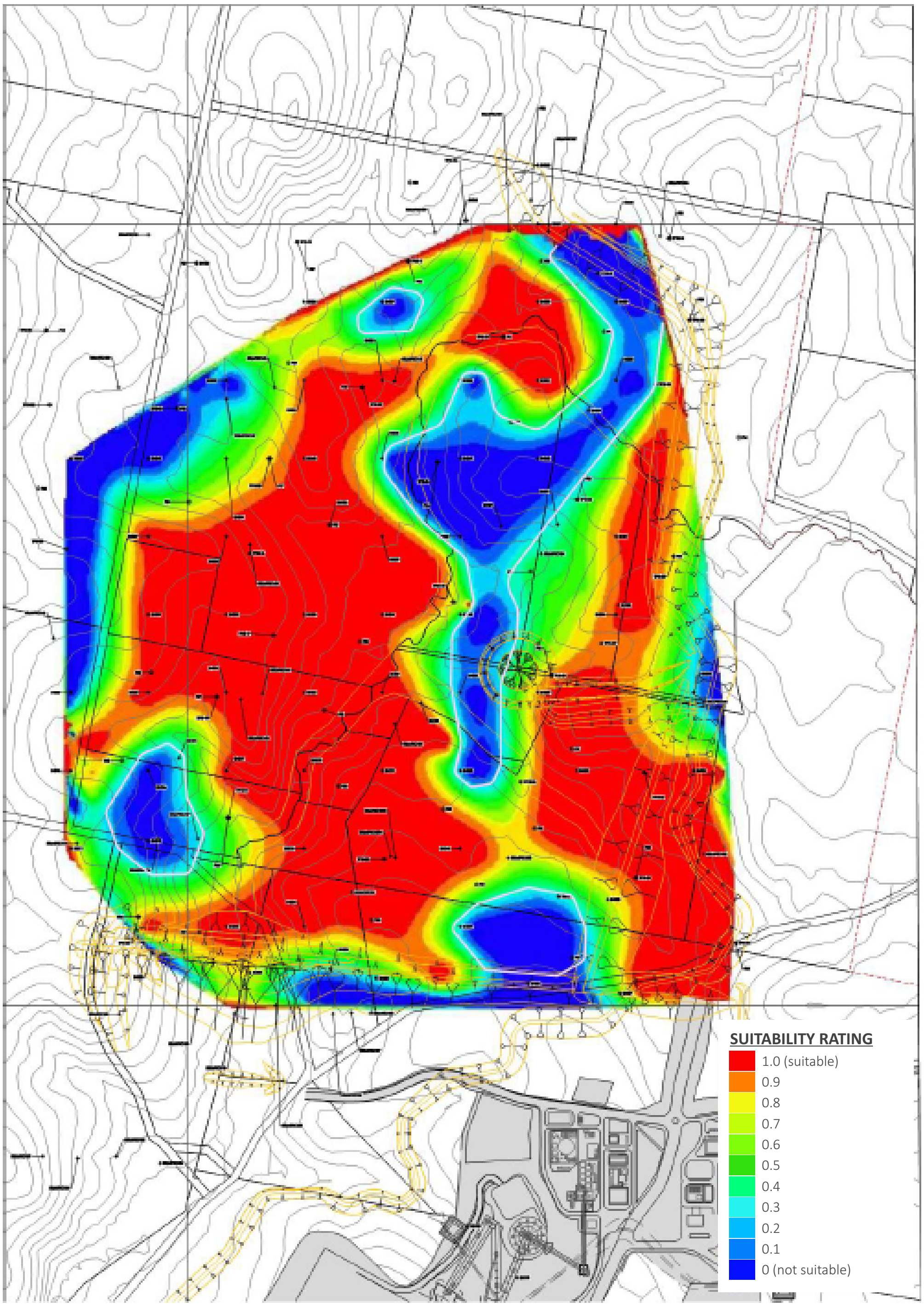
The areas mapped as containing clay suitable for lining the TSF as a result of ATCW's (2020) investigation, is shown in Figure 2.9, and the resulting proposed TSF liner system is shown in Figure 2.10, illustrating the areas that are suitable for providing borrow material as well as zones that will require an artificial lining system. Noting that over 50% of the investigations did not extend through to the base of clay materials and that with the use of modern construction equipment, it is highly likely that the available clay will significantly extend into the completely weathered basement horizon.

In summary, key findings are as follows:

- Using in-situ and imported clays within the TSF storage area will achieve an overall equivalent seepage performance to a 1,000 mm thick clay liner at $1x10^{-9}$m/s permeability. The in-situ clay liner proposed (and using locally imported clays) represents some 86% of the total TSF storage area.

- Enhancing the clay liner thickness in the areas of the existing drainage features and beneath the decant structure will comprise a minimum 1,000 mm at $1x10^{-9}$m/s liner. This liner area represents some 8% of the total TSF storage area.

- An engineered liner such as a GCL will be provided in areas of limited clays and unsuitable clays as defined in Figure 4.10. This area represents an area of some 6% of the total TSF storage area and will be installed in the various stages, generally on the upper slopes/ridge areas.



Mapped suitable clay areas in the TSF footprint (ATCW 2020)

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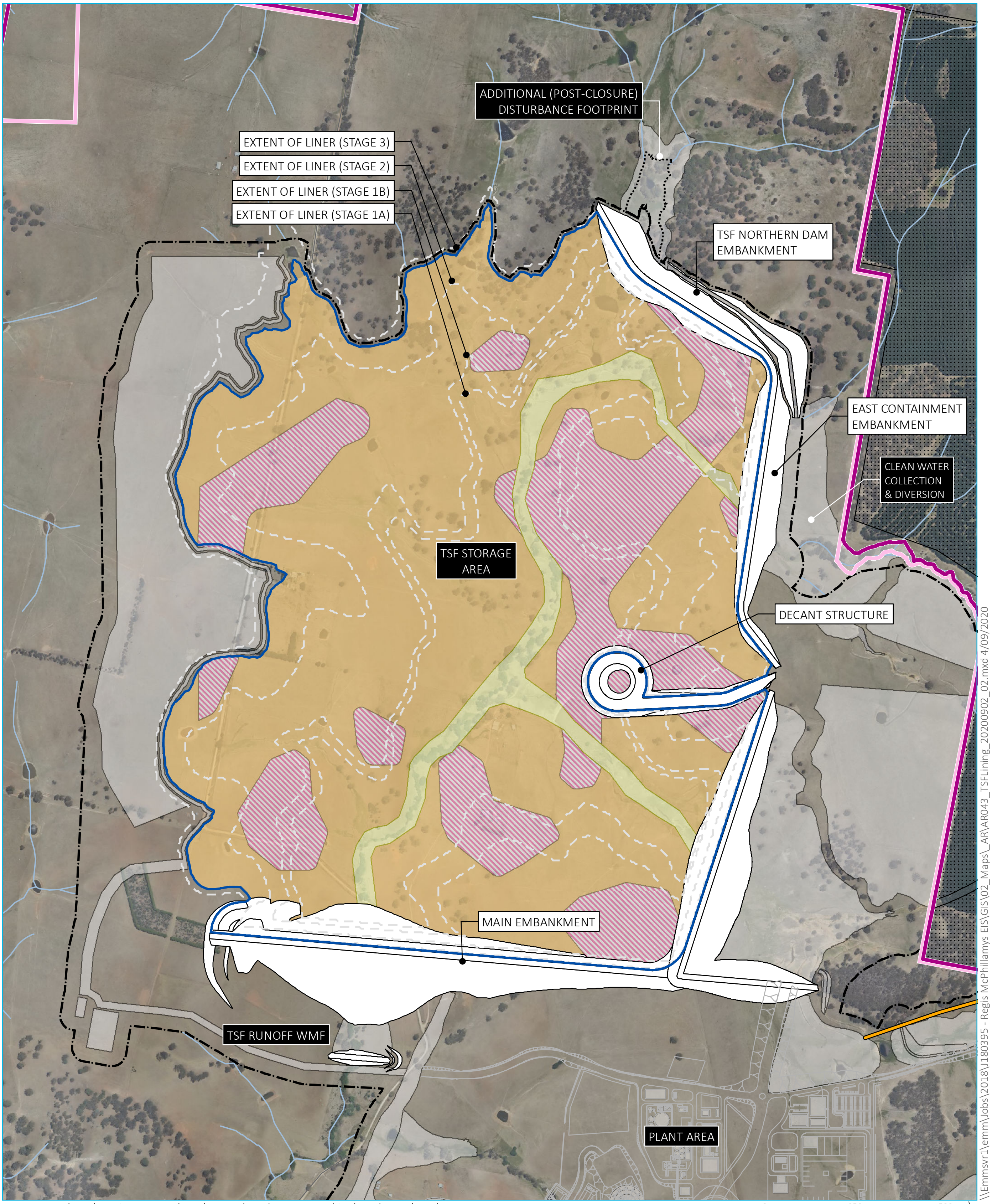
Amendment Report
Figure 2.9



Source: EMM (2020); Regis Resources (2020); ATCW (2020); Survey Graphics (2019); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 55

N

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- TSF embankments
- Other mine layout elements
- Full supply level (at stage 3)
- Staged liner extents
- Drainage channel liner
- Unsuitable clay soils - Stage 1A and above (locally imported clay/GCL liner)
- Residual suitable clay soils

Existing environment

- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Proposed TSF lining plan

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Figure 2.10

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2.9 Water management

2.9.1 Water demand and supply

i Construction and development of the open cut

Section 2.10.1(i) of the EIS identified there may be a shortfall in construction and dust suppression water prior to the commissioning of the pipeline development before the end of Year 1, and that potential shortfalls would be managed by investigating alternative water supplies. These additional investigations have been carried out since submission of the EIS, specifically looking at whether water could be supplied by groundwater bores.

Two test bores (shown in Figure 2.1) and associated monitoring bores were installed as part of the groundwater investigation into construction water supply options, as follows:

- test bore TPB4 and three monitoring bores in the mine development project area, near the proposed location of the main TSF embankment; and
- test bore TB05 and a monitoring bore on land owned by Regis, approximately 700 m north of the mine development project area, targeting a high yielding, but localised, limestone feature.

Aquifer testing was conducted on the test bores and the results were analysed to select appropriate pumping rates for operating the bores, which were determined as follows:

- TPB4: 5 L/s.
- TB05: 10 L/s.

The construction water demand of the mine development is estimated to be 15 to 20 L/s, depending on climatic conditions, with a maximum total of around 470 ML anticipated for the initial nine months of the project (ie until the anticipated commissioning of the pipeline). Therefore, the investigation confirmed that the construction water supply can be primarily sourced from groundwater via production bores at TPB4 and TB05. The required volume of water would be extracted pursuant to an existing groundwater licence under the NSW *Water Management Act 2000* (WM Act) held by Regis with an entitlement of 400-unit shares for the Lachlan Fold Belt Murray Darling Basin groundwater source. Regis also lodged an expression of interest for an additional 200 unit-shares in this groundwater source under the July 2020 Controlled Allocation Order.

In hot, dry weather an additional 5 L/s may be required to meet construction water demand. The groundwater investigation indicated that this additional supply could be met through additional groundwater bores in or near the mine development project area on Regis-owned land, and the construction water supply report (EMM 2020b) recommends some further investigations to confirm the locations of these bores (indicative additional groundwater bore locations are shown on Figure 2.1.

The construction water supply groundwater investigation is described in full in the technical report included as an appendix to the Groundwater Assessment (Appendix H of this report). The potential impacts of sourcing water from the identified production bores are discussed in Section 6.4.

Water pumped from the production bores will be stored in the construction WMF (CWMF) for use. This storage will have a capacity of around 75 ML. Water will be transported from the construction groundwater bores via above ground poly piping. These water transfer pipelines will not require any vegetation or ground disturbance.

Once the pipeline development is commissioned the CWMF will revert to use as a raw water dam capable of storing suitable quality pipeline water for treated water supply to site.

ii Processing and mining operations

No significant changes to the description of anticipated water demand and supply arrangements during processing and mining operations, as presented in Section 2.10(ii) of the EIS, are required as part of the amendments to the project. The design of the water management system has been revised, as summarised in Table 2.1 and described below in Section 2.9.2.

The water balance model has been updated to simulate the management of the amended operational water system over the life of the mine (Appendix G). Consistent with the predictions of the previous model, the water balance predicts that on average the external supply provided by the pipeline development contributes the highest supply source of operational water, followed by runoff from the operational (ie disturbed) areas of the mine development.

2.9.2 Water management system

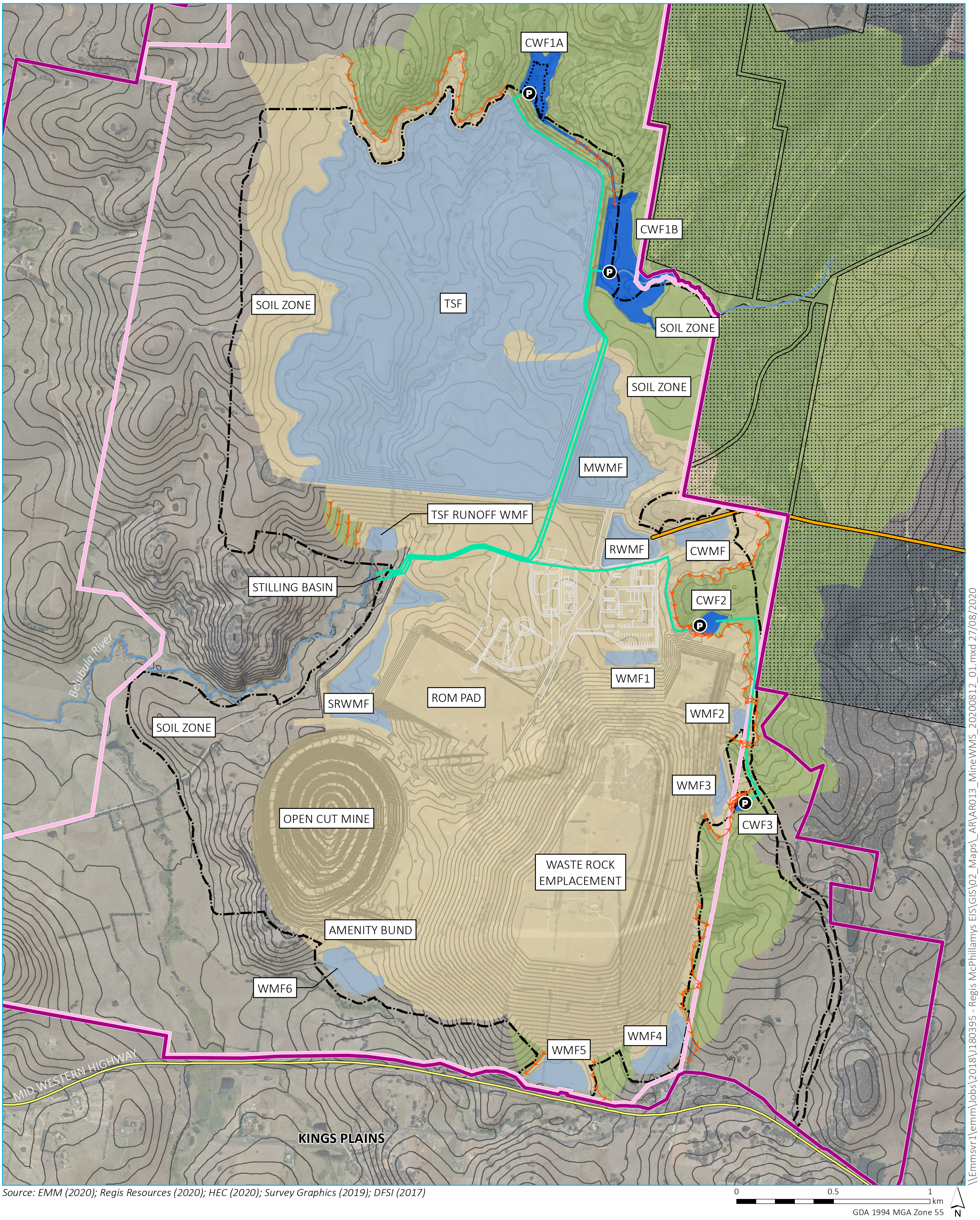
i Overview

The design of the water management system has been revised to achieve a reduced likelihood of spill from the storages within the operational water system and improve operational and post closure water management. The revision of the water management system has also resulted in the avoidance of impacts to the potential historic heritage item Hallwood. Key changes are:

- realignment of the north-eastern perimeter embankments of the TSF and the addition of an embankment along the south-east perimeter, resulting in a small change (approximately 3 ha, or 1%) to the footprint of the TSF;
- removal of the Secondary MWF from the north-western corner of the mine development project area, with its function replaced by the new Main WMF next to the south-east corner of the TSF. This relocation has provided efficiencies in that the new Main WMF can take a range of water from different WMFs. It also reduces the role of the Primary WMF during operations;
- a slight reduction in the eastern extent of the waste rock emplacement, resulting in alterations to the clean and operational water systems around its eastern perimeter;
- revision of the operational WMFs that results in no predicted spills in the operational water balance model. This includes the change in the size of the Primary WMF, which has been renamed the Site Runoff WMF, through the addition of a new WMF (now named WMF1) to the south of the mine infrastructure area; and
- the design of the clean water diversion system has been revised including improvements to the design of the post-closure clean water diversions.

The revised surface water management system for the mining development is summarised below and described in detail in the revised surface water assessment (Appendix G). The principles adopted in the design of the water management system remain as per the EIS; that is to limit the generation of waste water and to segregate mine site water according to water quality and associated use constraints.

The amended indicative layout of the water management system is illustrated in Figure 2.11.



Source: EMM (2020); Regis Resources (2020); HEC (2020); Survey Graphics (2019); DFSI (2017)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- Mine plan contour (5 m)
- Diversion pump
- Diversion drain
- Plant layout
- Pipeline
- Operational water storage
- Clean water collection and diversion maximum area
- Diverted catchment
- Non-diverted catchment

Existing environment
- Major road
- Belubula River
- Vittoria State Forest

Amended indicative mine development water management system layout

McPhillamys Gold Project
Amendment report
Figure 2.11

ii Construction water management

As described in the EIS, during site establishment and the initial construction phase, rainfall/runoff will be managed in accordance with the principles specified in the Blue Book (Landcom (2004) and DECC (2008a)).

Prior to the commencement of construction activities for the main embankment of the TSF, a coffer dam will be established in the main Belubula River channel approximately 500 m upstream of the main embankment. Runoff collecting from upstream areas, undisturbed by construction activities, will be pumped from the coffer dam around the TSF construction works to the Belubula River downstream. The TSF Runoff WMF will also be constructed prior to commencement of the main TSF embankment, with an estimated design capacity of 26 ML. During construction of this main embankment, sediment laden runoff accumulating in the TSF Runoff WMF and upstream of the main embankment will be used in construction works or will be pumped to the Site Runoff WMF. Operational water balance modelling by HEC (refer to Section 6.4 and Appendix G) indicates that there is a risk of spill from the TSF Runoff WMF during construction of the main TSF embankment; however the TSF Runoff WMF will be functioning as a sediment dam at this stage and is designed to spill occasionally in accordance with the 'Blue Book' (Landcom 2004) and as regulated by the environment protection licence for the project issued by the NSW EPA.

A similar construction sequence will be adopted for the remainder of the mine development project area, with downstream WMFs constructed ahead of any development activity in the WMF catchment. For example, the Site Runoff WMF will be commissioned prior to construction occurring in the processing plant area and WMF4, WMF5 and WMF6 will be constructed ahead of soil stripping activities in the upslope waste rock emplacement area. In addition, upslope clean water diversion drains will be constructed in advance of any development activity downslope to prevent runoff from undisturbed catchment reporting to the WMFs. Given the likely high sediment generation potential of the ROM and ore crushing area upslope of the Site Runoff WMF, a sediment basin will be installed immediately downslope of this area with a design capacity (based on Landcom (2004)) of 11.7 ML. This will control the volume of sediment accumulating in the Site Runoff WMF.

iii Clean water management

As described in the EIS, during mining clean water runoff will be diverted around the mine development via a series of diversion drains, dams, pumps and pipelines. Runoff from undisturbed areas will be intercepted in a system of upslope runoff diversion drains and either directed to existing gully lines or to one of three CWFs which will be dewatered by pumping to the Belubula River during and following rainfall events. Clean water will not be retained within CWFs for any extended period of time. Runoff diversion drains will be constructed along the contour with low longitudinal gradients and designed as grassed channels or with rockfill rip-rap to control the risk of erosion. Engineered drop structures will be used where runoff is directed down slope between diversion drains or at diversion drain outfalls (to existing gully lines).

The largest of the CWFs is CWF1 (comprising facilities 1A and 1B), upslope of the TSF, with an estimated catchment area of 6.8 km^2. CWF1 will be in place prior to the commencement of basin construction works within the TSF storage to capture and divert (via pumping) upslope clean water runoff. The embankment which forms CWF1 is also the northern TSF embankment. This embankment is planned to be built progressively in stages, with a smaller embankment initially resulting in a smaller capacity diversion storage. The capacity of the pumping system which dewaters CWF1 has been sized accordingly, with a larger capacity pump initially and a reduced pump rate when the ultimate embankment is constructed. The pump capacities have been sized such that the CWF1 storage capacity is not exceeded in any simulated climatic scenario (based on the full historical climate record); that is CWF1 is not simulated to spill to the TSF. The pump capacities have also been sized such that the ponded CWF1 water level is not simulated to exceed 954 m AHD, substantially avoiding inundation of the Vittoria State Forest. As described in Table 2.1, the mine development project area has been revised in this area to accommodate this inundation area. The CWF1 dewatering system (pump and pipeline) will discharge downstream of the proposed TSF and associated TSF Runoff WMF.

CWF2 and CWF3 are located upslope (east) of the waste rock emplacement and processing plant area. CWF2 and CWF3 will be commissioned prior to commencement of mining and waste rock emplacement and will remain in place for the duration of the mine development. Water in CWF3 will be pumped to CWF2, while the CWF2 pipeline outlet will be located downstream of the proposed TSF and TSF Runoff WMF. Operational water balance modelling has been used to size the dewatering pump capacities for CWF1, CWF2 and CWF3 such that no spills are predicted to occur to the operational water management system. Further detail on the water balance modelling undertaken and outcomes is provided in Section 6.4.

iv Operational water management system

The operational water system will be comprised of a number of WMFs, the open cut and the TSF, together with a system of pumped transfers and drains. A schematic illustrating these storages and their inter-linkages for the duration of the mine development is shown in Figure 2.12.

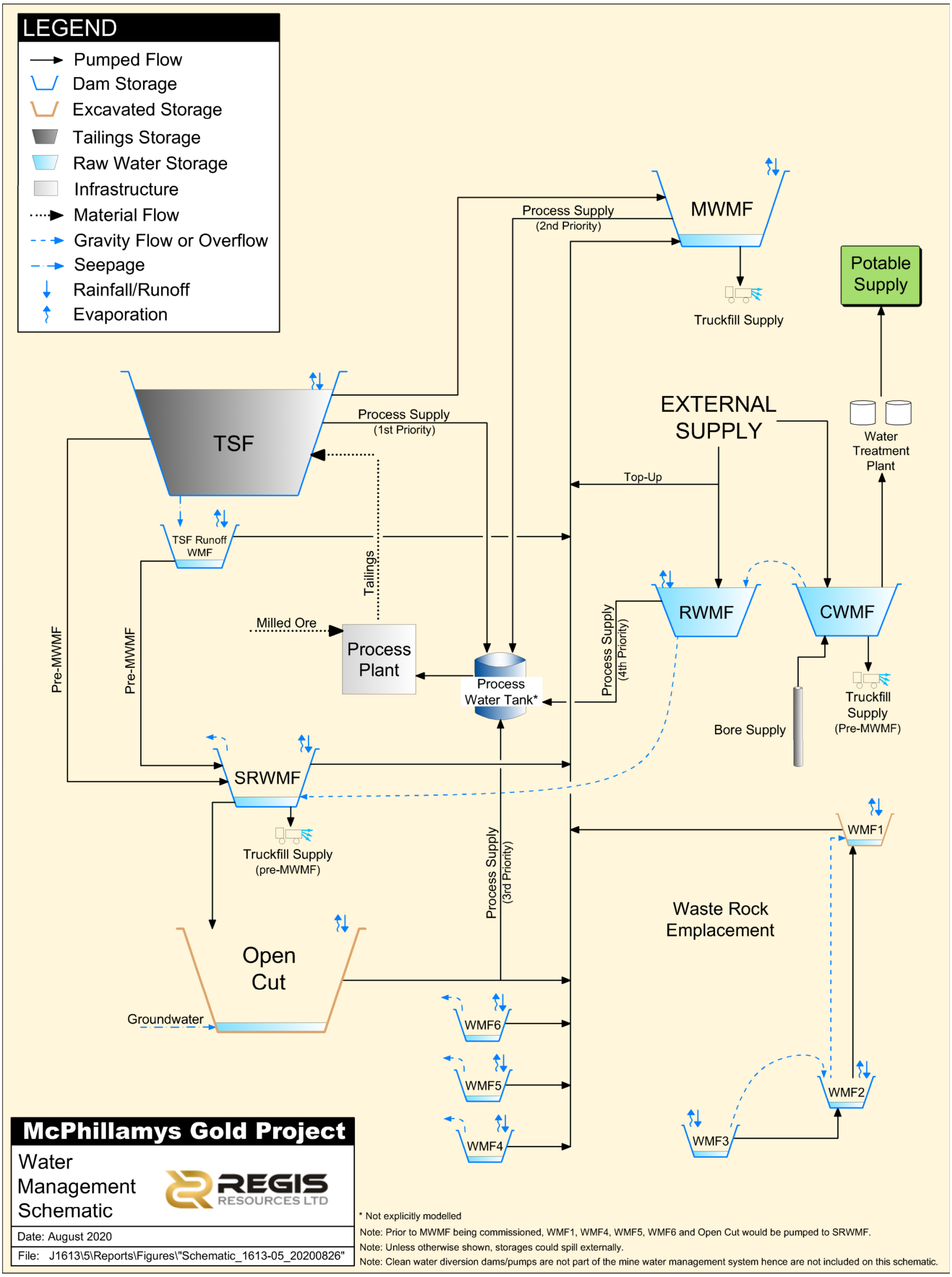
The raw WMF (RWMF) will be the long-term site water supply storage for the mine development, and will be used to store water from the imported pipeline supply, with an ultimate capacity of approximately 220 ML. The RWMF will be commissioned during Year 2, around the start of ore processing. Following commissioning of the RWMF, the CWMF will be used as an additional raw water storage to provide increased system flexibility.

The Main WMF will be the main water storage for the mine development with a maximum capacity of approximately 2,009 ML. It will be progressively constructed over a number of years as waste rock becomes available, completed to its full capacity by around Year 4. The Main WMF will first come into service around the end of Year 1 with the start of ore processing. Prior to this date, the Site Runoff WMF will be the main operational water storage, with a storage capacity of approximately 530 ML. Operational water captured in other storages will be pumped to the Main WMF (or, prior to its commissioning, the Site Runoff WMF) which then supplies water to the processing plant and water truck fill point (for haul road dust suppression). The Main WMF will be maintained with a minimum storage ‘reserve’ of 200 ML by supply from the RWMF (and prior to its commissioning the CWMF) to maintain supply reliability.

Ore processing will commence early in Year 2 with tailings pumped to the TSF and tailings decant water recovered via pumping direct to the processing plant (first priority) or to the Main WMF. The TSF Runoff WMF, downstream of the TSF, will capture runoff from the crest and outer main embankment during its operational life. Once the TSF is commissioned, any runoff accumulating in the TSF Runoff WMF will be pumped to the processing plant or to the TSF and reclaimed together with tailings decant water. Any seepage from the TSF during its operational life will be captured in a subsurface seepage collection system at the toe of the TSF main embankment, upstream of the TSF Runoff WMF, and will be pumped to the processing plant or to the Main WMF. Monitoring bores will be constructed downstream of the TSF seepage collection system to monitor for seepage.

The Site Runoff WMF, WMF1, WMF2, WMF3, WMF4, WMF5 and WMF6 will capture runoff from the waste rock emplacement and other infrastructure areas. As shown in Figure 2.3a to Figure 2.3f, these WMFs will function as “infrequent” storages. Following and during rainfall events these WMFs will be dewatered to the Main WMF to maintain the capacity of these WMFs. Other than WMF1, WMF2 and WMF3, these WMFs could spill off site, hence their storage and pumping system capacities have been sized such that no spills are predicted during the operational life of the project.

The open cut will receive groundwater inflow and rainfall runoff with accumulated water to be pumped to the Main WMF (or the Site Runoff WMF prior to commissioning of the Main WMF).



Simplified site water management and process diagram

McPhillamys Gold Project
Amendment Report
Figure 2.12

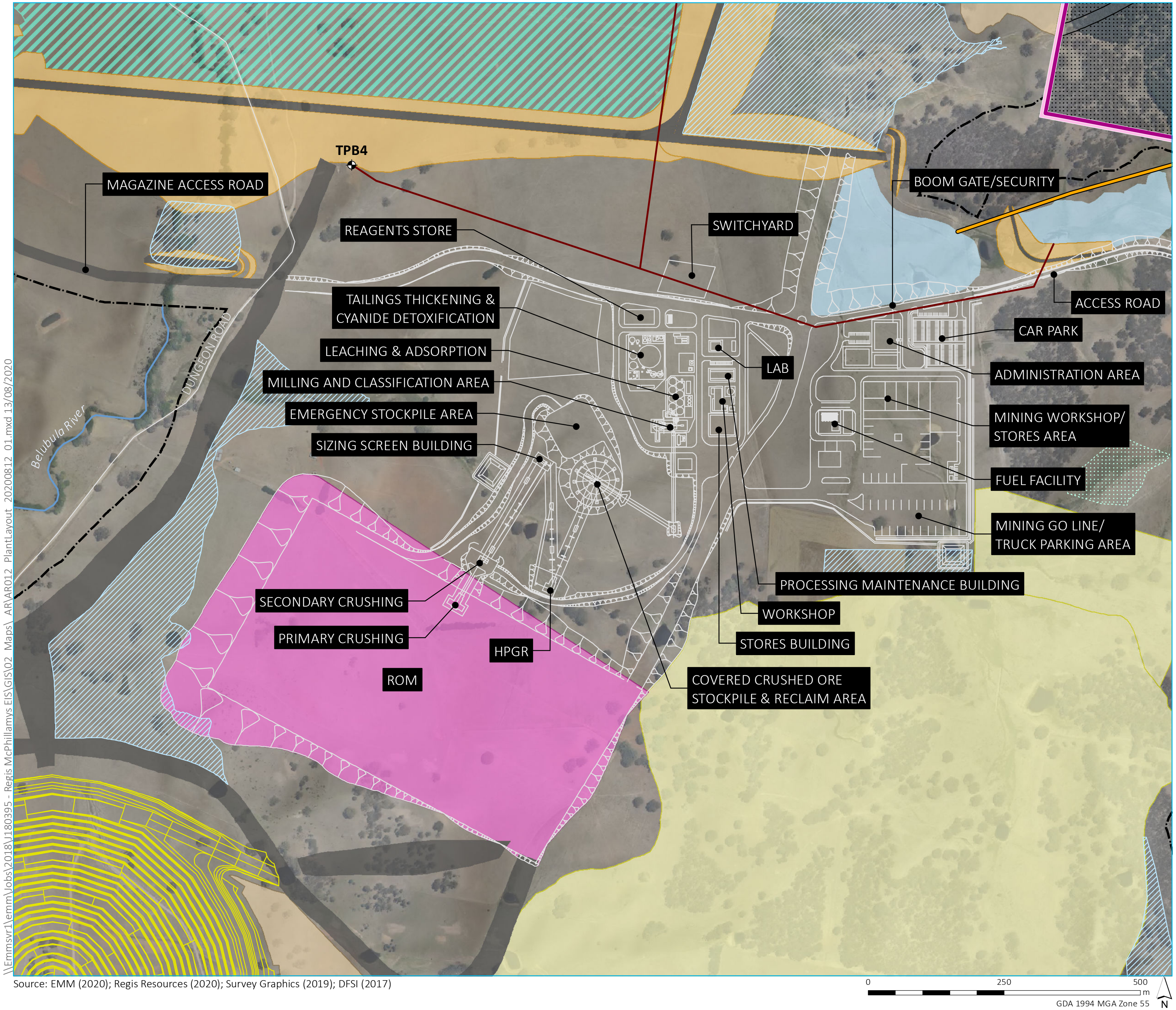
2.10 Mine infrastructure

Supporting infrastructure for the mine development is summarised in Section 2.11 of the EIS. A number of minor refinements to the proposed site infrastructure have been made since the public exhibition of the EIS. The amended processing plant and administration area layout is shown on Figure 2.13. The layout aims to provide sufficient work areas and facilitate traffic movements around the site in a safe and efficient manner. The layout remains conceptual at this stage and may be subject to some change during detailed design and in consultation with the selected contractor, noting that it will be within the footprint as shown on Figure 2.1.

As noted in Section 2.11.4 of the EIS, the mine development will have an electricity requirement of approximately 26 megawatts (MW) to 28 MW. The EIS identified two options for the supply of the required power; duplication of the existing 66 kV line from the Panorama substation near Bathurst, or to supply the site from the TransGrid 132 kV system Line 948, which passes between Bathurst and Orange approximately 14 km north of the processing plant.

Further investigation and consultation with electricity network owners has been undertaken in relation to the power supply for the project since submission of the EIS. As a result, Regis has chosen to pursue the second option for the mine development's primary power supply; that is to supply the site from the TransGrid 132 kV system Line 948. Consultation with TransGrid relating to this power supply is ongoing.

Separate approval under the EP&A Act will be sought to construct the required power supply infrastructure. A preferred route has been identified for connection to the Transgrid line from the mine development project area, and while approval for this infrastructure is not sought as part of the project, a broad overview of potential impacts relating to the physical works required are presented in Appendix X of this report to assist the consent authority for the project in considering the likely impacts of the required infrastructure.



KEY

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Disturbance footprint

Pipeline

Project general arrangement

Construction groundwater bore

Indicative construction groundwater pipeline

Open cut mine

Site infrastructure

Site access roads

Soil zone

Embankments

ROM pad

Waste rock emplacement

Tailings storage facility (TSF)

Water management facility (WMF) - continuous storage

Water management facility (WMF) - infrequent storage

Clean water facility (CWF)

Existing environment

Minor road

Belubula River

Vittoria State Forest

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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

Amended conceptual processing plant and administration area layout

McPhillamys Gold Project
Amendment report
Figure 2.13

2.11 Workforce

No material changes to the peak and average workforce assumptions, as presented in Section 2.12.1 (construction) and Section 2.12.2 (operations) of the EIS, have been made as part of the amendments to the project.

Regis will develop a strategy for local recruitment, which will include recruitment programs that aim to maximise local employment. Further details are provided in Section 2.12.3 of the EIS.

2.12 Decommissioning and rehabilitation

The rehabilitation and landscape management strategy provided in Appendix U of the EIS has been updated following the amendments to the project (Appendix T). The revised strategy is summarised in Section 6.16.

The overarching rehabilitation objective of the project remains to restore the land as much as possible to its pre-mining land use at the end of its operational life; that is, primarily an agricultural land use comprising grazing on improved pasture while improving the biodiversity values of the area through re-establishing endemic open-woodland communities as part of the rehabilitation program.

The main changes to the conceptual final landform relate to water management structures (including clean water diversions) and the TSF. The ROM pad has also been levelled and some microrelief added to be more consistent with the conceptual final landform for the rest of the site and to be more sympathetic to the surrounding topography. The conceptual final landform of the rehabilitated mine development has been updated and is illustrated in Figure 2.4.

Post mining, all disturbed areas, except for the final void, will be regraded to a stable landform and revegetated. A permanent clean water diversion channel will be constructed to allow a free-draining landform around the northern and eastern sides of the TSF to divert upslope clean runoff to the Belubula River. A conceptual alignment of diversion channels is shown in Figure 2.4. The alignment and design of the diversion channels will be confirmed during the detailed design stage.

The results of the final void water balance remain the same as the EIS, with the final void predicted to reach an equilibrium level more than 9 m below the spill level, with an average equilibrium level approximately 14 m below the spill level (ie the final void is contained). Equilibrium levels will be reached very slowly over a period of more than 500 years.

Final rehabilitation and project closure requirements will ultimately be developed as part of a detailed closure plan, which will be produced within five years of closure in consideration of input from key government agencies and relevant stakeholders at the time.

2.13 Pipeline development

2.13.1 Overview

The amended pipeline development is illustrated in a series of figures included in Appendix B (Figure B.3a to B.3v). The key components as described in the EIS still include:

- a pipeline approximately 90 km in length, starting at Angus Place and finishing in the mine development project area;
- up to four pumping station facilities including water storage tanks;
- pressure reducing system/s; and
- a control system.

Some amendments have been made to a section of the pipeline corridor and to the location of pumping station facility No. 3, as described in the below subsections.

2.13.2 Pipeline corridor and disturbance footprint

As described in Section 1.2, the pipeline route has been amended for a section of the corridor west of Bathurst, primarily due to land access constraints. Two options for the amended pipeline route have been included and assessed in the amended project; the northern option and the southern option. As shown in Figure 1.5, the pipeline alignment changes from that proposed in the EIS approximately 3 km west of pumping station facility No. 4. The new alignment continues for around 3 km, where it then splits into two options before re-joining the original route. The northern option is approximately 11 km long from where the two options split and the southern option is approximately 6 km long, before re-joining the original alignment. The amended section of the pipeline route is therefore around 14 km long if the northern option is adopted, and approximately 9 km if the southern option is constructed.

Approval is sought for the two options shown in Figure 1.5 for the amended section of the pipeline, with the option to be constructed dependant on the finalisation of landholder access agreements with relevant landholders.

The pipeline corridor has also been differentiated from the pipeline disturbance footprint, to better reflect the anticipated levels of disturbance within the corridor in consideration of biodiversity impacts, while maintaining flexibility in the detailed design within the corridor. As described in Section 1.5, the pipeline corridor has been identified as a corridor approximately 20 m wide to which the development application for the pipeline relates (refer to the schedule of lands in Appendix A).

Direct disturbance is not proposed across the entire 20 m wide corridor. The anticipated disturbance footprint has been delineated based on the nature of the vegetation or existing disturbance the pipeline route travels through. The area that will be directly impacted by construction activities within the pipeline corridor will range in width from 6-8 m, such as in areas of native vegetation and State forest, and up to 20 m in open farmland, depending on a range of factors such as presence of significant vegetation, constructability, construction management and safety considerations, landform, slopes and anticipated sub-soil structures. As described in the EIS, wherever possible the pipeline route follows existing roads and tracks to avoid vegetation clearance.

No changes are proposed to the sources of water that will be transferred from the pipeline; that is SCSO, MPPS and Angus Place in that order of priority, and no changes have been made to the proposed operating regime as described in Section 2.14.3 of the EIS.

2.13.3 Pumping station facilities and pressure reducing system

The proposed location of pumping station facility No.3 has moved from within close proximity of MPPS, to an area adjacent to Pipers Flat Road, approximately 4.3 km west of the location proposed in the EIS (refer to Figure 1.5). This change is a result of detailed engineering that improves the overall pipeline pressure gradient. The precise locations of the pumping station facilities may change as detailed engineering is completed; however, they will remain within the assessed pipeline corridor.

The EIS nominated the requirement for a pressure reducing system in the vicinity of Sunny Corner east of Bathurst. The EIS design comprised of pressure reduction valves, water storage tank, vents and electrical controls. Further design of the pipeline development has indicated while pressure reducing systems may still be required at locations along the pipeline corridor, the above ground components identified in the EIS (eg buildings and storage tanks) will not be required. The location and number of pressure reducing systems will be confirmed during detailed engineering design. Construction works and infrastructure (predominantly below ground) associated with pressure reducing system/s (if required) will be accommodated within the defined pipeline corridor.

2.13.4 Water sources, availability and security

No significant changes to the sources or availability of water, or the arrangements with Centennial and Energy Australia, as presented in Section 2.14.4 of the EIS, are required as part of the amendments to the project.

2.13.5 Pipeline development construction

No significant changes to the proposed pipeline development construction methodology, as presented in Section 2.15 of the EIS, are required as part of the amendments to the project.

Section 2.15.2 of the EIS described the creek and drainage crossings required for construction of the pipeline.

The number of watercourse crossings has been revised to reflect the amendments to the pipeline corridor. The amended pipeline development will cross 114 watercourses if the northern option is constructed and 122 watercourses if the southern option is constructed. The perennial water crossings identified in the EIS will continue to be crossed by the amended pipeline corridor. In addition, the revised pipeline route (both the northern and southern options) will cross Springs Creek (third order) and an unnamed third order tributary, while the northern option will cross Dicks Creek (forth order).

The potential impacts of the creek crossings have been assessed in the revised geomorphology report (Fluvial Systems 2020), included in Appendix I.

2.13.6 Approvals required and infrastructure responsibility

As described in the EIS, approval is required to be obtained by Centennial under the EP&A Act to enable the transfer of water between Angus Place, SCSO and the mine development. As described in the EIS, the approval will need to authorise:

- construction and operation of a water transfer pipeline and associated infrastructure between Angus Place and pumping station facility No.1;
- construction and operation of a water transfer system and associated infrastructure between SCSO and pumping station facility No.2;
- the transfer of up to 15.6 ML/day of water from Angus Place or SCSO to pumping station facility No.1 and No.2, respectively; and

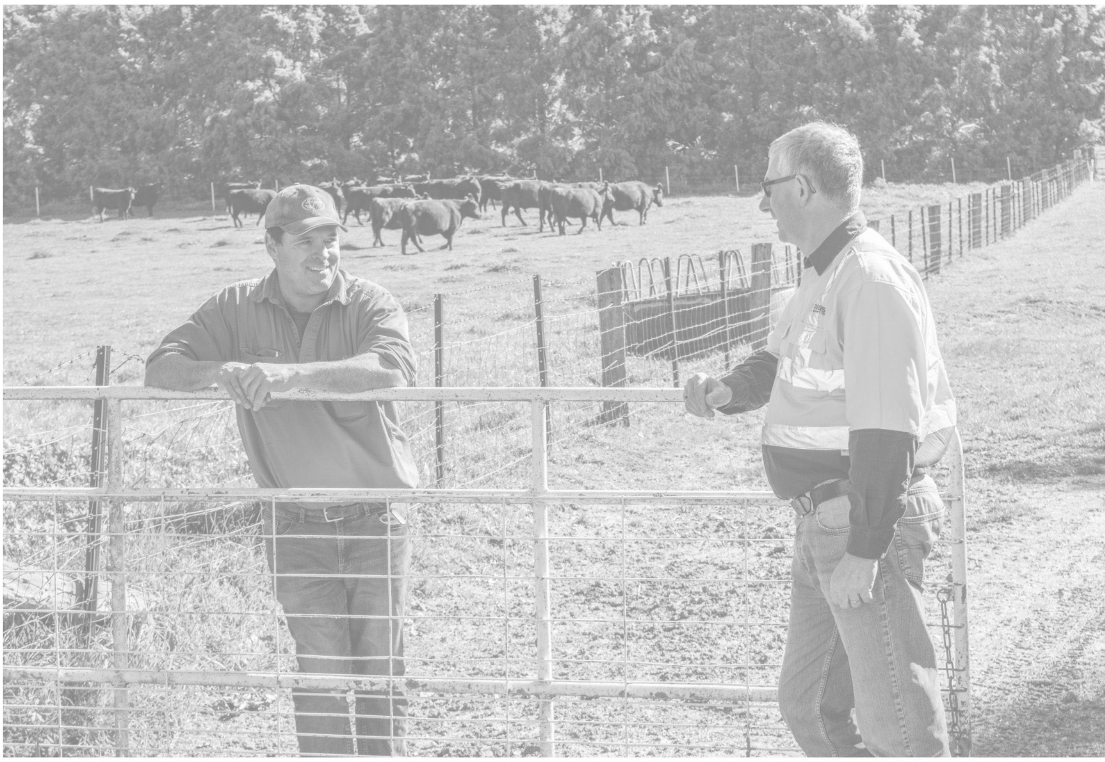
- the receipt of up to 15.6 ML/day of water from SCSO to Angus Place as required (ie at times when water is not able to be delivered to the mine development).

While the impacts of these works will be investigated in detail by Centennial in the required environmental assessments that will accompany the relevant applications, a broad overview of potential impacts relating to the physical works required are presented in Appendix W of this report, to assist the consent authority for the project in considering the likely impacts of the required infrastructure.

In relation to the required power supply for the pumping station facilities, each will require the establishment of new above ground powerlines, within a 20 m easement, connecting to the existing Endeavor Energy (pumping station facilities No.1 and No.3) and Essential Energy (pumping station facility No.4) networks. Approval for these electricity works will be sought separately under the EP&A Act. However, as per the required works by Centennial to connect to the pipeline development, a broad overview of potential impacts relating to the physical works required are presented in Appendix X of this report, to assist the consent authority for the project to consider the likely impacts of the required infrastructure.

Chapter 3

Strategic context



3 Strategic context

3.1 Overview

The project involves a mining operation that will, consistent with the objects of the NSW *Mining Act 1992*, extract a State-owned resource for the benefit of the State of NSW, and will provide an estimated $56 million in royalties over the life of the mine (base on a conservative January 2020 gold price forecast).

The product of the project will be gold doré, in the form of unrefined gold bars. Gold is used in a variety of applications; primarily for the production of jewellery and as an investment instrument for governments, central banks and private investments; the latter becoming increasingly important in the current uncertain times as discussed below. Gold is also used in the electronics industry, in medical and dentistry applications, and as globally backed exchange traded funds.

This chapter provides a summary of the strategic context for the project, including the need for and potential benefits of, the project. It also considers the context at a local level, including the level of community support and the potential benefits and impacts to the local region.

3.2 Need for the project

3.2.1 Demand for gold

The EIS for the project (EMM 2019a) reported that, according to the latest *National Resources Statement* by the Australian Government (Australian Government 2019), world gold demand is expected to remain strong over the coming decade. In early 2019, demand was forecast to rise by 16 percent to 2030, from 148,620 thousand ounces in 2018 to 172,906 thousand ounces in 2030.

Gold is a safe haven asset in uncertain times. Global events over the last 12 months, and in particular the outbreak of COVID-19, has significantly increased uncertainty across the globe. The EIS noted that, as described in the March 2019 *Resources and Energy Quarterly Report* from the Australian Government's Office of the Chief Economist, ongoing trade tensions between the US and its trading partners, a global economic slowdown, steady US Treasury bond yields, a lower US dollar, and Brexit uncertainty are all expected to dampen consumer and business confidence and boost demand for gold. This uncertainty remains even more true now.

The current global downturn is affecting commodities in a wide variety of ways, but the overall export outlook for Australia is still relatively strong. This is particularly true for gold as the safe haven asset it is, as noted above. The revised export earnings forecast for Australia, published in the June 2020 *Resources and Energy Quarterly* by the Office of the Chief Economist, confirm that gold is set to continue to be a strong performer, with prices surging to an 8-year high and export earnings now on track to set a new record (of almost $32 billion) in 2020-21.

World gold consumption is projected to rise at an annual rate of 2.1 per cent, to 4,712 tonnes in 2025, as lower gold prices boost jewellery demand and retail investment (Office of the Chief Economist March 2020). In the shorter term, as demand continues to adjust to current global circumstances, gold consumption is presently forecast to grow at a higher average annual rate of 4.2 per cent in 2021 and 2022, to 3,892 tonnes in 2022.

3.3 Gold production

Australia is currently the second largest producer of gold in the world and is forecast to overtake China as the number one gold producing country in the world in 2021 (Office of the Chief Economist June 2020). Australia therefore plays, and will continue to play, an essential part in meeting the strong global demand for gold.

The growth in Australian gold production is expected to be driven by both mine expansions and production from new mines. The March 2020 *Resources and Energy Quarterly* statement identified five gold projects that will contribute to this growth, reaching final investment decision stage in 2019; one of which is this project.

At a global level, world mine production is expected to grow until 2022, and is then projected to decline at an annual rate of 0.5 per cent between 2023 and 2025, to 3,596 tonnes in 2025, as ore grades decline (March 2020). In Australia, after reaching a peak in 2021–22, mine output is also projected to decline by 0.8 per cent annually to 370 tonnes in 2024–25. Production will be weighed down by lower grade ores, reserve exhaustion and mine closures. For example, Ramelius Resources' 1.9 tonne per year Edna May gold operation in Western Australia is expected to cease operations in 2022, and production at Northern Star's Jundee gold operation also in Western Australia is expected to decline from 12 tonnes in 2019 to about 9 tonnes in 2025.

To offset this decline in production, new mines will need to come online. As noted above, the March 2020 *Resources and Energy Quarterly* identified this project as one of these.

3.4 Local context

At a local level, the *Central West and Orana Regional Plan 2036* (DPE 2017) (the Regional Plan) highlights the important role the mineral resources sector plays in underpinning many local economies in the region, noting that mining represented the largest contributor to gross regional product at $2,508 million in 2011. Priorities of the regional plan include continuing to grow and support the mining sector in the Blayney and Cabonne LGAs.

As described in Section 3.6.1 of the EIS (EMM 2019a), the Regional Plan was released by the DPIE in 2017 to guide land use planning priorities and decision making in the Central West and Orana Region for the next two decades. The region covered by the plan comprises the Cabonne, Orange, Blayney, Bathurst Regional, Lithgow, Oberon, Lachlan, Parkes, Forbes, Weddin and Cowra LGAs (Central West); and the Bogan, Warren, Coonamble, Gilgandra, Narromine, Warrumbungle and Dubbo Regional Mid Western Regional LGA's (Orana). The Regional Plan provides an overarching framework to guide local land use plans, development proposals and infrastructure funding decisions. The implementation component of the Regional Plan includes priority actions and medium-long term actions.

The Regional Plan identifies the mining sector as the largest contributor to the regional economy, comprising $2.5 billion (16.2%) of gross regional product in 2011 and employing 5% of the regional workforce. The vision for the Central West and Orana region is for mining to continue to provide local job opportunities and make a significant regional economic contribution. Specifically, and of relevance to the project, mining is identified as one of the top three economic opportunities for the Blayney and Cabonne LGAs.

The Regional Plan sets four broad goals for the region; the number one goal being that the regional economy becomes the most diverse regional economy in NSW. The project is consistent with this goal, as it will contribute significantly to the diversity of economic development and employment in the region and will enable the realisation of the economic opportunity that mining presents, as identified in the plan.

This alignment of the project with the broader vision for the Central West Region, combined with the significant benefits of the project for the local community as described below in Section 3.4, has resulted in broad community support for the project, although it is acknowledged that this level of support varies, primarily depending on the proximity to the project area.

Following the public exhibition of the EIS, 671 submissions were received by DPIE. Of the submissions received, 474 were from individual community members. As described in Chapter 2 of the separate report responding to these submissions (*McPhillamys Gold Project Submissions Report* EMM 2020a), the majority of unique community submissions came from the Blayney LGA (52%), where the project is located. Just over half of the unique community submissions from this LGA support the project (also 52%), while approximately 46% object and 2% provided comments. Submissions showed that the community of Orange, in the neighbouring LGA, are highly supportive of the project with 77% of community submissions from that LGA lodged in support. Contrastingly, the majority of unique community submissions from Bathurst Regional LGA (72%) objected to the project. Orange has a long industrial and mining history, with Newcrest Mining Limited operating Cadia Mine, approximately 20 km south of Orange, since the 1990s. Mining provides employment in the region and many of the submissions from Orange LGA cited support for the project on the basis of the significant employment and economic benefits it will provide.

In addition to the unique community submissions received, approximately 150 form letters were submitted, all of which objected to the project. There were three variations of these form letters. The majority of form submissions came from Blayney LGA (42%).

Regis acknowledges the concerns raised about the project from community members close to the mine site. In recognition of these concerns, Regis has made considerable amendments to the aspects of the project that were raised as generating concern by the local community. This Amendment Report describes these amendments in detail which, as explained (and summarised in Chapter 6), have further reduced the predicted residual impacts that were identified in the EIS.

The local Blayney Shire Council also acknowledged support for the project in their submission, stating that:

> Blayney Shire Council acknowledges the positive economic stimulus, employment, diversity of income and local business opportunities that will arise from the McPhillamys Gold Mine proposal if the project is approved. Council is supportive of this generation of regional growth and has a long history of productive working relationships with a gold mining company in the Shire.

3.5 Project benefits

At a local level, the project will directly benefit the Blayney LGA through the following:

- direct and indirect employment generation, as Regis is committed to the employment of a majority local workforce;
- investment in community infrastructure and services, made possible through a VPA with Blayney Shire Council;
- investment in education and training as Regis seeks to build a local skill base to support labour supply for the project;
- project procurement spend as Regis is committed to supporting local businesses to participate in the project procurement process; and
- direct and indirect population growth as the project will attract new residents to the Blayney LGA (of which the majority are anticipated to reside in Blayney).

These benefits will also flow to surrounding LGAs, which are expected to contribute to the workforce, and where a portion of the employees will live, with workers to live within a 1 hour commute of the mine site. The economic assessment modelled the direct and indirect jobs (ie from flow-on effects) that the project will provide, which are significant and are as follows:

- 1,289 direct and indirect jobs during construction; and

- 788 direct and indirect jobs during operations.

The project will also provide net benefits to the broader state of NSW; benefits quantified by the economics assessment to be approximately:

- royalties of $56 million;
- company tax payments of $63 million;
- net producer surplus of $128 million;
- employment wage benefits of $32 million; and
- non-market benefits of employment of $60 million.

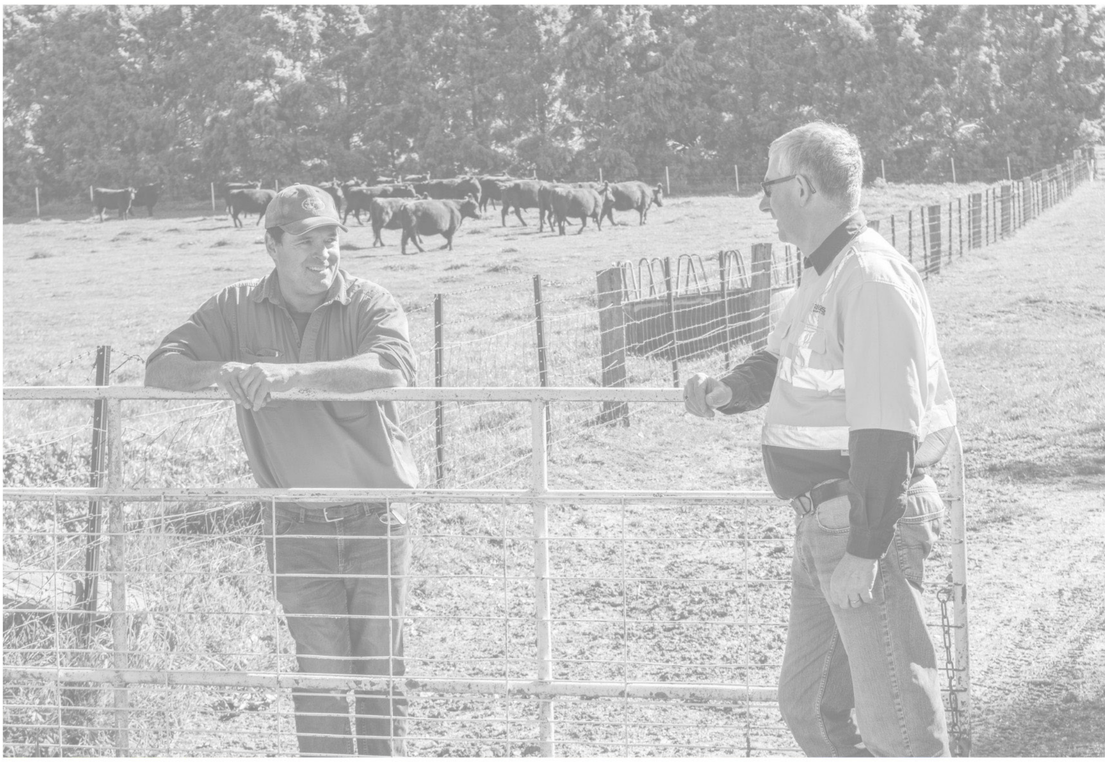
The project also has the potential to leave a lasting legacy in relation to water supply infrastructure. The project involves the construction of 90 km pipeline from near Lithgow, supplying excess water from the mines in that area. If the pipeline were to remain in place after the cessation of mining at the project, it could be a valuable asset for be Central West Region providing water supply options and enhancing water security.

Further discussion on the benefits and merits of the amended project is provided in Chapter 7.


Chapter 4

Statutory context





4 Statutory context

4.1 Introduction

There are limited changes to the statutory context for the project as described in Chapter 3 of the EIS (EMM 2019a). Relevant updates to the Commonwealth and NSW regulatory and policy framework under which the project will be assessed and determined, including as a result of the amendments made, are described in this chapter.

Updates are provided in the areas of biodiversity, water licensing, mining tenements and the approval process under the NSW EP&A Act. In relation to water licensing, the EIS identified the need to further detail the pathway for the project to meet the requirements of the WM Act. A review of the approach to the biodiversity assessment of the project has been conducted, resulting in a change to the assessment approach, as described in Section 4.2.2. The need for a condition to be imposed on the mining lease, when granted for the project, to authorise designated ancillary mining activities has also been identified as a result of amendments to the project with respect to water management, as described in Section 4.2.3.

In relation to the required approval from the Federal Minister for the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the amendments to the project have necessitated the submission of an application to vary the proposed action, as explained in Section 4.5.

4.2 NSW legislation

4.2.1 Approval process under the EP&A Act

As noted in Section 1.1, the project is declared to be SSD in accordance with the State and Regional Development SEPP. A DA and EIS was submitted to DPIE under Part 4 of the EP&A Act, which was publicly exhibited from 12 September 2019 to 24 October 2019. By the close of public exhibition, 671 submissions were received by DPIE, including submissions from government agencies and other organisations and public feedback. Of these, 624 submissions were received from the community (consisting of 474 unique submissions and 150 form letters), 27 from organisations, and 20 from public authorities. This Amendment Report outlines the changes made to the project in response to submissions received and ongoing mine planning and accompanies the Submissions Report prepared to respond to issues raised.

Following receipt of this report and the Submissions Report, DPIE will prepare its assessment report in consideration of these reports, as well as the EIS and submissions received during the exhibition process. DPIE's assessment report will then be referred to the consent authority for its consideration. As explained above, IPC is declared to be the consent authority for the project under the EP&A Act pursuant to clause 8A(1)(b) of the State and Regional Development SEPP. The IPC will hold a public hearing into the carrying out of the project prior to determining the DA.

As set out above, clause 55 of the EP&A Regulation provides that a development application may be amended or varied by the applicant, with the agreement of the consent authority, at any time before the application is determined.

4.2.2 Biodiversity Conservation Act 2016

The Secretary's Environmental Assessment Requirements (SEARs) for the project issued under the EP&A Act and EP&A Regulation required a 'hybrid' biodiversity assessment where:

- the mine development was to be assessed in accordance with the *Framework for Biodiversity Assessment* (FBA) (NSW Office of Environment and Heritage (OEH) 2014) and the NSW *Biodiversity Offsets Policy for Major Projects* (Major Projects Policy); and
- the pipeline development was to be assessed in accordance with the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method (BAM).

Accordingly, two biodiversity assessments were prepared for the project and included in the EIS; one for the mine development in accordance with the FBA (EMM 2019b), and one for the pipeline development in accordance with the BC Act and the BAM (OzArk 2019a).

Following consultation with DPIE, this report for the amended project provides an updated biodiversity assessment which assesses the mine development in accordance with the BC Act and the BAM. The Biodiversity Development Assessment Report (BDAR) (EMM 2020c) therefore considers the amended project as a whole under the BAM (the mine development and the pipeline development).

The revised biodiversity assessment is provided in Appendix M to this report, with the key findings summarised in Section 6.8.

4.2.3 Water Management Act 2000

i Water licensing overview

The EIS identified the need to obtain water access licences (WALs) for the project. Under the WM Act, a proponent of a mining project is required to hold WALs with sufficient water entitlement to account for the interception of water from a water source which is not taken pursuant to harvestable rights or a statutory exemption. As outlined in the NSW Government's *Aquifer Interference Policy* (AIP) (DPI 2012), under the WM Act a mining project is required to account for both its direct water take (ie direct take for water supply) and indirect water take, such as the interception of water (eg indirect pit inflow).

The Groundwater Assessment (EMM 2019c) and the Surface Water Assessment (HEC 2019) prepared for the EIS identified the predicted interception of water that would need to be licensed for the project. These assessments have been updated to account for the project amendments described in Chapter 2.

ii Groundwater

Based on the results of the revised groundwater model, the maximum volume required for licensing for the amended project in the Lachlan Fold Belt Murray Darling Basin (MDB) Groundwater Source is 580 ML/year in Year 2. This is lower than the licence requirement reported in the EIS, which peaked at 890 ML/year in Year 2. As described in Section 6.4, the reduction in the peak dewatering volume for the amended project compared to the simulated mine schedule presented in the EIS, is due to the steadier development profile scheduled over the first years of the amended project.

Further investigations have also been undertaken into the construction water supply demand for the project, which will be required prior to the pipeline development coming online. As described in Section 2.9.1, it is expected that this supply will primarily be met via groundwater bores, totalling around 470 ML over approximately the nine months from project commencement to commissioning of the pipeline development.

Regis has secured 400 unit shares in the Lachlan Fold Belt MDB Groundwater Source to license groundwater abstraction for the project (WAL 41835). Up to an additional 70 ML will be required to meet construction water demand and up to 180 ML will be required in Year 2 to meet the peak groundwater inflow requirement. There are sufficient licence entitlements available in the Lachlan Fold Belt MDB Groundwater Source for this groundwater volume, and the groundwater volume required to meet construction water demand. The mechanisms available for Regis to purchase these licence entitlements are:

- purchase of unassigned water during a controlled allocation order, which occur approximately every 18 months; or
- trading of existing water allocations (water allocation assignment or share assignment).

In this regard, Regis submitted a registration of interest for 200 unit shares for the most recent controlled allocation order (*Controlled Allocation Order (Various Groundwater Sources) 2020*) on 22 July 2020. The NSW Water register, when accessed in July 2020, reported that there are 1,086 WALs with a total entitlement of 75,521 share components in the Lachlan Fold Belt MDB Groundwater Source.

iii Surface water

The surface water related Water Sharing Plan (WSP) relevant to the project is the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*, with the mine project area located in the 'Belubula River above Carcoar Dam Water Source'.

At the outset, it is important to note that the impacts of the incidental take of surface water runoff have been found to be minor and within the natural variability in catchment conditions, as described in detail in Chapter 6.4.1. The mine development has been designed to minimise the volume of water taken from the greater catchment. As such, the physical impacts on the environment and downstream users will be minor and, in most cases, imperceptible.

The overall surface water 'take' for the mine development is addressed through consideration of the:

- the incidental capture of rainfall runoff by the operational mine water management system;
- the Maximum Harvestable Rights Dam Capacity (MHRDC) for all relevant Regis owned lands;
- licence exemptions - which include the excluded works exemption under the *Water Management (General) Regulation 2018* (WM Regulation); and
- the difference between the overall take, the overall MHRDC and excluded works are then considered to determine whether additional volumetric licences are required to account for the volume of intercepted water as a result of the mine development.

Notably, as a result of the project's clean water diversion system, the surface water impacts of the project are relatively minor. The project has been carefully designed to ensure that this is the case, with the vast majority of water needs supplied from the pipeline development, supplying otherwise surplus water to the mine and providing a reliable water source for the project.

Consistent with other mining and farming projects throughout NSW, the project will rely on statutory exemptions under the WM Act (where applicable) and available harvestable right entitlement to account for the capture of runoff associated with the project (including, for example, the capture and beneficial reuse of sediment-laden runoff and mine water runoff generated by disturbed and hardstand areas within the mine development).

Runoff from undisturbed areas upslope of the mine development will be intercepted in a system of runoff diversion drains and either directed to existing drainage lines or to one of three clean water facilities which will be diverted back the Belubula River during and following rainfall events.

The take of runoff by storages and structures that are located on minor streams in disturbed areas will be accounted for by way of the excluded works exemption under the WM Regulation. That is, these storages and structures within the operational water management system are required to prevent the contamination of a water source – ie are required to capture mine disturbed area runoff.

An indirect take of water is anticipated to occur due to an increase in leakage (as a result of groundwater drawdown) from the Belubula River and Tributary A. The model predicts leakage from the Belubula River (including Tributary A) will be up to 24 ML/year (65 kL/day) at the end of mining (Year 11) and up to 28 ML/year (76 kL/day) post-mining. This result is slightly less than the predictions reported in the EIS, which reported up to 31 ML/year post-mining.

As reported in the EIS, there are four WALs for the Belubula River above Carcoar Dam surface water source, with a total share component entitlement of 264 ML. These WALs, and their respective allocations, are WAL 43104 (2 ML), WAL43105 (20 ML), WAL31476 (50 ML), and WAL 31475 (192 ML). Since submission of the EIS, Regis has purchased 70 ML of the available entitlement (WAL43105 and WAL31476). Further, Regis is prepared to acquire WAL31475.

If consent is granted for the project, the take of surface water runoff within the mine development would be carried out in accordance with the requirements of the WM Act and as detailed in the project's approved surface water management plan (WMP) (prepared in consultation with relevant regulators).

4.2.4 Mining Act 1992

As part of the revision of the water management system to accommodate the amended mine development layout, the surface water assessment (HEC 2020) identified that an area of inundation associated with one of the clean WMFs, CWF1B (refer to Figure 2.1), will extend outside the project area defined in the EIS. Therefore, and as described in Chapter 2, a very small change has been made to the mine development project area along the eastern boundary (adding under 1 ha, or 0.04% change), to accommodate this inundation area. The change takes the project area from 2,513 ha to 2,514 ha. However, this area remains outside the MLA area (MLA574) for the project.

In addition, a part of CWF3 (including a portion of the embankment of this CWF) will extend outside MLA574, as can be seen in Figure 2.13 (in chapter 2). A number of clean water diversion drains will also be required along the eastern edge of the waste rock emplacement that will likely need to extend outside the MLA (again, shown in Figure 2.13).

In accordance with the NSW *Mining Act 1992* (Mining Act), the extended water storage is defined as a 'designated ancillary mining activity' under section 6(6):

> the construction, maintenance or use of any reservoir, dam (including a tailings dam), drain or water race, other than any reservoir, dam, drain or water race principally used for purposes not connected with mining or any other activities regulated by or under an authorisation…

A 'designated ancillary mining activity' may be carried out in accordance with an authorisation when inside the authorisation area as granted under the Mining Act. While the inundation areas, clean water diversion drains and a portion of the CWF3 embankment are outside of MLA574, these activities can be regulated by a condition of the mining lease imposed pursuant to Schedule 1B of the Mining Act. In this regard, clause 7B(3) of Schedule 1B states:

> A condition may regulate the carrying out of an ancillary mining activity on land that is not within the mining area that is the subject of the mining lease only if—
>
> (a) the mining lease is a mining lease in respect of a mineral or minerals, and
>
> (b) the ancillary mining activity is to be carried out in the immediate vicinity of and to directly facilitate the mining lease concerned.

Therefore, it is proposed that these CWFs, clean water diversion drains and associated inundation areas be regulated by means of a condition imposed on the mining lease, once granted for the mine development. An application will therefore be made to include a condition on the mining lease for the project that authorises these ancillary mining activities.

It is noted that a mining lease cannot be issued until development consent is granted. Section 4.42 of the EP&A Act mandates that a mining lease for an approved SSD project cannot be refused and is to be substantially consistent with the development consent.

4.3 Environmental Planning Instruments

4.3.1 Koala Habitat Protection SEPP

State Environmental Planning Policy No 44 Koala Habitat Protection was repealed and replaced by a new SEPP; *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala Habitat Protection SEPP) on 1 March 2020. The Koala Habitat Protection SEPP includes a new definition for 'core koala habitat', two maps to help protect koalas across NSW, and updated tree species data.

Clause 15 of the Koala Habitat Protection SEPP states:

> A development application made, but not finally determined, before the commencement of this Policy in relation to land to which this Policy applies must be determined as if this Policy had not commenced.

As the DA was made, but not finally determined, before 1 March 2020, the DA must be determined as if the Koala Habitat Protection SEPP had not commenced.

SEPP 44 was considered in section 3.55 of the EIS.

It is noted that consideration has been given to the potential occurrence of, and impacts upon, the Koala within the BDAR.

Koala habitat impacts were calculated in the EIS based on the repealed SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008b). Koala impacts were estimated to be 75.77 ha in the EIS, which would increase to 78.57 ha for the amended project, representing a 2.8 ha increase.

Koala impacts have been re-calculated in the Amendment Report BDAR in accordance with the feed tree species for the central and southern tablelands koala management area in Koala Habitat Protection SEPP. Using the Koala Habitat Protection SEPP, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project. Accordingly, provision for offsetting the loss of koala habitat as a result of the project is included in the proposed offset strategy.

It is noted that an area of native vegetation, which is now considered Koala habitat due to the Koala Habitat Protection SEPP, within the disturbance footprint to the north of the waste emplacement area, will be retained due to the amended project layout. Despite a commitment to protect this vegetation, as the vegetation will be isolated from surrounding habitat during the operational life of the mine, the Amendment Report BDAR has conservatively included this vegetation in the area requiring offsets.

As noted in the EIS (Section 13.4.6), a single koala was opportunistically recorded in the mine development project area.

4.4 Commonwealth legislation

4.4.1 EPBC Act

A proposed action was referred to the Commonwealth Minister for the Environment in April 2019 under the EPBC Act. The referred action included the mine development but excluded the pipeline development on the basis that the pipeline development was assessed by EMM as being unlikely to result in a significant impact on any matter of national environmental significance (MNES). The EPBC Act referral decision concluded that the referred mine development (the action) was a controlled action on 28 May 2019. The notice of that referral decision also identified that the controlled action would be "assessed under the assessment bilateral agreement with New South Wales", which is the 2015 bilateral agreement.

As described in Chapter 2, the amended project involves a change in the layout and disturbance footprint of the mine development, which has resulted in a small change to the predicted impacts on MNES; and in particular the area of Box Gum Woodland CEEC to be cleared. Approximately 20.4 ha of the EPBC Act listed Box Gum Woodland CEEC will be removed as a result of the mine development. This is compared to the 18.5 ha which would have been removed as a result of the layout proposed in the EIS (refer to Section 6.8 for further discussion on impacts to MNES).

Due to the amendments made to the project since the submission of the EPBC Act referral, a request for the Federal Minister for the Environment to accept a variation of the controlled action will be lodged under section 156A of the EPBC Act.

As described above in Section 4.2.2, a revised biodiversity assessment of the project has been prepared for the amended project (comprising both the mine development and the pipeline development) in accordance with the BC Act and the BAM.

At a Commonwealth level, since the time that the mine development was declared to be a controlled action and following the commencement of the BC Act, an amending bilateral agreement has been executed between the Commonwealth and NSW (in March 2020). However, while an assessment is presented with this Amendment Report of biodiversity impacts in accordance with the NSW BC Act requirements, the varied action needs to be assessed under the FBA and Major Projects Policy in order to be compliant with the 2015 bilateral agreement. An assessment of potential impacts to MNES as a result of the amended project has been prepared in accordance with the FBA, and is included as Appendix F of Appendix M.

4.4.2 Native Title

As described in the EIS, there are currently no native title claims or determinations over the mine development project area.

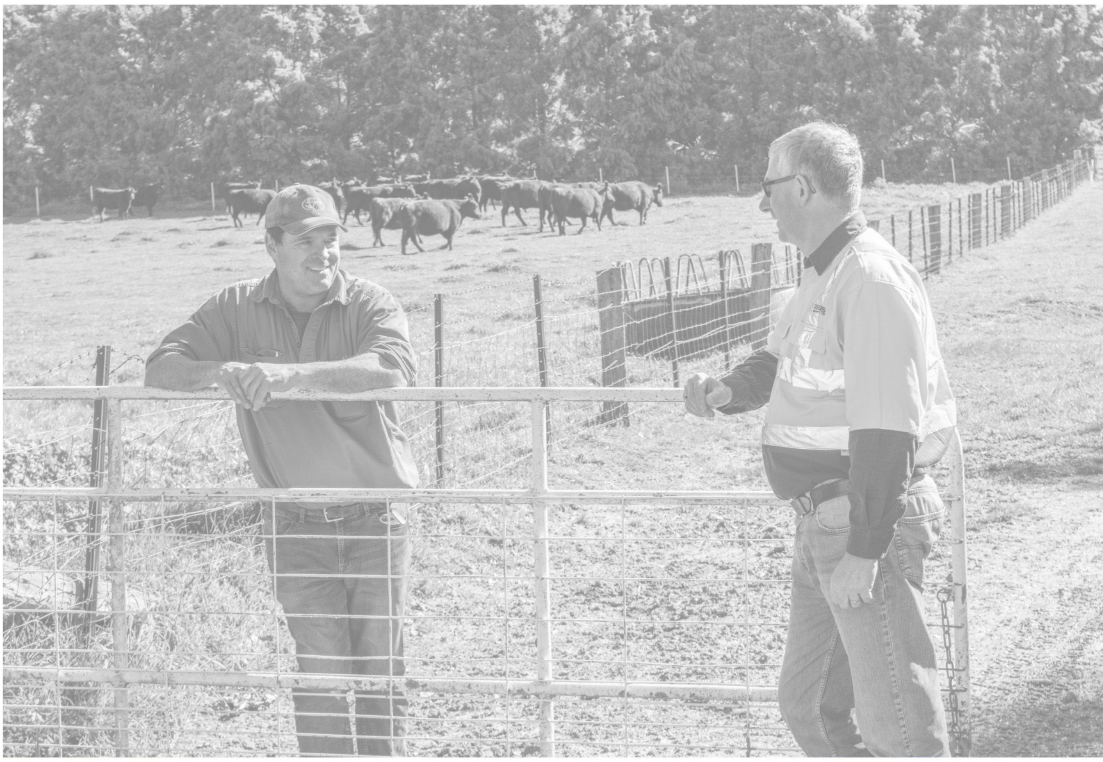
Most of the mine development project area is freehold land, although there are some Crown roads and waterways. It is considered that native title has been extinguished in the area of MLA574, except for a small part of the Belubula River abutting the eastern boundary of Lot 1 in DP 1212978 to the centreline of the river where the native title status is uncertain. This area is within the proposed TSF and will therefore be excised from MLA574 and an ancillary mining activity mining lease application (AMA MLA) lodged over the excluded area instead. It is anticipated that the AMA MLA will be granted following compliance with the mining infrastructure process under section 24MD(6B) of the Commonwealth *Native Title Act 1993*.

The pipeline corridor is not covered by any native title determinations; however, the eastern portion of the corridor is covered by the Warrabinga-Wiradjuri #7 registered native title claim (Federal Court file no. NSD857/2017).

The pipeline corridor traverses some areas of Crown land, including waterways and several State forests, where the native title status is uncertain. The tenure required for the pipeline development will be acquired consistent with the requirements of the Commonwealth *Native Title Act 1993*.

Chapter 5

Engagement



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5 Engagement

5.1 Introduction

Regis has been actively engaging with stakeholders since acquiring the exploration lease (EL 5760) and continuing throughout public exhibition of the EIS in late 2019. This engagement remains ongoing. Regis has identified stakeholders and subsequently built relationships with them, to inform and to obtain feedback about the project. Regis' stakeholder engagement has been comprehensive to date and reflects the importance Regis places on this aspect of its business and the project.

5.2 Community engagement

The EIS was placed on public exhibition from 12 September 2019 to 24 October 2019. Regis held two community open days during this time, on 14 and 15 October 2019. Issues raised during the open days and in the submissions received are presented and addressed in the Submissions Report (EMM 2020a).

Regis has actively sought to address the concerns of community members through a number of ways:

- through amendments to the project design, as described in detail in Chapter 2;
- by commissioning additional technical studies and providing further information to alleviate concerns about certain aspects, including two expert reviews of the TSF design (CMW Geosciences 2020 and Williams 2020 contained in Appendix C of Appendix D of this report), a health impact assessment (enRiskS 2020a), contained in Appendix E of the Submissions Report; and an assessment on the potential impact on European honey bees and local honey production (enRiskS 2020b), contained in Appendix D of the Submissions Report; and
- continued negotiation of agreements with residents in Kings Plains and the development of property specific mitigation plans, including tailored landscaping plans with both visual and noise benefits. Many of these property plans are at concept stage, with some already progressed to detailed construction design stage.

Further details on engagement undertaken are provided below.

5.2.1 Negotiated agreements

Regis is committed to implementing negotiated agreements with identified landholders in Kings Plains. This includes 13 of the 14 landholders identified in the EIS with predicted noise levels exceeding the project specific noise criteria, such that they would have been entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted (noting that the EIS listed 15 'noise-sensitive receivers'; however two of these (R23 and R24) are owned by the same landowner). The one receptor where an agreement isn't being progressed is a property in Kings Plains that has now been purchased by Regis (R27).

Two more negotiated agreements are also being progressed with landholders identified since submission of the EIS; a landholder in Kings Plains where the property owner has development consent to build a residence (R28a) and is predicted to experience noise levels up to 3dB above the relevant noise criteria for a brief period in Year 1; and a property in proximity to the mine site access intersection (R15). This takes the number of agreements being progressed by Regis to 15. These receptors are R15, R17, R19, R21, R23 and R24, R25, R26, 28, R28a, R29, R30, R31, R32, R33, and R34.

Notably, these negotiated agreements will also include a clause that states landowners may request, in writing, that Regis acquires their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force).

Five additional landholders (R14, R16, R18, R20 and R36) are also being offered negotiated agreements in Kings Plains in consideration of visual impacts (which will exclude the option to purchase) as described in Section 6.13 (visual amenity). This takes the number of agreements being progressed to 20.

In addition to the above, meetings have also taken place with residents outside of the Walkom Road/Kings Plains locality and along Guyong Road, offering visual mitigation tree planting where direct views of the site would be mitigated by tree plantings to improve visual amenity.

5.2.2 Community consultative committee

A Community Consultative Committee (CCC) was established for the project in August 2018 and has facilitated opportunities for increased community participation in the project, as well as the further development of productive working relationships between Regis and the local community and stakeholder groups. The CCC generally meets every two to three months and minutes from these meetings are published on the project website (https://www.mcphillamysgold.com/). Meetings of the CCC have continued since the public exhibition of the EIS. To date, nine meetings of the CCC have been held, and a number of these meetings have been attended by representatives of DPIE.

5.2.3 Training opportunities and local business/community group partnerships

Regis has engaged local training provider Skillset Lands Works. Staff and interns from this business have carried out extensive seed collection activities within the mine development project area. Skillset Lands Works and Central Tablelands Landcare will propagate seeds collected to be used in visual mitigation screening activities and future rehabilitation activities on the mine site.

5.2.4 Community sponsorship

Regis continues to sponsor local community organisations and events. Regis regularly receives requests for sponsorships and donations, and each of these requests are considered, with a number receiving funding and support.

Since the exhibition of the EIS, Regis has sponsored the Winter Fire Festival and has provided funds to Blayney High School to repair and upgrade the Greenhouse so the school can build on its current program of environmental activities.

5.2.5 Project updates

Regis has also continued to engage with the community through the following means:

- community newsletters are sent out quarterly and are distributed via Australia Post (letterbox drop) within the Blayney LGA to approximately 3000 residents and via email;
- project updates are published in the Blayney Chronicle every fortnight. These project updates are also sent to an email list of over 800;
- Regis information stall at the Blayney farmers markets (monthly prior to COVID-19);
- face to face meetings and phone calls focused on near neighbours (within an approximate 2 km radius of the project area);

- website containing all CCC minutes, community newsletters, project updates and environmental assessment documentation; and

- local office located in the main street of Blayney. This office is open to the public.

5.3 Government agency consultation

Consultation with government agencies has also been ongoing since the public exhibition of the EIS. Key agency consultation is summarised in Table 5.1.

Table 5.1 Summary of government agency consultation

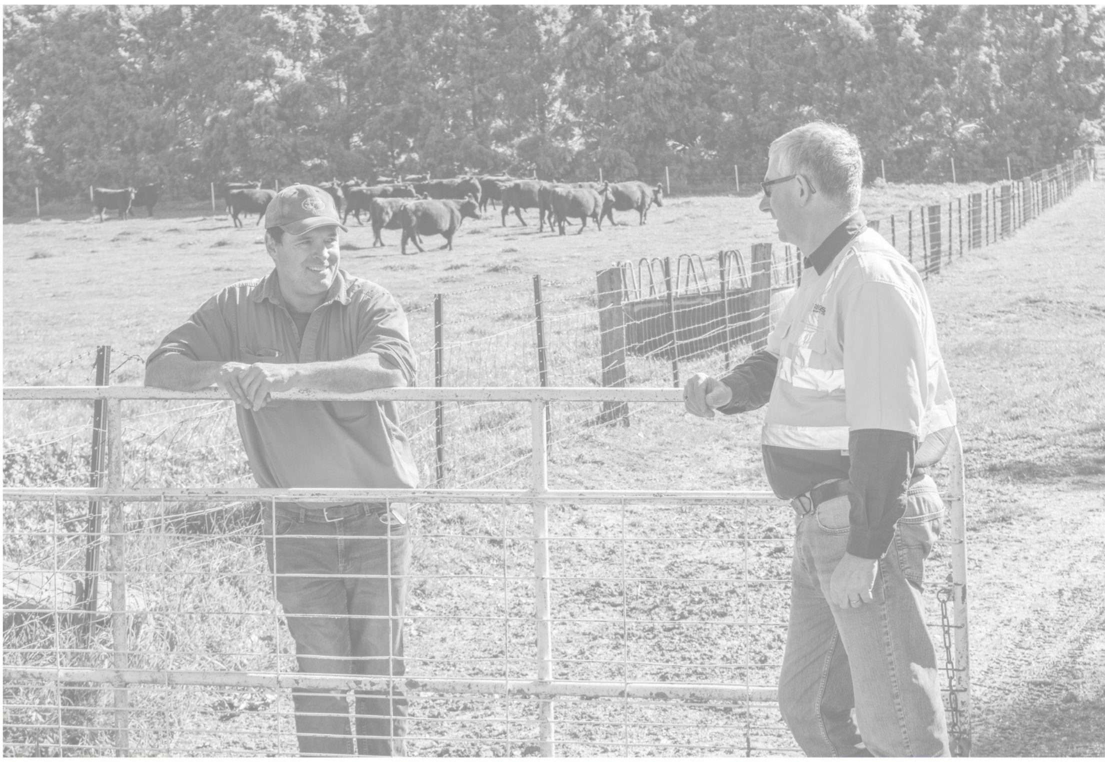
Stakeholder	Consultation method	Key matters discussed
Blayney Shire Council	Ongoing consultation through face to face meetings and email correspondence.	• Discussions concerning the voluntary planning agreement. • Relocation of the site access and the use of Dungeon Road during construction and closure. • Discussions regarding possible use of effluent water during construction. • Regular project updates.
Bathurst Regional Council	Face to face meetings	• Pipeline development update
Cabonne Council	Ongoing consultation through face to face, telephone and email correspondence.	• Dungeon Road closure
NSW Department of Planning, Industry & Environment – Planning and Assessment Group	Ongoing consultation through face to face/videoconference meetings and email correspondence.	• Meetings have been held with DPIE to discuss: – project amendments; – water resources; – variation of the referral; – outcomes of revised technical assessments; and – combined agency meetings with the EPA and Resources Regulator (refer below).
NSW Environment Protection Authority (EPA)	Consultation through face to face/videoconference meetings and ongoing email correspondence.	• Meeting to discuss the EPA submission on the EIS particularly with regard to: – noise assessment methodology; – response to submission on air quality assessment; and – TSF design. • Videoconference with EPA, DPIE and Resources Regulator and to discuss: – outcomes of revised noise modelling; and – revised TSF design and outcomes of independent technical review of the TSF.
NSW Department of Planning, Industry & Environment – Biodiversity and Conservation Division (BCD)	Ongoing consultation through face to face meetings/video conference and email correspondence.	• Consultation regarding: – assessment approach; – the preparation of a BDAR for the mine development and requirement to vary the referral application; and – expert assessment for threatened species for pipeline development.
NSW Department of Primary Industry – Forestry	Email correspondence.	• Consultation to confirm extent of clean water inundation of Vittoria State Forest.

Table 5.1 Summary of government agency consultation

Stakeholder	Consultation method	Key matters discussed
NSW Department of Primary Industry – Agriculture	Teleconference and email/telephone correspondence.	• Consultation in relation to addressing DPI Agriculture's submission on the EIS.
NSW Department of Planning, Industry and Environment – Division of Water (DPIE Water formally DoI Water)	Meeting and follow up email correspondence and letter advice.	• Correspondence sent to DPIE Water requesting clarification on Section 2 of the DPIE Water submission with regard to modelling expectations. • Meeting held with DPIE Water and DPIE to discuss approach to the revised modelling of the mine development and the availability of additional input data into the Carcoar Dam Australian Water Balance Model (AWBM). • Subsequent correspondence from DPIE Water providing guidance and confirmation of the proposed model input parameters and sensitivity analyses. • Additional email correspondence providing additional historical storage level and release data for Carcoar Dam. • Meeting held to discuss water licensing approach.
Transport for NSW	Onsite meeting and inspection of proposed access points, and ongoing consultation.	• Consultation has been ongoing with TfNSW regarding the concept design for the revised site access and the use of Dungeon Road during construction. TfNSW requested a road safety audit of Dungeon Road and SIDRA intersection analysis to demonstrate that Dungeon Road can accommodate construction traffic volumes up to month 6 of the project. • TfNSW has commenced the Works Authorisation Deed (WAD) process for the revised site access.
NSW Resources Regulator	Video conference meeting	• Videoconference with Resources Regulator, EPA and DPIE held to discuss the revised TSF design and outcomes of independent technical review of the TSF.
Commonwealth Department of Agriculture, Water and the Environment	Teleconference	• Variation of controlled action to reflect the amended project.

Chapter 6

Assessment of impacts



6 Assessment of impacts

6.1 Introduction

The SEARs identified the key matters for assessment in the EIS, which included consideration of the following:

- land;
- groundwater and surface water;
- noise, vibration and blasting;
- air quality and greenhouse gas;
- biodiversity;
- heritage;
- traffic and transport;
- visual;
- socio-economic; and
- closure, rehabilitation and final landform.

This chapter of the Amendment Report summarises how the changes to the project have changed the assessment of impacts for each of the key matters listed above. Where required, revisions or addendums to the technical reports prepared as part of the EIS have been appended to this report (refer to Appendix D to Appendix V). A summary of the mitigation and management measures for the project, including additional measures identified for the amended project are included Appendix C.

6.2 Soil and land resources

6.2.1 Mine development

i Introduction

A land capability and soil assessment was prepared by Sustainable Soil Management (SSM 2019) in support of the EIS for the project (included as Appendix H of the EIS). An updated assessment has been prepared for the amended mine development, which considers the differences in impacts on soil resources compared to the project presented in the EIS (SSM 2020). The updated assessment is provided in full in Appendix E.

The main amendments relevant to land capability and soil resources relate to the changes in the site layout and disturbance footprint; in particular the removal of the Secondary WMF, and the relocation of the main access road approximately 1 km to the east. These amendments result in small changes to the proportion of land in each Soil Association and land and soil capability (LSC) class.

ii Impact assessment

a Disturbance footprint

The disturbance footprint associated with the amended project layout is approximately 20 ha less than that presented in the EIS.

Eight soil associations were identified in the mine development project area in the EIS. The 20 ha reduction in total footprint for the amended project is distributed as 4 ha less in Manganic East Association, 12 ha less in Upland Centre Association, 3 ha less in Upland East Association, and minor changes in the remaining four soil associations.

In relation to land and soil capability, when compared with the EIS project design, the amended project will result in the disturbance of an additional 12 ha of LSC class 4 land, approximately 32 ha less of land with an LSC class of 6 and will disturb approximately 1 ha more of LSC class 5 land.

b Post mine land and soil capability

The primary objective of the project's rehabilitation strategy is to return disturbed land to a condition that is stable, non-polluting, and supports the proposed post mining use, which is a mixture of grazing on improved pasture, and woodland areas.

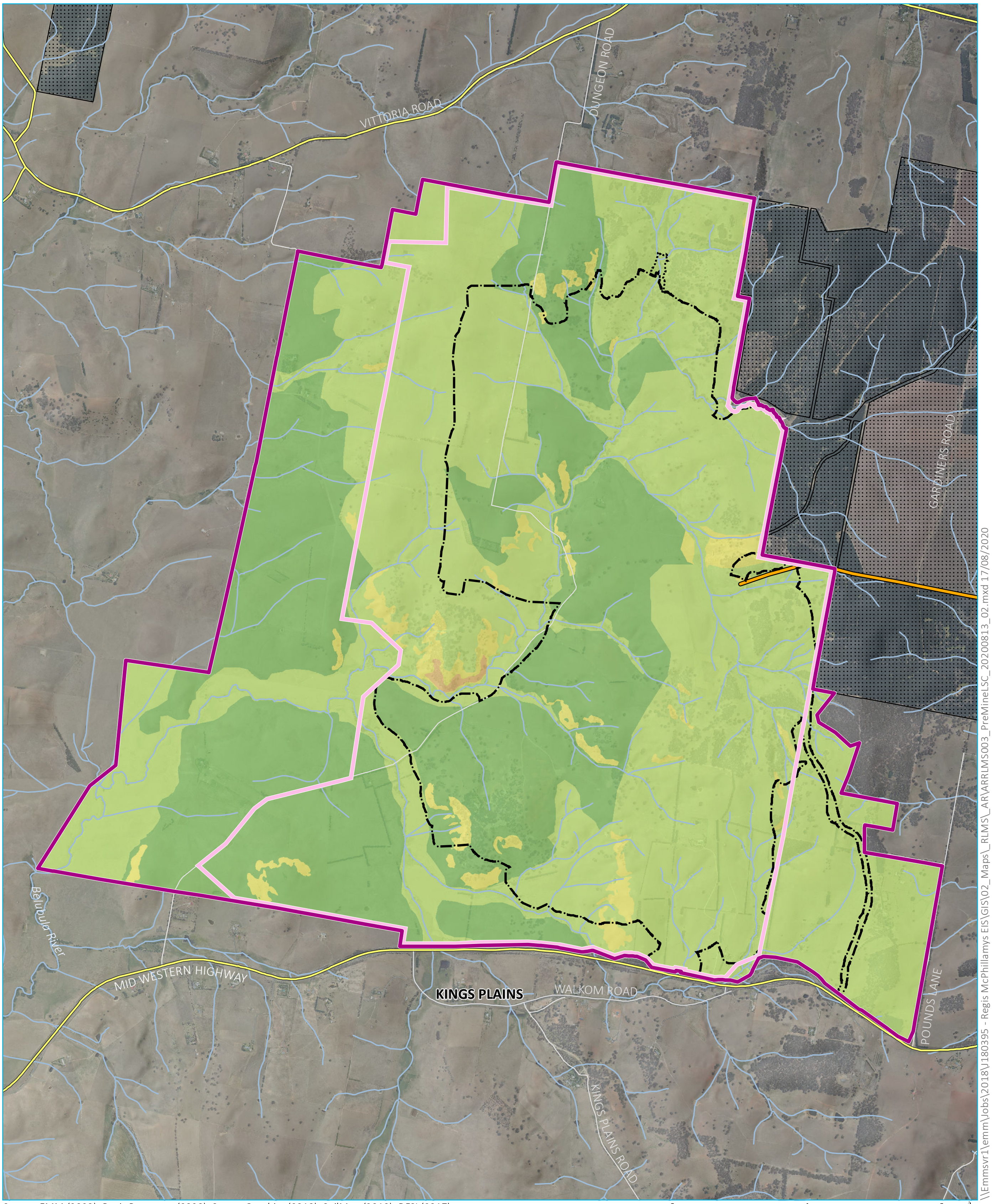
As per the EIS design, the final LSC class for the amended project will be constrained by changes in landform as a result of the project.

The change in land and soil capability class over the life of the project is summarised in Table 6.1. The amended mine development will result in a net reduction of 414 ha of soil with LSC classes 4 and 5, a 323 ha increase in the area of LSC class 6 and a 91 ha increase in the area of LSC 7 and 8. When compared to the EIS design, the amended project will result in 9 ha more of LSC class 4 land post-mining, 13 ha less of LSC class 6 and 8 ha more of LSC class 7, and 5 ha less of class 8. The pre and post mining land and soil capability for the mine development is shown in Figure 6.1 and Figure 6.2 respectively.

Table 6.1 Change in areas of each land and soil capability class over the life of the project

LSC Class	Capability	Pre-mining area (ha)	Post-mining area (ha)		Change over mine life for Amended Project (ha)
			EIS	Amended Project	
Land with a wide range of uses (cropping, grazing, horticulture, nature conservation)					
1	Extremely high	0	0	0	0
2	Very high	0	0	0	0
3	High	0	0	0	0
Land with a variety of uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)					
4	Moderate	932	920	929	-3
5	Moderate-low	1,492	1,080	1,081	-411
Land with a limited range of uses (grazing, forestry and nature conservation					
6	Low	86	422	409	323
Land generally unable to support agriculture (selective forestry and nature conservation)					
7	Very low	4	21	29	25
8	Extremely low	0	71	66	66

Much of the land with an LSC class 6 post-mining is on the batters of the waste rock emplacement and capped ROM pad. The LSC class 7 land is predominantly associated with the clean water diversion drain, which was revised as part of the amended project, and will convey rainfall/runoff from the upstream catchment around the rehabilitated TSF.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); SoilMan (2019); DFSI (2017)

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Pre mining LSC class
- 4
- 5
- 6
- 7

Pre mining land and soil capability – mine development

McPhillamys Gold Project
Amendment report
Figure 6.1

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EMM creating opportunities

Source: EMM (2020); Regis Resources (2020); ESRI (2020); SSM (2019, 2020); Survey Graphics (2019); DFSI (2017)

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AR\AR025_PostMineLSCComparison_20200815_01.mxd 2/09/2020

Post mining land and soil capability – mine development

McPhillamys Gold Project
Amendment report
Figure 6.2

REGIS RESOURCES LTD
EMM creating opportunities

iii Mitigation and management

Mitigation measures to manage disturbed soil as outlined in Section 10 of the Land and Soil Capability Assessment (SSM 2019) remain applicable to the amended project.

The soil balance prepared for the mine development was updated by SSM (2020) for the amended project design, considering the soil requirements and availability for rehabilitation.

Approximately 1,163,000 m^3 and 3,133,000 m^3 of topsoil and subsoil, respectively, is expected to be available for rehabilitation, based on an approximate 15 cm topsoil stripping depth and 45 cm for subsoil (ie approximate 60 cm stripping depth). As explained in SSM (2020), there will be adequate and suitable soil to construct the planned soil profiles associated with the identified post-mining land uses.

6.2.2 Pipeline development

i Introduction

The EIS (EMM 2019a) considered the potential impacts on soil and land resources associated with the construction and operation of the pipeline development through a desktop assessment of available information. This chapter considers the potential impacts on soil and land resources of the amended section of the pipeline alignment west of Bathurst, including both the northern and southern options for which approval is sought.

ii Existing environment

The existing environment of the pipeline alignment with respect to soils was described in Section 23.2 of the EIS, and the northern and southern options of the amended alignment change little in the way of the described soil landscapes, soil classification mapping and associated land and soil capability mapping. The surrounding land uses of the pipeline development are shown in Figure 6.3.

a Soil Landscapes

Mapping of the soil landscapes of Central and Eastern NSW is provided by OEH (2017a), based on 1:100,000 and 1:250,000 topographic sheets. The amended alignment options intersect the same three soil landscapes as the original alignment section assessed in the EIS; that is the Bathurst, Rocks and Evans Plains soil landscapes, with a minor area of the Burrendong soil landscape in the northern alignment option.

The soils landscapes along the amended pipeline corridor are shown in Figure 6.4 and the length of the various soil landscapes traversed, inclusive of both alignment options, is presented in Table 6.2.

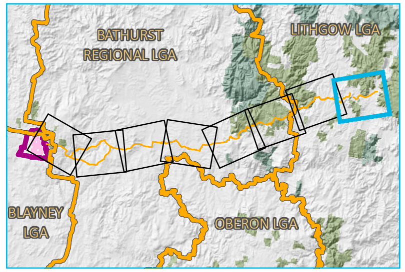
Table 6.2 Soil landscapes along the amended pipeline route

Name	Northern option			Southern option		
	Length (km)	Alignment (km)	%	Length (km)	Alignment (km)	%
Bathurst	21.34	90.47	23.59	19.14	91.07	21.01
Burrendong	2.17	90.47	2.40	2.17	91.07	2.38
Capertee	3.68	90.47	4.06	3.68	91.07	4.04
Cullen Bullen	3.89	90.47	4.30	3.89	91.07	4.27
Disturbed Terrain	4.01	90.47	4.44	4.01	91.07	4.41
Evans Plains	2.75	90.47	3.03	0.75	91.07	0.83
Hassans Walls	1.24	90.47	1.37	1.24	91.07	1.36
Lithgow	2.14	90.47	2.36	2.14	91.07	2.35
Long Swamp	0.40	90.47	0.45	0.40	91.07	0.44
Macquarie	2.68	90.47	2.96	2.68	91.07	2.94
Mookerawa	2.33	90.47	2.57	2.33	91.07	2.55
Mullion Creek	1.22	90.47	1.35	1.22	91.07	1.34
Panorama	0.49	90.47	0.54	0.49	91.07	0.54
Pinnacle	0.51	90.47	0.57	0.51	91.07	0.56
Pipers Flat	0.39	90.47	0.44	0.39	91.07	0.43
Raglan	9.53	90.47	10.54	9.53	91.07	10.47
Rocks	1.07	90.47	1.18	5.87	91.07	6.44
Sunny Corner	18.77	90.47	20.75	18.77	91.07	20.61
Turonfels	3.67	90.47	4.05	3.67	91.07	4.03
Vittoria-Blayney	3.93	90.47	4.34	3.93	91.07	4.31
Yetholme	4.24	90.47	4.69	4.24	91.07	4.66

b Australian soil classification

The Australian Soil Classification (ASC) scheme (Isbell 2016) is a multi-category scheme with soil classes defined on the basis of diagnostic horizons and their arrangement in a vertical sequence as seen in an exposed soil profile. The ASC soils mapping for the pipeline alignment was reviewed on regional scale mapping provided by OEH (2017a).

The amended pipeline alignment occurs on three soils types; texture contrast chromosols associated with the Bathurst soil landscape, poorly developed rudosols associated with Evans Plains Creek and the Evans Plains soil landscape, acidic texture-contrast kurosols associated with the Rocks soil landscape, and poorly developed rudosols and tenosols associated with the Burrendong soil landscape.



KEY

- Sensitive receiver
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- State forest
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Land use classification

- 1.3 Other minimal use
- 2.1 Grazing native vegetation
- 2.2 Production native forestry
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 5.2 Intensive animal production
- 5.3 Manufacturing and industrial
- 5.4 Residential and farm infrastructure
- 5.5 Services
- 5.6 Utilities
- 5.7 Transport and communication
- 5.8 Mining
- 5.9 Waste treatment and disposal
- 6.2 Reservoir/dam
- 6.3 River
- 6.5 Marsh/wetland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

0 1 2 km

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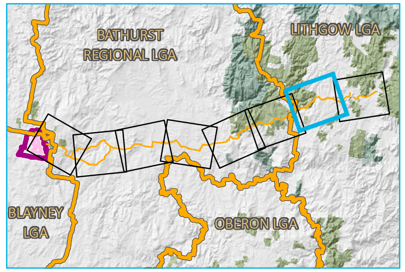
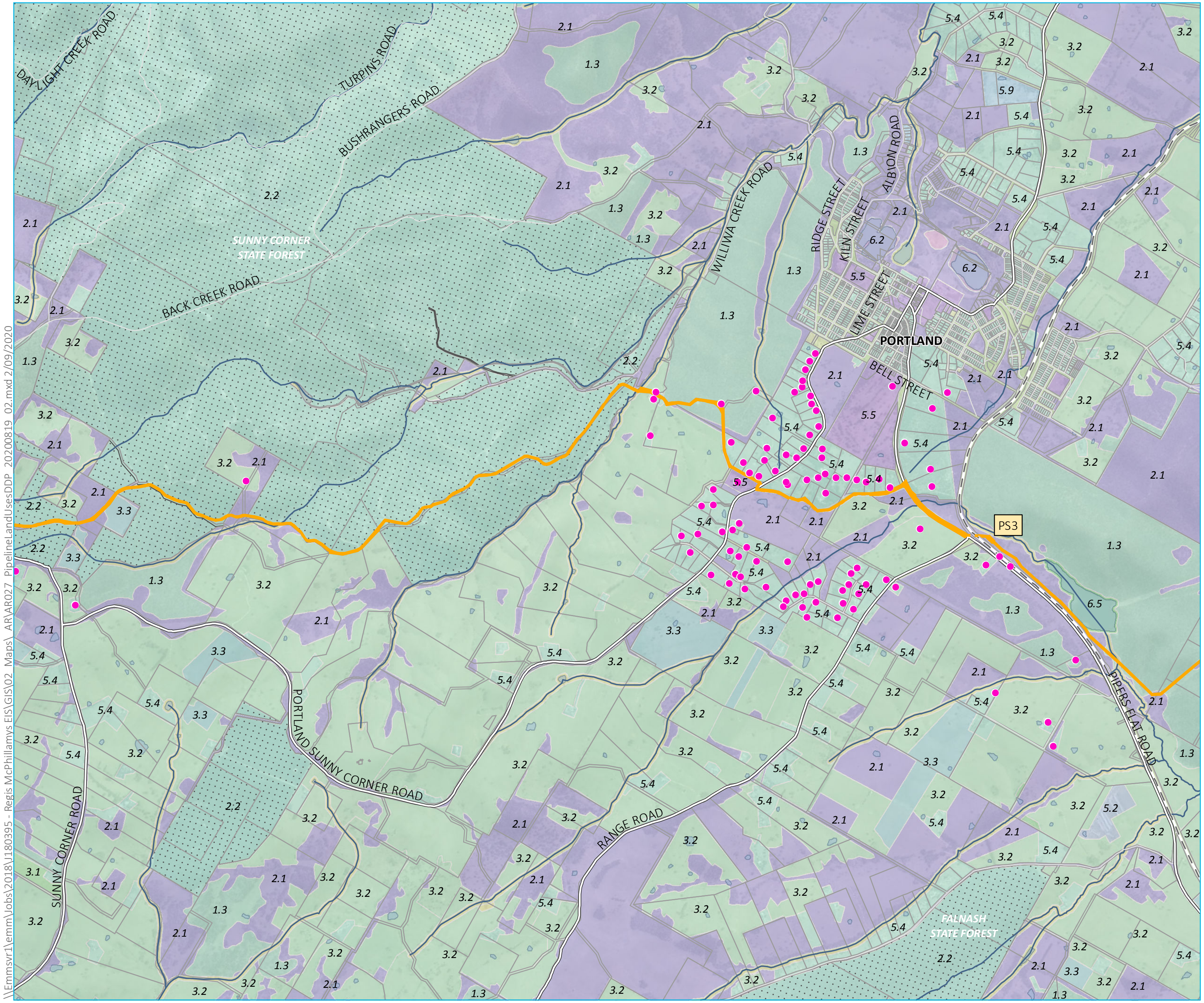
Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3a





KEY

- Sensitive receiver
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- State forest
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Land use classification

- 1.2 Managed resource protection
- 1.3 Other minimal use
- 2.1 Grazing native vegetation
- 2.2 Production native forestry
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 3.4 Perennial horticulture
- 5.2 Intensive animal production
- 5.3 Manufacturing and industrial
- 5.4 Residential and farm infrastructure
- 5.5 Services
- 5.6 Utilities
- 5.7 Transport and communication
- 5.9 Waste treatment and disposal
- 6.2 Reservoir/dam
- 6.3 River
- 6.5 Marsh/wetland

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3b

REGIS RESOURCES LTD EMM creating opportunities

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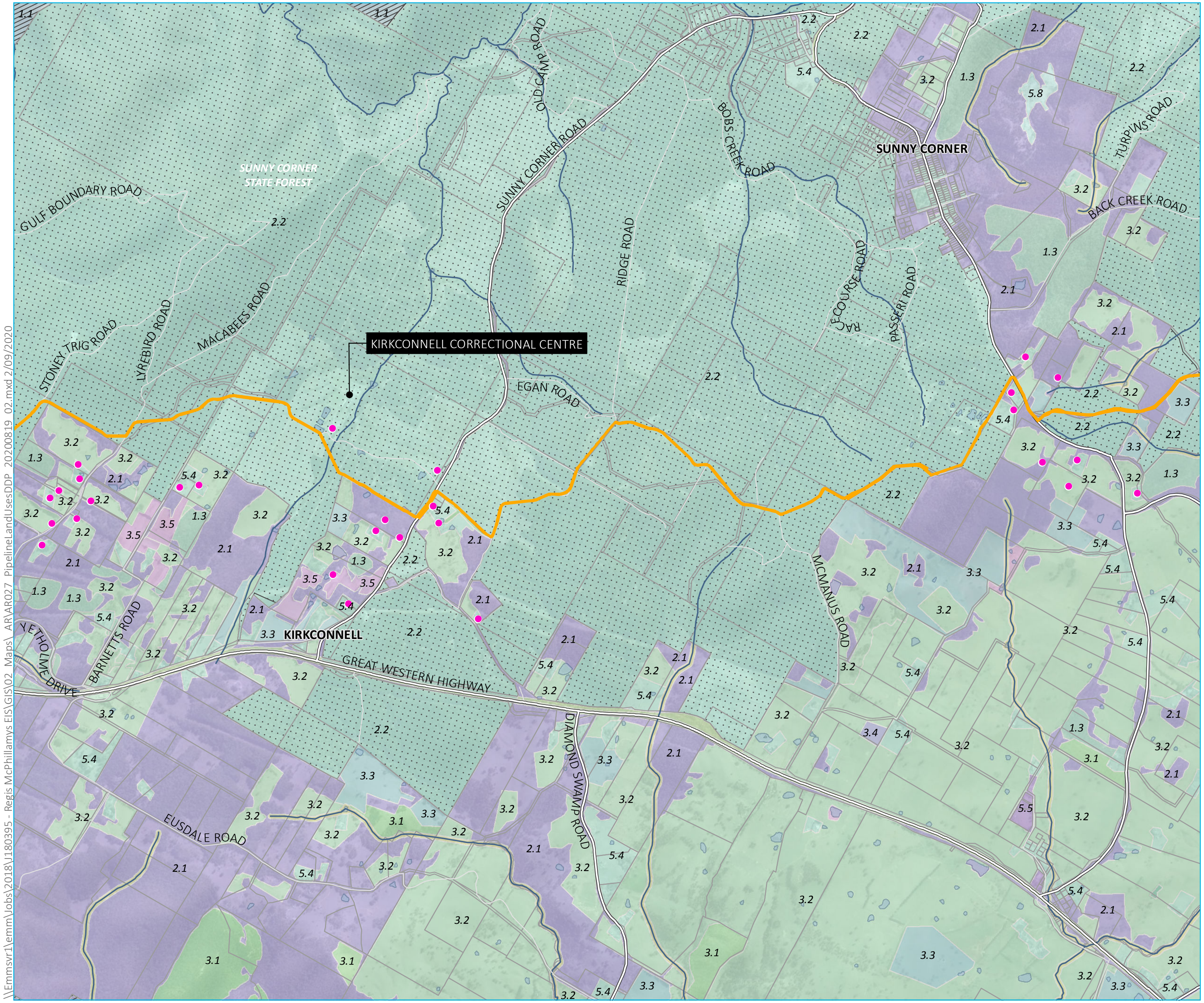
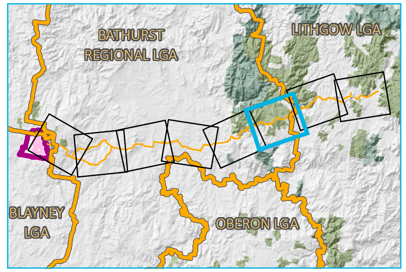




KEY

- Sensitive receiver
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

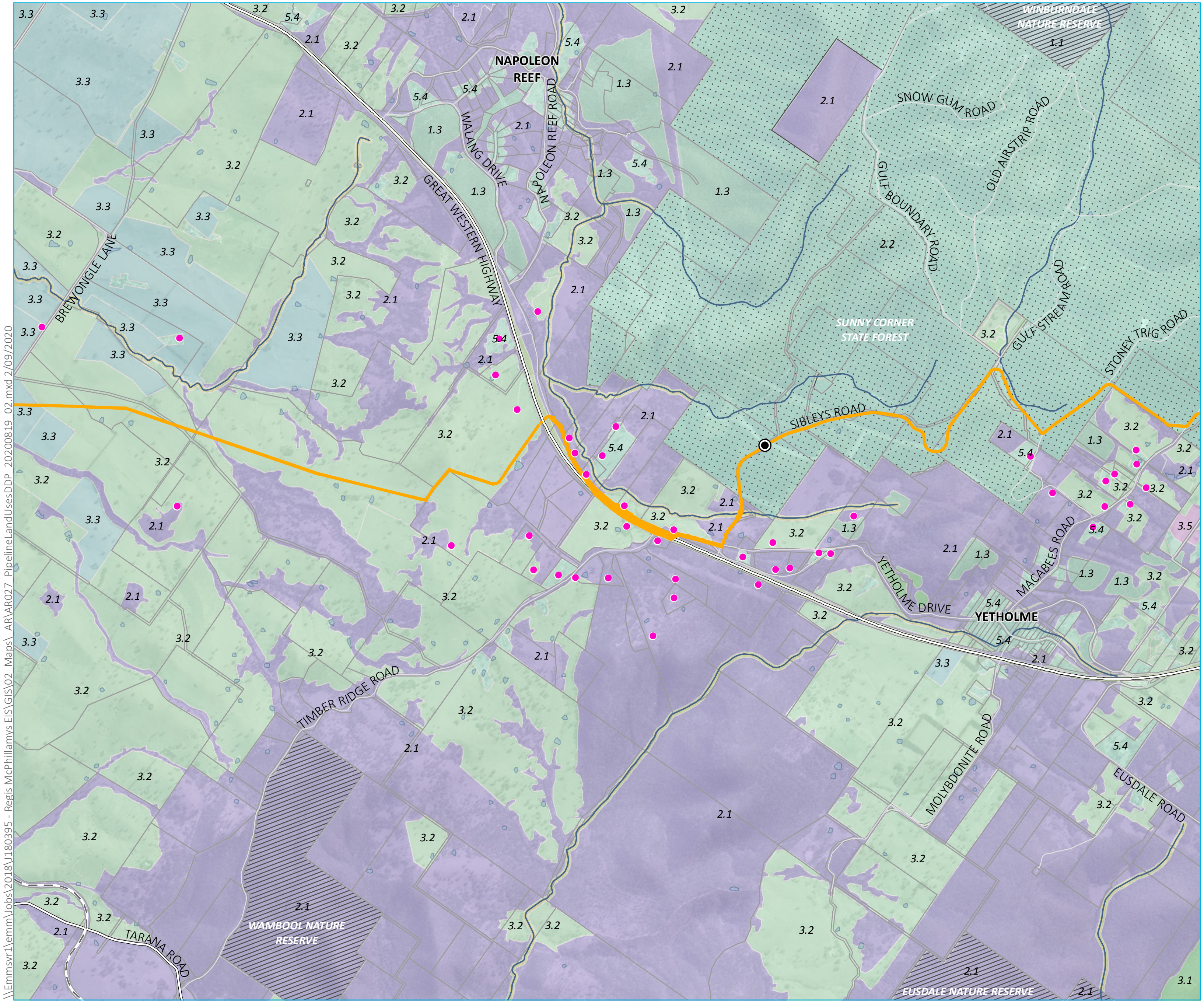
Land use classification

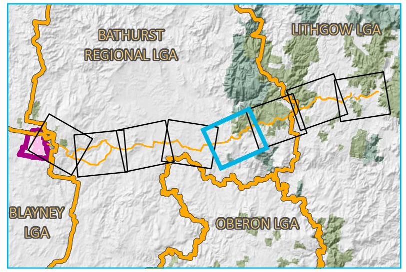
- 1.1 Nature conservation
- 1.2 Managed resource protection
- 1.3 Other minimal use
- 2.1 Grazing native vegetation
- 2.2 Production native forestry
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 3.4 Perennial horticulture
- 3.5 Seasonal horticulture
- 5.4 Residential and farm infrastructure
- 5.5 Services
- 5.7 Transport and communication
- 5.8 Mining
- 6.2 Reservoir/dam
- 6.3 River

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3c





KEY

- Sensitive receiver
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve
- State forest
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section
- Pressure reducing system

Land use classification

- 1.1 Nature conservation
- 1.3 Other minimal use
- 2.1 Grazing native vegetation
- 2.2 Production native forestry
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 3.4 Perennial horticulture
- 3.5 Seasonal horticulture
- 5.4 Residential and farm infrastructure
- 5.7 Transport and communication
- 6.3 River

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

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Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3d

REGIS RESOURCES LTD

EMM creating opportunities

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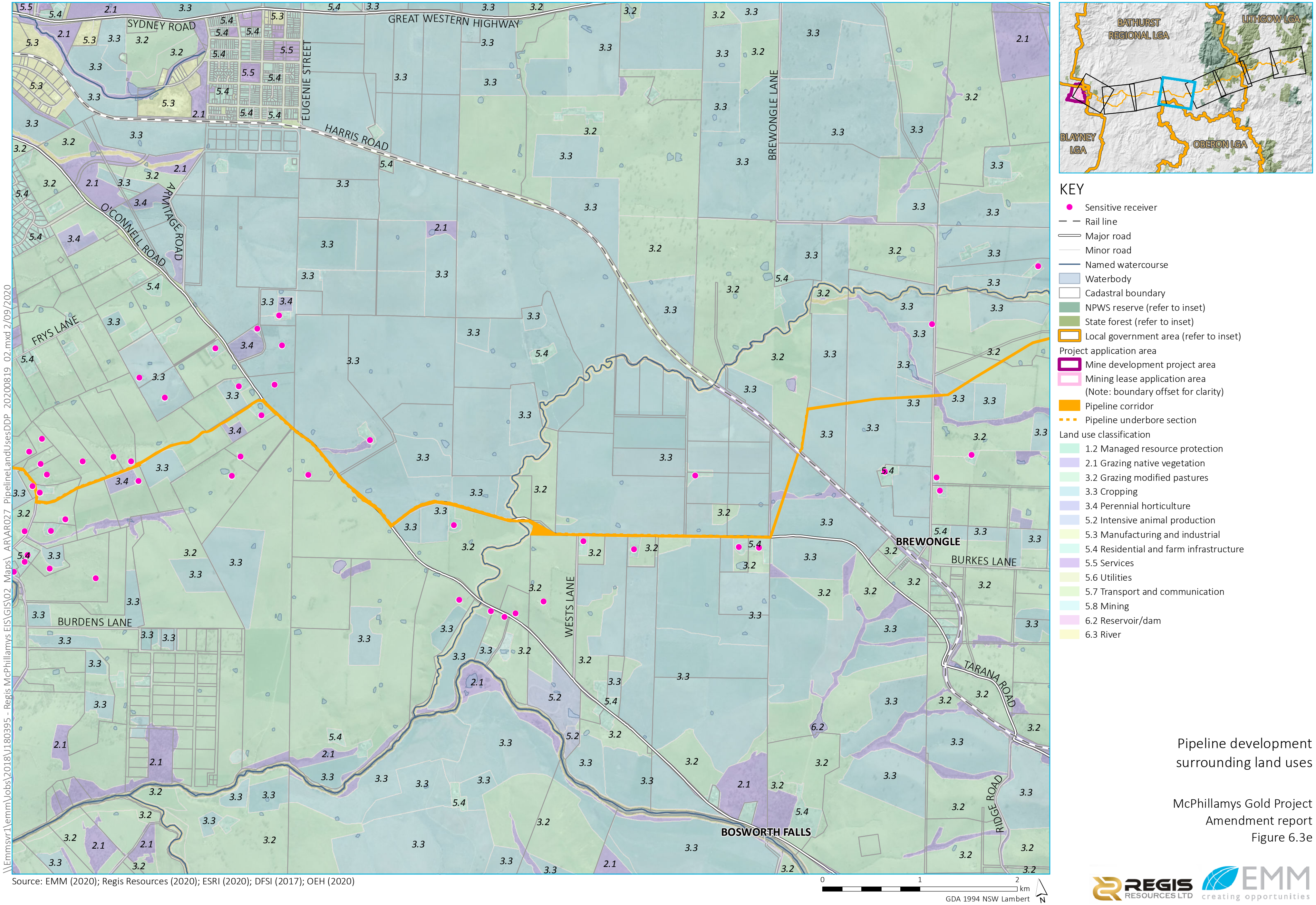

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

Pipeline development
surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3e

REGIS RESOURCES LTD
EMM creating opportunities

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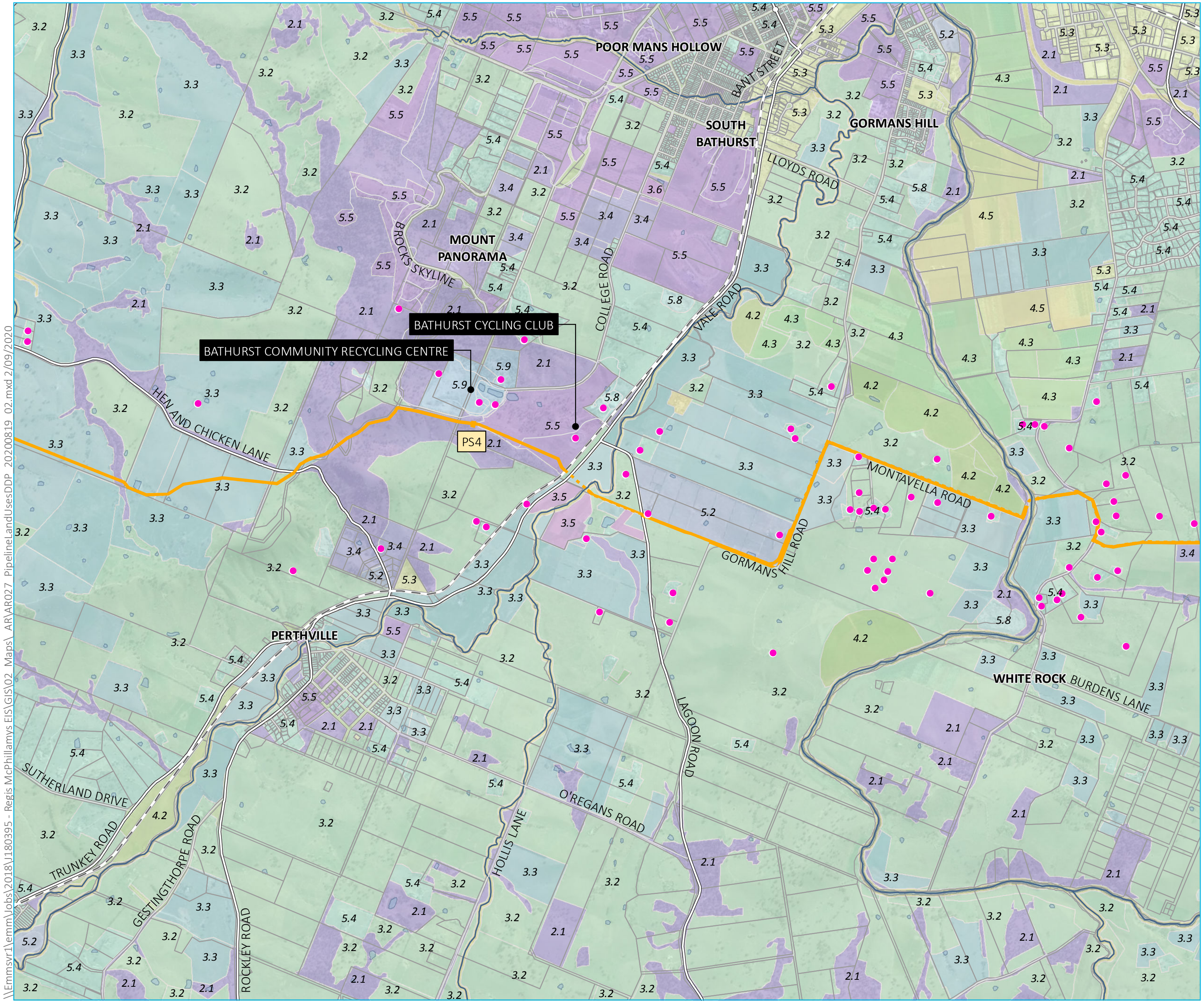

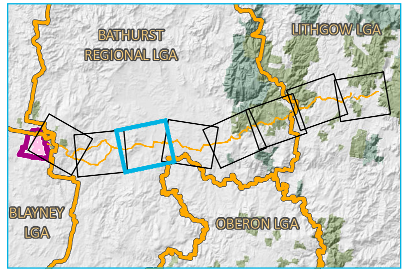

KEY

- Sensitive receiver
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Land use classification

- 2.1 Grazing native vegetation
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 3.4 Perennial horticulture
- 3.5 Seasonal horticulture
- 3.6 Land in transition
- 4.2 Grazing irrigated modified pastures
- 4.3 Irrigated cropping
- 4.5 Irrigated seasonal horticulture
- 5.1 Intensive horticulture
- 5.2 Intensive animal production
- 5.3 Manufacturing and industrial
- 5.4 Residential and farm infrastructure
- 5.5 Services
- 5.6 Utilities
- 5.7 Transport and communication
- 5.8 Mining
- 5.9 Waste treatment and disposal
- 6.3 River

Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3f

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

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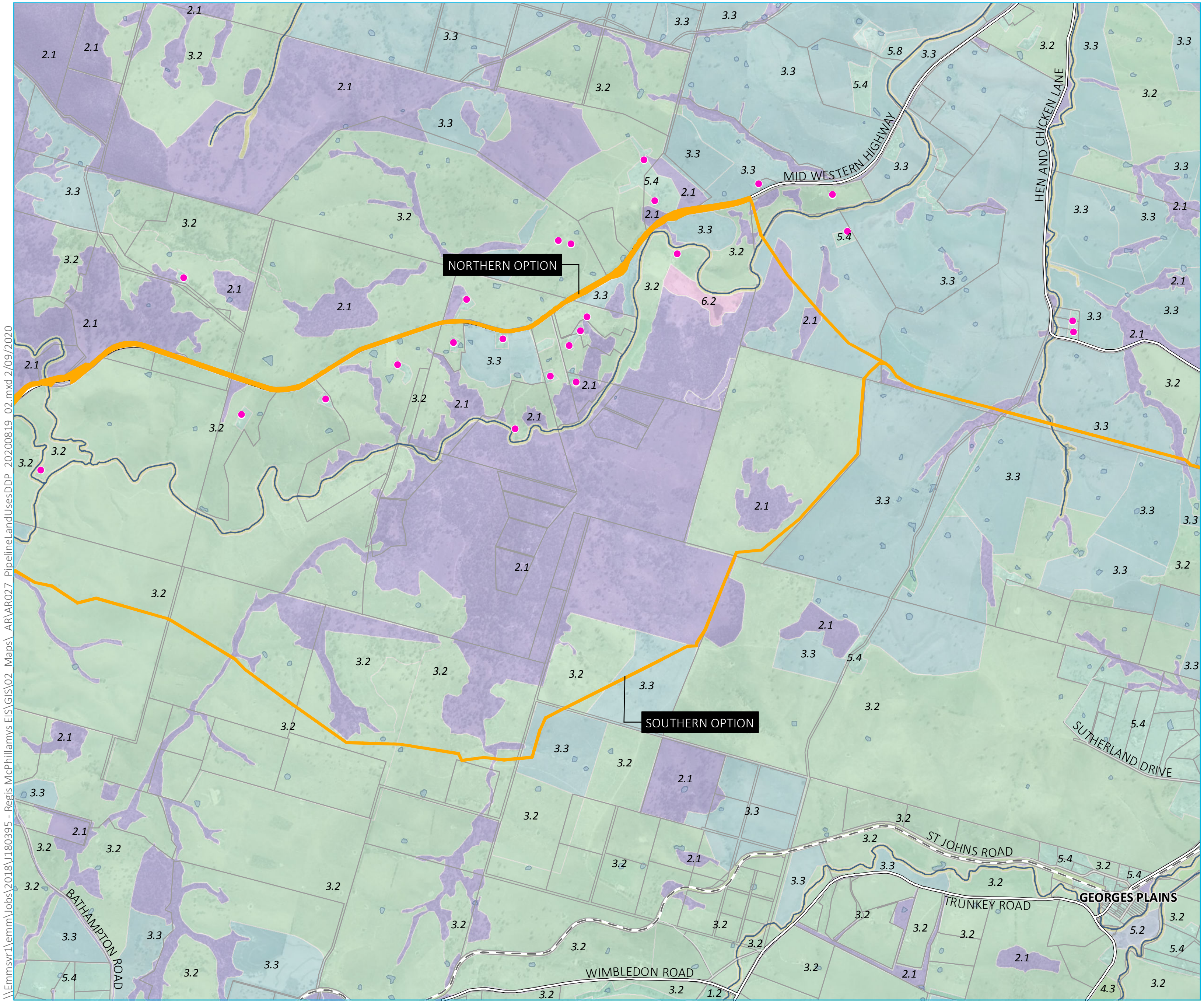

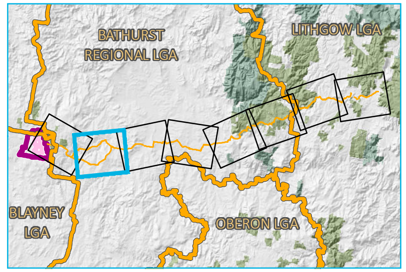

KEY

- Sensitive receiver
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Land use classification

- 1.2 Managed resource protection
- 2.1 Grazing native vegetation
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 4.2 Grazing irrigated modified pastures
- 4.3 Irrigated cropping
- 5.2 Intensive animal production
- 5.4 Residential and farm infrastructure
- 5.7 Transport and communication
- 5.8 Mining
- 6.2 Reservoir/dam
- 6.3 River

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

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Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3g

REGIS RESOURCES LTD

EMM creating opportunities

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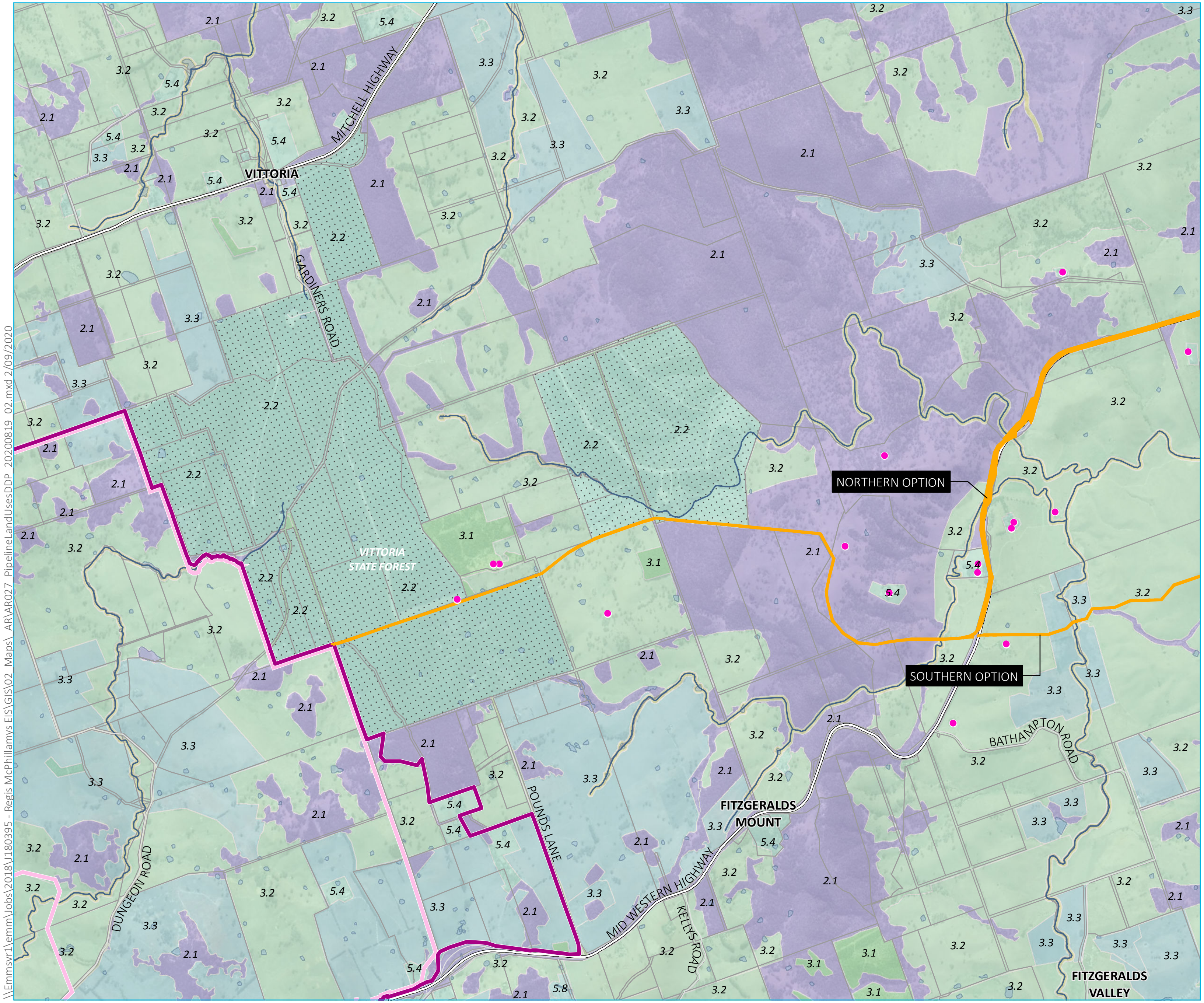

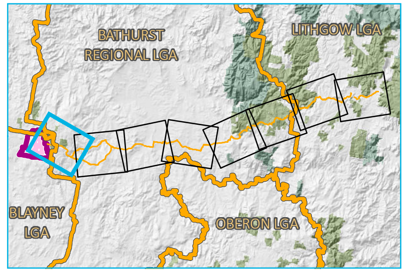

KEY

- Sensitive receiver
- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary
- State forest
- NPWS reserve (refer to inset)
- State forest (refer to inset)
- Local government area (refer to inset)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Land use classification

- 1.2 Managed resource protection
- 2.1 Grazing native vegetation
- 2.2 Production native forestry
- 3.1 Plantation forests
- 3.2 Grazing modified pastures
- 3.3 Cropping
- 3.4 Perennial horticulture
- 5.4 Residential and farm infrastructure
- 5.7 Transport and communication
- 5.8 Mining
- 6.2 Reservoir/dam
- 6.3 River

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017); OEH (2020)

0 1 2 km

GDA 1994 NSW Lambert

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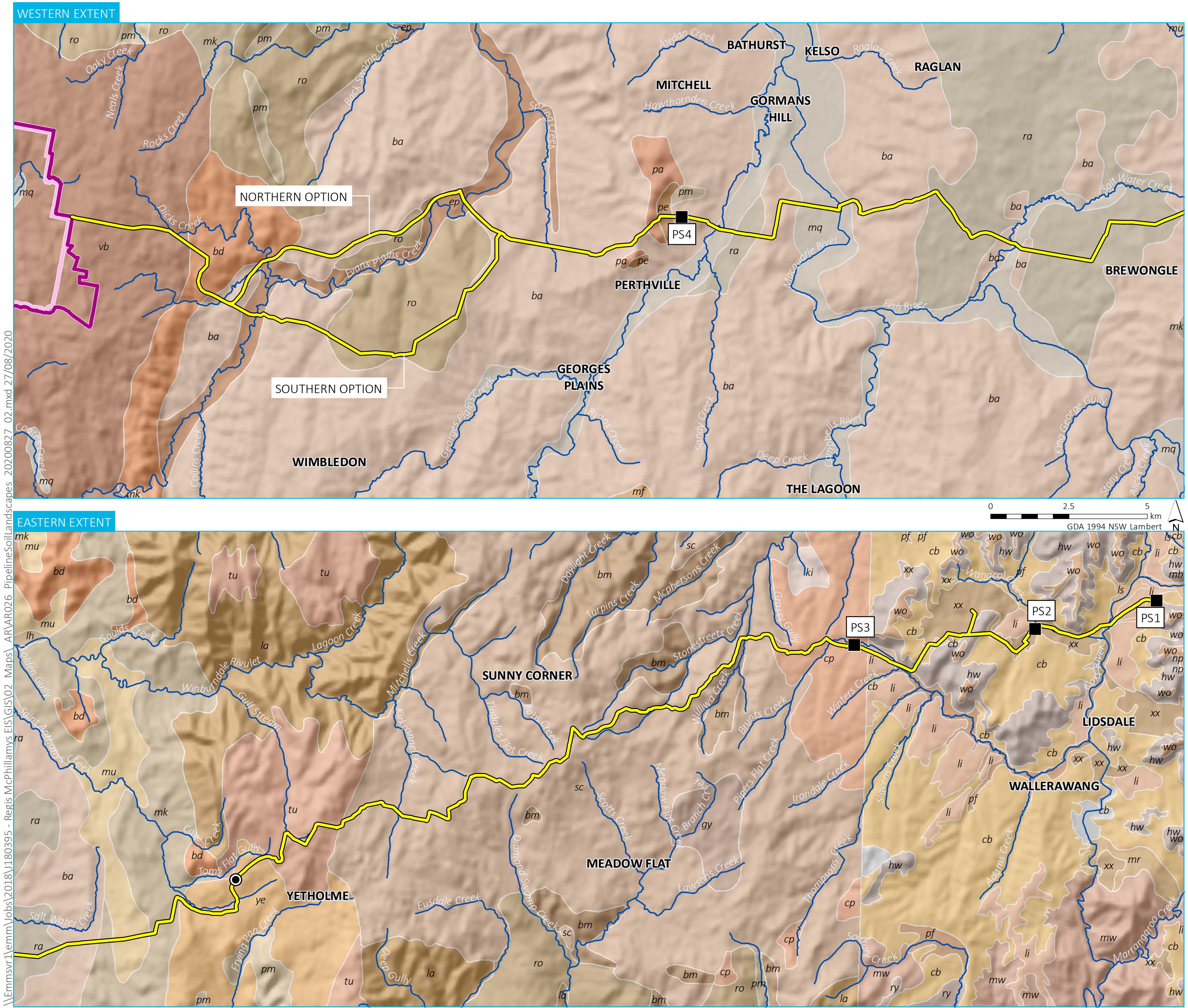
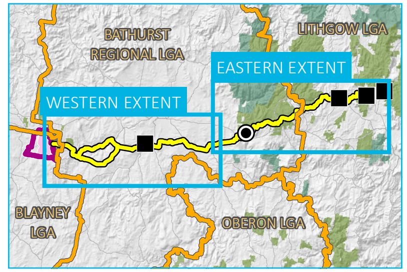
Pipeline development surrounding land uses

McPhillamys Gold Project
Amendment report
Figure 6.3h



Source: EMM (2020); Regis Resources (2020); OEH (2018); DFSI (2017)



KEY

- Watercourse/drainage line

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline
- Pumping station facility
- Pressure reducing system

INSET KEY

- Major road
- NPWS reserve
- State forest
- Local government area

Soil landscapes

- ba - Bathurst
- bd - Burrendong
- bm - Blackbutt Mountain
- cb - Cullen Bullen
- cp - Capertee
- ep - Evans Plains
- gy - Gately Rocks
- hw - Hassans Walls
- ki - Killonbutta
- la - Lambie
- lh - Lachlan
- li - Lithgow
- ls - Long Swamp
- mb - Medlow Bath
- mf - Mayfield
- mk - Mookerawa
- mq - Macquarie
- mr - Marrangaroo
- mu - Mullion Creek
- mw - Mount Walker
- np - Newnes Plateau
- pa - Panorama
- pe - Pinnacle
- pf - Pipers Flat
- pm - Pine Mountain
- ra - Raglan
- ro - Rocks
- ry - Rydal
- sc - Sunny Corner
- tu - Turonfels
- vb - Vittoria-Blayney
- wo - Wollangambe
- ye - Yetholme
- xx - Disturbed Terrain

Amended pipeline development – soil landscapes

McPhillamys Gold Project
Amendment report
Figure 6.4

iii Impact assessment

a Land and soil capability

The LSC mapping for the pipeline alignment has been identified based on regional scale mapping by OEH (2017a). The LSC mapping classes are in accordance with the descriptions of the LSC assessment scheme (OEH 2012).

The LSC classes intersected by both the amended northern and southern alignment options is LSC class 5, with some class 7 land along the northern alignment option. Class 5 is considered moderately low capability land with high limitations for high-impact land uses. Class 7 is considered very low capability land with severe limitations that restrict most land uses and generally cannot be overcome. The class 7 LSC land is a small area associated with the Rudosols and Tenosols of the Burrendong soil landscape.

b Soil salinity

The soil salinity potential of land within the amended alignment has been reviewed with reference to OEH hydrogeological landscape (HGL) mapping and reporting provided by OEH (2017a).

The HGLs in the amended pipeline alignment areas are the Dunkeld, Euchareena and Glanmire HGLs, predominantly the Dunkeld. The Dunkeld HGL has low salinity, low salt export potential and low overall hazard with moderate erosion hazard. The Euchareena HGL has low salinity and low salt export potential, with moderate overall hazard and high erosion hazard. Glanmire HGL is moderate in both salinity and salt export impacts, with moderate overall hazard and erosion hazard.

c Biophysical strategic agricultural land

Biophysical strategic agricultural land (BSAL) is land with a rare combination of natural resources highly suitable for agriculture. The amended pipeline alignment options both avoid any mapped BSAL land. However, it is noted that the original sections of the pipeline route traverse some small areas of BSAL, as described below in Section 6.3.2(ii)(a).

d Acid sulphate soils

There are no acid sulphate soils (ASS) or potential acid sulphate soils along the amended pipeline route, as per the rest of the pipeline corridor, according to the *Guidelines for the Use of Acid Sulfate Soil Risk Maps* (DLWC 2000). The NSW OEH Acids Sulphate Risk Map (OEH 2018) indicates that the nearest site with a high probability of ASS is more than 60 km east of the eastern extent of the pipeline corridor and as such the pipeline alignment is at no risk from ASS.

e Contaminated soils

The amended section of the pipeline alignment is in the Bathurst LGA. Consistent with the findings in the EIS, a search of the EPA Contaminated Land: Record of Notices (EPA 2020) within the Bathurst LGAs found no registered contaminated land sites within 1 km of the pipeline along the amended alignments.

f Naturally occurring asbestos

Naturally occurring asbestos is found in some rocks, sediments and soils, but is not common in NSW. There are no areas mapped on the NSW Government SEED database with the potential to contain naturally occurring asbestos in the amended section of the pipeline corridor (both northern and southern alignments).

iv Mitigation and management

In its submission on the EIS, DPI Agriculture noted that specific soil analysis across the identified soil landscapes and landscape features will assist in identifying soil limitations across the pipeline corridor and appropriate targeted management needs.

Appendix W of the EIS (*Pipeline development soil and land resources supplementary information*) identified that 52% of the pipeline route may have soils that are prone to tunnel and gully erosion due to their sodic and/or magnesic properties. These soils are likely to require amelioration with calcium sulphate to reduce their potential for dispersion. Therefore, Regis will progressively undertake some sampling of topsoils and subsoils for erosion and agronomic constraints at a scale of approximately 1:25,000 as recommended by *Australian Soil and Land Survey Handbook* (CSIRO, 2009) and the *Guidelines for Surveying Soil and Land Resources* (CSIRO, 2008). Sampling will be undertaken along the corridor prior to construction works commencing in each soil landscape, focusing on the Kurosols and Sodosols (Cullen Bullen, Lithgow, Capertee, Sunny Corner, Yetholme, Mookerawa, Mullion Creek, Raglan and Rocks Soil Landscapes) to refine the boundaries of reactive soils and determine erosion and agronomic amelioration requirements. Samples will be taken in the main topographic features in each landscape. It is also noted that only one of these landscapes (Rocks) is traversed by the amended section of the pipeline alignment; approximately 1 km of the northern alignment and 6 km of the southern alignment.

The details of the soil sampling plan will be documented in the Construction Environmental Management Plan (CEMP) to be prepared for the pipeline, post determination.

The additional soil management measures identified in the EIS remain applicable to the amended project (summarised in Appendix C).

6.2.3 Conclusion

The amended mine development will disturb approximately 1,116 ha to develop and operate the mine. This is a reduction of around 20 ha compared to the EIS. As per the EIS design, this will result in some changes to the land and soil capability class across the mine development project area compared to the existing landscape. The existing LSC classes across the project area comprise mainly class 4 and class 5 land. Upon completion of mining all surface infrastructure will be removed, unless required for the agreed post mining land use, and the area rehabilitated to a condition that is stable and supports the proposed post mining land use, which is typically grazing, with some woodland areas.

Post mining, the rehabilitation landform will predominantly be a combination of class 4, class 5 and class 6 land. Notably, the LSC class across parts of the TSF footprint will be improved from a pre-mining LSC class 5 to a post-rehabilitation LSC class 4. This commitment to rehabilitating the TSF final landform to achieve an LSC class of 4 means that there will be only a minimal change in class 4 land across the disturbance area as a result of the mine development.

The post mining change in LSC classes in the project area as a result of the amended project, compared to existing conditions, will be as follows: a reduction in LSC class 4 by 3 ha, a reduction in LSC class 5 by 411 ha, a 323 ha increase in the area of LSC class 6, a 25 ha increase of LSC class 7 and a 66 ha increase in LSC class 8 (associated with the final void). When compared to the EIS design, the amended project will result in 9 ha more of LSC class 4 land post-mining, no change in LSC class 5, 13 ha less of LSC class 6 and 8 ha more of LSC class 7, and 5 ha less of class 8. Consistent with the EIS, the majority of the site will be suitable for the continuation of agricultural land use post mining.

The soil resources on site will be stripped, stockpiled and managed to provide a post mining growth medium and re-establishment of an appropriate soil profile. There is a surplus of both topsoil and subsoil material to meet the nominated LSC classes on the post mining landform. The mine will be progressively rehabilitated to the final landform design.

The amendments to the pipeline alignment in a small section west of Bathurst change little with respect to the encountered soil and land conditions assessed in the EIS for the original proposed alignment. The impact assessment and mitigation measures of the EIS remain applicable and suitable. A soil sampling plan will be developed as part of the preparation of the CEMP for pipeline construction. This plan will target soils identified as potentially prone to tunnel and gully erosion, to ensure that appropriate targeted management measures are applied during construction.

6.3 Agriculture

6.3.1 Mine development

i Introduction

An addendum to the agricultural impact statement (AIS addendum) (EMM 2020e) has been prepared to assess the potential agricultural impacts of the amended mine development. The AIS addendum updates the findings of the original AIS for the mine development (included as Appendix I of the EIS, referred to herein as the EIS AIS) and is provided in full in Appendix F. The potential agricultural impacts associated with the pipeline development have also been considered in this chapter for the amended pipeline route, as discussed in Section 6.3.2.

The key changes to the mine development presented in the EIS that have implications for agricultural resources are the amendments to the disturbance footprint and mine development layout. These amendments will slightly change the total amount of land removed from grazing as a result of the mine development, as well as changing the post mining LSC classes that are achievable for land within the disturbance footprint at the completion of rehabilitation.

The project setting as described in the EIS, including surrounding agricultural land use and the pre-mining LSC assessment has not changed.

ii Existing environment

There is no BSAL within the MLA area for the amended project.

A comprehensive soil survey of the project area was undertaken by SSM (2019) as part of the preparation of the EIS AIS. The soil survey assessment results and soil properties described in Section 2.2.1 of the EIS AIS have not changed as a result of the amendments to the project. The revised mine development project area has added 0.6 ha to the project area (to accommodate a small inundation area associated with CWF1B). This land has an LSC class of 5. Other than this minor change, the pre-mining LSC class assessment remains applicable to the amended project.

The description of the agricultural setting and enterprises (including historical agriculture, agricultural enterprises and support infrastructure and agriculture production values) provided in Section 8.2.2 of the EIS also remains valid for the amended project.

iii Impact assessment

a Risk assessment and overview of impacts

The risk assessment performed as part of the EIS AIS is still valid and accurately identifies potential risks to agricultural land resources from the amended mine development. As described in Chapter 2, the design of the TSF and water management system have both changed as a result of the amendments to the project. These changes have further reduced the risk of overflows from WMFs in the mine development project area resulting in the pollution of water used for agricultural purposes downstream of the mine development project area. The WMFs have been designed to not spill.

b Groundwater

An addendum to the groundwater assessment has been prepared by EMM to account for the amendments to the mine development (Appendix H). As described in the EIS, during mine operation, water will be principally sourced externally via a pipeline transferring surplus water from Centennial's Angus Place Colliery and Springvale Coal Services Operations and Energy Australia's Mount Piper Power Station near Lithgow, to the mine development. The supply of water from these locations will enable a beneficial use of otherwise surplus water from mining in the Sydney Basin and provides a reliable water source for the mine development.

Since the submission of the EIS, groundwater investigations have been completed to consider the potential for groundwater to provide the initial project water supply (ie prior to the construction and operation of the proposed water transfer pipeline) and to assess the potential impacts on groundwater users and the environment. The investigations confirmed that the mine development's construction water supply can be primarily sourced from groundwater via production bores within or close to the mine development project area (refer to Appendix H).

Potential impacts from drawdown as a result of sourcing construction water from groundwater bores have been assessed based on the results of the groundwater investigation and location of sensitive receptors. The results indicate:

- localised groundwater level drawdown around the production bores extends no more than 500 m;
- there are no third-party bores within the extent of modelled drawdown;
- the predicted extent of drawdown will be significantly less than the predicted drawdown from the open cut pit; and
- a temporary reduction in baseflow contribution of 0.7 ML (2.5 kL/day) to the Belubula River is estimated in the vicinity of TPB4 during the nine month period[1].

Users downstream of the mine development who rely on and access water from the Belubula River will not experience reduced access to water. The predicted peak dewatering for the amended project is lower than the previous simulated mine schedule due to the steadier development profile scheduled over the first years of the amended project.

The groundwater model predicts that groundwater levels at existing privately-owned bores in the vicinity of the mine will experience little to no change as a result of the amended project. No bores will experience a cumulative pressure head decline of greater than 2 m, which the NSW *Aquifer Interference Policy* (DPI 2012) defines as 'minimal impact'.

The groundwater model predicts that the mine will have an insignificant impact on changes to spring flows outside the mine development project area. The model also predicts that with the implementation of the proposed management and mitigation measures, the risk of the mine development impacting on groundwater quality is negligible.

As the project will have a minimal impact on groundwater availability at private bores and an insignificant impact on groundwater quality it will not adversely impact agricultural groundwater use in the vicinity of the project.

c Surface water

An addendum to the surface water assessment has been prepared by HEC to account for the amendments to the mine development (Appendix G). Water management infrastructure has been sized to meet the mine development water demand requirements, with the capacity to store all surplus water generated by the mine development without the need to release operational water to the Belubula River. The overarching objective of the water management system is to control the volume of poor quality water generated by the mine development by reuse and by limiting and avoiding the contamination of clean water.

The mine development will use excess water from mining and power generation operations in the Lithgow area as its primary raw water supply, enabling a beneficial use of otherwise excess water. This also means that the reliance on other local sources of water, such as bores and other surface water sources is reduced, thereby minimising impacts on other local agricultural water users.

[1] Based on the existing understanding of the Belubula River (HEC 2020, EMM 2020), this is a minor change and not expected to be measurable.

A temporary reduction in the median annual inflow to Carcoar Dam (approximately 4% or 186 ML/year) will occur as a result of the construction and operation of the mine development. This percentage reduction is consistent with the EIS findings. Permanently, following mine closure and rehabilitation, the reduction in median annual flows will be much smaller (approximately 0.5% or 21 ML/year). These levels of change are expected to be imperceptible in comparison with the natural variability in catchment conditions. A detailed discussion on the predicted changes to streamflow is provided in Section 6.4.1(iv).

d Land and soil capability

The change in land use across the majority of the amended mine development project area will be temporary.

At the cessation of mining, this land will be rehabilitated, and the pre-mining agricultural land-use will be restored across the majority of the amended mine development project area. Of the approximately 1,116 ha to be disturbed by the mine, around 64 ha (or 6%) will be permanently removed from agricultural production associated with the final void.

The changes in LSC class from pre-mining to post mining for the amended project are described in detail in Table 6.1 in Section 6.2.

e Agriculture production values

The main impacts of the mine development on agricultural resources include the removal of grazing livestock from disturbed land during the life of the mine and the reduced carrying capacity of some land after the mine development project area is rehabilitated (ie due to the predicted change in LSC class).

As described above, the amended mine development will disturb a maximum area of approximately 1,116 ha, which will temporarily be removed from agricultural use. The uses to which this land will be put during mine operation are depicted in Figure 2.1 (amended mine site layout). The disturbance footprint accounts for less than 1% of the 132,592 ha used for agriculture in the Blayney LGA. More than half of the 2,514 ha amended mine development project area, comprising 1,398 ha, will remain undisturbed by the mine development during operations, with the majority of this land continuing to be used for current agricultural (grazing) purposes. In many cases this land will be leased back to the original owner/lessee and as a result agricultural practices should remain unchanged.

Conservatively, it has been assumed that all land within the amended disturbance footprint will have zero agricultural production during the life of the mine. The amended mine development is anticipated to result in a reduction in carrying capacity of approximately 8,962 dry sheep equivalent (DSE) (Section 4.1.1 of Appendix F).

To estimate the loss in value of agricultural production from this reduction in carrying capacity, the gross margin for the predominant livestock enterprise (inland store weaners) was taken from the inland store weaner gross margins compiled by DPI Agriculture (2019). The inland store weaner budgets give a gross value of production of $40.36/dse and gross margin of $32.45/dse. The reduction in carrying capacity and the gross value of agricultural production as a result of the amended project, and compared to the EIS, is provided in Table 6.3.

Table 6.3 Reduction in agricultural production over the life of the project

Disturbance footprint	Reduction in carrying capacity during life of project (dse/year)	Reduction in gross value of agricultural production during life of project ($/year)	Reduction in carrying capacity post mining (dse/year)	Reduction in gross value of agricultural production post mining ($/year)
EIS	10,064	$406,193	2,362	$95,373
Amended project	8,962	$361,706	2,728	$110,114

The reduction in the gross value of agricultural production during mining is less than 1% of the $42.7M gross value of agriculture production in Blayney LGA in 2015/16. The post-mining, gross value reduction of $110,114 equates to 0.3% of the $42.7M gross value of agriculture production in Blayney LGA in 2015/16.

f Local and regional employment

The description of the mine development's potential impacts on local and regional employment has not changed as a result of the amendments to the project. It is difficult to predict how many people currently working in other industry sectors in the Blayney LGA and broader region will move to new occupations in the mining and resource sector as a result of the project. The impact of the project on local labour supply will be influenced by the potential demand for local hires and the number of flow-on jobs generated in the Blayney LGA by the project.

To ensure that potential adverse impacts on labour supply in the non-mining sector are minimised, Regis will monitor local labour supply and adjust local labour recruitment practices and rates accordingly.

As discussed in Section 20.6 of the EIS and Section 6.15 of this report, a number of social impact management frameworks will be developed for the project, including a workforce accommodation and management framework, which will be developed to mitigate and manage the impact of the project workforce on the Blayney LGA.

g Other agricultural enterprises in the area

The description of agricultural enterprises in the vicinity of the mine development project area and potential impacts on these agricultural uses has not changed as a result of the amended project (Section 8.3.6 of the EIS).

In response to submissions received during the public exhibition of the EIS and ongoing stakeholder engagement, Regis engaged Environmental Risk Sciences Pty Ltd (enRiskS) to undertake a further review of the mine development's potential to impact on bees and the local honey industry. The report produced by enRiskS is attached as Appendix D of the Submissions Report and includes consideration of the potential impacts on bees from:

- dust blown from the mine development project area directly onto plants that bees visit (as well as indirectly when bees drink water that may be impacted by dust from the mine); and
- exposure to water within the TSF and other mine affected water sources.

The assessment concludes that adverse impacts to bees as a result of exposure to metals in dust or via water in the TSF are not anticipated given that:

- concentrations of metals in soils due to the deposition of dust from the mine development are predicted to be below soil quality guidelines that are protective for soil organisms that live in or on the soil for their entire lifecycles;
- concentrations of metals in water due to deposition of dust from the mine development are estimated to be below water quality guidelines that are protective for aquatic organisms that live in the affected water for their entire lifecycles;
- concentrations of metals that may mix with nectar or pollen in plants surrounding the mine development are estimated to be below concentrations that might indicate effects on the survival or health of bees;
- concentrations of metals or cyanide that may be present in water in the TSF are estimated to be below concentrations that might indicate effects on the survival or health of bees; and
- concentrations of metals that could be present in honey are within or below general levels reported for honey worldwide.

iv Mitigation and management

Mitigation measures committed to in the EIS AIS remain applicable to the amended mine development and continue to be consistent with best practice measures wherever practicable. A comprehensive suite of management plans will be prepared and implemented for the mine development. These management plans will be prepared in consultation with relevant government agencies and other stakeholders. These management plans will include monitoring and, where appropriate, establishment of triggers and appropriate responses. In addition, rehabilitation criteria will be used as the basis for assessing when rehabilitation of the mine development is complete, and post-mining land uses have been successfully re-established.

The proposed groundwater monitoring approach is discussed in Section 6.4.1(vi) and Appendix H. Groundwater monitoring (including levels and quality) has been conducted since May 2014, with more frequent monitoring occurring from December 2016. Groundwater monitoring data will continue to be collected throughout the life of the mine. The monitoring program will provide an early indication of potential impacts to sensitive receptors, including existing groundwater users (as well as groundwater dependent ecosystems and the Belubula River).

Mitigation measures have been proposed to manage potential impacts on surface water quality downstream of the mine during construction and operations. A detailed monitoring program has been developed comprising baseline monitoring, operational monitoring and post closure monitoring. The water quality monitoring program for the mine development project area will be continued through the operational phase with additional streamflow, channel stability, water quality, erosion and sediment control, water inventory and water use, sourcing and pumping monitoring proposed.

The performance of the water management system will be reviewed annually using the monitored data in combination with the site water balance model to identify changes in the system and compare against predictions. In the event of unforeseen impacts or impacts in excess of those predicted, contingency measures have been proposed (Section 6.4.1(vi)).

6.3.2 Pipeline development

i Introduction

An AIS was not prepared for the pipeline development as part of the EIS; however, the potential for the pipeline development to impact agricultural resources was considered and discussed in Chapter 23 (soil and land resources), Chapter 24 (water resources), Chapter 33 (social impacts) and Chapter 35 (rehabilitation and closure) of the EIS.

As part of the preparation of this Amendment Report and in response to feedback from NSW DPI Agriculture, EMM has prepared an AIS for the pipeline development (Pipeline Development AIS), which is included in full in Appendix V. The Pipeline Development AIS supersedes the information presented in the EIS and considers the potential agricultural impacts associated with the amended pipeline development.

The key changes to the pipeline development presented in the EIS that have implications for agricultural resources are the amendments to the pipeline alignment and relocation of pumping station facility No. 3. These amendments change the amount of land to be temporarily removed from agriculture as a result of the pipeline development.

ii Existing environment

a Biophysical strategic agricultural land

The pipeline development passes through approximately 4.5 ha of land mapped as BSAL. A site verification certificate or gateway certificate is not required because the pipeline development is wholly outside of the proposed mining lease application area for the mine development.

b Soil and land capability assessment

LSC classes mapped within the pipeline corridor are listed in Table 6.4.

Table 6.4 Land and soil capability class – Pipeline development

Land and soil capability class	Capability	Area (ha) – Northern option	Area (ha) – southern option
Land with a wide range of uses (cropping, grazing, horticulture, nature conservation)			
1	Extremely high	0	0
2	Very high	6.17	6.17
3	High	20.11	20.11
Land with a variety of uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)			
4	Moderate	25.07	25.07
5	Moderate-low	140.82	122.06
Land with a limited range of uses (grazing, forestry and nature conservation			
6	Low	5.74	5.74
Land generally unable to support agriculture (selective forestry and nature conservation)			
7	Very low	4.55	4.19
8	Extremely low	2.48	2.48

1. 8.2 ha of both the northern and southern options is mapped as LSC Class 98 (rock or disturbed terrain).

c Agricultural enterprises

The pipeline corridor traverses land within the Blayney, Bathurst and Lithgow LGAs. Each of these LGAs form part of the Central West region of NSW, which covers a total area of 7 million hectares. Of this, approximately 81% or 5.7 million ha is considered agricultural land with the most common land use being grazing on modified pastures, which occupies 3.8 million ha or 54% of the region (DAWE 2020).

Land uses within the pipeline corridor are summarised in Table 6.5.

Table 6.5 Land uses – pipeline development

Land use	Area (ha) – inclusive of the northern option	Area (ha) – inclusive of the southern option
1.3.0 Other minimal use	5.69	5.69
2.1.0 Grazing native vegetation*	59.98	41.58
2.2.0 Production native forestry	47.17	47.17
3.1.0 Plantation forests	0.04	0.04
3.2.0 Grazing modified pastures*	25.70	41.30
3.3.0 Cropping*	19.93	20.58
3.4.0 Perennial horticulture*	0.05	0.05
4.2.0 Grazing irrigated modified pastures*	0.13	0.13

Table 6.5 Land uses – pipeline development

Land use	Area (ha) – inclusive of the northern option	Area (ha) – inclusive of the southern option
5.2.0 Intensive animal production*	2.59	2.59
5.4.0 Residential and farm infrastructure*	0.90	0.89
5.5.0 Services	1.81	1.81
5.6.0 Utilities	1.63	1.63
5.7.0 Transport and communication	36.81	20.29
5.8.0 Mining	7.67	7.67
6.3.0 River	2.70	2.25
6.5.0 Marsh/wetland	0.35	0.35

2. Source: DPIE 2017, *NSW Land Use* 2017.
3. Land use classifications are consistent with the Australian Land Use and Management Classification.
4. *Considered to be an agricultural land use for the purposes of the Pipeline Development AIS.

As shown in Table 6.5, the majority of the pipeline corridor traverses cleared agricultural land, consisting of mostly cleared open paddocks utilised for cattle grazing and cropping. The highest value agricultural land is found around the Macquarie River and Queen Charlottes Creek.

iii Impact assessment

a Land to be removed from agriculture

Based on the land use data presented in Table 6.5, if it is conservatively assumed that the pipeline development will result in the direct disturbance of all agricultural land within the pipeline corridor, the pipeline development will temporarily remove up to 109.3 ha (northern option) or 107.1 ha (southern option) from agriculture.

At the completion of construction, all agricultural land (except for the pumping station facilities) will be rehabilitated to achieve the pre-disturbance LSC class, where possible, so that the land can be returned to agricultural use. Grassland areas will be rehabilitated so that they can continue to support grazing activities.

It is anticipated that the pipeline will remain in the ground at the end of mining operations. However, there may be an opportunity for the pipeline infrastructure to continue to provide future public benefit by enhancing water security and supply to the region, subject to obtaining the necessary approvals. If the pipeline is removed, it is assumed that the post-construction rehabilitation process would be repeated to rehabilitate land to its pre-existing condition. All above ground components of the pipeline development will be removed, if after a reasonable time period, no additional users for the water or pipeline are identified.

If the above ground components of the pipeline development are not removed (ie an additional user for the water or pipeline is identified), land that will not be returned to agriculture will be limited to:

- 0.56 ha of LSC Class 4 land (ie pumping station facility No. 1); however, it is acknowledged that the majority of this land is not currently used for agriculture and is associated with mining activities at Angus Place; and
- 0.73 ha of LSC Class 5 land (ie pumping station facility No. 3 and 4).

Pumping station facility No. 2 is on land mapped as rock or disturbed terrain and is not suitable for agricultural production.

Final rehabilitation and closure requirements will ultimately be developed as part of a detailed closure plan, which will be produced within five years of closure in consideration of input from key government agencies and relevant stakeholders at the time.

b Land and soil capability

With the exception of the pumping station facilities and possibly some access tracks, no permanent changes to LSC classes throughout the pipeline corridor are anticipated. Pumping station facilities will occupy a total maximum area of approximately 1.86 ha, of which less than 1.29 ha is suitable for agriculture.

The change in LSC classes along the pipeline corridor will therefore be negligible.

c Property and land use

The focus of the pipeline corridor selection process has been the minimisation of social and environmental effects (including minimising impacts on agricultural production activities). The alignment of the pipeline corridor was selected to minimise disruption to land uses, which included aligning with some existing easements and the use of existing roads and forestry tracks. Discussions have been held with landowners and changes made to the alignment (where possible) based on their preferences (eg to reduce impacts to existing irrigation infrastructure). The pumping station facilities have also been sited to minimise impacts on adjacent or nearby residential properties.

A number of concerns were raised during the consultation process with affected landholders about the potential for the pipeline development to disrupt agricultural operations. These concerns are discussed in Section 5.1.1 of Appendix V along with a description of how these potential issues will be appropriately managed.

d Water resources

Watercourses

The key risks to watercourses from the construction of the pipeline are associated with downstream knickpoints (longitudinally migrating bed level) and wide floodplains (laterally migrating channel position). These risks will be managed through further geotechnical assessment to assist with the selection of the most appropriate construction method or mitigation measures.

As per the EIS, the Macquarie River and Queen Charlottes Creek will be underbored to mitigate potential geomorphic impacts. The construction of the pipeline is expected to have negligible impacts on water flows due to the immediate backfill and rehabilitation of disturbed areas once the pipeline is laid.

Groundwater

Construction activities are not expected to interfere with groundwater resources or quality as trenching will typically be relatively shallow (1.3 m–2 m) compared to the likely depth of the watertable (generally greater than 10 metres below ground level (m bgl). It is therefore considered unlikely that pipeline construction works will intercept groundwater aquifers or their flow systems. The exception to this is the quaternary sandy alluvium associated with major river and creek crossings. The alluvium is unconsolidated and relatively thin (less than 15 m thick) but groundwater levels can be high with watertables generally 1.5–3 m bgl. Consequently, underboring of the pipeline is proposed at the Macquarie River and Queen Charlottes Creek to allow the pipeline to be specifically positioned at the base of the alluvium or into the weathered rock profile so as to not affect groundwater flows or water quality.

No impacts on groundwater availability or quality at private bores are anticipated and therefore the pipeline development is unlikely to impact agricultural groundwater use in the vicinity of the pipeline development.

Operations

During commissioning, the pipeline will be pressure tested and monitored for any leaks. To minimise the risk of uncontrolled discharge to the environment only high-quality water will be used for pressure testing. Emptying of the pipeline will occur at scour valves at intermediate low points along the alignment. Water will be removed via tanker trucks and taken to an appropriate storage location within the pipeline corridor or to the mine development project area.

Periodic monitoring of water quality is proposed along the pipeline corridor at permanent stream crossings, which will be outlined in the WMP for the project. During operation, isolation or section valves will isolate the pipeline into discrete sections and allow individual sections to be dewatered for maintenance, or to provide security in an event such as a pipeline leak. Isolation valves will be installed on either side of major watercourse crossings.

Periodic inspections and leak detection monitoring will be part of ongoing operations and maintenance procedures.

Water transfer

The impacts of the works associated with the transfer of water from SCSO and Angus Place will be investigated in detail by Centennial in the required environmental assessments that will accompany those development applications. Nonetheless, a broad overview of potential impacts relating to the physical works required are presented in Appendix W.

Based on this investigation, the supply of water to pumping station facilities No. 1 and 2 is not expected to result in significant adverse impacts on local groundwater users, downstream waterways or downstream water users. Further, it is acknowledged that the transfer of water from SCSO to the mine development would have a beneficial impact by removing raw mine water discharges into Wangcol Creek.

e Agriculture production values

Permanent impacts to agricultural resources within the pipeline corridor will be limited and will only occur on land where surface infrastructure, such as pumping station facilities and/or access tracks, is retained.

It is anticipated that any reduction in the gross value of agricultural production within the Blayney, Lithgow and Bathurst LGAs will be negligible.

During operation, usage restrictions will apply to private land within the pipeline easement in order to protect the pipeline infrastructure. Restrictions that may potentially limit the extent of agricultural production activities are likely to include:

- no earthworks, excavation, drilling or related works within the easement area below 300 mm;
- no construction of any buildings or structures over or under the easement area; and
- no planting trees or shrubs within the easement area.

It is anticipated that cropping and grazing (ie the dominant agricultural production activities in the area surrounding the pipeline corridor) will be able to continue within the easement area provided that the area remains accessible to Regis (and/or its contractors) at all times.

These restrictions will be included in the easement agreement entered into between Regis and landowners. Compensation will include consideration of potential impacts on agricultural production during the construction and operation of the pipeline development.

f Local and regional employment

The pipeline development will result in the creation of a number of direct and indirect employment opportunities with a peak construction workforce of approximately 120 people.

As noted in the EIS, the construction of the pipeline development will require a labour force with specialised skills. It is therefore anticipated that the majority of the construction workforce for the pipeline development will be 'non-local' hires. The majority of these non-local hires are anticipated to be sourced from outside the Central West Region and it is therefore considered very unlikely that the pipeline development will have any impact on the labour available for local agricultural enterprises.

During operations, staff from the mine development will be responsible for routine maintenance and inspections and therefore impacts on local and regional employment will be negligible.

g Other agricultural enterprises in the area

Permanent impacts to agricultural resources within the pipeline corridor will be limited and will only occur on land where surface infrastructure, such as pumping station facilities and/or access tracks, is retained.

Any reduction in the gross value of agricultural production within the Blayney, Lithgow and Bathurst LGAs as a result of the pipeline development will be negligible. Further, there are not expected to be any constraints on the current or potential agricultural uses of neighbouring land.

Subsequently, the potential for the pipeline development to adversely affect other agricultural enterprises in the areas (eg agricultural support services and processing and other value-adding industries) is negligible.

iv Mitigation and management

The following mitigation measures will be implemented to minimise potential impacts on agricultural resources during construction and operation of the pipeline development:

- Regis has committed to the development of tailored property management plans for each impacted property and the preparation of a Landholder Communication Plan to ensure adequate notification of the construction phase is provided to all directly affected landowners. As part of the preparation of the property management plans, a representative from Regis will discuss the details of the pipeline development that relate to each property, particularly in relation to where the pipeline is proposed to be placed. A signpost will be placed at intervals of approximately 250 m along the pipeline route to ensure that the property owner can identify its location should it be necessary. As part of this engagement, Regis will also confirm:
  - the current use of the land on each property along the proposed pipeline route;
  - access points and protocols (that is, suitable times for entry and gate locking arrangements);
  - types of grasses and fertilisers that are currently in use (or if the property has organic status) so that pasture rehabilitation can be successfully completed; and
  - known existing infrastructure (eg irrigation, communication, roads, etc).
- A CEMP and Operational Environmental Management Plan (OEMP) will be prepared and implemented and will address the procedures and management of all aspects of land disturbance, soils, erosion and sediment controls, rehabilitation, flooding, waste, weeds and pathogens, dust, construction noise and traffic. The CEMP and OEMP will be made available to individual landholders upon request and will also provide details of the formal complaints procedure.

- A Construction Traffic Management Plan (CTMP) will be prepared prior to construction of the pipeline as part of the CEMP. The CTMP will identify management strategies to be adopted during the pipeline construction to effectively manage traffic during construction so as to avoid impacts on the road network.

- To avoid impacts to surface water quality, erosion and sediment controls will be installed and maintained prior to the start of the construction activities in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) to protect local watercourses from impacts relating to erosion and the resulting sedimentation.

Further detail of mitigation measures to manage the pipeline development's impacts on biosecurity, erosion and sedimentation, air quality, noise and vibration, visual amenity and rehabilitation are provided in Chapter 6 of Appendix V.

The rehabilitation and closure strategy for the pipeline development is to ultimately create safe, stable and non-polluting landforms that are consistent with agreed post development land uses. Regis will ensure land disturbed by the pipeline is rehabilitated to an appropriate standard and representative of surrounding vegetation communities (including pasture) and is compatible with pre-disturbance and surrounding land uses. Rehabilitation will occur progressively and as soon as practical following completion of pipeline construction.

Notably, in addition to the property management plans mentioned above, Regis will also prepare a tailored rehabilitation management plan for each individual property in consultation with the landholder. These plans will set out the rehabilitation objectives and commitments for each property. An example of a rehabilitation management plan is provided in Appendix B of the Pipeline Development AIS (refer to Appendix V of this report).

Agricultural post-disturbance land use will be able to be re-established relatively quickly, although the full capability may not be realised until one to two years post disturbance, to allow pasture species to go through a number of growing cycles and for soil microbiology to re-establish.

6.3.3 Conclusion

There is no BSAL in the MLA area or amended disturbance footprint of the mine development. The amended project will result in a reduction in LSC classes 4 and 5 by 3 ha and 411 ha, respectively, and an increase in LSC classes 6, 7 and 8 by 323 ha, 25 ha and 66 ha, respectively.

While some reduction in LSC class will occur, disturbed areas within the amended mine development project area will be rehabilitated and returned to an agricultural land use, with the exception of the final void. Impacts to agricultural land within the project area will therefore predominantly be temporary and minor.

As a result of the removal of land from agricultural production, the amended mine development is estimated to contribute to a decline in the gross value of agricultural production of approximately \$361,706/year during the life of the mine and \$110,114/year following rehabilitation (compared to the estimate for the EIS design of a reduction of \$406,193/year during the mine life and \$95,373/year upon rehabilitation). For the amended mine development, this equates to approximately 0.9% and 0.3%, respectively, of the total annual income from agricultural production within the Blayney LGA.

All mitigated risks on agricultural resources as a result of the mine development were assessed as low.

Impacts of the underground pipeline construction on agricultural will primarily be temporary. The pipeline will take approximately 9-12 months to construct, and land will be rehabilitated progressively as construction moves along the pipeline corridor.

The pipeline will have minimal surface infrastructure; limited to four pumping station facilities. With the exception of these pumping station facilities and access tracks, no permanent changes to LSC classes throughout the amended pipeline corridor are anticipated. The change in LSC classes along the pipeline corridor will be negligible.

No permanent impacts to agricultural resources within the pipeline corridor are anticipated and any reduction in the gross value of agricultural production within the Blayney, Lithgow and Bathurst LGAs as a result of the pipeline development will also be negligible.

A suite of mitigation measures will be implemented to minimise potential impacts on agricultural resources during the construction and operation of the pipeline development. Pipeline easement deeds have been issued to all landholders along the pipeline route, and the development of tailored property management plans and rehabilitation management plans for each landholder will ensure adequate communication with landholders is undertaken, and that appropriate, tailored rehabilitation outcomes are agreed to, and implemented, along the pipeline route.

6.4 Water resources

6.4.1 Mine development

i Introduction

The project does not actively seek to directly intercept any surface water from the Belubula River or tributaries during operation. The need to intercept water to meet the majority of construction and all of the operational water demands has been avoided by the inclusion of the pipeline development in the project. The pipeline development, described will supply otherwise surplus water from mining operations and Mount Piper Power Station near Lithgow, enabling a beneficial re-use of this water.

The majority, if not all, of the water supply for these first nine months of construction will be sourced from existing groundwater bores (see Section 2.9.1(i), after which it will be supplied via the pipeline development.

The construction and operation of the mine development will result in diversions and incidental harvesting of rainfall runoff for environmental management of water that falls within the operational mine area. The proposed water management system seeks to maximise the construction of clean water diversions to actively divert the majority of clean water runoff around the mining area.

However, runoff within the active mining area cannot avoid being intercepted and will be retained, managed and recycled to ensure that the water quality of the greater catchment is not impacted. It is important to note that the impacts of the inadvertent take of water has been found to be minor and within the natural variability in catchment conditions, as described in detail below.

An addendum to the groundwater assessment (groundwater assessment addendum) (EMM 2020e) has been prepared to assess the groundwater impacts of the amended mine development. The assessment presented is consistent with the approach of the original groundwater assessment for the mine development (included as Appendix K of the EIS, referred to herein as the EIS groundwater assessment) and is provided in full in Appendix H.

A construction water supply groundwater Investigation and impact assessment (construction water supply assessment) (Appendix D of Appendix H) has also been prepared as part of the groundwater assessment addendum. The investigation comprised the drilling and hydraulic testing of two test bores and four monitoring bores and demonstrates that groundwater can be used to meet the construction water demand for the mine development prior to commissioning of the pipeline development.

A revised surface water assessment (HEC 2020) has also been prepared to assess the surface water impacts of the amended mine development. The revised assessment supersedes the findings of the original surface water assessment for the mine development (included as Appendix J of the EIS, referred to herein as the EIS surface water assessment) and is provided in full in Appendix G.

The key changes from the mine development presented in the EIS that have implications for surface water and groundwater resources include:

- revisions of the mine, waste rock emplacement and tailings placement schedules; and
- revisions of the mine water management system, including:
  - relocation of the north-eastern perimeter embankments of the TSF to the south-east, reducing the footprint of the TSF;
  - removal of the Secondary WMF from the north-western margin of the mine development project area;

- a slight reduction in the eastern extent of the waste rock emplacement, resulting in alterations to the clean and operational water systems; and
- revision of the operational WMFs.

The revised surface water assessment and groundwater assessment addendum have been prepared following the appropriate guidelines, policies and industry requirements and consultation with regulatory and community stakeholders, including:

- NSW AIP (DPI Water 2012);
- relevant WSPs;
- *Australian Groundwater Modelling Guidelines* (Barnett et al 2012);
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Livestock Drinking Water* (ANZECC & ARMCANZ 2000);
- *Australian Drinking Water Guidelines* (NHMRC 2016);
- Floodplain Development Manual – the management of flood liable land (Department of Infrastructure, Planning and Natural Resources 2005);
- *Guidelines for Controlled Activities on Waterfront Land* (Natural Resources Access Regulator 2018);
- Floodplain Development Manual (New South Wales Government 2005); and
- Managing Stormwater: Source Control (EPA 1998).

ii Existing environment

The existing hydrological and hydrogeological environments and baseline conditions within the mine development and surrounding area as described in Section 9.2 of the EIS remain applicable to the amended project.

a Groundwater

The mine development project area is within the Lachlan Fold Belt Murray Daring Basin (MDB) Groundwater Source. Groundwater in this source is managed by the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*.

The climate and water resources within the mine development project area and surrounds are described in Chapter 2 of the groundwater assessment addendum (Appendix H). An update on the existing groundwater and surface water environment within the mine development project area and surrounds (including outcomes of groundwater monitoring since submission of the EIS) is also provided in Chapter 3 of the groundwater assessment addendum (Appendix H).

The watertable is typically hosted in the saprock (weathered bedrock) or alluvium (where present) and is locally a subdued reflection of topography, with depth to groundwater typically 10–15 m below the ground surface.

The project-specific groundwater monitoring network has 27 monitoring points, distributed across 18 locations (Figure 3.5 of Appendix H). Since the public exhibition of the EIS, Regis has drilled and installed an additional test bore (TB05) and four monitoring bores. These bores were drilled and constructed as part of the groundwater drilling program conducted for the construction water supply assessment. In addition to project-specific monitoring bores, groundwater monitoring is also conducted at existing bores on Regis-owned land and some neighbouring landholder bores.

Groundwater use within the mine development project area and surrounds is currently limited to stock and domestic supplies. Groundwater quality is fresh to brackish and varies depending on the geology. Groundwater in the Anson Formation has the highest salinity (up to 4,250 mg/L total dissolved solids (TDS)). Groundwater pH generally varies from slightly acidic to slightly alkaline; however, some pH measurements from monitoring bores have been as low as 2.2 (in the Anson Formation).

Groundwater chemistry laboratory data are compared against the Australian and New Zealand (ANZG 2018 and ANZECC 2000) Guidelines that are relevant to the protection of freshwater aquatic ecosystems, irrigation and stock drinking water. Laboratory-reported water quality indicates that groundwater is generally suitable for livestock watering, except for salinity and pH at some locations. Dissolved metals are naturally high at some locations, including: copper; aluminium; cadmium; manganese; nickel; fluoride; zinc; and, in some bores within the volcanics, arsenic was also reported above the livestock drinking water guideline value (ANZECC 2000).

The available water quality monitoring data results suggest that the default guideline values (ANZECC 2000) are not representative of the baseline conditions in the mine development project area and site-specific water quality objectives (WQOs) and triggers will be developed prior to project commencement using all available baseline data (as part of the WMP for the mine development following approval).

Groundwater receptors presented in Section 9.2.5 of the EIS remain relevant to the amended project and include:

- bores on neighbouring properties (ie third-party bores);
- groundwater dependent ecosystems (GDEs), including:
  - the Belubula River (aquatic ecosystem);
  - springs and seeps in the mine development project area; and
  - PCT 951 (Mountain Gum – Manna Gum open forest), PCT 1330 (Yellow Box – Blakely's Red Gum grassy woodland on the tablelands) and PCT 766 (Carex sedgeland of the slopes and tablelands) (terrestrial ecosystems); and
- macroinvertebrate fauna identified at two spring/seep areas.

b Surface water

The mine development project area is in the upper reaches of the Belubula River catchment, within the greater Lachlan River catchment. The Belubula River has its headwaters immediately north-east of the mine development project area and flows to the south-west into Carcoar Dam (approximately 26 km from the mine development project area). The mine development project area is within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012*. The existing surface water environment is described in detail in Chapter 2 of the revised surface water assessment (Appendix G).

The existing surface water monitoring network for the mine development project area comprises a weather station, as well as rainfall, streamflow and water quality monitoring (Section 2.7 of Appendix G). Since the public exhibition of the EIS, Regis has installed a gauging station (Belubula River Downstream on Figure 5 of Appendix G) and three automatic rainfall stations. Data from the surface water monitoring network has been considered as part of the revised surface water assessment.

Surface water quality within the vicinity of the mine development project area has been compared against the Australian and New Zealand (ANZG 2018 and ANZECC 2000) Guidelines that are relevant to the protection of freshwater aquatic ecosystems. Surface water quality ranges from slightly acidic to alkaline. Electrical conductivity (EC) data (either recorded directly or converted from TDS) also exceeded the default guideline value in a high proportion of samples at all sites, although salinity may be characterised as fresh at all sites based on the recorded EC values (less than approximately 2,300 µS/cm). Baseline water quality data suggests that contemporary ANZECC (2000) default guideline trigger values are not representative of the background conditions in the mine development project area.

c Harvestable Rights

Pursuant to section 53 of the WM Act, incidental take of runoff can be accounted for by way of Harvestable Right entitlement. Harvestable Rights in NSW allow rural landholders to build dams on minor streams and capture rainfall runoff without the need for a licence or certain approvals under the WM Act. As the mine development is within the Eastern and Central Division of NSW, the applicable Harvestable Rights Order (31 March 2006) confers an entitlement to 10% of the average regional rain water runoff on the relevant land by means of dams located on "minor streams" which are within the total dam capacity calculated in accordance with Schedule 1 of the Harvestable Rights Order.

The Harvestable Right of the landholdings held by Regis has been calculated by HEC (2020) in the revised surface water assessment (Appendix G). The total current and proposed landholding area of Regis property associated with the mine project area is 2,908 hectares (ha), and the average annual rainfall runoff from the NSW Government 'harvestable rights calculator' for the Regis property is 0.075 ML/ha per year. A small proportion of the landholding area lies within *the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012* zone, while the majority of the property area lies within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012* zone. The portion of landholding in the Macquarie Bogan catchment is limited to the very top of the catchment and has been calculated separately due to being different water sources. Using the online maximum harvestable right calculator (WaterNSW 2019) for each landholding area, the MHRDC was assessed as shown in Table 6.6.

The total harvestable right based on Regis' landholding area (current and proposed) is 218 ML. After accounting for existing harvestable right farm dams, the remaining harvestable right capacity equates to 139.3 ML. The mine disturbance area is located solely within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012* zone. As such, the remaining harvestable right capacity within this area equates to 129.8 ML (refer Appendix G).

Table 6.6 Summary of harvestable right calculations

Water Sharing Plan	Total landholding area – current and proposed (ha)	Harvestable Right (ML) [1]	Volume of existing dams within MHRDC (ML)	Remaining volume of Harvestable Right (ML)
Water Sharing Plan for Macquarie Unregulated and Alluvial Water Sources 2012	148	11	1.5	9.5
Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012	2,760	207	77.2	129.8
Total	**2,908**	**218**	**78.7**	**139.3**

Note: 1: based on 0.075 ML/ha per year
MHDRC = Maximum Harvestable Rights Dam Capacity

d Surface water-groundwater interactions

As part of the preparation of the Submissions Report (EMM 2020a) and this Amendment Report, EMM prepared a surface water-groundwater interaction assessment (EMM 2020f) contained as Appendix C of the Submissions Report. The assessment:

- provides an update and additional detail to the information presented in the EIS on the local hydrogeological and hydrological environment, including additional water monitoring data, which adds to the conceptual understanding of the water environment within the mine development project area and surrounds;
- describes the interaction between the Belubula River (and its tributaries) and groundwater within the mine development project area and surrounds;
- describes and categorises the springs typically observed in the mine development project area; and
- discusses the potential changes to the interaction between surface water and groundwater, including springs, within the mine development project area and surrounds as a result of the mine development.

The assessment found that the Belubula River (from the top of the catchment to Blayney) receives water from the following sources (in order of largest contribution to smallest):

1. Runoff from rainfall during and after rainfall events from the local catchment.
2. Direct rainfall on the watercourse.
3. Groundwater discharge (baseflow).

The contribution of groundwater increases with distance down the water catchment. At the top of the catchment, the watercourse is not in connection with groundwater (ie no contribution from groundwater) and along Tributary A and downstream of Tributary E, groundwater is inferred to contribute around 5% of flows in the Belubula River (from immediately adjacent catchment areas).

Downstream of the Mid Western Highway, the contribution from groundwater is inferred to increase to around 20% and will vary with climate conditions and again is from immediately adjacent catchment contributions (ie not from upstream). During drought periods, flow of local groundwater to the Belubula River sustains flows in the watercourse along the length of the river from the Mid Western Highway to Carcoar Dam.

e Conceptual model

The conceptual hydrological and hydrogeological model for the amended project remains largely consistent with the model prepared as part of the EIS groundwater assessment (Figure 9.12 of the EIS). Additional work completed as part of the groundwater assessment addendum and revised surface water assessment has further informed the model as follows:

- Observations during drilling investigations completed for the project have generally found that where fracturing occurs, the fractures generally become clay filled and generally do not act as conduits for groundwater flow. However, there are areas north of the open cut where fracturing has enhanced permeability and reasonable bore yields (2–10 L/s) can be achieved. These areas have been targeted for the development of a construction water supply (Section 6.4.1(iii)(c)).

- Rainfall and runoff are the main contributing sources of water to the Belubula River flows.

- Springs and seeps are present across the mine development project area. Most springs are associated with areas where the topographic gradient changes abruptly and intercepts shallow groundwater flow. Many of these springs and seeps have been excavated into dams to increase water access for stock. Whilst some springs do contribute flow to the Belubula River, a large amount of the discharging groundwater will evaporate, be used by vegetation or for stock and domestic purposes.

iii Methodology

a Water balance

Site water balance

The GoldSim-based water balance has been updated to simulate the management of the amended operational water system over the mine development project life. The model enables assessment of mine development water supply/demand and risks, and informs infrastructure sizing, including assessment of:

- the amended project water balance, showing proportions of inflows and outflows;

- water supply reliability for future demands;

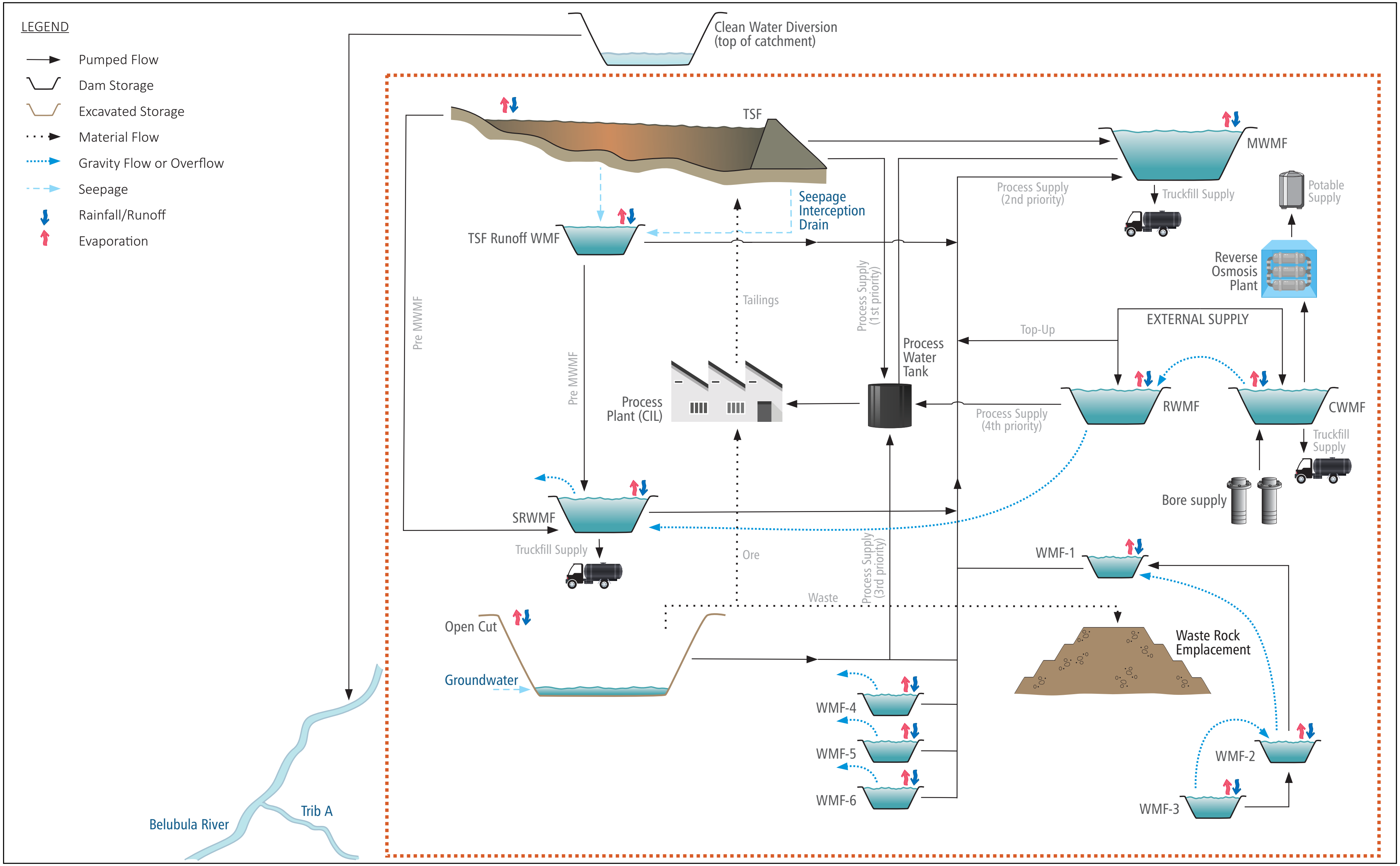
- the risk of disruption to mining as a result of excess water in the open cut;

- the risk of spill from externally spilling dams; and

- the external supply requirement.

A detailed description of the model design, assumptions and assessed scenarios is included in Section 3.2 of Appendix G. A schematic of the site water management system is presented in Figure 6.5.

Model predicted average inflows and outflows (averaged over the 11 year simulation period and all realisations) are shown in Figure 6.6.



Simplified site water management and process diagram

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Amendment Report
Figure 6.5

EMM creating opportunities

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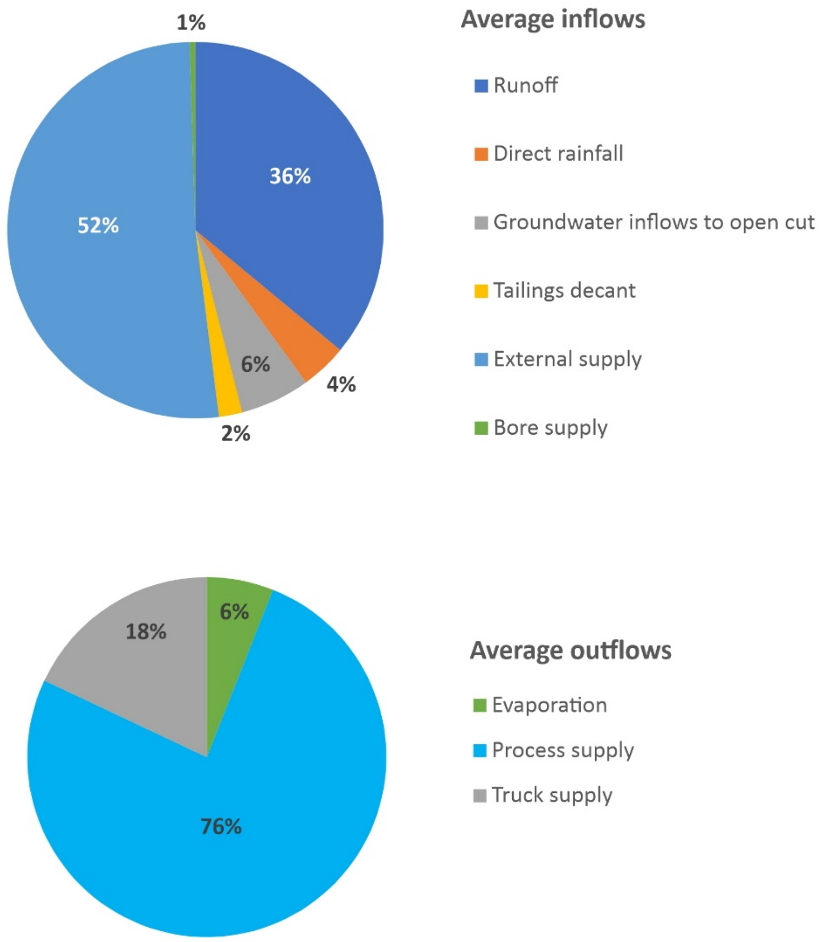


Figure 6.6 Average predicted mine water balance

Final void water balance

Post-mining, all mining areas, except the final void catchment, will be regraded to a stable landform and revegetated. All disturbed areas, except the final void, will be rehabilitated.

A daily timestep, final void water and salt balance model has been developed using GoldSim to assess the final pit lake recovery for the amended project. The model simulates the volume and salinity of the final void water body by simulating the inflows (including rainfall runoff, direct rainfall and predicted groundwater inflow), outflows (evaporation) and resultant volume of water and salt mass.

For the purposes of the model, a catchment area of 107.1 ha was used, comprising 40 ha of rehabilitated sub-catchment and 67.1 ha of remnant open cut pit sub-catchment. The 131 year historical climate record was repeated several times over to generate an extended period of data for the final void simulation.

Section 3.4 of Appendix G provides details regarding the model design, assumptions and results.

b Groundwater flow modelling

The regional groundwater numerical flow model is described in detail in Section 9.4.2 of the EIS and Section 5.3 of the groundwater assessment addendum (Appendix H). The model represents the conceptual hydrogeological understanding and assesses the influence of the mine development on the groundwater system and was developed in accordance with the *Australian Groundwater Modelling Guidelines* (Barnett et al 2012) and aligns with a Class 1, with elements of Class 2, model. The key objectives for the groundwater model are to:

- provide a numerical representation of the conceptual hydrogeological model;
- predict the likely extent and magnitude of groundwater drawdown induced by mine dewatering and related effects post-mining;
- predict changes to availability of groundwater for receptors in the immediate and wider vicinity of the project;
- predict the potential changes to the groundwater flow directions and heads as a result of the TSF during operations and post-mining;
- provide information that can be used to assess the potential impacts of the TSF on groundwater quality; and
- provide outputs to assist with the site wide water balance.

Predictive simulations have been run for the amended 11-year mine plan and for 100 years after mining to aid assessment of the objectives listed above.

Subsequent to submission of the EIS and following consultation with DPIE's technical expert (JBS&G), three additional scenarios were developed for the uncertainty analysis, the results of which demonstrate that the potential impacts have been adequately assessed and the groundwater model is fit for purpose.

Simulation of the TSF

As outlined in the EIS and Appendix H, the simulation of the TSF in the numerical groundwater model is deliberately conservative. The simulation of the TSF in the groundwater model was completed to assess the potential worst case TSF seepage scenario and the purpose is not to provide an accurate estimate of TSF seepage rates. This work was completed by ATCW (2019 and 2020).

As outlined in the EIS, the groundwater model does not simulate the TSF embankment, cut-off key, tailings material or tailings deposition. The simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam. The key difference between a lined water dam and TSF is that a TSF will consist of solid particles (eg ground and broken rock) and fluid, at a water content of around 20-30% and will therefore contain much less water than a water dam, which has 100% water content. The water held within the pore spaces between the tailings particles will drain slowly, driven by changing hydraulic pressures, the size of the tailings particles and pore space between the particles.

c Construction water supply

A groundwater drilling and testing program has been undertaken (Appendix D of Appendix H). At completion of the program, two test bores and four monitoring bores were constructed and tested.

- TPB4 is in the mine development project area and was first drilled in 2018, targeting a localised area of enhanced permeability in the Anson Formation; and
- TB05 is north of the mine development project area and was drilled targeting an area of localised enhanced permeability intercepted by an existing bore (GW704227).

Following construction and development of the test bores and monitoring bores, aquifer tests were conducted at the test bores to allow estimation of aquifer properties which have been used to assess the suitability of the bores to meet construction demand and to assess impacts. The testing comprised step tests and constant rate tests, including groundwater level monitoring at monitoring bores and existing bores in the vicinity of the pumping bore. Analytical modelling has been conducted using the results of the aquifer test analysis to:

- estimate the potential drawdown in the vicinity of the test bores;
- estimate the area of influence (extent of drawdown as defined by the 2 m change in groundwater level) caused by pumping of the test bores; and
- assess the potential impacts of operating the bores for the nine-month construction period of the pipeline development on local receptors.

d Surface water flow assessment

The main potential surface water impact during the operational phase of the amended project is reduced streamflow in the Belubula River and hence inflows to Carcoar Dam due to the reduction in catchment associated with the amended operational water management system.

Changes to streamflow in the Belubula River, and subsequent changes in inflows to Carcoar Dam, during mine development and post closure have been reassessed using a GoldSim water balance model. The rainfall-runoff component of the model was calibrated against available surface water flow data. This component of the assessment remained unchanged from the EIS as no additional river flow data were available. The GoldSim water balance model was run to compare the modelled stored water volume to the recorded stored water volume in Carcoar Dam. As requested by DPIE – Water, there was an emphasis on improving the modelled match during periods of low reservoir volume and recession. The period for this stored water volume calibration was limited by the extent of available dam release data which spanned 1985 to 2020.

Section 4.1.1 of Appendix G includes details regarding the model design and assumptions. The results of the calibration between recorded and modelled stored water volumes in Carcoar Dam confirms that the model is fit for purpose for assessing the potential effects of the project on inflows to Carcoar Dam.

e Water quality assessment

Potential impacts on groundwater quality and surface water quality downstream of the mine development project area include:

- accidental spills of hazardous materials contained on site (ie fuel, reagents, ore stockpiles, tailings);
- spills from the operational water management system containing environmentally significant contaminants;
- un-intercepted runoff from areas requiring erosion and sediment control treatment prior to flowing off-site (ie soil stockpiles);
- seepage from the TSF to the watertable and the Belubula River;
- seepage from the waste rock emplacement (including acid mine drainage (AMD) risk), WMFs or runoff from the ROM pad to the watertable;
- introduction of varying water quality via the pipeline development; and
- production of brine from the on-site reverse osmosis (RO) plant.

Potential impacts to groundwater and surface water quality associated with spills and runoff from erosion and sediment controls will be suitably managed through the implementation of the project-specific management plans and appropriate design controls. Potential impacts to groundwater and surface water quality associated with seepage from the waste rock emplacement, introduction of pipeline water and production of brine were considered as part of the EIS groundwater assessment and EIS surface water assessment and have not been reassessed.

The potential impacts of seepage from the TSF have been reassessed as a result of the amendments to the TSF design.

The risk of spill from the operational water management system has reduced as a result of the amendments to the project. No releases of water from the operational water system are planned as part of the amended project.

f Flooding assessment

The simplified flooding assessment presented in the EIS surface water assessment was updated to account for the amendments to the mine development. Flow calculations for a range of design rainfall events (10%, 1%, 0.5%, 0.2%, 0.1% and Probably Maximum Flood (PMF)) have been remodelled using analytical calculations for a point adjacent to the proposed open cut pit for both the existing case and at maximum mine development disturbance. A cross-section of the Belubula River at this point has been used to estimate peak flood levels for these events, by calculating 'normal' depth of flow for this cross-section.

Section 3.5 of Appendix G provides details regarding the analytical calculations and assumptions.

iv Impact assessment

a Water balance

The site water balance model results for the amended mine development indicate that, on average, imported pipeline supply provides the highest system inflow (52%) of the total inflow followed by runoff from the operational water management system (36%). The majority of outflows comprise process plant supply (76%) followed by truck supply (ie for haul road dust suppression) (18%).

It is anticipated that site storages will provide sufficient storage capacity during the operational phase of the amended mine development. There are no simulated external (off-site) spills from the modelled operational water system storages during the operational life of the amended mine development.

The model predictions indicate a low risk of a haul road dust suppression shortfall in Year 1 prior to the provision of imported pipeline supply. No shortfalls are simulated once the imported pipeline supply has been completed. In the period prior to the imported pipeline supply, water for haul road dust suppression will be sourced from site groundwater bores and additional sources (at an assumed supply rate of 20 L/s).

Model results indicate that, during periods of lower rainfall, the mine development will use up to approximately 3,900 ML/year of imported pipeline supply, which amounts to approximately two thirds of the imported pipeline supply capacity; however, under most circumstances, the external supply pipeline will not need to be utilised to this capacity on an annual basis. Modelling indicates that there is a low risk that mining operations will be significantly impacted by rainfall.

The implications of climate change predictions on water management are unlikely to be significant over the life of the mine development as they are fairly small compared to natural climatic variability and the relatively short duration of the mine development (Section 3.2.4 of Appendix G).

b Groundwater model results

The groundwater assessment addendum presents an additional model scenario that has been developed to assess the amended open cut pit schedule (refer to Chapter 2), with an 11-year mine life and steadier progression of both the open cut and TSF.

Mine inflow

Predicted inflow to the open cut during mining is presented in Figure 6.7 for the amended project, with a comparison to the EIS groundwater assessment base case ("EIS scenario").

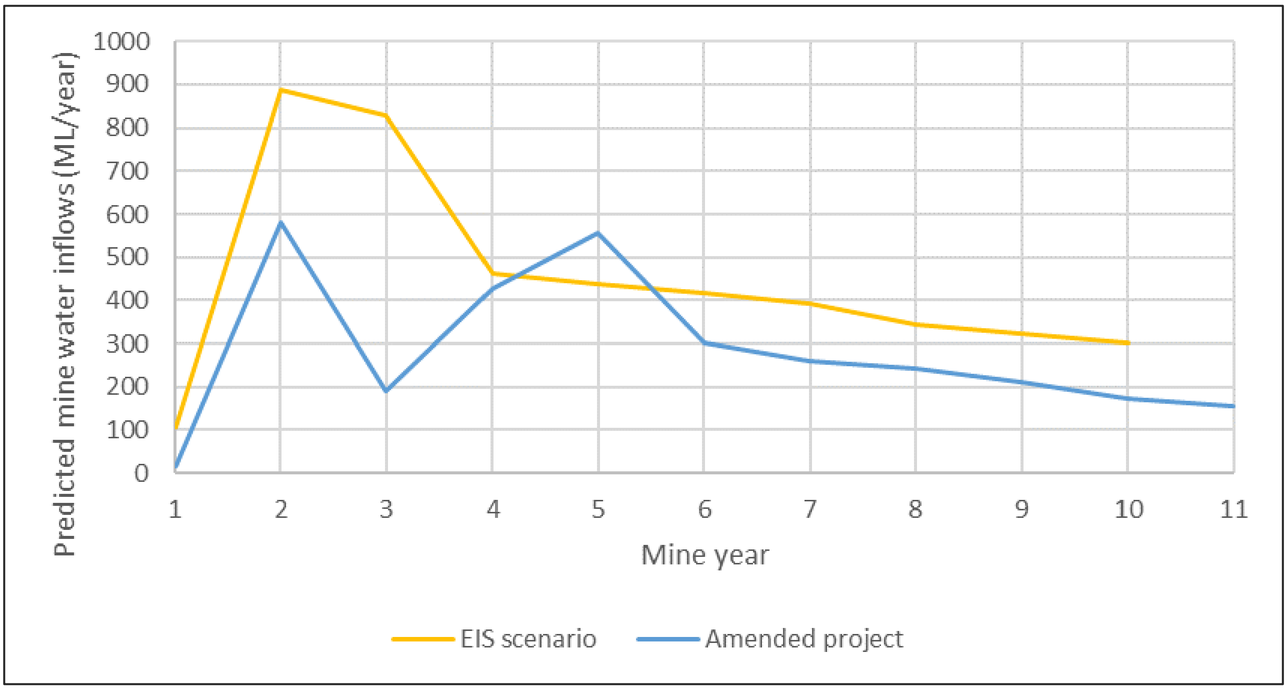


Figure 6.7 Comparison of predicted mine inflows – EIS and amended project

The predicted inflow rate peaks in mining year 2 at 580 ML/year (1,589kL/day), with a second slightly smaller peak in year 5 at 557 ML/year (1,526 kL/day) and declines to 160 ML/year (438 kL/day) in mining year 11. The predicted inflow volumes are driven by the volume of material mined from the simulated saprock layer (model layer 1), which stores and transmits more groundwater than the underlying fresh rock.

The predicted peak inflows for the amended project are lower than the previous simulated mine schedule presented in the EIS due to the steadier development profile scheduled over the first years of the amended project.

The peak mine inflow in the EIS scenario was predicted to occur in mining year 2, which represented the peak mined volume under the earlier mine plan and also simulated removal of more material from model layer 1, which as explained above, is the main driver of the predicted inflow volumes. The amended mine design and schedule has resulted in less volume mined from shallower depths in mine year 2 and 3.

Groundwater levels

The predicted drawdown of the watertable at the end of mining (year 11) and 100 years post-mining is presented in Figure 6.8 and Figure 6.9, respectively, with comparison to the results presented in the EIS. Predicted watertable elevations and groundwater flow direction for the same modelled times are presented in Figure 6.10 and Figure 6.11, respectively. The model predicts:

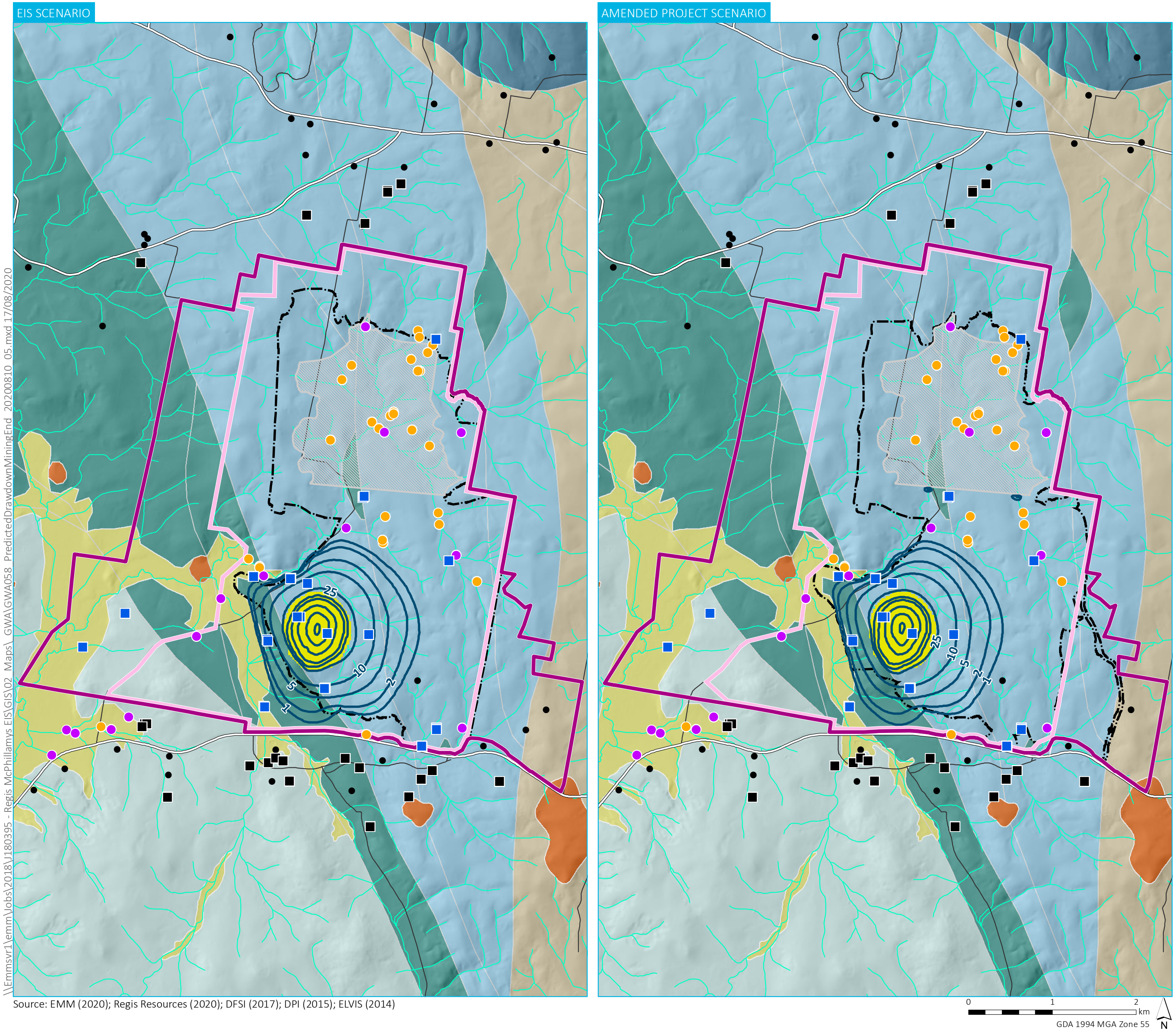
- the extent of watertable drawdown at the end of mining is predicted to be very similar to that predicted in the EIS groundwater assessment (Figure 6.8);

- the extent of drawdown is predicted to be greatest 100 years post-mining, with the 2 m drawdown contour extending approximately 1.4 km to the east of the open cut pit for both the EIS and amended mine development (Figure 6.9);

- modelled watertable contours show minor differences between the EIS and amended mine development;

- the watertable elevation north-east of the mine development is predicted to remain in place during mining and post-mining, confirming that project-related impacts are not predicted to extend north and north-east of the mine development (Figure 6.10 and Figure 6.11); and

- groundwater will continue to discharge to the Belubula River downstream of the mine development project area during mining and post-mining (Figure 6.10 and Figure 6.11).



KEY
- PINEENA/registered bore
- Groundwater monitoring site - Regis
- Groundwater monitoring site - other landholder
- Surface water monitoring site (dam)
- Surface water monitoring site (spring/seep)
- Drawdown (m) (end of mining)

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- TSF Stage 3
- Simulated pit

Existing environment
- Major road
- Minor road
- Watercourse/drainage line

Geology (Bathurst 250k, 2nd Edition)

Quaternary / Tertiary
- Alluvium
- Tertiary basalt

Carboniferous
- Bathurst Batholith - Icely Granite

Devonian
- Ungrouped Devonian Formations - Cunningham Formation

Silurian
- Mumbil Group (Northwest) - Anson Formation

Ordovician
- Cabonne Group - Blayney Volcanics
- Cabonne Group - Oakdale Formation
- Cabonne Group - Byng Volcanics

Source: EMM (2020); Regis Resources (2020); DFSI (2017); DPI (2015); ELVIS (2014)

Predicted watertable drawdown
(end of mining)

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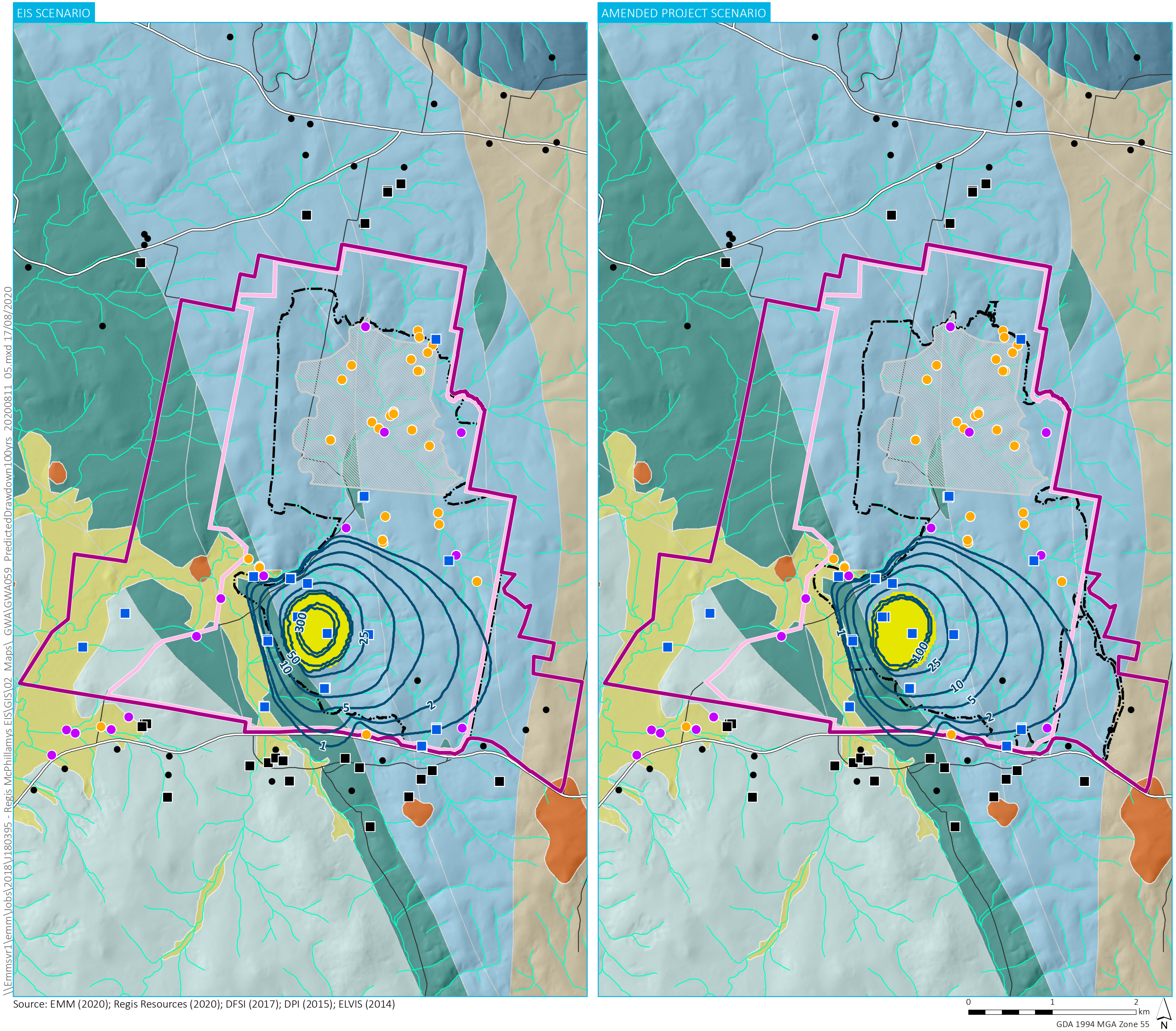
Figure 6.8



KEY

- PINEENA/Registered bore
- Groundwater monitoring site - Regis
- Groundwater monitoring site - other landholder
- Surface water monitoring site (dam)
- Surface water monitoring site (spring/seep)
- Drawdown (m) (100 years after mining)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- TSF Stage 3
- Simulated pit

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

Geology (Bathurst 250k, 2nd Edition)

Quaternary / Tertiary

- Alluvium
- Tertiary basalt

Carboniferous

- Bathurst Batholith - Icely Granite

Devonian

- Ungrouped Devonian Formations - Cunningham Formation

Silurian

- Mumbil Group (Northwest) - Anson Formation

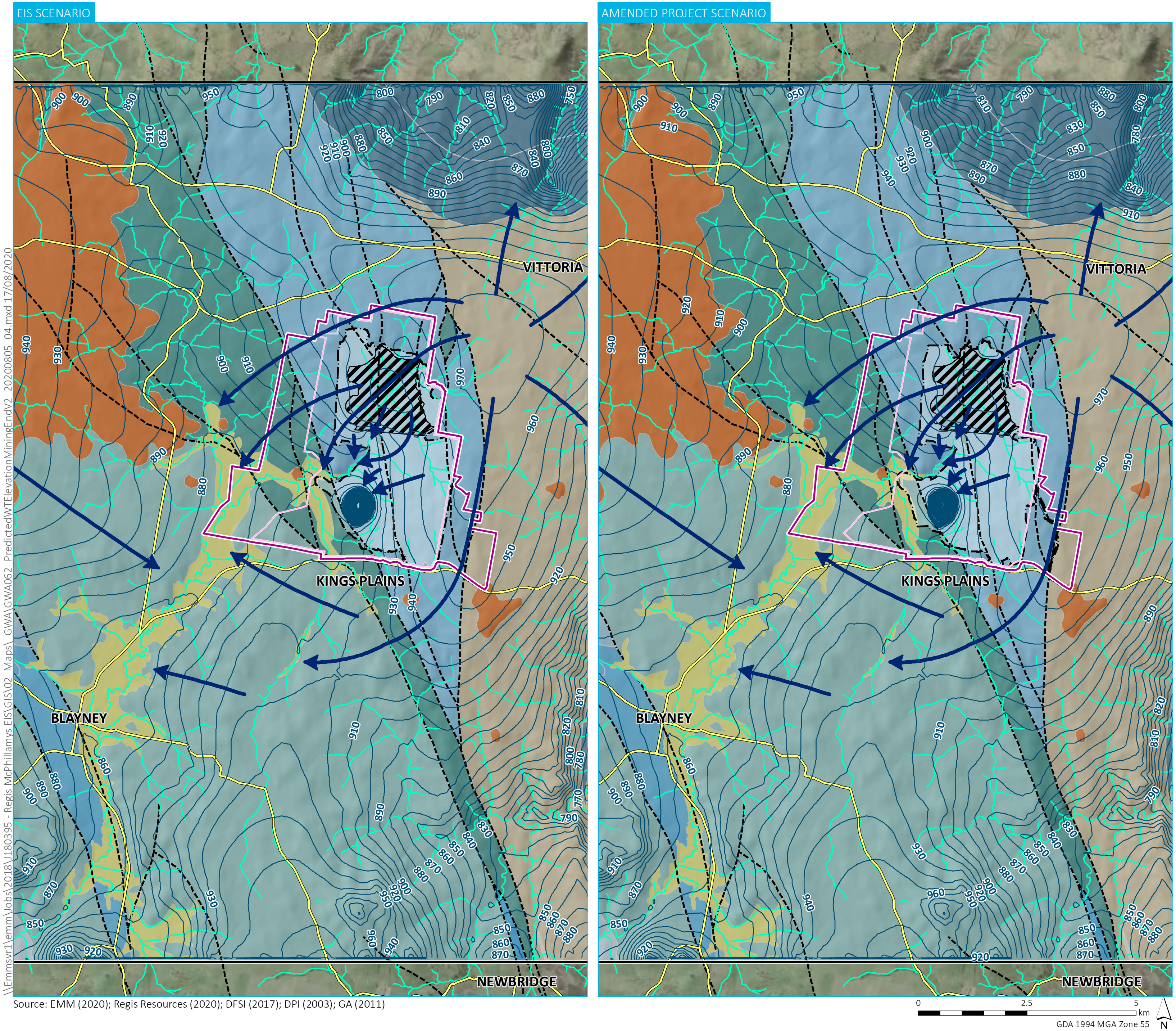
Ordovician

- Cabonne Group - Blayney Volcanics
- Cabonne Group - Oakdale Formation
- Cabonne Group - Byng Volcanics

Source: EMM (2020); Regis Resources (2020); DFSI (2017); DPI (2015); ELVIS (2014)

Predicted watertable drawdown (100 years after mining)

McPhillamys Gold Project
Amendment report
Figure 6.9



Source: EMM (2020); Regis Resources (2020); DFSI (2017); DPI (2003); GA (2011)

KEY

- Model boundary
- Watertable elevation contour (mAHD)
- Groundwater flow direction
- Watercourse/drainage line

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Tailings storage facility

Geology (Bathurst 250k, 2nd Edition)

- Fault

Quaternary / Tertiary

- Alluvium
- Tertiary basalt

Carboniferous

- Bathurst Batholith - Gresham Granite
- Bathurst Batholith - Icely Granite

Devonian

- Other Carboniferous Intrusions
- Ungrouped Devonian Formations - Cunningham Formation

Silurian

- Other Silurian Intrusions - Carcoar Granodiorite
- Other Silurian Intrusions
- Mumbil Group (Northwest) - Anson Formation
- Mumbil Group (Northwest) - Wombiana Formation
- Mumbil Group (East) - Campbells Formation

Ordovician

- Ordovician Intrusions
- Cabonne Group - Blayney Volcanics
- Cabonne Group - Oakdale Formation
- Cabonne Group - Byng Volcanics

Predicted watertable elevation and groundwater flow direction (end of mining)

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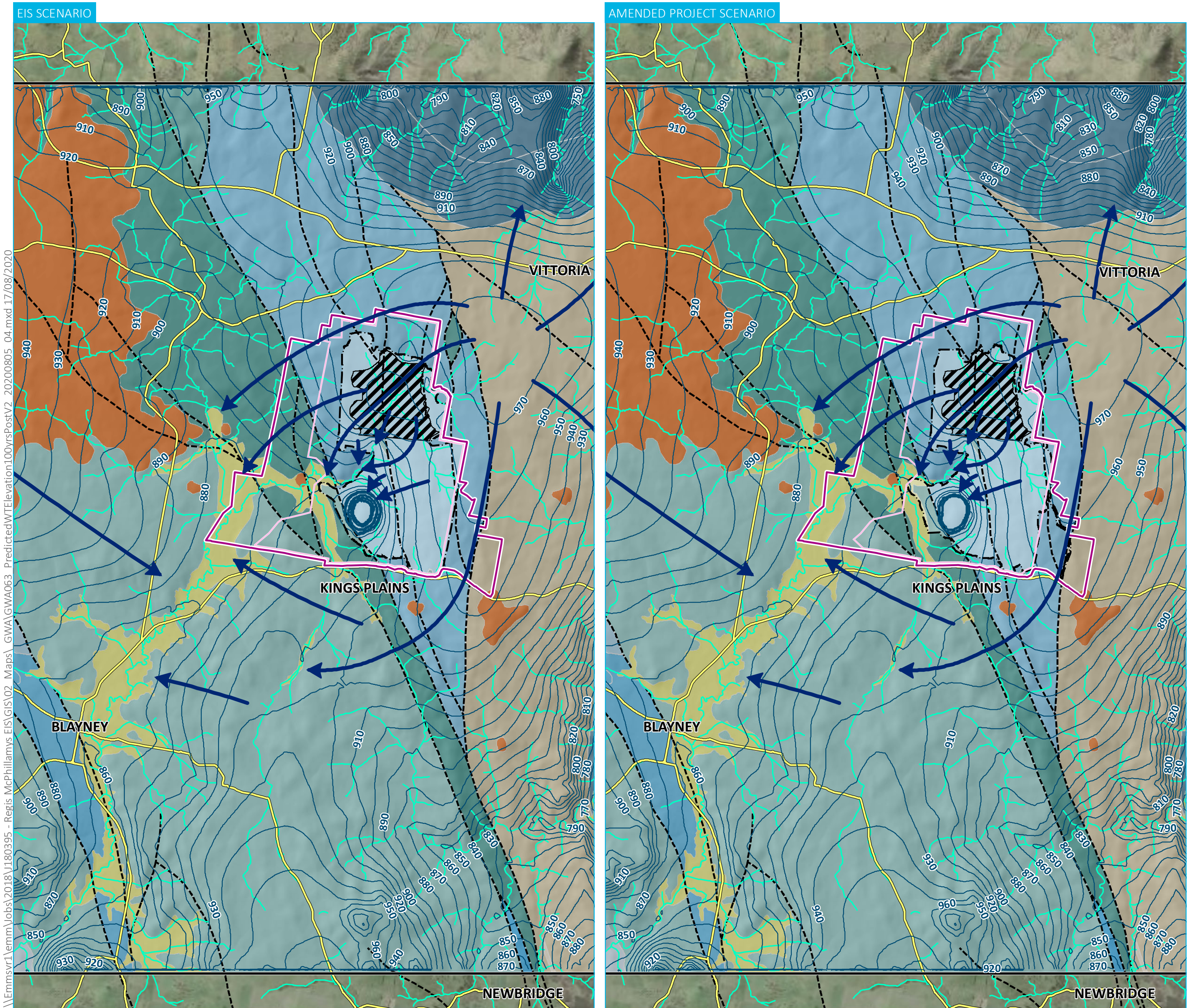
Amendment report
Figure 6.10

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_GWA\GWA062_PredictedWTElevationMiningEndV2_20200805_04.mxd 17/08/2020



Source: EMM (2020); Regis Resources (2020); DFSI (2017); DPI (2003); GA (2011)

0 2.5 5 km
GDA 1994 MGA Zone 55

KEY

- Model boundary
- Watertable elevation contour (mAHD)
- Groundwater flow direction
- Watercourse/drainage line

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Tailings storage facility

Geology (Bathurst 250k, 2nd Edition)

- Fault

Quaternary / Tertiary

- Alluvium
- Tertiary basalt

Carboniferous

- Bathurst Batholith - Gresham Granite
- Bathurst Batholith - Icely Granite

Devonian

- Other Carboniferous Intrusions
- Ungrouped Devonian Formations - Cunningham Formation

Silurian

- Other Silurian Intrusions - Carcoar Granodiorite
- Other Silurian Intrusions
- Mumbil Group (Northwest) - Anson Formation
- Mumbil Group (Northwest) - Wombiana Formation
- Mumbil Group (East) - Campbells Formation

Ordovician

- Ordovician Intrusions
- Cabonne Group - Blayney Volcanics
- Cabonne Group - Oakdale Formation
- Cabonne Group - Byng Volcanics

Predicted water table elevation and groundwater flow direction (100 years after mining)

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Figure 6.11

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As stated in the EIS groundwater assessment, the AIP identifies thresholds for impact considerations and defines a cumulative pressure head decline of less than 2 m (at any water supply work) as 'minimal impact'.

The model predictions for the amended project indicate that groundwater levels at existing third-party bores (ie bores on land adjacent to the mine development project area) will experience little to no change as a result of the project (refer Figure 6.12).

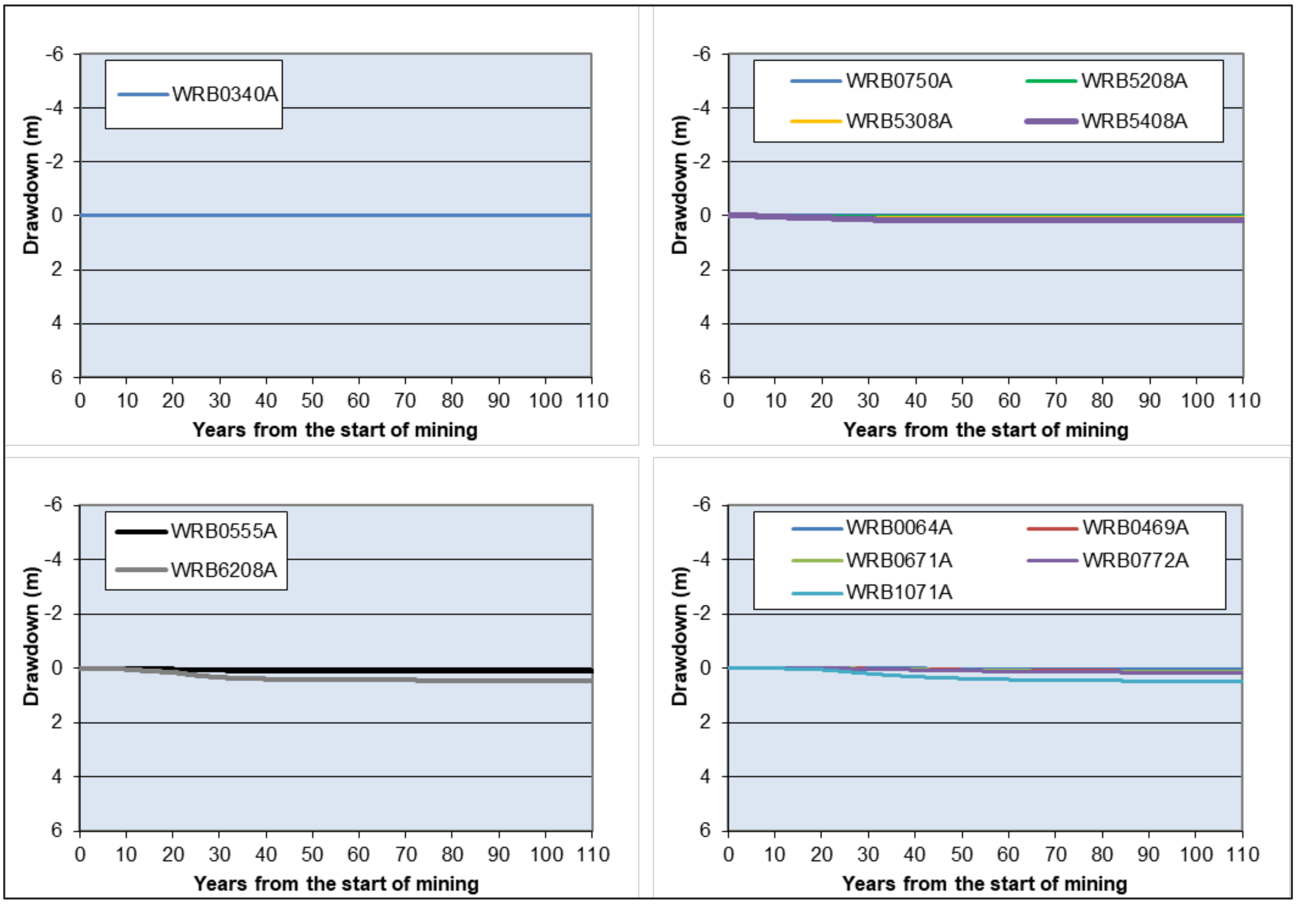


Figure 6.12 Predicted drawdown at third-party bores (south and east of the pit area)

Drawdown at all third-party bores is predicted to be less than 2 m. As such, the AIP make good provisions are not anticipated to be triggered. Operation of third-party bores is not predicted to affected by the project.

The BDAR (Appendix M) documents vegetation mapping conducted in the mine development project area and identifies the following PCTs as opportunistic users of groundwater during times of low rainfall:

- Mountain Gum – Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951); and
- Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330)[2].

[2] While Carex sedgeland of the slopes and tablelands, South Eastern Highlands Bioregion (PCT 766) is an opportunistic user of groundwater, all of this PCT present within the mine development project is within the disturbance footprint and therefore will be removed by the project (refer Figure 6.44 in Section 6.8.

These ecosystems will use groundwater where/when available, but can exist without the input of groundwater, except in periods of prolonged drought. These PCTs are restricted to damp riparian areas where shallow groundwater (ie up to 20 m bgl) occurs and therefore is likely to have some degree of groundwater dependence.

Vegetation within the disturbance footprint will be cleared for the mine development. As such, only vegetation outside of the disturbance footprint has the potential to be affected by changing groundwater levels.

Outside of the disturbance footprint, PCT 951 and PCT 1330 access to groundwater is predicted to remain predominantly unchanged as a result of the mine development.

A minor reduction in the extent of groundwater access is predicted for approximately 0.15 ha of PCT 951. Given this minor reduction in the extent of groundwater access and the low interaction and dependence on groundwater (ie between 2 and 20 m bgl), water stress is not predicted to occur.

Vegetation communities along the Belubula River, outside of the disturbance footprint, are not expected to experience reduced access to groundwater or water stress as a result of the amended project.

Uncertainty analyses

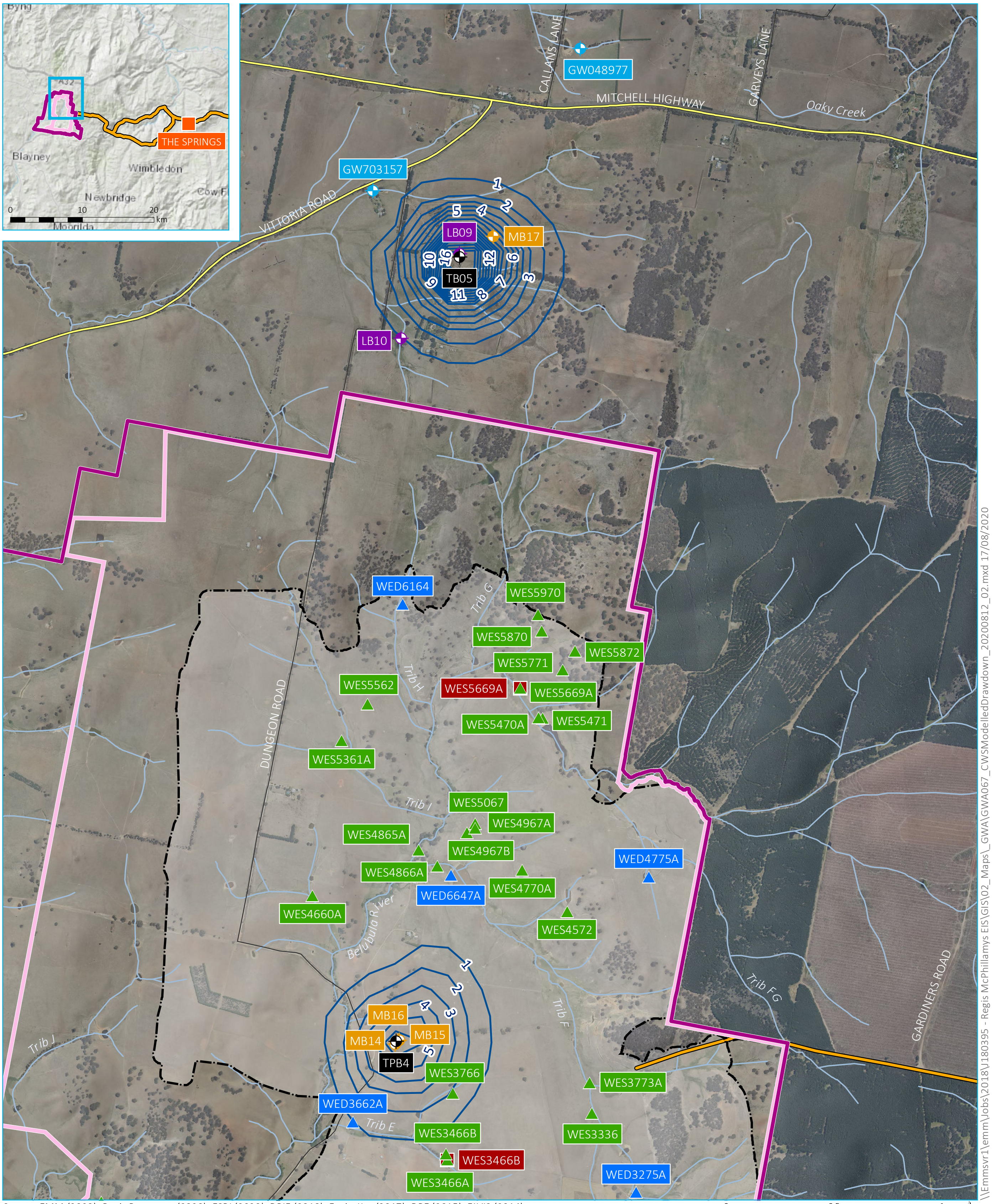
A total of 63 uncertainty scenarios were simulated as part of the EIS groundwater assessment. Since the public exhibition of the EIS and following consultation with DPIE's technical expert (JBS&G), three additional scenarios were developed for the uncertainty analysis. The results are presented in Appendix C of Appendix H and demonstrate that the potential impacts have been adequately assessed and the groundwater model is fit for purpose.

c Construction water supply

The construction water supply assessment has demonstrated that production bores can be used to meet the demand. The results of the construction water supply assessment predict:

- Localised groundwater level drawdown around the production bores extending no more than 500 m. There are no third-party bores or identified high priority GDEs within the modelled drawdown.
- A temporary reduction in baseflow contribution of 0.7 ML (2.5 kL/day) to the Belubula River is estimated in the vicinity of TPB4. Based on the existing understanding of the Belubula River (HEC 2020, EMM 2020b), this is a minor change and will not result in a noticeable change in flow downstream of the project. This short-term reduction in baseflow to the Belubula River will be accounted for by WALs held by Regis in the Lachlan Fold Belt MDB Groundwater Source.

The groundwater drawdown predicted after nine months of pumping (from the analytical modelling) is presented in Figure 6.13. Further discussion is provided in the construction water supply assessment report (Appendix D of Appendix H of this report).



Source: EMM (2020); Regis Resources (2020); ESRI (2020); DPIE (2018); EnviroKey (2017); DPE (2015); ELVIS (2014)

0 0.5 1 km
GDA 1994 MGA Zone 55
N

KEY

- Test bore
- Monitoring bore
- Existing bore (Regis land)
- Landholder bore
- High-priority GDE (refer to inset)
- Dam
- Spring
- Stygofauna sample location
- Predicted drawdown (m)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

Modelled drawdown in response to construction water supply

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Figure 6.13

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d Pit lake recovery

Predicted groundwater flux and groundwater elevation post-mining was provided for use in the post-mine water balance to assess pit lake recovery in the revised surface water assessment (Appendix G).

The final void water balance predicts the pit lake will recover to an elevation of around 902 m AHD (average equilibrium level 14 m below spill level); however, the rate of pit lake level rise is slow, and it is predicted to take over 500 years to reach this elevation.

Water balance information from the revised surface water assessment has been used to assess the long-term impacts of the mine development on the regional groundwater system. The long-term average inputs and outputs of the pit lake water balance model (excluding groundwater inflow) are:

- rainfall and runoff: 472 ML/year; and
- evaporation: 519 ML/year.

The pit void is predicted to act as a groundwater sink for around 500 years and may then change to a throughflow pit under pseudo steady state conditions. However, the model predicts predominantly sink conditions, with only minor groundwater flow through. At steady state in the very long term, the ongoing inflow is 66 ML/year (181 kL/day) while the outflow from the void is predicted to be much lower at around 11 ML/year (31 kL/day).

e Changes to surface water-groundwater interactions

Belubula River

Watertable drawdown has the potential to reduce baseflow to and increase leakage from the local watercourses; this was assessed as part of the groundwater model predictions. The following points summarise the results presented in Table 6.7:

- consistent with the predictions from the EIS groundwater assessment, there is no predicted change to baseflow or river leakage along the Belubula River downstream of the confluence with Tributary A;
- leakage from the Belubula River upstream of the confluence with Tributary A is predicted to increase by up to 10% between 5 and 10 years after mining (35 kL/day), which is less than the predicted leakage from the EIS groundwater assessment (predicted a 12% increase or 42 kL/day);
- leakage from Tributary A is predicted to increase by 5% (42 kL/day), which is slightly less than the EIS groundwater assessment (predicted an increase of 44 kL/day);
- baseflow reduction to the Belubula River upstream of the Tributary A confluence (to the TSF embankment) is predicted to peak at 28 kL/day (ie a 15% reduction) at the end of mining, compared to 29 kL/day at the end of mining in the EIS groundwater assessment;
- the predicted change in baseflow to Tributary A as a result of the amended project is similar to that predicted in the EIS groundwater assessment, with a maximum reduction of 13 kL/day (7% change) compared to 14 kL/day in the EIS groundwater assessment; and
- overall flux changes are delayed for the amended project, due to the slower progression of the open cut and TSF development.

Table 6.7 Predicted change in baseflow to and river leakage from Tributary A and the Belubula River

Mine year	Belubula River upstream of Tributary A confluence (kL/day)				Belubula River downstream of Tributary A confluence (kL/day)				Tributary A (kL/day)			
	Leakage [1]		Baseflow [2]		Leakage [1]		Baseflow [2]		Leakage [1]		Baseflow [2]	
	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project
1	0	0	0	0	0	0	0	0	0	0	0	0
2	2	-1	-4	-1	0	0	0	0	2	1	0	0
3	10	0	-14	-2	0	0	0	0	10	2	-3	-1
4	19	5	-19	-8	0	0	0	0	19	7	-6	-2
5	24	14	-23	-16	0	0	0	0	24	15	-8	-4
6	28	23	-25	-21	0	0	0	0	29	22	-9	-7
7	29	27	-27	-24	0	0	0	0	31	26	-10	-8
8	30	30	-28	-26	0	0	0	0	33	30	-11	-10
9	30	31	-28	-27	0	0	0	0	34	32	-11	-10
10	30	31	-29	-28	0	0	0	0	35	34	-11	-11
11	-	31	-	-28	-	0	0	0	-	35	-	-11
+1	32	28	-22	-22	0	0	0	0	36	35	-12	-11
+2	36	31	-23	-21	0	0	0	0	37	36	-12	-12
+3	38	33	-24	-22	0	0	0	0	39	37	-13	-12
+4	40	34	-25	-22	0	0	0	0	40	38	-13	-12
+5	41	35	-26	-23	0	0	0	0	41	39	-13	-13
+6	42	35	-26	-23	0	0	0	0	41	39	-14	-13
+7	42	35	-26	-23	0	0	0	0	42	40	-14	-13
+8	42	35	-27	-23	0	0	0	0	42	40	-14	-13
+9	42	35	-27	-23	0	0	0	0	42	41	-14	-13

Table 6.7 Predicted change in baseflow to and river leakage from Tributary A and the Belubula River

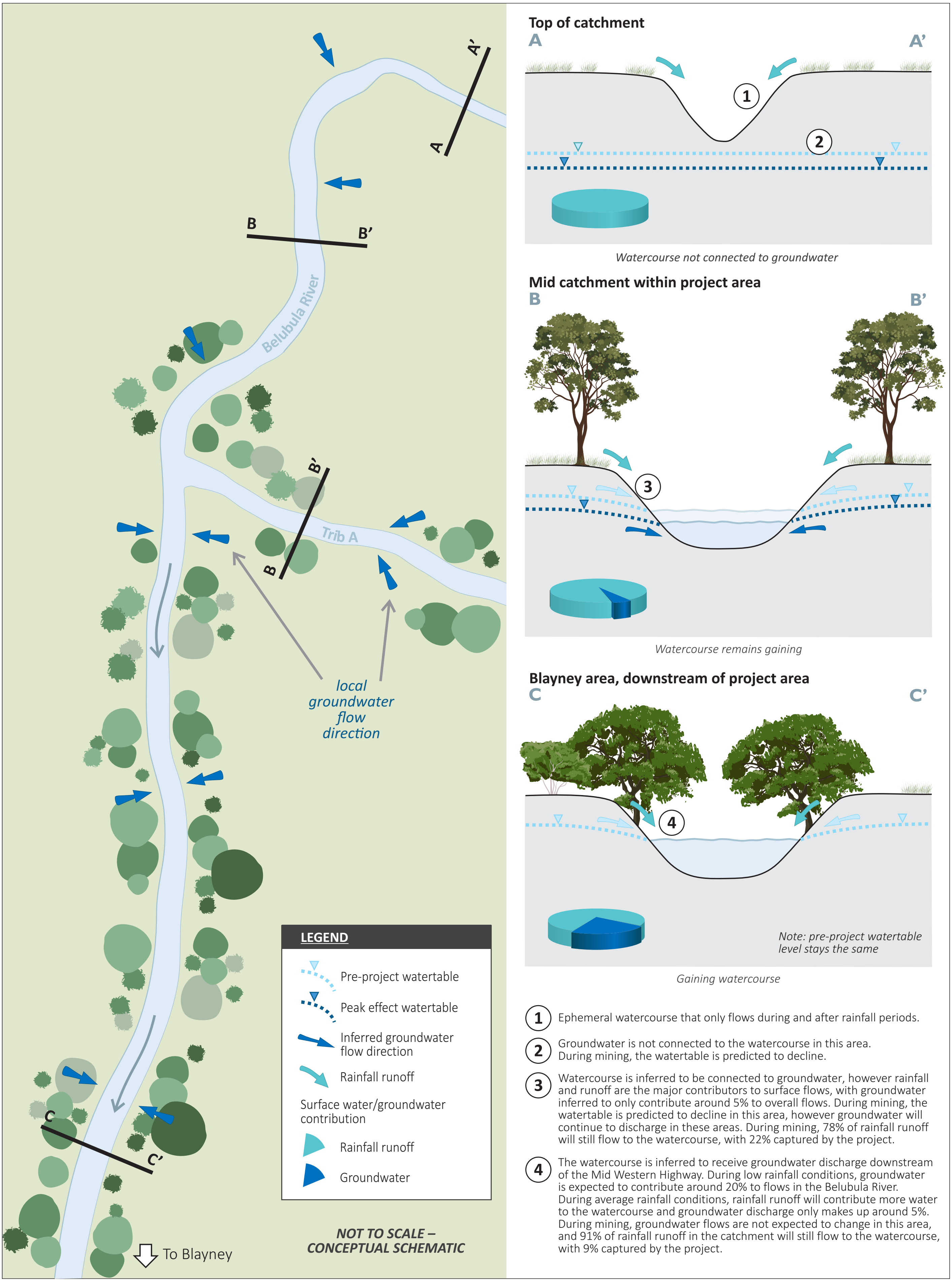
Mine year	Belubula River upstream of Tributary A confluence (kL/day)				Belubula River downstream of Tributary A confluence (kL/day)				Tributary A (kL/day)			
	Leakage [1]		Baseflow [2]		Leakage [1]		Baseflow [2]		Leakage [1]		Baseflow [2]	
	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project	EIS design	Amended project
+10	42	35	-27	-23	0	0	0	0	43	41	-14	-13
+50	42	24	-28	-20	0	0	0	0	44	42	-14	-13
+100	42	24	-29	-20	0	0	0	0	44	42	-14	-13

1. A positive number indicates river leakage (to groundwater) is predicted to increase as a result of the amended project (ie leakage is greater in the mining scenario when compared to the null scenario).
2. A negative number indicates baseflow (groundwater discharge to the watercourse) is predicted to reduce as a result of the amended project, when compared to the null (no mining) scenario.

As discussed in the EIS groundwater assessment, groundwater is currently predicted to contribute approximately 5% of overall surface flows in the Belubula River upstream of the confluence with Tributary A. Therefore, the predicted reduction in baseflow is expected to have a minor influence on overall surface flows in Tributary A and the Belubula River upstream of the confluence with Tributary A.

There is no predicted impact to baseflows downstream of the confluence with Tributary A. Given the small current contribution of groundwater to surface water flows and the ephemeral nature of the Belubula River upstream of Tributary E, the predicted reduction in baseflow resulting from groundwater level drawdown upstream of the confluence with Tributary A is minor.

Figure 6.14 presents the conceptual understanding of the interaction between groundwater and the Belubula River during operation of the mine development project.



Conceptual understanding of Belubula River interaction with groundwater (during mining)

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Amendment Report
Figure 6.14

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Springs/seeps

Most springs and seeps identified in the mine development project area have been altered (excavated and converted into a dam) to allow cattle access for drinking water. Most identified springs are associated with the shallow, locally recharged, groundwater flow system (ie short flow path groundwater systems).

Predicted watertable drawdown/mounding at selected spring locations outside of the disturbance footprint are presented in Figure 6.15. The results predict:

- mounding of the watertable at spring WES5970 north of the TSF (greater than 2 m draw up), consistent with the predictions of the EIS, but with a slower development due to the amended placement schedule;
- minor changes to the watertable in the area between the TSF and the open cut pit, consistent with the predictions from the EIS; and
- minor drawdown of the watertable at spring WES1164A south-east of the open cut pit (less than 1 m drawdown predicted), consistent with the EIS predictions.

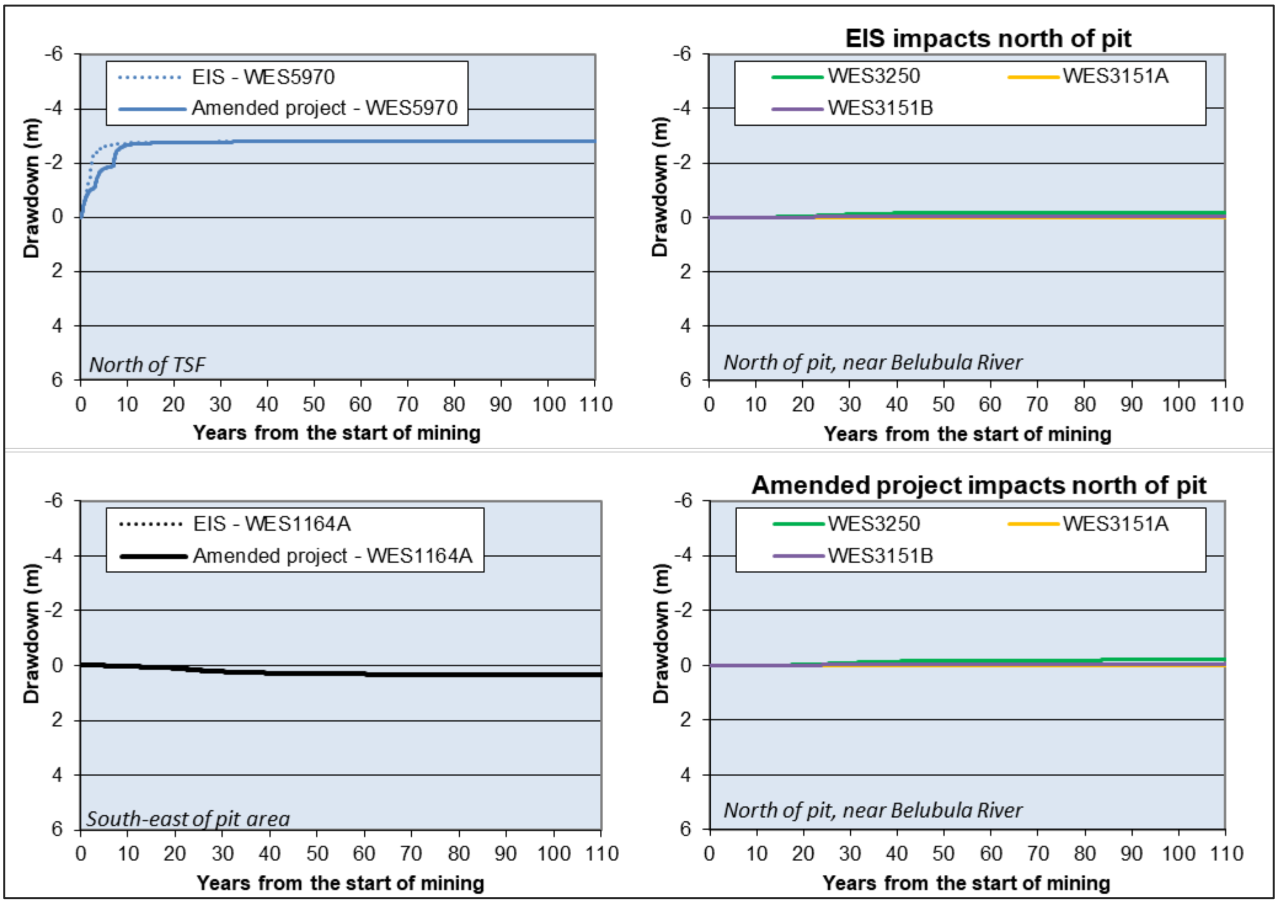


Figure 6.15 Predicted watertable drawdown at selected spring locations outside of disturbance footprint

Based on the assessments conducted, the main contribution to the flows in the Belubula River in the mine development project area come from rainfall and surface water runoff, with minor contribution provided by the springs and the local groundwater system.

The main change to the Belubula River flows will result from a reduction in the surface water catchment area (discussed in the next section), rather than construction of the mine development (including the TSF) on the springs. The TSF and other mine development infrastructure will be constructed in areas where springs/seeps have been observed. This activity will change the ground conditions, and shallow groundwater that currently discharges at surface as a seep or spring will no longer discharge at that location. Instead, the shallow groundwater will continue to move underground (ie this water will remain in the greater catchment). Some of this shallow groundwater will be intercepted by the TSF seepage interception drain or will continue to move underground discharging in the Belubula River or at new or other spring locations.

Outside of the mine development project area, groundwater levels are not predicted to change as a result of the project. Therefore, seeps and springs outside of the mine development project area will not be altered as a result of the mine development.

f Changes to streamflow

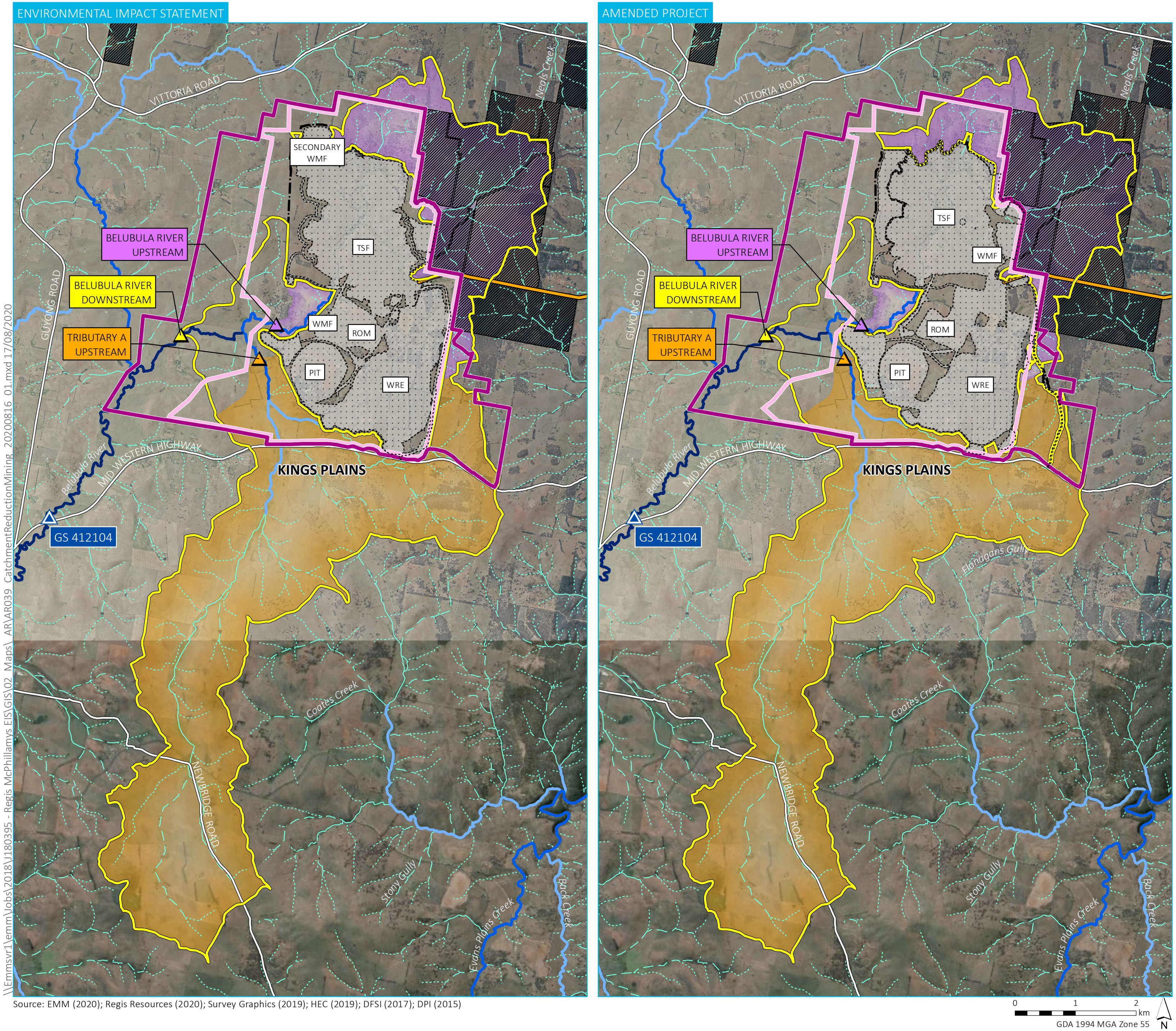
The predicted changes in surface water flow as a result of reduced catchment size are discussed below and presented in detail in the revised surface water assessment (Appendix G). Details regarding the amended operational water management system are included in Chapter 2 and Figure 2.11.

The predicted change in streamflow to Carcoar Dam is summarised in Table 6.8. Under existing conditions, median annual inflows to Carcoar Dam have been modelled to be 4,485 ML/year or higher. With the excision of 964 ha of the catchment (captured by the operational water management system), the existing modelled inflow to Carcoar Dam that occurs 50% of the time reduces by 186 ML/year to 4,299 ML/year or higher (compared with 5,594 ML/year in the EIS surface water assessment with a reduction of 242 ML/year). This is still a 4.1% reduction in median annual inflow to Carcoar Dam. This level of change is expected to be imperceptible in comparison with the natural variability in catchment conditions.

Table 6.8 Predicted change in streamflow to Carcoar Dam – operational and post-closure

Percentage of time flow is greater than the modelled inflow	Existing	Operational phase (at maximum disturbance)		Post-closure	
	Modelled inflow (ML/year)	Modelled inflow (ML/year)	Decrease in inflow (compared to existing inflow) (ML/year)	Modelled inflow (ML/year)	Decrease in inflow (compared to existing inflow) (ML/year)
95%	1,574	1,509	65	1,566	7
90%	2,014	1,930	84	2,005	9
50%	4,485	4,299	186	4,464	21

The changes to flow during the operational phase are predicted to be short-lived and peak at the time of maximum disturbance of the mine development. The maximum catchment area captured by the amended mine development will still be 964 ha (ie 4.1% of the total Carcoar Dam catchment; refer to Figure 6.16). In the long-term, following rehabilitation, the area removed from the Carcoar Dam catchment will be significantly smaller at 107 ha (ie the catchment of the final void; refer to Figure 6.17), resulting in smaller changes to flow downstream. During the post closure phase, following mine rehabilitation, median annual inflows will be reduced by 21 ML/year (0.46%) when compared to the existing situation. This level of change is expected to be imperceptible in comparison with the natural variability in catchment conditions.



Project area surface drainage – catchment reduction during mining

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Figure 6.16

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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); HEC (2019); DFSI (2017); DPI (2015)

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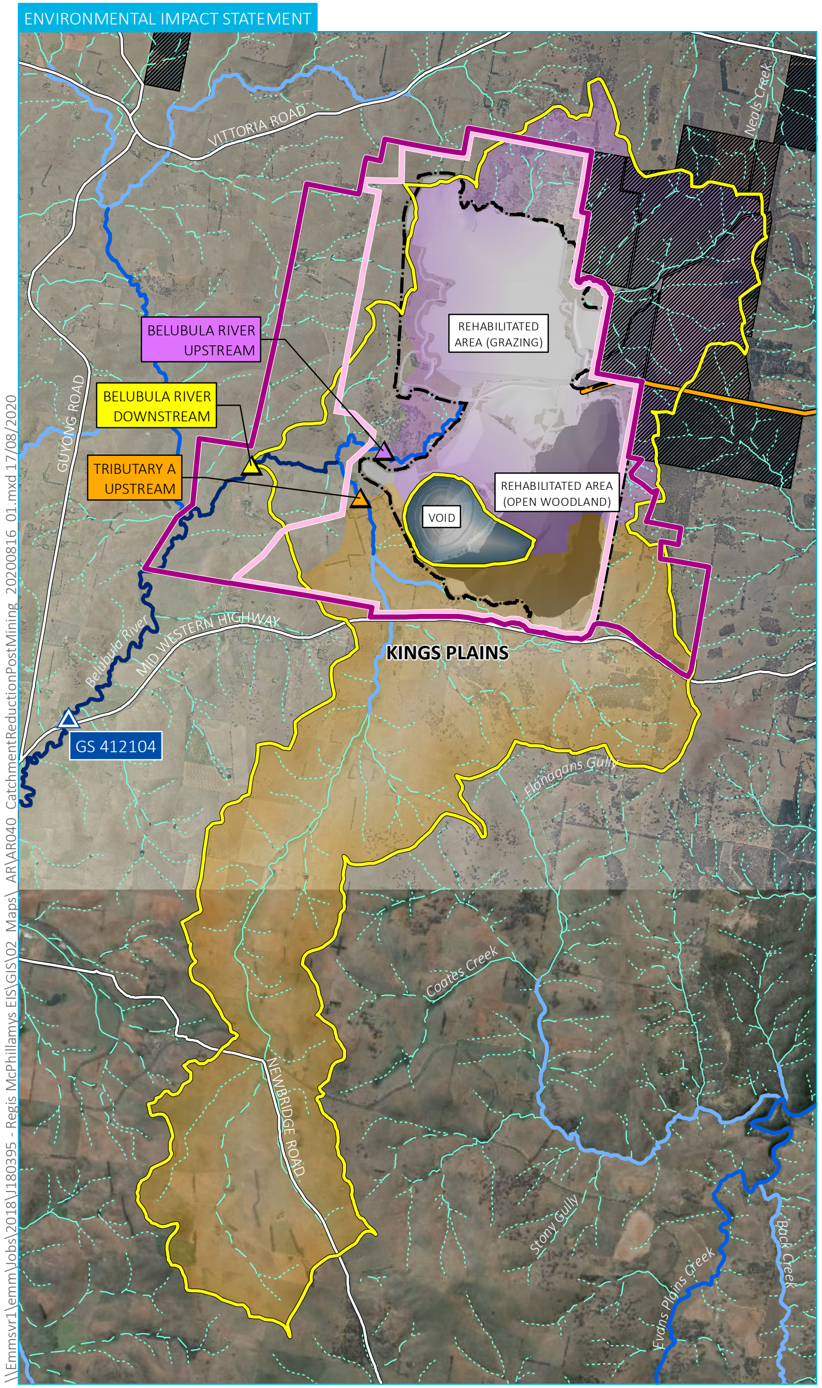

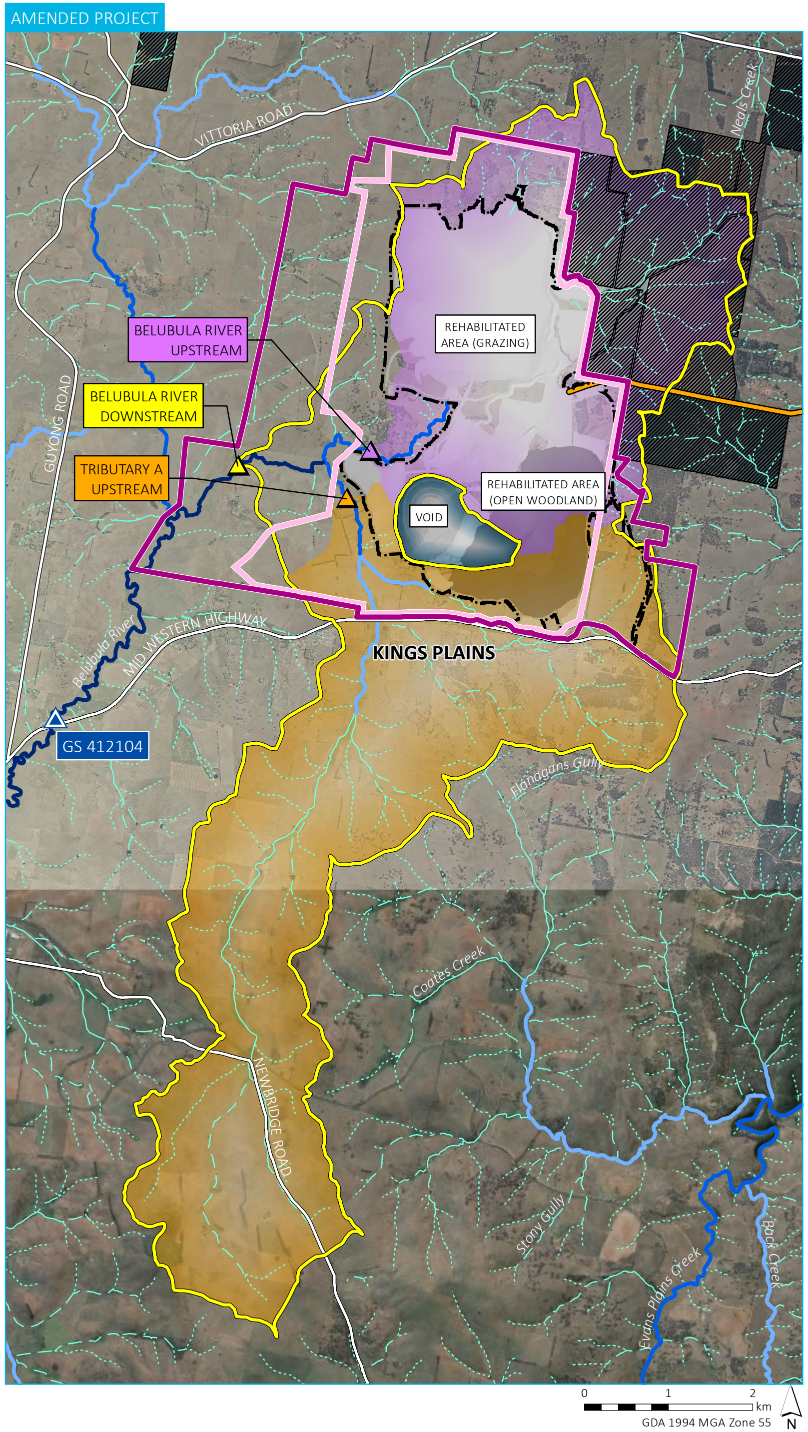

KEY

- Existing stream gauging station

Proposed stream gauging station
- Belubula River Downstream
- Belubula River Upstream
- Tributary A Upstream

Undisturbed catchment area
- Area 1 (Belubula River Downstream)
  - 42.39 km² (EIS)
  - 42.42 km² (amended project)
- Area 2 (Belubula River Upstream)
  - 15.71 km² (EIS)
  - 15.75 km² (amended project)
- Area 3 (Trib A Upstream)
  - 23.85 km² (EIS)
  - 23.84 km² (amended project)
- Void catchment area
  - 1.10 km² (EIS)
  - 1.07 km² (amended project)

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Vittoria State Forest

Strahler stream order
- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Project area surface drainage – catchment reduction post mining

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Amendment report
Figure 6.17

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); HEC (2019); DFSI (2017); DPI (2015)

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The percentage reduction of flow is larger higher up in the catchment. During the operational phase, the percentage reduction in median annual flow in the Belubula River at the Mid Western Highway is approximately 8.6% (Table 6.9), and at the Belubula Downstream gauging station (within the mine development project area) median flows are estimated to reduce by approximately 22.2%.

Table 6.9 Predicted change in streamflow at Mid Western Highway

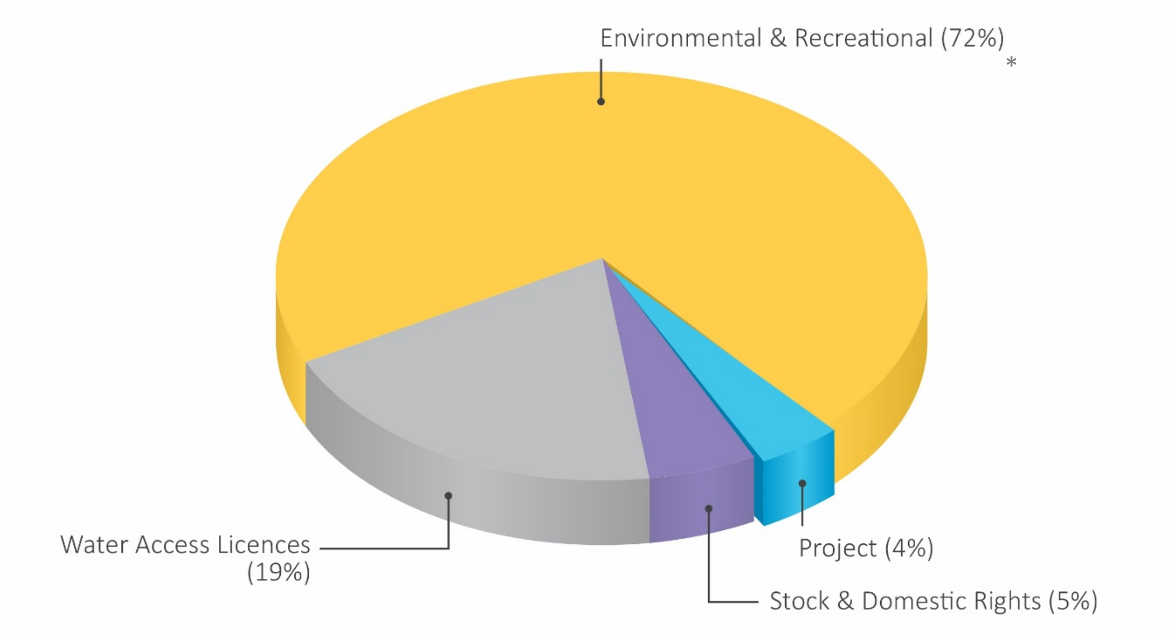
Percentage of time flow is greater than the modelled inflow	Existing	Operational phase	(at maximum disturbance)
	Modelled inflow (ML/year)	Modelled inflow (ML/year)	Decrease in inflow (compared to existing inflow) (ML/year)
95%	764	697	66
90%	1,001	914	87
50%	2,193	2,003	190

Downstream users are most reliant on water within the river during low flow periods, and therefore this was considered in detail. At maximum disturbance, flows in the Belubula River below the Mid Western Highway and above Carcoar Dam are expected to range between at least 697 and 1,509 ML/year during periods of low rainfall (Appendix G). This is compared with 764 and 1,574 ML/year that currently flows during low rainfall periods. During these periods of low rainfall when downstream users are most reliant on water within the Belubula River, groundwater discharge to the Belubula River in the Mid Western Highway area and further downstream is predicted to remain unchanged from current conditions.

To put these flows into context, the water requirements for the Belubula River above Carcoar Dam Water Source regulated by the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*, and known unregulated river licences that are not accounted for in the WSP, are as follows:

- Domestic and stock rights: 68 ML/year.
- Share components of domestic and stock access licences: 5 ML/year.
- 264 ML of unregulated river water access licences.

Therefore, there is a total of 337 ML/year already allocated to this Water Source for downstream users. This leaves a minimum of 1,172 ML/year (ie 1,509 ML/year minus 337 ML/year) available for environmental and recreational purposes flowing into Carcoar Dam during low rainfall periods (and the capture of rainfall runoff associated with Harvestable Rights). This is presented graphically, as percentages, in Figure 6.18.



** Capture of rainfall runoff associated with Harvestable Rights will be taken from Environmental and Recreational*

Figure 6.18 Proportions of water use from the unregulated Belubula River above Carcoar Dam water source (during operations)

The project is predicted to result in a minor change in streamflow during operations, with the change expected to be within the current natural variability of the Belubula River flows. Users downstream of the project who rely on and access water within the Belubula River are not predicted to experience reduced access to water and are not expected to be affected by the project.

g Changes to water quality

Third-party bores

The regional groundwater flow direction is predicted to remain unchanged from pre-mining conditions and groundwater levels at third-party bores are not predicted to be affected by the mine development. As such, groundwater chemistry at third-party bores is not predicted to be affected.

TSF seepage

The TSF modelling completed by ATCW (2020) shows that the proposed TSF multi-barrier seepage management system provides a robust system and is effective at reducing seepage. Following closure, seepage from the TSF will continue due to the low permeability liner, the nature of the geology and the tailings. This predicted low volume of seepage post closure (11-15 kL/day or 1.4-2.1 mm/year/m^2) is predicted to flow towards the open cut pit and some is predicted to move towards the Belubula River. This volume is very small in comparison to the Belubula River streamflow (at the gauging station downstream of the confluence with Tributary A), which is estimated to have median flows that represent 10,000 times the predicted seepage rate (around 289 ML/day (289,000 kL/day) during average climate conditions and 2.7 ML/day (2,700 kL/day) during dry conditions).

The results of the highly conservative simulation of the TSF in the groundwater model predicts that the watertable underneath the TSF will become elevated and seepage from the TSF is predicted to slowly migrate south-west and south of the TSF. This seepage is predicted to remain within the saprock zone, flowing in a horizontal direction. Some of the seepage that migrates south from the TSF that is not intercepted by the seepage management system is predicted to seep towards the open cut pit. Some seepage is predicted to move towards the Belubula River at a rate of approximately 50 m in 100 years.

TSF seepage is predicted to be very slow, and by the time the residual seepage migrates through the ground towards the Belubula River, the characteristics of the seepage water will have concentrations of aluminium, salinity (as EC), sulphate, selenium, cyanide and cobalt:

- below or within the range of water quality concentrations currently measured in groundwater, the Belubula River and its tributaries;
- below ANZECC (2000) livestock drinking water guideline values; and
- below ANZECC (2000) 95% protection level for freshwater aquatic ecosystem guideline values.

Final pit lake water quality

A final pit lake salinity assessment has been conducted as part of the revised surface water assessment using inputs from the geochemical characterisation (SRK 2019) and groundwater and surface water quality monitoring data. The salinity of the pit lake is predicted to increase due to evapo-concentration, reaching around 1,600 µS/cm (EC) after 1,000 years, which is within the current groundwater salinity range.

The final void water balance, geochemical assessment and groundwater modelling will continue to be refined and verified as additional data becomes available and closure planning for the mine development will be reviewed as required.

h Changes to flood regime

An assessment of the flooding potential of the amended mine development and downstream as a result of the mine development are consistent with the findings presented in the EIS, and identified that:

- the amended mine development project area is in the headwaters of the Belubula River hence the flooding risk resulting from upstream floodwaters will be minor;
- the open cut is greater than 250 m from the Belubula River; and
- the amended mine development project area will capture runoff from disturbed areas (most notably the TSF, waste rock emplacement area and open cut), which will result in a reduction in catchment area reporting downstream, hence the impact on flooding to downstream floodwaters will be a reduction in total flow downstream of the mine development project area.

The diverted catchment of the amended project is anticipated to total 751 ha, which is 42 ha less than the project considered as part of the EIS.

i Predicted impacts on water users

The potential effects on sensitive surface water and groundwater users as a result of the mine development, in accordance with the AIP and the assessment criteria as defined in Section 6.4.1(i), are described below. A schematic summarising the results of the site water balance model and predicted changes to streamflow (including diversions) is presented on Figure 6.19.

- Surface water users and stream environments:

  - Changes to flow for licensed and basic rights users and stream environments due to the reduction in catchment area and reduction in baseflow are predicted to be minor. Based on the assessments conducted, the main contribution to the Belubula River surface flows in the mine project area comes from rainfall and surface water runoff, with minor contribution provided by the springs and the local groundwater system. The main change to the surface water flows will result from a reduction in the surface water catchment area, rather than construction of the project. The reduced catchment results in a maximum 4% reduction of streamflow at Carcoar Dam during operation of the project and reduces to 0.5% following completion of the project. Downstream of the mine development project area, groundwater discharge to the Belubula River will not change and will continue to contribute around 20% to the watercourse flows. Surface water flow and yield changes are considered minor and within the natural variability in catchment conditions.

  - Stream bank erosion changes can be mitigated via an erosion and sedimentation control plan. This is further discussed in the EIS and Appendix G. These changes are considered minor.

  - Changes in flood levels as a result of the project are considered acceptable; no flood levee is warranted and there is negligible potential for flooding of the final void from the downstream Belubula River. Changes are considered minor.

  - The project is not anticipated to result in a lowering of the beneficial use category of the local surface water sources. Potential for changes in surface water quality due to seepage from the TSF and the waste rock emplacement will be mitigated with appropriate management measures. This is discussed further in Section 6.4.1(vi). Surface water quality changes are considered minor.

- Ecosystems that potentially rely on groundwater:

  - Vegetation communities along the Belubula River, outside of the disturbance footprint, are not expected to experience reduced access to groundwater or water stress as a result of the project. Effects on GDEs are considered minor. Refer to Section 6.9 for further details.

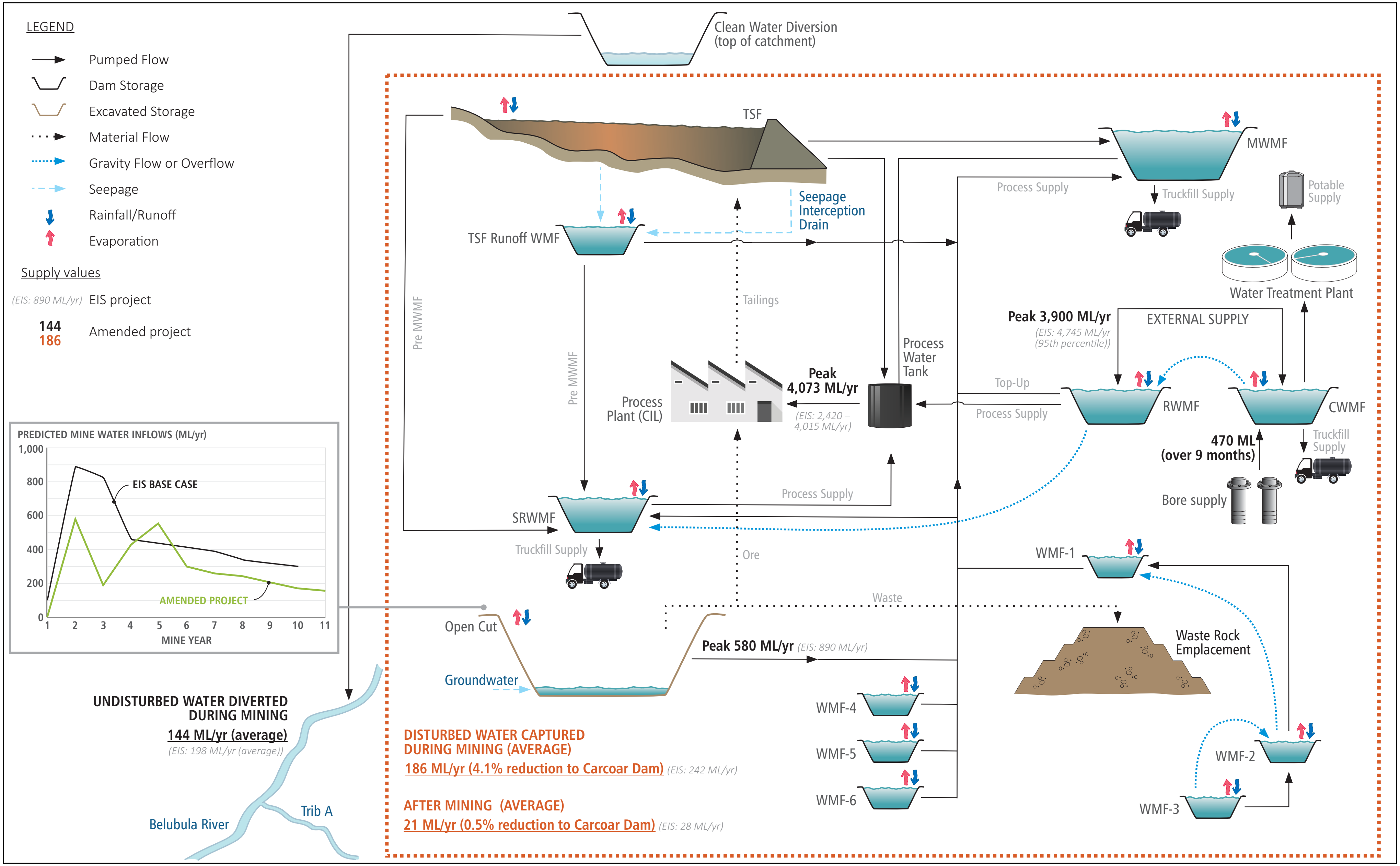
- Watercourses, drainage lines, creeks and springs that receive baseflow:

  - Changes in streamflow and spring flow as a result of groundwater drawdown is predicted to occur locally near the open cut pit and is considered minor.

- Groundwater users (third-party bores and associated infrastructure):

  - Groundwater levels at existing third-party bores will experience little to no change as a result of the project and do not trigger the AIP impact criteria for make good requirements. Operation of third-party bores is not predicted to affected by the project. Groundwater level and yield changes in bores are considered minor. Refer to Section 6.4.1(iv)(b) for further details.

  - The project is not anticipated to result in a lowering of the beneficial use category of the local groundwater sources. Potential changes in groundwater water quality are not expected to affect third-party bores and are considered minor.



Simplified schematic: site water balance results and predicted changes in streamflow

McPhillamys Gold Project
Amendment Report
Figure 6.19

v Licensing

a Approach to licensing

Regis is required to hold WALs and entitlement (or shares) in each relevant water source in accordance with the requirements of the WM Act and the AIP.

In accordance with the AIP, a project's WAL requirement is required to account for both the direct water take (ie water taken and used for the project) and indirect water take (ie pit inflow). Proponents are required to hold WALs and sufficient share entitlements to account for both direct and indirect take (ie the volumetric contribution of flow from adjacent, overlying, underlying and connected water sources). The groundwater model is utilised to predict and quantify the volume of water intercepted during mining and the ultimate sources of that water.

The WALs and associated shares need to be held for the water year in which the take occurs. All shares and WALs do not need to be held prior to the project approval, as some water capture does not occur for years after mining commences. As detailed in this report, the proponent will procure the WALs and associated shares it requires for each water year of the project's lifespan.

b Summary of required groundwater licence entitlements

Based on the results of the groundwater model, the maximum volume required for licensing in the Lachlan Fold Belt MDB Groundwater Source is 580 ML/year in mine year 2, which can reduce in Year 6 to approximately 300 ML/year and then reduce further to approximately 200 ML/year following 5 years of recovery post mining (Figure 6.20). The pit void is predicted to act as a groundwater sink following completion of mining. As such, groundwater inflows to the pit will continue after mining and it is conservatively predicted to eventually become a throughflow pit after 500 years (with minor groundwater flow out of the pit).

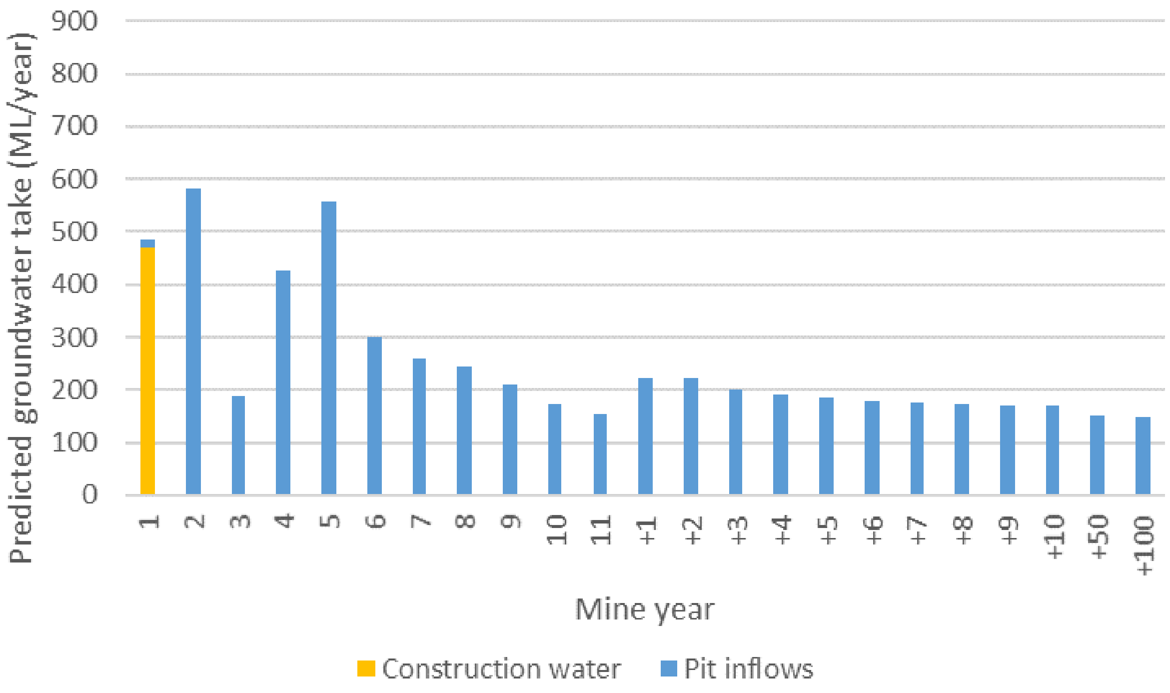


Figure 6.20 Predicted groundwater interception (direct and indirect) over time

c Summary of required surface water licence entitlements

The overall surface water 'take' for the mine development is addressed through consideration of the:

- the incidental capture of rainfall runoff by the operational mine water management system;
- the MHRDC for all relevant Regis owned lands;
- licence exemptions - which include the excluded works exemption under the WM Regulation; and
- the difference between the overall take, the overall MHRDC and excluded works exemption are then considered to determine whether additional volumetric licences are required to account for the volume of intercepted water as a result of the mine development.

A catchment yield assessment was undertaken as part of the EIS to assess the potential 'take' by the temporary interception of mine development project area catchments within the mine operational water management system. Catchment yield modelling was undertaken by calibrating a model of the catchment of Carcoar Dam, within which the mine development area is located. The modelling predicts a long-term median annual flow rate in the Belubula River at the project streamflow gauging station of 869 ML/year (located just downstream of the confluence of Belubula River and Tributary A). At this point, the Belubula River has an estimated existing catchment area of 43.5 km^2. Therefore, the median annual catchment yield at this point is estimated to be 19.97 ML/km^2/year. This yield rate has been used to estimate the median impact of the temporary interception of mine project area catchments within the operational water management system.

An indirect take of water is also anticipated to occur due to an increase in leakage (as a result of groundwater drawdown) from the Belubula River and Tributary A to groundwater. This has been estimated as part of the groundwater modelling conducted for the mine development (refer Appendix H and Section 6.4.1(iv)(e) above).

Application of the excluded works exemption

All WMFs located on minor streams (ie first and second order) will be constructed and operated so as to fall within the scope of the excluded works exemption under Schedules 1 and 4 of the WM Regulation. Consistent with best practice, the storage capacities and pumping infrastructure of the operational WMFs have been sized to the minimum storage volumes required to ensure no spills occur from these storages in any of 131 climatic scenarios modelled (derived from the 131 years of available historical climatic data for the site).

By reason of the combined operation of clause 21(1), clause 12 in Part 1 of Schedule 4 and clause 3 in Schedule 1 of the WM Regulation, the excluded works exemption provides that the 'take' of water by the following category of dams is exempt from the requirement for a water access licence (WAL) under the WM Act:

> Dams solely for the capture, containment and recirculation of drainage and/or effluent, consistent with best management practice or required by a public authority (other than Landcom or the Superannuation Administration Corporation or any of their subsidiaries) to prevent the contamination of a water source, that are located on a minor stream.

d Licences held for the project

Groundwater

There are sufficient licence entitlements available in the Lachlan Fold Belt MDB Groundwater Source for the take associated with groundwater inflows to the open cut pit and the groundwater volume required to meet the construction water demand. As at August 2020, Regis has secured 400 unit-shares in the Lachlan Fold Belt MDB Groundwater Source to account for groundwater abstraction for the project (WAL 41835). Regis also lodged an expression of interest for an additional 200 unit-shares in this groundwater source under the July 2020 Controlled Allocation Order.

The Lachlan Fold Belt MDB Groundwater Source is not yet fully allocated, with the Long Term Average Annual Extraction Limit (sustainable level of extraction) set at 253,788 ML/year in the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*. Currently there is 71,629.7 ML allocated to aquifer access licences that are available for trade. The NSW Government releases additional shares in this water source approximately annually, with a low uptake of water annually as seen in initially controlled allocation release results. Private trades between existing licence holders is also modest, with trades in the 2019-20 water year of 303 ML and the previous 12 months was 398 ML. The market is therefore deep, has a very low demand for shares, and buyers are able to readily source water either privately via trades or via the regular NSW Government controlled allocation releases.

Surface water

Regis has secured 70 unit-shares (equivalent to 70 ML/year) within the unregulated Belubula River above Carcoar Dam water source (WAL 43105 and 31476).

e Mechanism to secure the required licence entitlements

Groundwater

If the expression of interest in the additional 200 unit-shares in Controlled Allocation Order 2020 is successful, Regis' total licence entitlement will be 600 unit-shares per water year (equivalent to 600 ML/year). This entitlement would cover the project construction water demand and predicted groundwater inflows to the open cut pit for the life of the project.

Surface water

The Belubula River above Carcoar Dam surface water source has four WALs currently available for trading (noting that all allocations are on an annual basis):

- WAL31475 – 192 ML;
- WAL31476 – 50 ML (secured by Regis);
- WAL43104 – 2 ML; and
- WAL43105 – 20 ML (secured by Regis).

WAL31475 is held by the Water Administration Ministerial Corporation.

Regis has acquired 70 ML of surface water entitlements (WAL43105 and WAL31476) within the water source.

Regis has liaised with Government since the submission of the DA and EIS to determine an appropriate pathway for securing additional water entitlement. Discussions are ongoing, and Regis considers that there is a good and reasonable prospect of obtaining additional entitlement for the mine development.

The largest WAL within the water source has an entitlement of 192 ML (WAL31475). Regis is having ongoing discussions with the NSW Government to secure some, or all, of this 192 ML licence to account for surface water take that is required to be licensed.

It should also be noted that future developments may bear on the final water licensing approach adopted for the project, such as:

- Amendments to the water dealing rules of the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012* and the *Water Sharing Plan for the Belubula Regulated River Water Source 2012* to allow trading between water sources. As recently contemplated by a Ministerial note in a relevant draft WSP, this could enable Regis to purchase WALs in adjacent water sources and trade across the water source boundary.

- Commencement of the relevant “return flow” provisions in the WM Act to provide licensing credits for captured water beneficially returned to downstream watercourses.

vi Mitigation and management

a Overview

Proposed mitigation, management and monitoring measures are presented in Section 9.7 of the EIS. Two main WMPs will be developed for the project post-approval (ie one for construction and one for operations). The WMPs will be a sub-plan of the environmental management system and will document the proposed mitigation and management measures for the approved project. The WMPs will be prepared in consultation with DPIE Water, EPA and NRAR and will consider concerns raised during the exhibition and approvals process for the project. The WMPs will include details of:

- the surface water and groundwater monitoring program, including the monitoring network;
- monitoring frequencies;
- water quality objectives and parameters sampled;
- records of physical water take and pumping volumes between water storage structures (including the open cut pit);
- trigger levels for water quality parameters (surface water and groundwater) to assist in early identification of water quality trends (including TSF seepage migration);
- trigger levels for groundwater level changes to assist in early identification of groundwater level trends associated with the mine dewatering and TSF seepage management;
- a trigger action response plan;
- an erosion and sediment control plan; and
- a program for reviewing and updating the numerical groundwater model as more data and information become available.

b Groundwater

Monitoring of the groundwater network will continue and the network will be expanded, in consultation with EPA, NRAR and DPIE-Water, and as per the guidelines for the Groundwater Modelling and Monitoring Plan (EMM 2017), to target the identification of potential impacts from mining activities. The groundwater monitoring program will provide an early indication of potential impacts to sensitive receptors, including existing groundwater users (as well as groundwater dependent ecosystems and the Belubula River). Monitoring each component of the water management system underpins if, how and when management responses are required. Triggers and thresholds will be developed to provide context on if, how, and when management measures are required as part of the WMP for the project.

Two types of triggers will be defined for groundwater quality and quantity (heads), the first will be a performance trigger and the second an early warning trigger. Response (review, further investigations and evaluation) will be required when the early warning trigger is exceeded and, depending on the results, action may be required to implement mitigation measures to ensure the performance trigger is not exceeded.

In terms of groundwater heads, review will also be required if there is divergence of observed heads from model predicted heads. Triggers will also be assigned based on distance from the water affecting activity (ie TSF, open cut, etc) and will be based on a Source-Pathway-Receptor assessment approach. Further details on the proposed approach to groundwater monitoring, including locations, is provided in Section 7.1 of the groundwater assessment addendum (Appendix H).

c Surface water

Mitigation measures have been proposed to manage potential impacts on surface water quality downstream of the mine development during construction and operations. A detailed monitoring program would been developed comprising baseline monitoring, operational monitoring and post-closure monitoring. The surface water monitoring program for the mine development project area will be continued through the operational phase with additional streamflow, channel stability, water quality, erosion and sediment control, water inventory, and water use, sourcing and pumping monitoring proposed.

The performance of the water management system will be reviewed annually using the monitored data in combination with the site water balance model to identify changes in the system and compare against predictions. In the event of unforeseen impacts or impacts in excess of those predicted, contingency measures have been proposed (Section 5.4 of Appendix G).

Monitoring of streamflow, channel stability and water quality will continue for at least two years following completion of final water diversions. Monitoring data will be reviewed at annual intervals (as part of the annual review process) over this period and involve assessment against long term performance objectives that are based on baseline conditions or a justifiable departure from these, with due allowance for climatic variations. There will be provisions to extend the monitoring period if objectives are not substantially met within the post closure monitoring period. Monitoring and maintenance periods will continue until vegetation is established and sediment transfer and channel geomorphic features are functioning.

6.4.2 Pipeline development

i Introduction

A water assessment for the pipeline development carried out for EIS (EIS pipeline water assessment) (Appendix X of the EIS) considered potential surface water, groundwater, geomorphology and flooding impacts associated with the construction and operation of the pipeline development as summarised in Chapter 24 of the EIS. The findings of this assessment remain relevant to the amended pipeline development.

A Fluvial Geomorphology Addendum (Gippel 2020) (Appendix I) has been prepared to assess the fluvial geomorphic impacts associated with new watercourses crossed by the revised pipeline alignment options. This addendum assessment serves as an update to the EIS Fluvial Geomorphology assessment (Gippel 2019), found in Appendix B of the EIS pipeline water assessment.

Specifically, the Fluvial Geomorphology Addendum (2020):

- describes the existing geomorphic character of watercourses crossed by the new northern pipeline and southern pipeline option alignments and assesses the potential impacts of the pipeline development on these watercourses; and
- reports the River Styles classification of watercourses crossed by the pipeline over the entire 90 km pipeline corridor (as amended).

ii Methodology

a Geomorphic assessment

The Fluvial Geomorphology Addendum focused on geomorphic characteristics of the watercourses in the vicinity of the pipeline crossings that were relevant to the main risks associated with the pipeline during its operational phase. These risks comprise:

- geomorphic change leading to exposure of the pipeline to fluvial forces, thereby putting the integrity of the pipeline at risk; and
- the pipeline interfering with natural geomorphic processes.

The delineation of watercourses and their catchments was based on the best available topographic data. The drainage networks were represented by National Surface Hydrology Lines and revised in the catchments of watercourses intersecting the pipeline route using Global Mapper™ GIS (geographic information system). Channel morphology was characterised at each pipeline crossing in the long profile and cross-section directions.

b River Styles assessment

River Styles is a system for classifying stream geomorphic type based on valley setting, level of floodplain development, bed materials and reach-scale physical features within the stream (Brierley et al., 2011). The potential for physical recovery after disturbance depends on stream geomorphic condition, whereby streams in good condition (undisturbed and close to natural state) are more likely to be resilient and recover faster than those that are already degraded (Outhet and Cook, 2004; Brierley et al., 2011). The River Styles framework was designed to cover all Australian stream types, and it is normally applied over the basin or regional scale often limited to third or higher order streams rather than project impact assessment. River Styles was intended to classify watercourses over reaches, rather than at points, and the literature does not explain how it can be applied to point impact assessment (Gippel 2020).

The Fluvial Geomorphology Addendum classified the third order and above pipeline waterway crossings for the entire pipeline corridor (as amended) in accordance with the River Styles framework. Two second order watercourse crossings along the amended pipeline route options were also included as they occurred on gullied reaches. Across the pipeline corridor there are 17 named watercourses classified on the River Style Spatial Layer for NSW. The Fluvial Geomorphology Addendum classified an extra 12 currently unclassified non-minor watercourses along the pipeline corridor using the River Styles framework (Gippel 2020).

In the River Styles framework, watercourses with high fragility are considered to be at the greatest risk of geomorphic change if disturbed.

iii Existing environment

The number of watercourse crossings has been revised to reflect the amendments to the pipeline corridor. The amended pipeline development will cross 114 watercourses if the northern option is constructed and 122 watercourses if the southern option is constructed. The perennial water crossings identified in the EIS Fluvial Geomorphology Assessment (Gippel 2019) will continue to be crossed by the pipeline corridor (as amended). In addition, the revised pipeline route (both the northern and southern options) will cross Springs Creek (third order) and an unnamed third order watercourse, while the northern option will cross Dicks Creek (forth order).

The Fluvial Geomorphology Addendum identified three watercourse crossings (Springs Creek and associated third and second order tributaries (identified as NS20-22 in Gippel 2020) intersected by the shared portion of the revised pipeline route options, as having actively gullying, as evidence by bare soil and complex convex bank edges. A 2.5 m knickpoint was located about 1.5 km downstream of Springs Creek and its third order tributary (NS21 and NS20 respectively). The second order tributary of Springs Creek (NS 22) had a 6 m high knickpoint located 150 m downstream. Knick points were identified in the vicinity of an additional two crossings of unnamed watercourses on the southern option (identified as S14 and S19 in Gippel 2020).

Active gullying was also observed as an unnamed third order tributary intersected by the southern alignment (identified as S14 in Gippel 2020). This watercourse was previously crossed further to the south by the realigned portion of the EIS pipeline.

iv Impact assessment

The key risks to water courses from the construction phase of the project are associated with downstream knickpoints (longitudinally migrating bed level) and wide floodplains (laterally migrating channel position). These risks will be managed through further geotechnical assessment to assist with the selection of the most appropriate construction method or mitigation measures. As per the EIS, the Macquarie River and Queen Charlottes Creek will be underbored to mitigate potential geomorphic impacts.

The Fluvial Geomorphology Addendum reiterated the findings of EIS Fluvial Geomorphology assessment in that trenched crossings present a low risk of geomorphic impact on most watercourses during the operational phase, provided the pipeline is buried a sufficient depth from the consolidated bed, and sufficient distance from the watercourse banks. It will also be necessary to ensure the backfill is composed of the same material that was excavated (replaced in layers, as appropriate), the backfill is compacted, and effective restoration of the disturbed area is undertaken. Disturbance of the bank soil during and just after construction could expose the channel to enhanced risk of erosion if a significant storm runoff event occurred before vegetation had time to establish good coverage. This impact would be more likely at sites with steep bed and banks and can be avoided by fortifying the banks with gabions or riprap.

a River Styles Assessment

The Fluvial Geomorphology Addendum identified 11 high fragility watercourses, nine of which had previously been identified in the River Styles Spatial Layer. These watercourses are summarised in Table 6.10. It is noted that the Fluvial Geomorphology Addendum did not find a high correlation between a high fragility classification and the key risks to water courses from the construction phase of the project which were associated with downstream knickpoints (longitudinally migrating bed level) and wide floodplains (laterally migrating channel position). Notwithstanding, high fragility watercourses, along with watercourses with downstream knickpoints, sandy and/or rocky beds will be prioritised for further geotechnical assessment in the detailed design phase to assist with the determine the most appropriate construction method.

Table 6.10 Pipeline corridor - River styles framework high fragility watercourses

ID[1]	Name	Stream order	flow	River style	Condition	Recovery potential	Fragility
N1[N]	McLeans Creek	4	Perennial	Planform controlled, low sinuosity, sand	Moderate	Moderate	High
N2[N]	Dicks Creek	4	Perennial	Planform controlled, low sinuosity, sand	Poor	Low	High
N9[N]	Un-named	4	Non Perennial	Valley fill, fine grained	Moderate	High	High
N10[N]	Evans Plains Creek	5	Perennial	Planform controlled, low sinuosity, sand	Poor	Low	High
16[S]	McLeans Creek	5	Perennial	Planform controlled, low sinuosity, sand	Poor	Low	High
45	Queens Charlotte Creek	6	Perennial	Planform controlled, low sinuosity, sand	Moderate	Moderate	High
59	Salt Water Creek	5	Perennial	Low sinuosity, sand	Moderate	Moderate	High
87	Un-named	3	Non-Perennial	Valley fill, fine grained	Moderate	High	High
89	Kirk Connell Creek	3	Non-Perennial	Valley fill, fine grained	Good	Conservation	High
103	Williwa Creek	4	Non-Perennial	Planform controlled, low sinuosity, sand	Good	Conservation	High
127	Wangol Creek	4	Perennial	Valley fill, fine grained	Poor	Low	High

Notes: 1. Water crossing ID Gippel (2020 & 2019), N: the northern option, S - the southern option
2. Watercourses not identified in the River Styles Spatial Layer, however classified high fragility in Gippel (2020)

v Mitigation and management

The management and mitigation measures outlined in Chapter 24 of the EIS remain relevant to the amended pipeline development and are reproduced in Appendix C.

Additional mitigation measures to manage potential geomorphic risks during construction of watercourse crossings are provided below and included in Appendix C:

- Further geotechnical assessment will be carried out at crossings of high fragility watercourses as identified in Table 6.10 above as well as watercourses identified with the geomorphic risks outlined below to assist with the selection of the most appropriate construction method and mitigation measures:
  - For water crossings with a sand bed (Evans Plains Creek, McLeans Creek, Salt Water Creek and an unnamed 3rd order water course on the southern pipeline option (identified as S14 in Gippel 2020)), the pipeline construction trench depth will be below the base of the sand bed. The depth of sand will be comprehensively surveyed as part of the geotechnical assessment to be undertaken during the detailed design stage.

- The crossing at Pipers Flat Creek and an unnamed 4th order non-perennial along the southern pipeline option (identified as crossing 14 in Gippel 2019) have exposed bed rock. Bedrock confers geomorphic stability and its disturbance would pose a risk of bed instability. These sites will be comprehensively surveyed as part of the geotechnical assessment to be undertaken during the detailed design stage to determine the best approach to construction.

- The risk of an upwards migrating knickpoint impacting the five additional knickpoints identified along the revised pipeline route options (in addition to the crossing 68 as identified in Gippel 2019), will be mitigated by monitoring the position of the downstream knickpoints, stabilising the knickpoints using structural works, or re-locating the crossing further upstream.

As part of the CEMP for the pipeline development, Regis will:

- In consultation with DPIE-Water, Regis will develop a hierarchy of procedures for any excavation of watercourses based on the published NSW River Styles database and other watercourses identified as at risk to geomorphic change.

- Geomorphologic criteria will be established to prioritise those rivers and sections/reaches that are vulnerable to degradation on disturbance, particularly targeting bed and bank stability.

- Devise a remediation and reconstruction strategy in consultation with DPIE-Water for watercourses crossings of 3rd order and greater. The strategy will be consistent with Rutherford, Jerie and Marsh (2000).

- Monitoring of geomorphic aspects of the pipeline watercourse crossings will focus on significant storm runoff events. An inspection will be undertaken of a random sample of crossings of first and second order streams, and all third and higher order streams, as soon as possible following a 20% annual exceedance probability regional storm event.

- Inspection of watercourse crossings will be incorporated in the routine pipeline inspection and maintenance procedures developed for the operational phase.

6.4.3 Conclusion

The following is a summary of the outcomes of the assessed impacts of the amended mine development on water resources. These outcomes are generally consistent with the findings of the EIS.

- The design of the amended water management system has been further optimised to minimise disruption of and to avoid discharge of process affected water to surface water systems.

- Numerical modelling and analytical techniques have been used to develop the site water balance, investigate potential changes in flood extent, and predict water quantity and quality changes to surface water and groundwater resources. The impacts on surface water and groundwater as a result of the amended mine development are predicted to be minimal and impacts to downstream water users are predicted to be minor.

- Groundwater levels will decline in a localised area surrounding the open cut pit. The AIP requires 'make good' provisions for landholder bores affected by greater than 2 m drawdown as a result of the mine development. However, consistent with the EIS. there are no third-party bores with a predicted drawdown in excess of 2 m.

- Consistent with the EIS, a temporary reduction in the inflow to Carcoar Dam (4%) will occur as a result of construction and operation of the project. Permanently, following mine-closure and rehabilitation, the reduction in flows will be much smaller (0.5% reduction). This level of change is expected to be within the current natural variability in catchment conditions.

- Downstream of Tributary A, there is no change in groundwater discharge (baseflow) or river leakage predicted to occur during and after mining.
- Upstream of the Tributary A confluence, a 15% reduction in baseflow to surface water (ie the Belubula River) in the local area is predicted to occur during and after mining. However, under existing pre-mining conditions baseflow is predicted to contribute only around 5% to the overall surface water flows in this area.
- At maximum disturbance, flows in the Belubula River below the Mid Western Highway and above Carcoar Dam is expected to range between at least 697 ML/year and 1,509 ML/year during periods of low rainfall (compared to the EIS findings of at least 636 ML/year and 1,402 ML/year). During these periods of low rainfall when downstream users are most reliant on water within the Belubula River, groundwater discharge as baseflow in the Mid Western Highway area is predicted to remain unchanged from current conditions.
- The mine development is not anticipated to result in a lowering of the beneficial use category of the local water sources. The mine development has been designed to appropriately mitigate and/or manage water quality affects.
- Changes to flood levels and flood peak velocities are considered minimal and a construction of flood levee is not warranted.
- Terrestrial ecosystems identified as opportunistic users of groundwater outside of the disturbance footprint (PCT 951 and 1330) are not predicted to have reduced access to groundwater as a result of the mine development.
- Further geotechnical assessment will be carried out for the pipeline development watercourse crossings identified as high fragility as well as watercourses identified with the geomorphic risks to determine the most appropriate construction method and mitigation measures.

Monitoring of the mine development water monitoring network will continue, and the network will be expanded to target the identification of potential impacts from mining activities. Monitoring each component of the water management system underpins if, how, and when management responses are required. Triggers and thresholds will be developed to provide context on if, how, and when management measures are required as part of the WMP for the amended mine development.

A pipeline instrumentation system (flowmeters and pressure transducers) fault detection system will be incorporated within the pipeline design. With leak detection measures, periodic inspections, maintenance and monitoring, the likelihood of a pipeline leak causing water quality impacts on the environment is considered rare and the risk is assessed as low.

6.5 Noise and vibration

6.5.1 Mine development

A Noise and Vibration Assessment has been prepared by Muller Acoustic Consulting (MAC 2020a) to assess the potential impacts of the amended project on identified noise-sensitive receptors. The revised assessment was undertaken in accordance with the *Noise Policy for Industry* (NPfI) (EPA 2017) and supersedes the findings of the EIS Noise and Vibration Impact Assessment (Mine NVIA), which was included as Appendix L of the EIS.

As described in Chapter 2, many of the amendments to the project were specifically made with the aim of further reducing the predicted noise levels from the mine development at the nearest sensitive receivers; ie at residences in Kings Plains. The result is lower predicted noise levels during the initial site establishment and construction phase, and throughout operation of the mine development, primarily through:

- revision of the waste schedule and development of the waste rock emplacement. This revision has included a change in the construction sequence of the emplacement, which will now commence in the north, away from Kings Plains, rather than in the south, as was the case in the EIS;
- optimisation of the location of exit and entry ramps to the open cut, which have been revised to reduce potential noise emissions from trucks exiting and entering the pit (also reducing the height of the pit amenity bund in this area);
- selection of mobile equipment with lower noise emissions by sourcing in field tested sound power levels from manufacturers of equipment with original equipment manufacturer (OEM) fitted mitigation;
- optimisation of the mining mobile equipment fleet (both the quantity and type) through selection of larger capacity equipment (haul trucks and excavators) with proven noise mitigation options available through OEM or aftermarket providers;
- general reduction in the number of equipment in the mining fleet;
- realignment of the processing plant and mine infrastructure areas, enhancing natural topographical shielding;
- incorporating localised barriers along haul roads to the southern area of the waste rock emplacement; and
- implementing equipment with reduced noise output and the scheduling of noise intensive works such as the construction of the pit amenity bund and WMFs during the initial six months construction phase in sequence, and with works to occur during the daytime only in these first six months.

This chapter summarises the findings of the revised noise and vibration assessment, with the full technical report included in Appendix J.

i Existing environment

a Sensitive receivers

There are two changes to the status of privately-owned residences in the vicinity of the mine development project area from that described in the EIS. Since the EIS submission, an additional receiver (R28A) has been identified in Kings Plains. While there is no existing dwelling at this location, the property owner has obtained planning approval from Blayney Shire Council to build a residence, and therefore the property has been conservatively included as a sensitive receiver for the amended project and potential impacts have been assessed. Regis has also purchased a property in Kings Plains since the EIS and DA submission (R27).

Further, an additional structure has been included in the assessment of blasting and vibration impacts. The EIS identified an item of potential historic heritage significance in the mine development project area in the direct disturbance footprint of the secondary WMF; site MGP 23 (Hallwood). Hallwood has been specifically avoided by the amended project design, with this WMF removed from the mine design and replaced with the Main WMF. As the building will remain, the revised noise and vibration assessment considered the potential impacts to this property.

The assessed receivers for the mine development are shown in Figure 6.21.

b Rating background level

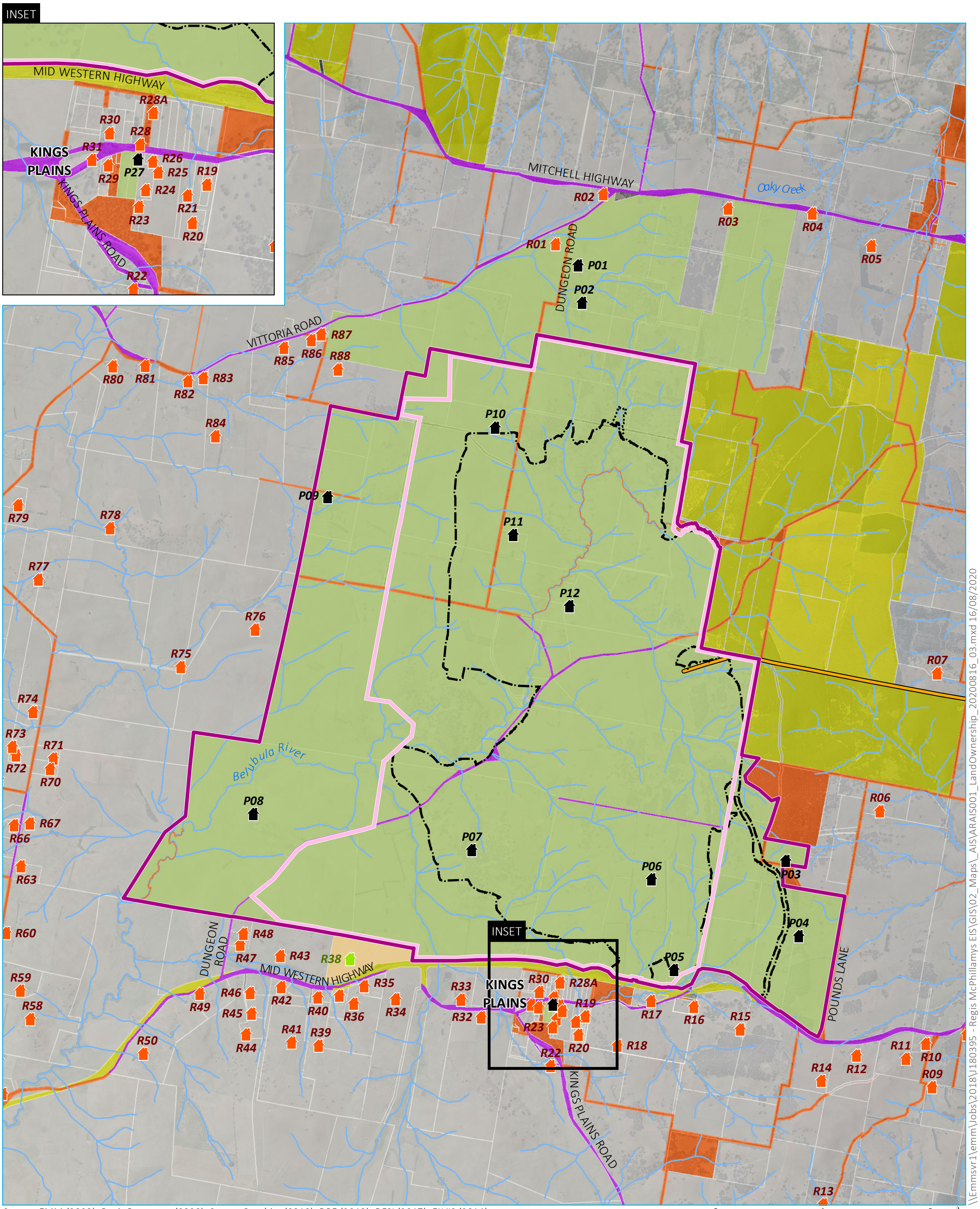
The Rating Background Level (RBL) is an overall single background level representing each assessment period (day, evening and night) over a noise monitoring period for a particular receiver or identified noise catchment area.

As described in the EIS, noise monitoring was conducted to characterise the existing noise environment around the mine development project area. To quantify background noise levels, historic long-term unattended noise monitoring results undertaken by EMM in 2013 were reviewed, as well as monitoring data from a noise monitoring terminal (NMT) deployed by Regis in Kings Plains for a period of 87 days, between November 2016 to February 2017. Review of ambient and background noise levels from this monitoring data showed that the Mid Western Highway is the most significant man-made noise source in the area, as background noise levels measured in proximity to the Mid Western Highway were noticeably higher than locations more distant from the highway.

Supplementary monitoring was then undertaken in July 2018 by MAC to capture any change in the existing environment and to validate the influence of the Mid Western Highway on receivers in the Kings Plains and Sturgeon Hill noise catchment areas (refer to Figure 6.21).

Review of the supplementary monitoring data shows that in Kings Plains, the long-term data (36dB LA90 (daytime) and 32dB LA90 (evening) from the Regis NMT exceeds the NPfI minimum applicable RBL of 35dB LA90 (daytime) and 30dB LA90 (evening). Furthermore, ambient noise levels exceed the recommended amenity noise levels for a rural receiver, indicating that the Kings Plains catchment differs from other catchments more distant from the Mid Western Highway. Therefore, the long-term data confirms that receivers in the Kings Plains noise catchment area are influenced by road traffic on the Mid Western Highway during the daytime and evening periods, and as such the RBLs for this catchment have been defined as the minimum measured RBL from the long-term dataset measured in 2016/2017. Night time background levels are below the minimum applicable RBL of 30dB LA90 (night).

RBLs for all other assessment periods in the other catchments are below the NPfI minimum applicable values of 35dB LA90 (daytime), 30dB LA90 (evening) and 30dB LA90 (night), which is reflective of the rural environment in these catchments, except for the evening period in the Sturgeon Hill catchment. The minimum measured RBL in that catchment was 1 dB above the minimum RBL specified by the NPfI of 30 dB in the evening period (ie 31 dB). Considering the relatively small monitoring dataset available in the Sturgeon Hill catchment of seven days (compared to the 87 days in Kings Plains), the influence of the highway on the background noise environment is not as clearly demonstrated by this data, and therefore the minimum applicable RBL has been conservatively adopted for this catchment in the evening period.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DPE (2018); DFSI (2017); ELVIS (2014)

0 1 2 km
GDA 1994 MGA Zone 55

KEY

- Sensitive receptors
- Residences under option
- Project-related residences

Project application area

- Mine development project area
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- Watercourse/drainage line

Land ownership status (Regis, 2019)

- Regis
- Under option

Controlling authority

- Crown
- Freehold
- Local government authority
- NSW government

Sensitive receptors and land tenure – mine development

McPhillamys Gold Project
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Figure 6.21

Therefore, in consideration of the measured noise levels discussed above, and consistent with comments made by the NSW EPA in relation to RBLs, the minimum applicable RBLs specified by the NPfI have been adopted for all noise catchment areas around the mine development project area, except for the daytime and evening periods in the Kings Plains catchment. The amended project RBLs are presented in Table 6.11.

In the EIS, the RBL for each catchment was determined by taking an average of the RBLs measured in each catchment. It is noted that the NPfI does not specify how to assign RBLs in the situation where multiple noise monitoring data sets are obtained, and therefore, MAC applied a method of using averages. However, in response to the EPA's request to adopt the minimum measured RBL for each catchment, this approach has been conservatively adopted as described above. For comparison, the RBLs adopted in the EIS assessment are also presented in Table 6.11.

Table 6.11 Amended Rating Background Levels for the mine development

Noise catchment area	Measured RBL dB LA90 (period)			Adopted RBL dB LA90 (period)					
				EIS			Amended project		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Distant Rural (MAC06)	29	25	24	35	30	30	35[3]	30[3]	30[3]
Kings Plains (NMT)	36	32	30	36	**31**	30	36	**32**	30[3]
Walkom Road (MAC01, MAC03)	34	30	24	35	30	30	35[3]	30[3]	30[3]
Sturgeon Hill (MAC04)	40[2]	31	26	35	**33**	30	35[3]	**30[4]**	30[3]

Note 1: Day - 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - 6pm to 10pm; Night - the remaining periods.
Note 2: Wind affected data.
Note 3: Minimum applicable RBL adopted.
Note 4: Minimum applicable RBL adopted for the Sturgeon Hill evening period due to a relatively small data set of seven days valid data.

As can be seen in Table 6.11, only two RBLs have changed compared to the EIS (shown in bold). The difference in the evening RBL for Kings Plains is attributed to the use of an average RBL in the EIS, compared to adopting the minimum measured value based on the long-term NMT dataset in the amended project, and the minimum NPfI applicable evening RBL has been adopted for Sturgeon Hill, again rather than an average, as described above.

It is noted that for Kings Plains, the use of the *minimum* measured RBL from the NMT data has resulted in a higher RBL than the calculated RBL (using *averages*) in the EIS. The average used in the EIS was an average of the RBLs from several datasets with different ranges (minimum - maximum). The RBL is the median (50^{th} percentile) of the (daily) Assessment Background Levels (ABLs), which is the lowest 10^{th} percentile of the measured value for each day, evening and night, including any values below 35 (for day) or 30 (for evening and night). Hence, the average of the RBLs can be a low number, as was the case for Kings Plains.

ii Noise criteria

Based on the revised RBLs described above, the Project Noise Trigger Levels (PNTLs) adopted for the amended project are presented in Table 6.12.

Table 6.12 Project noise trigger levels – mine development

Catchment	Assessment Period[1]	PINL dB LAeq(15min)	PANL dB LAeq(15min)	EIS	Amended project
				PNTL[2] dB LAeq(15min)	PNTL dB LAeq(15min)
Distant Rural R01-R14, R52-R88	Day	40	53	40	**40**
	Evening	35	48	35	**35**
	Night	35	43	35	**35**
Kings Plains R15-R17, R25-R33	Day	41	53	41	**41**
	Evening	37	48	**36**	**37**
	Night	35	43	35	**35**
Walkom Road R18-R24	Day	40	53	40	**40**
	Evening	35	48	35	**35**
	Night	35	43	35	**35**
Sturgeon Hill R34-R51	Day	40	53	40	**40**
	Evening	35	48	**38**	**35**
	Night	35	43	35	**35**

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.
Note 2: EIS PNTLs are bolded where different from the Amended Project PNTLs

The other applicable noise criteria have not changed as identified in the EIS; such as the construction noise criteria (noise management levels (NML)), road traffic noise, blasting and vibration criteria.

iii Reasonable and feasible mitigation

As outlined in Section 6.5.1, some notable changes have been made to the project to specifically reduce noise predictions. The results presented in section 6.5.1(iv) account for the implementation of these reasonable and feasible mitigation measures, as follows:

- **Change in equipment selection**, resulting in a lower overall sound power level (SPL) from the mining fleet:
  - The octave data provided in the EIS NVIA were for a diesel fleet with mechanical drive haul trucks. The amended project includes the use of alternate, quieter equipment, such as electric drive haul trucks (or a similar fleet with equivalent sound power levels and spectral content).
  - In the EIS NVIA, the use of tracked bulldozers was generally limited to daytime operations with wheeled dozers taking their place during the evening and night time periods, particularly on the waste rock emplacement. The amended project design excludes higher capacity, higher noise output bulldozers from the mining fleet which have been replaced with a comparable bulldozer with a lower sound power level of 110 dBA.

- The amended mining schedule has rationalised the equipment quantities and type, reducing the overall fleet by 20% to 30% at various stages of the project life compared to that modelled in the EIS. This rationalisation of equipment (ie larger capacity requiring less quantity) combined with lower equipment noise emissions has yielded an overall reduction of approximately 3dBA in total project sound power level.

- **Amended mining and waste rock emplacement schedule:**
  - As described in Chapter 2, the construction schedule for the waste rock emplacement has been revised so that construction commences in the north, rather than in the south, as was assumed in the EIS. A detailed explanation of this amendment is provided in Chapter 2 (refer to Section 2.4.3). In addition, activity on the southern amenity bund and the pit amenity bund, which are the closest mining areas to Kings Plains, will only be undertaken during the daytime period, resulting in both noise and visual benefits (such as reduced direct lighting).

- **Open cut pit exits**:
  - The northern and south-eastern exits to the open cut pit have been modified.

- **Site access**:
  - The site access intersection with the Mid Western Highway has been moved approximately 1 km east, away from a residential property (R17) which was predicted to experience significant noise levels, albeit temporary, from the construction of this intersection.

- **Scheduling of construction activities**:
  - Careful consideration of activities carried out in the southern portion of the mine development project area (closest to Kings Plains) during the initial six months of the project has contributed to a reduction in noise levels in this period. In the first six months the pit amenity bund and the three WMFs around the southern end of the waste rock emplacement (WMFs 4, 5 and 6) will be constructed generally in sequence, rather than in parallel. This will limit the equipment numbers and activity in the southern end of the waste rock emplacement. Construction will occur in the daytime period only.

iv Impact assessment

a Construction noise

As described in the EIS, mine construction activities will overlap with the operational phase. The construction scenario modelled in the amended noise assessment comprises the first six months of the project, essentially comprising site establishment, and includes the following main activities:

- temporary site access via Dungeon Road;
- construction of the permanent site access from the Mid Western Highway;
- clearing and grubbing of the open cut pit area and ROM pad;
- construction of the WMFs at the southern end of the mine development project area (WMFs 4, 5 and 6);
- initial construction of the pit amenity bund; and
- other construction activities (eg earthworks, civil works and construction of other WMFs).

Consistent with the EIS, these site establishment activities will be undertaken predominantly during the daytime only (ie standard construction hours of 7 am to 6 pm, as per the ICNG).

Predicted construction noise levels for Month 1 to Month 6 in Year 1, compared with that predicted in the EIS, are provided in Table 6.13. This includes a range of predicted construction noise levels at sensitive receivers during standard day time hours (Monday to Friday 7 am to 6 pm, Saturday 8 am to 1 pm and no work on Sunday or public holidays).

Table 6.13 Predicted day time construction noise levels – Year 1 Month 1 to Month 6

		EIS		Amended project	
Catchment (no of receivers) and receiver ID	**NML dB $LA_{eq(15\ min)}$**	**PNL range dB $L_{Aeq(15\ min)}$**	**Receivers > NML**	**PNL range dB $L_{Aeq(15\ min)}$**	**Receivers > NML**
Distant Rural (51) R01-R14, R52-R88	45	21-34	Nil	**22-37**	**Nil**
Kings Plains (13) R15-R17, R25-R33	46	36-51	R17 (51 dB(A))	**36-46**	**Nil**
Walkom Road (7) R18-R24	45	36-44	Nil	**36-44**	**Nil**
Sturgeon Hill (18) R34 to R51	45	22-42	Nil	**23-41**	**Nil**

As shown, predicted daytime noise levels are expected to comply with NMLs at all receivers throughout the construction phase of the amended project. Construction noise levels are substantially lower than those presented in the EIS NVIA, particularly in the Kings Plains and Sturgeon Hill catchment areas, which were up to 51 dBA and 42 dBA, respectively. This reduction is predominantly attributed to the use of equipment with reduced noise output in the southern end of the mine development project area, the relocation of the site access road and the specific scheduling of activity on the main structures in the southern portion of the mine development project area closest to receivers (WMFs and the pit amenity bund).

Representative construction noise level contours are illustrated in Figure 6.22. The levels predicted are for about halfway through the construction period (ie Months 3 to 4). Additional construction noise level contours are presented in Section 6.3 of the Amended NVIA (Appendix J).

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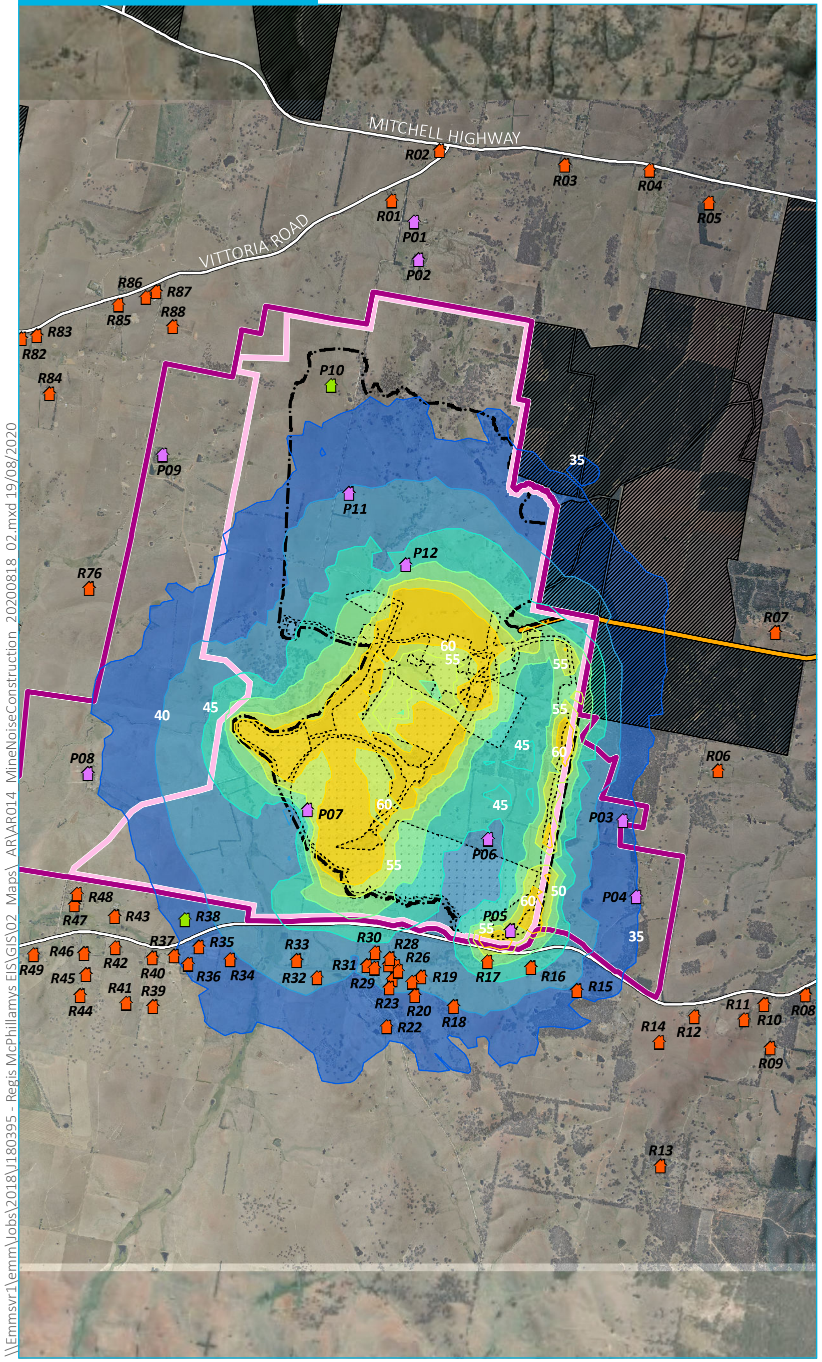
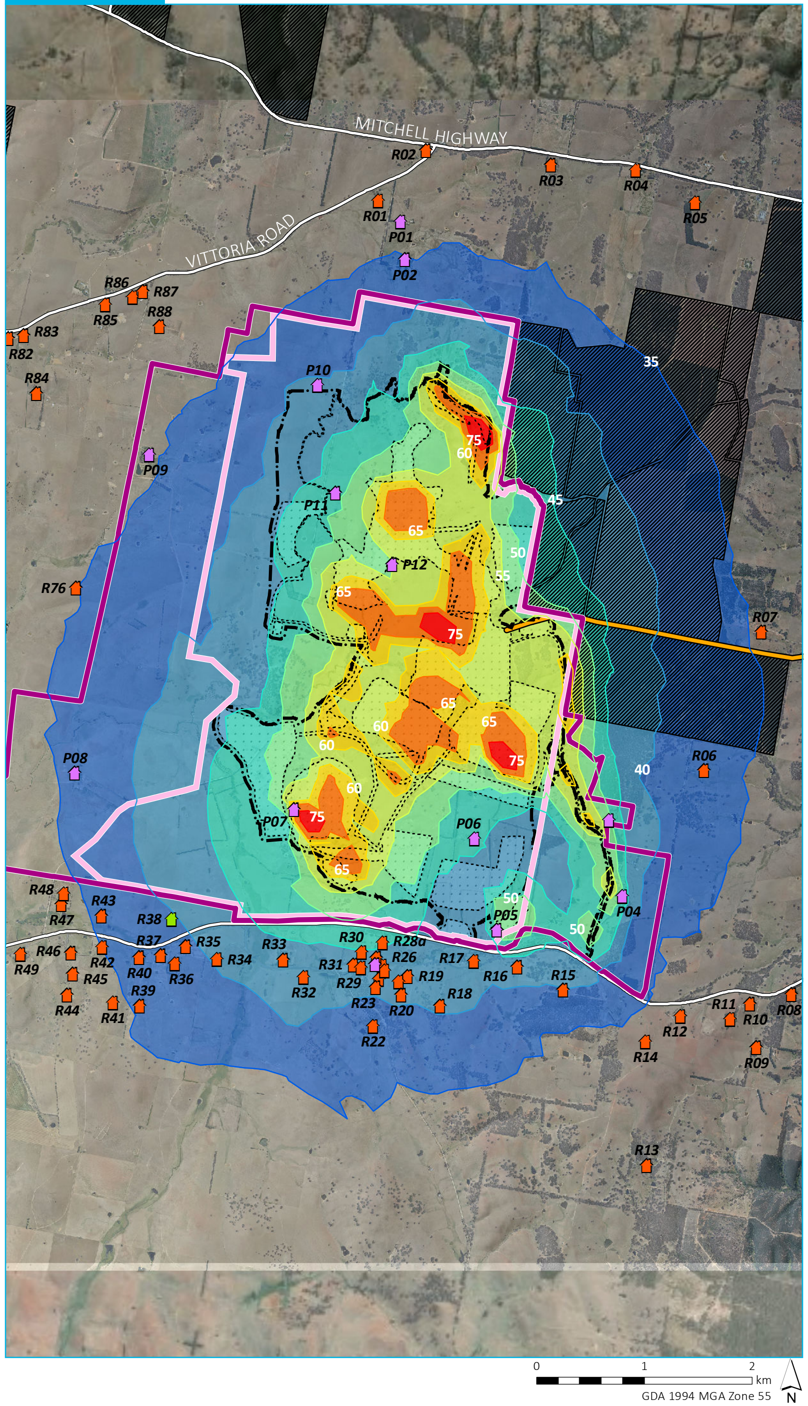


AMENDED PROJECT



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – construction phase (daytime)

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Figure 6.22

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: Figure 8 (MAC170434) (EIS); Post_EIS_Sched_00-04-03_P3_CONST_Day_con (amended project)

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b Operational noise

After the first six months of activity on site, the amended project will transition to a 24 hour, 7 days per week operation consisting of both construction and operational activities. Heavy earthworks activities to construct the TSF, haul roads, bunds and WMFs will continue to occur during the daytime period, whereas the construction of the processing plant, administration, maintenance areas and other mine infrastructure will occur 24/7. Therefore, all activities on site are included in the operational noise assessment, including the construction activities that are yet to be completed. This is considered a conservative approach, given that once operations move to 24/7, they will be subject to the more stringent operational noise criteria (as specified in Section 6.5.1 (ii)).

Operational noise modelling scenarios include construction and operation activities proposed from the second half of Year 1, Year 2, Year 4, Year 6, Year 8 and Year 11. It is noted that the operational life of the amended project, as described in Chapter 2, is proposed to continue into Year 11, rather than finishing in Year 10 as described in the EIS. An additional scenario (Year 6) was considered in the amended assessment, due to the large amounts of waste rock anticipated to be moved in this year (refer to Section 2.5.1 in Chapter 2). The activities proposed and modelled in each scenario are described below. While detailed scenarios and assumptions are required in the noise model, it is noted that detailed mine scheduling will be refined as the project progresses, as is the case with all mining operations, subject to factors such as geological and market conditions at the time. However, the key commitments upon which the scenarios modelled in the noise assessment are based will remain, as outlined in the description of amendments in Chapter 2, the project description in Appendix B, and the summary of reasonable and feasible mitigation measures in Section 6.5.1(iii).

- **Year 1 (second half, Month 7-12)** - construction activity will continue along the main access road from the Mid Western Highway, which is anticipated to be completed in this period. Ongoing removal of soil from cleared areas to stockpiles. Operational activities include initial development of the open cut pit from 965 m RL to 925 m RL. Development of pit ramps to the north and south of the waste rock emplacement will be ongoing and include the pit amenity bund and haul roads. The construction fleet will continue the development of the pit amenity bund as it increases in height to maintain compliance with the daytime PNTL of 40dB LAeq (15 min), 5 dB lower than the construction NML of 40dB LAeq (15 min). The pit amenity bund is expected to be completed in this period.

- **Year 2** - sealing of the main access road from the Mid Western Highway will be completed. Commissioning of the processing plant and other infrastructure will occur and become operational. Open cut mining operations will reach around 890 m RL, with ore being hauled to the ROM via the north pit exit. Waste will be hauled to the southern area of the waste rock emplacement during the daytime and to the northern area of the emplacement during the night time. Waste material will be placed on the front face of the southern amenity bund, or the top of the pit amenity bund, as required during the daytime only.

- **Year 4** - open cut mining operations will continue to around 740 m RL. Widening of the pit will also occur around this time. Haulage of waste will now occur 24/7 to both the southern and northern areas of the waste rock emplacement. The rehabilitation fleet will continue to place waste material on the southern face, or the top of the amenity bund as required during the daytime only.

- **Year 6** - open cut mining operations will continue with stage 2 activities requiring a third excavator and additional haul trucks by this time. Peak material movement will be occurring, with waste haulage 24/7 to both the southern and northern areas of the waste rock emplacement. The rehabilitation fleet is anticipated to complete placing waste material on the southern face of the waste rock emplacement (ie the southern amenity bund) during this year.

- **Year 8** - from around Year 7 onwards the mining fleet is anticipated to reduce to two excavators and associated haul trucks, which will be hauling waste to the centre of the waste rock emplacement.

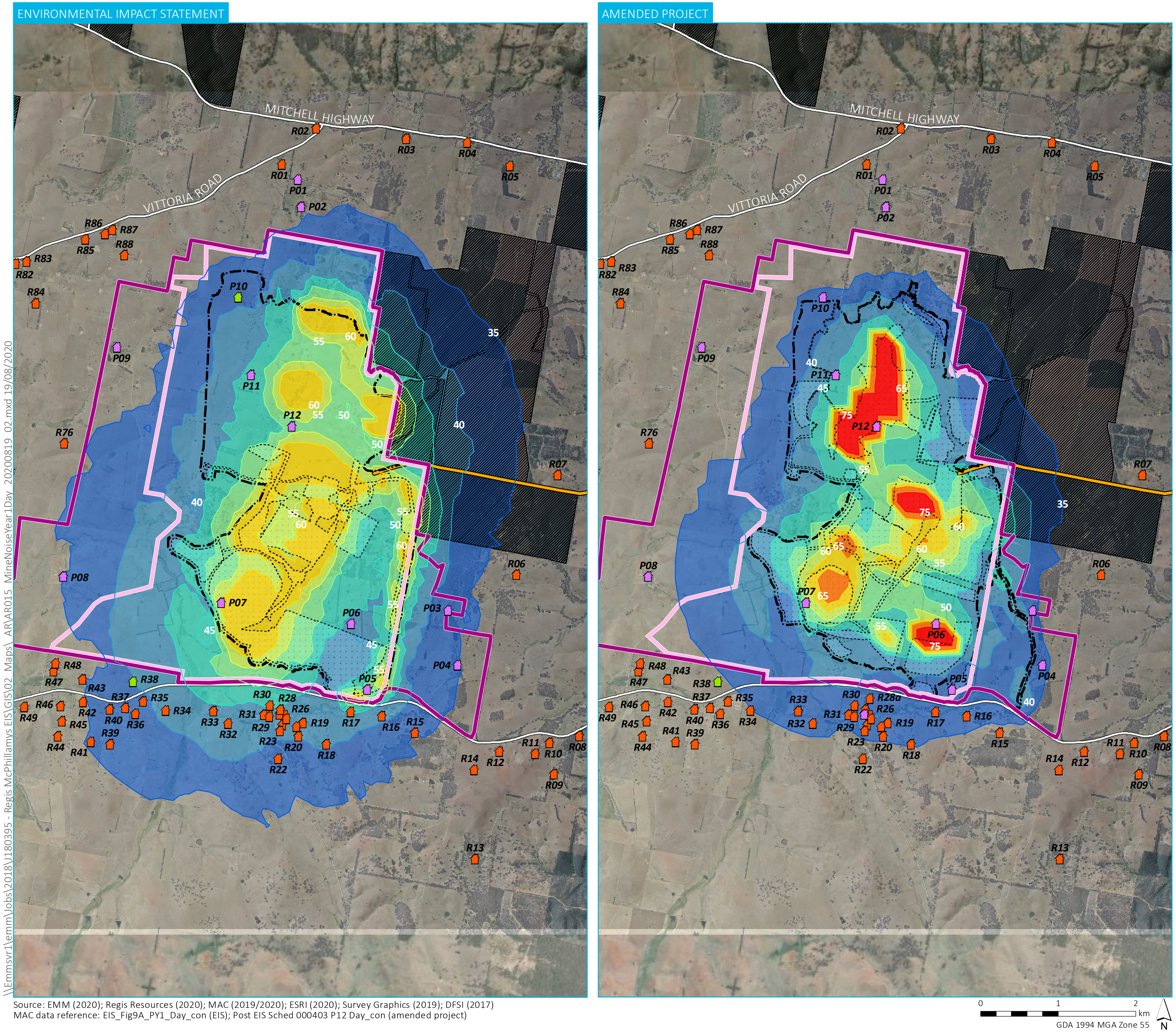
Noise levels predicted for the scenarios described above are provided in Table 6.14. Results are presented as a range for each catchment together with the number of receivers that exceed the PNTLs by up to 2 dB and up to 5 dB. As shown, no receivers are predicted to experience noise levels greater than 5dB above the PNTL with the mitigation measures in place as described in Section 6.5.1(iii) and 6.5.1(v) of this report and detailed in Section 7 of MAC (2020a).

Predicted noise contours for the day and night time periods for the progressive mine stages modelled (Year 1 to Year 8) are presented in Figure 6.23 to Figure 6.32.

Table 6.14 Operational noise levels – mine development

Catchment (No)[1] Receiver ID	Period[1]	PNTL dB LAeq (15min)	Project Noise Level (PNL) Range dB LAeq (15min)							No. of Receivers PNTL < PNL <PNTL+2dB[2]							No. of Receivers PNTL+3dB < PNL <PNTL+5dB[2]						
			M7-9[3]	M10-12[3]	Y2	Y4	Y6	Y8	Y11	M7-9[3]	M10-12[3]	Y2	Y4	Y6	Y8	Y11	M7-9[3]	M10-12[3]	Y2	Y4	Y6	Y8	Y11
Distant Rural (51)	Day	40	22-35	19-31	19-33	18-33	19-33	18-33	18-33	-	-	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
R01-R14, R52-R88	Evening	35	20-30	16-29	17-32	18-33	19-33	18-32	18-32	-	-	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	Night	35	20-30	16-29	17-32	18-33	19-33	18-32	18-32	-	-	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Kings Plains (13)	Day	41	35-41	34-39	36-39	35-38	34-38	34-38	29-35	-	-	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
R15-R17, R25-R33	Evening	37	31-**38**	30-37	31-35	34-37	28-35	27-35	28-35	**2**	-	-	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	Night	35	31-**38**	30-**37**	30-35	34-**37**	28-35	27-35	28-35	**8**	**7**	Nil	**7**	Nil	Nil	Nil	**1 (R28a)**	Nil	Nil	Nil	Nil	Nil	Nil
Walkom Road (7)	Day	40	34-39	33-37	32-38	32-37	30-36	30-35	29-33	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
R18-R24	Evening	35	33-**37**	32-35	28-34	31-**36**	27-34	28-33	29-33	4	Nil	Nil	**1**	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	Night	35	33-**37**	32-35	28-34	31-**36**	27-34	28-33	29-33	4	Nil	Nil	**1**	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Sturgeon Hill (18)	Day	40	23-36	20-35	23-35	21-33	23-34	21-33	21-33	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
R34-R51	Evening	35	21-35	19-34	22-33	21-33	23-34	21-33	21-33	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	Night	35	21-35	19-34	22-33	21-33	23-34	21-33	21-33	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Note 1: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.
Note 2: Exceedance of the PNTL by less than 2dB is considered negligible as per NPI methodology.
Note 3: M7-9 and M10-12 are both PY1
Note 4: Bold text indicates exceedance of the PNTL.



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 1 day

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Amendment report
Figure 6.23

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig9A_PY1_Day_con (EIS); Post EIS Sched 000403 P12 Day_con (amended project)

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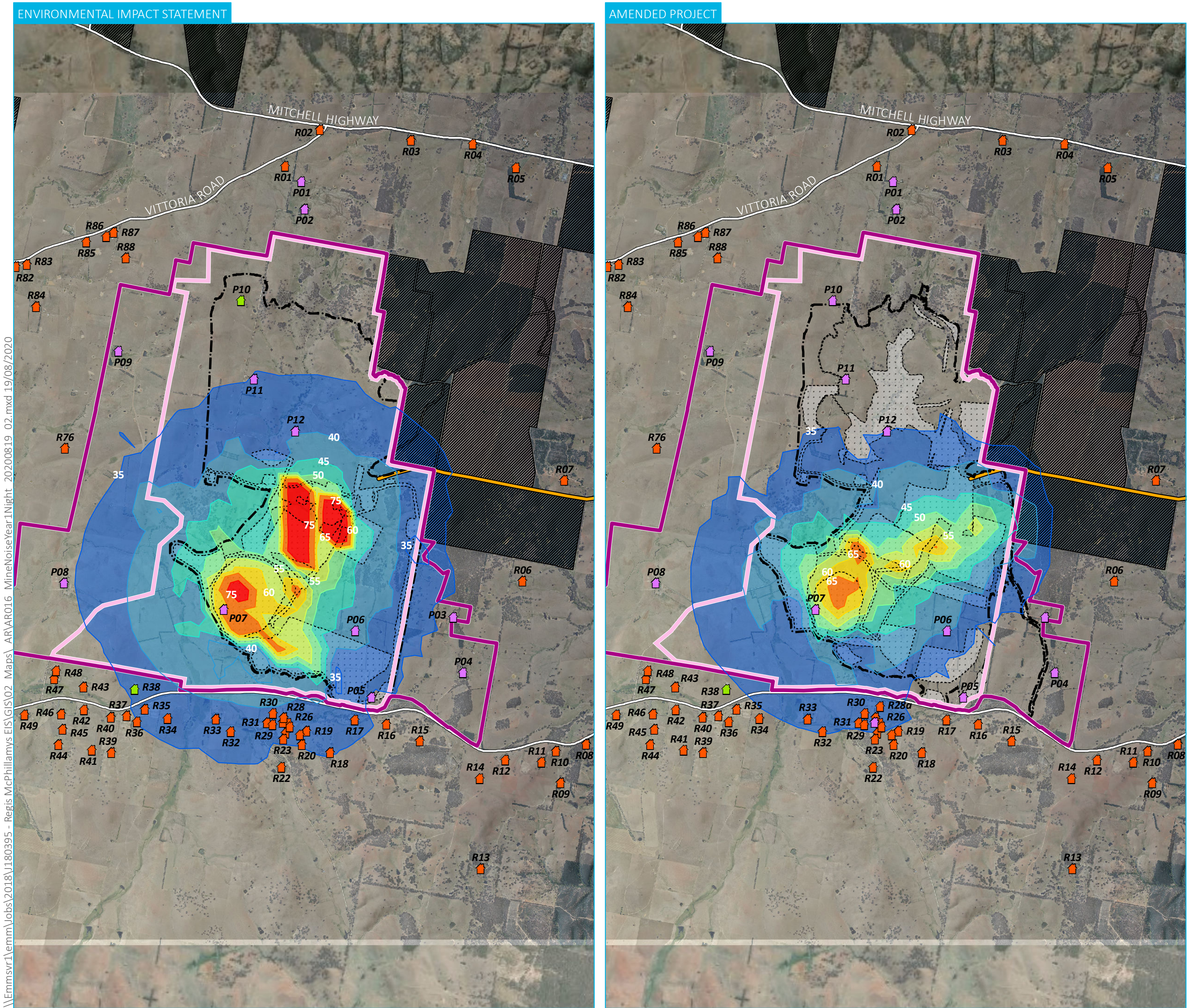

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 1

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 1 night

McPhillamys Gold Project
Amendment report
Figure 6.24

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig9B_PY1_Eve-Night_con (EIS); Post EIS Sched 000403 P12 Night_con (amended project)

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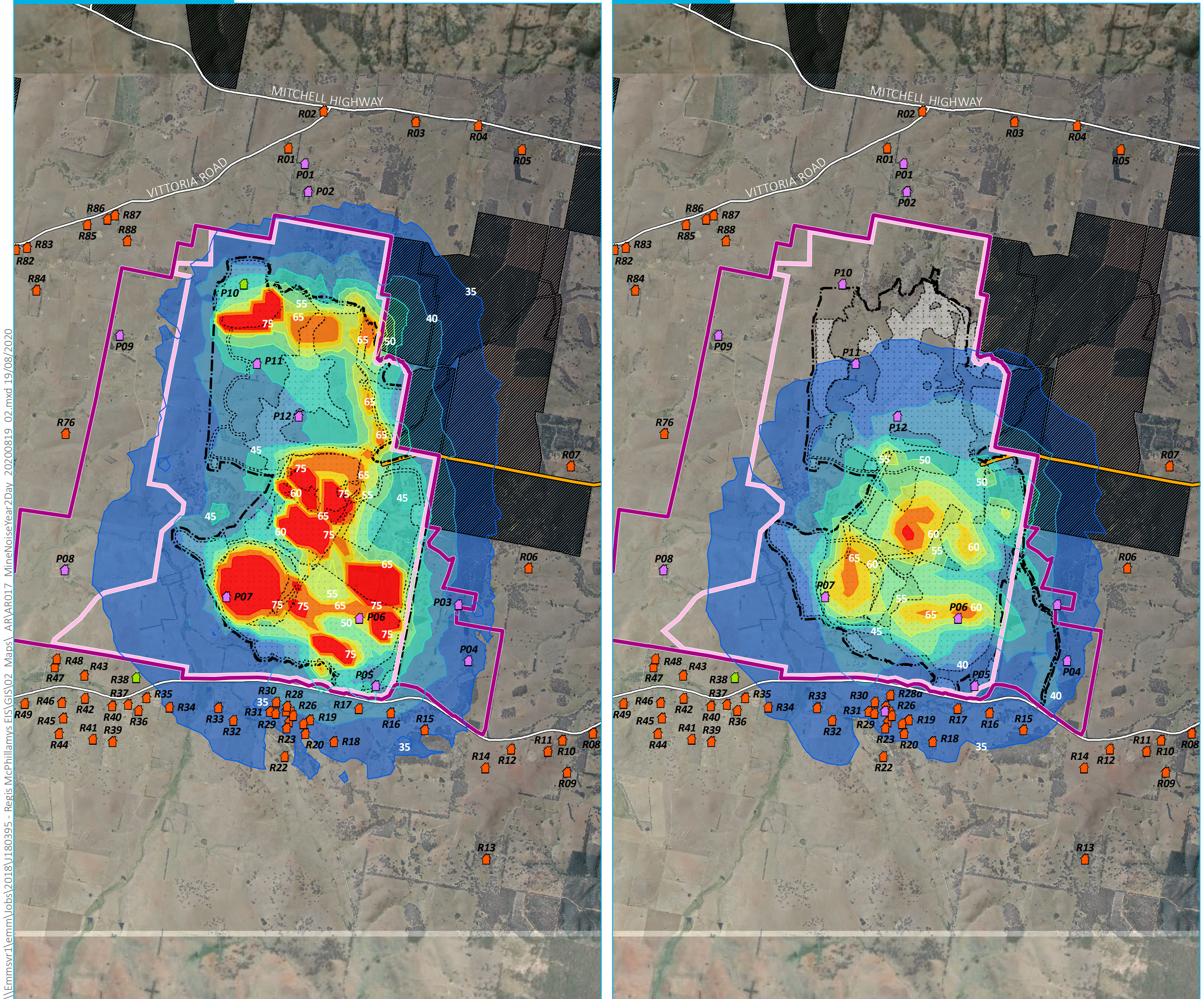
ENVIRONMENTAL IMPACT STATEMENT

AMENDED PROJECT



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 2 day

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Amendment report
Figure 6.25

0 1 2 km
GDA 1994 MGA Zone 55
N

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig10A_PY2_Day_con (EIS); Post EIS Sched 000403 P24 Day_con (amended project)

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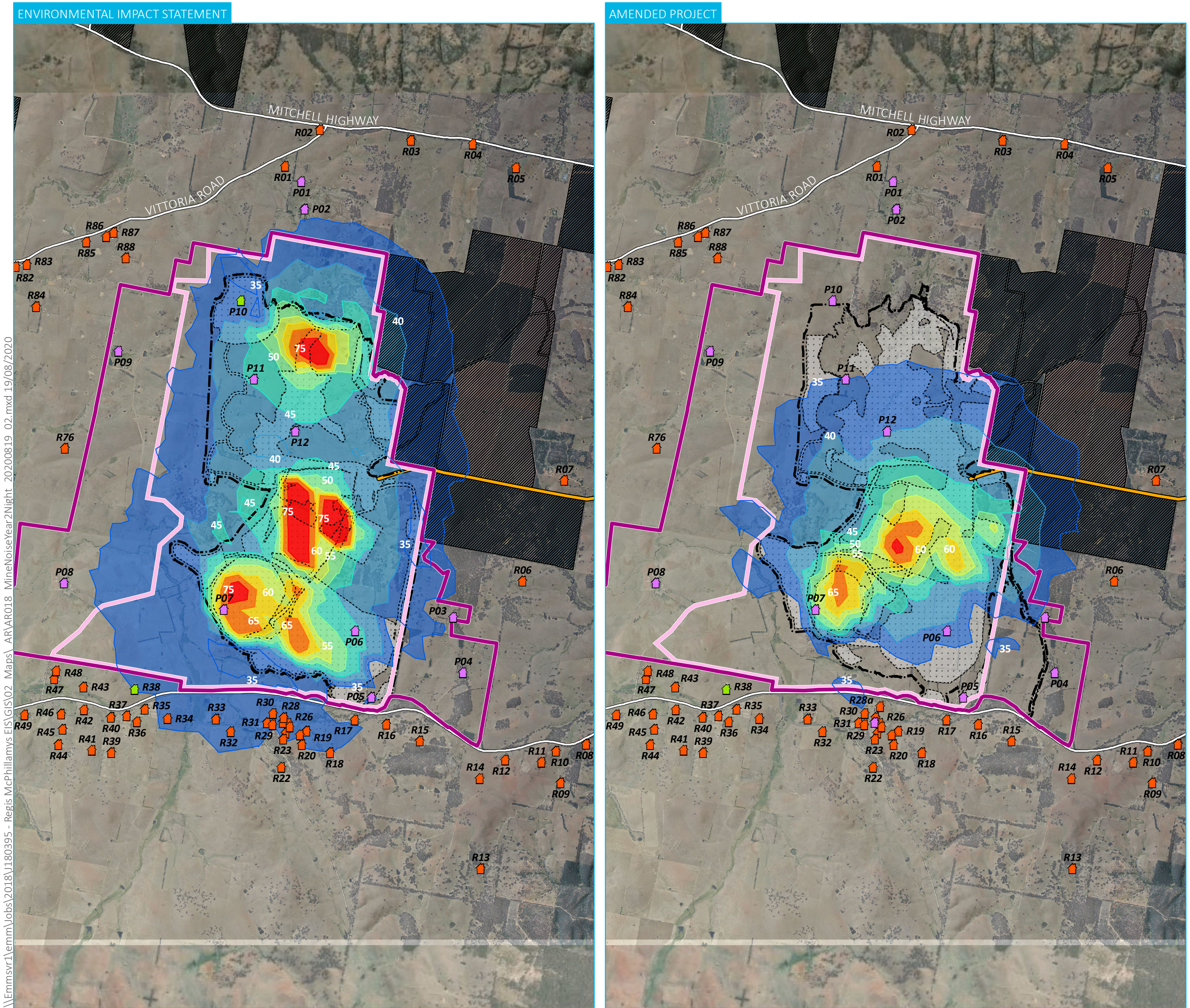


KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 2

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Existing environment

- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)

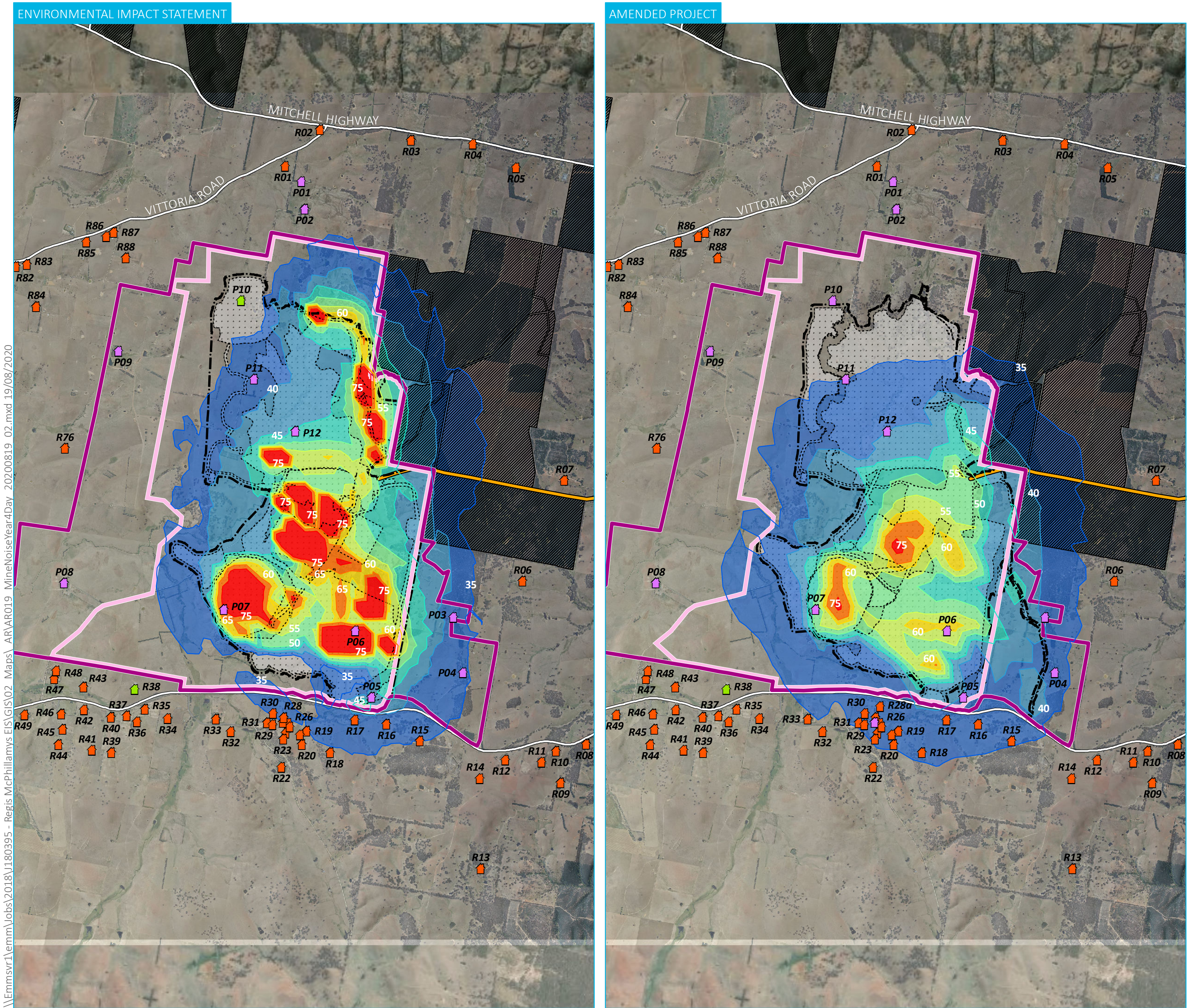
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 2 night

McPhillamys Gold Project
Amendment report
Figure 6.26

0 1 2 km
GDA 1994 MGA Zone 55
N

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig10B_PY2_Eve-Night_con (EIS); Post EIS Sched 000403 P24 Night_con (amended project)



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Existing environment

- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)

- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

0 1 2 km

GDA 1994 MGA Zone 55

N

Predicted noise level contours – Year 4 day

McPhillamys Gold Project
Amendment report
Figure 6.27

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig11A_PY4_Day_con (EIS); Post EIS Sched 000403 P48 Day_con (amended project)

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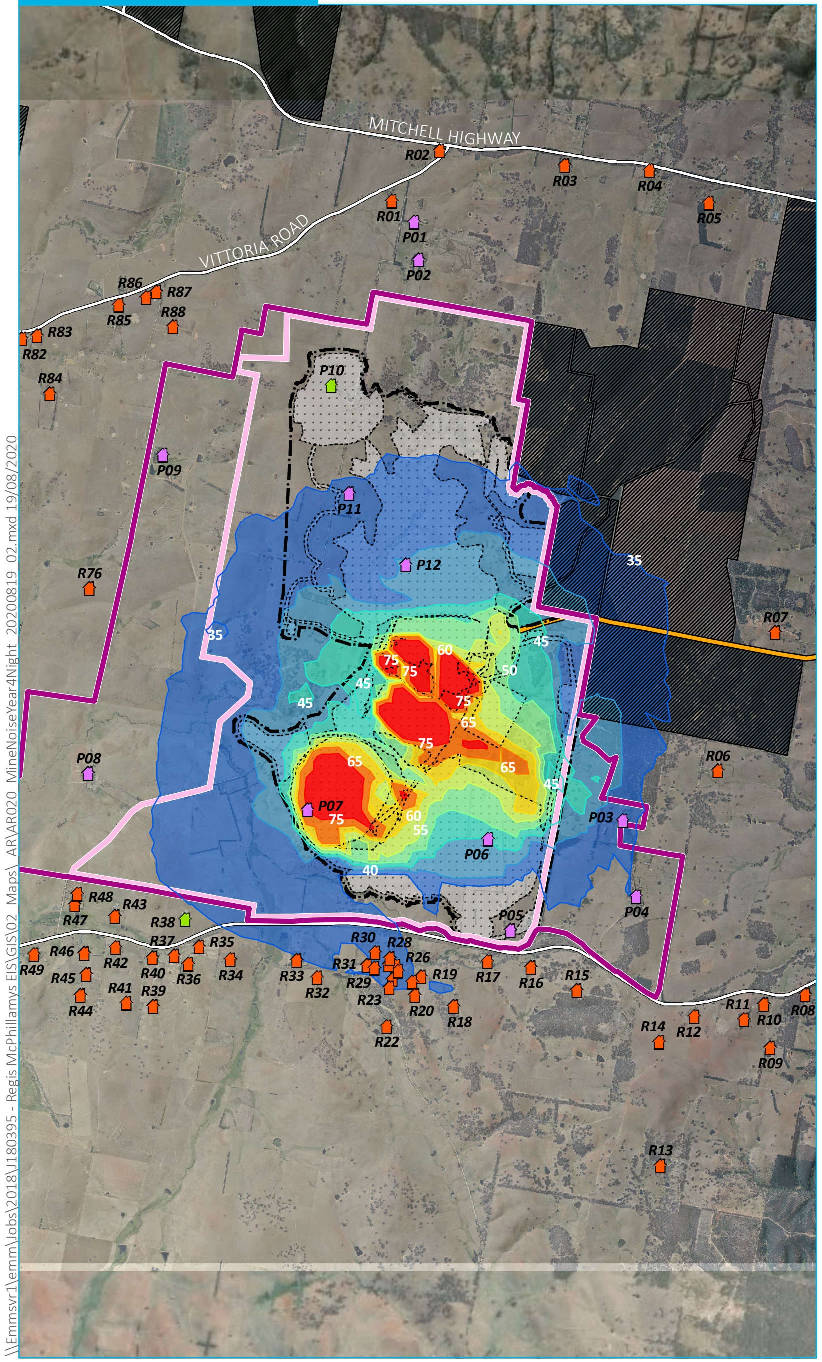
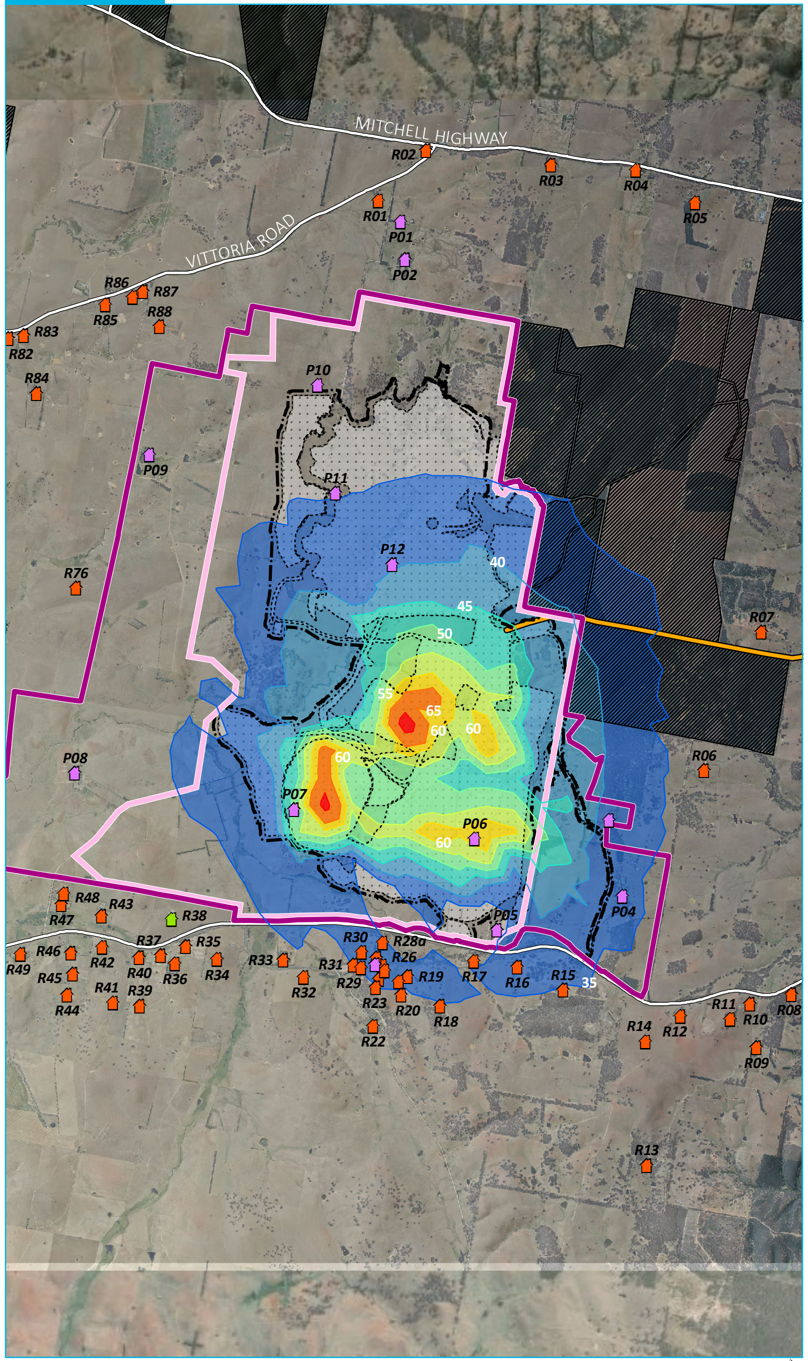
REGIS RESOURCES LTD
EMM creating opportunities

ENVIRONMENTAL IMPACT STATEMENT



AMENDED PROJECT



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 4

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

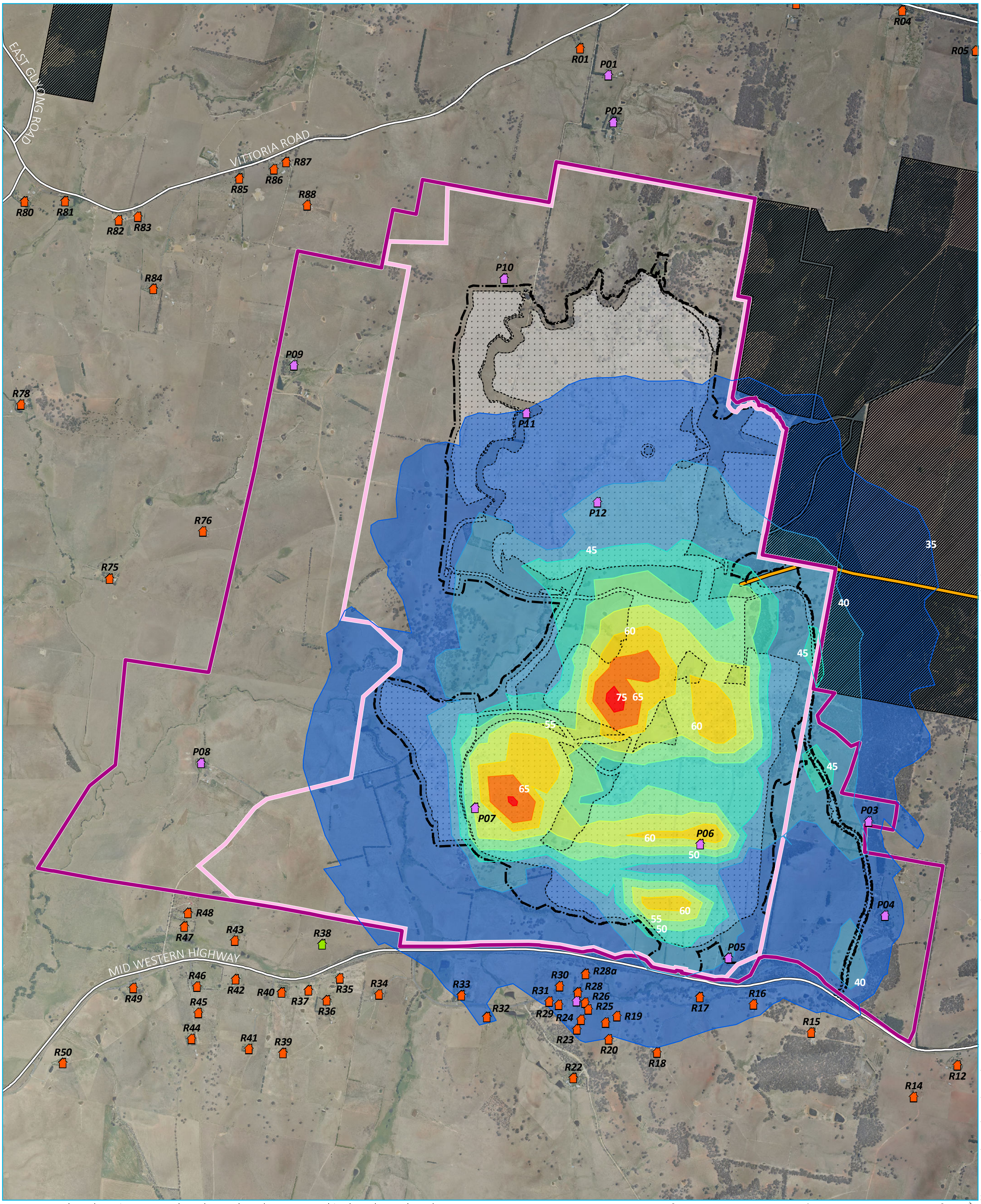
Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 4 night

McPhillamys Gold Project
Amendment report
Figure 6.28

0 1 2 km
GDA 1994 MGA Zone 55
N

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig11B_PY4_Eve-Night_con (EIS); Post EIS Sched 000403 P48 Night_con (amended project)



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Source: EMM (2020); Regis Resources (2020); MAC (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: Post EIS Sched 000403 P72 Day_con

0 1 2 km

GDA 1994 MGA Zone 55

N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

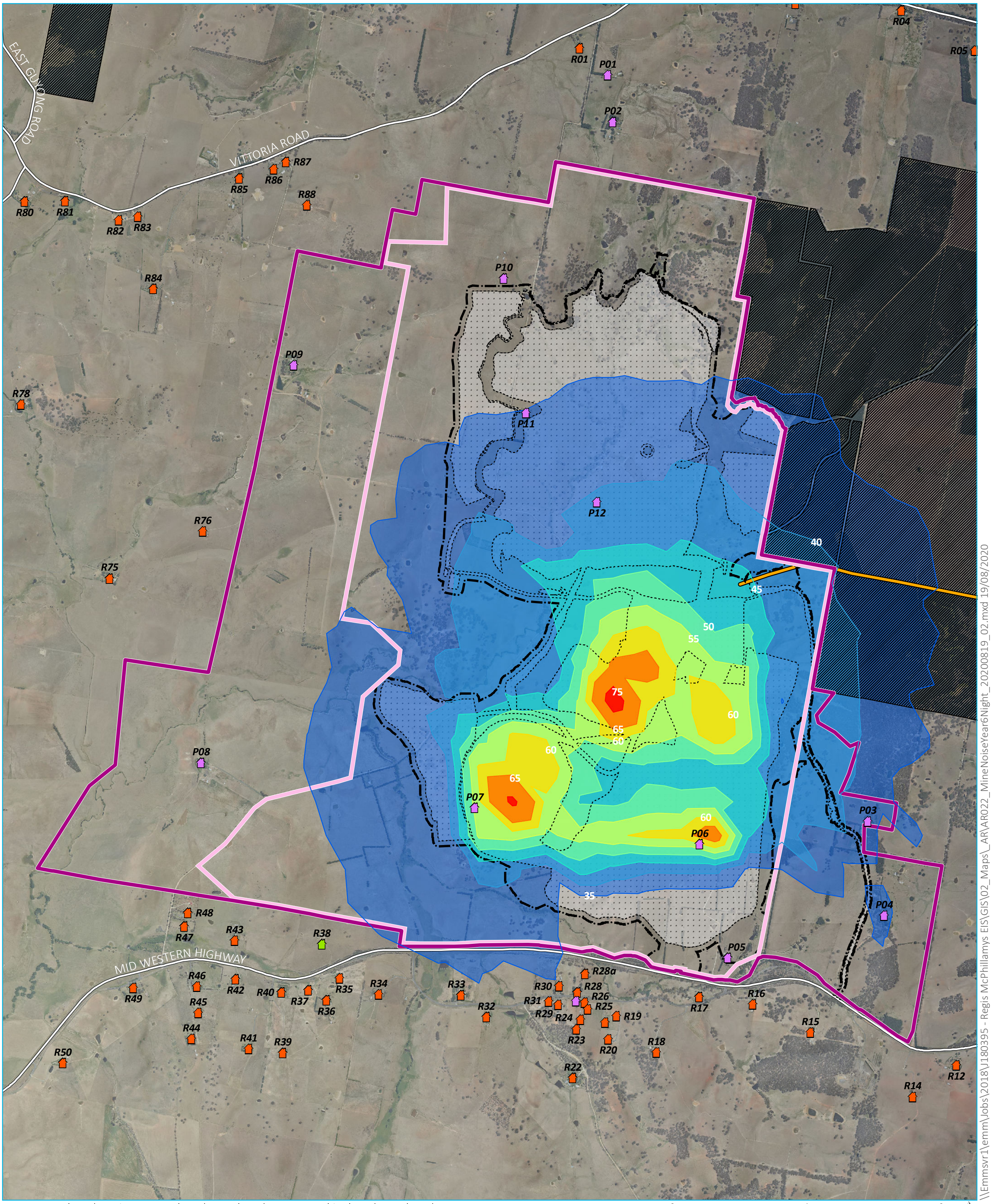
Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 6 day

McPhillamys Gold Project
Amendment report
Figure 6.29

REGIS RESOURCES LTD
EMM creating opportunities



Source: EMM (2020); Regis Resources (2020); MAC (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: Post EIS Sched 000403 P72 Night_con

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 6

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

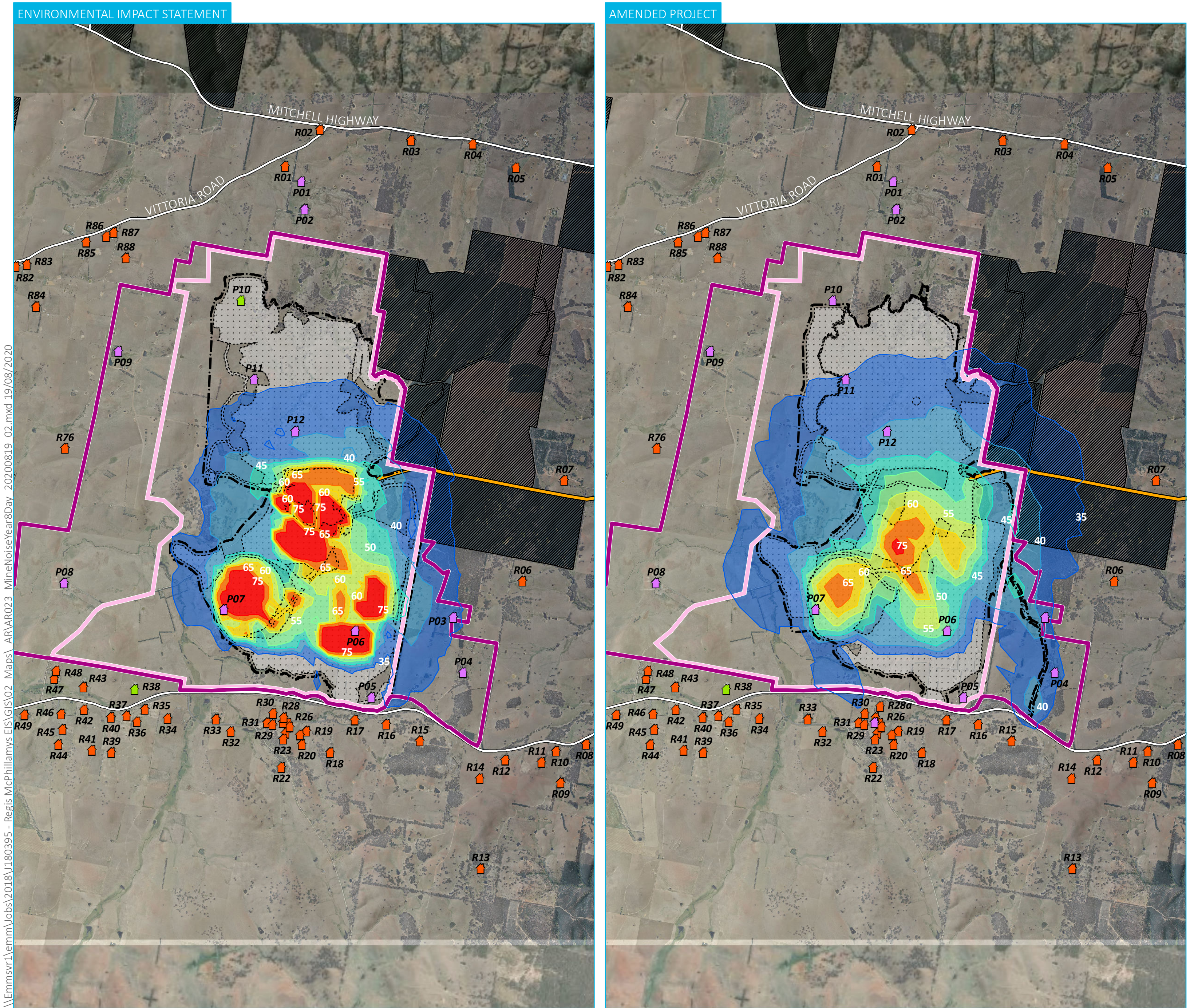
Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 6 night

McPhillamys Gold Project
Amendment report
Figure 6.30

REGIS RESOURCES LTD
EMM creating opportunities



KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor

- Private
- Residences under option
- Project related (Regis-owned)

Existing environment

- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)

- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)

- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 8 day

McPhillamys Gold Project
Amendment report
Figure 6.31

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig12A_PY8_Day_con (EIS); Post EIS Sched 000403 P96 Day_con (amended project)

0 1 2 km
GDA 1994 MGA Zone 55

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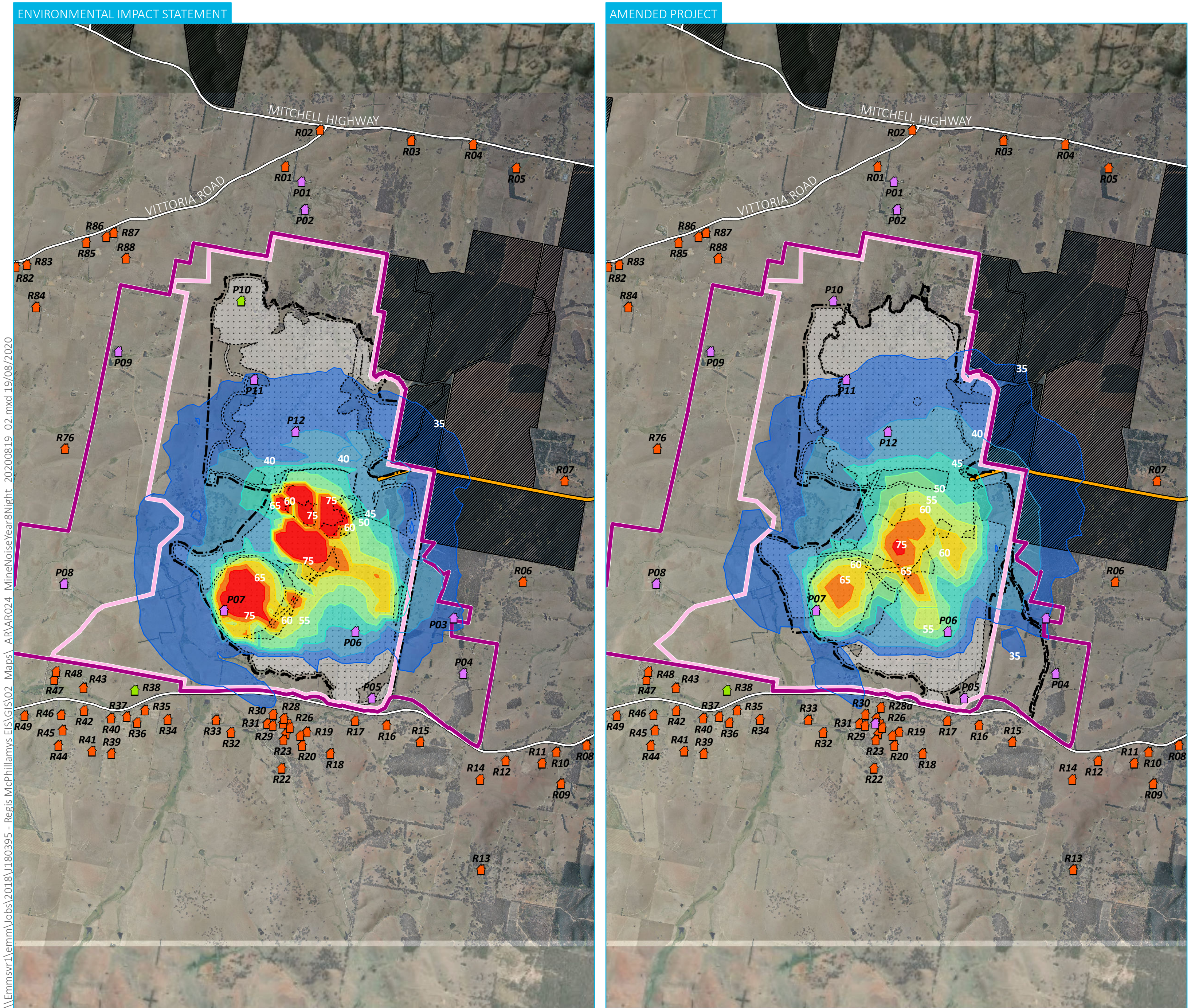


KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline
- Mine development general arrangement - Year 8

Sensitive receptor
- Private
- Residences under option
- Project related (Regis-owned)

Existing environment
- Major road
- Vittoria State Forest

Predicted noise level - dB LAeq(15min)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)
- 60 dB(A)
- 65 dB(A)
- 75 dB(A)

Predicted noise level - dB LAeq(15min)
- 35 - 39 dB(A)
- 40 - 44 dB(A)
- 45 - 49 dB(A)
- 50 - 54 dB(A)
- 55 - 59 dB(A)
- 60 - 64 dB(A)
- 65 - 74 dB(A)
- 75 + dB(A)

Predicted noise level contours – Year 8 night

McPhillamys Gold Project
Amendment report
Figure 6.32

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AR\AR024_MineNoiseYear8Night_20200819_02.mxd 19/08/2020

Source: EMM (2020); Regis Resources (2020); MAC (2019/2020); ESRI (2020); Survey Graphics (2019); DFSI (2017)
MAC data reference: EIS_Fig12B_PY8_Eve-Night_con (EIS); Post EIS Sched 000403 P96 Night_con (amended project)

0 1 2 km
GDA 1994 MGA Zone 55

REGIS RESOURCES LTD
EMM creating opportunities

As shown in Table 6.15, predicted operational noise levels during the daytime are not expected to exceed the PNTLs throughout the life of the mine. Predicted noise levels during evening and night time periods are below the PNTLs for all receivers except for some receivers in the Kings Plains catchment and the Walkom Road catchment during Year 1 and Year 4, where levels are expected to exceed the PNTLs by up to 2 dB, as summarised in Table 6.15. The exceedances predicted in Year 1 are primarily due to mining activities commencing in the open cut pit which will have minimal shielding at this time. The exceedance predicted in Year 4 is primarily due to the movement of haul trucks in the southern area of the waste rock emplacement. Where predicted noise levels exceed the PNTLs by up to 2 dB, the residual impact is considered 'negligible' in accordance with the NPfI.

A single receiver (R28a in Kings Plains) is expected to experience noise levels up to 3 dB over the PNTL during the evening period for a brief time in the first half of Year 1, during the development of the pit amenity bund and as the open cut pit develops from a depth where there is minimum natural shielding. The significance of this impact in accordance with NPI methodology is considered 'marginal' and of short duration. This is the closest receiver to the mine development project area, and as described in Section 6.5.1(i), there is currently no residential dwelling on this property. The owner has development approval to build a residence.

Table 6.15 Receivers where mine development project noise levels exceed PNTL by up to 2dB

Catchment (No) Receiver ID	Period	M7-9[1]	M10-12[1]	PY2	PY4	PY6	PY8	PY11
Distant Rural (51) R01-R14, R52-R88	Day	-	-	-	-	-	-	-
	Evening	-	-	-	-	-	-	-
	Night	-	-	-	-	-	-	-
Kings Plains (13) R15-R17, R25-R33	Day	-	-	-	-	-	-	-
	Evening	R28a, R30 (2)	Nil	-	-	-	-	-
	Night	R25, R26, R28, R29-R33 (8)[2]	R26, R28, R28a, R29-R31, R33 (7)	-	R16, R25-R30 (8)	-	-	-
Walkom Road (7) R18-R24	Day	-	-	-	-	-	-	-
	Evening	R19, R21, R23, R24 (4)	-	-	R19 (1)	-	-	-
	Night	R19, R21, R23, R24 (4)	-	-	R19 (1)	-	-	-
Sturgeon Hill (18) R34-R51[3]	Day	-	-	-	-	-	-	-
	Evening	-	-	-	-	-	-	-
	Night	-	-	-	-	-	-	-

Note 1: M7-9 and M10-12 are both Year 1.

Note 2: A single additional receiver (R28a) is expected to experience noise levels up to 3dB over the PNTL for a brief period during Year 1.

Note 3: Regis has the option to purchase R38 on receipt of project approval.

The predicted operational noise results for the amended project are significantly improved to those presented in the EIS NVIA. Numerous occurrences of noise levels exceeding the PNTLs by more than 3 dB were predicted in the EIS in Kings Plains, although not exceeding 5dB. Predicted noise levels associated with the amended project are generally within 2 dB of the PNTL at all receivers throughout the amended project life and are lower than those presented in the EIS NVIA. The reduction in predicted noise levels at receivers in Kings Plains is primarily attributable to the revised open cut pit exit design, waste schedule and waste rock emplacement design.

c Low frequency noise

An updated assessment of the potential for low frequency noise (LFN) was undertaken for the amended project, finding that no LFN penalty should apply to the project.

Due to a differing methodology for calculating LFN, the assessment undertaken for the EIS applied a +2 dB penalty to noise predictions, contributing to potential exceedances at some residences in the Kings Plains, Walkom Road and Sturgeon Hill catchments. A detailed explanation of the methodology adopted for the amended project, in accordance with comments from the NSW EPA on the required LFN methodology, is presented in Section 4.2 of the Submissions Report (EMM 2020a). The full results of the LFN assessment are contained in Appendix E of the amended NVIA (refer to Appendix J of this report).

d Blasting and vibration

As noted above, an additional potential historic heritage item (Hallwood) required assessment in the NVIA for the amended project, given it is no longer in the direct disturbance footprint of the mine. The results of the assessment of potential blasting effects by MAC (2020a) show that emissions would meet the overpressure criteria and a vibration criteria of 3 mm/s.

e Road traffic noise

As requested by the EPA (refer to section 4.2 of the submissions report (EMM 2020a), road traffic noise from the construction and operational phases of the amended project was recalculated by MAC (2020) using a Bruel & Kjaer Predictor (V11.1) noise modelling software, including 3D terrain data, using the CRTN calculation method. Road traffic noise predictions in the EIS were calculated using the United States Federal Highway Agency noise prediction method, using measured noise levels from pass by events from cars and trucks at offset distances.

In the EIS NVIA, the calculated increases in road traffic noise levels resulting from project were between 0.7 dB during (daytime) and 1.2 dB (night time). The revised calculation using noise modelling software shows a slightly lower variation (0.6 dB to 1 dB) in the increase of road traffic noise, due to the inclusion of a terrain model. The results presented in the EIS and the additional revised calculations correlate with the expected increase in traffic flows.

v Mitigation and management

Notwithstanding the significant improvements in predicted noise levels associated with the amended project, Regis is committed to implementing negotiated agreements with 13 of the 14 landholders identified in the EIS with predicted noise levels exceeding the project specific noise criteria, such that they would have been entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted (noting that the EIS listed 15 'noise-sensitive receivers'; however two of these (R23 and R24) are owned by the same landowner, and are therefore counted as one agreement). The one receptor where an agreement isn't being progressed is R27 which has now been purchased by Regis.

Negotiated agreements will also be progressed with two additional receptors, R28a, where the landholder has development consent to build a residence and which is predicted to experience noise levels up to 3dB over the PNTL during the evening for a brief period in Year 1, and R15, which is close to the new proposed mine site access intersection. Notably, these negotiated agreements will also include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force). This takes the number of landholders with whom Regis will progress negotiated agreements with to 15. They are receptors are R15, R17, R19, R21, R23 and R24 (owned by the same landholder), R25, R26, R28, R28a, R29, R30, R31, R32, R33, and R34.

It is noted that five additional landholders (R14, R16, R18, R20 and R36) are also being offered negotiated agreements in Kings Plains in consideration of visual impacts, which will exclude the option to purchase, as described in Section 6.13 (visual amenity).

6.5.2 Pipeline development

i Introduction

A Noise and Vibration Assessment (Appendix K) has been prepared by MAC (2020b) to assess the potential impacts of the amended pipeline development on identified noise-sensitive receptors. The revised assessment was also undertaken in accordance with the NPfI (EPA 2017) and supersedes the findings of the EIS Noise and Vibration Impact Assessment (EIS Pipeline NVIA), which was included as Appendix AA of the EIS. The amendments relevant to the assessment of potential noise and vibration impacts of the pipeline development are:

- amendments to the alignment, and the associated change in receivers to be considered; and
- the change in the location of pumping station facility No. 3.

ii Existing environment

The amended section of the pipeline route has added some additional receivers to be considered in the noise and vibration assessment. The receivers identified along the northern and southern alignment options are presented in Figure 6.33a to Figure 6.33d. As shown, the northern alignment is in proximity to a number of sensitive receivers (ie residential properties). The southern alignment is not, with only one receiver at the eastern end of this alignment option.

Considering both the northern and southern alignment options, a total of 329 receivers have been identified along the pipeline corridor that may be affected by noise from construction activities, sorted into nine noise catchments. The EIS NVIA identified 297 receivers; however, as a result of further ground truthing of receivers, and the revised pipeline alignment (including the northern and southern option), the receiver list for the pipeline has been updated. The amended section of the pipeline route is predominantly in the Bathampton catchment, with the western end in the McPhillamys catchment (refer to Figure 1.5).

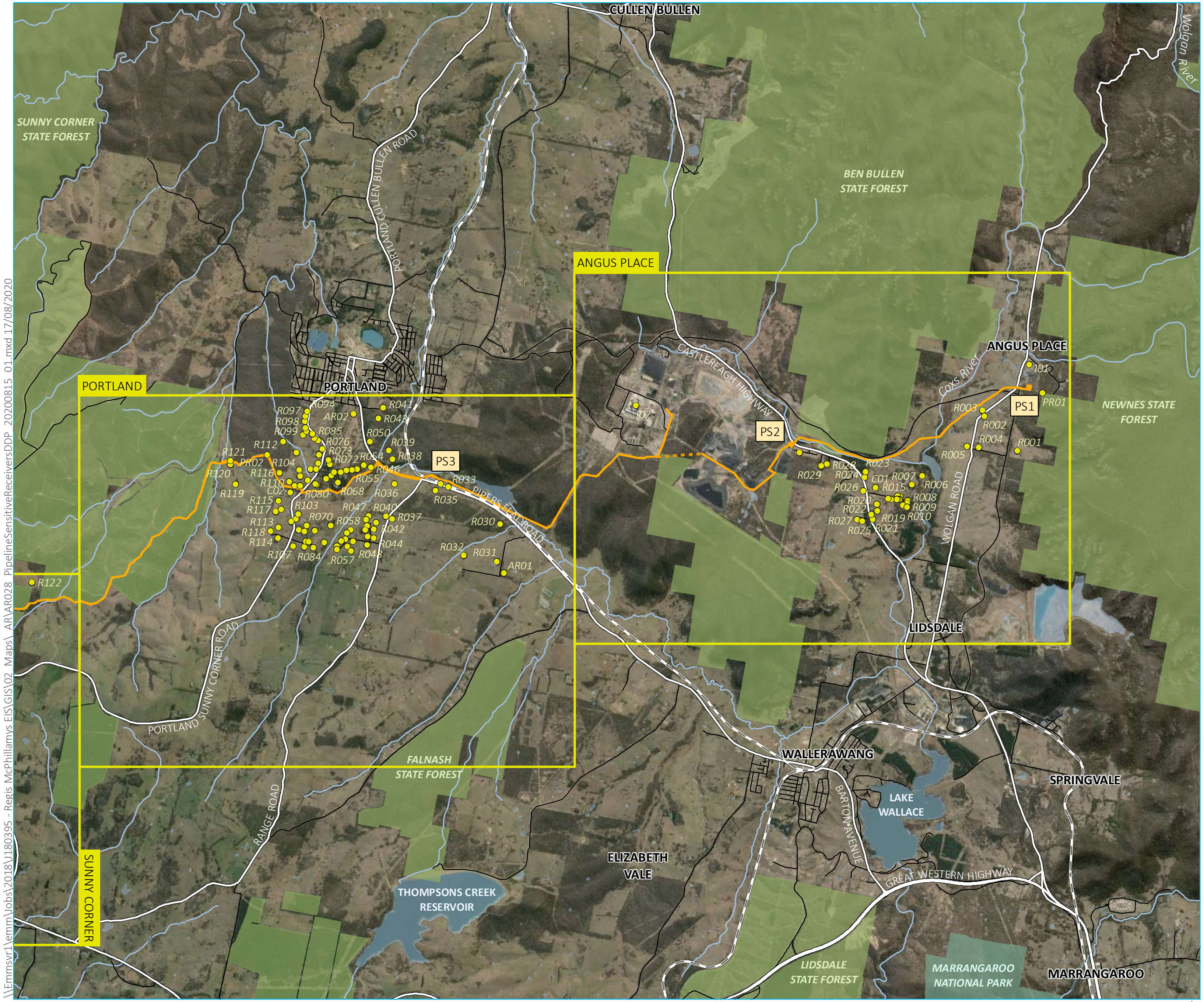
Pumping station facility No.3 has also been moved compared to the location presented in the EIS, from near MPPS, approximately 4.3 km west to a location adjacent to Pipers Flat Road. As shown in Figure 6.33a to Figure 6.33d, there are very few houses in proximity of this location. The site sits between heavily forested areas on the northern side, and Pipers Flat Road and the Gwabegar rail line on the southern side. Three houses on Pipers Flat Road are approximately 140 m, 200 m and 260 m from the pumping station facility location, respectively.

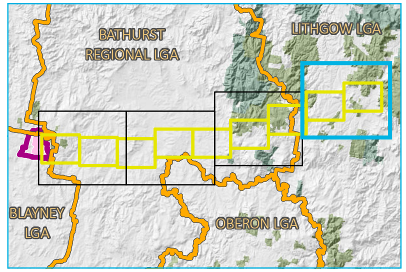
There are also two additional heritage items to consider for the amended pipeline route:

- Bathampton Homestead, stables and brick barn, which is listed in Schedule 5 of the *Bathurst Regional Local Environmental Plan 2014* (item number I6) as being of local significance, and is situated at 2021 Mid Western Highway and approximately 250 m from the northern pipeline corridor; and
- Binalong (former university building), which is also listed in Schedule 5 of the *Bathurst Regional Local Environmental Plan 2014* (item number I129) as being of local significance, and is situated at 1216 Mid Western Highway, approximately 100 m from the pipeline corridor.

This takes the total number of heritage receivers assessed by the NVIA to four, including the two identified in the EIS:

- Portland General Cemetery situated on Sunny Corner Road, listed on the listed on the *Lithgow Local Environmental Plan 2014* (item number A107) as being of local significance; and
- Leeholme Homestead and outbuildings situated at 3664 O'Connell Road and 47 Tarana Road, listed on the listed on the *Bathurst Regional Local Environmental Plan 2014* (item number I97) as being of local significance.





KEY

- Sensitive receiver
- Sensitive receiver catchment

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve
- State forest
- Local government area (refer to inset)

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 1 2 km

GDA 1994 NSW Lambert

N

Sensitive receptors – pipeline development

McPhillamys Gold Project
Amendment report
Figure 6.33a

REGIS RESOURCES LTD

EMM creating opportunities

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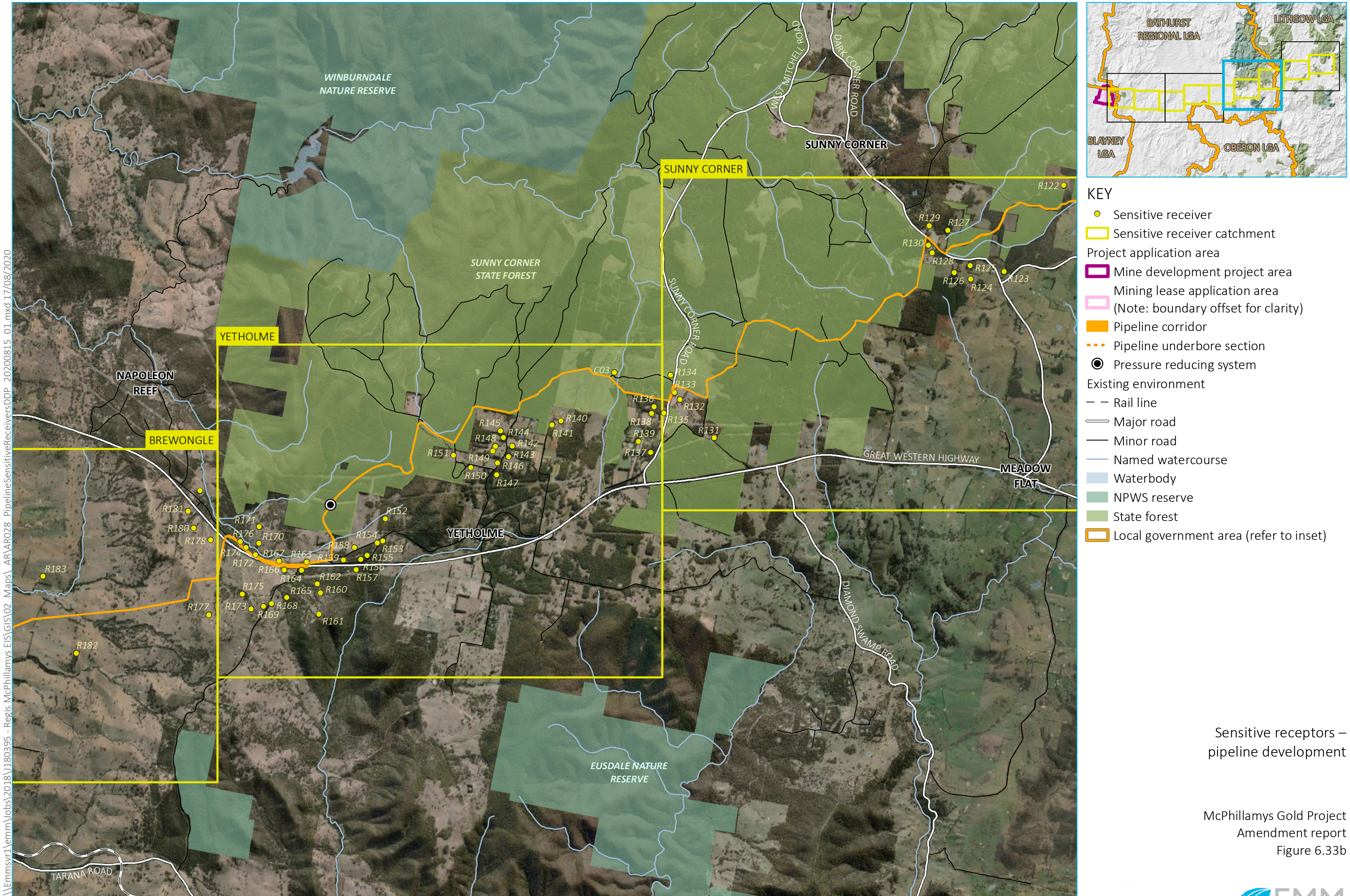


\\Emmsvr1\emm\Jobs\2018\180395 - Regis McPhillamys EIS\GIS\02_Maps_AR\AR028_PipelineSensitiveReceiversDDP_20200815_01.mxd 17/08/2020

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

KEY

- Sensitive receiver
- Sensitive receiver catchment

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section
- Pressure reducing system

Existing environment

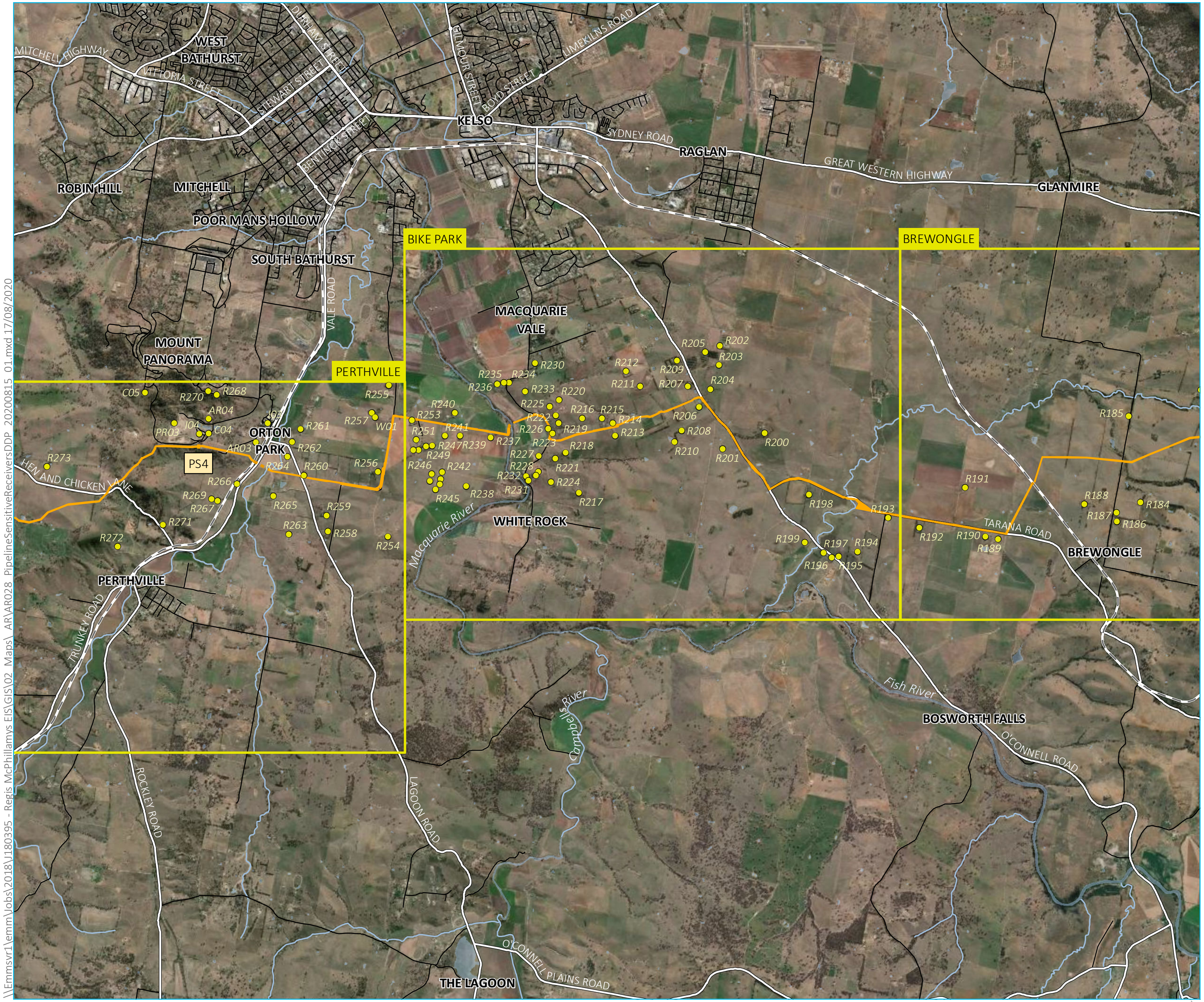
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve
- State forest
- Local government area (refer to inset)

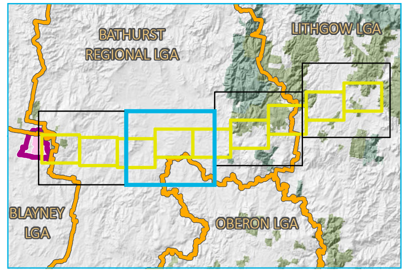
Sensitive receptors – pipeline development

McPhillamys Gold Project
Amendment report
Figure 6.33b

REGIS RESOURCES LTD

EMM creating opportunities





KEY
- Sensitive receiver
- Sensitive receiver catchment

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Existing environment
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve
- State forest
- Local government area (refer to inset)

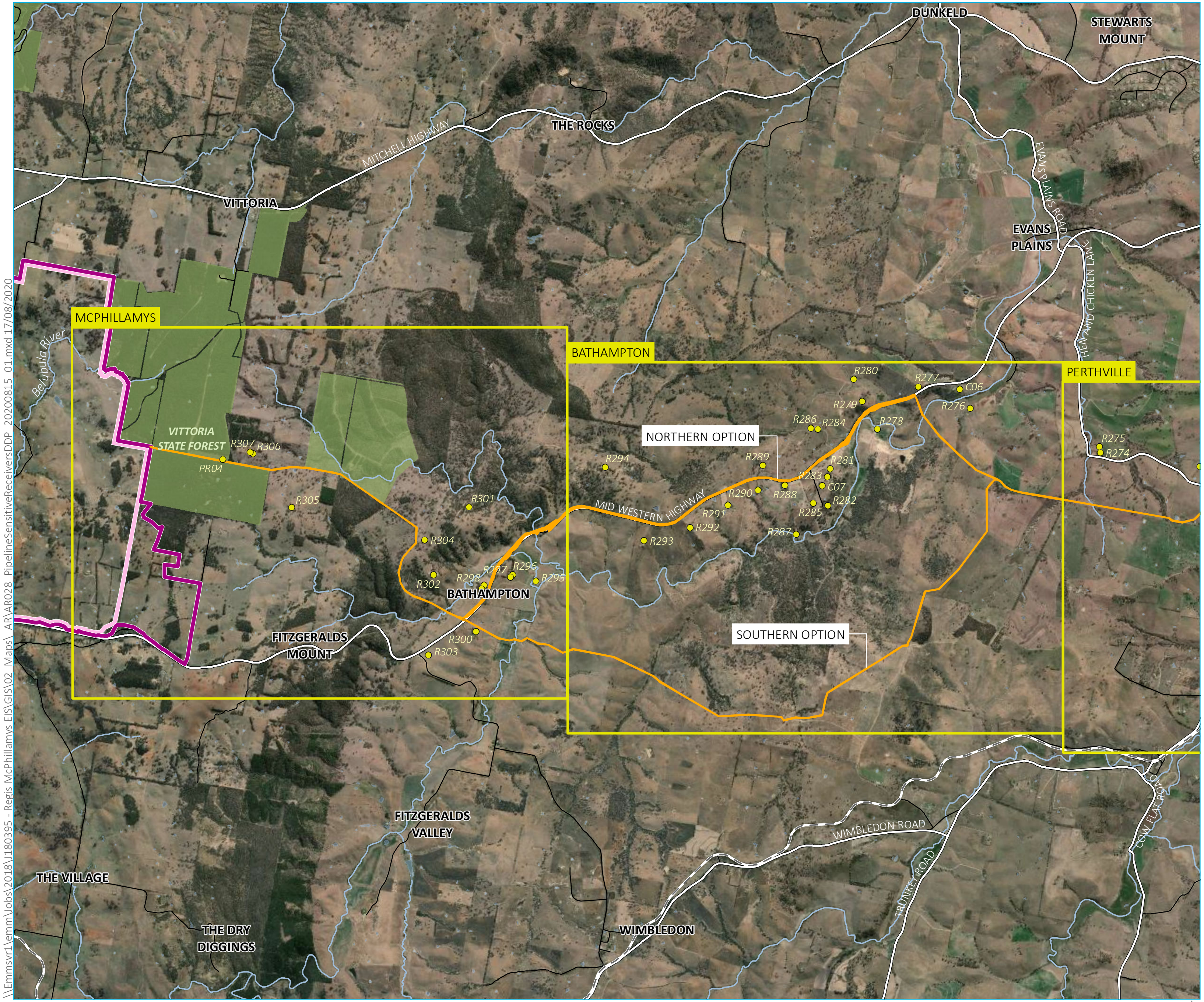
Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

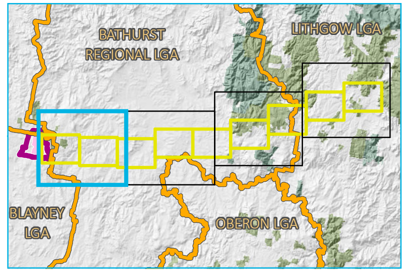
\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_AR\AR028_PipelineSensitiveReceiversDDP_20200815_01.mxd 17/08/2020

Sensitive receptors – pipeline development

McPhillamys Gold Project
Amendment report
Figure 6.33c

REGIS RESOURCES LTD
EMM creating opportunities





KEY

- Sensitive receiver
- Sensitive receiver catchment

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Pipeline corridor
- Pipeline underbore section

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- NPWS reserve
- State forest
- Local government area (refer to inset)

Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

0 1 2 km
GDA 1994 NSW Lambert
N

Sensitive receptors – pipeline development

McPhillamys Gold Project
Amendment report
Figure 6.33d

All other heritage structures listed in the regions through which the pipeline traverses are more than 300 m away from the pipeline corridor.

iii Noise criteria

The pipeline corridor was sorted into a series of catchments for the purpose of assigning noise criteria. The majority of additional receivers along the amended section of the pipeline are in the Bathampton catchment, with a few at the eastern end of the amended section in the McPhillamys catchment. Consistent with the EIS, the minimum Rating Background Levels (RBLs) specified in the NPfI were assigned to these catchments and therefore these additional receivers, resulting in the following noise criteria (ie NMLs):

- Day (standard hours): 45dB LAeq (15 min);
- OOH Period 1: 35dB LAeq (15 min); and
- OOH Period 2: 35dB LAeq (15 min).

iv Impact assessment

a Construction noise – residential receivers

Consistent with the EIS assessment, two assessment scenarios were considered to quantify noise emissions, as some construction activities occur along the entire alignment (ie transient activities) and potentially affect all receivers, while other activities are static (such as underboring and the establishment of fixed infrastructure such as the pumping station facilities) and only have the potential to impact a select few receivers.

Predicted noise levels from the transient construction activities at receivers for both alignments are presented in Table 6.16. Results shown in bold text indicate the highest potential noise level from the construction of the two options. Noise levels at receivers from the construction of the northern alignment are generally higher than noise levels from the construction of the southern alignment. This is primarily due to the northern alignment being closer to receivers (ie R295-R299, R301 and R302), whereas R300 is the only receiver in proximity to the southern alignment, and R303 is equidistant from both alignments.

In addition to the amended sections of the pipeline corridor, as described on Section 6.5.2(ii) a review of all receiver locations was undertaken along the entire pipeline corridor. Noise emissions for transient scenarios during standard construction hours and out of hours periods without additional noise mitigation or management measures at the assessed, revised receiver locations are presented in Tables 19, 20 and 21 of the NVIA in Appendix K.

Consistent with the findings of the EIS, a review of the results show that construction noise levels for transient activities have the potential to be above the relevant NMLs at most residential receivers in proximity to the work, although for the most part are expected to be only for a short duration (ie either one to two shifts or up to a few days).

Furthermore, the highly affected LAeq (15min) noise management level of 75dBA is expected to be satisfied at all receivers during all pipeline transient construction activities (clearing and grading, trenching and backfill); however, noise levels at some receivers (R108, R121, R613, R167, R172, R223, R226, R260) exceed 70dBA, approaching the highly noise affected threshold. In comparison to the EIS NVIA, the highly affected LAeq (15min) noise management level of 75 dBA was satisfied at all receivers except one (identified as R48) which was originally identified as a residential receiver and later verified as an outbuilding.

Table 6.16 Predicted construction noise levels – northern & southern alignments

Receiver	Noise level northern alignment dB LAeq (15min)			Noise level southern alignment dB LAeq (15min)		
	Clearing & Grading	**Trenching**	**Backfill & restoration**	**Clearing & grading**	**Trenching**	**Backfill & restoration**
R295	**44**	**44**	**39**	41	39	35
R296	**49**	**49**	**43**	43	43	37
R297	**48**	**48**	**43**	43	43	38
R298	**65**	**66**	**60**	51	51	51
R299	**62**	**63**	**57**	50	50	44
R300	51	51	45	**58**	**59**	**53**
R301	**34**	**33**	**29**	32	33	27
R302	**49**	**49**	**43**	48	47	43
R303	41	41	36	41	41	36

Detailed tabulated results for each receiver are presented in Appendix G of the revised Pipeline NVIA (refer to Appendix K of this report).

In relation to static activities, predicted noise emissions during standard construction hours and out-of-hours periods, as per the ICNG, have been calculated at several offset distances to determine the buffer distance required to meet the relevant NMLs for each catchment. The predictions presented are worst case, ie without additional noise mitigation or management measures, and are shown in Figures 7, 8 and 9 of the Revised Pipeline NVIA (Appendix K).

b Vibration

Consistent with the findings of the EIS Pipeline NVIA, as the nearest receivers to the pipeline corridor are greater than 10 m, human exposure to vibration is anticipated to be minimal. Furthermore, where the human response criteria are satisfied, the structural and cosmetic criteria for sensitive receivers will also be achieved. Therefore, vibration impacts are not considered to be a significant issue to the pipeline development.

c Road traffic noise

There are no changes to the findings in the EIS relating to road traffic noise, which will be generated by an assumed 10 workers on average per shift at each activity or work area. This level of traffic will not increase existing levels by more than 2dBA, which is considered an acceptable increase in accordance with the *Road Noise Policy* (DECCW 2011).

d Heritage receivers

The pipeline corridor does not intersect the curtilages of the heritage listed items in close proximity to the amended section of the pipeline corridor (Bathampton Homestead and Binalong) and no direct impacts are expected. Bathampton Homestead and the Binalong former university building are approximately 250 m and 100 m from the northern pipeline alignment, respectively.

e Operational noise

An updated assessment of the potential impacts from operation of the pumping station facilities was undertaken to account for the revised receiver locations and the new location for pumping station facility No. 3. Consistent with the EIS, noise modelling predicts that the operation of the pumping station facilities will satisfy the most conservative night criteria of 35 dB LAeq (15min). Noise levels are predicted to be less than 30 dB LAeq (15 min) at all of sensitive receivers.

v Mitigation and management

Mitigation measures committed to by Regis to effectively manage noise levels that were identified in the EIS remain applicable to the amended pipeline development and are summarised in Appendix C.

6.5.3 Conclusion

As part of further detailed mine planning and in response to submissions received, project amendments have been made primarily to reduce predicted noise emissions from the mine development. Substantial reductions in predicted noise levels at the closest residences to the mine development project area have been achieved, primarily through optimisation of mobile equipment and the mining schedule. The key amendments that have reduced predicted noise levels are as follows:

- the careful scheduling of activity in the initial stages so that works on the main structures at the southern end of the mine development project area (such as the WMFs and the pit amenity bund) are undertaken generally in sequence to avoid a high concentration of activity in areas closest to receivers;
- redesign of the waste rock emplacement construction schedule, so that it will commence in the north rather than the south;
- relocation of the site access intersection with the Mid Western Highway approximately 1 km further to the east than that proposed in the EIS; and
- utilisation of equipment with reduced noise output, particularly in the southern end of the mine development project area.

Predicted daytime noise levels are expected to comply with NMLs at all receivers throughout the construction phase of the amended project.

Predicted operational noise levels during the daytime are also expected to comply with the PNTLs throughout the life of the mine. Noise levels during evening and night time periods are predicted to be below the PNTLs for all receivers except for some receivers in the Kings Plains catchment and the Walkom Road catchment during Year 1 and Year 4, where exceedances of up to 2dB of the PNTLs are predicted. Levels are predicted to exceed PNTLs by up to 3 dB for a period in Year 1 at only one property, (R28a) where there is development approval to build a residence.

Notwithstanding the significant improvements in predicted noise levels associated with the amended project, Regis remains committed to implementing negotiated agreements with identified landholders in Kings Plains. This includes 13 landholders identified in the EIS with predicted noise levels exceeding the project specific noise criteria, such that they would have been entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted. A negotiated agreement will also be progressed with two additional receptors, R28a mentioned above, and R15, which is close to the new proposed site access intersection. This takes the number of agreements being progressed to 15 (covering 16 receivers, noting that R23 and R24 are owned by the same landholder). The negotiated agreements will also include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force).

The findings of the revised Pipeline NVIA are consistent with the EIS Pipeline NVIA, with the results demonstrating predicted construction noise levels for most activities have the potential to be above the relevant NMLs at most receivers in close proximity to the pipeline corridor, although for the most part are expected to be only for a very short duration (ie either one to two shifts or up to a few days). Notwithstanding, construction noise mitigation measures as outlined in Chapter 25 of the EIS and presented in C of this report remain applicable to the amended project and will be implemented to minimise noise impacts during pipeline construction. Furthermore, the highly affected LAeq (15min) noise management level of 75 dBA is expected to be satisfied at all receivers during all pipeline construction activities.

6.6 Air quality

6.6.1 Mine development

i Introduction

An amended air quality impact assessment (amended AQIA) (EMM 2020g) has been prepared to assess the air quality impacts of the amended mine development on identified sensitive receptors. The revised assessment supersedes the findings of the original AQIA for the mine development (included as Appendix M of the EIS, referred to herein as the EIS AQIA) and is provided in full in Appendix L. The potential air quality impacts associated with pipeline construction have also been re-considered for the amended pipeline route, as discussed in Section 6.6.2.

The key changes from the original mine development presented in the EIS that have implications for air quality include:

- realignment of the site access road;
- revision of the mine and waste rock emplacement schedule;
- proposed use of larger trucks with increased capacity; and
- optimisation of the pit design allowing for a reduction in the size of the pit amenity bund.

The amended AQIA has been completed in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2016) (Approved Methods) and, like the EIS AQIA, is classified as a 'Level 2' assessment consisting of a refined atmospheric dispersion modelling approach using site-specific and/or representative inputs.

There is no change to the emission sources or types assessed as part of the amended AQIA compared to the EIS AQIA. Similarly, the project setting, including the surrounding land use and local topography, has not changed. However, the assessment locations have been updated and are discussed below in Section 6.6.1(ii). Air quality criteria applicable for the evaluation of measured and modelled air pollution levels as documented within EIS AQIA also remains applicable. The prevailing dispersion meteorology and baseline air quality were comprehensively documented within the EIS and also remains valid for the revised assessment.

ii Existing environment

As described in the EIS, the land surrounding the mine development area features a number of scattered rural and rural-residential properties, with the highest density of houses (ie sensitive receptors) adjacent to the southern boundary of the project area in Kings Plains.

Since completion of the EIS, one additional receptor has been identified in Kings Plains (R28a) and one more property has been purchased by Regis (R27). In relation to R28a, there is no dwelling currently at this location; however, the property owner has development approval to build a residence, and therefore it has been conservatively included in the list of privately-owned receptors used as assessment locations. Receptor R27, renamed to P27 to reflect that it is now mine-owned, has been retained in the amended AQIA to enable a comparison of results to the EIS.

The EIS AQIA also identified that Regis has agreed to purchase receptor R38. Regis anticipate taking ownership of this property in early 2021, and therefore R38 has been retained as an assessment location in the modelling conducted.

The net result of these changes is that the number of assessment locations increases to 89 dwellings in the amended AQIA. The assessment locations considered in the air and noise modelling are shown in Figure 6.21.

iii Methodology

a Scenarios modelled

The EIS AQIA quantified particulate matter emissions for four emission scenarios representative of different stages of the mine development, specifically Year 1, Year 2, Year 4 and Year 8.

Following review of the revised annual mine and waste rock emplacement schedule associated with the amended mine development design, an additional scenario representative of Year 6 operations was included in the scenarios modelled for both air quality and noise. Consequently, for the amended mine development assessment, five emission scenarios were quantified: Year 1, Year 2, Year 4, Year 6 and Year 8.

Similar to the original EIS modelling, Year 1 accounts for both construction (occurring in the first six months of year 1) and operational phase emissions. Years 2 and 4 represent the staged development of the waste rock emplacement area with the highest potential of impacts to receptors to the south of operations. Year 6 has been added as it represents the highest period of material extraction and haulage for the project. Year 8 remains representative of peak haulage distances for ore material from the developed pit.

b Emissions inventory

Annual material movements/throughputs are an important factor in the modelling of air emissions. The following points are noted in this regard for the amended mine development:

- as described in Chapter 2, the amended mine development schedule features an additional year of operations (Year 11) with the material activity rates more evenly distributed across the mine years, rather than the peak occurring over the first five years of the original mine development schedule;
- material activity rates for Year 1 through to Year 5 are notably lower for the amended mine development;
- material activity rates in Year 6 through to Year 11 for the amended mine development are higher than the equivalent mine years in the original mine development schedule; and
- the maximum annual throughput is lower for the amended mine development schedule relative to the original mine development schedule.

iv Impact assessment

a Incremental results

The emissions to air predicted from the amended mine development for all pollutants and averaging periods are below the relevant EPA air quality assessment criteria, as shown in the summary of results in Table 6.17. Although it is noted that, with the exception of dust deposition and the assorted metals and metalloids, the assessment criteria listed are applicable to cumulative concentrations. Analysis of cumulative impact compliance is presented in Section 6.6.1(iv)(b). The differences between particulate matter concentrations modelled in the EIS AQIA and for the amended mine project are presented in Figure 6.34 to Figure 6.39. This shows that particulate matter emissions predicted for the amended project are less than that predicted in the EIS for each modelling scenario except for Year 8.

The main differences between the modelling results for the amended and the EIS project are as follows:

- the modelling results for Year 1, Year 2 and Year 4 for the amended mine project are lower than the corresponding years in the EIS. This is due to the lower volumes of material moved in those years associated with the smoother production profile;

- while modelling was not conducted for Year 6 in the EIS AQIA, the results are highest for Year 6 for the amended mine project, which is as expected due to the changes to the mine schedule. The maximum predicted concentrations for Year 6 are comparable with the peak year impacts associated with the EIS project (typically Year 2 or 4); and

- the predicted concentrations and deposition rates in Year 8 of the amended mine development are higher than those presented in the EIS, although remain below applicable criteria. This is due primarily to the increased rate of waste rock movements in Year 8 of the amended mining schedule. Year 8 only involved ROM ore haulage in the schedule presented in the EIS.

Table 6.17 Summary of highest predicted project-only increment concentrations and deposition levels across all assessment locations

Pollutant	Averaging period	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
TSP	Annual	µg/m³	1.5	3.3	3.6	4.7	3.3	90
PM_{10}	24-hour max	µg/m³	9.9	18.6	16.3	22.9	15.2	50
	Annual	µg/m³	1.0	2.1	2.1	2.7	1.8	25
$PM_{2.5}$	24-hour max	µg/m³	2.0	3.7	3.7	5.2	3.4	25
	Annual	µg/m³	0.2	0.5	0.4	0.6	0.4	8
Dust deposition	Annual	g/m²/ month	0.2	0.5	0.6	0.7	0.6	2
NO_2	1-hr max	µg/m³			149.6			246
	Annual	µg/m³			2.0			62
Ag	99.9th %tile 1-hr	µg/m³	0.0002	0.0002	0.0003	0.0003	0.0003	1.8
As	99.9th %tile 1-hr	µg/m³	0.019	0.023	0.033	0.027	0.027	0.09
Ba	99.9th %tile 1-hr	µg/m³	0.017	0.020	0.028	0.023	0.023	9
Be	99.9th %tile 1-hr	µg/m³	0.00003	0.00003	0.00005	0.00004	0.00004	0.004
Cd	99.9th %tile 1-hr	µg/m³	0.0004	0.0005	0.0006	0.0005	0.0005	0.018
Cr	99.9th %tile 1-hr	µg/m³	0.008	0.008	0.012	0.010	0.010	0.09
Cu	99.9th %tile 1-hr	µg/m³	0.059	0.090	0.130	0.108	0.112	18
Fe	99.9th %tile 1-hr	µg/m³	8.2	10.1	14.2	11.9	11.9	90
Hg	99.9th %tile 1-hr	µg/m³	0.00005	0.00006	0.00009	0.00007	0.00007	0.18
Mg	99.9th %tile 1-hr	µg/m³	2.6	3.1	4.3	3.6	3.6	180
Mn	99.9th %tile 1-hr	µg/m³	0.39	0.46	0.64	0.53	0.53	18
Ni	99.9th %tile 1-hr	µg/m³	0.004	0.004	0.006	0.005	0.005	0.18
Pb	Annual	µg/m³	0.00017	0.00037	0.00042	0.00053	0.00038	0.5
Sb	99.9th %tile 1-hr	µg/m³	0.0004	0.0004	0.0006	0.0005	0.0005	9
Zn	99.9th %tile 1-hr	µg/m³	0.12	0.14	0.19	0.16	0.15	90

Note: A single worst case scenario was modelled for NO_2 emissions based on Year 6 diesel combustion.

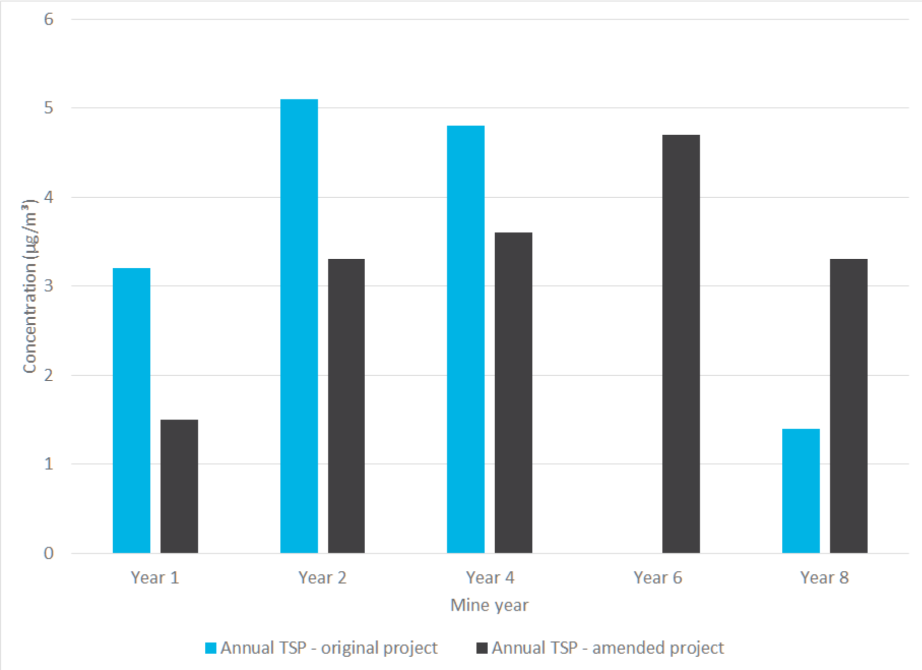


Figure 6.34 Comparison of predicted highest annual average incremental TSP concentration by mine year - EIS vs amended mine development

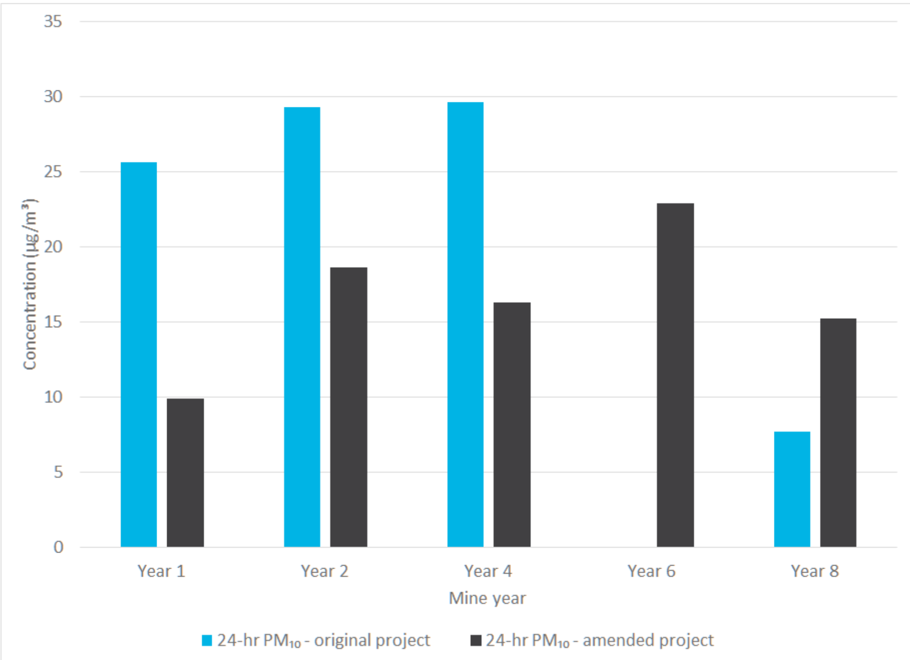


Figure 6.35 Comparison of predicted highest 24-hour average incremental PM_{10} concentration by mine year - EIS vs amended mine development

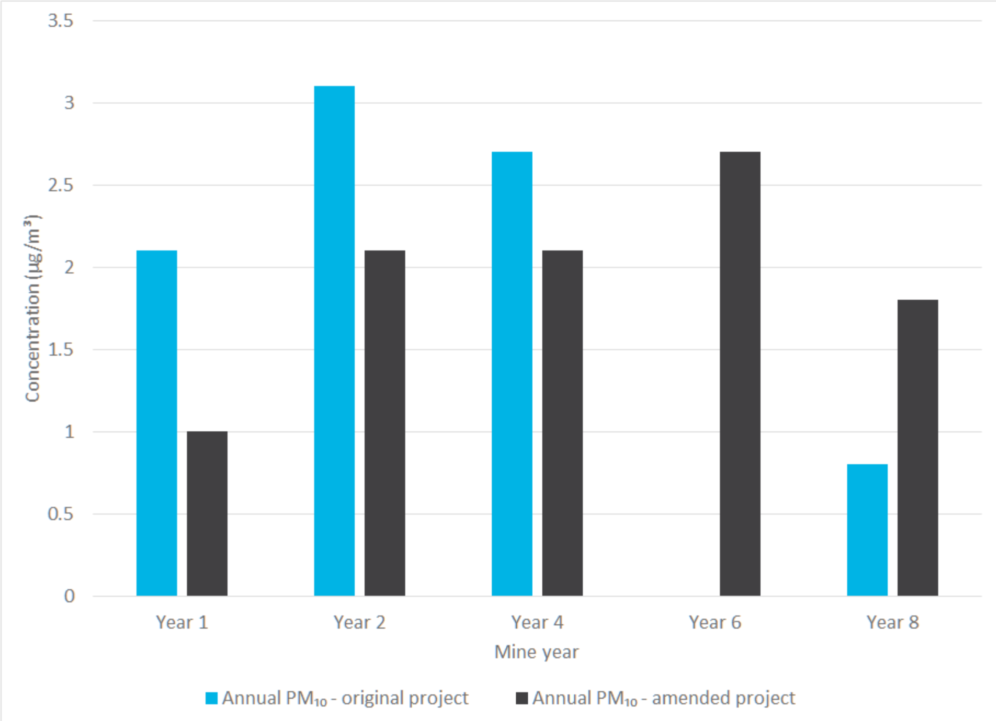


Figure 6.36 Comparison of predicted highest annual average incremental PM_{10} concentration by mine year - EIS vs amended mine development

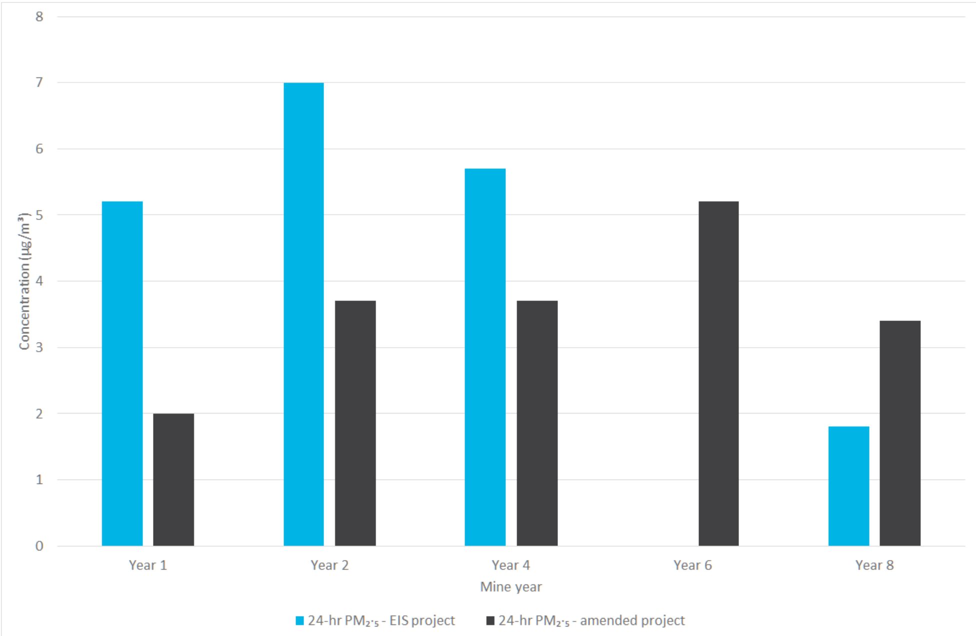


Figure 6.37 Comparison of predicted highest 24-hour average incremental $PM_{2.5}$ concentration by mine year - EIS vs amended mine development

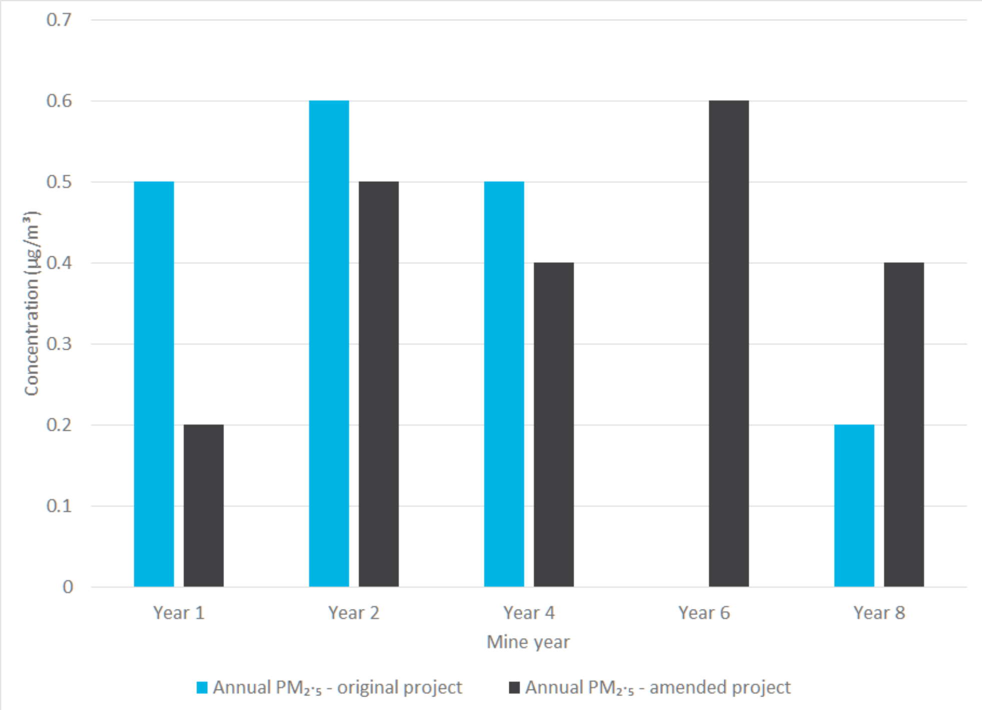


Figure 6.38 Comparison of predicted highest annual average incremental $PM_{2.5}$ concentration by mine year - EIS vs amended mine development

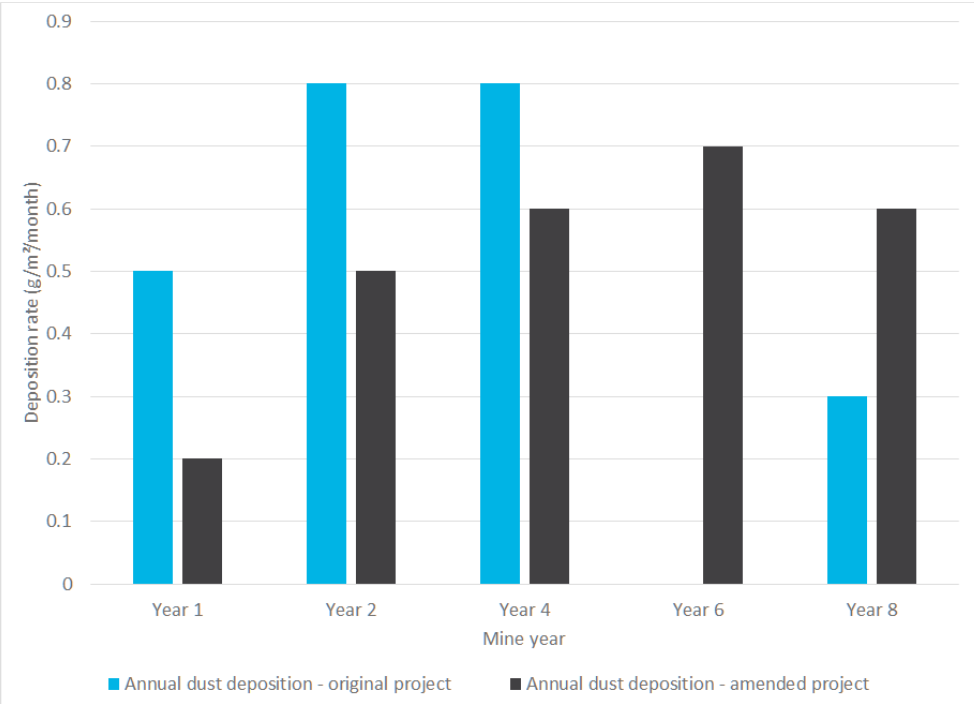


Figure 6.39 Comparison of predicted highest annual average incremental dust deposition rate by mine year - EIS vs amended mine development

Considering the differences in predictions shown in Figure 6.34 to Figure 6.39, it is evident that the amendments to the mine development have considerably improved air quality modelling predictions. Improving features include:

- revision of the waste rock emplacement schedule to provide greater sheltering to southern receptors when material movements are at their peak. These peak movement are now in Year 6, rather than in the first few years of the mine development as proposed in the EIS, when activities were concentrated at the southern end of the waste rock emplacement;

- increased haul truck capacity reducing annual truck movements; and

- the modification of open cut pit exit ramps.

b Cumulative results

The predicted cumulative concentrations (background plus amended mine project emissions) and deposition rates for all pollutants and averaging periods are below the relevant EPA criterion, as shown in Table 6.18. For Years 1, 2 and 4, the maximum cumulative results for all pollutants and averaging periods for the amended mine development are lower than the equivalent maximum cumulative results presented in the EIS. Consistent with the incremental model predictions presented above, the predicted cumulative concentrations for Year 8 are higher than the equivalent model predictions presented in the EIS AQIA. However, all concentrations are below applicable assessment criterion.

The EIS AQIA reported one modelled exceedance of cumulative air quality criteria associated with the mine development. This was for a single exceedance day at receptor R38 during Year 4 for 24-hour average PM_{10}. As shown in Table 6.18, this exceedance is not predicted to occur for the amended mine development.

Table 6.18 Summary of highest predicted cumulative (background + project) concentrations and deposition levels across all assessment locations

Pollutant	Averaging period[1]	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
TSP	Annual	µg/m³	36.8	38.6	38.9	40.0	38.6	90
PM_{10}	3rd highest 24-hr	µg/m³	40.9	43.4	43.1	46.1	43.2	50
	Annual	µg/m³	15.1	16.2	16.2	16.8	15.9	25
$PM_{2.5}$	24-hour max	µg/m³	15.7	16.2	16.2	17.5	16.1	25
	Annual	µg/m³	6.3	6.5	6.5	6.7	6.5	8
Dust deposition	Annual	g/m²/month	1.6	1.9	2.0	2.1	2.0	4
NO_2	1-hour max[2]	µg/m³			171.7			246
	Annual[2]	µg/m³			14.2			62

Note: 1 - Due to two existing exceptional dust storm events in 2017 (see Section 6.3.1 of Appendix M of the EIS), the third highest cumulative 24-hour average PM_{10} concentration is presented
Note: 2 - A single worst case scenario was modelled for NO_2 emissions based on year 6 diesel combustion.

c Voluntary land acquisition criteria

The predicted emissions from the amended mine development are compliant with the criteria set out in the *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) (NSW Government 2018) (outlined in Appendix L) for both mitigation and acquisition.

The VLAMP criteria also applies if a development contributes to an exceedance on more than 25% of privately-owned land upon which a dwelling could be built under existing planning controls. The modelled project-only 24-hour PM_{10} and $PM_{2.5}$ concentrations do not exceed 50 µg/m³ or 25 µg/m³ across more than 25% of any privately-owned land during any of the five modelled scenarios. Additionally, cumulative concentrations for PM_{10} and $PM_{2.5}$, TSP or dust deposition do not exceed the VLAMP criteria across more than 25% of any privately-owned land.

d Blast fume assessment

No material change in blasting operations is proposed under the amended mine development and the results of the blasting modelling presented in the EIS remain applicable. Blasting will generally be restricted to between 8 am and 4 pm, is likely to be conducted on a one blast per day basis unless required for safety reasons or other environmental considerations, and will generally not be carried out on Sundays and public holidays.

v Mitigation and management

Mitigation measures committed to in the EIS AQIA remain applicable to the amended mine development and continue to be consistent with best practice measures wherever practicable. Additional mitigation measures incorporated into the amended project design include:

- increase in the load capacity of the haul trucks for waste rock and ore material, minimising the number of vehicle kilometres travelled per year;
- redesign of the pit development and haul route alignment, including modification of the pit exit ramps and moving a proportion of material haul routes further away from residential receptors; and
- optimisation of the waste rock emplacement design to increase the amount of protection for waste rock dumping activities by the southern amenity bund.

These controls were incorporated into the emissions calculations and dispersion modelling wherever an appropriate emission reduction factor was available. As noted above, management measures described in the EIS are still deemed consistent with best practice management guidelines, including the accepted best practice for dust control, when applied to the amended mine project.

6.6.2 Pipeline development

i Introduction

The EIS AQIA presented a qualitative impact assessment of the air quality impact potential of the proposed construction phase of the pipeline, using the United Kingdom-based Institute of Air Quality Management (IAQM) document *Guidance on the Assessment of Dust from Demolition and Construction* (hereafter GADDC, IAQM 2014).

This assessment has been updated to consider the amended pipeline route, considering both the northern and southern options.

Consistent with the EIS, there will be no significant emission sources of air pollutants associated with the operation of the amended pipeline development, and consequently there is negligible potential for air quality impacts to the surrounding environment.

ii Existing environment

As described in Section 6.5, a further detailed review of sensitive receivers along the pipeline route has been undertaken since submission of the EIS, including a ground-truthing exercise, to better differentiate residential properties from other buildings such as sheds. As a result, a revised set of sensitive receptors has been identified for the pipeline to be assessed for amenity impacts.

The amended pipeline route has also resulted in changes to the number of receptors along the pipeline corridor. The southern option travels through open farmland in which there are no additional receptors, and if this option were to be adopted, eight rural residential properties identified in the EIS as located within 350 m of the pipeline alignment would be avoided. However, the northern option travels past numerous additional rural residential properties, adding a further eight sensitive receptors within 350 m of the pipeline alignment. It is also noted that the southern alignment passes near one receptor, R300; however, this is in the section where the southern alignment re-joins the original alignment, as presented the EIS, and as such R300 is not a new receptor.

Therefore, inclusive of the northern option, there are approximately 121 sensitive receptors within 350 m of the pipeline corridor, of which approximately 110 are residential. Approximately 14 of these are within 50 m or less of the pipeline corridor. Inclusive of the southern option, 105 receptors have been identified within 350 m of the pipeline corridor, of which 95 are residential and 14 are within 50 m of the pipeline corridor.

This is compared to the 113 sensitive receptors identified with 350 m of the pipeline corridor in the EIS.

The closest sensitive receptors to the pipeline corridor are located around pumping station facility No.2, areas south of Portland, Sunny Corner Road near the Kirkconnell Correctional Centre, the Great Western Highway, Tarana Road, White Rock Road and Montavella Road. Sensitive receptors are shown in Figure 6.33a to Figure 6.33d in Section 6.5.

iii Impact assessment

The IAQM specify that if a human receptor is located within 350 m of the boundary of a site, or within 50 m of a route used by construction vehicles up to 500 m from site entrance, then a detailed construction dust assessment should be undertaken. Table 6.19 lists the sensitive receptors for the corridor, with either the northern option or southern option included.

Table 6.19 Sensitive receptors within 350 m of the pipeline corridor

EIS	Northern option	Southern option
113 receptors within 350 m	121 receptors within 350 m	105 receptors within 350 m
69 receptors within 200 m	71 receptors within 200 m	65 receptors within 200 m
29 receptors within 100 m	30 receptors within 100 m	29 receptors within 100 m
17 receptors within 50 m	16 receptors within 50 m	16 receptors within 50 m
2 receptors within 20 m	1 receptor within 20 m	1 receptor within 20 m

The GADDC identifies that the risk category for dust impacts from construction activities should be allocated based on the following factors:

- the scale and nature of works; and
- the sensitivity of the area to dust impacts.

These factors are then combined to determine the risk of impacts from the works.

The proposed scale and nature of the works for the pipeline construction, and the sensitivity of the area to dust impacts, remains the same for the amended project as that presented in the EIS (Section 26.4). Therefore, the results remain applicable to the amended project; that is, the risk rating for dust impacts to human health and ecological receptors from the demolition, construction and truck trackout demobilisation phases of the pipeline construction, prior to the application of dust mitigation measures, ranges between negligible and low. An impact risk rating of medium is allocated for earthworks activities for dust soiling.

The mitigation measures presented in Section 26.7.1 of the EIS to alleviate the residual risk of dust soiling during the earthworks phase, also remain applicable.

6.6.3 Conclusion

The EIS reported that the air quality impacts at neighbouring residences as a result of the mine development would be below applicable EPA impact assessment criteria for all assessed stages of the mine. The cumulative results also demonstrated compliance with applicable impact assessment criteria, despite a range of conservative assumptions in the emission calculations and dispersion modelling techniques, at all receptors apart from R38 which indicated one exceedance in Year 4 of the project (noting Regis has agreement to purchase this property).

The changes made to the mine design as described in this Amendment Report, primarily to reduce noise impacts, have further improved the predicted air quality outcomes.

Dispersion modelling was undertaken for five stages over the proposed life of the amended mine development. Consistent with the EIS, the predicted concentrations and deposition rates for particulate matter (TSP, PM_{10}, $PM_{2.5}$, dust deposition, metals and metalloids) and gaseous pollutants (NO_2 and HCN) are below the applicable impact assessment criteria at neighbouring sensitive receptors for all assessed stages of the mine development and operation. Cumulative modelling predictions, considering both the mine and ambient background levels, also demonstrate compliance with applicable impact assessment criteria. The one exceedance predicted in the EIS in Year 4 is no longer forecast to occur.

The design of the mine development incorporates a range of dust mitigation measures. A review of dust control measures was undertaken for the amended mine development, and this identified that the proposed mitigation and management measures continue to be in accordance with accepted industry best practice.

A risk assessment approach was applied to the assessment of potential air quality impacts of the pipeline construction. Consistent with the EIS, the assessment concluded that proposed mitigation measures will adequately control emissions and therefore the potential for dust related impacts from this temporary activity.

6.7 Greenhouse gas

6.7.1 Mine development

i Introduction

A revised greenhouse gas (GHG) assessment has been prepared as part of the amended AQIA (refer to Appendix L), to reflect the changes to the mine development associated with the Amended Project. The revised GHG assessment supersedes the findings of the original assessment for the mine development presented in the EIS (referred to as the EIS GHG assessment, which was included in Appendix M of the EIS).

The key changes from the original mine development presented in the EIS that have implications for GHG emissions include the revision of the mine and waste rock emplacement schedule and the proposed use of larger equipment with associated changes in fuel consumption.

ii Emission estimates

The amended GHG emissions estimations are based on the Department of the Environment and Energy's (DoEE) *National Greenhouse Accounts Factors* (NGAF) *workbook* (DoEE 2019). Emissions have therefore been updated from those adopted in the EIS GHG assessment, which used the latest available factors at the time from the 2018 NGAF workbook.

There is no change to the emission sources and types of emissions assessed as part of the amended GHG assessment compared to the EIS GHG assessment. Similarly, the project setting, including the surrounding land use and local topography, has not changed. Estimates of annual diesel, LPG and electricity consumption associated with the amended mine development have been updated to reflect the revised mine schedule and anticipated equipment to be used for the Amended Project. The estimated annual GHG emissions for each emission source are presented in Table 6.20.

Table 6.20 Estimated annual GHG emissions – amended mine development

Stage of project	Scope 1 (t CO_2-e/year)			Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)			
	Diesel	LPG	Total	Electricity	Diesel	LPG	Electricity	Total
Year 1	23,629.5	-	23,629.5	-	1,211.8	-	-	1,211.8
Year 2	52,417.1	759.3	53,176.4	89,157.8	2,688.1	53.0	9,906.4	12,647.5
Year 3	56,621.6	759.3	57,380.9	131,804.8	2,903.7	53.0	14,645.0	17,601.7
Year 4	57,987.2	759.3	58,746.4	131,804.7	2,973.7	53.0	14,645.0	17,671.7
Year 5	58,487.7	759.3	59,247.0	132,165.9	2,999.4	53.0	14,685.1	17,737.5
Year 6	92,947.9	759.3	93,707.1	142,758.4	4,766.6	53.0	15,862.0	20,681.6
Year 7	74,950.2	759.3	75,709.5	146,449.8	3,843.6	53.0	16,272.2	20,168.8
Year 8	73,393.4	759.3	74,152.7	146,449.8	3,763.8	53.0	16,272.2	20,089.0
Year 9	47,484.9	759.3	48,244.1	146,851.0	2,435.1	53.0	16,316.8	18,804.9
Year 10	38,468.0	759.3	39,227.3	123,582.6	1,972.7	53.0	13,731.4	15,757.2
Year 11	26,163.6	759.3	26,922.9	123,582.6	1,341.7	53.0	13,731.4	15,126.2
Year 12	12,504.5	759.3	13,263.7	112,989.8	641.3	53.0	12,554.4	13,248.7
Year 13	7,695.6	759.3	8,454.9	-	394.6	53.0	-	447.7
Year 14	3,078.2	-	3,078.2	-	157.9	-	-	157.9

Table 6.20 Estimated annual GHG emissions – amended mine development

Stage of project	Scope 1 (t CO_2-e/year)			Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)			
	Diesel	LPG	Total	Electricity	Diesel	LPG	Electricity	Total
Year 15	3,078.2	0.0	3,078.2	0.0	157.9	0.0	0.0	157.9
Average	41,927.2	607.4	42,534.6	95,173.2	2,150.1	42.4	10,574.8	12,767.3
Total	**628,907.6**	**9,111.4**	**638,018.9**	**1,427,597.3**	**32,251.7**	**636.5**	**158,621.9**	**191,510.1**

iii Impact assessment

The significance of project GHG emissions relative to state and national GHG emissions is made by comparing annual average GHG emissions against the most recent available total GHG emissions inventories (calendar year 2018) for NSW (131,684.9 kt CO_2-e) and Australia (537,446.4 kt CO_2-e).

Annual average GHG emissions (combined Scope 1, 2 and 3) generated by the mine development represents approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018.

The contribution of the mine development to projected climate change, and the associated environmental impacts, would be in proportion with its contribution to global greenhouse gas emissions.

There is a small increase in predicted annual average GHG emissions from that calculated in the EIS for the mine development (reproduced for comparison in Table 6.21). This is primarily due to the fact that fuel and energy consumption is projected to be higher for the amended mine development relative to the original mine development, because of a slightly longer operating schedule (from around 10 years to 11 years) and the proposed use of larger equipment, such as larger haul trucks. The cumulative diesel consumption rates for the amended project, compared to the EIS, are presented in Figure 6.40.

Table 6.21 Estimated annual GHG emissions – EIS GHG assessment

Stage of project	Scope 1 (t CO_2-e/year)			Scope 2 (t CO_2-e/year)	Scope 3 (t CO_2-e/year)			
	Diesel	LPG	Total	Electricity	Diesel	LPG	Electricity	Total
Average	38,083.9	643.7	38,727.6	86,123.5	1,961.2	38.5	10,502.9	12,502.6
Total	**533,174.5**	**9,012.3**	**542,186.9**	**1,205,728.9**	**27,456.9**	**538.8**	**147,040.1**	**175,035.8**

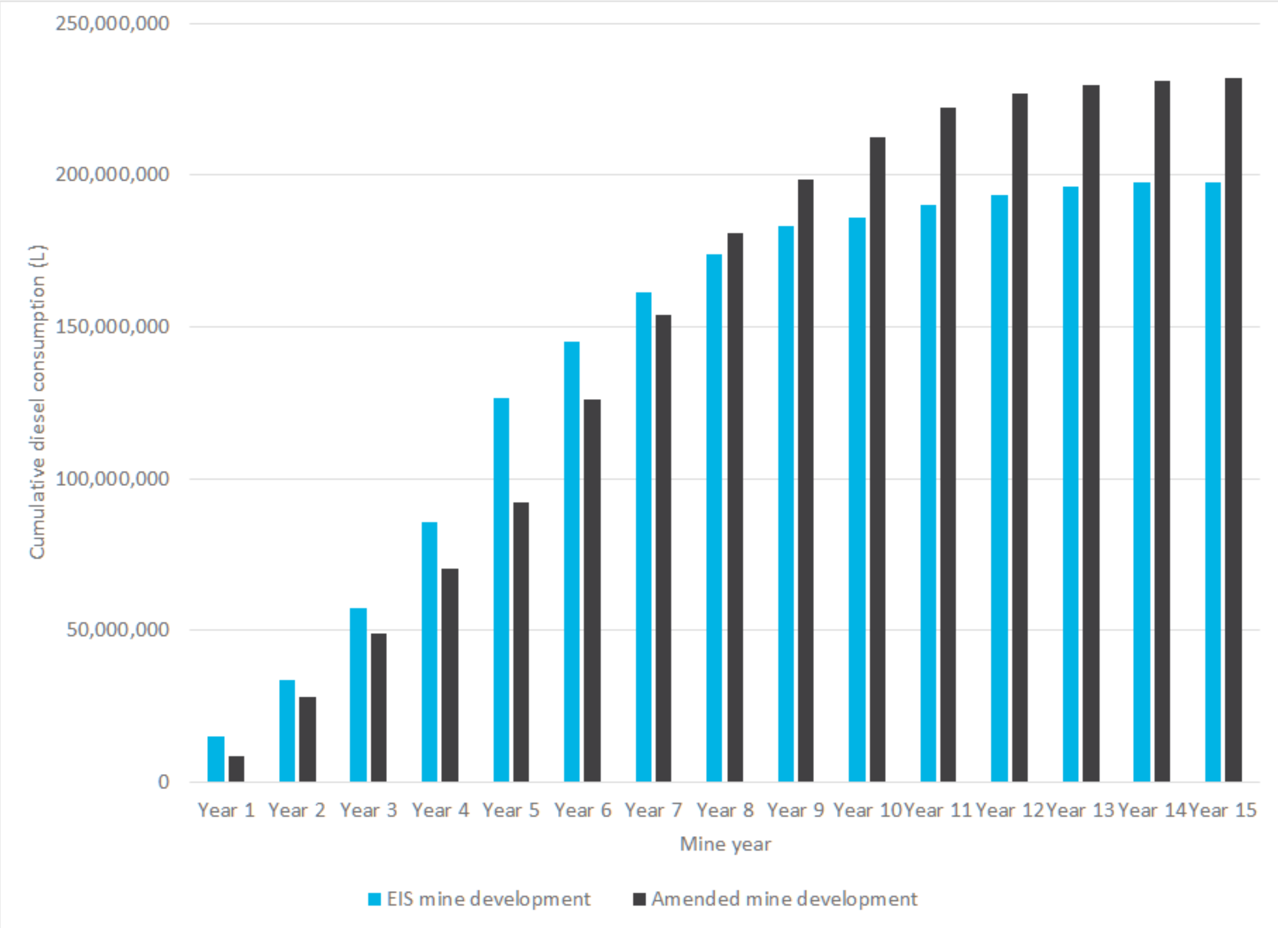


Figure 6.40 Cumulative diesel consumption rates by mine year – EIS mine development vs amended mine development

iv Mitigation and management

Consistent with the EIS, the GHG emissions from the amended mine development are principally associated with on-site energy consumption, specifically diesel combustion and consumption of purchased electricity. The proposed mining development features conventional drill, blast and haul techniques, which is largely dependent on the use of diesel-powered equipment. Regis continues to investigate the feasibility of an electricity-powered fleet. It is noted that the use of an electric powered fleet would ultimately lead to a reduction in the amount of diesel combustion related particulate matter and NO_x emissions and therefore the GHG emissions presented are conservative.

Ultimately, measures and practices designed to improve energy efficiency, will assist with the management of project GHG emissions. The diesel consumption management strategies listed in the EIS and reproduced in the amended AQIA (refer to Appendix L) will equally assist with the reduction of associated GHG emissions.

The calculated annual average Scope 1 and 2 emissions from the project are greater than the NGER Scheme facility reporting threshold of 25,000 tpa CO_2-e. Consequently, Regis will measure energy consumption, and calculate and report Scope 1 and 2 GHG emissions in accordance with the requirements of the NGER Act.

6.7.2 Pipeline development

The assumptions regarding the construction methodology and operational energy requirements of the pipeline development have not changed, and therefore there is no change in GHG emissions to what was presented in Section 26.5 of the EIS (EMM 2019a).

Estimates of annual diesel and electricity consumption associated with the pipeline development therefore remain as follows:

- total construction phase diesel consumption 350.8 kL; and
- annual electricity consumption by pumping station facilities – 2,365,300 kWh/year.

Total (Scope 1, 2 and 3) GHG emissions generated by the pipeline development range from 0.00076% (construction) to 0.00165% (operation) of NSW total GHG emissions and from 0.000019% (construction) to 0.00040% (operation) of Australian total GHG emissions, based on the National Greenhouse Gas Inventory for 2018.

6.7.3 Conclusion

GHG emissions generated by the amended mine development are predicted to be minimal and make only minor contributions to the total GHG emissions from NSW and Australia. Annual average total GHG emissions (Scope 1, 2 and 3) predicted for the mine development represent approximately 0.114% of total GHG emissions for NSW and 0.028% of total GHG emissions for Australia, based on the National Greenhouse Gas Inventory for 2018. The GHG emissions as a result of the pipeline development are so minor that they will make negligible contributions to the GHG emissions from the project as a whole.

6.8 Terrestrial biodiversity

6.8.1 Introduction

In accordance with the SEARs for the project, the biodiversity impacts of the mine development were assessed in the EIS in accordance with the former NSW *Framework for Biodiversity Assessment* (FBA) in the Biodiversity Assessment Report (BAR) (EMM 2019b), included as Appendix N of the EIS (herein referred to as the EIS BAR), while the pipeline development was assessed in accordance with the current *Biodiversity Assessment Method* (BAM) in the Biodiversity Development Assessment Report (BDAR) prepared by OzArk (2019) (Appendix Y of the EIS) (herein referred to as the EIS BDAR).

The biodiversity assessment of the amended project has been updated to assess the mine development in accordance with the BC Act and the BAM. The resulting BDAR (EMM 2020c) therefore considers the amended project as a whole under the BAM (the mine development and the pipeline development). The revised assessment considers amendments to the mine development and pipeline development as well as comments raised by DPIE - BCD in their submission on the EIS.

The key findings of the BDAR are summarised in this chapter, with the full technical report included in Appendix M. The BDAR considers and outlines the differences in impacts compared to the project as presented in the EIS. Accordingly, the BDAR supersedes the EIS BAR and the EIS BDAR (with the exception of the aquatic ecology assessment contained in the EIS BDAR (refer to Section 6.9)).

As outlined in Section 4.3.1, a proposed action was referred to the Commonwealth Minister for the Environment in April 2019 under the EPBC Act. The referred action included the mine development but excluded the pipeline development on the basis that the pipeline development was assessed by EMM as being unlikely to result in a significant impact on any MNES. The EPBC Act referral decision concluded that the referred mine development (the action) was a controlled action on 28 May 2019, requiring assessment under the EPBC Act, on the basis that the action would be likely to have a significant impact on the following MNES:

- listed threatened species and communities:
  - White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered; and
  - Koala (QLD, NSW, ACT) – Vulnerable.

Due to the amendments made to the project since the submission of the EPBC Act referral, a request for the Commonwealth Minister for the Environment to vary the action under section 156A of the EPBC Act to reflect the amended project will be submitted by Regis.

6.8.2 Mine development

i Existing environment

a Native vegetation

The vegetation of the mine development consists of open paddocks with some fragmented patches of timbered natural vegetation. Four native plant community types (PCTs) are located in the mine development, including:

- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330);
- Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727);

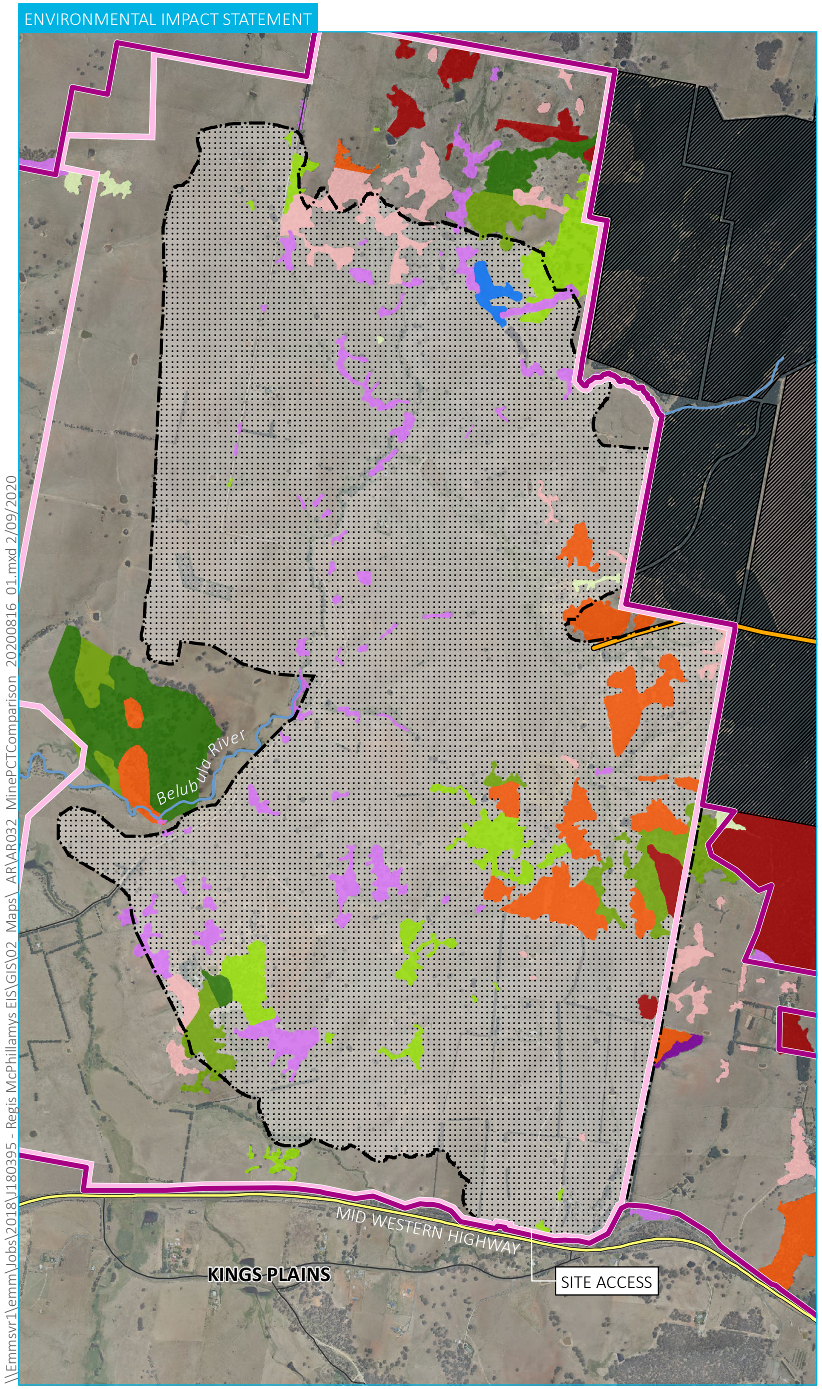
- Mountain Gum – Manna Gum open forest of the South Eastern Highlands Bioregion (PCT 951); and
- Carex sedgeland of the slopes and tablelands (PCT 766).

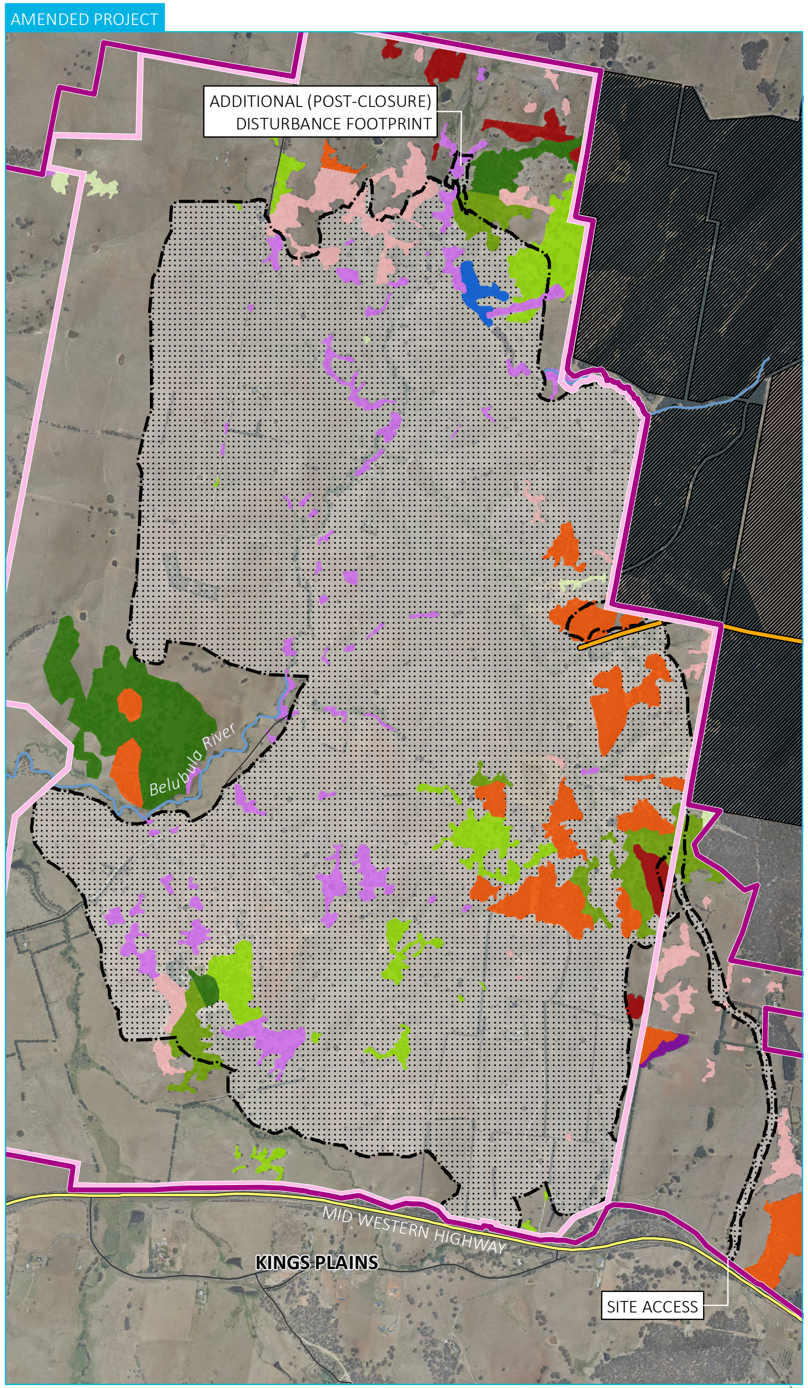
All native plant community types recorded varied from higher condition patches to poor condition patches. PCTs within the mine project area are shown in Figure 6.41.

One PCT, Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, represents White Box Yellow Box Blakely's Red Gum Woodland, which is listed as a critically endangered ecological community (CEEC) under the BC Act. Patches of this PCT in moderate/good (high) and moderate/good (medium) condition also represent White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands, which is listed as a critically endangered ecological community (CEEC) under the EPBC Act.

b Threatened species - ecosystem credit species

Twenty-nine ecosystem credit species were predicted to be associated with the PCTs in the mine development project area by the BAM Calculator (BAMC). In accordance with the BAM, ecosystem credit species do not require targeted survey, and therefore their presence was assumed where suitable habitat was present. A predicted species assessment for these ecosystem credit species has been carried out in Section5.2.2(i) of the revised BDAR.





KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Belubula River
- Vittoria State Forest
- Areas not requiring offset: EIS – 1,002.38 ha; Amended project – 986.79 ha

Plant community types

727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

766 - Carex sedgeland of the slopes and tablelands
- Poor

951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Medium
- Poor

1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); EnviroKey (2017/2018)

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Plant community types – mine development

McPhillamys Gold Project
Amendment report
Figure 6.41

c Threatened species - candidate credit species

Four candidate threatened flora species and 12 candidate threatened fauna species were assessed for the mine development. Of these, only Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*) were recorded during targeted surveys in the mine development project area. The Koala is associated with three PCTs across the site, namely PCT 727 (medium and high condition vegetation zones only), PCT 951 and PCT 1330. The Squirrel Glider has been associated with all woody communities on site. Species polygons for the Squirrel Glider and Koala are shown in Figure 6.42.

d Groundwater dependent ecosystems

The Groundwater Dependent Ecosystem (GDE) Atlas (BOM 2013) does not show any terrestrial GDEs as occurring in the mine development project area. Although terrestrial GDEs are not predicted to occur, parts of PCT 951 and 1330 overlie areas of predicted shallow groundwater from 0 to 20 m bgl, and would likely range from having a very high (ie 0-2 m) to very low (5-20 m bgl) interaction with groundwater. Opportunistic GDEs are mainly located north and south-west of the TSF, with smaller patches south and south-east of the TSF. It is noted that PCT 766 located within the footprint of the TSF is likely to be an obligate/entirely dependent GDE, however this PCT will be removed by the mine development and if therefore not considered in the GDE assessment. All other PCTs are non-dependent as they do not have access to shallow groundwater.

e EPBC Act protected matters

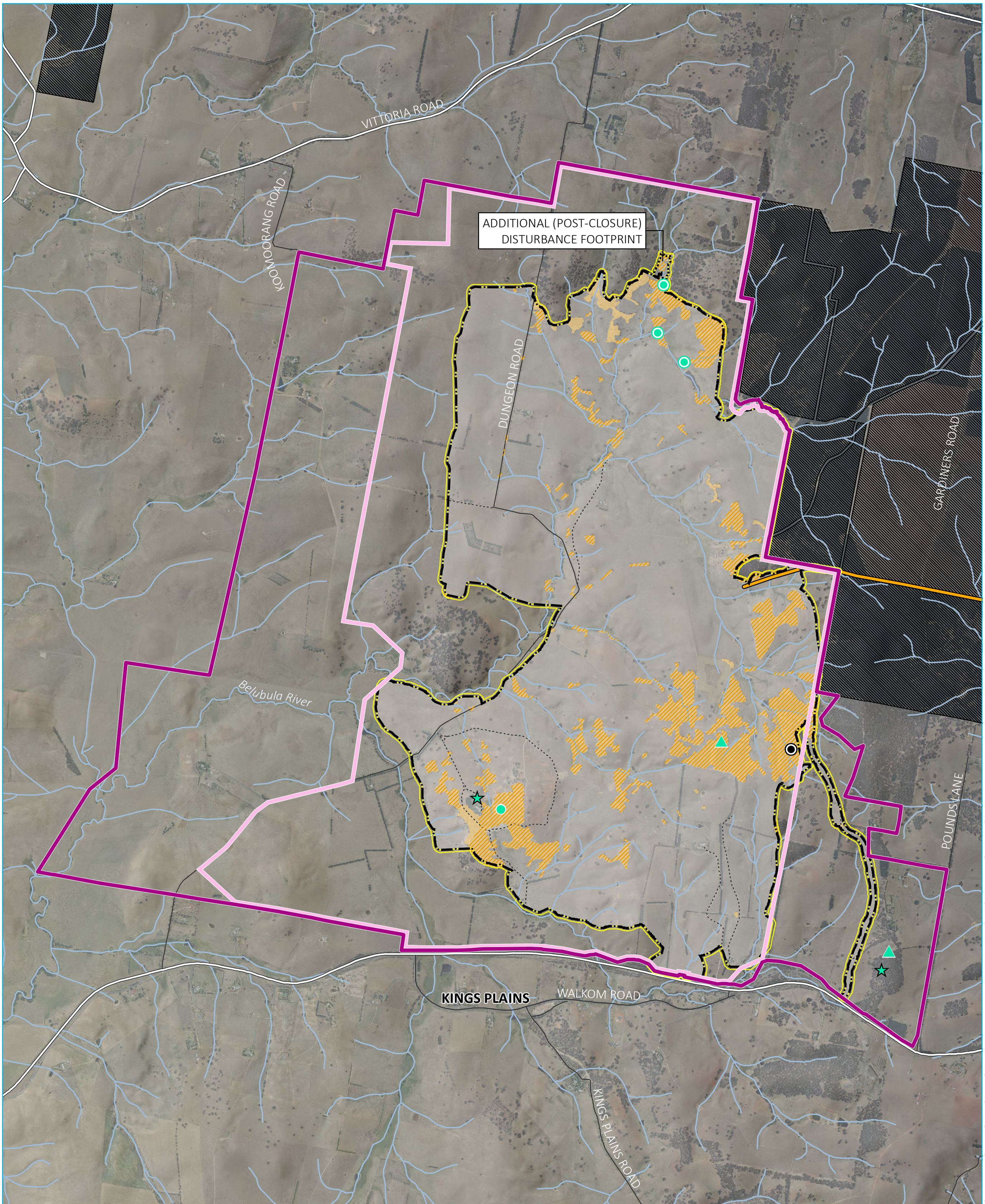
Four PCTs were predicted to occur within the mine development project area by the Protected Matters Search Tool (PMST), one of which, White Box - Yellow Box - Blakely's Red Gum Grassy Woodland was recorded within the mine development project area. None of the other PCTs identified in the mine development project area are consistent with the other Threatened Ecological Communities (TECs) predicted to occur.

The PMST and/or BAMC predicted that 30 species listed as threatened under the EPBC Act could occur within the mine development project area. The likelihood of occurrence found only two of these species were considered likely to occur (Koala and Superb Parrot (*Polytelis swainsonii*)).

Three species listed under the EPBC Act were recorded in the mine development project area. These comprised two species listed as vulnerable (Koala and Superb Parrot) and one migratory species (Latham’s Snipe (*Gallinago hardwickii*)). PCTs 727, 951 and 1330 in the mine development project area were assessed against the Koala habitat assessment tool in the EPBC Act referral guidelines for the vulnerable Koala (DoE 2014). Vegetation in the project area represents Koala habitat, in accordance with the referral guidelines (ie a score greater than five).

One Superb Parrot was recorded directly south of the mine development project area. The breeding range is concentrated on the NSW South Western Slopes and Riverina Bioregions; however, the mine development project area does not occur within any of the three main breeding areas identified by the species recovery plan. The species may occasionally forage in the mine development project area; however, the mine development project area does not comprise habitat critical to the species survival as it does not contain the required vegetation types stated in the species recovery plan and is not considered core breeding habitat.

Latham’s Snipe was recorded directly adjacent to the mine development project area. This species breeds in Japan and in far eastern Russia during the northern summer and then migrates to Australia, where it remains for the duration of the northern winter. Latham's Snipe is a non-breeding visitor to south-eastern Australia, that migrates through northern Australia to reach non-breeding areas located further south. Only one site in Australia, Seaford Swamp in Victoria, is recognised as an internationally important wetland for the species.



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Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); OEH (2017); EnviroKey (2013/2014)

0 1 2 km

GDA 1994 MGA Zone 55

N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest
- Weed impact management zone (WIMZ)
- Koala species polygon
- Squirrel Glider species polygon

Threatened fauna species (EMM, 2019)
- Squirrel Glider (3)
- Koala (1)

Threatened fauna species (EnviroKey)

May 2013 sightings
- Squirrel Glider (3)

November 2013 sightings
- Squirrel Glider (4)

March 2014 sightings
- Squirrel Glider (2)

Species polygons - mine development

McPhillamys Gold Project
Amendment report
Figure 6.42

ii Impact avoidance and minimisation

Key avoidance measures have been implemented to mitigate and manage potential impacts from the mine development. These measures have helped to decrease the impact on biodiversity by avoiding native vegetation through revising the mine design, and include:

- avoidance of all areas of PCT 1330 which are considered Moderate/Good (High) condition within the amended mine development footprint, apart from a small area in the direct footprint of the open cut pit. This area was impossible to avoid due to this being the location of the gold deposit targeted by the project;
- minimisation of impacts to PCT 1330 of medium condition wherever feasible; and
- location of the TSF which avoids almost all White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands in the area.

The EIS identified that a northern clean water diversion would be required to divert water around the north of the final TSF landform and that this diversion would be designed as part of the detailed mine closure plan. Further consideration of the EIS TSF design identified that a large diversion drain would need to be cut into the natural ground at closure, to enable water pooling against the northern embankment to freely drain, resulting in additional impacts to PCT 1330. An alternative option considered for the EIS TSF design would have allowed water to pool against the EIS TSF northern embankment; however, this option would also have resulted in impacts to PCT 1330 as pooled water would inundate the community.

The re-designed north-eastern TSF embankment, combined with the infill of a portion of the revised CWF 1A, avoids the need for this large diversion drain construction at closure and will allow any rainfall runoff from upstream of the TSF to drain naturally around the north-eastern side of the TSF into the diversion drain.

iii Impacts of amended mine development

a Potential direct and indirect impacts

As outlined in the EIS, in the absence of mitigation measures, the mine development would have the following direct and indirect impact on biodiversity:

- direct impacts:
  - loss of native vegetation; and
  - loss and degradation of native fauna habitat.
- indirect impacts:
  - alteration to hydrology for groundwater dependent ecosystems;
  - erosion and sedimentation;
  - weed introduction and spread;
  - feral animal invasion into retained habitats;
  - removal of habitat resources for threatened fauna;
  - removal of hollow-bearing trees;

- increased noise, vibration and dust levels resulting in disturbance of fauna species, and consequent abandonment of habitat, or changes in behaviour (including breeding behaviour); and

- lighting for night works, resulting in disturbance to fauna species and changes in occupancy or behaviour.

Direct impacts have been avoided and/or minimised through the design of the mine development wherever possible. Impacts will be further managed and mitigated through the development and implementation of a biodiversity management plan, using the measures recommended in Section 6.8.4. Any residual impacts will be compensated through implementation of the biodiversity offset framework (refer Section 6.8.5).

b Prescribed and uncertain impacts

An assessment of prescribed and uncertain impacts relevant to the mine development is provided in Table 6.22.

Table 6.22 Assessment of prescribed and uncertain impacts mine development

Prescribed/uncertain impact	Mine development
• karst, caves, crevices, cliffs and other geological features of significance; • rocks; or • human-made structures; or • non-native vegetation.	The mine development does not contain geologically significant features, rocky areas, human-made structures or non-native vegetation that represent habitat for threatened species or ecological communities.
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Native vegetation and fauna habitats are highly fragmented in the mine disturbance footprint. Ecosystem and species credit species predicted to occur in the mine development project area predominantly comprise highly mobile birds and bats, and therefore most species will not be impacted by fragmentation. However, species dependent on the retention of vegetated corridors recorded in the mine footprint (Koala and Squirrel Glider) and predicted to occur in the mine footprint (Brown Treecreeper and Spotted-tail Quoll) may be impacted by fragmentation.
Impacts of development on movement of threatened species that maintains their life cycle	Species dependent on the retention of vegetated corridors recorded in the mine footprint (Koala and Squirrel Glider) and predicted to occur in the mine footprint (Brown Treecreeper and Spotted-tail Quoll) may be impacted by fragmentation. These species would depend upon maintenance of connectivity during the breeding season to find mates.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	Impacts on groundwater dependent ecosystems that represent threatened ecological communities and threatened species habitats are discussed in Section 6.8.2(iii)(e).
Impacts of wind turbine strikes on protected animals	The mine development does not include wind turbines; therefore, this prescribed impact is not relevant to the project. Accordingly, management of this prescribed impact is not required.
Impacts of vehicle strikes or on animals that are part of a threatened ecological community	The mine development traffic impact assessment (Constructive Solutions 2019) predicted a minor increase in traffic on the local road network as a result of the project, with a 15% increase noted for the Mid Western Highway.

c Comparison of predicted EIS impact with amended project

Impacts on biodiversity have changed for the amended mine development, compared to that presented in the EIS, due to a revision of the mine disturbance footprint. Changes to the mine disturbance footprint have resulted in no change for some PCTS, decreased impacts for some PCTs and small increases for others. Overall, the amended project will reduce the direct impact on PCTs by 1.97 ha, reducing from 132.36 ha for the EIS mine disturbance footprint to 130.39 ha in the amended mine disturbance footprint. Of this area of native vegetation directly impacted, the amended project will decrease the direct impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands as listed under the BC Act by 0.35 ha and increase the direct impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands as listed under the EPBC Act and EPBC Act by 1.93 ha. A comparison of the PCT predicted direct impacts as presented in the EIS with the amended mine development is detailed in Table 6.23.

Table 6.23 Comparison of mine development PCT direct impacts

Plant community type/species credit species	Residual direct impact - EIS (ha)	Residual direct impact - Amended project (ha)	Change (ha)
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (High)	4.75	2.84	-1.91
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Medium)	34.55	35.54	0.99
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion – Moderate/Good (Poor)	14.25	10.40	-3.85
951 - Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion – Moderate/Good (Poor)	31.55	32.73	1.18
766 - Carex sedgeland of the slopes and tablelands – Moderate/Good (Poor)	3.04	3.04	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion– Moderate/Good (High)	1.47	1.47	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Medium)	17.03	18.96	1.93
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Other)	0.76	0.76	0.00
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion – Moderate/Good (Poor)	24.96	24.65	-0.31
Total	**132.36**	**130.39**	**-1.97**

A comparison of the direct threatened species impacts as presented in the EIS with the amended mine development is provided in Table 6.24. The method of Koala habitat mapping has changed with the introduction of the Koala Habitat Protection SEPP. Accordingly, the direct residual impacts of the EIS and amended mine development are provided for the Koala in Table 6.24, using both methods for calculating Koala habitat, comprising:

- Koala habitat as presented in the EIS, calculated based on SEPP 44 and the feed tree species for the central and southern tablelands koala management area in the Koala Recovery Plan (DECC 2008); and
- Koala habitat as presented in the BDAR (Appendix M), calculated based on the feed tree species for the central and southern tablelands koala management area in the Koala Habitat Protection SEPP.

The amended mine development will increase direct Koala impacts by 2.8 ha using the Koala species polygon as presented in the EIS, and will increase by 1.89 ha using the Koala species polygon as presented in the BDAR (Appendix M).

The amended mine development will decrease Squirrel Glider direct impacts by 1.9 ha.

Table 6.24 Comparison of mine development threatened species impacts

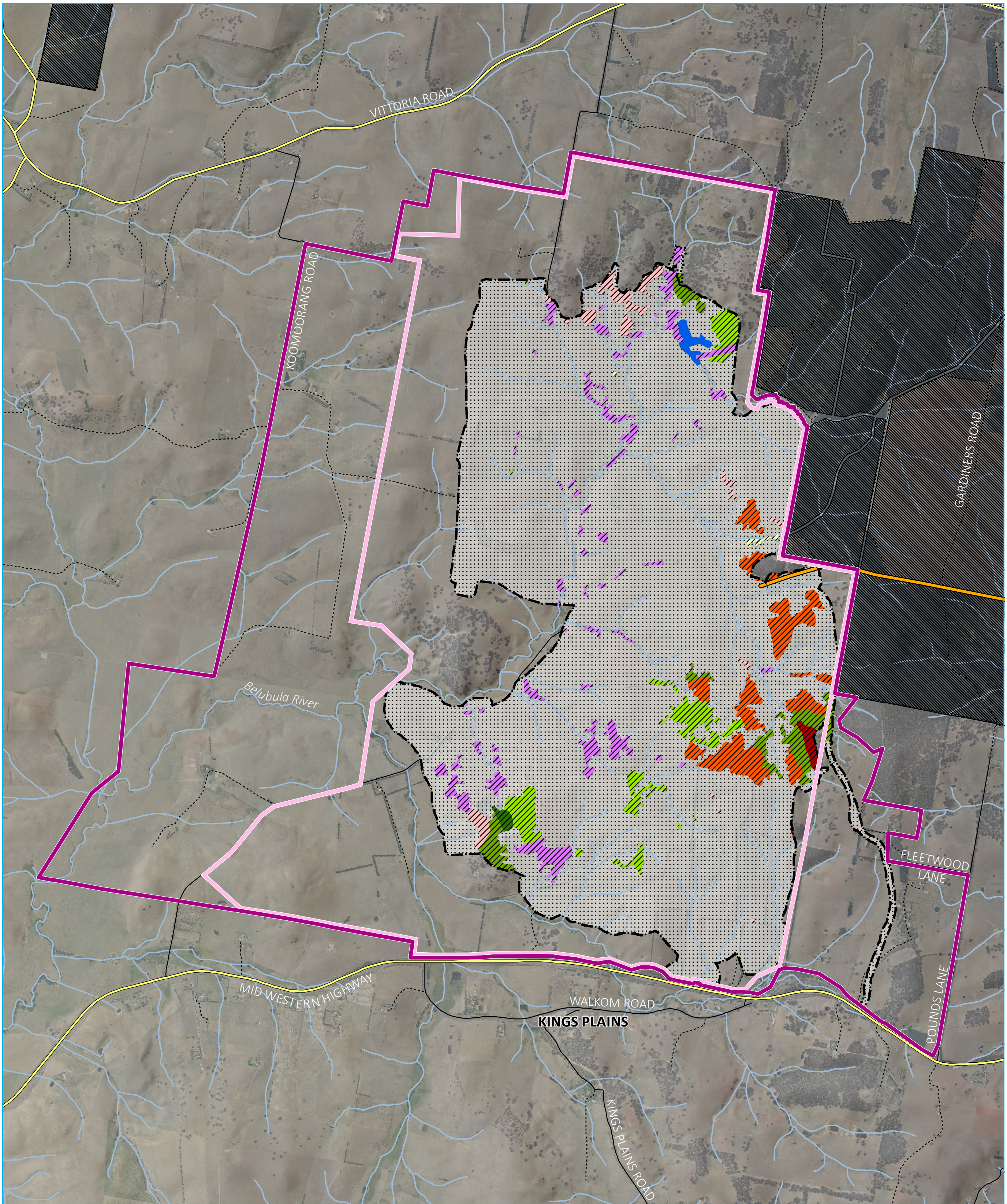
Candidate species	Residual impact - EIS (ha)	Residual impact - Amended project (ha)	Change (ha)
Koala - SEPP 44 and Koala recovery plan mapping method presented in EIS	75.77	78.57	2.80
Koala - Koala Habitat Protection SEPP mapping method presented in the BDAR (Appendix M)	115.06	116.95	1.89
Squirrel Glider	129.32	127.35	-1.97

d Impacts requiring offsets

An assessment of the impacts requiring offsetting for the mine development in accordance with Section 10 of the BAM (OEH 2017b) is provided in Section 6.7.1 of the revised BDAR, with the credit report provided in Appendix D of that report. A total of 2,541 ecosystem credits are required to offset the residual impacts on native vegetation and a total of 5,082 species credits are required to offset the residual impacts on threatened species for the mine development as detailed in Table 6.25. Impacts to biodiversity requiring offsets within the mine development disturbance footprint are illustrated in Figure 6.43.

Table 6.25 Ecosystem and species credits required

PCT/Species	Credits required
727 – Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion	955
766– Carex sedgeland of the slopes and tablelands	26
951– Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion	464
1330– Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	1096
Koala	2,431
Squirrel Glider	2,651



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); EnviroKey (2017/2018); DFSI (2017); ELVIS (2014)

0 1 2 km

GDA 1994 MGA Zone 55 N

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line
- Vittoria State Forest

- Species credit polygon for Koala and Squirrel Glider
- Areas not requiring offset

Plant community types

PCT 727 | Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
- High
- Medium
- Poor

PCT 766 | Carex sedgeland of the slopes and tablelands
- Poor

PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- Poor

PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- High
- Medium
- Poor
- Other

Impacts to biodiversity requiring offsets

McPhillamys Gold Project
Amendment report
Figure 6.43

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e Impacts to groundwater dependent ecosystems

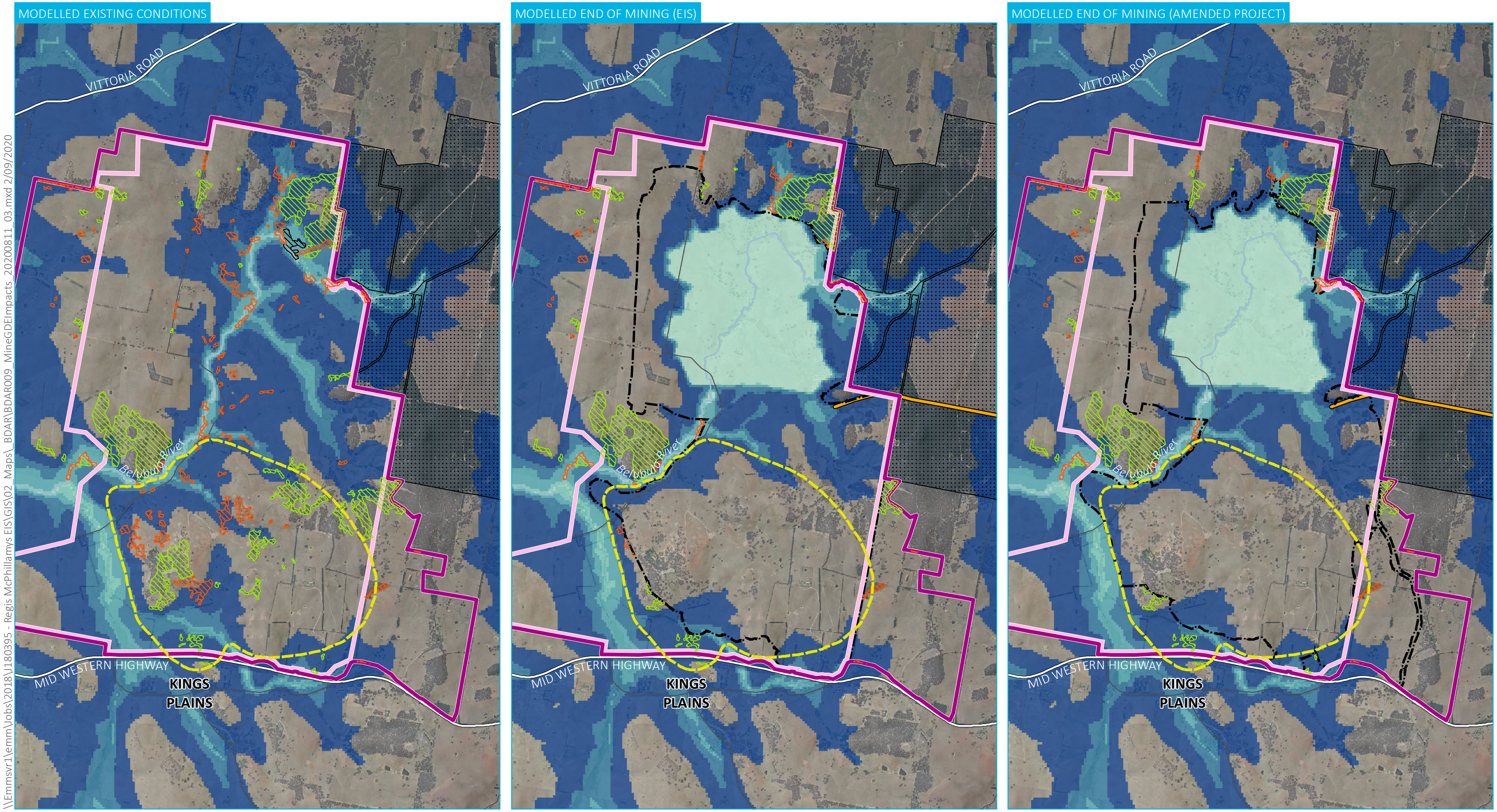
The extent of groundwater drawdown associated with open cut mining is predicted to be steep and localised around the void and limited in extent to the mine development project area (refer to the Groundwater Assessment Addendum, Appendix H of this report). The simulation of the TSF is simulated in the groundwater model using a highly conservative approach (the simulation of the TSF in the groundwater model is more comparable to a lined water storage dam rather than a tailings dam). Under this simulation, seepage from the TSF is predicted to result in the depth to groundwater below and around the TSF becoming shallower and rising towards the ground surface. Under this unlikely scenario, the predicted change in depth to groundwater will enable terrestrial vegetation adjacent to the proposed TSF increased access to groundwater (ie increase in the extent (ha) of the three PCTs that can access groundwater).

Figure 6.44 shows the predicted changes in the extent of groundwater accessibility between the existing and end of mine conditions for PCTs 951 and 1330, which are deemed to have a facultative and opportunistic dependence on groundwater. It is noted that while PCT 766 as shown in Figure 6.44 is likely to be an obligate/entirely-dependent GDE, this PCT will be removed by the project and is therefore not considered further.

The project is predicted to result in no change to a minor increase in the extent of groundwater access for PCTs with a higher level of dependence on groundwater by the end of mining and 100 years following mining. This is likely to range from no impact on opportunistic GDEs in areas where no change is predicted, to a minor beneficial impact through a predicted increase to the extent of groundwater access during drought conditions under the highly conservative simulation of the TSF (eg an additional 0.69 ha of PCT 1330 with a moderate groundwater interaction will have access to groundwater at the end of mining, assisting with meeting the ecosystem's water requirements during times of low rainfall and soil moisture).

A minor reduction in the extent of groundwater access is predicted for PCT 951 (0.15 ha). Given this minor reduction in the extent of groundwater access and the very low interaction and dependence on groundwater (ie between 5–20 m bgl), water stress is not predicted to occur.

Accordingly, no negative groundwater access impacts are expected to occur for GDEs as a result of the amended project.



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline

- Predicted 1 m drawdown extent (100 years after mine end)

Depth to groundwater
- 0 m
- 0 - 0.5 m
- 0.5 - 2 m
- 2 - 5 m
- 5 - 20 m

Existing environment
- Major road
- Minor road
- Named watercourse
- Vittoria State Forest

Plant community types
- PCT 766 | Carex sedgeland of the slopes and tablelands
- PCT 951 | Mountain Gum - Manna Gum open forest of the South Eastern Highlands Bioregion
- PCT 1330 | Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); ELVIS (2014)

Potential impacts on groundwater availability for terrestrial vegetation

McPhillamys Gold Project
Amendment report
Figure 6.44

0 1 2 km
GDA 1994 MGA Zone 55
N

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EMM creating opportunities

f EPBC Act significant impact assessment

Within a 5 km buffer of the mine development project area, approximately 1,129 ha of Box Gum Woodland is mapped. This comprises 1,096.66 ha of PCT 1330 (including areas mapped on site), 25.67 ha of PCT 654 (Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion) and 6.68 ha of PCT 278 (Riparian Blakelys Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion). Note that this does not account for the condition of vegetation mapped, and areas of these PCTs in poor condition would likely not meet the criteria for the EPBC Act listed community.

Approximately 20.43 ha of the EPBC Act listed community will be impacted by the mine development. Accordingly, the project would result in a reduction of approximately 1.8% in extent of the CEEC within a 5 km radius of the mine development. The assessment of significance for the removal of 20.43 ha of White Box-Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland, in accordance with the assessment criteria for CEECs (DoE 2013) found the mine development is likely to result in a significant impact on the listed community as 20.43 ha of habitat critical to its survival will be removed.

Koala impacts have been re-calculated in the BDAR (Appendix M) in accordance with the feed tree species for the central and southern tablelands koala management area in the Koala Habitat Protection SEPP. Using the Koala Habitat Protection SEPP, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project.

An assessment has been completed for the mine development project area in accordance with the Koala habitat assessment tool in EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014). This assessment found vegetation in the mine development project area represents habitat critical to the survival of the Koala, in accordance with the referral guidelines. The assessment of significance found that the mine development may result in a significant impact on the Koala as an area of habitat critical to the survival of the Koala will be removed.

Assessments of significance carried out for the other EPBC listed species known or considered to have the potential to have suitable habitat within the mine development, found that the mine development will not result in a significant result on these species.

As noted in Section 4.5 above, an assessment of potential impacts to MNES because of the amended project has been prepared in accordance with the FBA, for the purposes of DAWE's assessment and is contained in Appendix F of Appendix M.

6.8.3 Pipeline development

i Existing environment

Much of the pipeline corridor, particularly within the Bathurst Interim Biogeographic Regionalization of Australia IBRA subregion, comprises of cleared agricultural land used for grazing and cropping and plantations of *Pinus radiata* within state forests. Native vegetation consists of areas of paddock trees over exotic pasture and open woodlands in the western part of the pipeline corridor, to forests in the higher altitudes in the eastern part of the pipeline corridor.

a Native vegetation

A total of six PCTs were identified within the amended pipeline corridor as follows:

- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion (PCT 1330);
- Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (PCT 277);

- Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion (PCT 1093);

- Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191);

- Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion (PCT 1197); and

- Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highlands Bioregion (PCT 727).

The PCTs present across the pipeline corridor are shown in Figures 4.2a to 4.2v in Section 4.3.1(ii) of the revised BDAR (refer Appendix M). All native plant community types recorded varied from intact patches to derived native grasslands (DNG).

Two PCTs, namely PCT1330 and PCT227, represent White Box Yellow Box Blakely's Red Gum Woodland and Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, listed as a CEEC under BC Act. Areas of theses PCTs also represent White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC, listed under the EPBC Act.

It is noted that OzArk (2019) identified 12 PCTs occurring along the pipeline corridor. EMM has subsequently revised the vegetation mapping in response to BCD's submission on the EIS BDAR in accordance with the BAM (as described in Section 4.2.1(ii) of the revised BDAR). This revision included refinement of vegetation mapping to accurately map PCTs and further stratify PCTs into vegetation zones based on broad condition state, using biometric data derived from plot surveys.

b Threatened species ecosystem credits

A number of ecosystem credit species were predicted by the BAMC for the pipeline development. A predicted species assessment for these ecosystem credit species has been carried out in Section5.2.2(ii) of the revised BDAR.

c Threatened species - candidate credit species

Two candidate species, comprising Black Gum (*Eucalyptus aggregata*) and Clandulla Geebung (*Persoonia marginata*) were recorded in the pipeline corridor. Potential host plants for the Bathurst Copper Butterfly (*Paralucia spinifera*) were also recorded.

Several threatened species have been assumed as present in limited parts of the pipeline development where suitable habitat occurs, comprising:

- Pink-tailed Worm Lizard (*Aprasia parapulchella*);

- Bathurst Copper Butterfly (*Paralucia spinifera);*

- Basalt Peppercress (*Lepidium hyssopifolium*);

- Booroolong Frog (*Litoria booroolongensis*);

- Small Purple-pea (*Swainsona recta*);

- Silky Swainson-pea (*Swainsona sericea*);

- Tarengo Leek Orchid (*Prasophyllum petilum*);

- Austral Toadflax (*Thesium australe*);
- Squirrel Glider (*Petaurus norfolcensis*);
- Koala (*Phascolarctos cinereus*);
- Bush Stone-curlew (*Burhinus grallarius*);
- Eastern Pygmy Possum (*Cercartetus nanus*);
- Masked Owl (*Tyto novaehollandiae*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Barking Owl (*Ninox connivens*);
- Powerful Owl (*Ninox strenua*);
- Brush-tailed Phascogale (*Phascogale tapoatafa*);
- Large-eared Pied Bat (*Chalinolobus dwyeri*); and
- Brush-tailed Rock-Wallaby (*Petrogale penicillata*).

d Groundwater dependent ecosystems

The GDE atlas indicates that some watercourses within the pipeline corridor have a high potential for the occurrence of GDEs; however, many of these watercourses are ephemeral, and no evidence of groundwater flow was identified during field work (OzArk 2019). The mapping does not encompass any terrestrial GDEs suggesting there is a low to moderate potential for these to occur in the pipeline corridor. Any GDEs are likely limited to terrestrial vegetation within the riparian corridor that opportunistically access groundwater under dry conditions.

e EPBC Protected matters

The PMST and/or BAMC predicted that 50 species listed under the EPBC Act could occur within the pipeline development corridor. Of these:

- Black Gum and Clandulla Geebung (*Persoonia marginata*) were identified within or in the vicinity of the pipeline corridor;
- Bathurst Copper Butterfly and Koala were considered to have a high likelihood of occurrence; and
- Austral Toadflax, Basalt Peppercress, Hoary Sunray (*Leucochrysum albicans var. tricolor*), Small Purple-pea, Superb Parrot, Booroolong Frog, Greater Glider (*Petaurus volans*) and Pink-tailed Worm Lizard were considered to have a moderate likelihood of occurrence.

The Tarengo Leek Orchid was conservatively assessed, including an expert assessment (contained as in Appendix E of the revised BDAR), as although this species has a low likelihood, the risk of impact would be high if recorded.

ii Impact avoidance and minimisation

The pipeline has been designed, where possible, to avoid sensitive biodiversity areas. Regis has invested significant time and expense in revising vegetation mapping, conducting targeted surveys and assessing habitat for threatened species in response the BCD's concerns with the EIS BDAR, and siting the pipeline route accordingly.

The additional surveys and assessments have been carried out in parallel with, and have informed the evolution of, the pipeline corridor design. This process has ensured the avoidance of environmental constraints, including impacts on Box Gum Woodland and threatened species habitat, as far as practicable.

Key avoidance measures that have been implemented by Regis comprise:

- selection of a pipeline route that maximises use of existing roads and non-native vegetation and minimises disturbance to native vegetation;
- in areas of native vegetation, reducing the pipeline disturbance footprint to 8 m width, with a further restriction to 6 m width where the pipeline intersects White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands which is listed under the EPBC Act;
- avoiding direct impacts on Bathurst Copper Butterfly host plants; and
- avoiding direct and indirect impacts on potential Tarengo Leek Orchid habitat (to be informed by the outcomes of a targeted survey in October/November 2020).

iii Impact of amended pipeline development

a Potential direct and indirect impacts

Potential direct and indirect impacts of the pipeline development have the potential to result in the same impacts on biodiversity as the mine development outlined in Section 6.8.2(iii)(a) above.

b Prescribed and uncertain impacts

An assessment of prescribed and uncertain impacts relevant to the pipeline development is provided in Table 6.26.

Table 6.26 Assessment of prescribed and uncertain impacts pipeline development

Prescribed/uncertain impact	Pipeline development
• Karst, caves, crevices, cliffs and other geological features of significance; • rocks; or • human-made structures; or • non-native vegetation.	The pipeline development does not intersect geologically significant features or human-made structures that would represent habitat for threatened species or ecological communities. The pipeline corridor intersects areas of granite outcropping that represent potential habitat for Pink-tailed Worm Lizard in the Bathurst IBRA subregion. The pipeline disturbance footprint has minimised impacts on this area of granite outcropping, and a species polygon has been created for Pink-tailed Worm Lizard in PCT 1330, encompassing these rocky areas to compensate for direct impacts. Additional measures will be implemented to manage this prescribed impact during construction. No operational impacts are expected. A species polygon has also been created for Booroolong Frog in the Bathurst IBRA subregion (northern and southern options) and Capertee Uplands IBRA subregion. These species polygons intersect areas of non-native vegetation and therefore will not generate species credits under the BAM. No operational impacts are expected. Five Black Gum trees occur in areas of non-native vegetation. Three of these individuals would be directly impacted, while two would be potentially indirectly impacted by tree root damage
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The pipeline predominantly traverses non-native vegetation but intersects four large and contiguous areas of native vegetation. In these areas of contiguous native vegetation, the pipeline corridor has been placed on existing roads and tracks to minimise fragmentation impacts. As the pipeline will be buried, fragmentation impacts will be temporary and mainly limited to the construction period. There is potential for nocturnal animals to become trapped in the trench if sections are left open overnight. Minor operational impacts may occur if pipeline maintenance is required.
Impacts of development on movement of threatened species that maintains their life cycle	The main impact to threatened species life cycles is fragmentation, as species like Koalas and Squirrel Gliders need some level of connectivity in vegetation to access mates during the breeding season. As fragmentation impacts are temporary and restricted to the construction period, potential life-cycle impacts will be managed through managing connectivity.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	The trench for the pipeline is not expected to intersect groundwater given its shallow depth, therefore impacts on groundwater dependent ecosystems are not expected. Additionally, large waterways like the Macquarie River are being underbored. Therefore, impacts on threatened species and ecological communities as a result of changes in water quality, water bodies and hydrological processes are not expected during construction or operation. Accordingly, management of this prescribed impact is not required.
Impacts of wind turbine strikes on protected animals	The pipeline development does not include wind turbines; therefore this prescribed impact is not relevant to the project. Accordingly, management of this prescribed impact is not required.
Impacts of vehicle strikes or on animals that are part of a threatened ecological community	The pipeline development traffic impact assessment (Ason Group 2019) concluded that the pipeline would result in minor increases of approximately 30 vehicle movements in the morning and afternoon peak periods from existing traffic levels during the construction period and no material impacts during the operational period. Therefore, the pipeline development is not predicted to significantly increase animal vehicle strikes above existing levels. Accordingly, management of this prescribed impact is not required.

Table 6.26 Assessment of prescribed and uncertain impacts pipeline development

Prescribed/uncertain impact	Pipeline development
Indirect impacts on Black Gum in native vegetation	Three Black Gum individuals may be potentially impacted by tree root damage by weeds.
Indirect impacts on Tarengo Leek Orchid	Regis has committed to avoiding all direct impacts on Tarengo Leek Orchid and implementing a 5 m buffer around any recorded individuals to minimise indirect impacts. Strategies to manage this uncertain impact are described in Section 6.8.4

c Comparison of predicted EIS impacts with amended project

Impacts on biodiversity have changed for the pipeline development, partly relating to a change in the pipeline disturbance footprint and addition of two pipeline route options in the Bathurst IBRA subregion. The impacts on biodiversity have mainly changed due to the revision of PCT mapping, additional targeted surveys and habitat assessment results.

A comparison of the direct impacts on PCTs as presented in the EIS with the amended project and changes to the biodiversity assessment results is presented in Table 6.27. Where vegetation zones have been substantially revised (ie PCT 1093, 1191, 1197 and 1330), the total area of the PCT has been combined as a separate line item to provide a comparison of the changes. Overall, the direct impacts on PCTs have increased by 10.21 ha for the pipeline development if the southern pipeline option is constructed and 7.54 ha if the northern option is constructed.

A comparison of the direct impacts on candidate species as presented in the EIS with the amended project and changes to the biodiversity assessment results is presented in Table 6.28. The number of candidate species assessed has greatly increased when compared with the EIS; however, this is due mainly to a change in how candidate species have been assessed in response to BCD’s submission on the EIS BDAR.

In the EIS, the candidate species assessment was only completed in the dominant IBRA subregion, namely Bathurst, while separate candidate species have been completed for each IBRA subregion the pipeline intersects, in response to BCD’s submission. In addition, the increase in native PCTs mapped within the project footprint has increased the area of habitat impacted for threatened species when comparing the amended project to the EIS. Overall, species direct impacts have increased by 13.57 ha for the southern option and 12.5 ha for the northern option. It should be noted that some of these impacts are combined, as multiple species in some cases can occupy the same area of habitat.

Table 6.27 Comparison of pipeline development PCT impacts

Plant community type	Residual impact EIS (ha)	Residual impact - Amended project: southern option (ha)	Residual impact - Amended project: northern option (ha)	Change (southern option)	Change (northern option)
85 - River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion	0.10	0.00	0.00	-0.10	-0.10
277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	0.00	2.37	2.37	2.37	2.37

Table 6.27 Comparison of pipeline development PCT impacts

Plant community type	Residual impact EIS (ha)	Residual impact - Amended project: southern option (ha)	Residual impact - Amended project: northern option (ha)	Change (southern option)	Change (northern option)
287 - Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion	0.70	0.00	0.00	-0.70	-0.70
654 - Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	0.60	0.00	0.00	-0.60	-0.60
679 - Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands, South Eastern Highlands Bioregion	0.40	0.00	0.00	-0.40	-0.40
727 - Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	0.00	0.03	0.03	0.03	0.03
731 - Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills, South Eastern Highlands Bioregion	2.50	0.00	0.00	-2.50	-2.50
732 - Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion	1.10	0.00	0.00	-1.10	-1.10
765 - Carex - Juncus sedgeland/wet grassland of the South Eastern Highlands Bioregion	0.00	0.00	0.00	0.00	0.00
1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	2.10	3.24	3.25	1.14	1.14
1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	0.00	2.11	2.11	2.11	2.11
1197 - Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	0.30	0.96	0.96	0.66	0.66
1330 - Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	0.50	9.30	7.13	9.29	6.63
Total	**8.30**	**18.51**	**15.84**	**10.21**	**7.54**

Table 6.28 Comparison of pipeline development species impacts

Species	EIS impacts (ha)	Amended project impacts (ha)		Notes	Change (ha)	
		Southern option	Northern option		Southern option	Northern option
Flora						
Silky Swainson-pea	0.46	0.57	0.57	Revised vegetation mapping has increased and changed the area of habitat.	0.11	0.11
Austral Toadflax	0.27	0.09	0.09	Revised vegetation mapping has refined the area of habitat.	-0.18	-0.18
Acacia meiantha	0	3.83	3.83	New candidate species predicted by BAMC during revised EMM assessment 2020.	3.83	3.83
Black Gum	0	0.42	0.42	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.42	0.42
Lepidium hyssopifolium	0	0.09	0.09	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.09	0.09
Clandulla Geebung	0	0.19	0.19	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.19	0.19
Small Purple-pea	0	0.39	0.39	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.39	0.39
Veronica blakelyi	0	0.87	0.87	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.87	0.87
Fauna						
Eastern Pygmy Possum	7.4	4.67	4.67	Revised vegetation mapping has refined the area of habitat.	-2.73	-2.73
Southern Myotis	0.2	0.00	0.00	Species habitat now classified as degraded.	-0.20	-0.20
Barking Owl	0.27	0.41	0.41	Additional hollow trees recorded have increased the habitat area.	0.14	0.14
Powerful Owl	0.27	2.34	2.34	Additional hollow trees recorded have increased the habitat area.	2.07	2.07
Bathurst Copper Butterfly	0.29	0	0	The route now avoids direct impacts on potential host plants for the species.	-0.29	-0.29
Squirrel Glider	4.42	4.56	4.56	Revised vegetation mapping has increased and changed the area of habitat.	0.14	0.14

Table 6.28 Comparison of pipeline development species impacts

Species	EIS impacts (ha)	Amended project impacts (ha)			Change (ha)	
		Southern option	Northern option	Notes	Southern option	Northern option
Brush-tailed Phascogale	2.9	2.15	2.15	Revised vegetation mapping has refined the area of habitat.	-0.75	-0.75
Booroolong Frog	0	0.37	0.38	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.37	0.38
Brush-tailed Rock Wallaby	0	0.13	0.13	New candidate species predicted by BAMC during revised EMM assessment 2020.	0.13	0.13
Bush Stone-curlew	0	1.15	1.15	New candidate species predicted by BAMC during revised EMM assessment 2020.	1.15	1.15
Gang-gang Cockatoo	0	1.66	1.66	New candidate species predicted by BAMC during revised EMM assessment 2020.	1.66	1.66
Koala	0	4.77	4.77	New candidate species predicted by BAMC during revised EMM assessment 2020	4.77	4.77
Large-eared Pied Bat	0	0.15	0.15	New candidate species predicted by BAMC during revised EMM assessment 2020	0.15	0.15
Pink-tailed Worm Lizard	0	1.25	0.16	New candidate species predicted by BAMC during 2020 revised EMM assessment 2020.	1.25	0.16
Total	**16.48**	**30.05**	**28.98**	-	**13.57**	**12.50**

d Impacts requiring offsets

A total of 363 ecosystem credits are required to offset the impacts of the pipeline development on vegetation zones if the southern option is constructed, and 331 ecosystem credits are required for the pipeline development if the northern option is constructed. A total of 968 species credits are required to offset the impacts of the pipeline development on threatened species habitat for the southern pipeline option, and 833 species credits required to offset the impacts of the pipeline development on threatened species habitat for the northern pipeline option. Credit reports are provided in Appendix D of the revised BDAR (refer Appendix M).

Table 6.29 Ecosystem and species credits required

PCT/Species	Credits required	
	Southern option	**Northern option**
Ecosystem credits		
277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	30	30
727- Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion	2	2
1093 - Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	101	101
1191 - Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion	71	71
1197- Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion	52	52
1330- Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	107	75
Total – ecosystem credits	***363***	***331***
Species credits		
Aromatic Peppercress	74	39
Austral Toadflax	56	3
Barking Owl	6	6
Bathurst Copper Butterfly	9	9
Black Gum	2	2
Booroolong Frog	34	33
Brush-tailed Phascogale	80	80
Brush-tailed Rock-wallaby	5	5
Clandulla Geebung	4	4
Eastern Pygmy Possum	141	141

Table 6.29 Ecosystem and species credits required

PCT/Species	Credits required	
	Southern option	Northern option
Gang-gang Cockatoo	11	11
Koala	155	155
Large-eared Pied Bat	5	5
Masked Owl	23	23
Pink-tailed Worm Lizard	14	3
Powerful Owl	29	29
Silky Swainson-pea	107	72
Small Purple-pea	28	28
Squirrel Glider	147	147
Veronica blakelyi	38	38
Total – species credits	***968***	***833***

e EPBC Act significant impact assessment

The assessments of significance carried out for the identified threatened species found the pipeline development is unlikely to result in a significant impact.

In the event Tarengo Leek Orchid is identified during the targeted survey in November 2020, the pipeline will be microsited to avoid impact.

6.8.4 Mitigation and management mine and pipeline developments

Mitigation and management measures to minimise the potential for indirect impacts on biodiversity for both the mine and pipeline developments are detailed in Table 6.30. Adaptive management strategies for prescribed and uncertain impacts are detailed in Table 6.31.

Table 6.30 Management and mitigation mine and pipeline developments

Action	Project components	Intended outcome	Timing
Retain and protect the area of native vegetation and Koala habitat north of the waste rock emplacement, in the area between the site access road, the mine infrastructure area, and the waste rock emplacement.	Mine development	Retention of native vegetation and Koala habitat	During mining
Retain native vegetation and habitats where not required for mine infrastructure	Mine development	Retention of native vegetation and threatened species habitats	Prior to and during clearing operations

Table 6.30 Management and mitigation mine and pipeline developments

Action	Project components	Intended outcome	Timing
Identify the limit of approved disturbance footprints on the ground through the use of suitable visible markers and ensure that all ground disturbing activities are only undertaken within approved areas	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations
Carefully remove vegetation in such a way that avoids damage to surrounding vegetation	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations
Undertake a pre-clearing inspection to identify and, where practicable, remove nesting or roosting fauna	Mine development, pipeline development	Minimise impacts on threatened species and communities	Prior to and during clearing operations
Develop specific procedures for Koala pre-clearing inspections and safe relocation outside the clearing area	Mine development, pipeline development	Prevent injury and mortality of Koalas during clearing operations by relocating into adjacent retained habitat	Prior to and during clearing operations
Undertake a revegetation project targeted at Koalas	Mine development	Increase the connectivity of fragmented patches of Koala habitat within the mine development project area, and outside the mine disturbance footprint	To be determined as part of BMP development.
Undertake a staged clearing of native vegetation and fauna habitat to minimise impacts to native fauna species	Mine development	Allow fauna to gradually self-relocate outside of project footprint	During clearing operations
Stockpile vegetation onsite for use during rehabilitation operations, where practicable. Larger vegetation may be retained whole for use in rehabilitation operations on site	Mine development	Retain important structural habitat features in the mine development project area for use in rehabilitation and/or at offset site	During clearing operations
Implement a weed and pathogen monitoring program	Mine development	Monitor weed impacts to retained vegetation outside the mine disturbance footprint, but within the mine development project area to target weed control efforts	Prior to and during clearing operations and mine operation
Undertake weed management and pest control programs in consultation with surrounding landholders, based on the results of the weed and pathogen monitoring program	Mine development	Maintain or improve condition of retained native vegetation	Prior to and during clearing operations and mine operation
Undertake progressive rehabilitation where possible	Mine development	Retain native vegetation and fauna habitats for as long as possible	In stages as the mine progresses

Table 6.30 Management and mitigation mine and pipeline developments

Action	Project components	Intended outcome	Timing
Conduct targeted pre-clearance survey for Tarengo Leek Orchid during the peak flowering season (October to November 2020) in the 0.62 ha of potential habitat to determine presence or absence of the species. If the species is present, the following procedures will be implemented: • the route will be microsited such that direct impacts to individuals are avoided; • protective fencing will be established prior to trenching in the species habitat with a 5 m buffer around each individual or group of individuals; and existing hydrological conditions will be determined in the area where individuals have been recorded, with this hydrology maintained during the construction period.	Pipeline development	If found, the route will be microsited such that direct impacts are avoided, and indirect impacts are appropriately managed.	Detailed design
Conduct pre-clearance surveys for Basalt Peppercress and Hoary Sunray during their flowering season (concurrent with Tarengo Leek Orchid surveys in October/November 2020) in potential habitats.	Pipeline development	If found, the route will be microsited such that the least possible number of individuals of each species are impacted.	Detailed design
A pre-clearance inspection will be conducted prior to trenching potential Booroolong Frog habitat near Coxs River (and Evans Plains Creek if the northern option is selected), surrounding the candidate species polygons shown on Figure 5.6, p, q, s and u of the BDAR (Appendix M). During the pre-clearance inspection, Booroolong Frogs (if present) will be salvaged and safely relocated outside of the trenching area and into adjacent retained habitats. The project ecologist will be present for the duration of trenching through the abovementioned areas to undertake salvage and relocation.	Pipeline development	Avoid damage to upstream and downstream vegetation and rocks (potential Booroolong Frog habitat) and minimise frog injury/mortality.	Prior to and during trenching operations

Table 6.30 Management and mitigation mine and pipeline developments

Action	Project components	Intended outcome	Timing
The route will be microsited where possible such that impacts on large trees, hollow-bearing trees and recorded individuals of Black Gum, Clandulla Geebung are minimised where possible. Protective fencing (eg parawebbing) will be placed around retained individuals for their protection during trenching.	Pipeline development	Maintain or improve condition of retained native vegetation	Prior to and during clearing operations
The route will be microsited through the area of potentially suitable rocky habitat for Pink-tailed Worm Lizard, delineated by the species polygons shown on Figure 5.6 p, q, s and u of the BDAR (Appendix M). A pre-clearance inspection will be completed to salvage and safely relocate Pink-tailed Worm Lizards (if present) outside the trenching area and into adjacent retained habitats. The project ecologist will be present for the duration of trenching through the abovementioned areas to undertake salvage and relocation.	Pipeline development	The route will be microsited such that the least area of potential habitat is impacted during trenching and minimise reptile injury/mortality during trenching.	Prior to and during clearing operations
Trenches while left open will be subject to daily inspection and escape measures or shelter provided (eg ramps or material under which animals can shelter). If species are trapped in the trench they will be freed by a trained and competent individual.	Pipeline development	Animal injury is minimised during trenching.	Daily inspections in active (open) trenching areas

Table 6.31 Adaptive management strategy for prescribed and uncertain biodiversity impacts

Prescribed/uncertain biodiversity impact	Project component	Monitoring/management strategy	Trigger for management	Response
Impacts on potential Booroolong Frog habitat in non-native vegetation	Pipeline development	A pre-clearance inspection will be conducted prior to trenching through potential habitat (at the locations specified in the BDAR).	Frogs are present in trenching area	Place frogs in upstream/downstream habitats out of trenching area, in accordance with Hygiene guidelines: Protocols to protect priority biodiversity areas in NSW from Myrtle Rust (Phytophthora cinnamomi), amphibian chytrid fungus and invasive plants (EES 2020).
Impacts on potential Pink-tailed Worm Lizard habitat	Pipeline development	A pre-clearance inspection will be conducted prior to trenching through potential habitat (at the locations specified in the BDAR).	Lizards are present in trenching area.	Place lizards in retained rocky habitats out of trenching area.
Direct and indirect impacts on Black Gum in non-native vegetation	Pipeline development	Protective fencing (eg parawebbing) will be placed around retained individuals for their protection during trenching, where required. The condition of the fencing will be monitored during trenching. The condition of the two Black Gum in the TRWIMZ will be assessed prior, during and following trenching to determine if an impact has occurred.	Protective fencing is breached (where installed).	Repair fencing (where required).
Indirect impacts on Black Gum in native vegetation in TRWIMZ and WIMZ	Pipeline development	The condition of the three Black Gum in the TRWIMZ and 11 in the WIMZ will be assessed by an arborist prior to, during and following trenching to determine if an impact has occurred.	The health of the 14 trees declines when compared to baseline arboricultural assessment.	Mitigate damage in accordance with arborist's recommendations.

Table 6.31 Adaptive management strategy for prescribed and uncertain biodiversity impacts

Prescribed/uncertain biodiversity impact	Project component	Monitoring/management strategy	Trigger for management	Response
Indirect impacts on Tarengo Leek Orchid	Pipeline development	If Tarengo Leek Orchids are recorded during targeted survey, the route will be microsited such that direct impacts are avoided. Indirect impacts will be managed through providing a 5 m buffer of protective fencing around recorded individuals (or groups of individuals) and implementing controls that maintain existing hydrological conditions during construction.	Protective fencing is breached Hydrological controls are breached.	Repair protective fencing. Repair hydrological controls.
Fragmentation of vegetated corridors in the mine project area	Mine development	Monitor increases in tree cover against benchmark values for the target PCTs (to be selected during development of the Biodiversity Management Plan).	Tree cover does not achieve 25% of the benchmark values by Year 10 of mining.	Conduct additional tree planting to increase tree cover.
Potential entrapment of fauna during pipeline trenching	Pipeline development	Daily inspections of open trenches for trapped fauna and condition of escape and shelter measures provided.	Animal is trapped in open trench and/or condition of escape and shelter measures are breached.	Rescue and release fauna from open trench, unless injured or juvenile. Injured or juvenile fauna will be taken to a vet or wildlife carer.

6.8.5 Biodiversity offset strategy

Under the NSW Biodiversity Offsets Scheme, proponents can meet their offset requirements through one, or a combination of the following actions:

1. establishment of a biodiversity stewardship site containing the required ecosystem and species credits;
2. purchase and retirement of the required ecosystem and species credits from the biodiversity credit market;
3. payment into the Biodiversity Conservation Fund; and
4. fund a management action that directly benefits the species and/or ecological communities impacted.

Regis has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site near Blayney (ie option 1, above). The property is approximately 388 ha and contains some of the required ecosystem and species credits (PCT 951, PCT 1330 and Koala). It is Regis' intention to secure the property under a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. Regis will assess the residual ecosystem and species credits and secure these under one or a combination of options 1 to 3. Option 4 is not available under the ancillary rules for any of the species or communities impacted.

For the pipeline development, a corridor has been identified representing the area in which the pipeline disturbance footprint will sit. The BDAR assessed impacts and calculated associated offset requirements based on this disturbance footprint which is based on the concept design (refer BDAR Figures 3.2a-h). The disturbance footprint may shift within the pipeline corridor. This is designed to allow Regis with some degree of flexibility to microsite the pipeline to avoid impacts and address construction issues (eg areas of shallow rock) during construction. Following detailed design and construction, Regis proposes to confirm the ecosystem and species credit requirements for the pipeline development as part of the development of the Biodiversity Offset Strategy for the project.

6.8.6 Conclusion

A revised BDAR has been prepared in accordance with the BAM to assess the amended project, inclusive of the mine and pipeline developments.

Annual biodiversity surveys have been carried out within the mine development project area since Regis acquired EL 5760 in 2012, and biodiversity surveys have been conducted between 2018 and 2020 in the pipeline corridor. These surveys have been carried out in parallel with, and have informed the evolution of, the mine and pipeline design. This process has enabled the avoidance and minimisation of biodiversity constraints as far as practicable.

Direct impacts on biodiversity have changed for the amended mine development due to a revision of the mine disturbance footprint. Revisions have resulted in no change for some PCTS, decreased direct impacts for some PCTs and small increases for others. Overall, the amended project will reduce the direct impact on native vegetation by 1.97 ha, reducing from 132.36 ha associated with the EIS mine disturbance footprint to 130.39 ha for the amended project. Of this area of native vegetation directly impacted, the amended project will decrease direct impacts on Box Gum Woodland as listed under the BC Act by 0.35 ha and increase the direct impacts on Box Gum Woodland as listed under the EPBC Act by 1.93 ha.

The method for calculating Koala impacts has changed since the EIS, with the introduction of the Koala Habitat Protection SEPP. Koala impacts have been re-calculated in the BDAR in accordance with the feed tree species for the central and southern tablelands koala management area in the Koala Habitat Protection SEPP. Using the Koala Habitat Protection SEPP, the EIS mine disturbance footprint would have directly impacted 115.06 ha, increasing by 1.89 ha to 116.95 ha for the amended project. In the EIS, direct impacts on the Squirrel Glider were 129.32 ha. The amended mine development reduces direct Squirrel Glider impacts by 1.97 ha to 127.35 ha.

Impacts on biodiversity have changed for the pipeline development, partly relating to a change in the project disturbance footprint and addition of two pipeline options in the Bathurst IBRA subregion. The impacts on biodiversity have mainly changed due to the revision of PCT mapping, additional targeted survey and habitat assessment results. The direct impacts on PCTs and species have increased by 10.22ha and 13.57 ha, respectively for the pipeline development if the southern pipeline route option is constructed with a total 18.51 ha of native vegetation removed, and an increase in direct impacts on PCTs and species of 7.54ha and 12.50 ha, respectively if the northern pipeline option is constructed with a total of 15.84 ha of native vegetation removed.

The mine development requires 2,541 ecosystem credits to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires 2,431 species credits for the Koala and 2,651 species credits for the Squirrel Glider. The pipeline development requires a total of 363 ecosystem credits (if the southern pipeline alignment is constructed) or 331 ecosystem credits (if the northern alignment is constructed) to compensate for impacts on native PCTs and ecosystem credit species. In addition to ecosystem credits, the project also requires a total of 968 species credits to offset the residual impacts of the pipeline development (southern pipeline option) and 833 to offset the pipeline development (northern pipeline option). Regis will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The revised BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The mine development is expected to result in significant impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands and the Koala, while the pipeline development is not expected to significantly impact any EPBC Act listed species or ecological communities. As the mine development is being assessed under the EPBC Act in accordance with the 2015 bilateral agreement made between the NSW and the Commonwealth under Section 45 of the EPBC Act, impacts on this listed ecological community and species will be compensated through the implementation of the biodiversity offset strategy.

6.9 Aquatic ecology

6.9.1 Mine development

i Introduction

An aquatic ecology assessment addendum (EMM 2020h) (herein referred to as the aquatic ecology addendum) has been prepared to assess the potential impacts of the amended mine development on aquatic ecology.

The aquatic ecology addendum, provided in Appendix N, considered and outlined the differences in impacts compared to the project design presented in the EIS. It also served as an update to the aquatic ecology assessment (EMM 2019d) prepared for the EIS (referred to herein as the EIS aquatic ecology assessment) (Appendix O of the EIS).

The EIS aquatic ecology assessment identified that key fish habitat associated with the Belubula River within the disturbance footprint would be removed within the mine development disturbance footprint. The assessment recommended that further spatial data analysis be carried out to quantify the area of key fish habitat within the disturbance footprint that will be removed by the project. This spatial data analysis has been carried out as part of the Aquatic Ecology Addendum.

The aquatic ecology addendum also considered Tributary G within the disturbance footprint, which was not formally assessed in the EIS aquatic ecology assessment due to the presence of a series of farm dams, as well as sections of the Belubula River and Tributary G upstream of the disturbance footprint, in terms of whether these watercourse sections meet the definitions of key fish habitat in the DPI document *Policy and guidelines for fish habitat conservation and management* (DPI 2013).

The key changes from the mine development presented in the EIS that have implications for aquatic ecology include:

- revised mine layout which has resulted in an amended disturbance footprint;
- avoidance of Tributary B in the southern portion of the mine development project area; and
- development of the post-closure clean water diversion, and primarily the waterway design (refer to Section 6.16).

ii Existing environment

a Overview of EIS aquatic ecology assessment

The existing aquatic ecology values within and downstream of the mine development project area are described in detail in Chapter 4 of the EIS aquatic ecology assessment and summarised in Chapter 14 of the EIS. Overall, the existing aquatic and riparian environment within the mine development project area is generally in poor condition, with invasive exotic species dominant and habitat modification prevalent (eg constructed dams, land clearing and surface flow barriers). The Belubula River within the mine development project area generally exhibits no flow and no permanent pools during dry conditions, with the exception of some downstream sections.

The EIS aquatic ecology assessment included an assessment of 15 sites across the upper Belubula River and its tributaries, including 12 sites within the mine development project area and three downstream. All of the surveyed sites on third order watercourses and above within the EIS disturbance footprint were identified as Type 1 highly sensitive key fish habitat and either Class 2 moderate key fish habitat or Class 3 minimal key fish habitat in accordance with the definitions in DPI (2013), as presented in Table 6.32 and Table 6.33. The EIS aquatic ecology assessment did not identify suitable aquatic habitat for threatened species within the mine development project area.

Table 6.32 Waterway type definitions for habitat sensitivity

Classification	Characteristics of waterway type
Type 1 – Highly sensitive key fish habitat	Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants.
Type 2 – Moderately sensitive key fish habitat	Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in Type 1.
Type 3 – Minimally sensitive key fish habitat	Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation.

Table 6.33 Waterway class definitions for fish passage

Classification	Characteristics of waterway class
Class 1 – Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (eg river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.
Class 2 – Moderate key fish habitat	Generally named intermittently flowing stream, creek or waterway with clearly defined bed and banks, semi-permanent to permanent water in pools or in connected wetland areas. Freshwater aquatic vegetation is present. Type 1 and Type 2 habitats present.
Class 3 – Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (eg fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other Class 1-3 fish habitats.
Class 4 – Unlikely key fish habitat	Generally unnamed waterway with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools post-rain events (eg dry gullies, shallow floodplain depressions with no aquatic flora).

b Upstream reaches of the Belubula River and Tributary G within the disturbance footprint

The EIS aquatic ecology assessment did not assess any sites upstream of the confluence of the Belubula River and Tributary G due to a lack of key fish habitat features and a proliferation of agricultural dams observed in these areas during the survey, which blocked fish passage as well as access (Plate 6.1). However, for the purposes of the aquatic ecology addendum assessment, any unassessed third order or above sections of the Belubula River and Tributary G within the disturbance footprint have been conservatively classed as key fish habitat in accordance with DPI (2013), based on the classifications assigned to nearby assessment locations and review of the values of these sites.

The Belubula River above the farm dam upstream of BR-02 (refer to Figure 6.45), consisted of a minimally defined channel with little aquatic vegetation. Erosion of bank edges was observed due to access by stock and past land use practices. Towards the edge of the project area boundary, the channel becomes less defined and grades to a grassy swale.

Upstream of its confluence with the Belubula River, Tributary G consists of a series of three dams with a poorly defined grassy channel largely dominated by exotic species (Plate 6.2). This watercourse was assessed in the addendum assessment as Type 3 – Minimally sensitive key fish habitat due to the intermittency of this watercourse and lack of any significant cover of aquatic native vegetation. Tributary G is assigned a class of Class 4 - Unlikely key fish habitat based on the little or no defined drainage channel and little to no standing water post-rainfall.

Plate 6.1 Site BR-02 assessed during the November 2018 field survey showing presence of dam wall blocking interface between upstream and downstream key fish habitat, Belubula River

Plate 6.2 Tributary G, ~200 m upstream of the Belubula River, immediately above the first dam

c Upstream reaches of the Belubula River and Tributary G outside of the disturbance footprint

In its submission on the EIS, DPI Fisheries requested that the area of key fish habitat upstream of the disturbance footprint that would be potentially isolated from downstream habitat be quantified. However, areas of Tributary G and the Belubula River upstream of the disturbance footprint are not considered to constitute key fish habitat, for the following reasons:

- the upstream reaches contain limited discernible watercourse channel, likely only flowing during major rainfall and flood events with pooled surface water not persisting in these areas over a sufficient time period to support aquatic species;
- the Belubula River becomes a poorly defined grassy channel within the Vittoria State Forest. There are a number of dams that have been constructed within the State Forest, and forestry operations are conducted over this watercourse;
- upstream sections of Tributary G are separated from the Belubula River (during low and medium-flow conditions) by several agricultural dams immediately upstream of the confluence with the Belubula River; and
- upstream sections of the Belubula River are separated from downstream sections (during low and medium-flow conditions) by a large agricultural dam immediately inside the disturbance footprint.

iii Impact assessment

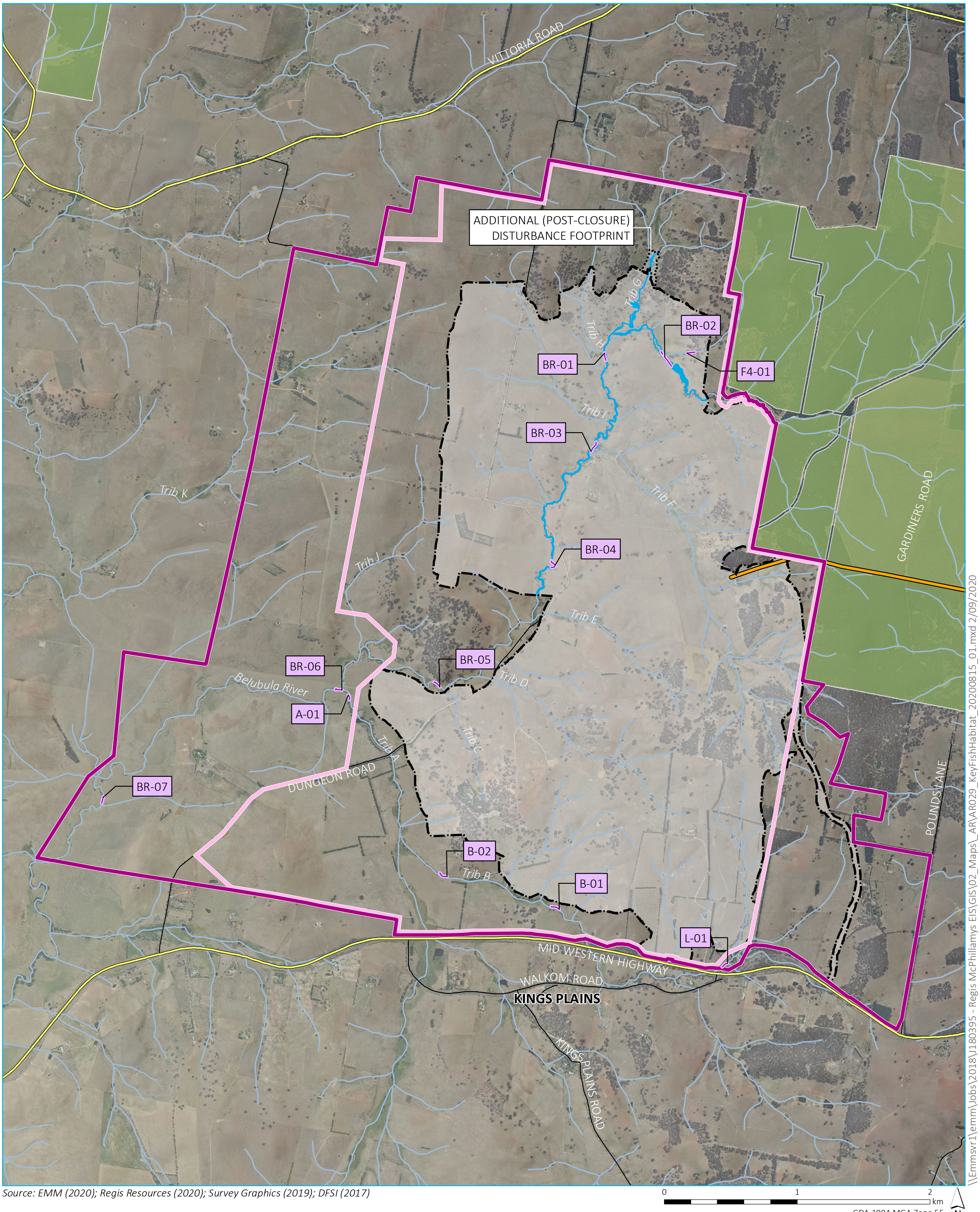
The amended mine development will avoid direct impacts on Tributary B due to the revised design of WMF6.

For the reasons outlined in Section 6.9.1(ii)(b), the EIS aquatic ecology assessment did not assess Tributary G or sections of the Belubula upstream of BR-02. Following consultation with DPI Fisheries, the Aquatic Ecology Addendum has conservatively classified all unassessed sections of the Belubula River and Tributary G within the amended disturbance footprint as key fish habitat (refer to Figure 6.45). Accordingly, this has resulted in an additional watercourse (Tributary G) within the disturbance footprint being classified as key fish habitat compared to the EIS.

As noted in Section 6.9.1(i), the Aquatic Ecology Addendum carried out spatial data analyses to estimate the areas of key fish habitat within the disturbance footprint that will be removed by the amended project, as summarised in Table 6.34.

Table 6.34 Area of direct impact calculated for key fish habitat within the disturbance footprint

Waterway	Direct impact area (ha)
Belubula River	3.25 ha
Tributary G	0.79 ha
Total area of direct impact	**4.04 ha**



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

KEY

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- Key fish habitat sample site
- Key fish habitat

Existing environment

- Major road
- Minor road
- Watercourse/drainage line
- Vittoria State Forest

Key fish habitat within disturbance footprint

McPhillamys Gold Project
Amendment report
Figure 6.45

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EMM creating opportunities

iv Mitigation and management

As noted in the EIS, an aquatic ecology offset package will be implemented in accordance with *Biodiversity Offsets Policy for Major Projects Fact sheet: Aquatic biodiversity* (DPI 2014). This will be developed in consultation with DPI Fisheries based upon the amended disturbance footprint resulting in a direct impact of approximately 4.04 ha to key fish habitat.

The Aquatic Ecology Addendum provides further information on the proposed rehabilitation and remediation programs with which Regis propose to offset the mine development's impact on key fish habitat. These programs will focus on downstream sections of the Belubula River, Tributary A and Tributary B within the mine development project area and may include:

- undertaking aquatic habitat rehabilitation within degraded areas outside of the disturbance footprint, including remediation of eroded waterways and planting of indigenous aquatic macrophyte species;
- undertaking riparian habitat rehabilitation within degraded areas outside of the disturbance footprint, including remediation of eroded banks and planting of indigenous riparian plant species;
- removal of introduced terrestrial and aquatic species and weed species from the riparian zone and from within watercourses;
- fencing of rehabilitated areas and watercourses within the mine development project area to ensure grazing by stock and native herbivores is mitigated (excluding areas where the final land use will comprise grazing);
- re-snagging of areas of watercourses where semi-permanent or permanent surface water pools exist, and/or in areas where high-flow would occur during flood events; and
- removal of existing barriers to fish passage in the mine development project area (that are not critical to transport, mine development or closure stock watering requirements), including constructed soil dams, livestock dams, sediment alluviation, access tracks and blocked culverts.

6.9.2 Pipeline development

i Introduction

Aquatic ecology impacts of the pipeline development were assessed in the EIS BDAR. This section provides an assessment of the amended pipeline options' potential impacts on aquatic ecology and therefore serves as an update to the aquatic ecology assessment contained in the EIS BDAR.

ii Existing environment

a Summary of OzArk (2019)

The EIS BDAR identified that the pipeline corridor assessed in the EIS would cross 26 watercourses mapped as key fish habitat. Field verification of these watercourse confirmed 21 of these watercourses met the criteria under DPI (2013) for key fish habitat.

The EIS BDAR identified two threatened fish species as having potential habitat in watercourses crossed by the pipeline corridor:

- the Macquarie Perch, which is known to occur only in the Macquarie River upstream of Bathurst. The pipeline corridor, although crossing this part of the river, will be underbored; and
- the Purple-spotted Gudgeon is more widely distributed within more permanent watercourses.

The EIS BDAR did not identify any aquatic endangered ecological communities within the watercourses crossed by the pipeline corridor.

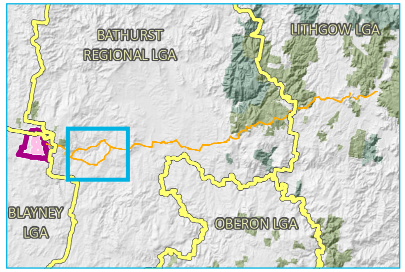
b Existing environment of amended pipeline options

A review of DPI (2015) key fish habitat mapping was carried out to identify key fish habitat watercourses that will be crossed by the amended pipeline alignment options. The watercourses identified are summarised in Table 6.35 and shown in Figure 6.46. The northern option will cross six watercourses mapped as key fish habitat and the southern option will cross five. It is noted that with the exception of Springs Creek and its unnamed tributary, all watercourses mapped as key fish habitat along the southern alignment option have been previously identified and assessed in the EIS BDAR.

Table 6.35 Key fish habitat watercourses crossed by amended pipeline route options

Watercourse	Stream order	Pipeline route option
Springs Creek	3	Shared route of amended pipeline options
Unnamed tributary of Springs Creek	3	Shared route of amended pipeline options
Evans Plains Creek	5	Southern and northern options
Unnamed tributary of Evans Plains Creek	4	Northern option
Dicks Creek	4	Northern option
McLeans Creek	4	Northern option
Unnamed tributary of Evans Plains Creek	3	Southern option
Unnamed tributary of Evans Plains Creek	3	Southern option

A review of DPI freshwater threatened species distribution maps (DPI 2016) did not identify known or expected distribution of the Purple-spotted Gudgeon or other threatened aquatic species or populations within the watercourses crossed by the amended pipeline options.



KEY

Key fish habitat

Project application area

Mine development project area

Mining lease application area (Note: boundary offset for clarity)

Pipeline corridor

Pipeline alignment (EIS)

Existing environment

Rail line

Major road

Minor road

Watercourse/drainage line

NPWS reserve (refer to inset)

State forest (refer to inset)

Local government area (refer to inset)

Source: EMM (2020); Regis Resources (2020); DPI (2020); DFSI (2017)

Key fish habitat – amended pipeline route options

McPhillamys Gold Project
Amendment report
Figure 6.46

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iii Impact assessment

The amended pipeline corridor will cross 23 key fish habitat watercourses in total if the southern pipeline option is constructed (including five watercourses along the realigned portion of the southern option) and 26 watercourses in total if the northern option is constructed (including six watercourse along the realigned portion of the northern option).

With the exception of Queen Charlottes Creek and the Macquarie River, all watercourse crossings will be crossed using open trenching, including the watercourse crossings that will be crossed by the amended pipeline route options. Trenched watercourse crossings have the potential to impact on key fish habitat during construction due to temporary flow interruptions resulting from instream structures, geomorphic impacts (addressed in Section 6.4.2) and potential sedimentation impacts.

As identified in the EIS, watercourse trenched crossings will be scheduled as far as practicable to occur during drier low flow conditions. Coffer dams will be used, as required, to enable trenching of these watercourses. The coffer dams will be sized to provide sufficient water storage to allow the trench to be excavated, the pipeline to be laid and the protective concrete encasement to be placed. If the flow rate and gradient of the creek is such that insufficient storage volume is available, a bypass pumping system around the dam may be established. A typical crossing using this method will take approximately two to four days. Therefore, impact on key fish habitat as a result of trenched watercourse crossings will be short term and transitory and will be managed in accordance with the CEMP.

The realigned portions of the amended pipeline options will not impact on threatened fish species listed under the *Fisheries Management Act 1994* FM Act. It is noted that the 7-part-test completed on Purple-spotted Gudgeon for the overall pipeline development in the EIS BDAR found the pipeline development will not result in a significant impact on this species.

iv Mitigation and management

Environmental safeguards for aquatic habits described in Table 27.7 of the EIS remain applicable to the amended pipeline development. In addition, watercourse crossings will be generally constructed in accordance with the *Policy and guidelines for fish habitat conservation and management* (DPI 2013).

6.9.3 Conclusion

In response to DPI Fisheries submission on the EIS, the Aquatic Ecology Addendum has conservatively classified all sections of the Belubula River and Trib G within the amended mine development disturbance footprint as key fish habitat. This has resulted in an additional watercourse (Tributary G) within the disturbance footprint being classified as key fish habitat as well as additional upstream reaches of the Belubula River compared to the EIS. The amended mine development will avoid direct impacts on Tributary B due to the revised design of WMF6. As per the EIS, the watercourses within the mine development project area are not considered to provide habitat for threatened aquatic species.

Spatial data analysis has estimated the areas of key fish habitat within the disturbance footprint that will be removed by the amended project. Based on the amended disturbance footprint, the mine development will result in a direct impact to approximately 4.04 ha of classified key fish habitat.

As noted in the EIS, an aquatic ecology offset package will be implemented in accordance with *Biodiversity Offsets Policy for Major Projects Fact sheet: Aquatic biodiversity* (DPI 2014) and in consultation with DPI Fisheries. The proposed rehabilitation and remediation programs with which Regis propose to offset the mine development's impact on key fish habitat will focus on rehabilitation and restoring downstream sections of the Belubula River, Tributary A and Tributary B within the mine development project area.

The amended pipeline corridor will cross 23 key fish habitat watercourses in total if the southern pipeline option is constructed and 26 watercourses in total if the northern option is constructed.

As per the findings of the EIS, construction of the pipeline development will not impact significantly on Purple-spotted Gudgeon, which is considered as potentially occurring in some watercourses crossed by the pipeline. This species is not known or expected to occur in the amended pipeline route options. No other threatened species or populations will be impacted by the pipeline development.

Trenched watercourse crossings have the potential to impact on key fish habitat during construction due to temporary flow interruptions resulting from instream structures, geomorphic impacts and potential sedimentation impacts. Potential impacts will be managed through the implementation of measures outlined in the CEMP which will be prepared in accordance with the relevant guidelines.

6.10 Aboriginal heritage

6.10.1 Mine development

i Introduction

The mine development Aboriginal and Historical Cultural Heritage Assessment Addendum (mine development AHCHA Addendum) has been prepared by Landskape (2020) to assess the Aboriginal heritage impacts associated with the mine development component of the project, with the exception of the revised site access road (refer to Appendix O). The mine development AHCHA Addendum considered and outlines the differences in Aboriginal cultural heritage impacts of the amended project compared to those presented in the EIS (Landskape 2019) (referred herein as the mine development EIS AHCHA) (Appendix P of the EIS).

A key amendment relevant to Aboriginal cultural heritage is the revised site access with the Mid Western Highway, approximately 1 km east of the location presented in the EIS, and the associated revised alignment for the internal access road outside of areas assessed in the mine development EIS AHCHA. Due to travel restrictions associated with the COVID19 pandemic, Landskape was unable to travel to the mine development project area to carry out the required field survey. Accordingly, OzArk (2020) carried out an Aboriginal heritage assessment for the revised mine access road as part of the Aboriginal Cultural Heritage and Historical Heritage Assessment Addendum for the Mine Access Road and Pipeline Options (mine access road and pipeline AHCHA Addendum) (refer Appendix P) with results relevant to the mine access road included in the following subsections, while results for the pipeline development component are presented in Section 6.10.2.

ii Methodology

Additional field assessment was not carried out during preparation of the mine development AHCHA Addendum within the mine project area as this area was comprehensively assessed as part of the mine development EIS AHCHA.

The mine access road and pipeline AHCHA Addendum included a desktop study, development of a predictive model, field survey and consultation with RAPs. A representative from Orange Local Aboriginal Land Council (OLALC) participated in the field survey for the mine access road.

iii Aboriginal consultation

The staged consultation undertaken with the OLALC was carried out having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010). Regis will continue to actively consult with the OLALC throughout the life of the project.

Consultation for the mine access road has been carried out having regard to the *Aboriginal Cultural Heritage Community Consultation Requirements for Consultation* (DECCW 2010) (consultation requirements). In accordance with stage 2 and 3 of the consultation requirements, the amended field survey methodology was provided to OLALC (the only RAP for the mine development component) on 29 April 2020.

In accordance with stage 4 of the consultation requirements, the mine development AHCHA Addendum was provided to RAPs for review on 25 August 2020.

iv Field survey

Two pieces of red ochre were identified in the study area for the revised mine access road. Neither piece of ochre had evidence of having been utilised. Both pieces were also in secondary contexts and no Aboriginal items or sites were recorded in conjunction with them. The pieces are not part of another Aboriginal item or site and accordingly neither piece was recorded with the Aboriginal Heritage Information Management System (AHIMS). Nevertheless, they have been recorded in OzArk (2020) at the request of the RAP present.

v Impact assessment

The amended mine development will result in up to 30 identified Aboriginal cultural heritage sites being impacted (27 directly impacted and 3 indirectly impacted). The amended mine development will result in the direct disturbance of six additional Aboriginal cultural heritage sites (MGP-A5, A6, A9-A12; artefact scatters and/or isolated finds). These sites were previously assessed in the EIS as being potentially subject to harm (i.e. potential indirect disturbance). Two Aboriginal cultural heritage sites (MGP-A14, A22) were previously assessed as being subject to direct harm, however these sites are now located proximal to the proposed direct disturbance footprint for the project, and hence may be subject to indirect harm. In addition, a further three Aboriginal cultural heritage sites (MGP-A13, A16, A37) will now be avoided by the project. These sites were previously assessed in the EIS as being potentially subject to harm (i.e. potential indirect disturbance).

Aboriginal heritage sites that will have different impacts to those described in the mine development EIS AHCHA are detailed Table 6.36. It is noted that a number of these sites were identified in the mine development EIS AHCHA as potentially indirectly impacted by the EIS design, as they were either within the disturbance footprint but not directly under mine components or were in the immediate vicinity of the disturbance footprint. For the amended project all sites within the disturbance footprint have been conservatively assumed to be directly impacted, and those sites in immediate proximity to the disturbance footprint have been conservatively assumed to be indirectly impacted. A comparison of the impact on Aboriginal heritage sites within the mine development between the EIS design and the amended project is shown in Figure 6.47.

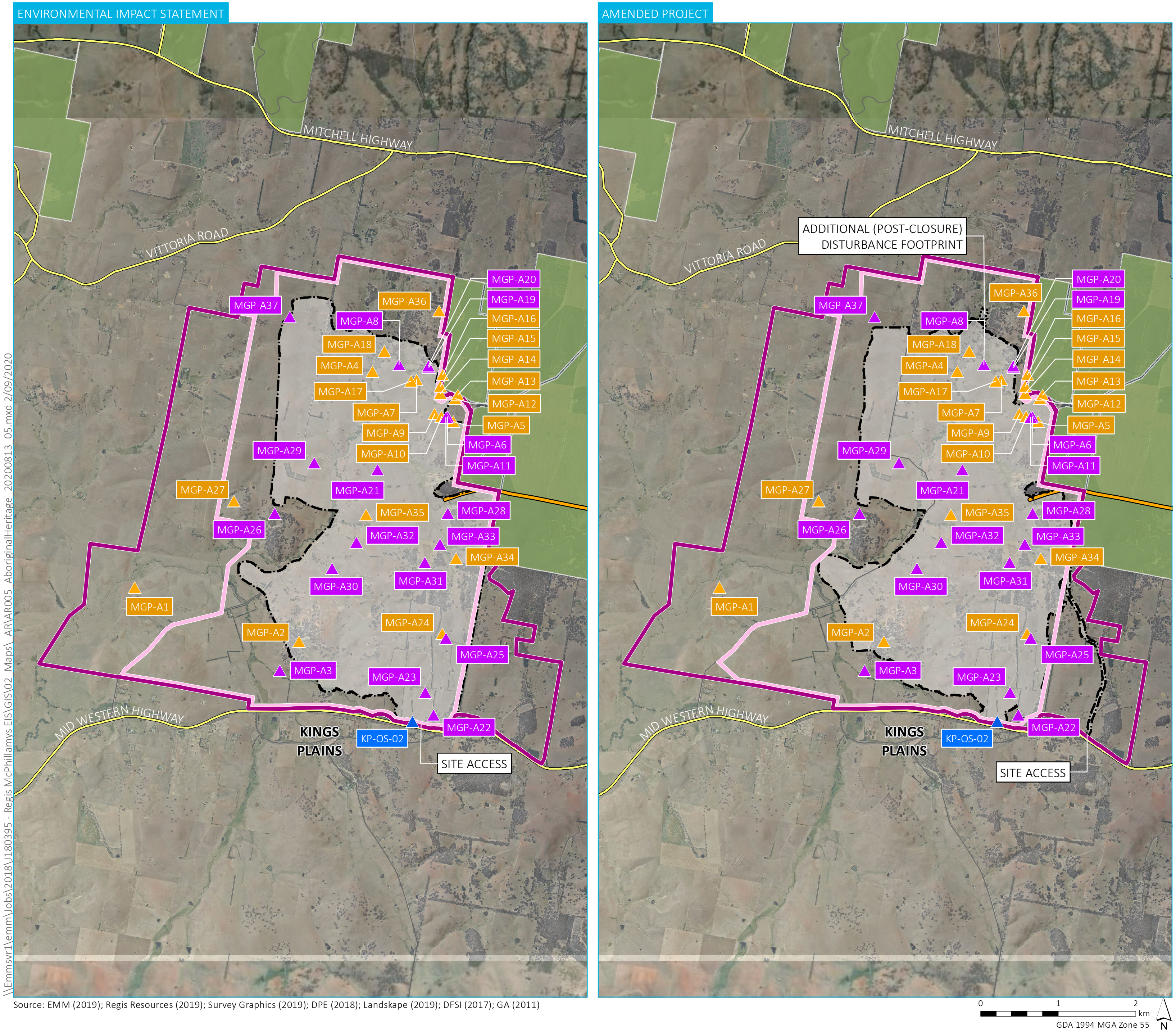
Table 6.36 Comparison of impact to Aboriginal heritage sites between the EIS and amended project

Site name	Type	EIS impact	Amended project impact
MGP-A5	Artefact scatter	Indirect/none	Direct
MGP-A6	Isolated find	Indirect/none	Direct
MGP-A9	Artefact scatter	Indirect/none	Direct
MGP-A10	Artefact scatter	Indirect/none	Direct
MGP-A11	Isolated find	Indirect/none	Direct
MGP-A12	Artefact scatter	Indirect/none	Direct
MGP-A13	Artefact scatter	Indirect/none	None
MGP-A14	Artefact scatter	Direct	Indirect
MGP-A16	Artefact scatter	Indirect/none	None
MGP-A22	Isolated Find	Direct	Indirect
MGP-A37	Isolated find	Indirect/none	None

As presented in the EIS AHCHA, the Aboriginal cultural heritage sites identified in the mine project area and their context are not assessed as being of high archaeological (ie scientific) significance, but Regis acknowledges the mine project area has cultural significance to members of the Aboriginal community.

As described in the EIS cultural heritage assessment (Appendix P), it is acknowledged that all archaeological sites provide connection to the past for the present Aboriginal community and for future generations. Aboriginal cultural heritage sites such as that identified within the mine project area can also provide information about past lifestyles and strengthen the links between Aboriginal people and the land.

No Aboriginal heritage sites were identified during the assessment of the amended mine access road.



KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment
- Major road
- Minor road
- Vittoria State Forest

Aboriginal heritage site (Landskape, 2019)
- Artefact scatter
- Isolated find

Previously recorded site
- Open artefact site

Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DPE (2018); Landskape (2019); DFSI (2017); GA (2011)

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Comparison of EIS and amended project impacts on Aboriginal cultural heritage

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Figure 6.47

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EMM creating opportunities

vi Mitigation and management

Mitigation measures committed to in the mine development EIS AHCHA remain applicable to the amended mine development (refer to Appendix C). Specific management measures for Aboriginal cultural heritage sites have been updated in the mine development AHCHA Addendum as summarised in Table 6.37. All directly and indirectly impacted Aboriginal heritage sites will be salvaged in accordance with the Aboriginal cultural heritage management plan (CHMP), which will be prepared in consultation with the RAPs and BCD. All Aboriginal heritage sites outside of the disturbance footprint will be protected by a barrier or fence to avoid harm.

Table 6.37 Revised specific management strategies for Aboriginal cultural heritage sites

Site name	Type	Potential impact	Proposed management measures
KP-OS-02	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A1	Artefact scatter	None	Avoid harm by protective barrier
MGP-A2	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A3	Isolated find	None	Avoid harm by protective barrier
MGP-A4	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A5	Isolated find	Direct	Salvage Aboriginal objects
MGP-A6	Isolated find	Direct	Salvage Aboriginal objects
MGP-A7	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A8	Isolated find	Direct	Salvage Aboriginal objects
MGP-A9	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A10	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A11	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A12	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A13	Artefact scatter	None	Avoid harm
MGP-A14	Artefact scatter	Indirect	Salvage Aboriginal objects
MGP-A15	Artefact scatter	Indirect	Salvage Aboriginal objects
MGP-A16	Artefact scatter	None	Avoid harm by protective barrier
MGP-A17	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A18	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A19	Isolated find	Direct	Salvage Aboriginal objects
MGP-A20	Isolated find	Direct	Salvage Aboriginal objects
MGP-A21	Isolated find	Direct	Salvage Aboriginal objects
MGP-A22	Isolated find	Indirect	Salvage Aboriginal objects
MGP-A23	Isolated find	Direct	Salvage Aboriginal objects
MGP-A24	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A25	Isolated find	Direct	Salvage Aboriginal objects
MGP-A26	Isolated find	None	Avoid harm by protective barrier
MGP-A27	Artefact scatter	None	Avoid harm by protective barrier

Table 6.37 Revised specific management strategies for Aboriginal cultural heritage sites

Site name	Type	Potential impact	Proposed management measures
MGP-A28	Isolated find	Direct	Salvage Aboriginal objects
MGP-A29	Isolated find	Direct	Salvage Aboriginal objects
MGP-A30	Isolated find	Direct	Salvage Aboriginal objects
MGP-A31	Isolated find	Direct	Salvage Aboriginal objects
MGP-A32	Isolated find	Direct	Salvage Aboriginal objects
MGP-A33	Isolated find	Direct	Salvage Aboriginal objects
MGP-A34	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A35	Artefact scatter	Direct	Salvage Aboriginal objects
MGP-A36	Artefact scatter	None	Avoid harm by protective barrier
MGP-A37	Isolated find	None	Avoid harm by protective barrier

6.10.2 Pipeline development

i Introduction

The mine access road and pipeline AHCHA Addendum assessed the potential Aboriginal cultural heritage impacts of the revised pipeline route options. It also assessed whether the relocation of pumping station facility No.3 to Pipers Flat Road and minor increases in corridor width at various locations along the entire 90 km alignment would change impacts on known Aboriginal heritage sites identified in the pipeline development EIS AHCHA (OzArk 2019 Appendix Z of the EIS, herein referred to as the pipeline development EIS AHCHA).

ii Methodology

The mine access road and pipeline AHCHA Addendum included a desktop study, development of a predictive model, field survey and consultation with RAPs. Due to social distancing restrictions for the COVID19 pandemic, in conjunction with land owner requests regarding vehicle numbers and movements along the two pipeline options, no RAPs were able to be present for the survey of the revised pipeline options. Further field survey was not required for the relocation of pumping station facility No.3 or changes in corridor width amendments as these amendments are within the study area previously assessed in the pipeline development EIS AHCHA.

iii Consultation

The consultation undertaken for the mine access road and pipeline AHCHA addenda was carried out having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010). Regis will continue to actively consult with the Aboriginal stakeholders throughout the life of the project.

In accordance with stage 2 and 3 of consultation requirements, the amended field survey methodology was provided to the relevant RAPs on 29 April 2020. Feedback was received from Wellington Valley Wiradjuri Aboriginal Corporation requesting that RAPs are invited to participate in the field survey.

In accordance with stage 4 of the consultation requirements, the mine access road and pipeline AHCHA Addendum was provided to RAPs for 26 August 2020.

iv Field survey

One Aboriginal heritage site (IF-01) was identified during the field survey of the southern option for the amended pipeline alignment in the vicinity of a tributary of Evans Plains Creek within a private property. This site is an isolated find, consisting of a single quartz flake. The site is likely disturbed due to agricultural land uses and is not in situ. The site holds low archaeological/scientific, aesthetic and historic value. The site is considered to hold high social or cultural value, as it is representative of ancient occupation in the region and considered a tangible link to the ancestors of the RAPs. No Aboriginal heritage sites were identified along the northern pipeline alignment option.

v Impact assessment

The identified site will be disturbed only by the southern option for the amended pipeline route. The northern option for the amended pipeline route will avoid impacts on the site.

A re-assessment of impacts over the remainder of the amended pipeline corridor and pumping station facility No.3 determined that there are no other changes to impacts as outlined in the pipeline development EIS AHCHA.

vi Mitigation and management

Mitigation measures committed to in the pipeline development EIS AHCHA remain applicable to the amended pipeline development. In addition, if the southern option is constructed and impacts are deemed unavoidable on IF-01, it will be salvaged in accordance with the cultural heritage management plan (CHMP). If avoidance is possible, temporary barriers will be erected to prevent impact during construction.

In addition, Forestry NSW will be notified of the management and final artefact location of Aboriginal heritage site within forestry lands.

6.10.3 Conclusion

The amended mine development will result in up to 30 identified Aboriginal cultural heritage sites being impacted (27 directly and 3 indirectly). Compared to the EIS design, the amended mine development will result in the direct disturbance of six additional Aboriginal cultural heritage sites. Two Aboriginal cultural heritage sites which were previously assessed as being subject to direct harm are now outside of the disturbance footprint; however, are located proximal to the proposed direct disturbance footprint for the project and hence may be subject to indirect harm. In addition, a further three Aboriginal cultural heritage sites will now be avoided by the project. No Aboriginal heritage sites were identified during the assessment of the mine access road.

One Aboriginal cultural heritage site will be potentially impacted if the southern pipeline option is constructed. There are no other changes to impacts as described in the pipeline EIS AHCHA. Therefore, a total of seven Aboriginal sites will be disturbed by the pipeline route if the northern alignment is constructed, and eight if the southern option is constructed.

All sites to be impacted will be salvaged and managed in accordance with the procedures outlined in the CHMP, to be prepared in consultation with the RAPs.

6.11 Historic heritage

6.11.1 Mine development

i Introduction

The mine development AHCHA Addendum has been prepared by Landskape (2020) to assess the historic heritage impacts associated with the mine development component of the project (refer Appendix O). The AHCHA addendum considered and outlined the differences in the historic heritage impacts of the amended project compared to those presented in the EIS.

As outlined in Section 6.10, the revised alignment for the internal access road is outside of areas assessed in the mine development EIS AHCHA. Due to travel restrictions associated with the COVID19 pandemic, Landskape was unable to travel to the mine development project area to carry out the required field survey. Accordingly, OzArk (2020) carried out an historic heritage assessment for the revised mine access road as part of the mine access road and pipeline AHCHA addendum (refer Appendix P) with results relevant to the mine access road included in the following subsections, while results for the pipeline development component are presented in Section 6.11.2.

As described in Chapter 2 and in this chapter, the water management system for the mine development has been revised as part of the amendments to the project. This has removed the Secondary WMF from the project resulting in an avoidance of impacts to Hallwood, a potential item of historic heritage identified during the preparation of the EIS.

ii Methodology and field survey

Additional field assessment was not carried out during the mine development AHCHA Addendum within the MLA area as this area was comprehensively assessed in the mine development EIS AHCHA.

The assessment of the mine access road (OzArk 2020) included a desktop study, database review and field survey.

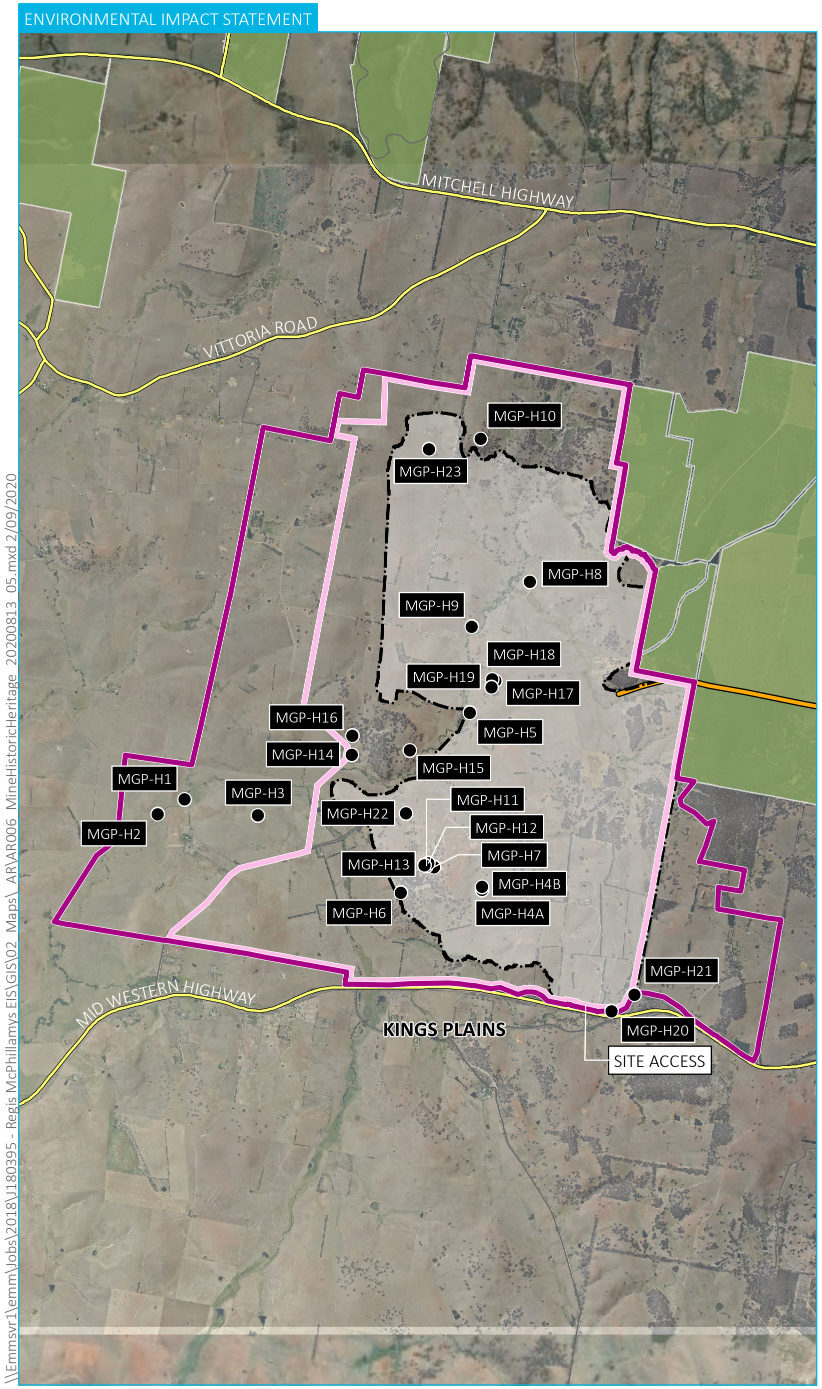
iii Results

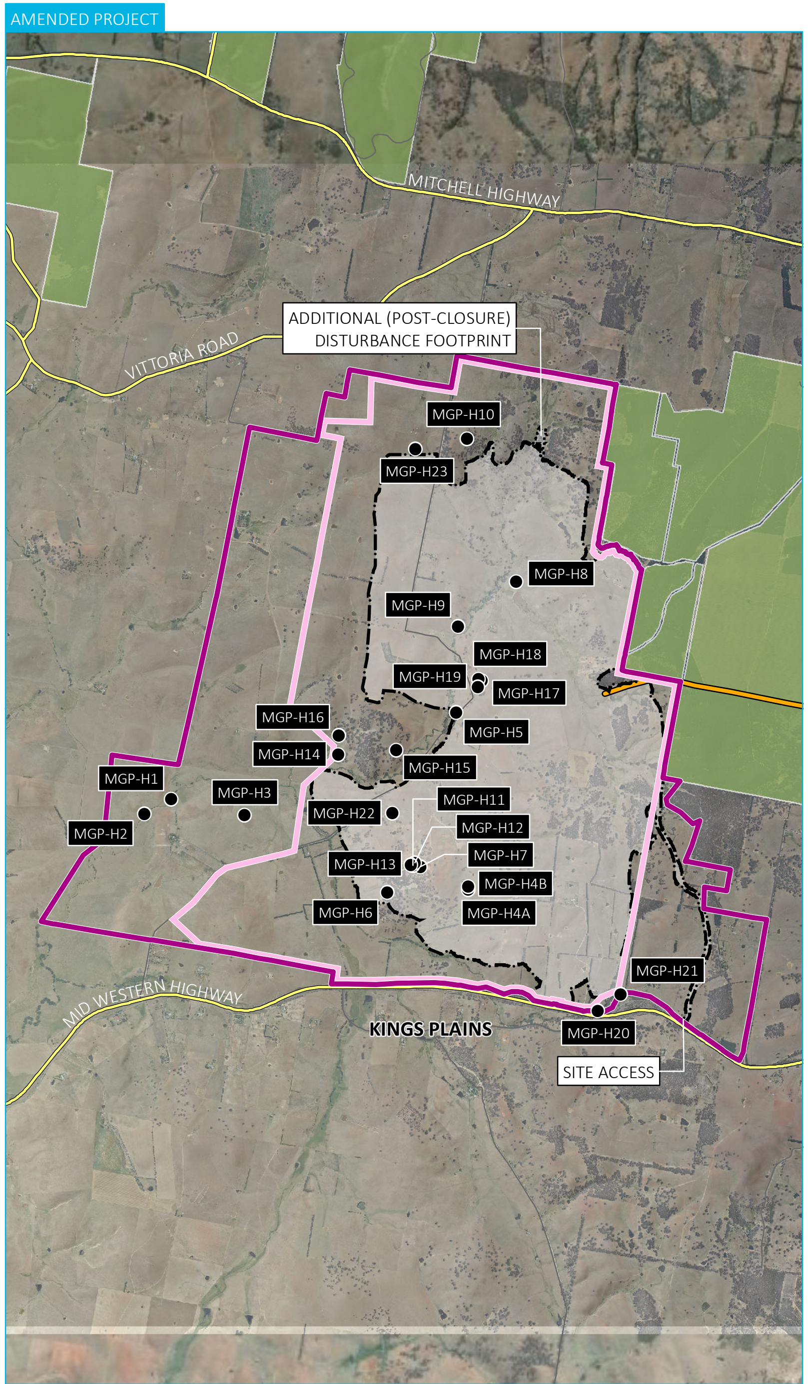
One historic heritage site was identified during the additional survey (OzArk 2020) (HS-01); a single survey blaze tree with one survey scar on the trunk facing south-west. Blaze trees were commonly used to mark land boundaries. This site does not meet the criteria for local or state significance.

iv Impact assessment

A benefit of the amended project has been the redesign of the water management system and TSF layout which has removed the Secondary WMF from the project and thereby has avoided the removal of Hallwood (MGP-H23), a potential heritage item that while not listed, was identified in the mine development EIS AHCHA as of potential state significance (Landskape 2019).

Heritage sites that will have different impacts to those described in the mine development EIS AHCHA are detailed in Table 6.38. It is noted that although MGP-H4a and MGP-H4b are located between the open cut and the waste rock emplacement footprints, and MGP-H19 is located just south of the TSF main embankments, they were all identified in the mine development EIS AHCHA as only potentially indirectly impacted as they were not directly under mine components. For the amended project all sites within the disturbance footprint have conservatively been assumed to be directly impacted. A comparison of the impacts on historic heritage sites within the mine development between the EIS design and amended project is shown in Figure 6.48.





KEY

- Cultural heritage site (Landskape, 2019)

Project application area

- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Pipeline

Existing environment

- Major road
- Minor road
- Vittoria State Forest

Source: EMM (2019); Regis Resources (2019); Survey Graphics (2019); DPE (2018); Landskape (2019); DFSI (2017); GA (2011)

0 1 2 km

GDA 1994 MGA Zone 55

N

Comparsion of EIS and amended project impacts on historic cultural heritage

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Figure 6.48

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Table 6.38 Comparison of impact to historic heritage sites between the EIS and amended project

Site name	Type	EIS impact	Amended project impact
MGP-H23	Farm complex	Direct	None
MGP-H4a	Ruin	Indirect/none	Direct
MGP-H4b	Ruin	Indirect/none	Direct
MGP-H19	Ruin	Indirect/none	Direct

The identified site in the mine access road study area is located on a parcel of crown land adjacent immediately to the east of the mine development project area and the revised site access alignment, and accordingly will not be impacted by the project.

v Mitigation and management

Mitigation measures committed to in the mine development EIS AHCHA remain applicable to the amended mine development. Specific management measures for historic heritage sites have been updated in the mine development AHCHA Addendum as summarised in Table 6.39 with subsurface, archival recording and salvage recommended for the three sites now directly impacted. In addition, a conservation management plan will be prepared for Hallwood.

Table 6.39 Revised management measures for historic heritage sites in the mine project area

Site name	Type	Potential impact	Proposed management measures
MGP-H1	Bridge Ruin	None	None
MGP-H2	Building Material Dump	None	None
MGP-H3	Building Material Dump	None	None
MGP-H4a	Ruin	Direct	Subsurface testing, archival recording and salvage
MGP-H4b	Ruin	Direct	Subsurface testing, archival recording and salvage
MGP-H5	Building Complex	None/Indirect	Avoid harm, or subsurface testing, archival recording and salvage
MGP-H6	Mine Shaft	Direct	Archival recording
MGP-H7	Survey Marker Tree	Direct	Archival recording and salvage
MGP-H8	Shed and Ruin	Direct	None
MGP-H9	Ruin	Direct	Subsurface testing, archival recording and salvage
MGP-H10	Mine Benching	None	None
MGP-H11	Mineshaft and Dump	Direct	Archival recording
MGP-H12	Mineshaft and Dump	Direct	Archival recording
MGP-H13	Mineshaft	Direct	Archival recording
MGP-H14	Ruin	None	Avoid harm

Table 6.39 Revised management measures for historic heritage sites in the mine project area

Site name	Type	Potential impact	Proposed management measures
MGP-H15	Adit	None	Avoid harm
MGP-H16	Stockyards	None	None
MGP-H17	Mined Quartz	Direct	None
MGP-H18	Ruin	Direct	Subsurface testing, archival recording and salvage
MGP-H19	Ruin	Direct	Subsurface testing, archival recording and salvage
MGP-H20	Bridge	None	None
MGP-H21	Ruin Complex	None	None
MGP-H22	Mine Subsidence	Direct	None
MGP-H23	Hallwood Farm Complex	None/Indirect	Avoid harm, archival recording and conservation management

6.11.2 Pipeline development

i Introduction

As outlined above, the mine access road and pipeline Addendum AHCHA has been prepared by OzArk (2020) to assess the impact of the amended pipeline route options and mine access road on historic cultural heritage. The amendment report assessed the potential historic heritage impacts of the revised pipeline route options.

The addendum report also assessed whether the relocation of pumping station facility No.3 to Pipers Flat Road and minor increases in corridor width along the entire 90 km alignment would change impacts on historic heritage sites identified in the pipeline development EIS AHCHA. Further field survey was not required for these amendments as they are within the study area previously assessed in the pipeline development EIS AHCHA.

ii Methodology

The methodology included a desktop study, consisting of searches of relevant statutory and non-statutory databases and listings, a field survey and assessment of significance of sites identified during the field survey.

iii Results

The desktop study identified two items listed in Schedule 5 of the Bathurst LEP within 150 m of the northern pipeline option as summarised in Table 6.40. No items are listed within the footprint of the northern or southern pipeline options.

Table 6.40 Listings within proximity to the amended project elements

Listing	Item number	Distance from amended project element
Bathurst LEP	I6 - Bathampton Homestead, stables and brick barn	134 m north-west of the northern pipeline option
Bathurst LEP	I129 - Binalong (former university building)	50 m east of northern pipeline option

iv Field survey

One site (HS-02) was identified approximately 17 m from the pipeline corridor of the southern pipeline option. The site consists of a stone and brick chimney, a large shed, a smaller shed adjacent to the chimney, two water tanks and some brick rubble partially buried on the western side of the complex. This type of site is commonly found in the regional area and is not considered to be of local or state significance. No historic heritage sites were identified along the northern pipeline option.

v Impact assessment

HS-02 is outside of the pipeline corridor and therefore will not be impacted during construction. There will be no direct impact on the listed heritage items in the vicinity of the northern pipeline option. The revised pipeline development noise and vibration impact assessment (MAC 2020b) confirmed that vibration impacts are not anticipated on these items.

vi Mitigation and management

As outlined in the EIS, potential impacts on historic heritage during construction of the pipeline development will be managed through the CEMP. In addition to the measures outlined in Chapter 29 of the EIS, if the northern pipeline option is constructed, the following measure will be included in the CEMP:

- A no-go zone will be established around the curtilages of Bathampton Homestead (item I6 under the Bathust LEP) and Binalong (item I129 under the Bathurst LEP) to avoid impact from construction of the northern pipeline option.

These mitigation measures are included in Appendix C.

6.11.3 Conclusion

Consistent with the EIS, there are no listed historic heritage items in the mine development project area or pipeline corridor. The amended mine development will directly disturb 13 sites of potential local significance and could indirectly impact an additional site of potential local significance.

The amended mine development avoids impacts on Hallwood which would have been removed by the EIS project. A conservation management plan will be prepared to manage Hallwood during the project life. The revised mine access road will not impact identified items of historic heritage.

Mitigation measures committed to in the mine development EIS AHCHA remain applicable to the amended mine development with subsurface, archival recording and salvage recommended for all sites proposed to be directly impacted.

The amended pipeline development will not impact on any listed heritage items or the heritage item identified in the vicinity of the southern pipeline option. Potential historic heritage impacts will be managed through the implementation of measures outlined in pipeline development CEMP.

6.12 Traffic

6.12.1 Mine development

i Introduction

A Traffic and Transport Assessment Addendum (TTA Addendum) (Constructive Solutions 2020) has been prepared to assess the traffic impacts of the amended mine development (Appendix Q). The TTA Addendum considers and outlines the differences in traffic and transport impacts compared to the project as presented in the EIS. In this way, it serves as an update to the Traffic and Transport Assessment prepared for the EIS (referred herein as the EIS TTA) (Appendix Q of the EIS).

The key amendment for the mine development presented in the EIS that has implications for traffic is the revised site access. As outlined in Section 2.4.4, the site access off the Mid Western Highway has been amended to address issues raised in submissions from the local community and TfNSW. The new location for the intersection of the access road with the Mid Western Highway is approximately 1 km east of the location presented in the EIS, as shown in Figure 1.3. Subsequently, a new alignment is required for the site access road to connect to the mine administration and infrastructure area, as also shown in Figure 1.3. Construction of the intersection and site access road are anticipated to be completed within the first six months of the project. As per the EIS design, the internal mine access road will be sealed for approximately the first kilometre.

Discussions with TfNSW regarding the final layout of the revised site access design are ongoing and it is noted that possible further minor amendments to the intersection design and location will be required prior to proceeding to detailed design of the intersection. It may also be required to shift the intersection further east (approximately 40 to 50 m) to provide greater separation from the existing curve on the Mid Western Highway to the west. Refinements to the site access design may also require refinements to the internal road layout.

Consistent with the EIS TTA, construction traffic will initially access the mine development project area via the existing Dungeon Road access for the first six months of the project while the construction and commissioning of the new site intersection is completed. The TTA Addendum carried out a supplementary assessment on the Dungeon Road/Mid Western Highway intersection in response to TfNSW’s submission on the EIS TTA. This submission raised concerns regarding the use of Dungeon Road during the construction phase of the project.

There is no change to the types or volume of traffic generated from the mine development (as assessed in the EIS TTA). As per the EIS TTA, traffic volumes for the project are expected to peak during months 10 and 11 due to overlap of the construction and operational phases of the mine development.

ii Existing environment

a Local and regional road network

There have been no changes to the existing road network as described in the EIS TTA. The local road network includes the Mid Western Highway, Dungeon Road, Vittoria Road and Guyong Road. The regional road network includes the Great Western Highway.

b Revised site access

An existing property access is located approximately 50 m to the west of the proposed new access. Rather than use this existing access the proposed new intersection is located further east to provide separation from a curve on the Mid Western Highway to the west. An additional property access is located opposite the intersection and a school bus stops to service this property both in the morning and afternoon.

Safe Intersection Sight Distance (SISD) at the revised site access location is greater than 350 m to the east and exceeds the minimum 262 m for a 100 km/hr speed zone to the west. Bitumen seal and line marking on the Mid Western Highway are considered to be in good condition.

iii Methodology

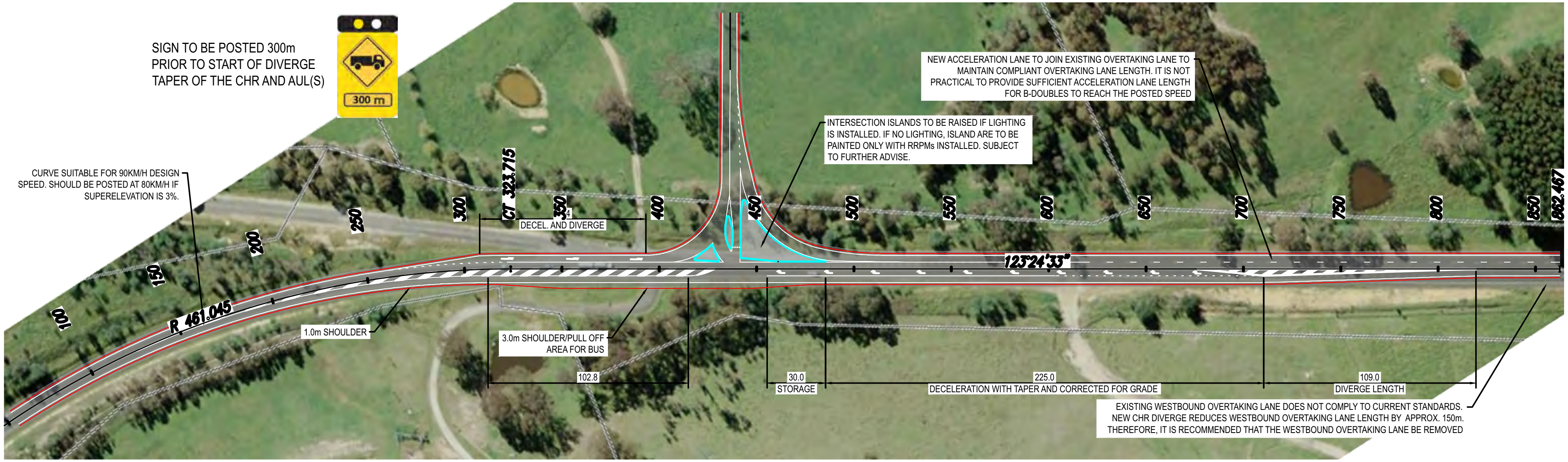
The methodology to assess the amended site intersection on the traffic network included an Austroads intersection warrant assessment, intersection modelling using the SIDRA-8 Model and a review of road safety, public transport and pedestrian and cyclist activity.

The supplementary assessment for the preliminary construction access on Dungeon Road included intersection modelling using the SIDRA-8 Model and a road safety audit.

iv Impact assessment - revised site access

a Austroads intersection warrant assessment

As the amended mine development will not result in additional construction or operational traffic, the intersection warrant assessment remains unchanged from the EIS TTA. Construction Solutions (2020) recommends that the amended site intersection will require a Basic Left Turn Lane (BAL) and CHR on the Mid Western Highway in accordance with *Part 4 Intersection Design Standards* (Austroads 2017). This design will cater for the worst-case scenario of background and project related traffic and will have the dimensional capacity to cater for the turning movements of a 25 m B-Double. A concept design of the revised site access is shown in Figure 6.49.



MID WESTERN HWY - NEW SITE ACCESS INTERSECTION CONCEPT LAYOUT PLAN

1:1000

SOURCE: CONSTRUCTIVE SOLUTIONS

Concept design – revised site access

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Figure 6.49

b SIDRA analysis

Intersection modelling of the revised site access was completed using the SIDRA-8 Model to predict the performance of the intersection considering its new location on the Mid Western Highway. The performance of the intersection was determined through the parameters summarised in Table 6.41.

Table 6.41 Intersection performance parameters

Parameter	Description
Level of service (LOS)	LoS is a qualitative measure describing operational conditions within a traffic stream and considers service measures such as speed and travel time, freedom to manoeuvre, traffic interruptions, safety, comfort and convenience. There are six levels of service, designated A (best – free flow) to F (worst – breakdown in flow).
Degree of saturation (DoS)	DoS is defined as the ratio of demand flow to capacity. As it approaches 1, extensive delays and queues would be expected. For a satisfactory situation, the DoS should be less than the nominated practical degree of saturation, usually 0.9.
Average delay per second (DEL)	Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. The delays include queued vehicles decelerating and accelerating to and/or from the stop, as well as delays experienced by all vehicles negotiating the intersection. At sign-controlled intersections the average delay for the worst movement is reported. Queue length is the number of vehicles waiting at the hold line and is usually quoted as the 95th percentile back of the queue, which is the value below which 95% of all observed queue lengths fall.
Que length	Queue length is the number of vehicles waiting at the hold line and is usually quoted as the 95th percentile back of the queue, which is the value below which 95% of all observed queue lengths fall.

As noted above peak mine development traffic is predicted to occur in months 10 and 11 due to the overlap of the construction and operational phases of the mine development. Accordingly, predicted project related and background traffic movements were modelled for months 10 and 11 at the revised site intersection with the results summarised in Table 6.42. All modelled scenarios resulted in a LOS of A, meaning traffic will be free flowing with minimal delays during these months. The DOS, DEL and que length indicate that delays and queues are not expected to occur at the amended site intersection.

Table 6.42 SIDRA modelling results for the amended site intersection

Scenario	DOS	DEL	LOS	Que
Peak mine development traffic (month 10 and 11)	0.102	6.1 seconds	A	0.9 m

c Road safety

As noted in the EIS TTA, three accidents occurred on the Mid Western Highway, Guyong Road and Vittoria Road between 2013 to 2017. No accidents were reported on Dungeon Road. The number of accidents reported is minor given the volume of traffic using these roads. No repetitive or reoccurring accident patterns were identified, and it is was considered that the reported accident history in the vicinity of the project does not indicate any areas of concern within the road network.

As part of the Amendment TTA, review of the NSW Government Centre for Road Safety Interactive Crashes website was completed and no new accidents have been reported in addition to those documented in the EIS TTA.

d Public transport

As stated in the EIS TTA, school buses operate along the Mid Western Highway during morning and afternoon school times (7:30 am to 9:00 am and 3:30 pm to 4:45 pm). The school buses stop to pick up and drop off passengers at informal locations along the Highway including the property access opposite the revised site access.

A westbound 3 m sealed shoulder will be constructed opposite the revised site access as part of the intersection construction to allow the school bus to pull over clear of traffic. When travelling eastbound the school bus will be able to pull over on the northern side of the Mid Western Highway by slowing down within the AUL and pulling over onto the old highway alignment clear of traffic.

School pickup and drop off times do not coincide with the start or end of shifts at the mine, therefore turning traffic at the amended site intersection will be minimal during school pickup and drop off. The design of the amended site intersection will improve safety outcomes for school buses at this location.

e Pedestrian and cyclist activity

Pedestrian and cycling activity are considered rare in the vicinity of the mine development and currently there are no dedicated on-road cycleways or off-road paths for cyclists and pedestrians. Additionally, limited pedestrian activity is associated with the school bus pick up and drop off.

The revised site access and intersection will maintain the existing 1 m wide sealed shoulder on both sides of the Mid Western Highway. The revised site access will not adversely impact pedestrian or cyclist activity.

v Impact assessment - preliminary construction access

a SIDRA analysis

Intersection modelling was completed using the SIDRA-8 Model to predict the performance of the preliminary construction access via the Dungeon Road/Mid Western Highway intersection. The performance of the intersection was determined through the parameters summarised in Table 6.41 and modelled for the peak morning period (5:30 am to 6:30 am) and peak project related traffic predicted for month 4 (up to 290 total daily vehicle movements) and month 6 (up to 330 total daily vehicle movements) of the construction phase.

The results are summarised in Table 6.43. All modelled scenarios resulted in a LOS of A, meaning traffic will be free flowing with minimal delays during these months. The DOS, DEL and que length indicate that delays and queues are not expected to occur at the Dungeon Road/Mid Western Highway intersection during the first 6 months of the project prior to construction of the revised site access.

Table 6.43 SIDRA modelling results for the preliminary construction access

Scenario	DOS	DEL	LOS	Que
Month 4	0.083	4.4 seconds	A	0.5 m
Month 6	0.098	5.0 seconds	A	0.8 m

b Road safety audit

A road safety audit was completed for the preliminary construction access via the Dungeon Road/Mid Western Highway intersection. It resulted in two corrective action requests (CARs):

- length of the CHR; and
- inclement weather.

The road safety audit identified that the CHR(s) was shorter than the recommended design length. Potential risks associated with the existing CHR will mitigated by the following:

- as stated in the EIS TTA it is estimated that 80% of the construction workforce traffic will originate from the west (Blayney). Therefore, only a small percentage of traffic will be using the CHR(s) to turn right into Dungeon Road;
- the EIS TTA outlines that 70% of heavy vehicles deliveries are expected from the east (Bathurst). 70% of the maximum 20 heavy vehicles daily delivery movements (10 inward movements) results in a very small number (less than one per hour) of potential long heavy vehicles waiting to turn right at the short CHR(s);
- construction traffic peak hour falls well before peak hour traffic on the Mid Western Highway (8 am-9 am). Therefore, peak development turning traffic and peak Highway through traffic do not coincide; and
- SIDRA analysis of the intersection has been completed and predicts a high level of service. Therefore, queue lengths of vehicles waiting to turn at the intersection will be minimal thereby reducing the risk of rear end collisions or an overrun of the intersection.

Mitigation measures to minimise risk during poor weather has been provided below.

vi Mitigation and management

Mitigation measures committed to in the EIS TTA remain applicable to the amended mine development.

In addition to the installation of fog activated flashing yellow lights as identified in EIS TTA, the following mitigation measures have been developed to further mitigate road safety risks associated with poor weather, as heavy fog is present during in the early morning:

- installation of raised reflective pavement markers;
- operational restrictions limiting heavy vehicles movements which cross the road centreline when visibility is less than the safe intersection sight distance. An infrared visibility sensor may be used to measure visibility at the intersection; and
- for Dungeon Road only, operational restrictions such as limiting all heavy vehicles movements to daylight hours.

6.12.2 Pipeline development

i Introduction

The pipeline development EIS traffic and transport assessment (Pipeline EIS TTA) (Ason Group 2019) contained in Appendix BB of the EIS, and Chapter 30 of the EIS assessed potential traffic and transport impacts associated with the pipeline development. The Pipeline EIS TTA remains relevant to the amended project as the pipeline development is predominantly the same as that assessed in Ason Group (2019) with the exception of the amended pipeline options and revised location of pumping station facility No.3 as outlined in Section 2.1. The are no changes to the pipeline development construction methodology, workforce and schedule as identified and assessed in the Pipeline EIS TTA.

This section of the Amendment Report considers the traffic and transport related impacts of the amended pipeline route options and the revised location of pumping station facility No.3. Due to the nature and scale of impacts (as described below), which have generally been assessed in the Pipeline EIS TTA, an Addendum to this assessment has not been prepared.

ii Existing environment

a Road network

The regional and local network that will be used to access the amended pipeline route options for construction and ongoing maintenance were identified in the Pipeline EIS TTA and are summarised in Table 6.44.

Table 6.44 Roads affected by the amended pipeline route options

Road	Location	Sealed / Unsealed	Number of lanes and traffic direction	Width	Posted speed limit (km/h)
Hen and Chicken Lane	Minor access lane between Mid Western Highway and Vale Road	Unsealed	Single lane, two-way	5-7.3 m + verge up to 8 m	50
Private land	Accessed from Hen and Chicken Lane, Trunkey Road, Wimbledon Road and Mid Western Highway	Unsealed			
Mid Western Highway	State Highway 6 between Bathurst and Hay. Access to pipeline corridor on private land via minor road and private driveways to Mid Western Highway	Sealed	Two lane, two way	10 m + Verge 10 m	100

Similarly, Pipers Flat Road, the revised location for pumping station facility No.3 was considered in the Pipeline EIS TTA. This road is a sealed, two-lane, local collector road between Portland and Wallerawang with a speed limit of 100 km/h.

b Rail crossings

Pumping station facility No.3 will be constructed on the northern side of the Gwabegar Railway Line which runs parallel to Pipers Flat Road. Access for construction and subsequent maintenance of this pumping station facility will be via an existing unsealed access road immediately to the west of the Pipers Flat Road/Range Road intersection. This access road crosses the Gwabegar Railway Line via a level crossing. This crossing is typical of rural level crossings off local roads with no warning lights or boom gates present.

c Road safety

The Pipeline EIS TTA included a review of the Centre for Road Safety's Crash and Casualty Statistics database within the vicinity of the pipeline corridor including the Mid Western Highway and Pipers Flat Road. This identified 2 crashes (1 serious and 1 moderate) at the Pipers Flat Road / Range Road intersection and 2 crashes (1 serious and 1 moderate) in the vicinity of the EIS pipeline route's crossing of the Mid Western Highway (the amended southern option will cross at this location).

The northern option of the revised pipeline route options will travel along the Mid Western Highway for approximately 9 km (refer to Figure 1.5). A review of the Crash and Casualty Statistics database was carried out as part of this traffic and transport assessment of the pipeline development amendments to identify crashes along and in the immediate vicinity of this section of the Mid Western Highway. The review identified 13 crashes between 2014 and 2018 of which seven involved serious injury.

iii Impact assessment

a Traffic related impacts during construction

Consistent with Chapter 30 of the EIS, traffic impacts associated with the construction of the amended pipeline route options would be temporal and transitory. It is expected that crews working on the pipeline installation will be working on different sections along the 90 km pipeline corridor and therefore construction traffic generation is expected to spread geographically along the corridor with particular roads used as construction access routes for only a portion of the overall construction period.

The southern pipeline option is located predominantly within private agricultural landholdings apart from an underbore crossing of the Mid Western Highway (assessed as part of the EIS pipeline corridor). Accordingly, traffic and transport related impacts will be limited to construction traffic using the local and regional road network to access the pipeline corridor.

The northern pipeline option runs along the Mid Western Highway for approximately 9 km and will include an underbore crossing to allow the pipeline to cross to the northern side of the highway. The pipeline will be installed via trenching outside of the road surface to minimise impacts on this important regional road. However partial lane closures may be required to facilitate construction activities and to allow construction machinery to move along the Mid Western Highway road corridor. Construction speed limits will also be implemented along the Mid Western Highway construction work.

Consistent with the Pipeline EIS TTA, most of the construction workers will be transported in their crews through group transport, such as utility vehicles or mini-buses to specific work areas along the pipeline corridor. All light and heavy vehicle parking throughout construction will be provided off-road within or adjacent to pipeline development construction sites. Construction access for the pumping station facilities will be utilised for a longer period albeit with lower expected traffic movements than pipeline installation works.

Construction vehicle routes will be documented in the construction traffic management plan (CTMP) and will be used by all construction vehicles travelling to and from the pipeline construction sites. They will be designed to provide the most efficient trips between subregional roads and the construction sites. Any oversized vehicles will require concurrence from TfNSW and/ or the National Heavy Vehicle Register.

b Traffic related impacts during operations

As outlined in Chapter 30 of the EIS, scheduled maintenance for the operation of the pipeline will generate very little traffic as less than 4 vehicles trips are expected per day when these periodic events occur. Access for maintenance activities will utilise the same designated routes used during the construction phase. It is estimated the pumping station facilities will be visited approximately weekly, however major maintenance will likely be two to three times per year.

iv Mitigation and management

The Pipeline EIS TTA included a draft CTMP to inform the final CTMP to be prepared in consultation with TfNSW, Blayney, Bathurst and Lithgow Councils. In addition to the factors for consideration outlined in the draft CTMP (Ason 2019), the final CTMP will also address:

- rail safety procedure for access to pumping station facility No.3; and
- traffic control and construction access along the northern option Mid Western Highway route (if the northern option is constructed).

Ongoing access arrangements to the pipeline easement along the Mid Western Highway (if the northern option is constructed) and access to pumping station facility No.3 via the Gwabegar Railway Line level crossing will be documented in the overall OEMP for the project to ensure the safety of maintenance personnel.

6.12.3 Conclusion

In consideration of submissions received from the local community, Blayney Shire Council and TfNSW, the mine site intersection on Mid Western Highway has been relocated approximately 1 km east of its original location. From the Austroads intersection warrant assessment, it was found that the current design of the intersection is adequate. Subsequent consultation with TfNSW has confirmed in principle support for the revised site access concept design however it is noted minor refinements of the design may still be required during the detailed design process. The results of the SIDRA-8 Model also showed that the traffic will remain free flowing with minimal delays. The intersection will not increase the risk of crashes, impact public transport, including school bus routes, or pedestrian and cyclist activity.

A supplementary assessment was completed for the preliminary construction access via the Dungeon Road/ Mid Western Highway intersection, which included intersection modelling using the SIDRA-8 Model and a road safety audit. The supplementary assessment demonstrated that the Dungeon Road/Mid Western Highway intersection could accommodate predicted peak construction movements in month 6 of the project with additional management measures to address inclement weather.

There is no change to the types or volume of traffic generated from the mine development (as assessed in the EIS TTA), with traffic volumes for the mine development expected to peak during months 10 and 11 due to overlap of the construction and operational phases of the mine development. As outlined in Chapter 17 of the EIS, while there will be minor increase to traffic volumes on the surrounding road network, the impacted roads have sufficient capacity to cater for the combined background traffic and project related traffic over the 15 year project life.

Consistent with the EIS, construction related traffic generated during construction of the pipeline development, including construction of either the northern or southern pipeline options and the construction of pumping station facility No.3 will not have a significant impact on the operation or capacity of key regional, urban, local or unsealed roads and intersections providing access to each of the pipeline development construction sites. All construction related vehicles will use dedicated construction routes between the individual pipeline development construction sites and the regional road network. Additional management measures will be incorporated in the CTMP to manage safety issues associated with construction of the northern pipeline option along the Mid Western Highway and access to pumping station facility No.3 via the existing Gwabegar Railway Line level crossing.

6.13 Visual amenity

6.13.1 Mine development

i Introduction

An addendum to the visual impact assessment (VIA Addendum) (VPA 2020) has been prepared to assess the visual amenity impacts of the amended mine development. Where relevant, the VIA Addendum supersedes the findings of the original VIA for the mine development (included as Appendix S of the EIS, referred to herein as the EIS VIA) and is provided in full in Appendix R.

The key changes from the mine development presented in the EIS that have implications for potential visual amenity impacts include:

- revision of the mine and waste rock emplacement schedule, resulting in;
  - revision of the size and timing of construction of the pit amenity bund;
  - revision of the timing of construction of the southern amenity bund; and
- realignment of the site access road.

The VIA Addendum was prepared in accordance with appropriate guidelines, policies and industry requirements, and following consultation with stakeholders including community members and relevant government agencies.

ii Existing environment

A detailed description of the existing visual environment is presented in Chapter 3 of the EIS VIA. The EIS VIA defines the area of the primary visual catchment (PVC) within which the mine project area is located. The PVC is shown in Figure 6.50 and covers an area of approximately 232 km. The western slopes of the Great Dividing Range form the eastern section of that perimeter. Within the PVC, the mine project area is located within a predominantly rural setting, with cattle grazing being the predominant land use. The project area includes dispersed residential development incorporating both small and large rural holdings.

To assist in the evaluation of the visibility of the various elements of the mine development, the primary visual catchment (PVC) was divided into four sectors as shown in Figure 6.50:

- northern view sector - dominated by low sensitivity rural land, but includes a number of rural residences, Mitchell Highway, Vittoria Road, Vittoria State Forest and East Guyong Quarry;
- eastern view sector – largely comprises grazing land and state forest, with scattered rural residences mainly to the west and south of the mine development project area, Beekeepers Inn and Dungeon Road;
- southern view sector – includes rural residences in Kings Plains, listed heritage items, Mid Western Highway and local roads (including Walkom Road and Kings Plains Road); and
- western view sector – rural residences (the majority of which are scattered along the Guyong Road ridge north of the Mid Western Highway), elevated areas of the township of Blayney, Church Hill Rotary Lookout and rest areas.

Consistent with the EIS VIA, the VIA Addendum used these view sectors to assess potential visual amenity impacts from the amended mine development.

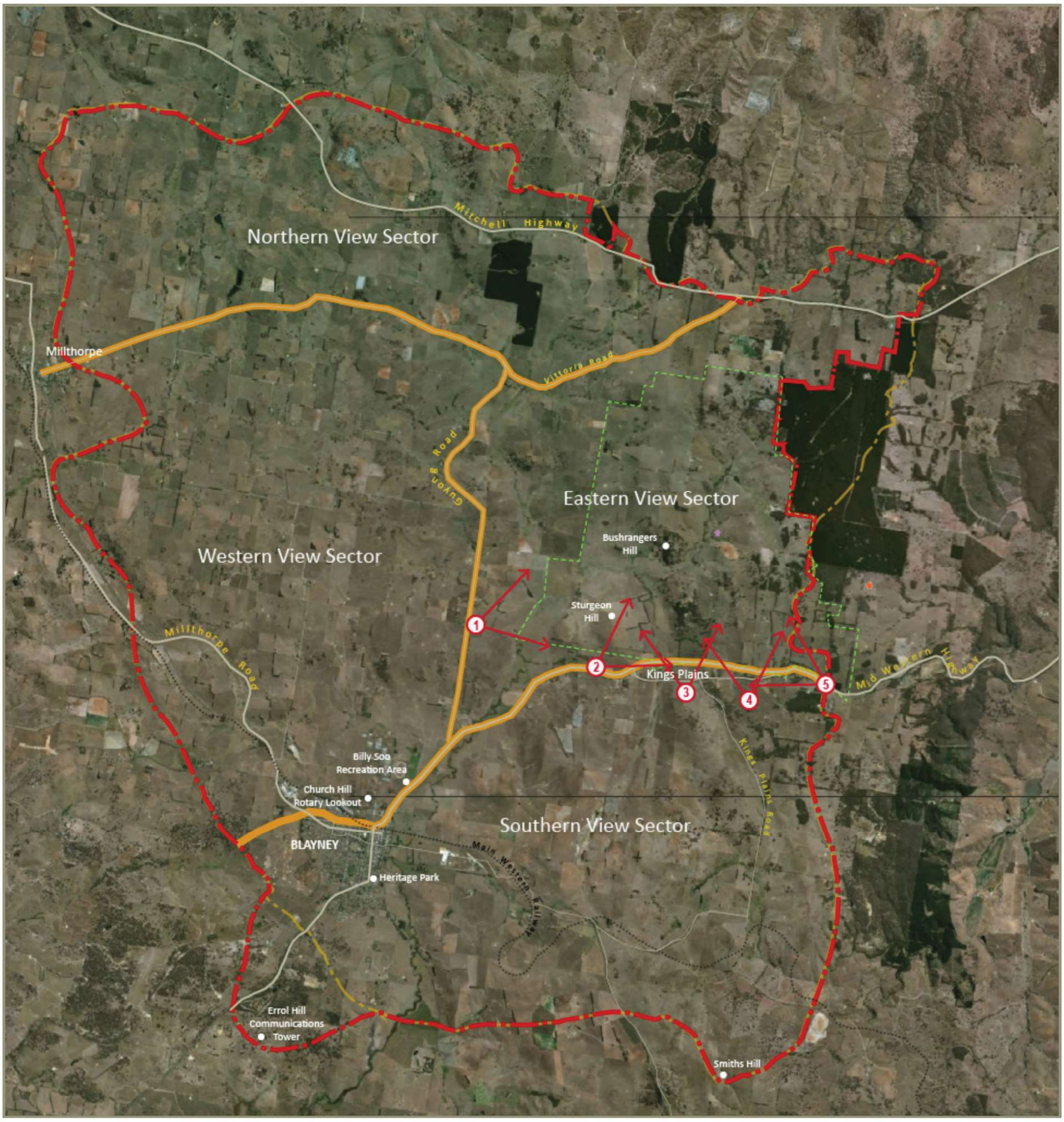
iii Methodology

No changes to the assessment methodology described in Chapter 2 of the EIS VIA and Section 19.2 of the EIS were required as a result of the amendments to the mine development. The assessment of visual amenity impacts included consideration of the visual environment and visual effect (ie contrast and integration) and sensitivity.

iv Visual effect

Visual effect is a measure of the visual contrast and integration of the mine development with the existing landscape. Levels of visual effect have been assigned consistent with the methodology presented in Table 2.1 of the EIS VIA. This was assessed for the same viewpoint locations assessed in the EIS VIA (Figure 6.50). Updated photomontages have been prepared to illustrate the view from these locations during construction and operation of the amended mine development. While Year 6 was not presented in the respective EIS photomontages, it is presented for the amended project as it represents the year that the southern amenity bund will be completed.

The EIS committed to a final height landform height of 1,065 m AHD across the majority of the waste rock emplacement, with microrelief elements taking the final height up to 1,075 m AHD in places. This final landform height is considered conservative as it assumes a higher than predicted swell factor in the waste rock, to ensure some contingency in the available storage volume. The photomontages contained in the EIS VIA were based on a waste rock emplacement design that assumed a less conservative swell factor based on the characteristics of the waste rock, thereby depicting a final height of approximately 1,050 m (excluding microrelief). While it is likely that the final height of the waste rock emplacement will be comparable to the height shown in the EIS VIA, for conservatism, the photomontages of the amended project presented in the VIA Addendum (and this chapter) use the more conservative waste rock emplacement design with a maximum emplacement height of 1,065 m AHD, with areas of microrelief up to 1,075 m AHD, which adopts a more conservative swell factor.



key

Primary visual catchment

Roads

Main Western Railway

Mine Development Project area

Photomontage view locations

Ref: VPA 2019

View sectors and photomontages locations – mine development

Figure 6.50

a VP1 – Guyong Road, Blayney

This view is from Guyong Road. This viewpoint is representative of those visual effects to be expected when viewed from residences and their surrounding lands, close to this view location on Guyong Road. It also reflects the short duration views from vehicles travelling along Guyong Road. The existing view of the mine development project area from VP1 and an overview of the anticipated visual effects of the amended project over the project life are depicted in Plate 6.3 to Plate 6.6. The plates include a comparison with the photomontages presented in the EIS.

As a result of the amended project, there are variations to visibility of mine components over the development period as follows:

- **Year 2:** Soil stripping and development of the ROM pad are the main components in this view. The exposed soils creates colour contrast resulting in level 1 high visual effect. With some variations to soil stripping areas the visual effects are consistent with the EIS.

- **Year 4:** Extent of waste rock emplacement landform extends further north than EIS mine design. Visual effects vary across the mine components with waste rock emplacement having high visual effect and grassed ROM embankment having Level 2 moderate visual effect due to lowering of visual contrast on western edge.

- **Year 6:** Southern amenity bund at its final height is now visible above Sturgeon Hill; its profile and partially rehabilitated slopes have a Level 1 to Level 2 visual effect. The waste rock emplacement extends development to the north of southern amenity bund, with visual effects consistent with the EIS. Direct and indirect lighting from night time operations would be consistent with the EIS.

- **Year 8:** Established grass cover across parts of west facing slopes progressively lowers visual effect of mining landform and ROM embankment. Waste rock emplacement in northern areas continues to have Level 1 - high visual effect due to visual contrast of exposed earthworks and benching within the rural setting. Direct and indirect lighting from night time operations would be consistent with the EIS.

- **Final Landform:** Upper profile modulation has improved visual integration with surrounding landforms. Vegetation patterns and micro-relief of final landform create a view that is well integrated with the surrounding rural setting. Visual effects are Level 3 consistent with the EIS design.

VP 1: Guyong Road

EXISTING VIEW

EIS – YEAR 2

Source – VPA 2020

AMENDED PROJECT – YEAR 2

VP1 – Guyong Road – Existing view and Year 2 comparison between EIS and amended project
McPhillamys Gold Project
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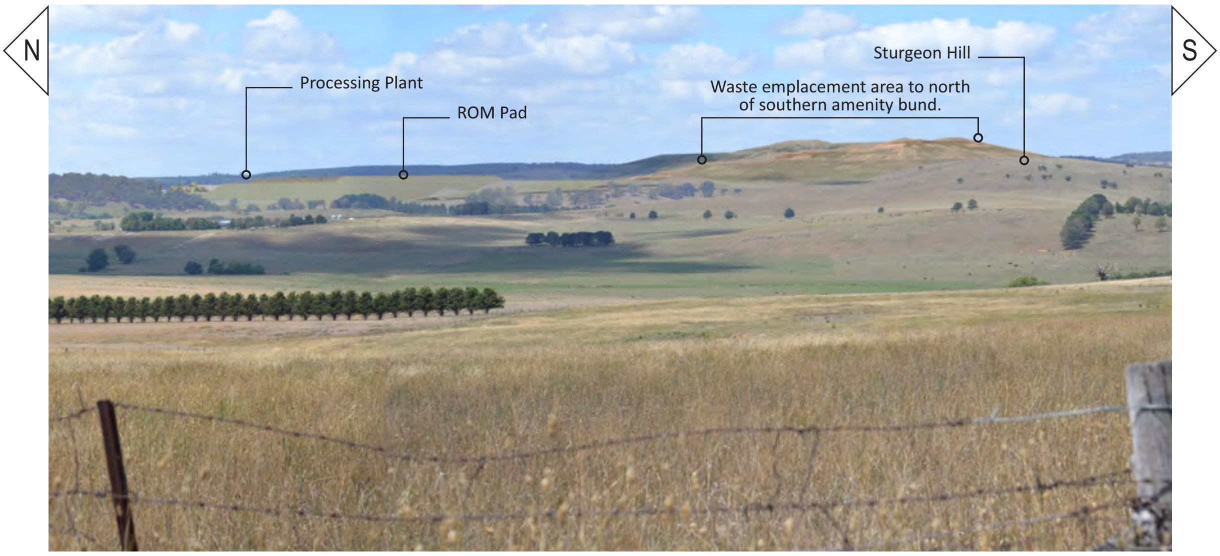
VP 1: Guyong Road



EIS – YEAR 4

AMENDED PROJECT – YEAR 4

AMENDED PROJECT – YEAR 6

Source – VPA 2020

VP1 – Guyong Road – Year 4 and Year 6 comparison between EIS and amended project

VP 1: Guyong Road

EIS – YEAR 8

AMENDED PROJECT – YEAR 8

Source – VPA 2020

VP1 – Guyong Road – Year 8
comparison between EIS and amended project

VP 1: Guyong Road

EIS – FINAL LANDFORM

AMENDED PROJECT – FINAL LANDFORM

Source – VPA 2020

b VP2 – Mid Western Highway travelling east

This view is from the highway travelling east. It is representative of the short duration views from the highway whilst passing the mine development project area southern boundary. Views onto this face are limited to an approximately 3.2 km long stretch of the highway. Outside this section, such views are screened by intervening topography such as Sturgeon Hill or filtered by roadside vegetation. The existing view of the mine development project area from VP2 and an overview of the anticipated visual effects of the amended project over the project life are depicted in Plate 6.7 to Plate 6.10. The figures include a comparison with the photomontages presented in the EIS.

As a result of the amended project, there are variations to visibility of mine components over the development period as follows:

- **Year 2:** Development of the waste rock emplacement will continue for the life of the mine as waste rock from operations is deposited. Initially there will be vegetation clearing, soil stripping, stockpiling and creation of new landforms. Benching for development of waste rock emplacement and southern amenity bund is in view with Level 1 visual effects due to exposed earthworks causing high colour contrast and landform contrast with surround landscape setting.

- **Year 4:** Development of waste rock emplacement is within this view. Upper benches and exposed faces create level high visual effect. Previous EIS views at Year 4 showed the southern amenity bund at its final height with early rehabilitation across all of the southern face. This view shows early rehabilitation on lower slopes. Visual effects range from Level 1 high to Level 2 high across the face.

- **Year 6:** Southern amenity bund face is built to height with rehabilitation in various levels of establishment. Visual effects are predominantly Level 2 high across the face. EIS mine plan showed bund well established with planting of woodland species implemented. Upper profile was at maximum height with rounded upper profile. Visual effects were Level 2-3.

- **Year 8:** Flat upper profile still under development but not clearly in view as it is above skyline from this view point. Southern face has established grass cover and early woodland establishment lowering visual effect to Level 2-3. EIS design showed rehabilitation vegetation patterns more established lowering the visual effect to Level 3.

- **Final Landform:** Final landform is higher than existing ridgeline (refer to Section 6.13.1(iv) regarding landform height). Upper profile modulation has improved visual integration with surrounding landforms. Rehabilitation across southern face has lowered contrast and improved overall integration. Visual effects are Level 3 consistent with the EIS design.

VP 2: Mid Western Highway west

EXISTING VIEW

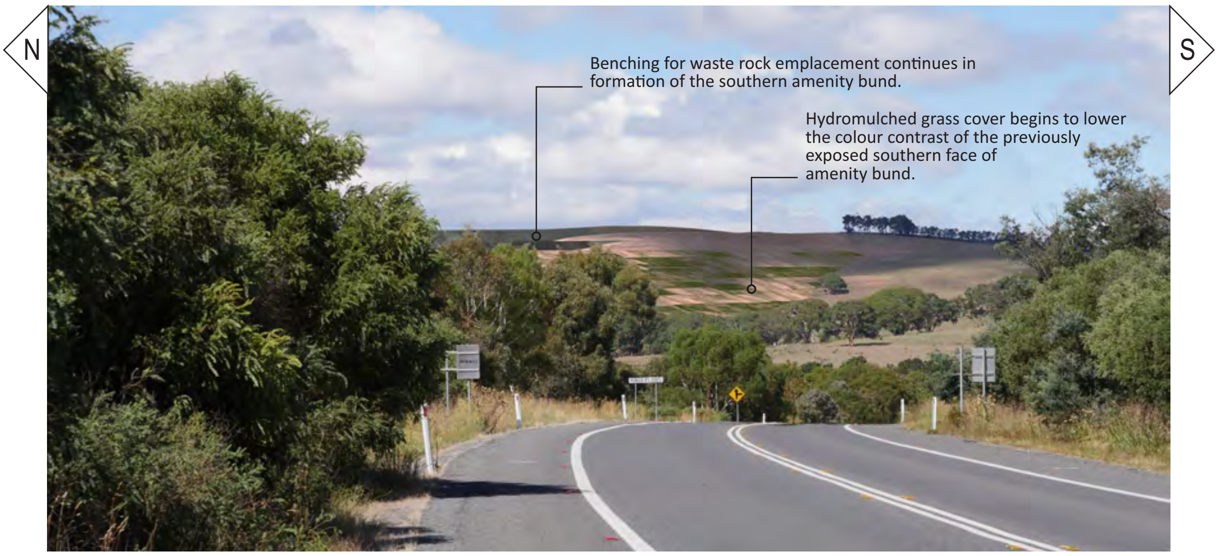
EIS – YEAR 2

Source – VPA 2020

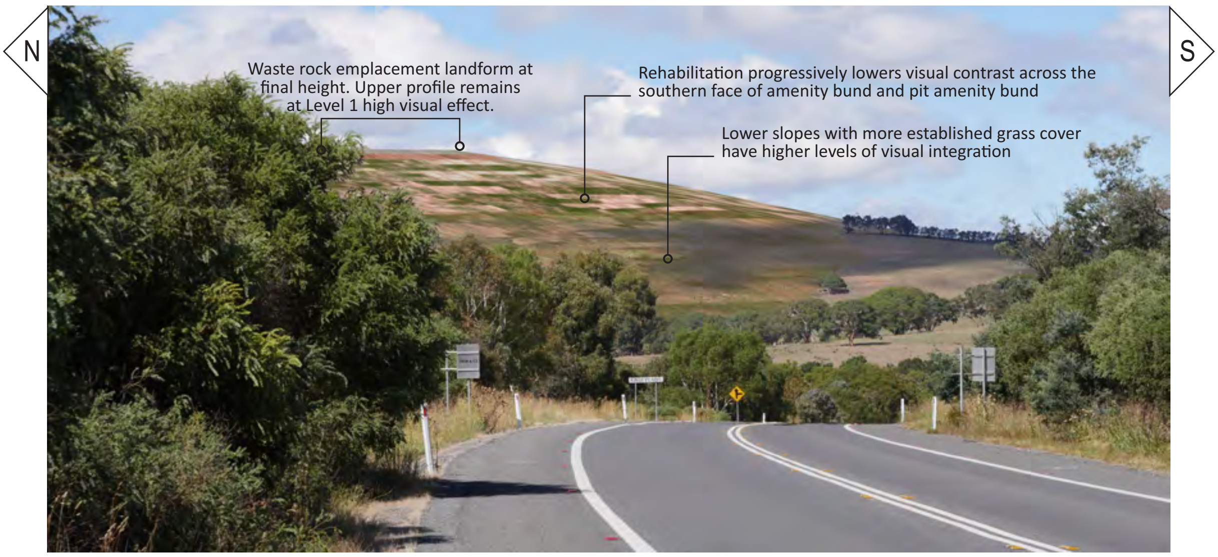
AMENDED PROJECT – YEAR 2

VP 2: Mid Western Highway west

EIS – YEAR 4



AMENDED PROJECT – YEAR 4

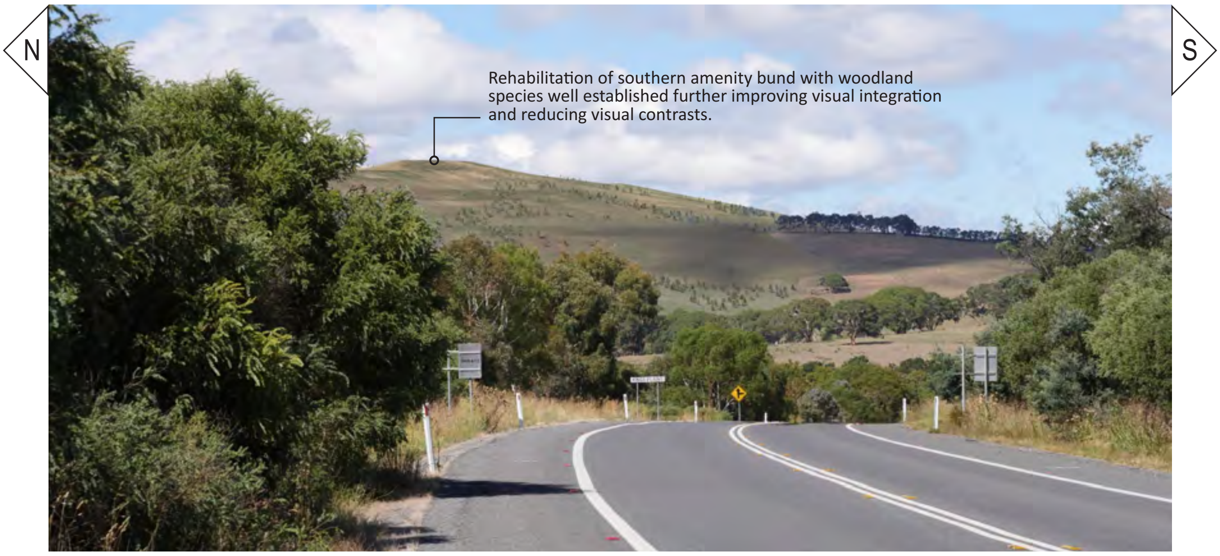


Source – VPA 2020

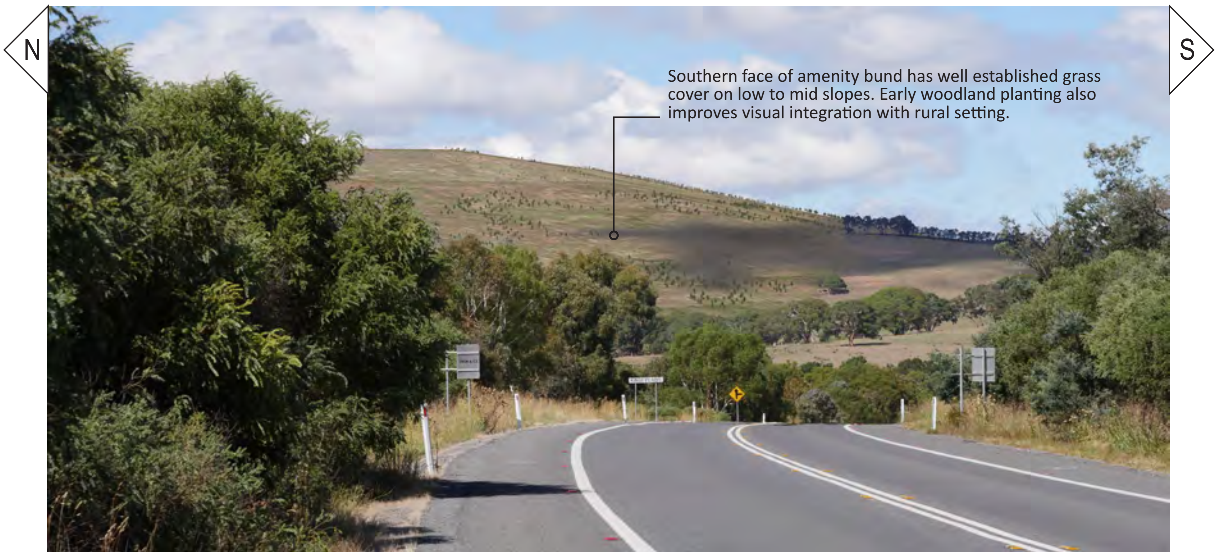
AMENDED PROJECT – YEAR 6

VP2 – Mid Western Highway (West) – Year 4 and Year 6 comparison between EIS and amended project

VP 2: Mid Western Highway west



EIS – YEAR 8



AMENDED PROJECT – YEAR 8

Source – VPA 2020

VP 2: Mid Western Highway west

EIS – FINAL LANDFORM

AMENDED PROJECT – FINAL LANDFORM

Source – VPA 2020

VP2 – Mid Western Highway (West) – Final landform comparison between EIS and amended project

c VP3 – Residence on Walkom Road (west) Kings Plains

VP3 is in the southern view sector and is representative of residential or locality views at lower elevations along Walkom Road and within the Kings Plains locality (ie south of the Mid Western Highway and the mine development project area). The tree covered hill in centre view is the south face of the open cut pit which is the focal point of this particular view from this residence. A low intervening ridgeline between this view and the southern boundary of the mine development project area screens existing views of elevated slopes north of the Mid Western Highway within the mine development project area. The existing view of the mine development project area from VP3 and an overview of the anticipated visual effects of the amended project over the project life are depicted in Plate 6.11 to Plate 6.14.

The figures include a comparison with the photomontages presented in the EIS.

As a result of the amended project, there are variations to visibility of mine components over the development period as follows:

- **Year 2:** Soil stripping areas to south-west of open cut visible with Level 1 visual effect. Pit amenity bund is lower in elevation with Level 1 visual effect until hydromulch (or similar protection) is established within this mine stage. The southern amenity bund is consistently Level 1 visual effect with no rehabilitation at this stage. Minor views of previously screened mine components, eg soil stockpiles, within the infrastructure area are now in views. Contributing to overall Level 1 visual effect at this mine stage.

- **Year 4:** Rehabilitation has lowered visual effect on the pit amenity bund to Level 2. Southern amenity bund has partial rehabilitation establishment while placement of waste material continues to develop the bund profile. There will be Level 1–2 visual effects across the face of southern bund at this stage. Previous EIS views at Year 4 showed the southern amenity bund at its final height with early rehabilitation across all of the southern face.

- **Year 6:** Visual effects are lower with rehabilitation implemented across both bunds. Lower slopes are well established (Level 3 visual effects) with upper slopes of southern amenity bund showing higher level 2 visual effects. Final height of bund is achieved within this Year 6 stage.

- **Year 8:** Rehabilitation with woodland plantings becoming established (Level 3 visual effect). Minor views of previously screened Level 1 visual effect mine components e.g. rock stockpiles, within the infrastructure area can be seen above the pit amenity bund.

- **Final landform:** Visual effects are Level 4 with established rehabilitation reducing contrast and improving visual integration with surrounding rural setting consistent with the EIS design.

VP 3: Kings Plains Residence

EXISTING VIEW

EIS – YEAR 2

AMENDED PROJECT– YEAR 2

Source – VPA 2020

VP 3: Kings Plains Residence

The pit amenity bund will initially be seeded with introduced grass species to provide erosion protection and to improve visual amenity.

Southern amenity bund has developed to final height. Early rehabilitation of lower slopes begins to reduce visual contrast.

EIS – YEAR 4

Waste emplacement area with varying levels of hydromulched grass lowering contrast on lower slope.

Open cut screened by retained trees on hill slopes.

Pit amenity bund

Upper profile has high visual effect due to contrast in colour, texture and form.

AMENDED PROJECT – YEAR 4

Pit amenity bund

Montage shows final height of the southern amenity bund with upper profile achieved within mine Year 6. Upper profile remains at Level 1 high visual effect.

AMENDED PROJECT – YEAR 6

Source – VPA 2020

VP3 – Kings Plain Residence – Year 4 and Year 6 comparison between EIS and amended project

VP 3: Kings Plains Residence

Rehabilitation of grassing and vegetation to pit amenity bund reduces visual contrast of lower slopes.

Upper slopes have levels of contrast in colour and texture with surrounding setting. Micro-relief implemented to upper profile of waste rock emplacement contributes to improved visual integration.

W

E

EIS – YEAR 8

Rehabilitation of amenity bund face progressively lowers visual contrast improving visual integration.

W

E

AMENDED PROJECT – YEAR 8

Minor views of infrastructure components can be seen above amenity bund landforms.

Source – VPA 2020

creating opportunities

VP3 – Kings Plain Residence – Year 8
comparison between EIS and amended project

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VP 3: Kings Plains Residence

Southern amenity bund completed. Rehabilitation of grassing and vegetation to slopes reduces visual contrast. Micro-relief implemented to upper profile of waste rock emplacement contributes to improved visual integration.

The pit amenity bund has been regraded to achieve lower height landform and improve visual amenity.

W

E

EIS – FINAL LANDFORM

Pit amenity bund has maturing woodland and hedgerow plantings lowering visual effects to low.

Face of southern amenity bund has maturing woodland and hedgerow plantings lowering visual effects to low.

W

E

AMENDED PROJECT – FINAL LANDFORM

Source – VPA 2020

d VP4 – Residence on Walkom Road (west) Kings Plains

VP4 is in the southern view sector and is representative of residential or locality views at higher elevations along Walkom Road and within the Kings Plains locality (ie south of the mine development project area). Views from this residence reflect open views to the north from some more elevated residences within Kings Plains. Existing primary views include undulating rural grazing land, stands of woodland and other residences. The linear fence line planting along the hill/ridgeline in centre right of view is indicative of the extent of the proposed waste rock emplacement. The existing view of the mine development project area from VP4 and an overview of the anticipated visual effects of the amended project over the project life are depicted in Plate 6.15 to Plate 6.18. The figures include a comparison with the photomontages presented in the EIS.

As a result of the amendments to the mine development, changes to the potential visibility of the mine components over the life of the project are anticipated to include:

- **Year 2:** Pit amenity bund is lower in elevation with Level 1 visual effect until hydromulch (or similar protection) is established. The southern amenity bund is consistently Level 1 visual effect with no rehabilitation at this stage. Landform under development with benching and areas of stripped soil evident resulting in low visual integration and high contrast with Level 1 visual effects. ROM pad (with stockpiling) within the infrastructure area is visible above the pit amenity bund (previously screened), contributing to overall Level 1 visual effect at this mine stage.

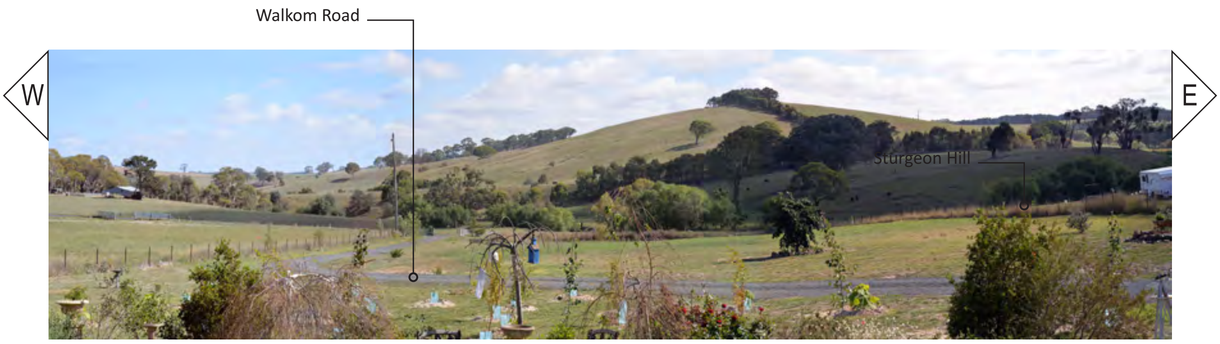
- **Year 4:** Rehabilitation has lowered visual effect on the pit amenity bund to Level 2. Southern amenity bund has partial rehabilitation establishment while placement of waste material continues to develop the bund profile and eastern face. There will be Level 1 visual effects for the views along the eastern face and Level 2 visual effects across the face of southern amenity bund where rehabilitation has been implemented and shows some evidence of establishment. Upper profile does not reflect previous well integrated landform at this stage. ROM pad is now screened behind the southern amenity bund.

- **Year 6:** Waste rock emplacement continues to upper profile of southern amenity bund to achieve final height within six months within the Year 6 mine stage. Rehabilitation results in progressive lowering of visual effects are lower (Level 2) achieving better visual integration and less visual contrast on southern face.

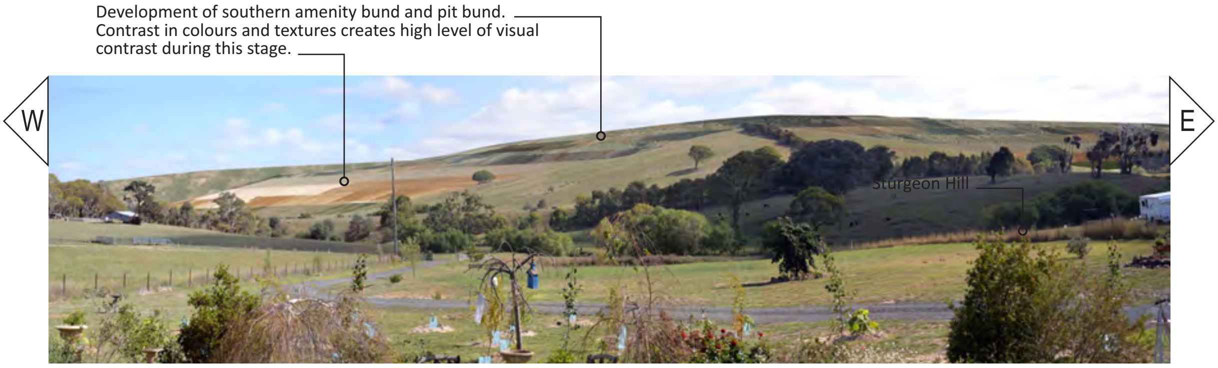
- **Year 8**: Rehabilitation with woodland plantings becoming established (Level 3 visual effect) across all bund faces in this view. Project infrastructure remains screened from views. The upper profile is less articulated, resulting in a less natural landform.

- **Final landform**: Final elevation of waste rock emplacement is higher (refer to 6.13.1(iv) regarding landform height) and pit amenity bund is significantly lower than in EIS. Visual effects are Level 4 with established rehabilitation reducing contrast and improving visual integration with surrounding rural setting consistent with the EIS.

VP 4: Kings Plains Residence



EXISTING VIEW



EIS – YEAR 2

AMENDED PROJECT – YEAR 2

Source – VPA 2020

VP 4: Kings Plains Residence

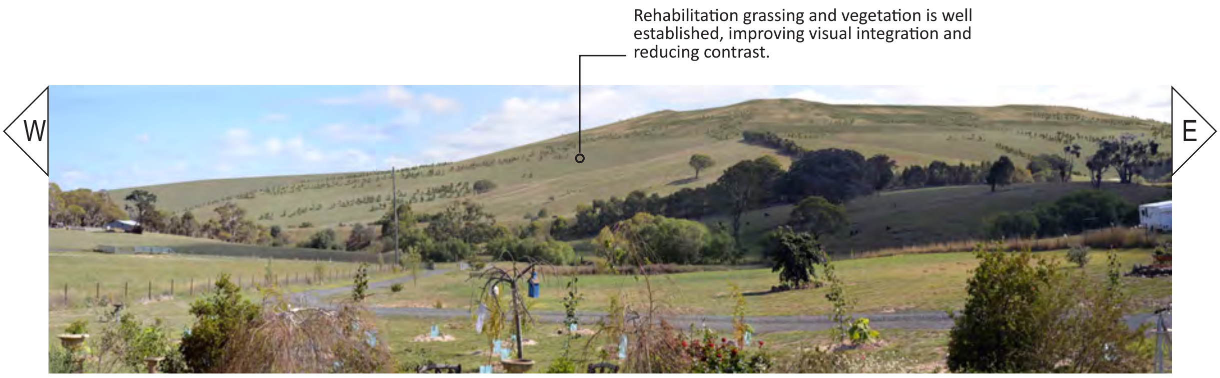
EIS – YEAR 4

AMENDED PROJECT – YEAR 4

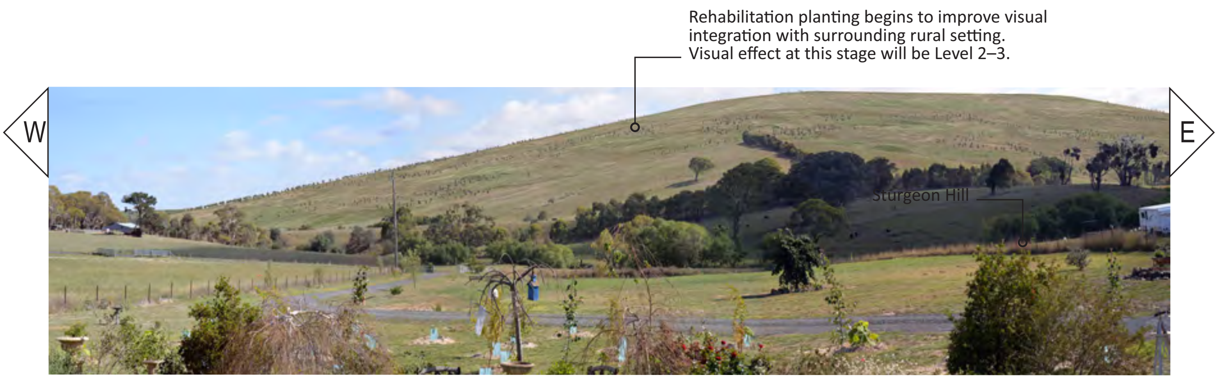
AMENDED PROJECT – YEAR 6

Source – VPA 2020

VP 4: Kings Plains Residence



EIS – YEAR 8



AMENDED PROJECT – YEAR 8

Source – VPA 2020

VP 4: Kings Plains Residence

Established tree planting with patterns emulating existing landscape vegetation patterns of woodland and hedgerows. Landform is larger in scale but well integrated with surrounding rural setting.

EIS – FINAL LANDFORM

Established woodland and hedgerow planting improves visual integration with surrounding rural setting. Visual effect at this stage will be Level 3 Low.

AMENDED PROJECT – FINAL LANDFORM

Source – VPA 2020

VP4 – Kings Plain Residence – Final landform comparison between EIS and amended project

e VP5 – Mid Western Highway travelling west

VP5 is in the southern view sector and is representative of the visual effects to be experienced by motorists travelling west on the Mid Western Highway. Motorists will experience views over a short duration while passing the southern face of the mine development project area. Views will be limited to an approximately 3.2 km long stretch of the Mid Western Highway. Beyond this, views are screened by roadside vegetation. Thick plantation pine forests to the north of the Mid Western Highway also limit view angles at this location. The existing view of the mine development project area from VP5 and an overview of the anticipated visual effects of the amended project over the project life are depicted in Plate 6.19 to Plate 22. The figures include a comparison with the photomontages presented in the EIS.

As a result of the amendments to the mine development, changes to the potential visibility of the mine components over the life of the project are anticipated to include:

- **Year 2:** Waste rock emplacement creates high levels of visual effects on the lower to mid slopes. Exposed soil and mine operations around the waste rock emplacement create high colour contrast with surrounding setting. Vegetation and soil has been cleared from southern face of waste rock emplacement which also has high colour and texture contrast. Together they result in Level 1 high visual effects from this view point.

- **Year 4:** Waste rock emplacement creates high levels of visual effects across the mid to upper face of waste rock emplacement. Benching also contrasts in form with landscape setting. These mine operations create high colour contrast with surrounding setting. Lower slope of waste rock emplacement has initial hydromulch protection (or similar) implemented which lowers contrast in those zones of southern face. There are consistent Level 1 high visual effects across face of waste rock emplacement from this view point.

- **Year 6:** Waste rock emplacement continues to upper profile of southern amenity bund to achieve final height within six months of Year 6 mine stage. Rehabilitation results in progressive lowering of visual effects (Level 2) achieving better visual integration and less visual contrast on southern face. Upper profile on eastern face remains at Level 1 visual effect while still under development to achieve final height and landform within six months.

- **Year 8:** Rehabilitation with woodland plantings becoming established (Level 3 visual effect) across all southern bund face in this view.

- **Final landform**: Visual effects are Level 4 with established rehabilitation reducing contrast and improving visual integration with surrounding rural setting. The upper profile is modulated consistent with the EIS outcome.

VP 5: Mid Western Highway east

EXISTING VIEW

EIS – YEAR 2

AMENDED PROJECT – YEAR 2

Source – VPA 2020

VP5 – Mid Western Highway (East) – Existing view and Year 2 comparison between EIS and amended project

VP 5: Mid Western Highway east

EIS – YEAR 4

AMENDED PROJECT – YEAR 4

AMENDED PROJECT – YEAR 6

Source – VPA 2020

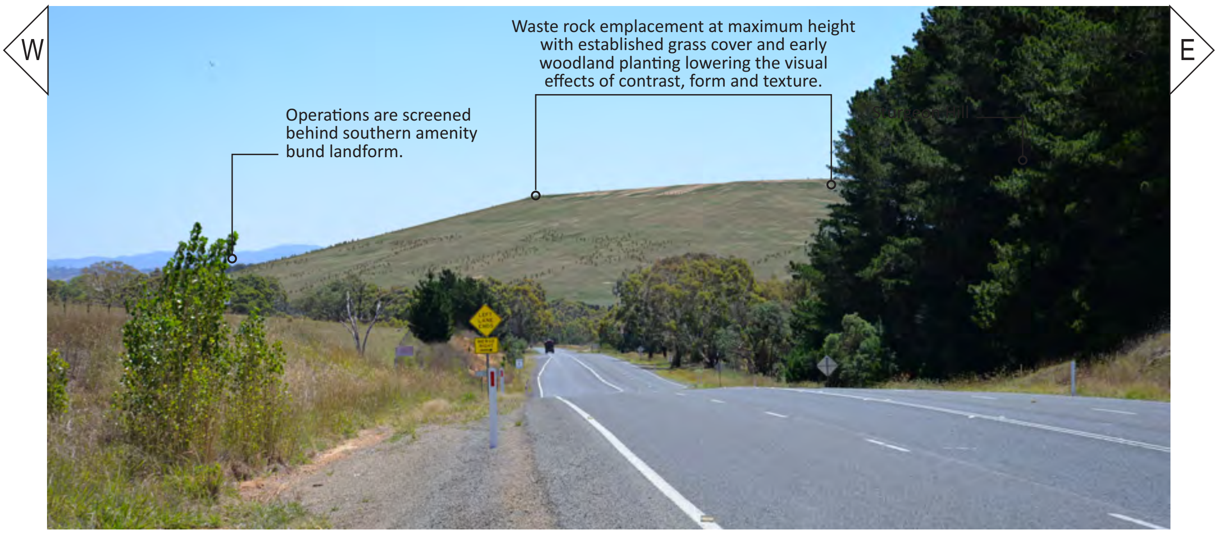
EMM creating opportunities

REGIS RESOURCES LTD

VP5 – Mid Western Highway (East) – Year 4 and Year 6 comparison between EIS and amended project

VP 5: Mid Western Highway east

EIS – YEAR 8



AMENDED PROJECT – YEAR 8

Source – VPA 2020

VP5 – Mid Western Highway (East) – Year 8 comparison between EIS and amended project

VP 5: Mid Western Highway east

EIS – FINAL LANDFORM

AMENDED PROJECT – FINAL LANDFORM

Source – VPA 2020

VP5 – Mid Western Highway (East) – Final landform comparison between EIS and amended project

McPhillamys Gold Project

Amendment Report

Plate 6.22

f Summary of visual effects

The visual effects experienced from each of the five viewpoints at various stages of the mine development are summarised in Table 6.45 and compared with the outcomes of the EIS VIA. The level of visual effects have been assigned consistently with the methodology presented in Table 2.1 of the EIS VIA.

Table 6.45 Comparison of visual effects from the EIS and amended mine development

Viewpoint	Distance to closest project component	Visual sensitivity	Project stage	Visual effect (EIS)	Visual effect (Amendment Report)
VP1 – Guyong Road, Blayney	4.5 km	Low	During mine life	Level 1 – High	Level 1 – High
			Final landform	Level 3 – High	Level 3 – High
			Long term	Level 4 – Very low	Level 4 – Very low
VP2 – Mid Western Highway travelling east	2.1 km	High	During mine life	Level 1 – High	Level 1 – High
			Final landform	Level 3 – High	Level 3 – High
			Long term	Level 4 – Very low	Level 4 – Very low
VP3 – Residence on Walkom Road (west), Kings Plains	1 km	High	During mine life	Level 1 – High	Level 1 – High
			Final landform	Level 3 – High	Level 3 – High
			Long term	Level 4 – Very low	Level 4 – Very low
VP4 – Residence on Walkom Road (west), Kings Plains	0.8 km	High	During mine life	Level 1 – High	Level 1 – High
			Final landform	Level 3 – High	Level 3 – High
			Long term	Level 4 – Very low	Level 4 – Very low
VP5 – Mid Western Highway travelling west	2 km	High	During mine life	Level 1 – High	Level 1 – High
			Final landform	Level 3 – High	Level 3 – High
			Long term	Level 4 – Very low	Level 4 – Very low

The revisions to the mine design and schedule do not change visual effect levels for those with views of the mine development for each of the stages presented in Table 6.45. However, the duration over which higher level visual effects (ie Level 1 and Level 2) will increase for some viewpoints as a result of the proposed amendments.

As a result of the amended project, the visual effects as represented by these viewpoints remain consistent generally with the EIS with variations due to the scheduling of mine development. Visual effects remain high for longer at various locations during the life of the mine but reduce to Level 3 for the final landform following implementation of progressive rehabilitation over pit amenity bund, southern amenity bund and other areas of disturbance such as soil stockpile areas and ROM embankments.

v Visual impacts

a Northern view sector

Visual impacts are consistent with the EIS. Visual receivers in the northern view sector will still be predominantly screened by topography and vegetation, therefore limiting direct views of the mine development. There may be locations along Vittoria Road that will have views of the TSF. From these locations the mine development will present a low to moderate visual impact during the mine life. The final rehabilitated landform will present a very low visual impact.

b Eastern view sector

Visual impacts are consistent with the EIS. Where the mine development is visible in the surrounding landscape of the eastern view sector, it will present a high visual impact during construction and a high to moderate visual impact during operation. The final landform will present a moderate to low visual impact.

Some fire and recreation trails within the Vittoria State Forest are within 2.5 km of the mine development project area. During construction and operation, where there is no screening vegetation, the mine development will result in a high to moderate visual impact to views from these trails. The final rehabilitated landform will result in a very low visual impact.

c Southern view sector

When viewed from residential receivers in the southern view sector, the mine development will result in a high visual impact during construction and a high to moderate impact during establishment of rehabilitation. The final rehabilitated landform will result in a low visual impact.

When viewed from the Mid Western Highway and Walkom Road, the mine development will result in a high visual impact during construction of the pit amenity bund and southern amenity bunds and high to moderate impact during rehabilitation of these bunds. As noted previously, the amendments to the mine and waste rock emplacement schedule will extend the duration over which high visual impacts will be experienced in the southern view sector from 4 years (EIS) to 6 years (Amended Project). The final rehabilitated landform will result in a moderate to low visual impact.

d Western view sector

There are variations in the visual effects due to the amended project, however the visual impacts are consistent with the EIS. When viewed from residential receivers on Guyong Road, the mine development will result in a high visual impact during construction and operation and a moderate to low visual impact during rehabilitation. The final landform will result in a very low visual impact. For residential receivers in Blayney, the mine development will result in a moderate to low visual impact during construction and operation and very low visual impact for the final landform.

The mine development will result in a moderate visual impact where visible along the Mid Western Highway in this view sector during construction and operation and moderate to low impact during rehabilitation. The final rehabilitated landform will result in a very low visual impact.

When viewed from the Billy Soo Rest Area, Heritage Park Rest Area and Church Hill Rotary Lookout, the mine development will result in a moderate to low visual impact during construction and operation. When viewed from these areas, the final rehabilitated landform will result in a very low visual impact.

e Summary of visual amenity impacts

The visual amenity impacts from the amended mine development are compared with the EIS mine development in Table 6.46. As demonstrated in Table 6.46, the amendments to the mine development are not expected to change the level of visual amenity impact from each of the identified receptors; however, the length of time over which visual amenity impacts will be experienced has increased for receptors in the southern view sector.

Table 6.46 Comparison of visual amenity impacts from the EIS and amended mine development

Receptor	Land use sensitivity	Visual sensitivity	Visual effects	Visual impact (EIS)	Visual impact (Amendment Report)
Northern view sector					
Rural residences	High	Low (no views)	Low	No impacts	No impacts
Mitchell Highway	High	Low (no views)	Low	No impacts	No impacts
Vittoria Road	Moderate to low	Moderate to low	High to moderate	Moderate to low	Moderate to low
Rural lands	Low	Low	Low	Moderate to low	Moderate to low
Eastern view sector					
State Forest recreation trails	Low	Low	High to moderate	Moderate to low	Moderate to low
Commercial facilities	High	Low (no views)	Low	No impacts	No impacts
Rural residences	High	High	High	High	High
Dungeon Road	Low	Low	High	Low	Low
Rural land	Low	Low	High	Moderate to low	Moderate to low
Southern view sector					
Kings Plains locality	High	High	High	High	High
Rural residences	High	High	High	High	High
Heritage listed items	High	High	High to low	High to low	High to low
Mid Western Highway	High	High	High	High	High
Walkom Road	Moderate	Moderate	High	High	High
Kings Plains Road	Moderate to low	Moderate to low	High to moderate	Moderate to low	Moderate to low
Rural lands	Low	Low	High	Moderate to low	Moderate to low
Western view sector					
Blayney township	High	High to moderate	Low	Moderate to low	Moderate to low
Rural residences	High	High	High	High	High
Recreation areas (Billy Soo Rest Area, Church Hill Rotary Lookout and Heritage Park)	High	Moderate	Low	Moderate to low	Moderate to low
Commercial facilities	High	High to moderate	Low	Moderate to low	Moderate to low
Mid Western Highway	High	Moderate	Moderate to Low	Moderate to low	Moderate to low
Guyong Road	Moderate to low	Low	High	Moderate to low	Moderate to low
Rural land	Low	Low	High	Moderate to low	Moderate to low

f Lighting impacts

There are two types of lighting effects (also termed light pollution) that could be generated by the project, direct light effects and diffuse light effects. Direct light effects result from when the light source is directly visible and will be experienced if there is a direct line of sight between the light source and viewpoint. Diffuse light effects relate to the general night-glow that results from light of sufficient strength being reflected into the atmosphere. Diffuse light effect will create a local focal point that will vary with distance and atmospheric conditions such as fog, low clouds and/or dust particles which all reflect light.

The amendments to the mine development will result in the following changes to potential lighting impacts:

- Previously identified direct lighting impacts from the night time movement of vehicles will no longer be an issue as operations on the southern face and pit amenity bund will be limited to daytime only.
- There may be direct lighting spill to views from the south above the lower pit amenity bund.
- As a result of stockpiling activity on the ROM pad, direct lighting may appear above the pit amenity bund up to Year 4. After Year 4, this direct lighting is expected to transition to diffuse lighting impacts (or skyglow) along the top of the pit amenity bund.
- There may be direct lighting impacts associated with any street lighting potentially installed at the new access road intersection with the Mid Western Highway. This lighting will have potential to impact residences in the vicinity of this intersection. Localised vegetation and topography may provide screening.
- The revised alignment of the site access road may create direct lighting impacts (through headlight spill) from project-related vehicle movements. This may be potentially visible from residences on north-facing hills adjacent the proposed access road.
- Diffuse lighting impacts (or skyglow) from the mine development project area will be consistent with those predicted in the EIS and will create moderate to high contrast to the existing dark sky character of the rural setting.

vi Mitigation and management

a Project design

As noted previously, the amended waste emplacement schedule has achieved a reduction in predicted noise levels at nearby residences; however, it will extend the construction timeframe for the southern amenity bund. Visual impacts are unchanged; however, will not be limited to between two to four years (as described in the EIS).

Amendments to the mine development have resulted in additional clearance of some vegetation below the open cut pit. A narrow line of trees at the upper edge of the pit will still be retained and is expected to provide some screening.

b On-site mitigation

On-site treatments involve rehabilitation of landforms and land cover and will include the measures described in Section 19.9.2 of the EIS.

c Off-site mitigation

Additional residences to the south and south-west of the mine development will receive further consideration for residential landscape mitigation treatments to screen or mitigate views of the mine development. For example, tree plantings are being offered to residences where they have been deemed likely to be affective at reducing potential visual amenity impacts.

As outlined in Section 5.2, Regis is progressing negotiated agreements with 15 Kings Plains landholders who will experience high visual amenity impacts from the mine development. These agreements include visual and noise mitigation plus a five year option to purchase following development approval. Conceptual residential mitigation plans are in the process of being developed for these residences and include built structures (such as pergolas) to either screen views of the mine development or redirect focus away from highly impacted views. Plans may also include alternative use areas or outdoor rooms.

It is noted that five additional landholders are also being offered negotiated agreements in Kings Plains in consideration of visual impacts (excluding the option to purchase clause). Meetings have also taken place with residents outside of the Walkom Road/Kings Plains locality and along Guyong Road, offering visual mitigation tree planting where direct views of the site would be mitigated by tree plantings to improve visual amenity.

d Lighting mitigation

As a result of the amended project, mine operations plan needs to regulate vehicle movement along the site access road to ensure headlights are where possible on low beam and movement is rationalised to limit traffic after dark.

6.13.2 Pipeline development

i Introduction

An assessment of the visual amenity impacts from the pipeline development was provided in Chapter 32 of the EIS. Where relevant, this assessment has been updated to account for the realignment of the pipeline route and relocation of Pumping Station Facility No. 3, which has been relocated from within close proximity of MPPS approximately 4.3 km west, adjacent to Wallerawang Road (Figure 1.5).

ii Existing environment

The description of the existing environment presented in Section 32.3 of the EIS has not changed as a result of the amendments to the pipeline development. The selected viewpoints are still relevant to the amended pipeline development.

The landscape character zones assigned to the pipeline route will not change as a result of the amendments to the pipeline development; however, pumping station facility No. 3 will be relocated to an area considered to be part of 'LCZ2 Open Farmland'.

Pumping station facility No. 3 has been relocated to open farmland close to the intersection of Range Road and Pipers Flat Road and on the northern side of the Gwabegar railway line. The land on which pumping station facility No. 3 will be installed is owned by Centennial Coal Company Limited. Land use in the immediate vicinity of the proposed power supply corridor for pumping station facility No.3 is associated with transport infrastructure of Pipers Flat Road and Gwabegar rail line with areas of agricultural land use and environmental conservation and management. There are approximately 6 sensitive receivers in the vicinity of the pumping station facility with the nearest residential receiver located approximately 100 m to the south-east.

Plate 6.23 View of existing environment pumping station facility no.3

iii Methodology

No changes to the assessment methodology described in Section 32.2 of the EIS were required as a result of the amendments to the pipeline development. The assessment of visual amenity impacts included consideration of the visual environment and visual effect (ie contrast and integration) and sensitivity.

iv Impact assessment

a Visual features of the pipeline development

The visual features of the pipeline development will not change from the description presented in Section 32.4.1 of the EIS. Once constructed, the majority of the pipeline development will be below ground, with only the pumping station facilities, pressure reducing system and valves visible above ground during the operational phase.

As described in Table 32.3 of the EIS, the pumping station facilities will be contained in a covered building. The compounds will be approximately 75 m by 75 m and will be surrounded by a 1.8 m high perimeter fence. Other features will include a water storage tank and control room.

b Visual impact assessment

The potential impacts of the pipeline development on surrounding visual landscape character during construction and operation are summarised in Table 32.4 of the EIS. Visual impacts during construction will be temporary along the pipeline route and will typically include construction vehicles, stockpiles and construction zones; however, many of these areas are away from public views and views from residences. Where the pipeline construction is visible, potential visual impacts will be limited, in any one location, to up to a week for conventional trenching pipeline installation and up to six weeks for underboring installation as construction progresses along the corridor.

Construction of pumping station facilities with generally take between four and six months. Construction compounds and laydown areas will also move as construction progresses but may be in place in any one location for up to six months. These will be located to take advantage of existing screening as far as practicable.

c Visual assessment of permanent features

An assessment of the visual impacts of permanent features to landscape character during the construction and operation of the pipeline development was completed in Section 32.4.3 of the EIS. The assessment considered both the visual sensitivity and magnitude of impact associated with these features. This assessment has been amended to account for the relocation of pumping station facility No. 3. The pumping station facility will include a pumping station building, above ground water storage tank, above ground pipeline and valving, a control room and a pad mounted power transformer. An example of an indicative pumping station arrangement is shown in Plate 6.24. In pumping station facility will be viewed by vehicles travelling along Pipers Flat Creek Rd and by rail passengers. Existing vegetation will screen the pumping station facility from most viewpoints including from rural residential receivers.

Plate 6.24 Indicative pumping station facility arrangement

v Mitigation and management

The pipeline development has been designed to minimise the visual impacts through careful consideration during route design. The mitigation measure described in Section 32.5 of the EIS will be implemented during detailed design and construction to minimise potential visual amenity impacts of the pipeline development.

6.13.3 Conclusion

The revisions to the mine design plan and mine development schedule do not change visual impact levels for those with views to the mine development, which range from high level visual impacts for residences in Kings Plains to low or nil visual impacts to residences north and north-east of the mine development project area. However, the duration of the high visual impacts for viewpoints to the south, south-east and some to the south-west of the project have extended from between the two to four years associated with the EIS design to up to six years. After Year 6, visual effects and impacts are consistent with those of the EIS, progressively lowering as rehabilitation is implemented and establishes across the southern face of the amenity bund and pit amenity bund.

From the west, there is variation in the landform and its visible progress; however, visual impacts are consistent with the EIS. Views from other view locations to the north, east have had no discernible changes to the visual effects and visual impacts.

The revised pit amenity bund will not screen all views of infrastructure components in views from the south over the life of the mine. Minor views to components such as the ROM pad and stockpiling may be evident from some viewpoints prior to Year 4.

The more extensive soil stripping and stockpiling areas on south-western face of Ingledoon Hill (the open cut pit) will result in areas of high visual effect during placement and removal. Although these views are generally screened by the terrain, some areas will remain visible.

Direct lighting effects will be lower on the southern amenity bund due to the revised mine schedule and restrictions to daylight operations on the south facing slope of the amenity bund. There may be direct lighting spill to views from the south above the lower pit amenity bund. Direct lighting experienced from the south-west to the north-west, such as when viewed from Guyong Road, will be consistent with those described in the EIS. Diffuse lighting will be consistent with EIS mine plan, with more intense horizon skyglow from the south above the pit amenity bund being closer to the light sources associated with the infrastructure area.

Consistent with the EIS, the final landform will have a low visual impact and over time will have very low visual impact after woodlands and cultural plantings mature.

As outlined in Section 5.2.1 above, Regis is committed to implementing negotiated agreements with identified landholders in Kings Plains. This includes 15 agreements containing visual and noise mitigation as well as a clause that states landowners may request, in writing, that Regis acquires their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force).

Five additional landholders are also being offered negotiated agreements in Kings Plains in consideration of visual impacts (which will exclude the option to purchase).

In addition to the above, meetings have also taken place with residents outside of the Walkom Road/Kings Plains locality and along Guyong Road, offering visual mitigation tree planting where direct views of the mine development would be mitigated by tree plantings to improve visual amenity.

Consistent with the EIS, the pipeline development will not have significant visual impacts along the pipeline corridor. Construction impacts will be temporary in nature and will move progressively along the pipeline corridor. Once constructed, the majority of the pipeline development will be below ground, with only the pumping station facilities and valves visible above ground during the operational phase. Pumping station facilities No.1 and No.2 are located on existing mine and infrastructure sites. Pumping station facility No.3 and No.4 will be visible from public viewpoints; however, existing screening vegetation will assist in filtering view of the infrastructure.

6.14 Social assessment

6.14.1 Introduction

This section provides a summary of the results of the addendum social impact assessment (SIA) prepared for the amended project, comprising both the mine and pipeline developments, by Hansen Bailey (2020). The addendum SIA is provided in full in Appendix S and considers and outlines the differences in impacts compared to the project as presented in the EIS. In this way the addendum SIA serves as an update to the SIA presented in Appendix T of the EIS (Hansen Bailey 2019) (referred herein as the EIS SIA).

6.14.2 Mine development

i SIA study area

The SIA study area for the assessment of social impacts associated with the amended mine development is consistent with the SIA study area adopted for the EIS SIA. The SIA study area is defined by the mine development's social area of influence. The SIA study Area for the mine development incorporates the 'Primary Assessment Area (PAA)', the 'Secondary Assessment Area (SAA)' and the 'Regional Assessment Area' (RAA) as defined in Table 6.47.

Table 6.47 SIA study area definition for the mine development

SIA study area component	
PAA	Defined as the area within an approximate 2 km radius of the mine project area inclusive of the Kings Plains locality and Kings Plains settlement. An estimated 88 private residences are located within the PAA, the majority to the south of the mine project area along the Mid Western Highway and to the west along Guyong Road. The estimated population of the PAA is 230 people.
SAA	Defined as the Blayney LGA (Figure 4 of the SIA). The main communities of interest within the Blayney LGA are Blayney and Millthorpe. Outside of the PAA, the primary area of influence of the project is likely to be the town of Blayney.
RAA	Defined as the combined LGAs of Bathurst, Blayney, Cabonne, Cowra and Orange City.

The primary focus of the EIS SIA and therefore the addendum SIA was the PAA and SAA as these areas are the most likely to be impacted by the project.

ii Mine development amendments relevant for SAA and PAA

The mine development amendments with potential implications for the secondary assessment area (SAA) and primary assessment area (PAA) are:

- amendments made to the mine development specifically with the aim of further reducing the predicted noise levels from the mine development at the nearest sensitive receivers (ie Kings Plains receivers) include:
  - revision of the waste schedule and development of the waste rock emplacement. This revision has included a change in the construction sequence of the emplacement, which will now commence in the north, away from Kings Plains, rather than in the south, as was the case in the EIS;
  - optimisation of the location of exit and entry ramps to the open cut, which have been revised to reduce potential noise emissions from trucks exiting and entering the pit (also reducing the height of the pit amenity bund in this area);

- optimisation of the mining mobile equipment fleet (both the quantity and type) through selection of larger capacity equipment (haul trucks and excavators) with proven noise mitigation options contributing to the lower predicted noise levels in Kings Plains;

- changes to the design of the TSF;
- changes in the disturbance footprint of the mine development;
- changes to the mine site water management arrangements; and
- extension of the operational life of the mine development from 10 years to 11 years.

There are no material changes to workforce arrangements (including accommodation) as presented in the EIS as part of the amended project. The potential social impacts and opportunities associated with the project workforce as described in the EIS SIA (EIS Appendix T) remain valid for the amended project.

iii Primary assessment area

a Amenity

There are around 88 rural and rural residential properties, as well as the Vittoria State Forest, surrounding the mine development project area (excluding properties owned by Regis). The impacts predicted as a result of the EIS project on these nearby residences in relation to noise levels, air quality and visual amenity were described in detail in Chapters 10, 11 and 19 of the EIS.

Key findings of the EIS SIA with respect to residential amenity in the PAA as a result of the mine development are summarised as follows:

- Near neighbours would experience a reduction in rural amenity due to the impact of cumulative biophysical changes ie changes in noise levels and a reduction in visual quality. This impact was predicted to accrue predominantly to residents of Kings Plains locality and some near neighbours to the west and north of the mine development.
- Mitigated, the predicted impact of the mine development on rural amenity in the PAA was assessed as high.
- The overall significance of the predicted impact to rural amenity for near neighbours was assessed as high.
- Residents of Kings Plains locality and some near neighbours west and north of the mine development may experience reduced enjoyment of outdoor spaces at night due to intrusive lighting and resulting impacts on dark skies.
- This impact was assessed as a mitigated high risk and of high significance given the apparent value residents in the PAA place on outdoor activities and dark skies.

As outlined in Chapter 2, in response to issues raised in submissions received, as well as a result of further detailed mine planning and design, many of the mine development amendments were made specifically with the aim of further reducing the predicted noise levels from the mine development at the nearest sensitive receivers. These amendments, particularly the rescheduling of the waste rock emplacement, optimisation of the location of exit and entry ramps to the open cut and optimising the mining fleet have improved noise and dust outcomes for near neighbours but extended the duration of visual and potential lighting impacts. Noise, air quality and visual amenity impacts of the amended mine development are described in detail in Sections 6.5, 6.6 and 6.13 of this report. A summary of amenity impacts of the amended mine development relevant to the PAA is provided below.

Noise amenity impacts

In relation to noise, the outcomes of the amended mine development for acoustic amenity in the PAA are significantly better than the predicted outcomes documented in the EIS. During the first six months of the project (assessed as construction), predicted daytime noise levels are expected to comply with noise management levels (NMLs) at all receivers throughout the construction phase of the amended mine development (in the EIS one receiver was predicted to experience noise levels 5 dB over the NML). Significantly, construction noise levels associated with the amended mine development are substantially lower than those presented in the EIS NVIA, particularly in the Kings Plains and Sturgeon Hill NCAs.

The findings of the EIS NVIA indicated that a number of residential receivers would experience operational noise levels on occasion above the PNTLs from Year 1 to Year 4 inclusive and that the exceedances would trigger voluntary mitigation rights at 15 receivers.

Predicted noise levels in the revised NVIA for the amended mine development are generally within 2dB of the PNTL at all receivers, with the exception of one receiver in Kings Plains who is expected to experience noise levels up to 3 dB over the PNTL during the evening period for a brief period in the first half of Year 1 during the development of the pit amenity bund. Where predicted noise levels exceed the PNTLs by up to 2 dB, the residual impact is negligible in accordance with NPI methodology. Hence, the residual noise impacts at those receivers is considered negligible.

Notwithstanding the significant improvements in predicted noise levels associated with the amended mine development, Regis is progressing negotiated agreements with 14 of the 15 Kings Plains receivers identified in the EIS NVIA with predicted noise levels exceeding the PNTLs, such that they would have been entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted (Regis has purchased R27 since submission of the EIS). A negotiated agreement will also be progressed with two additional receptors, R28a a future DA approved residence, which is predicted to experience noise levels up to 3 dB over the PNTL during the evening for a brief period in Year 1, and R15, which is close to the new proposed site access intersection.

The negotiated agreements will include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that the consent remains in force).

Air quality

The revised air quality modelling carried out for the amended mine development indicate that the amended mine development will not result in any exceedances of the applicable cumulative impact assessment criteria at any of the surrounding private residences. Relative to the model predictions for the EIS project design, the results from the amended mine development modelling highlight the following key points:

- the results for Years 1,2 and 4 for the amended mine development are lower than the corresponding years in the EIS; and
- while no modelling for Year 6 was conducted in EIS, the results are highest for Year 6 for the amended mine development corresponding with the peak material movement for the mine operation. These maximum predicted concentrations for Year 6 are comparable with the peak year impacts for the EIS design (Years 1 and 2).

Visual

Relative to the outcomes of the EIS VIA, the findings of the VIA Addendum (Appendix R) highlight the following key points:

- Areas to the south and south-west of the mine development project area will experience a longer duration of high visual impacts. The EIS design, prioritised completion of the pit amenity southern amenity bunds to minimise duration of high level visual effects during construction. The mine development amendments have extended this from two to four years to up to six years.

- Some areas to the south and south-west may experience higher visual impacts from views in to the infrastructure areas up to Year 4 due to the lower height of the pit amenity bund.

- An expanded soil stockpiling zone will increase areas of high visual impact to views from west, south-west and some locations south of the project.

- In the EIS direct lighting impacts occurred due to night time activity in the southern portion of the waste emplacement area. The amended mine development no longer proposes night time activity in the southern portion of the waste rock emplacement, however the ROM pad may be visible to some near neighbours up to Year 4.

The 15 negotiated agreements identified above will also include provisions for visual mitigation in addition to noise mitigation. Regis has offered a further four landholders visual negotiated agreements (one of which will include the acquisition clause).

Summary

In the EIS SIA, noise and dust were key drivers of the predicted reduction in rural amenity in the PAA. With the amended mine development, visual impact is the primary driver of reduced amenity impacts in the PAA. Noise remains a contributor to predicted reductions in rural amenity however changes in both day time and night time noise levels mean the potential changes in noise levels (including night time noise levels) anticipated in the EIS SIA have either been reduced (in the case of day time) or removed (in the case of night time).

Consistent with the findings of the EIS SIA, the amended project will result in a reduction in rural amenity for near neighbours due to the impact of cumulative biophysical changes ie changes in noise levels, a reduction in visual quality and the impact of diffuse lighting. This impact is predicted to accrue predominantly to residents of Kings Plains locality and some near neighbours to the west and north of the mine development. It is notable that noise levels at several residences in Kings Plains settlement and Kings Plains locality will be significantly improved with the amended project.

b Access to water resources

Residents within the PAA have expressed ongoing concerns during consultation activities that the mine development will lead to long-term impacts on the Belubula River system in addition to impacting groundwater accessibility for near neighbours.

The predicted impacts on surface water and groundwater accessibility of the amended mine development are discussed in Section 6.4 of this report. The findings of the revised surface water assessment (HEC 2020) and the Groundwater Addendum (EMM 2020e) are not materially different to the finding of the assessments carried out for the EIS.

Consistent with the EIS, no impacts on accessibility to groundwater for use by near neighbours is predicted. Similarly, as per the EIS predicted impacts, a temporary reduction in the inflow to Carcoar Dam (4%) will occur due to the excision of the mine disturbance footprint during operations. This level of change is expected to be within the current natural variability in catchment conditions.

The water management system has been designed so that the mine will be a nil discharge site. The size of operation WMFs have been revised in the amended mine design to ensure they will not spill for all modelled climate scenarios (as opposed to a 1% spill risk in the EIS design).

c Access

The amended mine development proposes a new location for the site access intersection off the Mid Western Highway. This intersection will be located approximately 1 km east of the original location assessed in the EIS. The change in intersection location responds to feedback from TfNSW and the community. A new alignment is subsequently proposed for the site access road to the mine administration and infrastructure area.

In addition to the management actions identified in the EIS SIA to address the impacts of any changes in access and connectivity for the SAA, Regis proposes additional inclement weather mitigation measures for the revised site access and Dungeon Road intersection as outlined in Section 6.12.

d Surrounding agricultural uses

During consultation local bee industry representatives raised concern about potential industry impacts should the local bee population be impacted by the mine development.

Following EIS submission Regis commissioned enRiskS (2020b) to complete a review of the potential impact of the mine development on bees with as specific focus on ecotoxicity. The findings of enRiskS (2020b) indicate that dust and water associated with the amended mine development will not adversely impact the bee industry. The assessment on the potential impact on European honey bees and local honey production (enRiskS 2020b) is contained as Appendix D of the Submissions Report.

e Health and wellbeing

Following submission of the EIS Regis commissioned a health impact assessment (HIA) to address existing resident concerns and perceived uncertainty in relation to the health impacts of the project. The health impact assessment, included as Appendix E of the Submissions Report), also addressed relevant concerns raised in EIS submissions. The objective of the HIA was to provide an assessment of potential impacts to human health in relation to the mine development, specifically in relation to impacts related to air quality, noise and vibration, hazardous incidents, the risk of naturally occurring asbestos and water quality.

Increased levels of stress and anxiety, both short-term acute events and chronic events/impacts are well recognised to affect health and wellbeing. According to enRiskS (2020a:58):

> Individuals experience a wide range of complex factors and issues influence health and wellbeing, specifically mental health. In addition, individuals respond to changes in stress and anxiety in different ways and hence it is not possible to quantify how the project would affect stress and anxiety levels in the community.

The EIS SIA acknowledges the project's potential to adversely impact resident stress and anxiety and the high significance of this impact. The additional assessment presented in the HIA specifically addresses impacts on community health in relation to impacts to air quality (a key concern identified by the community) as well as other impacts such as noise and water, will further assist in addressing concerns of the community, which would assist in managing stress and anxiety.

As described above, Regis is currently progressing negotiations with landholders in Kings Plains, which will include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force).

The inclusion of this clause primarily seeks to respond to the anxiety expressed by landowners in relation to the uncertainty about how future impacts may be experienced, particularly impacts to property values and impacts to way of life and the use and enjoyment of their private property.

Naturally occurring asbestos

The EIS noted that the Anson Formation, over which the disturbance footprint associated with the mine development lies, has been categorised as having low potential for naturally occurring asbestos and noted that the extensive exploration drilling program conducted to date on site had not identified any naturally occurring asbestos to date in cores drilled. Notwithstanding, the EIS outlined that Regis will follow appropriate procedures for naturally occurring asbestos as recommended by SafeWork NSW and in accordance with Regis' naturally occurring asbestos procedure.

Subsequent to the EIS, to further quantify the potential risk of encountering NOA during the life of the project, Regis (2020) has undertaken a review of the project location, in conjunction with information and mapping on the potential presence of geological materials that have the potential to include NOA. This review identified that the project is hosted within intermediate rocks of the Anson formation which is categorized as low potential for NOA. The high and medium potential NOA mafic units of the Blayney and Byng Volcanics occur on the western side of a large fault known as the Godolphin Fault. This fault is located to the west of the McPhillamys Gold Deposit

Based on the assessment undertaken by Regis (2020), the intermediate-mafic rock unit in the southern portion of the deposit from the surface may contain NOA. This unit has been extensively drilled and the majority of the material falls outside of the ore zone. It is expected that the rock unit reaches the surface based on modelling from drilling and extends to depths greater than 400m. The unit constitutes less than 1% of the total rock mass proposed to be mined. The location and mining of these materials has been further considered by the air quality modelling specialists, with modelled estimates of NOA in dust predicted and provided for use in this assessment.

The assessment concluded that maximum predicted exposure concentrations of NOA are well below the adopted guideline from the World Health Organisation (WHO). Hence risks associated with potential exposure to NOA in air as a result of the project are considered to be low and acceptable (refer Appendix E of the Submissions Report).

iv Secondary assessment area

The EIS SIA identified that the predicted impacts of the mine development on the Blayney LGA were largely confined to the construction phase of the project associated primarily with the influx of a temporary construction workforce to the Blayney township and the associated demand for short-term accommodation and private rental housing.

The amended mine development does not propose any changes to workforce size, workforce commute arrangements or construction or operations phase traffic volumes presented in the EIS, hence no new social impacts or material changes in already assessed social impacts relative to the workforce are anticipated with the amended project.

The amended mine development does not propose any changes in the transportation or storage of hazardous goods, eg cyanide, accordingly no new social impacts or material changes in already assessed social impacts relative to public risk are anticipated.

v Benefits and opportunities

The EIS SIA predicted a number of potential economic and social opportunities associated with the mine development for the broader secondary and regional assessment areas these benefits remain unchanged for the amended project and are summarised below.

The project will provide direct employment for up to:

- 590 workers at peak construction, with 55% assumed to already reside in the local area (ie within a 1-hour commute of the mine project area); and
- 320 workers at peak operations, with an average annual direct workforce of approximately 260 and 80% assumed to already reside in the local area.

It will also provide indirect employment in the regional economy from employee and project expenditure. The economic impact assessment (refer to Appendix DD) found that the total annual impact of the peak year of construction on the regional[3] economy is estimated at up to:

- $531 M in annual direct and indirect regional output or business turnover;
- $218 M in annual direct and indirect regional value added;
- $114 M in annual direct and indirect household income; and
- 1,289 direct and indirect jobs.

The main sectors in the regional economy likely to benefit from direct operational expenditure are Construction Services, Other Repairs and Maintenance, Professional, Scientific and Technical Services, Wholesale Trade, Exploration and Mining Support Services and Heavy and Civil Engineering Construction.

The project operation is estimated to make up to the following contribution to the regional economy:

- $492 M in annual direct and indirect regional output or business turnover;
- $272 M in annual direct and indirect regional value-added;
- $67 M in annual direct and indirect household income; and
- 788 direct and indirect jobs.

Economic activity in the region will also arise from the expenditure of the project's workforce in the region. The revenue, expenditure and employment associated with the construction and operation phases of the project will stimulate economic activity for the regional economy. The main sectors in the regional economy likely to benefit from direct expenditure of wages in the regional economy include retail trade, food and beverage services, health care services, wholesale trade and primary and secondary education services.

In addition to the economic benefits, Regis is currently negotiating a VPA for the project with Blayney Shire Council. The VPA is the primary mechanism for managing socio-economic impacts associated with the project and enhancing opportunities for the local area.

[3] The regional area defined in the *Economic Impact Assessment* (Gillespie Economics, 2019) (Appendix DD) is the combined area of the LGAs of Blayney, Bathurst, Cabonne and Orange. This is different to the Local Area considered in the SIA which is defined as the combined area of the LGAs of Blayney, Bathurst, Cabonne, Cowra and Orange. Further, the Region in the SIA is defined as the Central West Region of NSW.

As described above, an estimated 20% and up to 40% of the operations phase workforce are anticipated to be non-local hires who will relocate permanently into the local area to take up employment during the operations phase. Based on scenario testing, the project has the potential to directly attract between 48 and 104 people to the Blayney LGA representing a population increase of 1.5% and 3.4% respectively.

The additional project induced population is anticipated to have the following potential positive benefits for the Blayney LGA:

- increased participation rates in local sporting groups and clubs supporting long term sustainability of these services;
- increased enrolments at local education institutions;
- increased pool of volunteer labour for local service and facility operations;
- introduce new and additional skills into the LGA which may support existing services and businesses and strengthen community cohesion; and
- stimulate demand for residential development in Blayney and neighbouring areas.

vi Management and mitigation measures

The EIS SIA included a wide range of actions to avoid, mitigate and manage potential social impacts of the project and enhance the delivery of benefits to the SAA and the broader RAA. These actions and mitigation measures are still relevant for the amended project.

Three social impact management frameworks have been developed for the project:

- Stakeholder Engagement Framework;
- Near Neighbours Impact Management Framework; and
- Workforce Accommodation and Workforce Management Framework.

The frameworks have been updated in the SIA Addendum to account for the amended project and the relevant components of the landowner negotiated agreements (refer Appendix S). The frameworks include mechanisms for monitoring the effect of the management measures in minimising likely social impacts and enhancing potential benefits.

One of the key actions outlined in the Near Neighbours Impact Management Framework to manage predicted social impacts in the PAA was the development of property specific management plans. As outlined above, this action has been substantially progressed since submission of the EIS. Regis is currently progressing negotiated agreements with 16 landholders including noise and visual mitigation. These agreements will include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force). In addition to these agreements, Regis has also offered five additional landholder visual mitigation agreements (one of which includes the voluntary acquisition clause).

Prior to the commencement of construction, a detailed Construction Workforce Accommodation Strategy (CWAS) will also be developed. The strategy will be prepared in consultation with BSC, Orange360, key accommodation providers and where necessary proponents of existing or new major projects in the Blayney LGA.

A Community Consultative Committee (CCC) was established for the project in late 2018 in accordance with the EARs and will continue to operate for the life of the project. The key role of the CCC will be to foster dialogue between Regis, the community and key stakeholders regarding the project. The CCC will aim to provide community members with a voice and will give Regis a structured process for addressing community interests and concerns.

Regis has progressed negotiations with Blayney Shire Council in relation to a VPA for the project since submission of the EIS. This VPA will be linked to the anticipated increase in demand on infrastructure and services of the mine development, which are only expected to occur in Blayney due to an increase in population, particularly during the first 18 months or so of the project as a result of an influx of construction workers.

The following additional management tools, as outlined in the EIS, will also be developed prior to the commencement of the project construction phase to manage potential social impacts and support the realisation of opportunities across the project life:

- Social Impact Management Plan;
- Stakeholder Engagement Plan;
- Corporate Volunteer Strategy;
- Local Content Plan;
- Indigenous Participation Plan; and
- Recruitment and Training Strategy.

6.14.3 Pipeline development

i SIA pipeline development study area

Table 6.48 SIA study area definition for the pipeline development

SIA study area component	
PAA	The PAA for the pipeline development is the area of land directly impacted by the pipeline corridor and includes land within the Bathurst and Lithgow LGAs and 2 km within the Blayney LGA. The pipeline development will directly impact 17 private landholders if the northern amended pipeline option is constructed and 17 private landholders if the southern pipeline option is constructed, plus landholders associated with Angus Place Colliery, Centennial Coal and Energy Australia. Lithgow City Council and the BRC and five crown entities (Forestry NSW, Roads and Maritime Services, Department of Fisheries, Department of Industry (Crown Land) and Railcorp).
SAA	Defined principally as the Bathurst and Lithgow LGAs (Figure 1). The main community of interest within the Bathurst LGA is the urban centre of Bathurst. The main communities of interest within the Lithgow LGA are Lithgow City, and the small localities of Blayney and Millthorpe, and the smaller townships of Portland and Wallerawang.

The pipeline PAA was the primary focus of the EIS SIA and SIA Addendum as the PAA is more likely to be impacted by the project.

ii Pipeline development amendments relevant to PAA

The revised pipeline route options and the revised location to pumping station No.3 have the potential to result in amenity and access impacts on different receivers to those identified in the EIS SIA.

The pipeline amendments will not change proposed to workforce size, employment or procurement arrangements or construction schedule and therefore the potential social impacts and opportunities associated with the pipeline development workforce as described in the EIS SIA (EIS Appendix T) remain valid for the amended project.

iii Amenity impacts

The amended section of the pipeline route has added some additional receivers to be considered in the noise and vibration assessment. The northern alignment is in proximity to a number of sensitive receivers (ie residential properties). The southern alignment is not, with only one receiver at the eastern end of this alignment option.

Considering both the northern and southern alignment options, a total of 329 receivers have been identified along the pipeline corridor that may be affected by noise from construction activities. Consistent with the findings of the EIS, a review of the results show that construction noise levels for transient activities have the potential to be above the relevant NMLs at most residential receivers in proximity to the work, although for the most part are expected to be only for a short duration (ie either one to two shifts or up to a few days).

There may be temporary impacts to amenity during the construction of the amended pipeline development due to temporary and short-term noise and vibration, dust and visual amenity impacts.

Operational noise emissions from the pump stations are anticipated to be negligible at adjacent receivers to each site, although this assumes some form of container or enclosure is adopted for each pump station.

iv Access impacts

As outlined in Section 6.12, traffic impacts associated with the construction of the pipeline development will be temporal and transitory. It is expected that crews working on the pipeline installation will be working on different sections along the 90 km pipeline corridor and therefore construction traffic generation is expected to spread geographically along the corridor with particular roads used as construction access routes for only a portion of the overall construction period.

The northern pipeline option runs along the Mid Western Highway for approximately 9 km and will include an underbore crossing to allow the pipeline to cross to the northern side of the highway. The pipeline will be installed via trenching outside of the road surface to minimise impacts on this important regional road. However partial lane closures may be required to facilitate construction activities and to allow construction machinery to move along the Mid Western Highway road corridor. Construction speed limits will also be implemented along the Mid Western Highway construction work. Temporary access interruptions to private property accessed from the Mid Western may occur for short periods.

A traffic management plan will be prepared as a subplan of the CEMP to manage traffic impacts during construction.

v Property and land use impacts

The southern pipeline route option will impact on an additional landholder not included in the EIS pipeline development. The northern pipeline option will impact on two additional landholders. The focus of the pipeline corridor selection process has been the minimisation of social and environmental effects. The alignment of the pipeline corridor was selected to minimise disruption to land uses, which included aligning with some existing easements and the use of roads and forestry tracks. Prior to the finalisation of alignments in this area, discussions were held with landowners and changes made to the alignment where possible based on their preferences, for example to reduce impacts to existing irrigation infrastructure.

vi Management and mitigation measures

There are no changes to the mitigation measures identified in the EIS to minimise potential social impacts during construction and operation of the pipeline development. These mitigation measures are contained in Appendix C.

6.14.4 Conclusion

The EIS SIA predicted a number of potential social impacts and opportunities associated with the project for the PAA and the SAA. EIS SIA assessment showed that the majority of impacts and the most significant social impacts accrue to residents in closest proximity to the mine project area (such as residents in Kings Plains).

The most significant change in social impacts between the EIS and the amended project relate to noise and the effect on rural amenity of the PAA. With respect to noise, the outcomes of the amended mine development for residential amenity are significantly better than the predicted outcomes documented in the EIS. These improved outcomes are a direct result of the revised mine development schedule and waste emplacement development schedule proposed as part of the amended mine development. These revisions achieved a reduction in predicted noise levels at nearby residences but have extended the construction timeframe for the southern amenity bund and subsequently the duration that some near neighbours are exposed to high visual impacts and diffuse lighting impacts.

Regis is currently progressing negotiated agreements with 15 landholders, including noise and visual mitigation measures. These agreements will include a clause that states landowners may request, in writing, that Regis acquire their interest in their land at any time within five years from the date that development consent is granted (provided that it remains in force). In addition to these agreements, Regis has also offered five additional landholder visual mitigation agreements.

The significant benefits of the project accrue largely to the broader Blayney LGA. The amended project is not predicted to change these predicted benefits as described in the EIS SIA. Importantly the amended project will not give rise to any new social impacts beyond those assessed in the EIS SIA.

As outlined in Chapter 20 of the EIS, the mine development will provide substantial direct and indirect employment opportunities, which will in turn provide a significant boost to the regional economy. The Blayney LGA in particular will benefit from investment in community infrastructure and services made possible through the VPA, investment in education and training as Regis seeks to build a local skill base to support labour supply for the project, project procurement spend as Regis is committed to supporting local businesses to participate in the project procurement process, and direct and indirect population growth.

The pipeline amendments will not change proposed to workforce size, employment or procurement arrangements or construction schedule and therefore the potential social impacts and opportunities associated with the pipeline development workforce as described in the EIS SIA (EIS Appendix T) remain valid for the amended project. However, the amendments change the receivers that will experience short term amenity impacts during construction of the project.

6.15 Economic assessment

6.15.1 Introduction

This chapter provides a summary of the results of an addendum economic impact assessment (EIA) prepared for the amended project, comprising both the mine and pipeline development, by Gillespie Economics (2020). The addendum EIA is provided in full in Appendix U.

The addendum EIA was prepared in accordance with *Guideline for the economic assessment of mining and coal seam gas proposals* (NSW Government 2015) and considers the efficiency of the amended project through a cost and benefits analysis (CBA). It focuses on the CBA of the amended project relative to the CBA reported in the EIS. The EIA prepared for the EIS also included a Local Effects Analysis (LEA); however, the amended project does not materially change the employment and expenditure driven components of the LEA, or the supplementary LEA, and so a revised LEA has not been undertaken. The externality component of the LEA is addressed as part of the CBA analysis of the amended project.

6.15.2 Cost benefit analysis

i Net production benefits

In comparison to the EIS project, the change in the production schedule associated with the amended project, and hence the magnitude and timing of some costs and revenues, will have some effect on the net production benefits associated with the amended project.

Table 6.49 provides a summary of the net production benefits to NSW of the EIS project and the amended project, holding all variables constant apart from those that change as a result of the revised production schedule and the reassessment of the environmental, social and cultural impacts.

As shown, the net production benefit of the amended project is estimated at $141 M present value at 7% discount rate. This has decreased by $2 M from the EIS and is due to the change in the production schedule as well as the timing and magnitude of revenues and costs. The higher capital costs and lower revenue associated with the amended project will be partly offset by lower operating, offset, compensation and mitigation costs.

It should also be noted that the forecasted gold price and exchange rate has increased since preparation of the EIA for the EIS. The CBA of the EIS project was based upon a gold price and AUD:USD exchange rate of USD 1,320 and 0.75, respectively. Since then, the forecasted gold price has increased considerably. Conservatively applying the average annual January 2020 (pre-COVID 19) forecasts of USD1,485 and an AUD:USD exchange rate of 0.71 to the amended project, the net production benefits would be significantly greater, at $247 M present value at 7% discount rate. (It is also noted that the latest average July gold price forecast (ie post COVID 19) was even higher at USD1,800.)

Table 6.49 Net production benefits to NSW of the EIS and amended project ($M Net Present Value at 7% Discount Rate)

Value	EIS ($M)	Amended project ($M)	Amended project with revised gold price ($M)
Royalties	$47	$46	$56
Company tax	$31	$33	$63
Net production surplus	$65	$63	$128
Total	**$143**	**$141**	**$247**

ii Indirect benefits

The amended project does not propose any change to employment levels. There will be no change to the originally assessed wage benefits of employment assessed at $32 M and the nonmarket benefits of employment assessed at $62 M. This estimate as presented in the EIS remains unchanged.

iii Environmental, social and cultural costs of the amended project

The environmental, social and cultural costs included in the capital costs of the amended project, as well as other costs not borne by Regis, and how these have changed with the amended project, are summarised in Table 6.50.

Table 6.50 Summary of environmental, social and cultural costs of the amended project

	EIS	Amended project	Difference
Cost to Regis			
Surface WALs	198 WAL units required at cost of $198,000	186 WAL units required at cost of $186,000	-$12,000
Groundwater WALs	905 WALs required at cost of $588,250	580 WALs required at cost of $377,000	-$211,250
Noise*: Significantly impacted receptors	None	None	Nil
Noise: Moderately impacted receptors	15 moderately impacted properties with mitigation costs at $240,000	1 moderately impacted property but mitigation being paid for 15 properties at cost of $750,000	+$510,000
Visual	69 impacted properties with mitigation costs at $840,000	69 impacted properties** with mitigation costs at $808,696	-$31,304
Biodiversity Offsets - mine and pipeline	$20,468,289	$16,576,356	-$3,891,933
Road transport	No adverse impacts on surrounding road network. Costs of the access intersection included in capital costs	No adverse impacts on surrounding road network. Costs of the alternative access included in capital costs	No material change in cost
Sub-total	***$ 22,334,539***	***$$18,698,052***	***-$3,636,487***
Other costs			
Aboriginal heritage	23 sites directly impacted by mine. 8 indirectly impacted by mine and 7 impacted by pipeline	27 sites directly impacted and 3 indirectly by mine. 7 impacted by northern pipeline option or 8 impacted by southern pipeline option	+4 sites impacted overall by the mine -7 sites indirectly impacted +1 impacted by southern pipeline option
Historic heritage	8 locally significant sites (1 with potential of higher significance) directly impacted, 4 indirectly impacted - cost of $2,207,197	13 locally significant sites directly impacted, 1 indirectly impacted - cost of $2,575,063	-1 site of potentially higher value impacted +3 reclassified from indirectly to directly impacted +3 indirectly impacted +$367,866

Table 6.50 Summary of environmental, social and cultural costs of the amended project

	EIS	Amended project	Difference
GHG	Damage costs of Scope 1 and 2 emissions to NSW - $28,343	Damage costs of Scope 1 and 2 emissions to NSW - $36,832	Additional emissions +$8,484
Sub – total	***$2,235,545***	***$2,611,895***	***+$376,351***
Total	**$24,570,084**	**$21,309,947**	**-$3,260,137**

*The costs to the amended project of noise mitigation far exceed those of just noise attenuation for individual properties. This includes mining equipment noise suppression costs, the pit amenity bund, keyway cut at pit exit, cost to place waste on mine schedule in a non-conventional manner, etc. Mining equipment noise suppression costs alone are estimated at around $10M.
**15 of these properties have already been accounted for under noise impacts mitigation costs.

Overall, the offset, mitigation and compensation costs associated with amended project have reduced. This reduction is incorporated into the estimate of net production benefits of the amended project. As summarised in Table 6.50, the following changes have occurred to the environmental, social and cultural costs, leading to an overall reduction in the total costs associated with the amended project:

- reduction in surface and groundwater impacts including associated costs;
- reduction in the number of properties moderately impacted by noise resulting from the amended project;
- increase in the overall cost of mitigation or compensation to properties relating to noise. This is as a result of the negotiated agreements Regis is committed to implementing with residents in Kings Plains in recognition of potential impacts in this regard; notwithstanding that the overall predicted noise levels for the amended project have reduced compared to the EIS;
- increase to overall cost of mitigation or compensation to properties visually impacted by the amended project;
- reduction in disturbance to biodiversity due to the amended mine design;
- increase in Aboriginal heritage sites impacted by the amended project due to the slight change in disturbance footprint and the change in assigning some impacts from indirect to direct (refer to Section 6.10);
- decrease in historic heritage sites impacted by the amended project, and specifically the avoidance of the potential historic heritage item Hallwood; and
- increase in GHG emissions resulting from the amended project.

iv Net social benefits to NSW of the amended project

Based upon the net production benefits, indirect benefits and environmental, social and cultural costs associated with the amended project, the net social benefit of the amended project is estimated to be $139 M net present value at a 7% discount rate. In comparison to the EIS project, this equals a decrease of $2 M, which is considered to hold no material difference.

As noted above, considering recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be significantly greater than estimated at $139 M. The adoption of conservative, contemporary gold price forecasts results in the net social benefit of the amended project increasing to $244 M present value (at 7% discount rate), as summarised in Table 6.51.

Table 6.51 Net social benefits of the amended project to NSW ($M Net Present Value at 7 Discount Rate)

Value	EIS ($M)	Amended project($M)	Amended project with revised gold price ($M)
Royalties	$47	$46	$56
Company tax	$31	$33	$63
Net producer surplus	$65	$63	$128
Sub-total	$143	$141	$247
Additional benefits			
Wage benefits to employment	$32	$32	$32
Non-market benefits of employment	$60	$60	$60
Economic benefits to existing landholders			
Economic benefits to suppliers			
Sub-total	**$92**	**$92**	**$92**
Environmental, social and cultural impacts			
Agriculture	Reflected in land costs which are included in opportunity costs of land and development costs		
Surface water	WAL unit cost included in development costs. No material residual impacts		
Groundwater	WAL unit cost included in development costs. No material residual impacts		
Air quality	No material impacts		
Noise and vibration	At receiver mitigation/compensation costs included in development costs. No material residual impacts		
Ecology and biodiversity	Some loss of values but offset. Cost of offsets included in development costs		
Aboriginal heritage	38 sites of stone artefacts impacted. Not quantified	39 sites of stone artefacts impacted. Not quantified	
Historic heritage	$2	$3	
Transport and traffic	No material impacts. Costs of access upgrade included in development costs		
Visual amenity	Cost of mitigation/compensation measures for impacted properties included in development costs		
Greenhouse gas	$0*	$0**	
Net public infrastructure costs	No material impacts		
Loss of surplus to other industries	No material impacts		
Total	**$2**	**$3**	
Net social benefits – including employment benefits	**$232**	**$231**	**$336**
Net social benefits – excluding employment benefits	**$141**	**$139**	**$244**

* cost of $28,348
** cost of $36,832

6.15.3 Conclusion

The amended project will bring significant net benefits to NSW and the local region. The addendum EIA concluded that the amended project has a similar net production benefit to the EIS project; that is $141 M present value (at 7% discount rate) compared to $143 M for EIS project. The higher capital costs and lower revenue associated with the amended project (relative to the EIS project) are partly offset by lower operating costs and lower offset, compensation and mitigation costs.

The net social benefit of the amended project to NSW is estimated at $139 M present value (at 7% discount rate) ($231 M with employment benefits included) compared to $141 M for the EIS project ($232 M with employment benefits included). The net social benefit of the amended project to NSW is therefore not materially different to the EIS project, and the project remains highly desirable and justified from an economic efficiency perspective.

However, with recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be much greater than estimated conservatively using the same gold price as the EIS. Adoption of conservative, contemporary gold price forecasts from January 2020, results in the net social benefit of the amended project increasing to $244 M present value (at 7% discount rate), and $336 M with employment benefits included.

6.16 Rehabilitation and closure

6.16.1 Introduction

A revised Rehabilitation and Landscape Management Strategy (EMM 2020i) has been prepared to present an updated strategy for the rehabilitation and closure of the mine development. The revised assessment is an addendum to the Rehabilitation and Landscape Management Strategy presented in the EIS (Appendix U) and is provided in full in Appendix T. This chapter summarises the main revisions to the strategy. The rehabilitation methods for the pipeline development presented in Chapter 35 of the EIS remains applicable to the amended development.

The proposed final land use for the amended mine development remains the same as that presented in the EIS, comprising a combination of grazing and woodland areas.

6.16.2 Final land use

Consistent with the EIS, a grazing land use is proposed across most of the rehabilitated mine development project area, with woodland proposed over the waste rock emplacement and the final void remaining a void. The rehabilitation objectives committed to in the EIS remain applicable to the amended project and the rehabilitation approach for the project continues to comprise the reinstatement of pre-mining land-uses as much as possible, while enhancing biodiversity values lost due to past agricultural clearing.

Rehabilitation will be undertaken progressively over the mine life, as shown in the staged mine plans included in Chapter 2 (Figures 2.3a to 2.3f).

As described in Section 6.2, the small amendments to the disturbance footprint mean that there are minor changes to the areas of various post-mining LSC class associated with the final landform. More LSC class 4 land will be re-established for the amended project, such that there will only be a loss of 3 ha of this class land compared to a loss of 12 ha associated with the EIS. The post-mining area of LSC class 5 remains the same, less land becomes LSC class 6 and class 8, and slightly more LSC class 7 land will be established (associated with the clean water diversions post-mining), compared to the EIS.

6.16.3 Final landform

The conceptual final landform for the amended mine development remains broadly the same to that presented in the EIS, as illustrated in Figure 2.4 in Chapter 2. Slight amendments have been made to reflect the changes to the site layout and disturbance areas. The main amendments include the following.

- Further detailed design has been undertaken on post-closure water management, particularly with respect to the TSF. The drainage of the TSF final landform has been integrated with the water diversions that will be constructed along the north-east, east and south-east of the TSF, to facilitate the safe and stable flow of rainfall runoff through the site.
- The ROM pad final landform has been softened compared to that presented in the EIS so that it blends better with the existing topography and is less visually intrusive. Micro-relief elements have also been added.
- The final height of the pit amenity bund has been reduced by approximately 20 m from that proposed in the EIS.

The conceptual final landform for the amended project is shown in Figure 6.51. Cross sections of the final landform have also been developed, as requested by the Resources Regulator, and are included as Figures 4.8, 4.9 and 4.10 in Appendix T.

i Waste rock emplacement

The overall conceptual landform of the waste rock emplacement remains effectively the same as that proposed in the EIS, with the exception of a small reduction in the footprint at the northern end. This area was included in the emplacement footprint as a contingency, should the swell factor of the waste rock be greater than anticipated. The expected waste rock volume has been refined by the more detailed mine design undertaken for the amended project. The result is that the required waste rock storage volume for the amended project, with some contingency still built in, is slightly less than that presented in the EIS. A stockpile of capping material has been included at the northern end of the waste rock emplacement, which will be removed during rehabilitation at the end of the operating mine life to cap the TSF.

While there is a small reduction in the footprint at the northern end of the waste rock emplacement, the design remains essentially the same such that the erosion and landform evolution modelling conducted for the EIS, and described in the EIS Rehabilitation Strategy, remains applicable to the amended project.

Soil stockpiles have been moved to the western side of the TSF to minimise the distance required for soil to be hauled in the rehabilitation phase for capping purposes. Waste rock for capping of the TSF will be sourced from the stockpile at the northern end of the waste rock embankment, from the Main WMF embankment which will be removed during closure works, and from material removed during establishment of the clean water diversions to the east.

ii Tailings storage facility

As described in Chapter 2, the TSF layout has been revised for the amended project, primarily to further enhance the robustness of the TSF landform in terms of surface water management during operations and post-closure. The overall objective of TSF rehabilitation will be to form the TSF such that runoff from the rehabilitated surface will report to the clean water diversion system located on the eastern extent of the TSF.

The post-closure drainage system of the amended TSF is illustrated in Figure 2.7 in Chapter 2. This system comprises a diversion channel around the north-east, eastern and south-eastern sides of the TSF. As described in Section 2.8, the EIS TSF design included a northern and eastern embankment, which have been realigned to enable the free draining of the clean water diversion system around the TSF upon closure. Some minor filling of the area on the northern side of the north-eastern embankment (CWF1A) post-closure will be required so that the area is free draining, enabling diversion of 100 percent of the upslope runoff in this catchment.

As described in ATCW (2020), the revised drainage design is generally a reversal of the landform drainage proposed in the EIS (refer to ATCW 2019). The benefits of this change are considered as follows:

- The post-closure drainage will be more centrally aligned within the catchment providing greater integration into the surrounding topography.
- The final landform will be formed to ensure no dead storage/ponding within the catchment, allowing the entire catchment to be reinstated post mining, although noting that some storage may be provided, within the applicable harvestable rights, as part of the closure planning for use in post-mining land use, such as agriculture.

CMW Geosciences (2020) considered the closure concept of the TSF in their expert review of the TSF, finding that:

> The closure concept is appropriate. Adequate planning has been performed that should ensure the closure outcomes are achievable.

Dr David Williams (2020) made the following comment in his expert review of the TSF design, including post-closure rehabilitation:

Their proposed tailings and water management accommodate well both operations and closure requirements, and their proposed cover will limit any uptake of contaminants from the tailings into the cover, prevent exposure of the tailings, and allow a post-closure grazing land use.

iii Final void

As described in Chapter 2, the final void associated with the amended project is slightly shallower, at 450 m, than the void presented in the EIS, which was 460 m. Figure 4.9 and 4.10 in Appendix T show cross sections through the final void. The results of the final void water balance remain the same as the EIS, with the final void predicted to reach an equilibrium level more than 9 m below the spill level, and an average equilibrium level approximately 14 m below the spill level (ie the final void is contained). Equilibrium levels will be reached very slowly over a period of more than 500 years.

6.16.4 Rehabilitation by domain

The proposed rehabilitation methods for each domain as described in the EIS Rehabilitation Strategy remain applicable to the amended project. Amendments are noted in the sections below.

a Domain 2 Tailings storage facility

Permanent revegetation of the TSF main embankment will be completed once the TSF embankment has reached maximum height around Year 5. This is a change from the EIS, where permanent vegetation would have been established on some of the TSF embankment by around Year 2, and is due to the change in construction of the TSF embankment in a number of stages in a series of downstream lifts as part of the amended project rather than the pyramid style construction presented in the EIS.

Soil will be stripped and stockpiled on both the eastern and western sides of the TSF, for respreading at the completion of tailings depositing and capping.

To tie into the post-closure water diversion system, amendments have been made to the tailings deposition locations (noting that the same subaerial deposition approach is proposed) to form the final surface such that it drains towards the east to discharge into the post-closure drainage system.

Additional capping material for covering the TSF at closure will be sourced from the stockpile of capping material at the northern end of the waste rock emplacement, the wall of the Main WMF and from excavation of the clean water diversion channel.

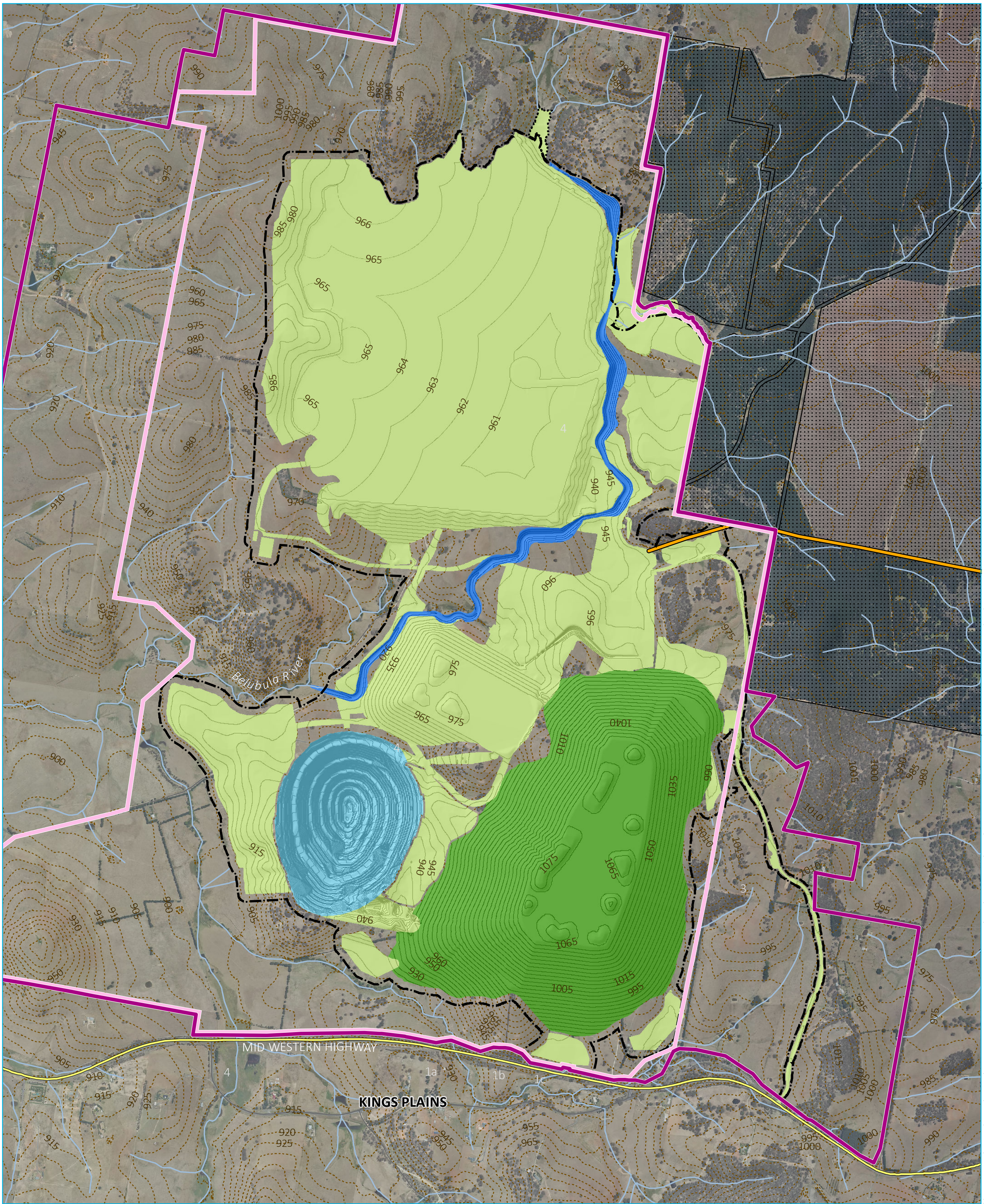
Anticipated seepage rates from the TSF were modelled by ATCW (2020), and show that seepage rates, which are extremely low to start with and peak at just 3.1 mm/m^2/year, will decrease even further over time. It is expected that capping of the TSF, grading the surface of the cap to the east, and establishment of an effective grass cover on the surface will significantly minimise the potential for seepage from the TSF.

Post-closure seepage management is described further detail in Section 6.4.

b Domain 3 Water management areas

As described above, the water management system has been revised as part of the amended project, and this domain has been updated accordingly in the rehabilitation and landscape management strategy.

The location of the southern end of the clean water diversion that extends around the eastern and south-eastern side of the TSF has been revised for the amended project to enable channel gradients more consistent with the natural gradients of the Belubula River. The diversion channel will be constructed to generally mimic natural geomorphological features consistent with appropriate reference reaches of the Belubula River and guided by *A Rehabilitation Manual for Australian Streams* (LWRRDC 2000) or current best practice natural channel design guideline.



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017)

GDA 1994 MGA Zone 55

KEY

Project application area
- Mine development project area
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Additional (post-closure) disturbance footprint
- Pipeline
- Mine plan contour (5 m); TSF contour (1 m)

Conceptual final landform elements
- Rehabilitated area (grazing)
- Rehabilitated area (open woodland)
- Clean water diversion
- Void

Existing environment
- Major road
- Minor road
- Watercourse/drainage line
- Existing contour (5 m)
- Vittoria State Forest

Conceptual final landform – amended project

McPhillamys Gold Project
Amendment report
Figure 6.51

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The amended design avoids the need for two large engineered drop structures associated with the EIS design, where the diversion entered the Belubula River downstream of the TSF. A bed level stabilised stock crossing and light vehicle/machinery crossing may be included in the design if deemed necessary for the post mining agricultural land use.

c Domain 5 Waste rock emplacement

Domain 5 also includes the pit amenity bund, which will be one of the first landforms to be constructed and rehabilitated so as to provide an effective noise bund to receptors south of the mine development project area.

A key change from the EIS with respect to the waste rock emplacement is the change to the construction sequence of the emplacement, as described in detail in Chapter 2, and the subsequent change in the planned progression of rehabilitation. The change in construction sequence, material movements and the reduced fleet proposed in the early years of the project (primarily to reduce noise impacts), mean that the southern face of the waste rock emplacement (ie the southern amenity bund) will take slightly longer to construct and therefore rehabilitate. This bund will be completed to its final landform height in around Year 6 of the project, rather than Year 4 as described in the EIS.

6.16.5 Rehabilitation methods for closure

The rehabilitation methods described in the EIS Rehabilitation Strategy remain applicable to the amended project.

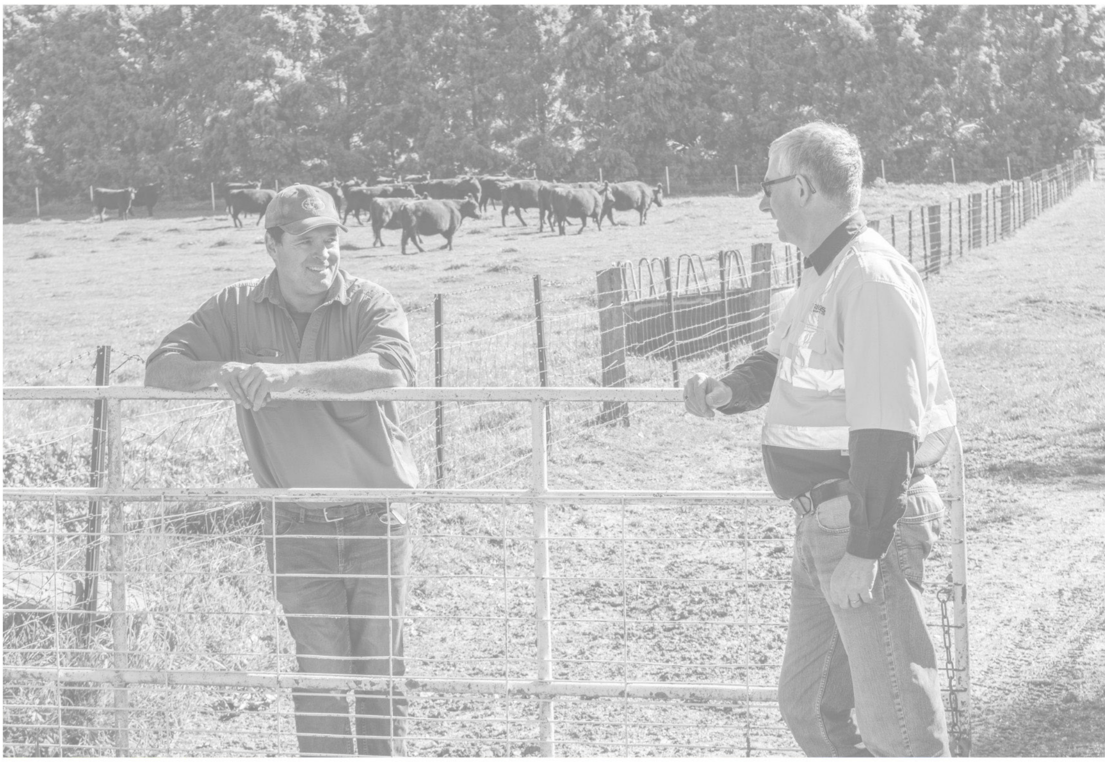
The soil balance has been updated to determine the availability of soil resources for rehabilitation of the amended disturbance footprint. This identified that soil is available across the mine development project area for stripping to a depth of approximately 0.60 m. Approximately 1,163,000 m^3 and 3,133,000 m^3 of topsoil and subsoil, respectively, is expected to be available for rehabilitation, based on an approximate 15 cm topsoil stripping depth and 45 cm for subsoil (ie approximate 60 cm stripping depth). These estimates will be confirmed before construction begins, but consistent with the EIS, they indicate there is adequate suitable topsoil and subsoil to construct the planned soil profiles.

6.16.6 Conclusion

The proposed 1,116 ha of disturbed land for mining and infrastructure use will be rehabilitated to a range of LSC classes, from class 4 to class 8. Consistent with the EIS, the majority of rehabilitation will target an agricultural (grazing) final land use, with woodland areas to be established over the waste rock emplacement. The upper slopes of the final void will be battered back to ensure a safe and stable landform remains post mining. A robust clean water diversion system will be instated so that post-closure, all upstream flows can continue downstream in the Belubula River catchment.

Chapter 7

Evaluation of merits



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7 Evaluation of merits and conclusion

This chapter provides an updated overall evaluation of the project, with regard to the strategic need for the project and its environmental, social and economic impacts.

7.1 Project design

7.1.1 Principles

Consistent with the principles of ecological sustainable development (ESD), the project has been designed to avoid and minimise impacts where possible. These principles were implemented through an iterative approach, supported by consultation with numerous technical specialists and government agencies. The design process has continued post lodgement of the EIS consistent with the objective of avoiding and minimising the impacts to the neighbouring residents of the mine and on identified environmental and social constraints as much as possible, while developing an efficient and viable mine plan that will enable flow on benefits to the local community. Since public exhibition amendments have focussed on matters raised in submissions received and as a result of discussions with key stakeholders.

7.1.2 Project amendments

As described in the EIS, the project design that was the subject of the original development application was the result of an ongoing and responsive design process, which accounted for the results of initial technical studies and consultation with stakeholders. This process was undertaken to achieve a project design that would enable the efficient extraction of the identified gold resource, environmental protection and socio-economic benefits. The alternatives considered and design changes made as part of the EIS compared to the preliminary environmental assessment design included:

- a reduction in the MLA area and site layout to avoid an area of potential BSAL that was identified in the western portion of the mine development project area;
- changes to the site layout, including moving the main administration area, mine support services and equipment laydown area from the western side of the open cut to the eastern side of the project area, north of the waste rock emplacement and in the vicinity of the processing plant and workshop;
- a western waste emplacement/amenity bund was removed altogether from the project;
- relocation of the main site access point off the Mid Western Highway;
- addition of a northern TSF embankment to minimise impacts on the EPBC Act listed Critically Endangered Ecological Community White Box Yellow Box Blakely’s Red Gum Woodland and Derived Native Grasslands (CEEC Box Gum Woodland) and to facilitate clean water diversion; and
- consideration of various tailings disposal options and location options to avoid and minimise environmental impacts from the project.

As mentioned above, since lodgement of the EIS, the design process has continued as part of ongoing design optimisation and in particular consideration of submissions received. The amendments have been described in detail throughout this Amendment Report, and in summary include:

- a new location for the site access intersection off the Mid Western Highway in response to feedback from TfNSW and to reduce impacts to neighbouring residential properties;
- revision of the mine schedule and the subsequent construction sequence of the waste rock emplacement to reduce predicted noise levels in Kings Plains, resulting in reduced early activity in the southern end of the mine development project area while extending the construction timeframe for the southern amenity bund;
- improved location of the primary exit ramps for haul trucks (which will reduce noise emissions for neighbouring properties);
- amendments to the TSF layout, including changes to the embankment design and construction timing, the TSF footprint and the TSF post closure landform to facilitate improved water management around the TSF;
- revision of the water management system, including the removal of the Secondary WMF from the water management system, resulting in an avoidance of impacts to an item of potential historic heritage significance (ie Hallwood). The size of the WMFs has also been revised to achieve a reduced likelihood of discharge from the storages within the operational water management system as part of a revised nil discharge design;
- revision of the mine administration and infrastructure area layout to further integrate into the surrounding natural topographical shielding in the area reducing its visibility;
- amendments to the pipeline route for a section of the corridor west of Bathurst, primarily in consideration of land access; and
- relocation of pumping station facility No.3 to improve the overall pipeline pressure gradient and its operations.

7.2 Strategic and statutory context

Given its significance to the State, the project is declared to be SSD under the provisions of the EP&A Act. Under the EP&A Act, the IPC is the consent authority for the project. Approval for the project is also required from the Commonwealth Minister for the Environment under the provisions of the EPBC Act.

The project involves a mining operation that will, consistent with the objects of the Mining Act, extract a State-owned resource for the benefit of the State of NSW, and will provide an estimated $56 million in royalties over the life of the mine.

The project is generally consistent with all relevant government policies and plans. As described in the EIS, the project is permissible with development consent under the EP&A Act. An assessment of the project against the provisions in relevant environmental planning instruments was undertaken in the EIS, which concluded that the project is able to be undertaken in a manner that is generally consistent with these instruments.

In relation to the strategic context relevant to the project's assessment and determination, world gold consumption is projected to continue to rise at an annual rate of 2.1 per cent, to 4,712 tonnes in 2025, as lower gold prices boost jewellery demand and retail investment (Office of the Chief Economist March 2020). As described further in Chapter 3, gold is a safe haven asset in uncertain times. The current global downturn is affecting commodities in a wide variety of ways, but the overall export outlook for Australia is still relatively strong. This is particularly true for gold, with the recent revised forecast export earnings for Australia confirming that gold is set to continue to be a strong performer, with prices surging to an 8-year high and export earnings now on track to set a new record (of almost $32 billion) in 2020-21 (Office of the Chief Economist June 2020).

At a local level, the project is consistent with the objectives and key priorities set in the Regional Plan for the Central West and Orana Regions (DPE 2017), which include continuing to grow and support the mining sector. Mining was identified as one of the top three economic opportunities for the Blayney and Cabonne LGAs.

7.3 Impacts of the project

The project is expected to have a range of impacts, both positive and negative.

The EIS recognised that the residual impacts of the project will mostly accrue to residences closest to the mine development project area, particularly in the settlement of Kings Plains, and many of the submissions received on the project reflected this. As described above, substantial amendments have therefore been made to the project to specifically address these concerns and reduce the potential impacts on this community. Notably, predicted noise levels have substantially reduced compared to those associated with the EIS design, such that only one property (R28a) is predicted to experience noise levels 3 dB above the project specific noise criteria, compared to 15 in the EIS.

Notwithstanding, Regis is committed to, and is actively progressing, the negotiation of agreements with the landholders identified in the EIS in Kings Plains, plus the additional receiver R28a (where there is an approved DA to build a residential property) and R15 which is close to the new mine site access intersection location on the Mid Western Highway. The negotiated agreements include tailored landscape plans for each individual property, as well as the inclusion of a clause granting the landholder the option to request Regis purchase their property within five years of the date of development consent (providing the consent remains in force). Regis is also negotiating agreements (without the option to purchase clause) with a further five landholders in recognition of the visual impacts these properties will experience.

Further mitigation measures for residual impacts have been proposed particularly for noise, air, visual amenity and biodiversity, so that these residual impacts can be reduced to, or maintained at, an acceptable level (refer to Appendix C). Regis has purchased a property which will be secured under a stewardship agreement to effectively offset the biodiversity impacts of the project. With regards to visual amenity, it is acknowledged that the southern amenity bund will take longer to build as part of the amended project, which is due for completion in around Year 6 compared to Year 4 in the EIS, extending the visual amenity impacts related to views of active earthworks to residents south of the mine development project area. The longer construction timeframe is due to reduced equipment numbers and the change in the waste emplacement schedule to achieve a reduction in noise emissions. On balance, the large improvement in noise impacts is considered a significant benefit of the amended project. As described above tailored landscape and mitigation plans are being developed with individual landholders to appropriately mitigate the change in views that will result from the amended project.

In relation to water resources, the project will use excess water from mining and power generation operations in the Lithgow area as its primary raw water supply, meaning the project will not rely on intercepting water from the local catchment; rather, it will beneficially re-use otherwise excess water. Adequate groundwater entitlements are available, and there is a reasonable prospect of obtaining the required available surface water licences to account for the project’s interception of water. Again, the capture of surface water is relatively small due to the project design. The TSF design, which was raised in numerous submissions, has undergone two expert reviews, concluding the design is appropriate for the site and is consistent with leading best practice.

7.4 The public interest

The project will provide a range of direct and indirect benefits to the local, regional and State economies over its 15 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, the project operation will contribute up to 788 direct and 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 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.

For the project to be questionable from an economic efficiency perspective, all residual environmental impacts would need to be valued at greater than the total net production benefits that will accrue to NSW.

The economic assessment of the amended project clearly indicates that it will provide a net benefit to NSW. With the adoption of conservative, contemporary gold price forecasts (USD 1,485 and AUD:USD 0.71), the net social benefit to NSW is estimated at $244 M present value (at 7% discount rate) and $336 M with employment benefits included. Demand for gold, and hence 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.

Regis is an Australian listed gold miner with a proven record of developing gold mining operations and is one of the top five Australian gold companies by market capitalisation and production. Regis has established a local office in Blayney and is committed to making a positive contribution to the local community. The Blayney LGA in particular will benefit from the project as a result of investment in community infrastructure and services made possible through a VPA, investment in education and training as Regis seeks to build and augment a local skills base to support labour supply for the project, and project procurement spend as Regis is committed to supporting local businesses to participate in the project procurement process.

In response to submissions received, project amendments have been made to address concerns raised. Through the implementation of proposed mitigation, management and offsetting measures, the EIS and this Amendment Report demonstrates that the project can be undertaken without any significant long term impacts on the local environment. As such, the project is considered to be in the public interest.

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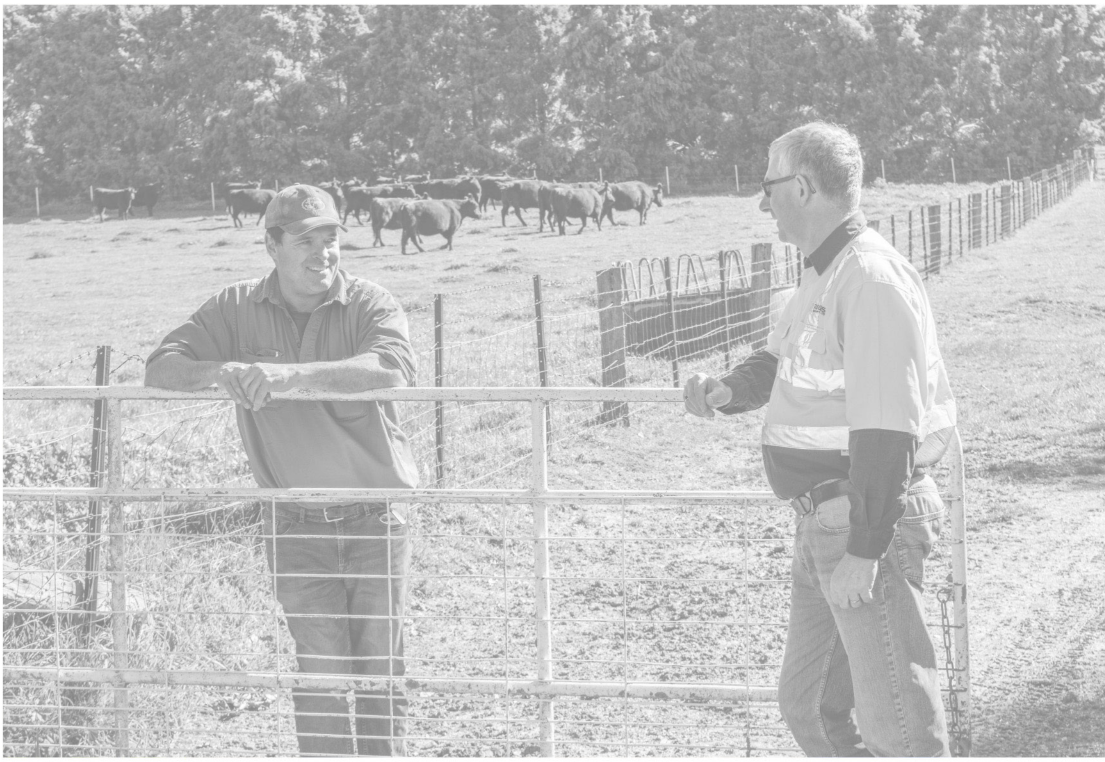

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Abbreviations

ACHA	Aboriginal cultural heritage assessment
ACHMP	Aboriginal cultural heritage management plan
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AIP	Aquifer Interference Policy
AIS	Agricultural Impact Statement
AMA	Ancillary mining activity
ANE	Ammonium nitrate emulsion
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZMEC	Australian and New Zealand Minerals and Energy Council
APZ	Asset Protection Zone
ASC	Australian Soil Classification
ASS	Acid sulfate soil
BAL	Basic left turn
BAM	Biodiversity assessment method
BAR	Biodiversity assessment report
BC Act	NSW *Biodiversity Conservation Act 2016*
BCD	NSW Department of Planning, Industry and Environment, Biodiversity and Conservation Division
bcm	Bank cubic metres
BDAR	Biodiversity development assessment report
bgl	Below ground level
BHPG	Belubula Head Waters Protection Group
BoM	Bureau of Meteorology
BOS	Biodiversity offset scheme
BSAL	Biophysical strategic agricultural land
CAR	Corrective action requests
CBA	Cost benefit analysis
CCC	Community Consultative Committee
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
CHMP	Cultural heritage management plan
CIL	Carbon in leach
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTMP	Construction Traffic Management Plan
CWF	Clean water facility
CWMF	Construction water management facility
DA	Development application
Dams Safety Act	NSW *Dams Safety Act 1978*
DAWE	Department of Agriculture, Water and the Environment
DEL	Average delay per second
DSC	Dans Safety Committee
dB(Z), dB(L)	Decibels Z-weighted (Z) or linear (L)
DEC	NSW Department of Environment and Conservation (former)

DoEE	Commonwealth Department of the Environment and Energy
DoS	Degree of saturation
DPE	NSW Department of Planning and Environment (now DPIE)
DPIE	NW Department of Planning, Industry and Environment
DPI	NSW Department of Primary Industries
DPIE Water	NW Department of Planning, Industry and Environment – Water
DRG	NSW Division of Resources and Geoscience (now Mining, Exploration and Geoscience)
DSC	Dams Safety Committee (now Dams Safety NSW)
DSE	Dry sheep equivalent
EA	Energy Australia
EC	Electrical conductivity
EEC	Endangered ecological community
EIS	Environmental impact statement
EL	Exploration lease
EMM	EMM Consulting Pty Limited
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW *Environmental Planning and Assessment Regulation 2000*
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environment protection licence
ESD	Ecologically sustainable development
FBA	Framework for Biodiversity Assessment
FM Act	NSW *Fisheries Management Act 1994*
FTE	Full time equivalent
GADDC	Guidance on the Assessment of Dust from Demolition and Construction
GDE	Groundwater dependent ecosystem
GDP	Gross domestic product
GHG	Greenhouse gas
GIS	Geographic information system
HGL	Hydrogeological landscape
IAQM	Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation of Australia
ICNG	Interim Construction Noise Guideline
Interim Protocol	Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land
IPC	Independent Planning Commission
kg	Kilograms
kL	kilolitres
kV	Kilovolts
LEA	Local effects analysis
LEP	Local environmental plan
LFN	Low frequency noise
LGA	Local government area
Local Government Act	NSW *Local Government Act 1993*
LoS	Level of service
LPG	Liquefied petroleum gas
LSC	Land and soil capability
Mbcm	Million bank cubic metres

m bgl	Metres below ground level
MDB	Murray Darling Basin
mg	Milligrams
MIC	Maximum instantaneous charge
Mining Act	NSW *Mining Act 1992*
Mining SEPP	*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
ML	Megalitres
MLA	Mining lease application
Mlcm	Million loose cubic metres
mm	Millimetres
MNES	Matter of national environmental significance
MOP	Mining operations plan
MPPS	Energy Australia's Mount Piper Power Station
Mt	Million tonnes
Mtce	Metric tonnes carbon equivalent
Mtpa	Million tonnes per annum
MW	Megawatts
NAF	Non-acid forming
NGAF	National Greenhouse Accounts Factors
NGERS Act	Commonwealth *National Greenhouse and Energy Reporting Act 2007*
NML	Noise management level
NMP	Noise management plan
NpfI	NSW Noise Policy for Industry
NPV	Net present value
NSW	New South Wales
NPW Act	NSW *National Parks and Wildlife Act 1974*
NVIA	Noise and vibration impact assessment
OEH	Office of Environment and Heritage, now the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment (BCD)
OEMP	Operational environmental management plan
oz	ounces
PAA	Primary assessment area used for the social impact assessment
PAF	Potentially acid forming
PCT	Plant community type
PEA	Preliminary Environmental Assessment
PHA	Preliminary hazard analysis
Pipelines Act	NSW *Pipelines Act 1967*
PM	Particulate matter
PM_{10}	Fine particulate matter 10 microns in diameter or less
$PM_{2.5}$	Fine particulate matter 2.5 microns in diameter or less
PMST	Protected Matters Search Tool
POEO Act	NSW *Protection of the Environment Operations Act 1997*
ppm	Parts per million
PNTL	Project noise trigger level
PVC	Primary view catchment
RAA	Regional assessment area

RAP	Registered Aboriginal party
RBL	Rating Background Level
Regis	Regis Resources Ltd
RFS	NSW Rural Fire Service
RMS	NSW Roads and Maritime Services
RNP	Road Noise Policy
RO	Reverse osmosis
Roads Act	NSW *Roads Act 1993*
ROM	Run of mine
Rural Fires Act	NSW *Rural Fires Act 1997*
RWMF	Raw water management facility
SAA	Secondary Assessment Area (used in the social assessment)
SCSO	Centennial Coal's Springvale Coal Services Operations
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SISD	Safe intersection sight distance
SIA	Social impact assessment
SSD	State significant development
SSM	Sustainable Soil Management
TAFE	Technical and Further Education
TDS	Total dissolved solids
TEC	Threatened ecological community
TfNSW	Transport for NSW
TN	Total nitrogen
TP	Total phosphorus
tph	Tonnes per hour
TSP	Total suspended particles
TSF	Tailings storage facility
TSS	Total suspended solids
TTA	Traffic and transport assessment
UC	Unclassified
VIA	Visual impact assessment
VLAMP	Voluntary Land Acquisition and Mitigation Policy
VPA	Voluntary planning agreement
WAD	Works Authorisation Deed
WAL	Water Access Licence
Water Act	NSW *Water Act 1912*
WHO	World Health Organisation
WM Act	NSW *Water Management Act 2000*
WMF	Water management facility (dam)
WMP	Water management plan
WQO	Water quality objectives
WSP	Water sharing plan

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