McPhillamys Gold Project
Submissions Report

Prepared for LFB Resources NL
{ŜLJúŜYōŜN 2020

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McPhillamys Gold Project

Submissions Report

Report Number

J180395 RP#9

Client

LFB Resources NL

Date

3 September 2020

Version

Final

Prepared by	**Approved by**
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3 September 2020	3 September 2020

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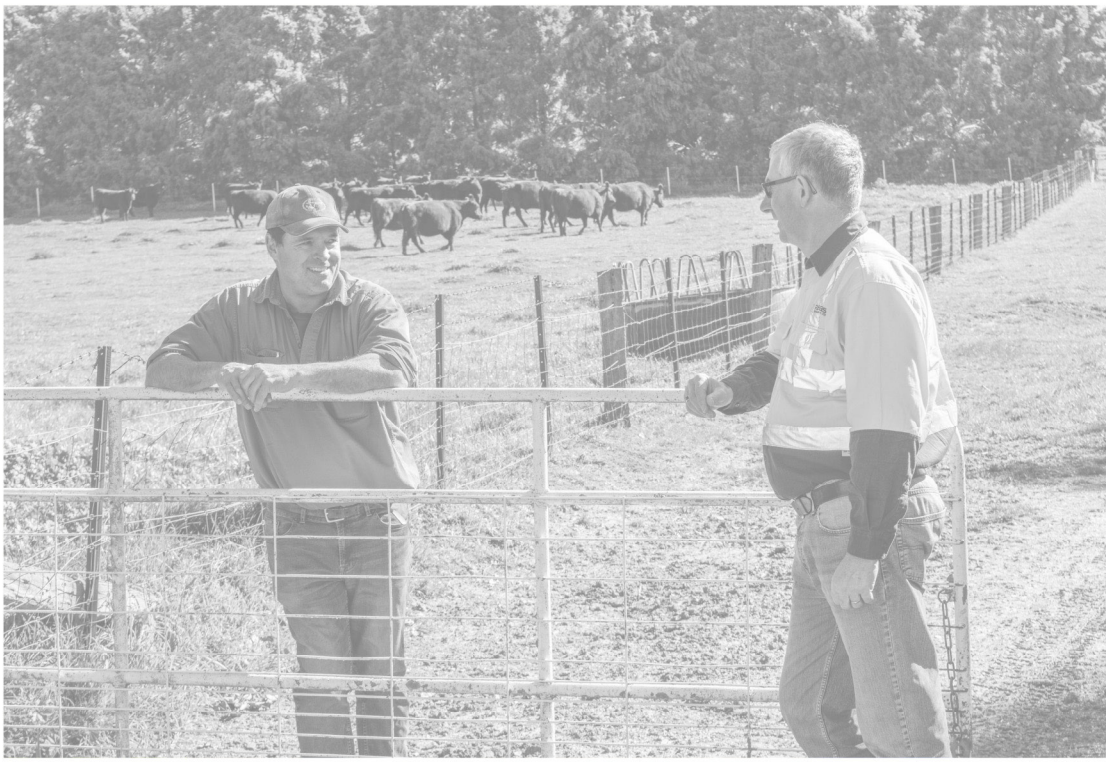
Chapter 1

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 proposed greenfield open cut gold mine and associated water supply pipeline in the Central West of New South Wales (NSW), as shown on Figure 1.1. LFB Resources NL is a 100% owned subsidiary of Regis Resources Limited (herein referred to as Regis). The project comprises two key components:

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

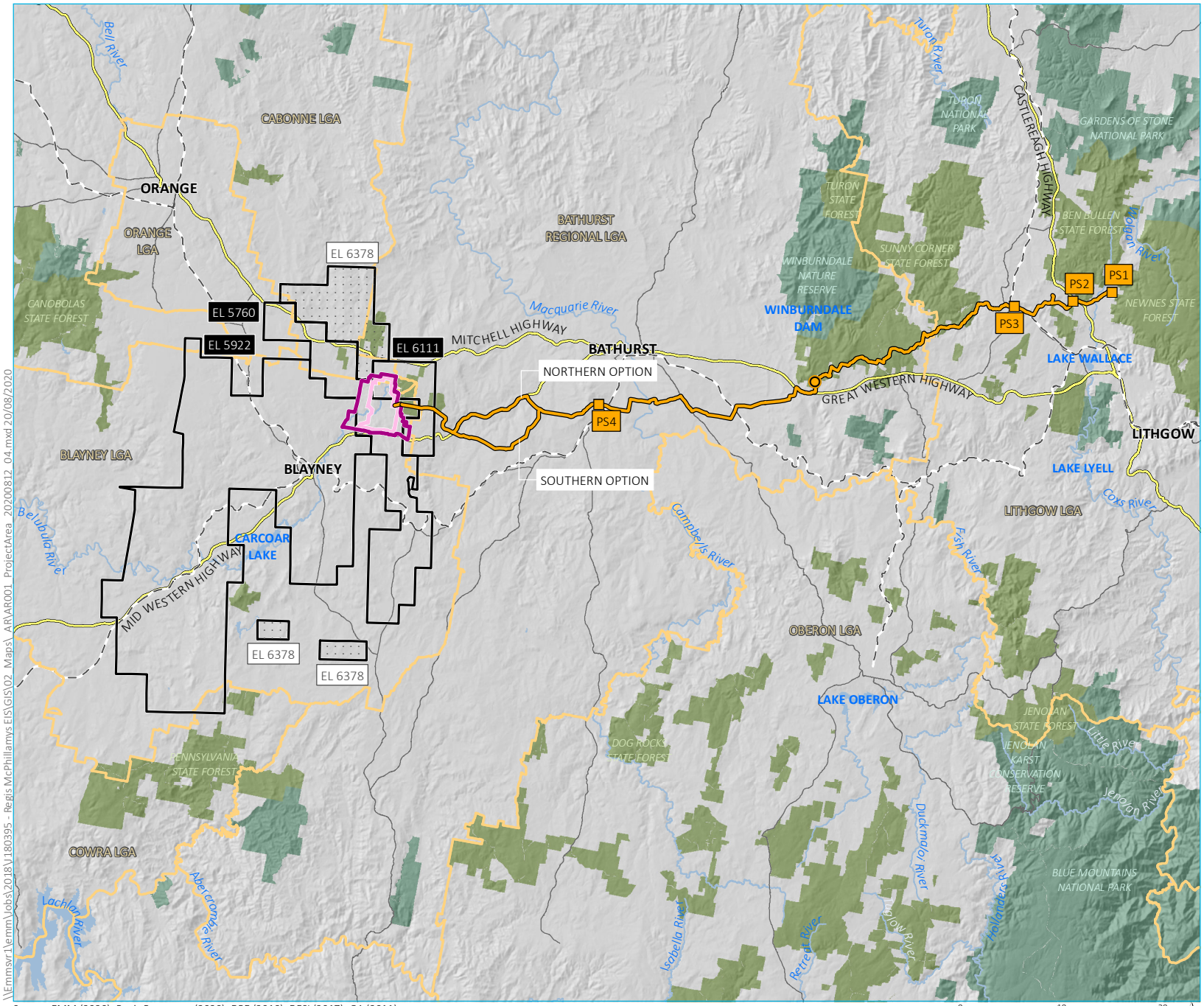
The mine development is approximately 8 kilometres (km) north-east of Blayney within the Blayney and Cabonne local government areas (LGAs) (refer to Figure 1.2). This locality has a long history of alluvial and hard rock mining, with exploration for gold and base metals occurring since the mid to late 19th century.

The project life for which approval is sought is 15 years, which will include construction, operation, and closure and rehabilitation works. The mine development comprises a single circular open cut pit, developed by conventional open cut mining methods including drill, blast, load and haul operations. The mine development will also include a conventional carbon-in-leach processing facility, waste rock emplacement area, a tailings storage facility (TSF), water management infrastructure, and general mine infrastructure.

Water will be supplied to the mine site via an approximate 90 km long pipeline, transferring surplus water from Centennial Coal's Angus Place Colliery (Angus Place) and Springvale Coal Services Operations (SCSO), and Energy Australia's Mount Piper Power Station (MPPS) near Lithgow, to the mine (the pipeline development). This development will include approximately four pumping station facilities, a pressure reducing system and a communication system, to enable the pipeline to transfer up to 15.6 megalitres (ML) per day to the mine development for use in mining and processing operations.

The product of the mine will be gold doré in the form of unrefined gold bars. Up to 8.5 Million tonnes per annum (Mtpa) of ore will be extracted and up to 7 Mtpa processed during the project life, producing approximately 200,000 ounces, and up to 250,000 ounces, per annum of product gold. Gold is used in a variety of applications, such as in jewellery, as an investment instrument for governments, central banks and private investments, in the electronics industry, in medial and dentistry applications, and as globally backed exchanged traded funds.

Australia is the second largest producer of gold in the world, and therefore plays an essential part in meeting the global demand for gold. Gold demand and price are projected to continue rising over the next five years, as gold's status as a safe haven asset boosts investor demand over the short term, and at the same time as world mine supply declines as some long and large established mines in Australia and other major gold producing countries reach the end of their mine life. To offset this decline in production, new mines will need to come online. This project is one of these potential operations.



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

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

0 10 20 km

GDA 1994 NSW Lambert

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Regional setting – project application area

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Figure 1.1

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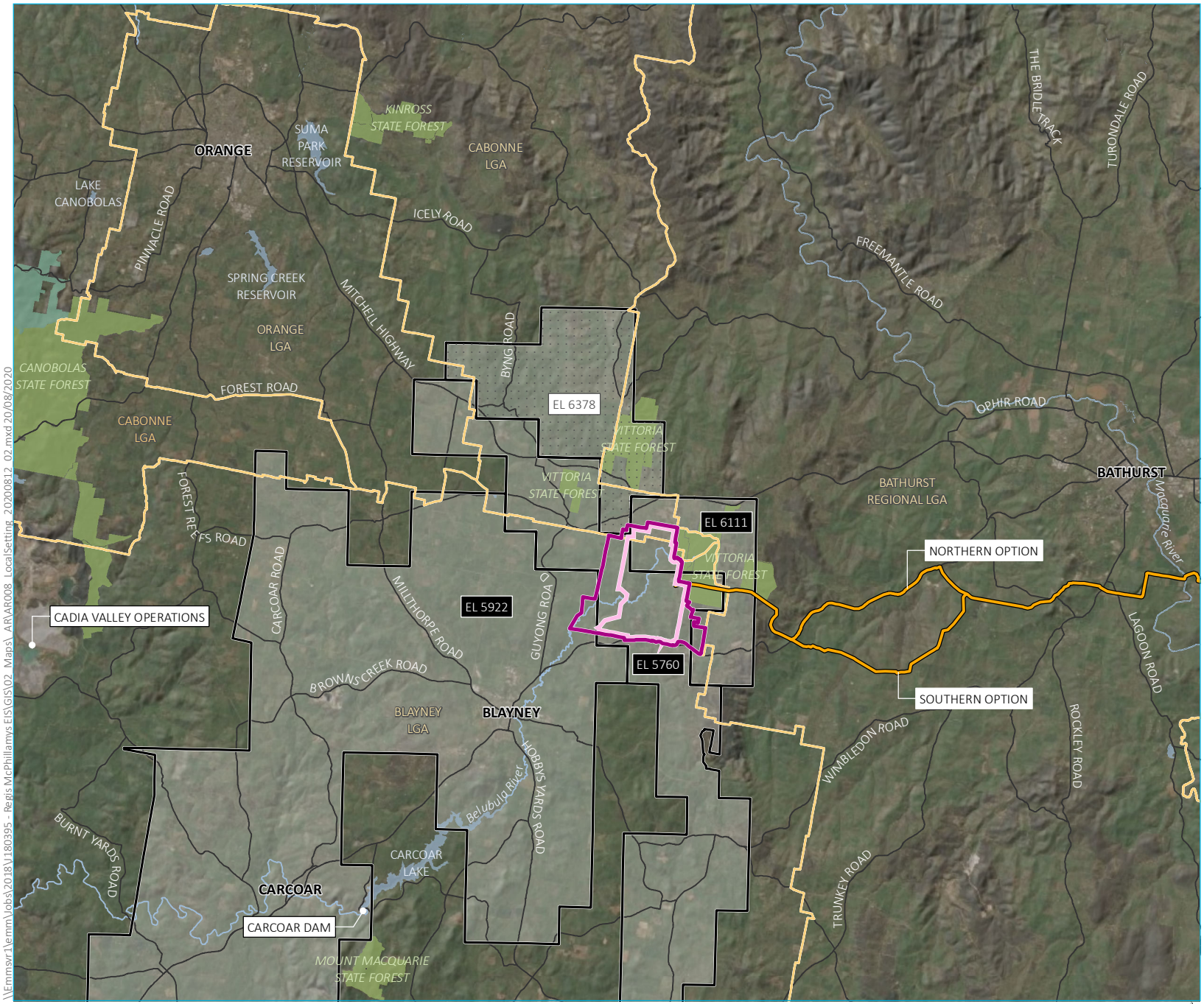

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Source: EMM (2020); Regis Resources (2020); DFSI (2017); GA (2011)

Local setting of the mine development

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Figure 1.2

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1.2 Approval process

Two major planning approvals are required for the project. The first is State significant development (SSD) consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The second is an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A preliminary environmental assessment (now referred to as a Scoping Report) was submitted to the NSW Department of Planning, Industry and Environment (DPIE) in July 2018. The Secretary's environmental assessment requirements (SEARs) (SSD 9505) were subsequently issued for the project on 19 December 2018. The mine development was also declared a controlled action on 28 May 2019 by a delegate of the Commonwealth Minister. Accordingly, the Secretary of DPIE issued supplementary SEARs to address matters of national environmental significance relevant to the mine development on 30 May 2019.

The development application (DA) for the project and accompanying environmental impact statement (EIS) was submitted to the DPIE and then publicly exhibited for six weeks, from 12 September 2019 to 24 October 2019.

A total of 671 submissions were received during the public exhibition period, including 624 submissions from the community (consisting of 474 unique submissions and 150 form letters), 27 from organisations, and 20 from public authorities. A detailed analysis of the submissions, including matters raised, is provided in Chapter 2.

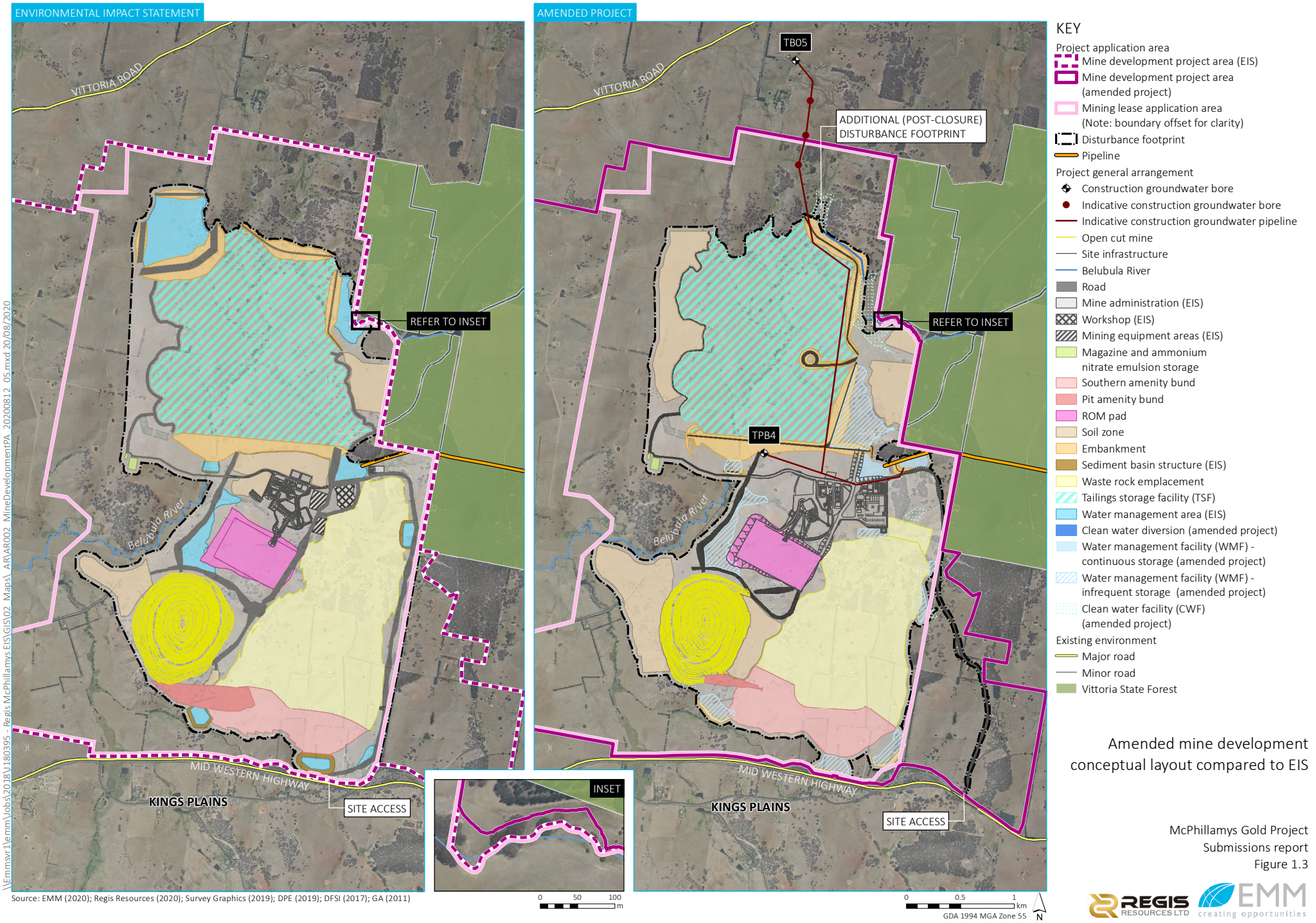
1.3 Project amendments

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. Issues raised in submissions included concerns relating to offsite amenity impacts (such as noise, air quality and visual amenity), potential impacts to water resources, the TSF, impacts to surrounding land uses such as agriculture, and potential impacts to biodiversity.

By amending the project, Regis has sought to address and where possible, resolve matters raised in submissions in order to reduce the overall impacts of the project. For instance, 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. Changes have deferred activity in the southern waste rock emplacement area and smoothed the level of activity occurring adjacent to the southern boundary of the mine development project area, with the aim of further reducing the potential noise related impacts to the residences of Kings Plains.

Other changes made to the project include amendments to the layout of the TSF, revision of the water management system, a change to the location of the mine site access intersection with the Mid Western Highway, and some alterations to 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 and a change to the location of pumping station facility No 3.

The amended mine development layout, compared to that assessed in the EIS, is shown in Figure 1.3 and the amended pipeline development layout is shown in Figure 1.4. An Amendment Report (EMM 2020a) has been prepared to outline the changes that have been made since the public exhibition of the EIS, as well as to present an updated assessment of the impacts and benefits of the project, as amended. Further discussion on amendments made to the project is provided in Chapter 3.



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

Amended mine development conceptual layout compared to EIS

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Figure 1.3

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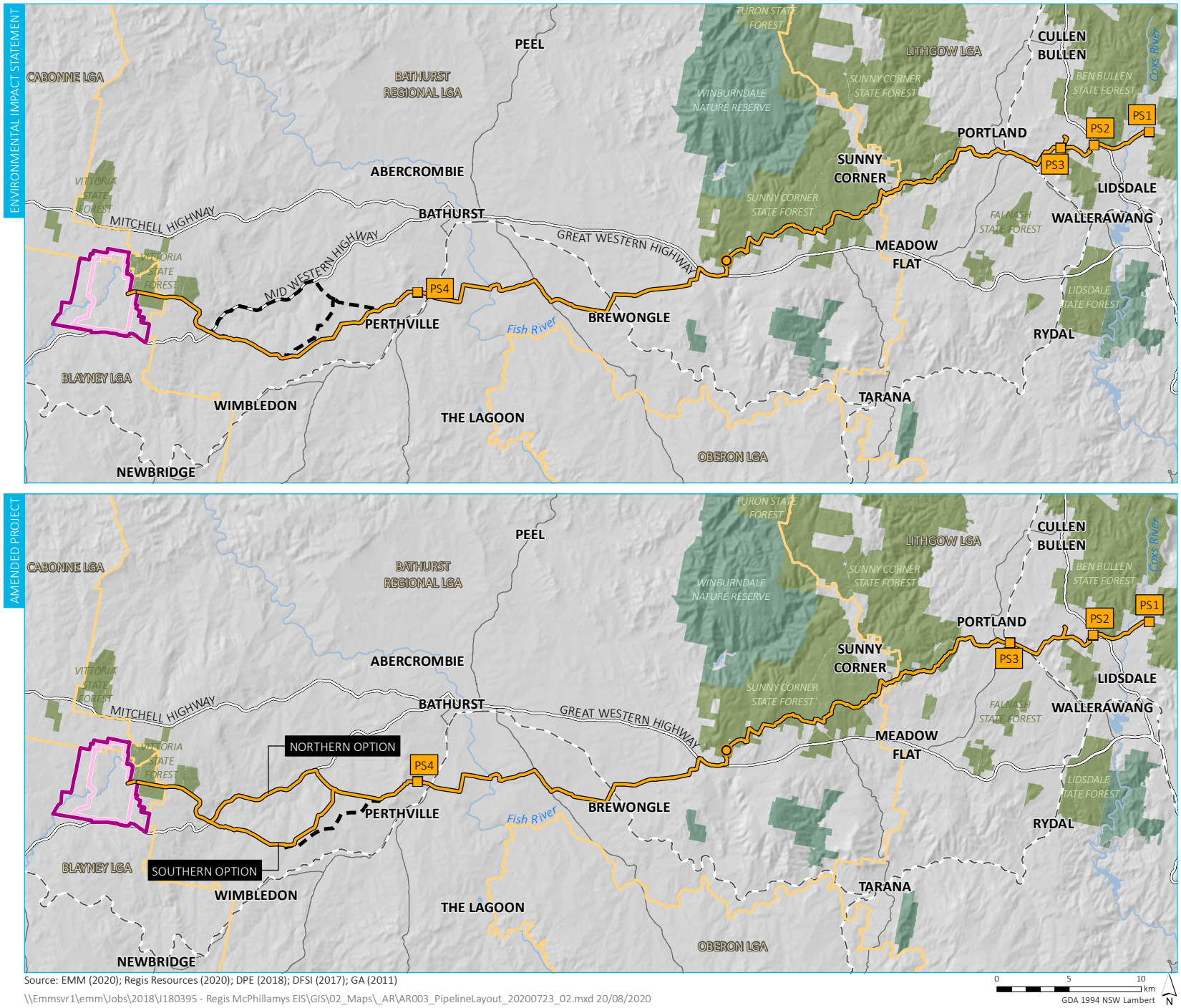

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Amended pipeline development conceptual layout compared to EIS

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Figure 1.4

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1.4 Purpose of this report

The DPIE requested Regis prepare and submit a Submissions Report, detailing responses to issues raised, in correspondence to Regis dated 12 November 2019. Accordingly, this report has been prepared pursuant to clause 82(2) of the NSW *Environmental Planning and Assessment Regulation 2000* and in accordance with the draft DPIE document *Guidance for State Significant Projects - Preparing a Submissions Report June 2019* (DPIE 2019). The purpose of this document is to consider and respond to submissions made by various public authorities, organisations, and the community, in relation to the EIS for the project.

This report also describes the additional activities undertaken relating to the project since exhibition of the EIS, including a summary of project amendments, further technical studies undertaken, and stakeholder and community engagement activities that Regis carried out during the exhibition period, and which the company continues to undertake.

This Submissions Report should be read in conjunction with the Amendment Report (EMM 2020a), which describes in full the project for which approval is sought and has been prepared and submitted in conjunction with this report.

1.5 Document structure

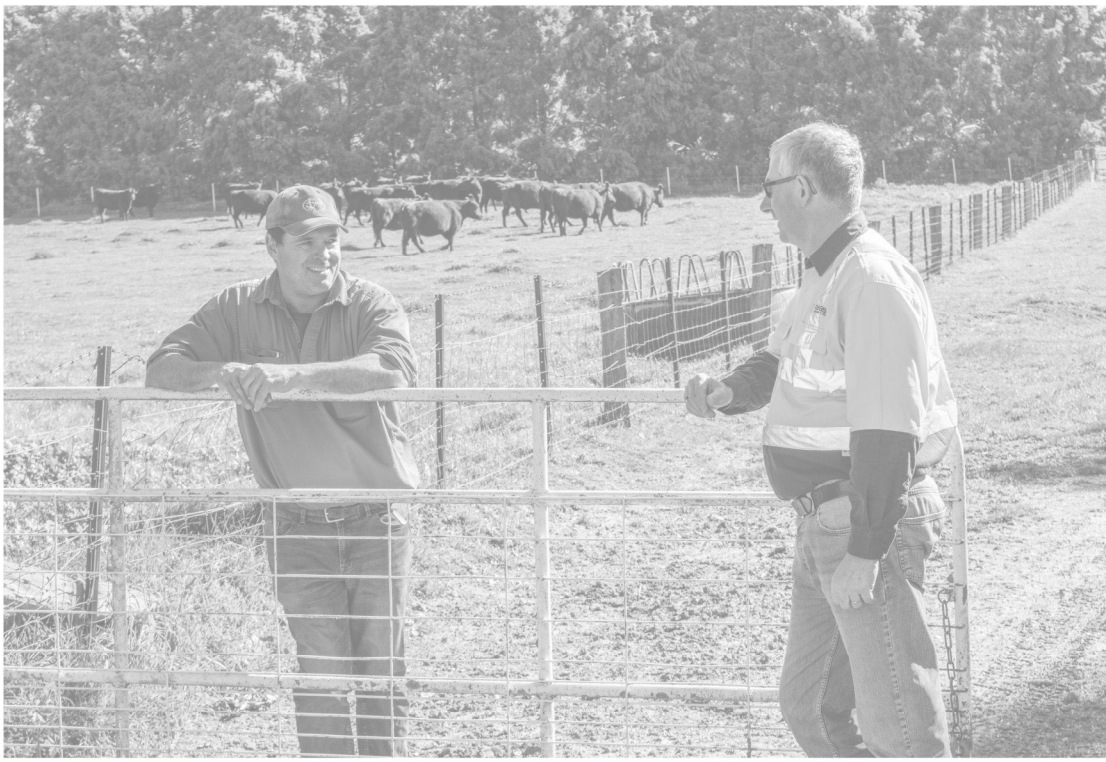
The Submissions Report consists of the main document and supporting appendices and is structured as follows:

- **Chapter 1 – Introduction**: Introduces the project, including providing an overview of the project, information about the project history, approval process, and the purpose and structure of this report.
- **Chapter 2 – Analysis of submissions**: Provides a detailed summary of the submissions received on the project, including from where the submissions were received, and the key issues raised.
- **Chapter 3 – Actions taken since exhibition**: Describes the activities undertaken by Regis since exhibition of the EIS, including the project refinements, additional technical studies and stakeholder engagement activities undertaken.
- **Chapter 4 – Response to Government agency submissions**: Provides responses to matters raised by government agencies in their submissions on the EIS and the accompanying technical studies undertaken for the project.
- **Chapters 5 – Response to community and organisation submissions**: Provides responses to matters raised by community members and organisations on the EIS and the accompanying technical studies undertaken for the project.
- **Chapter 6 – Updated evaluation of merits.**
- **Appendices**: The appendices to the Submissions Report which support the main document:
    - Appendix A – Submissions summary;
    - Appendix B – Register of submitters;
    - Appendix C – Surface Water-Groundwater Interaction Assessment (EMM 2020b;
    - Appendix D – Potential Impact on European Honey Bees and Local Honey Production (enRiskS 2020a);
    - Appendix E – Health Impact Assessment (enRiskS 2020b);

- Appendix F – Response to DPIE – Hazards' Queries for the McPhillamys Mine Proposal;
- Appendix G – Tailings disposal options (Regis 2020a); and
- Appendix H – Gold processing options (Regis 2020b).

Chapter 2

Analysis of submissions



REGIS RESOURCES LTD

2 Analysis of submissions

2.1 Exhibition details

The EIS was publicly exhibited from 12 September 2019 to 24 October 2019 at the following locations:

- Blayney Shire Council Chambers;
- Cabonne Council Chambers;
- Bathurst Regional Council Chambers;
- Lithgow City Council Chambers;
- Regis Resources Blayney Office;
- Nature Conservation Council office (14/338 Pitt Street, Sydney) – electronic copy only; and
- NSW Service Centres (electronic copies only).

The EIS was also available for review online on DPIE's Major Projects planning portal.

Hard copies and/or USBs with electronic copies were also made available to Orange City Council, members of the project's Community Consultative Committee (CCC), near neighbours and the broader community.

2.2 Overview of submissions

Following the public exhibition of the EIS, 671 submissions were received by DPIE. Of these, 624 submissions were from the community (consisting of 474 unique submissions and 150 form letters), 27 from organisations, and 20 from public authorities. Approximately 250, or 52%, of the unique community submissions came from the Blayney LGA where the mine development is located, and of these, 52% were in support and 46% objected, with a further 2% providing comments on the project.

Submissions are available to view on DPIE's website at the link below.

https://www.planningportal.nsw.gov.au/major-projects/project/9821

A breakdown of the submissions is provided in Table 2.1.

Table 2.1 Summary of submissions received

Source/type	Objects	Supports	Comment	Total
Government	-	-	20	20
Community (unique)	233	231	10	474
Community (form letter)	149	1[1]	-	150
Organisations	18	7	2	27
Total	**400**	**239**	**32**	**671**

1. Classified as support; however, likely misclassified.

The following NSW Government agencies provided submissions:

1. Bathurst Regional Council;
2. Blayney Shire Council;
3. Cabonne Council;
4. Crown Lands NSW (CLNSW);
5. Dams Safety NSW (DSNSW);
6. DPIE – Biodiversity and Conservation Division (BCD) (formerly Office of Environment and Heritage);
7. Forestry Corporation of NSW (FCNSW);
8. Heritage Council of NSW (HCNSW);
9. Lithgow City Council;
10. NSW Department of Primary Industries (DPI);
11. NSW DPIE - Division of Resources & Geoscience (DRG) (now Mining Exploration and Geoscience (MEG));
12. NSW DPIE – Hazards;
13. NSW DPIE – Water and Natural Resources Access Regulator (NRAR);
14. NSW Resources Regulator (RR);
15. NSW Roads and Maritime Services (RMS) (now part of TfNSW);
16. NSW Rural Fire Service (RFS);
17. NSW Environment Protection Authority (EPA);
18. Orange City Council;
19. Transport for NSW (TfNSW); and
20. WaterNSW.

The following organisations provided submissions:

1. Bathurst Community Climate Action;
2. Beekeepers Inn;
3. Belubula Headwaters Protection Group;
4. Canero Industries Group Pty Ltd;
5. Central Ranges Brewing Company;

6. Central West Environment Council;
7. Central West Logistics Pty Ltd;
8. Environmentally Concerned Citizens of Orange;
9. Goldfields Honey Australia Pty Ltd;
10. Goldfields Honey, Bee and Pollination Services Pty Ltd;
11. Hoadley Family Pty Ltd;
12. Hort Enterprises Pty Ltd;
13. IA & WM Manning;
14. LBS Supplies Pty Ltd;
15. Lithgow Environment Group;
16. Mudgee District Environment Group;
17. Neville & Region Landcare;
18. NSW Farmers Association Orange Branch;
19. Orange Field Naturalist and Conservation Society Inc.;
20. Orange Local Aboriginal Land Council;
21. Phillip Church Furniture;
22. Puma Energy;
23. Ryan's Bakery;
24. S.L.B Lawn & Garden Service;
25. Triaxial Consulting;
26. TWSevolution; and
27. WesTrac NSW.

2.3 Response methodology

All submissions received were collated and categorised based on who they were from, in accordance with the following categories for submitters:

- community;
- organisations; and

- government.

The submissions were reviewed, and the key matters raised in each submission identified. Matters raised in each submission were categorised by theme.

Responses were prepared to each matter by Regis and EMM, with input from technical specialists who prepared the relevant impact assessment for the EIS. The study team was the same team that prepared the EIS with the addition of:

- Environmental Risk Sciences Pty Ltd (enRiskS) - who were engaged to prepare a review of the project's potential to impact on bees and the local honey industry (Appendix D) and a health impact assessment (HIA) (Appendix E); and

- Dr David Williams – who was engaged to undertake an expert review of the TSF design (refer to Appendix D of the Amendment Report).

2.4 Origin of community submissions

2.4.1 Overview

The source of unique community submissions and all community submissions (including form letters) with a focus on the LGAs surrounding the project application area are shown in Figure 2.1 and Figure 2.2, respectively. Each figure shows the number of submissions that supported, objected to, or provided comment on the project. The number of submissions from elsewhere in NSW, other Australian states and overseas are also shown.

2.4.2 Unique community submissions

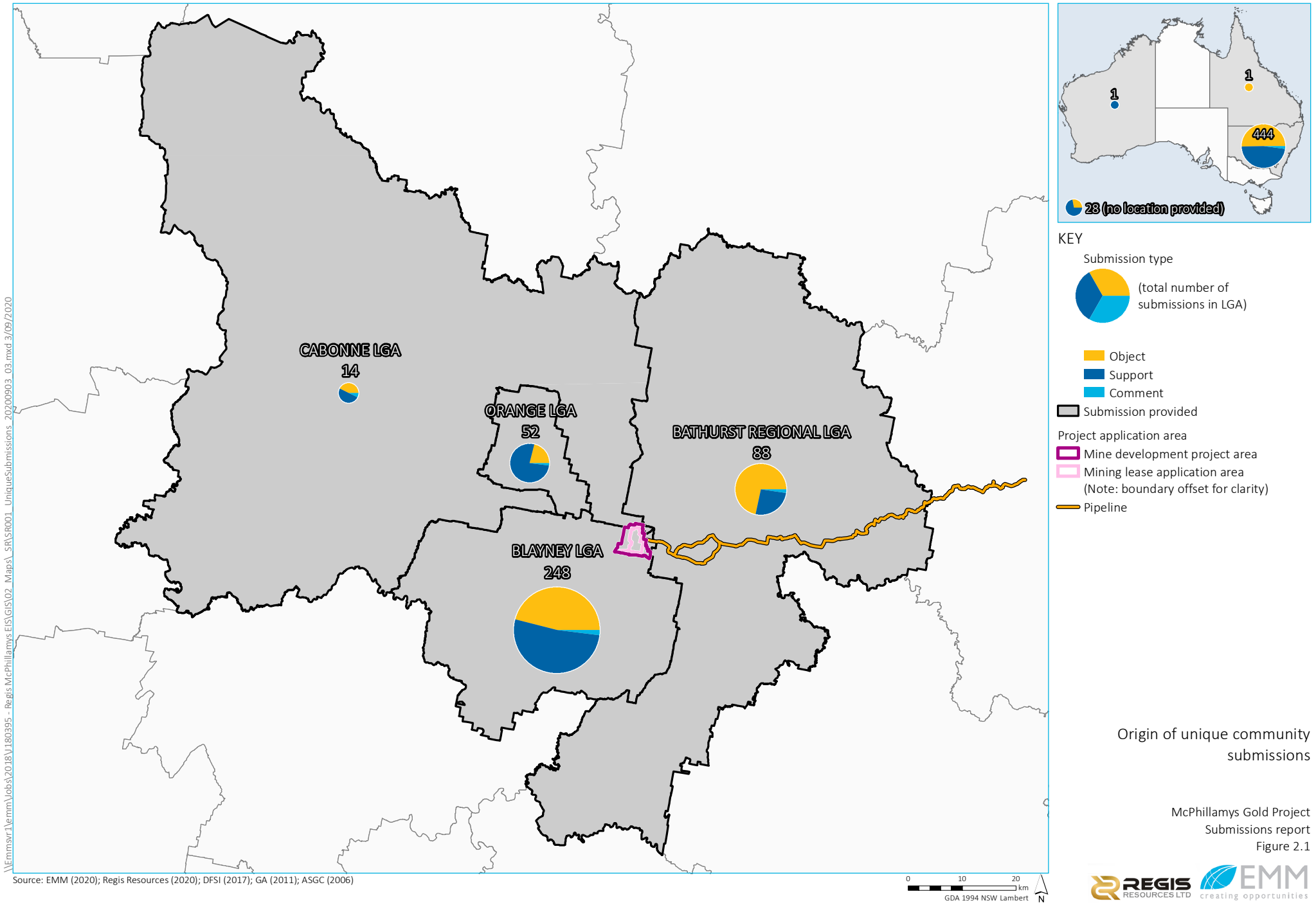
The majority of unique community submissions came from Blayney LGA (52%), where the project is located, and just over half of these (also 52%) supported the project. As shown in the inset in Figure 2.1, most of the unique community submissions (93.7%) came from NSW, with approximately 5.7% choosing not to identify their location and less than 1% from the remaining states. Other LGAs that contributed to the total number of unique community submissions included Bathurst Regional LGA (19%), Orange LGA (11%) and Cabonne LGA (3%).

Approximately 48.7% of the unique community submissions were in support of the project, 49.2% objected and 2.1% provided comments. As mentioned above more than half of the unique community submissions from Blayney LGA supported the project, while approximately 46% objected and 2% provided comments. Contrastingly, the majority of unique community submissions from Bathurst Regional LGA (72%) objected to the project, while the majority of unique community submissions from Orange LGA (77%) supported 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 of the project on the basis of the significant employment and economic benefits it will provide.

2.4.3 Form submissions

In total, 150 form letters were received, all of which objected to the project. There were three variations of form letters received. The total number of community submissions, including form letters, is shown in Figure 2.2, which also shows the number of submissions received in support and those that objected. The majority of form submissions came from Blayney LGA (42%), followed by Bathurst Regional LGA (23%) and Orange LGA (14%).



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Source: EMM (2020); Regis Resources (2020); DFSI (2017); GA (2011); ASGC (2006)

Origin of unique community submissions

McPhillamys Gold Project
Submissions report
Figure 2.1

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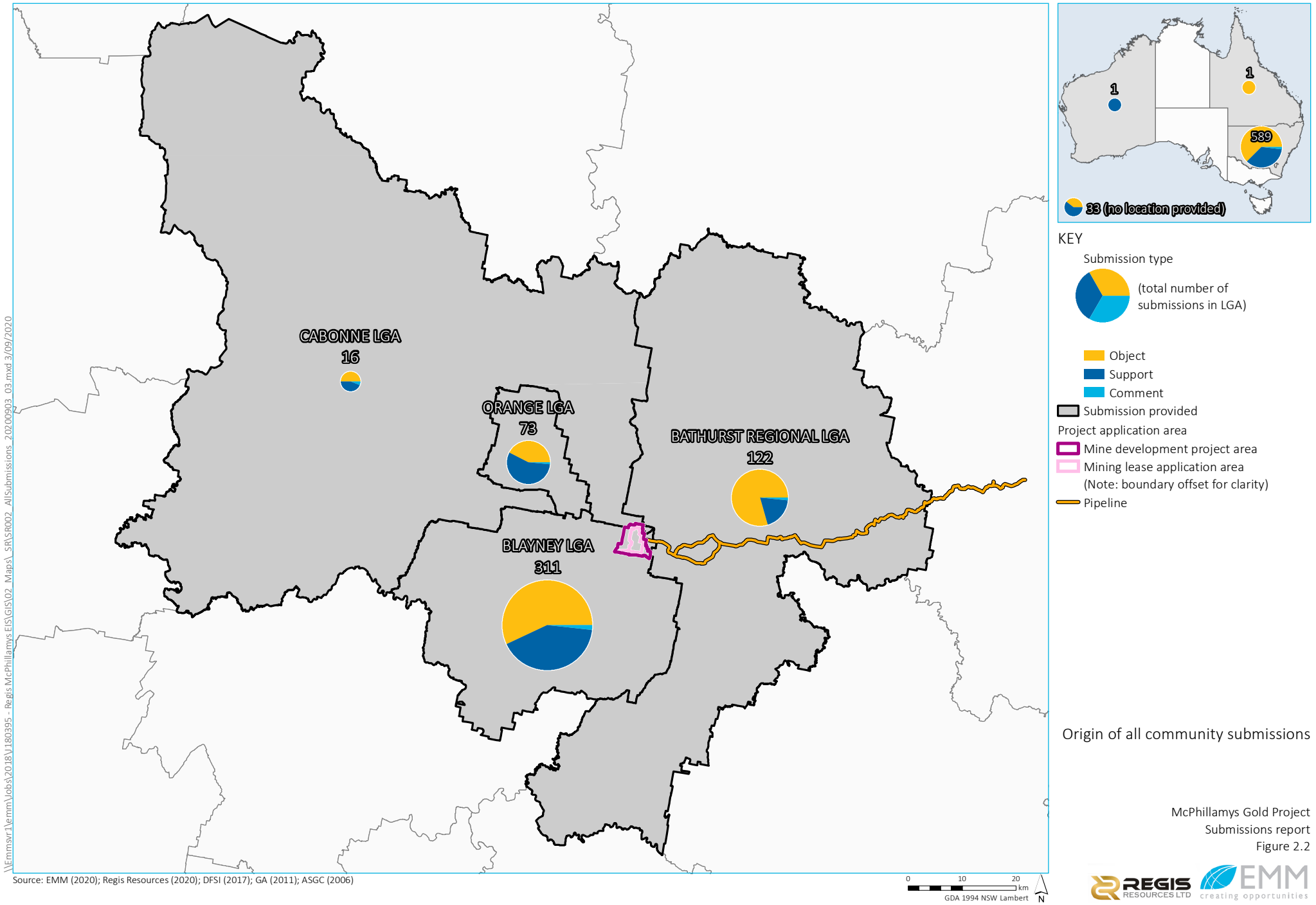
EMM creating opportunities



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Source: EMM (2020); Regis Resources (2020); DFSI (2017); GA (2011); ASGC (2006)

Origin of all community submissions

McPhillamys Gold Project
Submissions report
Figure 2.2

2.5 Summary of matters raised in community submissions

2.5.1 Overview

In accordance with DPIE's (2019) draft guideline, *Guidance for State Significant Projects - Preparing a Submissions Report June 2019*, each matter raised in submissions has been assigned to one of the following categories:

- the project (eg the site, the physical layout and design, uses and activities and timing);
- procedural matters (eg level or quality of engagement, compliance with SEARs, identification of statutory requirements);
- the environmental, social or economic impacts of the project (eg noise, air quality, biodiversity, heritage);
- the merits of the project (eg justification for the project, consistency with government plans, policies or guidelines); or
- issues that are beyond the scope of the project or not relevant to the project.

The categories assigned to each of the unique community submissions are shown in Figure 2.3.

Each of these categories have been divided into sub-categories, which align with the content of the EIS and technical assessments prepared as part of the EIS and Amendment Report. The number of unique community submissions assigned to each sub-category are shown in Figure 2.4 (all) and Figure 2.5 (Blayney LGA only).

A list of all matters raised within the community submissions and the section of this report in which they are addressed is provided in Table 2.2.

Table 2.2 List of matters raised in community submissions

Guideline category	Subcategory	Matter raised and reference
The project	Approvals and legal process	Site suitability (5.18.2)
		Site selection*
	Closure and rehabilitation	Closure planning (5.9.1)
		Final landform and void (5.9.2)
	Project design and justification	Closure of Dungeon Road (5.19.1)
		Construction workforce accommodation (5.19.2)
		Consideration of alternatives (5.19.3)
		Operation and construction hours (5.19.4)
		Location of primary access point (5.19.5)
	Tailings management	TSF design (including failure risk and location) (5.14.1)
Procedural matters	Approvals and legal process	Quality of EIS (5.18.1)
	Stakeholder engagement	Adequacy of community consultation (5.187)
		Positive community consultation*
		Positive design changes from community feedback*

Table 2.2 List of matters raised in community submissions

Guideline category	Subcategory	Matter raised and reference
Environmental, social or economic impacts of the project	Water resources	Impacts on groundwater users (5.1.1)
		Impacts on surface water users (5.1.2)
		Impacts on springs (5.1.3)
		Pipeline water quality (5.1.4)
		Use of water resources (5.1.5)
		Adequacy of water modelling (5.1.6)
		Additional water supply via pipeline*
	Air quality and greenhouse gas	Quantity and composition of dust and emissions (5.2.1)
		Dust contamination of surrounding waterways (5.2.2)
		Dust contamination of harvested rainwater and drinking water (5.2.3)
		Adequacy of air quality modelling (5.2.4)
		Contribution to greenhouse gas emissions (5.2.5)
	Noise, vibration and blasting	Application of VLAMP (5.3.1)
		Impacts from blasting and vibration (5.3.2)
		Noise impacts on sensitive receptors (including pipeline) (5.3.3)
		Adequacy of noise modelling (5.3.4)
	Social	General social impacts (5.4.1)
		Impacts on lifestyle (5.4.2)
		Compensation for neighbouring landholders (5.4.4)
		Positive impacts to population growth*
		Social benefits*
	Health	Dust health impacts (5.5.1)
		General health impacts (5.5.2)
		Lighting health impacts (5.5.3)
		Mental health and stress (5.5.4)
		Naturally occurring asbestos (5.5.5)
		Noise health impacts (5.5.6)
	Agricultural resources	Impacts to agricultural production (off-site) (5.6.1)
		Impacts to agricultural production (on-site) (5.6.2)
		Impacts on bees and honey production (5.6.3)
		Impacts on horses and livestock (5.6.4)
		Drought proof farms*
	Biodiversity	Impacts on aquatic ecology (5.7.1)

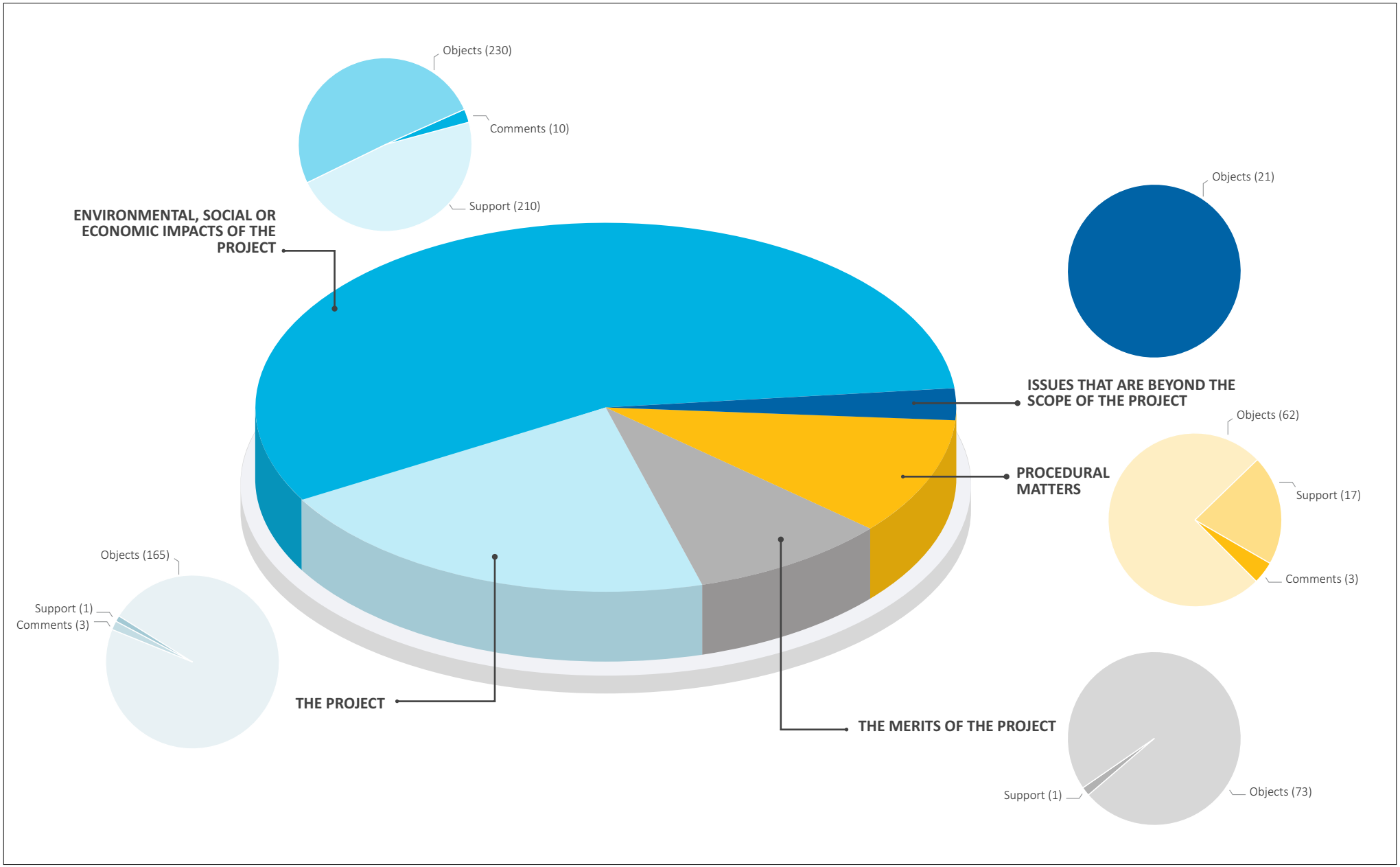
Table 2.2 List of matters raised in community submissions

Guideline category	Subcategory	Matter raised and reference
		Adequacy of biodiversity assessment and field survey effort (5.7.2)
		Contribution to land clearing and habitat loss (5.7.3)
		Impacts on biosecurity (including weed and pest management) (5.7.4)
		Impacts on threatened species (5.7.5)
		Suitability of proposed biodiversity offsets (5.7.6)
	Visual amenity	Far field visual impacts (5.8.1)
		Near field visual impacts (5.8.2)
		Light pollution (5.8.3)
	Economic	Property values (5.10.1)
		Employment opportunities for locals (5.10.2)
		Local economic growth (5.10.3)
		Impacts on local businesses (5.10.4)
		Impacts on tourism (5.10.5)
		Additional opportunities for local businesses*
		Future proofing the region*
		Local employment opportunities*
		Increased property values*
		Local and regional economic benefits*
		Positive economic impact on surrounding businesses*
	Aboriginal heritage	Adverse impacts on Aboriginal cultural heritage (5.11.1)
		Adequacy of Aboriginal cultural heritage assessment (5.11.2)
	Historic heritage	Impacts on items of historic heritage (5.12.1)
	Hazards and risk	Bushfire hazards (5.13.1)
		Exposure to PAF material (5.13.2)
		Transportation of hazardous goods (5.13.3)
		Use and storage of hazardous goods (including cyanide) (5.13.4)
	Tailings	TSF impacts on groundwater (5.14.2)
		TSF seepage (5.14.3)
	Traffic and transport	Traffic volumes on road network (5.15.1)
		Safety of road users (5.15.2)
	Waste	Waste management (5.16)

Table 2.2 List of matters raised in community submissions

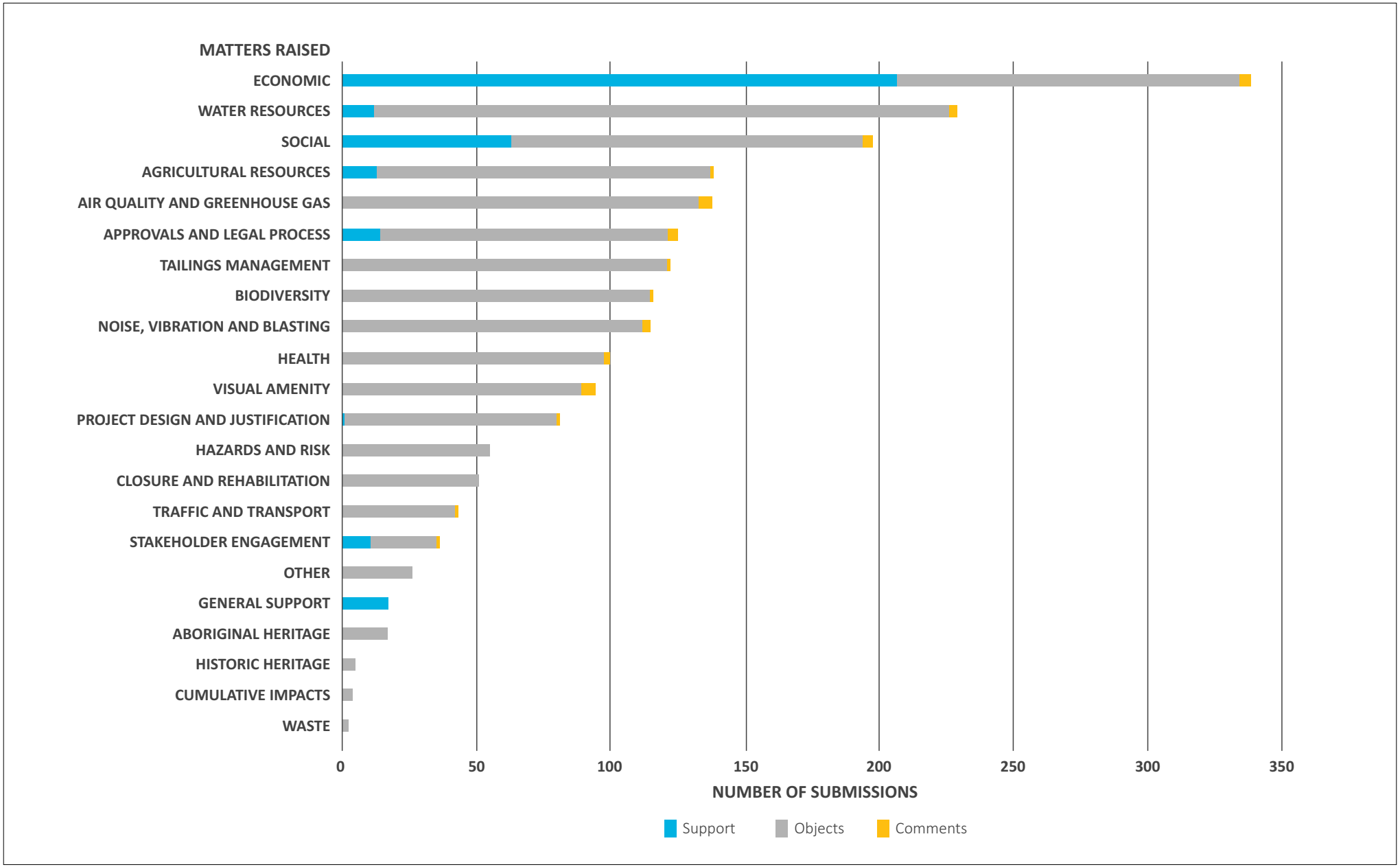
Guideline category	Subcategory	Matter raised and reference
	Cumulative impacts	Cumulative impacts from surrounding developments (5.22)
	Other	Contribution to climate change (5.21.1)
Merits of the project	Project design and justification	The public interest (5.19.7)
		Project justification (5.19.6)
		In best interest of the public*
	Social	Intergenerational equity (5.4.3)
Issues that are beyond the scope of the project	Other	Ownership model and structure (5.21.2)

Note: *Matter raised in a supporting submission and therefore no section reference provided.



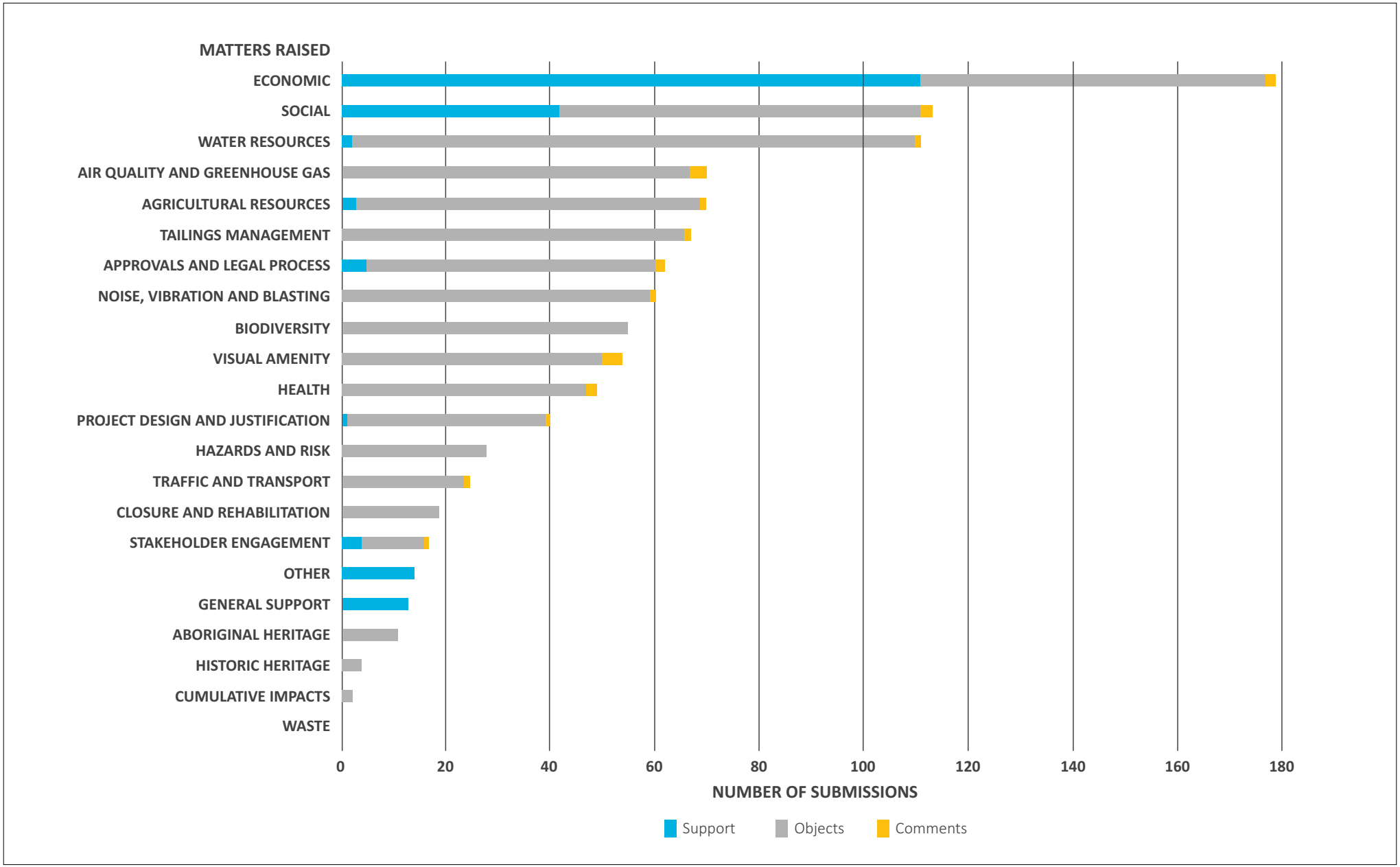
Categories raised in unique community submissions (all)

McPhillamys Gold Project
Submissions report
Figure 2.3



Matters raised in unique community submissions (all)

McPhillamys Gold Project
Submissions report
Figure 2.4



Matters raised in unique community submissions (Blayney LGA)

2.5.2 Objections

A total of 71 different matters were raised within the community submissions objecting to the project. Where possible, these matters were assigned to the relevant chapters of this report.

Matters raised in unique community submissions objecting to the project predominantly related to impacts to surface water and groundwater resources, potential impacts associated with the TSF, impacts on biodiversity and amenity-related impacts (including dust, noise and lifestyle).

As noted in Section 2.4.3, there were three variations of form letters submitted in objection to the project. The issues raised in each of the variations of the form letters are broadly summarised in Table 2.3.

Table 2.3 Matters raised in the form letter submissions

Form letter	Number of submissions	Category and matter raised
1	25	• Agricultural resources: impacts to agricultural production; impacts on bees and honey production; and impacts on horses and livestock. • Air quality and greenhouse gas: quantity and composition of dust and emissions. • Approvals and legal process: poor site suitability. • Biodiversity: contribution to land clearing and habitat loss; and impacts on threatened species. • Closure and rehabilitation: closure planning. • Economic: minimal employment opportunities for locals; and minimal local economic growth. • Historic heritage: impacts on items of historic heritage. • Hazards and risk: use and storage of hazardous goods (including cyanide). • Noise, vibration and blasting: impacts from blasting and vibration; and noise impacts on sensitive receptors. • Project design and justification: inadequate consideration of alternatives. • Social: intergenerational equity. • Tailings management: TSF design (including failure risk and location); TSF seepage; and TSF impacts on groundwater. • Traffic and transport: increased traffic volumes on road network. • Visual amenity: light pollution and near field visual impacts. • Water resources: impacts on groundwater and surface water users; and use of water resources.
2	14	• Aboriginal cultural heritage: adverse impacts on Aboriginal cultural heritage; and adequacy of Aboriginal cultural heritage assessment. • Agricultural resources: impacts on bees and honey production. • Approvals and legal process: poor site suitability. • Biodiversity: impacts on aquatic ecology and threatened species; and impacts on biosecurity (including weed and pest management). • Health: naturally occurring asbestos. • Economic: impacts on tourism. • Tailings management: TSF design (including failure risk and location). • Water resources: impacts on surface water users; and pipeline water quality.

Table 2.3 Matters raised in the form letter submissions

Form letter	Number of submissions	Category and matter raised
3	111	• Agricultural resources: impacts to agricultural production; impacts on bees and honey production; and impacts on horses and livestock. • Air quality and greenhouse gas: quantity and composition of dust and emissions; dust contamination of surrounding waterways; and contribution to greenhouse gas emissions. • Biodiversity: contribution to land clearing and habitat loss; and impacts on threatened species. • Economic: impacts on local businesses; and impacts on tourism. • Hazards and risk: use and storage of hazardous goods (including cyanide). • Noise, vibration and blasting: impacts from blasting and vibration; and noise impacts on sensitive receptors. • Project design and justification: construction workforce accommodation and operation and construction hours. • Social: intergenerational equity; and impacts on lifestyle. • Tailings management: TSF design (including failure risk and location); TSF seepage; and TSF impacts on groundwater. • Visual amenity: light pollution; and near field visual impacts. • Water resources: impacts on groundwater and surface water users; and pipeline water quality.

As discussed in Section 1.3, in response to issues raised in submissions from the community, government agencies, businesses and other organisations, as well as a result of further mine planning and stakeholder engagement, Regis has made a number of amendments to the project since the public exhibition of the EIS, including:

- revising the mine design;
- revising the mine and waste rock emplacement schedule;
- revising the design of the water management system;
- amending the layout of the TSF; and
- relocating the site access.

Further information on project amendments is provided in Section 3.1, and in Chapter 2 of the Amendment Report.

2.5.3 Comments

A total of 31 different matters were raised within the seven unique community submissions that provided comments on the project. Matters raised in unique community submissions providing comments on the project predominantly related to amenity impacts (including dust, visual, noise and lifestyle) and impacts on groundwater users. The local and regional economic benefits of the project and increase in local employment opportunities were also highlighted.

2.5.4 Support

The unique community submissions received in support of the project (231) predominantly raised job creation and flow on local and regional economic benefits associated with the project as reason for support.

A summary of the matters raised in submissions supporting the project is provided in Table 2.4.

Table 2.4 Summary of matters raised in supportive submissions

Matter raised	Quantity	Percentage
Increase in local employment opportunities	175	76%
Local and regional economic benefits	133	58%
Positive economic impact on surrounding businesses	51	22%
Positive impacts to population growth	41	18%
Social benefits	34	15%
Additional opportunities for local businesses	20	9%
Support - general	18	8%
Drought proof farms	13	6%
Quality of EIS	13	6%
Additional water supply via pipeline	12	5%
Future-proofing the region	10	4%
Positive community consultation	9	4%

2.6 Summary of matters raised in organisation submissions

2.6.1 Objections

A total of 64 different matters were raised within the organisation submissions objecting to the project (18). Where possible, these matters were assigned to the relevant chapters of this report.

Matters raised in organisation submissions objecting to the project predominantly related to:

- impacts on surface water users (15 or 83%);
- impacts on groundwater users (14 or 78%);
- quantity and composition of dust and emissions (13 or 72%);
- contribution to land clearing and habitat loss (11 or 61%);
- noise impacts on sensitive receptors (including pipeline) (10 or 56%); and
- light pollution (10 or 56%).

2.6.2 Comments

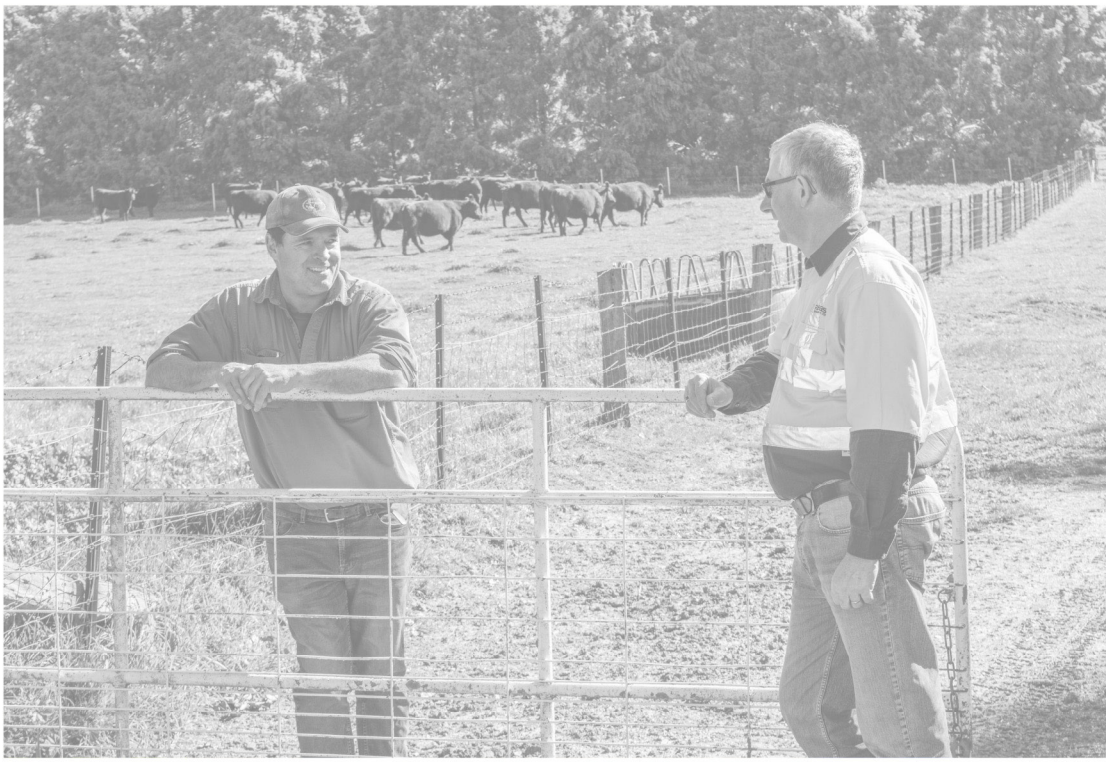
A total of 13 different matters were raised within the organisation submissions that provided comments on the project (2). This included concerns about the project's impacts on agricultural production and impacts on surface water and groundwater resources. The additional opportunities for local businesses and increase in local employment opportunities were also highlighted.

2.6.3 Support

The unique organisation submissions received in support of the project (7) predominantly raised job creation, opportunities for local businesses and flow on local and regional economic benefits associated with the project as reason for support.

Chapter 3

Actions taken since exhibition



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3 Actions taken since exhibition

3.1 Project amendments

The key components of the project as described in the EIS (EMM 2019a) 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 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 described 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 and as described in Chapter 1, 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 km east of the original location assessed in the EIS, in response 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.
- **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.

- **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 1.4.

- **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 MPPS, to approximately 4.3 km to the west and adjacent to Pipers Flat Road.

A full description of the amendments to the project is provided in Chapter 2 of the Amendment Report (EMM 2020a).

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.

3.2 Stakeholder engagement

3.2.1 Introduction

Regis has been actively engaging with stakeholders since acquiring the exploration lease (EL 5760) for McPhillamys in 2012. The purpose of this engagement has been to inform and to obtain feedback about the project. This engagement continued throughout the preparation of the EIS, into the public exhibition period and remains ongoing. Regis' stakeholder engagement has been comprehensive to date and reflects the importance Regis places on this aspect of its business and the project. This section describes the additional consultation that has taken place since the public exhibition of the EIS.

3.2.2 Community engagement

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

- amendments to the project design, as described in Section 3.1 and detailed in the Amendment Report (EMM 2020a);
- by commissioning additional technical studies and providing further information to alleviate concerns about certain aspects, including two expert reviews of the TSF design, a health impact assessment (enRiskS 2020b) and a review of the potential impact of the project on European honey bees and local honey production (enRiskS 2020a);
- community information open days in Blayney;
- community newsletters are sent out quarterly and are distributed via Australia Post (letterbox drop) within the Blayney LGA to approximately 3,000 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 residents;
- Regis information stall at the Blayney farmers markets (monthly prior to COVID-19);
- Blayney winter markets held at the Blayney community centre;
- Local office, where community members could come to talk to members of the Regis team;
- website containing CCC minutes, community newsletters, project updates and environmental assessment documentation;
- face to face meetings and phone calls focused on near neighbours (within an approximate 2 km radius); 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.

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.

Further details on engagement activities undertaken are provided below.

i Community information open days

Regis held two community open days during the public exhibition period, on 14 and 15 October 2019. These open days were held in Blayney at the community centre and were attended by 120 community members over the two days. To provide community members the opportunity to find out more about the project and to ask questions, staff from Regis attended the open days, as well as EMM Consulting Pty Ltd, who prepared the EIS for the project, and technical specialists who prepared the various technical studies that informed the EIS (including air quality, noise, TSF design, surface water, groundwater, and visual amenity).

ii Negotiated agreements

As described in Section 3.1, some project amendments have been made specifically to reduce predicted noise levels at private landholders in the vicinity of the mine development project area. These amendments have achieved significant improvements in predicted noise levels, as described in detail in Section 6.5 of the Amendment Report (EMM 2020a).

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 a property in proximity to the site access intersection (R15).

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).

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.

iii Community consultative committee

A CCC was established for the project in August 2018 and has facilitated opportunities for 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 the DPIE.

3.2.3 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 3.1. It is noted that a number of submissions were received well after the close of the public exhibition period, with the last of these being received in January 2020.

Table 3.1 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 via meetings and email	• Dungeon Road closure
NSW Department of Planning, Industry & Environment – Planning and Assessment Group	Ongoing consultation through face to face 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)	Two meetings and ongoing email correspondence	• Meeting held in Blayney 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, Resources Regulator and DPIE to discuss: – outcomes of revised noise modelling; and – revised TSF design and outcomes of independent technical review of the TSF.

Table 3.1 Summary of government agency consultation

Stakeholder	Consultation method	Key matters discussed
NSW Department of Planning, Industry and Environment – Biodiversity and Conservation Division (BCD)	Ongoing consultation through face to face meetings 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 Industries – Forestry	Email correspondence	• Consultation to confirm extent of clean water inundation of Vittoria State Forest.
NSW Department of Primary Industries – 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 Lake Carcoar 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.
Resources Regulator	Meeting	• Videoconference with Resources Regulator, EPA and DPIE held to discuss the revised TSF design and outcome of independent expert technical reviews of the TSF.
Commonwealth Department of Agriculture, Water and the Environment (DAWE)	Teleconference	• Variation of controlled action to reflect the amended project.

3.3 Further technical assessments and investigations

A number of additional technical investigations were commissioned by Regis in response to submissions received on the project after the public exhibition of the EIS, and/or to assess and refine the amendments to the project. These studies include:

- TSF:
  - CMW Geosciences, Chris Hogg – technical review focus on construction and operation.
  - Dr David Williams – expert review of the life of mine considerations, including post-closure water management and assessment of the design against leading practice.
- Apiarists - a review of the project's potential to impact on bees and the local honey industry (enRiskS 2020a, refer to Appendix D);
- Health impact assessment – in response to community concerns raised in relation to the potential impacts on human health (enRiskS 2020b, refer to Appendix E).
- Naturally occurring asbestos investigation (refer to section 5.5); and
- Construction water supply groundwater investigation (refer to Appendix C).

In addition to the above studies, technical studies that were conducted for the EIS were updated to assess the amended project design:

- soil resources;
- agricultural impact statement;
- groundwater and surface water;
- noise, vibration and blasting;
- air quality and greenhouse gas;
- terrestrial biodiversity;
- aquatic ecology;
- Aboriginal cultural heritage and historical heritage;
- traffic and transport;
- visual amenity;
- socio-economic; and
- closure, rehabilitation and final landform.

The revised technical studies are included as appendices to the Amendment Report, with the key findings summarised in Chapter 6 of that report (EMM 2020a).

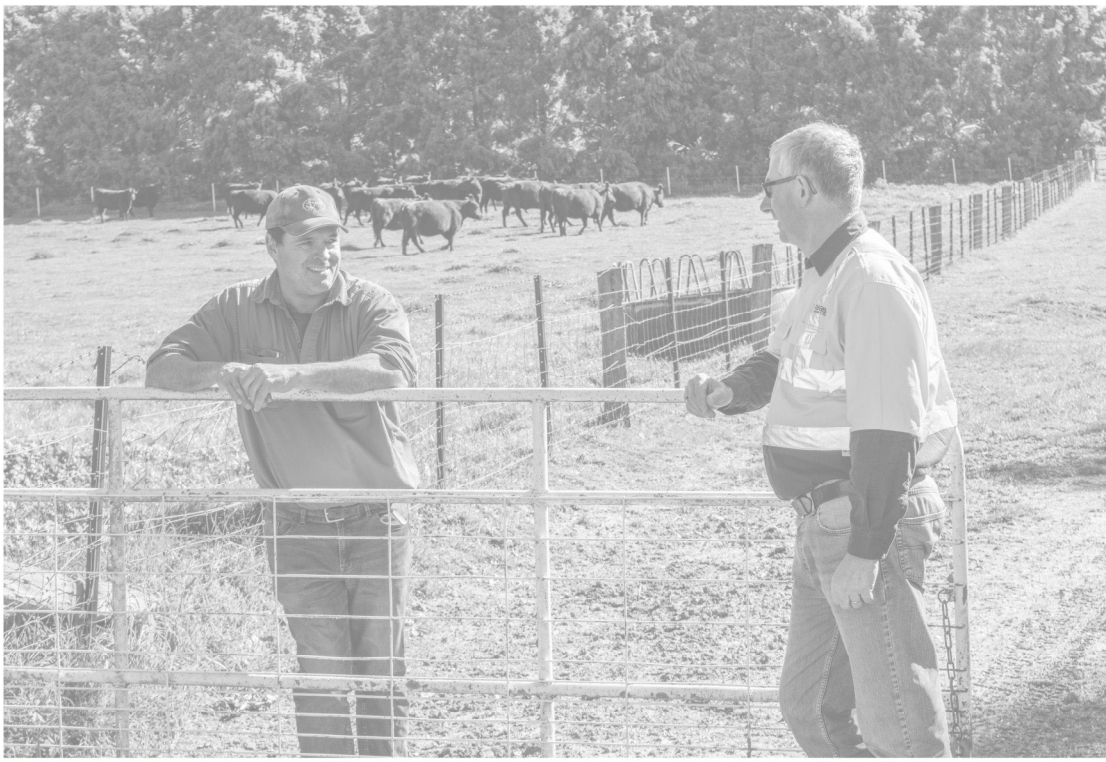
3.4 Other activities

Other activities that have been undertaken by Regis since the public exhibition of the EIS include:

- tree planting, for the purpose of establishing tree screens, around various sections of the mine development project area boundary;
- tree planting on private residences;
- seed collection and propagation of seedlings from Regis owned land;
- hosting school excursions for the collection of seeds to propagate;
- continued working with Skill set to collect and propagate seeds;
- restoration of the greenhouse at the Blayney High School;
- installation of a V-notch weir within the mine development project area for the purpose of flow monitoring, downstream of the confluence of Tributary A with the Belubula River;
- installation of three automatic rain gauges;
- installation of four additional depositional dust gauges;
- weed control and fencing on Regis owned land; and
- purchase of additional properties, with the establishment of lease arrangements with local farmers.

Chapter 4

Response to government agency submissions



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4 Response to Government agency submissions

Responses to the comments contained within the 20 respective state and local government submissions received are provided in the following subsections. Comments from the government agencies are presented verbatim, with each respective comment followed directly with a response.

4.1 Department of Planning, Industry & Environment – Water / Natural Resources Access Regulator (NRAR)

The NSW Department of Planning, Industry & Environment – Water / Natural Resources Access Regulator (DPIE-Water /NRAR) had a number of recommendations and concerns related to the proposed development, including sufficient water entitlement for the project, potential impacts of production bores on local receptors, pipeline water crossings, groundwater model improvements, potential impacts to groundwater dependent ecosystems (GDEs), seepage from the TSF and reductions in flow to Carcoar Dam.

This section provides a response to the recommendations and concerns raised in the DPIE-Water/NRAR and is presented in the following general order, grouping topics to assist the reader:

- surface water related recommendations and concerns, including:
  - an overview of the amended surface water management system;
  - summary of the project surface water take;
  - clean water diversions and Maximum Harvestable Rights Dam Capacity (MHDRC); and
  - surface water licensing.
- groundwater related recommendations and concerns, including:
  - summary of groundwater take and licensing;
  - impacts of production bores;
  - groundwater model upgrade;
  - groundwater impacts to third parties;
  - groundwater impacts to GDEs; and
  - groundwater monitoring.
- pipeline impacts, including:
  - geomorphic impacts (river styles framework); and
  - construction.

4.1.1 Surface water

DPIE - Water has significant concerns at the limited availability of surface water entitlement which remains a risk for this project. In particular, a number of runoff capture structures are located on 3rd order and higher streams and so will require entitlement.

Significant uncertainty exists in the ability of the proposed sizing and location of runoff capture structures to meet the requirements of the water regulatory framework.

A number of structures are proposed on third order and higher order streams, however the proponent has not advised that it holds entitlement for the water to be taken. Third order and higher watercourses will need to hold licensed entitlement and be assessed for impacts. For example, the Tailings Storage Facility (TSF) is located on a fifth order stream but captures water from 1st to 5th order streams.

The proponent should:

- Complete a review of the proposed dams/structures that will capture runoff. Key principles in completing this review include the following:
  - The dam capacity of dams/structures on minor streams (first and second order streams) need to be considered for whether they are within the Maximum Harvestable Rights Dam Capacity (MHRDC) or satisfy an exclusion. To meet an exclusion they need to be sized consistent with best practice for the purpose of the dam eg. a dam to capture runoff from an upstream disturbed area needs to be sized according to industry standards. Where a dam is capturing runoff from an undisturbed catchment it will not meet an exclusion.
  - Water holding structures on minor streams that are sized larger than the industry standards for the runoff capture need to be either 1) constructed to prevent runoff capture such as a turkeys nest dam, 2) need to be considered within the MHRDC or 3) considered for licensing.
  - Dams/structures constructed on third order or higher order streams are subject to licensing requirements for the water take (not the dam size). Where water is captured in these dams licensing needs to be considered whether or not it is later pumped out and back into the system.

i Overview

The response to the DPIE-Water/ NRAR submission on surface water is set out in the following structure:

- Legislative requirements (Section ii):
  - defining Harvestable Rights;
  - stream order classification; and
  - exemptions.
- Mine design and amendments (Section iii):
  - Operational mine water management systems (calculation of dam capacity, catchment areas/runoff);
  - Clean water diversions; and
  - Reconciliation and classification of Regis owned land based on legislative requirements.
- Licensing of surface water (Section iv):
  - Reconciliation of Harvestable Rights;

- River leakage, clean water diversions and operational mine water management;
- Available licences; and
- Pathway to secure additional required licences.

ii Surface water legislative requirements

The project does not actively seek to directly take any surface water from the Belubula River or tributaries to meet operational water demand. The take of such 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 in Chapter 2 of the EIS (EMM 2019a) and the Amendment Report (EMM 2020a), 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 4.1.3), after which it will be supplied via the pipeline development.

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

However, runoff within the active mining area must captured, managed and recycled to ensure that the water quality of the greater catchment is not impacted.

In other words, the interception and incidental capturing of runoff is unavoidable.

Pursuant to section 53 of the *Water Management Act 2000* (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 of the Amendment Report). 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 0.75 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 Maximum Harvestable Right Dam Capacity (MHRDC) was assessed as shown in Table 4.1.

The total harvestable right based on Regis' landholding area (current and proposed) is 218 ML. This equates to a Harvestable Right rate of 0.75 ML/ha per year (ie 218 ML = 10% x 0.75 ML/ha x 2,908 ha). 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 of the Amendment Report).

Table 4.1 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 0.75 ML/ha per year

MHDRC = Maximum Harvestable Rights Dam Capacity; ha = hectare; ML = megalitres

A catchment yield assessment was undertaken as part of the EIS to assess the potential downstream impact of the temporary interception of mine development project area catchments within the mine operational water management system (ie the temporary excision of these catchments from the greater catchment). Catchment yield modelling was undertaken by calibrating a model of the catchment of Carcoar Dam, within which the mine development area is located. The median annual catchment yield rate has been used to estimate the median impact of the temporary interception of mine development project area catchments within the mine operational water management system.

The impact has been calculated based on the estimated reduction in catchment flow as a consequence of the establishment of the mine development area within the headwaters of the Belubula River catchment. The reduced catchment flow is calculated at the furthest point downstream of the mine development area (Carcoar Dam) which is within the Belubula River above Carcoar Dam Water Source regulated by the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*.

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 of the Amendment Report and Section 4.1.1(iv)below).

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

- MHRDC for all relevant Regis owned lands.
- Licence exemptions - which include the excluded works exemption under the *Water Management (General) Regulation 2018* (WM Regulation).

- 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.

At the outset, it is important to note that the impacts of the incidental take of surface water runoff has been found to be minor and within the natural variability in catchment conditions, as described in detail in Chapter 6 of the Amendment Report (EMM 2020a). The mine development has been designed to minimise the volume of water taken from the catchment. As such, the physical impacts on the environment and downstream users will be minor and, in most cases, imperceptible.

a The excluded works exemption

All WMFs located on minor streams 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.

The project will rely on the excluded works exemption under the WM Act to account for runoff from the mine related disturbed land captured by the operational water management system. In this regard, the surface water management system has been designed in accordance with industry standards, and will be constructed such that each of the project's operational WMF, including the TSF, will be located on a "minor stream".

iii Amended surface water management system

The design of the water management system has been revised as part of the amended project. The water management system still incorporates two main elements:

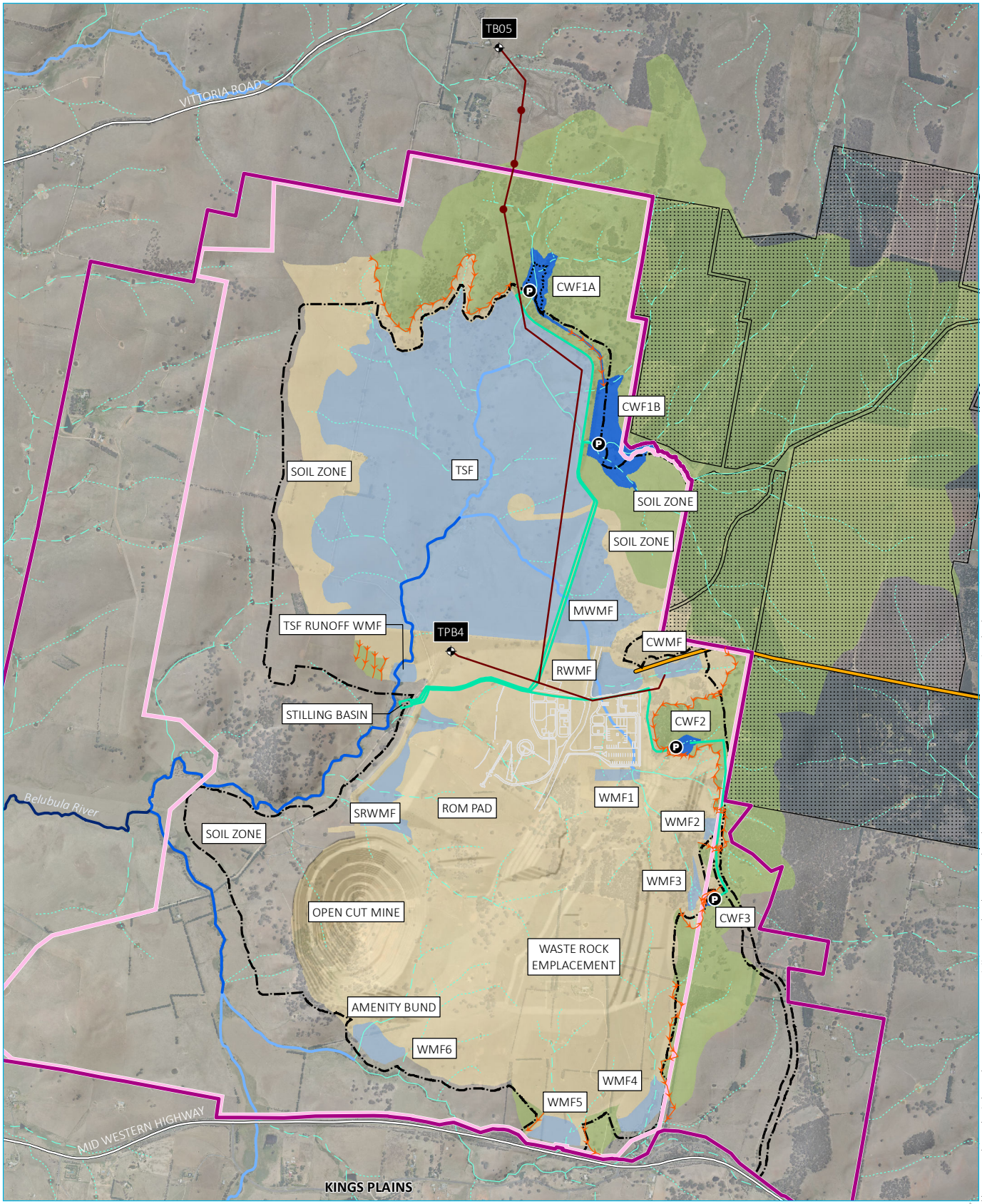
- a clean water diversion system to divert upstream clean runoff to the Belubula River; and
- a water management system to manage the collection and reuse of water captured within the mine disturbance area, consistent with the objective of nil discharge that meets leading practice requirements for mine disturbance areas.

Key changes to the EIS design water management system are summarised as follows and described in detail in Chapter 2 of the Amendment Report (EMM 2020a) and the revised surface water assessment (HEC 2020; Appendix G of the Amendment Report):

- the secondary WMF included in the EIS design has been removed from the water management system;
- a new Main WMF (MWMF) is proposed in the south-east corner of the TSF;

- the size of the Primary WMF has been reduced and it has been renamed the Site Runoff WMF (SRWMF), to better describe its function; however, prior to the MWMF coming online, the SWRMF will be the main operational water storage;
- the Raw WMF (RWMF) has been resized to store external water supplied by the pipeline;
- a new construction WMF (CWMF) is proposed and will be used for supplementary storage for raw water during operations;
- the capacity of the WMFs (WMF1 to WMF6) collecting runoff from the waste rock emplacement area have been revised and additional WMFs included to ensure WMFs do not spill; and
- the design of the clean water diversion system has been revised including improvements to the design of the post-closure clean water diversions.

WMFs play a significant role in the site water management system beyond runoff capture. The operational water management system is presented in Figure 4.1. The functions of the WMFs are shown in Figure 4.2, illustrating their respective roles in the site water management system.



Source: EMM (2020); Regis Resources (2020); HEC (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
- Additional (post-closure) disturbance footprint
- Pipeline
- Construction groundwater bore
- Indicative construction groundwater bore
- Indicative construction groundwater pipeline
- 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
- Vittoria State Forest

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

Water management system overview

McPhillamys Gold Project
Submissions report
Figure 4.1

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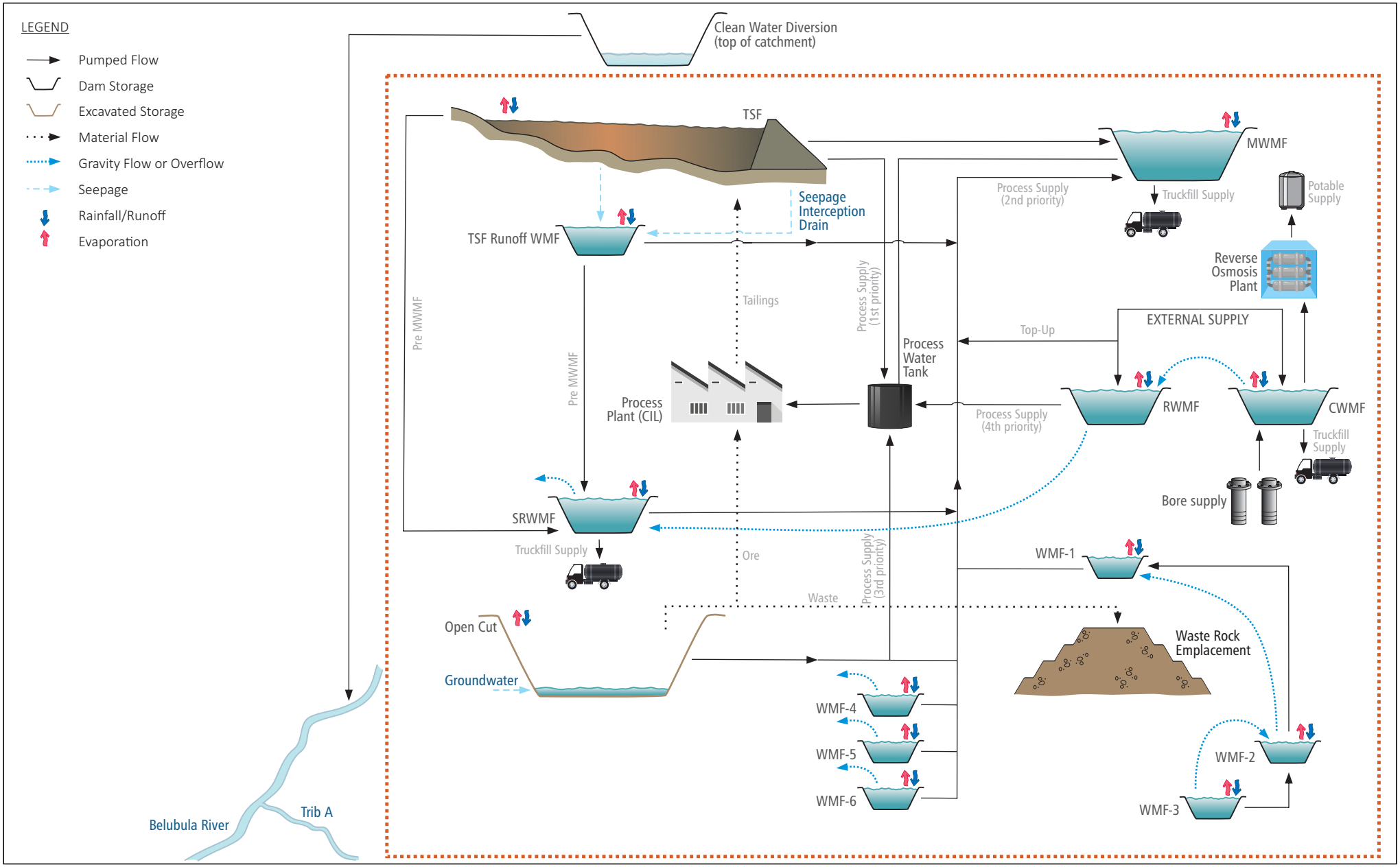
EMM creating opportunities



Simplified site water management and process diagram

McPhillamys Gold Project
Submissions report
Figure 4.2

a Operational mine water management system

A complete review of the proposed dams/structures that will capture runoff has been undertaken, in accordance with the key principles outlined by DPIE-Water/NRAR. This review included a calibration of the catchment yield assessment (detailed as part of the revised surface water assessment (Appendix G to the Amendment Report)).

Review of water balance model

A review of the water balance modelling should be completed if the proponent reviews the runoff capture structures. This is because the water availability for the project is based partly on the current location and sizing of water capture structures which is integrated into the water balance.

The GoldSim® water balance model (HEC 2020; Appendix G of the Amendment Report) has been revised based on the amended mine project area layout and amended surface water management system described above. Storage capacities and pumping infrastructure have been designed to achieve a zero spill site (ie no water balance model forecast spill from these storages in any of the 131 climatic scenarios derived from the 131 years of available historical climatic data for the site). Further detailed model results are provided in the revised surface water assessment (Appendix G of the Amendment Report).

Catchment yield modelling was undertaken by calibrating a model of the catchment of Carcoar Dam, within which the mine development area is located. The calibration of this model has been refined and improved as part of the revised surface water assessment (Appendix G to the Amendment Report), including the use of data provided by DPIE–Water. 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.

The changes to streamflow during the operational phase are predicted to be short-lived and peak at the time of maximum disturbance of the mine development. During mining, the maximum catchment area captured by the operational water management system constitutes 4.1% of the total Carcoar Dam catchment. In the long-term, following rehabilitation, the area will significantly reduce and be 0.46% less than the current catchment area draining to Carcoar Dam. This level of change is considered to be imperceptible and within the natural variability in catchment conditions.

A summary of all dams and water holding structures within the site water management system is provided in Table 4.2.

It should be noted that the majority of the WMFs 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. The total aggregated catchment for the storages and structures listed in Table 4.2 is 498 ha.

Table 4.2 Summary of mine water structures

Structure	Purpose and function	Classification of water stored within facility	Capacity (ML)	Interpreted pre-mine stream order
CWMF	Initial site water supply storage for construction and dust suppression	Raw water and mine water	75	2nd
Main WMF	Main water storage	Mine water	2,009	1st and 4th
RWMF	Long-term site water supply storage, storing water from the pipeline	Raw water	217	2nd and 4th
SRWMF	Site runoff WMF; prior to MWMF coming online, it will be the main operational water storage	Sediment	528	2nd
TSF Runoff WMF	Runoff WMF and sediment dam for construction of the TSF main embankment	Mine water	25.8	5th
WMF1	Capture runoff from the waste rock emplacement	Sediment	70	3rd
WMF2		Sediment	60	2nd
WMF3		Sediment	21.3	1st
WMF4		Sediment	123	2nd
WMF5		Sediment	136	2nd
WMF6		Sediment	158	3rd

Note: Refer Appendix G of the Amendment Report (HEC 2020)

Storages

The design capacities of the storages that are part of the revised operational water management system are listed in Table 4.2 and shown in Figure 4.1 and Figure 4.2. Storages WMF1, WMF2, WMF3, WMF4, WMF5, WMF6, SRWMF, the MWMF and the TSF Runoff WMF are downslope from mine infrastructure and/or disturbance areas or will receive pumped inflow from other storages, and hence are located to prevent contamination of a water source.

As described above, consistent with best practice, the storage capacities and pumping infrastructure of the operational water management system have been designed to the minimum storage size to meet the project design requirement of nil discharge in any of 131 climatic scenarios modelled (derived from the 131 years of available historical climatic data for the site).

The TSF is not a "runoff capture structure". It is designed to securely store mine process tailings. The volume of tailings that will be produced results in a significant area being required for the TSF. The volume of water held within the storage will be kept to a practical minimum during operations by pumping reclaim of water to other storages within the operational water management system and to the processing facility for reuse. The catchment area reporting to the TSF has been reduced to a practical minimum by the use of upslope clean water diversions.

The RWMF will ultimately form the main raw water storage for the mine development project area, supplied by the imported pipeline supply. The capacity of the RWMF is planned to be initially 108 ML, increasing to 217 ML at the end of Year 2 of the project. The increased capacity of the RWMF (in Year 2) is not a requirement of the mine water management system, but is caused by the fact that the embankment behind which the storage forms is also a perimeter embankment of the TSF (located downslope of the RWMF) and the embankment needs to ultimately be raised to a sufficient level in order to contain tailings within the TSF (ie to prevent tailings entering the RWMF). Water supplied from the imported pipeline supply is expected to have a total dissolved solids content of up to 3,000 mg/L, equivalent to an electrical conductivity (EC) of approximately 4,700 µS/cm. This is higher than the maximum recorded EC at surface water quality monitoring sites in the mine development project area. This WMF is therefore required to prevent contamination of a water source (ie to store raw water for process use from the imported pipeline supply without external spill). It is noted that the RWMF will effectively be isolated from the upper catchment as a result of the establishment of WMF1 (noting upper reaches will be diverted via the clean water management system).

The CWMF will initially form the construction water storage for the mine project area, supplied primarily by pumped extraction from production bores (refer Figure 4.2), and as such will comprise a water supply work associated with the groundwater supply WAL. Ultimately the CWMF will also receive supply from the imported pipeline supply. The CWMF has a proposed nominal design capacity of 75 ML and is located on a minor stream, with no catchment other than its own storage area. Upstream flows from the minor stream catchment will be diverted around the CWMF storage area and therefore it will effectively comprise a "turkeys nest" dam.

b Clean water diversion

The project seeks to divert water captured upstream around the site; however, these diversions require capture and pumping. As this water is still being captured on third order or higher watercourses, licensing is required.

- Diversions of watercourses around structures may remove the need for licensing provided they can divert all the volume downstream that previously passed the location of the proposed structure. Where this cannot be implemented the structure will need to be considered for licensing.

Consistent with the intent of the clean water management system included in the EIS design, the amended project clean water management system has been designed to maximise diversion of clean water flows around operational areas. During mining, the majority of clean water will be diverted around the mine development via a series of diversion drains, dams, pumps and pipelines shown in Figure 4.1 and Figure 4.2. Runoff from undisturbed areas will be captured in a system of upslope runoff diversion drains and either directed to existing drainage lines or to one of three Clean Water Facilities (CWFs), which will be dewatered by pumping to the Belubula River during and following rainfall events. The clean water management system comprises CWF 1a and 1b, CWF2 and CWF3. Further discussion is provided below.

Clean Water Facilities

Upstream CWF1a and 1b are not part of the mine operational water management system but collect runoff from upslope of the mine development area.

A WAL will be held to account for the minor transmission losses associated with CWF1a and 1b (ie the water lost through the short duration of retention, which in this case is evaporation). The effect of the clean water diversion is to maximise the diversion of clean water flows upstream of the mine disturbance area for downstream benefits and is consistent with best practice for mines.

CWF2 and CWF3 are located on existing minor streams and, if necessary, the temporary capture of clean runoff by these storages will be accounted for by Regis' Harvestable Rights entitlement (refer Section 4.1.1iv).

The proposed CWFs will inevitably pond water for short periods of time during and following rainfall events while diversion pumping occurs to the Belubula River downstream. Ponded water will be subject to evaporation. Conversely, ponded water will receive an increased rate of inflow due to rainfall falling directly on the water surface (and not being subject to catchment losses for this portion of the catchment). In order to assess the relative magnitude of evaporation versus increased catchment yield, a water balance model has been developed for the CWFs. The model generated 131 possible climate scenarios from the full period of available local climate data, with each scenario simulated for the 10 year operational life of the CWFs. Model simulations were also undertaken for the situation of no diversions at each CWF location (for comparative purposes). Table 4.3 summarises model average results (averaged over all years and climatic scenarios).

As shown in Table 4.3, the modelled net diverted flow for the CWFs is 429.5 ML/year (431.2 ML of catchment runoff plus 3.8 ML of direct rainfall minus 5.5 ML of evaporation), which is 2.2 ML/year less than the average flow modelled without the CWFs. This transmission (evaporation) loss will be accounted for by a WAL (refer Section 4.1.1iv).

Table 4.3 CWF Model Results

Scenario	Catchment median runoff (ML/year)	Direct pond rainfall (ML/year)	Pond evaporation (ML/year)	Flow diverted back to Belubula River (ML/year) (median)
With CWFs	431.2	3.8	5.5	429.5
Without CWFs (existing catchments)	431.7	0	0	Not applicable

iv Surface water licensing

The EIS identifies three existing WALs in the unregulated surface water source of the project area. These include WAL31475 (192 units), WAL36818 (22 units) and WAL31476 (50 units). The WALs total 264 units which will not adequately account for the potential take in the structures constructed on third order or higher streams, or for the dams on minor streams sized larger than the harvestable rights and not meeting an exclusion.

Recommendation:

- Due to the recognised limitations on water entitlement in the surface water source, confirmation is required of the ability to obtain the necessary surface water entitlement to account for runoff capture structures, water take and impacts to regulated water supply. The proponent should consider an alternate project design to reduce the need for surface water entitlement.

As outlined above, the mine development area is located within the Belubula River above Carcoar Dam Water Source regulated by the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*. The predicted surface water impacts of the project on this water source are small. As described in Section 4.1.1(iii)(a), the mine development has been specifically designed to ensure 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, thereby minimising the water take from the Belubula River catchment. In addition, the water management system has been designed to manage the collection and reuse of water captured within the mine disturbance area, consistent with the objective of nil discharge that meets leading practice requirements for mine disturbance areas. The residual impact of the mine development is primarily associated with catchment excision due to the disturbance footprint of the mine development. A description of proposed pathways to obtain the necessary surface water entitlement to account for runoff capture structures, water take and impacts to regulated water supply is presented in the following sections.

a Maximum Harvestable Rights Dam Capacity (MHRDC)

As described in Section 4.1.1(iv), the Harvestable Right of the landholdings held by Regis has been calculated by HEC (2020) in the revised surface water assessment (Appendix G of the Amendment Report).

The total Harvestable Right based on Regis' landholding area (current and proposed) within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012* zone is calculated as the MHRDC and is 207 ML. Existing dams on relevant Regis land have been calculated to have a maximum capacity of 77.2 ML. Therefore, the remaining volume of available Harvestable Rights for the current land held by Regis is 129.8 ML.

The mine development will be effectively isolated from the catchment, with the diversion of upstream minor and non-minor streams (according to the Strahler stream order classification system) around the disturbance footprint via a series of diversion drains, CWFs, pumps and pipelines. CWF2 and CWF3 will be located upslope (east) of the waste rock emplacement and process plant area, and are outside of the disturbance footprint (refer Figure 4.1). These two dams would be located on existing minor streams and have a combined total capacity of 24.6 ML. If necessary to account for the water captured and diverted by these dams, available Harvestable Right entitlement may be relied on.

Following cessation of mining and rehabilitation of the project, the volume of intercepted water will decline as rehabilitation of the operational mine disturbance area returns to the catchment and is no longer intercepting rainfall and runoff.

b River leakage

An indirect take of water is anticipated to occur from the unregulated Belubula River above Carcoar Dam Water Source via an increase in leakage (as a result of groundwater drawdown) from the Belubula River and Tributary A, in the immediate vicinity of the pit, to groundwater. The groundwater model predicts leakage from the Belubula River (including Tributary A) will be up to 24.1 ML/year at the end of mining (Year 11) and up to 28 ML/year post-mining (9 years after mining ceases). This predicted leakage is slightly less than the predictions reported in the EIS, which reported up to 31 ML/year post-mining (refer Appendix H of the Amendment Report).

c Clean water diversions

As noted in Section 4.1.1(iiib) above, the proposed CWFs would inevitably pond water for short periods of time during and following rainfall while diversion pumping occurs to the Belubula River downstream. Ponded water would be subject to evaporation. Modelling of the clean water management system indicates a negligible reduction of 2.2 ML/year from the catchment due to evaporation losses.

d Mine water management system

The operational mine area will involve some take of runoff by storages and structures that are located on non-minor streams (ie third order stream and above), and these volumes will require licensing under the WM Act.

The take of runoff by storages and structures that are located on minor streams in disturbed areas will be account for by way of the excluded works exemption under the WM Regulation (Section 4.1.1(ii)(a)). The median annual take by these structures located on minor streams within the operational area is predicted to be 112.7 ML.

e Licences in the Belubula River Upstream Carcoar Dam Water Source

The EIS identified the need to obtain 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 take of water from a water source which is not taken pursuant to Harvestable Rights or a statutory exemption. The WM Act requires both direct water take (ie direct take for water supply) and indirect water take, such as the interception of water (indirect pit inflow), to be accounted for.

There have been updates to the WALs recorded in the NSW Water Register for the unregulated Belubula River above Carcoar Dam Water Source since the submission and public exhibition of the EIS for the project. There are now four WALs for this water source, with respective allocations of:

- 2 ML (WAL43104) - privately held;
- 20 ML (WAL43105) – owned by Regis;
- 50 ML (WAL31476) – owned by Regis; and
- 192 ML (WAL31475) – owned by the Water Administration Ministerial Corporation.

These WALs, excluding WAL31475 (192 ML), are currently available for trading. Regis purchased 70 ML of the available entitlements (WAL43105 and WAL31476) following the exhibition of the EIS, and now hold 70 ML of surface water licence volume in the Belubula River Upstream Carcoar Dam Water Source.

f Licensing pathway

The surface water source for the mine development is the unregulated Belubula River above Carcoar Dam surface water source. As outlined above, 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 entitlements. 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 regarding this WAL.

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.

4.1.2 Surface water impacts

i Surface water model

DPIE - Water requires more information to improve understanding of the likely reductions in storage volumes and reliability of Carcoar Dam and proposed mitigation options. DPIE Water believes that the analysis in the EIS does not reflect the realities of inflows into Carcoar dam and how regulated flows are managed.

Regis Resources has developed a runoff-flow model, using the Australian Water Balance Model platform to derive site water balance, catchment runoff and river flow outputs. This includes a modelled flow input graph for Carcoar Dam, which differs significantly to recorded storage volumes at recession limb and low storage level conditions, such as during the Millennium Drought.

An explanation about this divergence is not given in the EIS. DPIE Water is concerned that the modelled flow input is not effectively simulating actual inflow situations. Given the small size of Carcoar Dam it is important that further work is undertaken on the surface water model so that predicted impacts and mitigation options are better understood.

Recommendations:

- Compare the adequacy of the site AWBM model to the Source model developed by DPIE – Water to form the accounting basis for storage reliability and flow release into the regulated Belubula River water source
- Provide DPIE Water with the input data to the AWBM model and model sensitivity runs to see if specific input variables are sensitive to outputs and comparisons between the AWMB model and DPIE Water's Source model for the Belubula River.
- Remodel the impacts on flow transmission downstream of the mining disturbance zone to Carcoar Dam to include sensitivity analyses of input variables to the AWBM model used for water balance and flow response through all stages of mining development and post-mine landform and drainage formation.

a Comparison of the AWBM to DPIE-Water's Belubula River source model

Ongoing consultation has been held with DPIE-Water during the response to submissions phase of the project in relation to Section 2 of the DPIE-Water submission on the EIS. In April 2020, correspondence was sent to DPIE-Water to clarify the recommendations contained in Section 2 of their submission. The correspondence provided further justification and maintained that the use of the Australian Water Balance Model (AWBM), a nationally recognised and accepted catchment-scale water balance model, provides results that are fit for purpose for assessing the potential impacts of the mine development (EMM letter dated 2 April 2020).

In addition, the letter also provided DPIE-Water with their requested calibrated input parameters used in the AWBM of the Carcoar Dam catchment as presented in the surface water assessment (HEC 2019; Appendix J to the EIS), and outlined the proposed approach to the requested sensitivity analysis. The letter offered to provide additional output as needed from the Carcoar Dam AWBM presented in the EIS to DPIE-Water so that the model may be compared to the Belubula River Source model outputs.

A meeting was subsequently held with DPIE, DPIE-Water, Regis, HEC and EMM on 14 April 2020. It was agreed at the meeting that HEC would provide additional background information on the Carcoar Dam AWBM to DPIE- Water. DPIE-Water subsequently provided additional advice in writing on 23 April 2020 outlining DPIE- Water had reviewed the Carcoar Dam AWBM and confirmed the model is generally fit for purpose for assessing flow interception and reduction of river flow inputs to Carcoar Dam. DPIE-Water's advice noted, however, that extension of the period of record used to test and calibrate the model (including previous dry periods) would increase the confidence in the model's predictions of river flows above Carcoar Dam.

Accordingly, DPIE-Water provided data records of historical storage levels and release volumes which have subsequently been incorporated into the revised modelling. The revised model was undertaken in accordance with the recommendations of DPIE -Water.

b Revised Carcoar Dam AWBM

The Carcoar Dam AWBM was subsequently updated to account for the amended project and additional data. As requested by DPIE-Water, there was an emphasis on improving the model 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. Key model refinements included:

- implementation of flow 'routing' or attenuation of peak flow produced by the AWBM;
- increasing the surface storage capacity of the AWBM, which reduces the volume of flow in response to rainfall.

Results showing the comparison between the recorded and modelled stored water volumes in Carcoar Dam during this period are shown in Figure 4.3. This figure also shows modelled stored water volumes using the model parameters used for the EIS surface water assessment ("Modelled (EIS model)"). The good calibration between recorded and modelled stored water volumes in Carcoar Dam confirms that the model provides a reasonable fit for longer term simulation. The model is considered fit for purpose for assessing the potential effects of the project on inflows to Carcoar Dam. This is particularly evident in the model fit for the period of low volumes from 2003 to 2010 and in the recession, which occurred in 2018 to 2020 (refer to Appendix G of the Amendment Report).

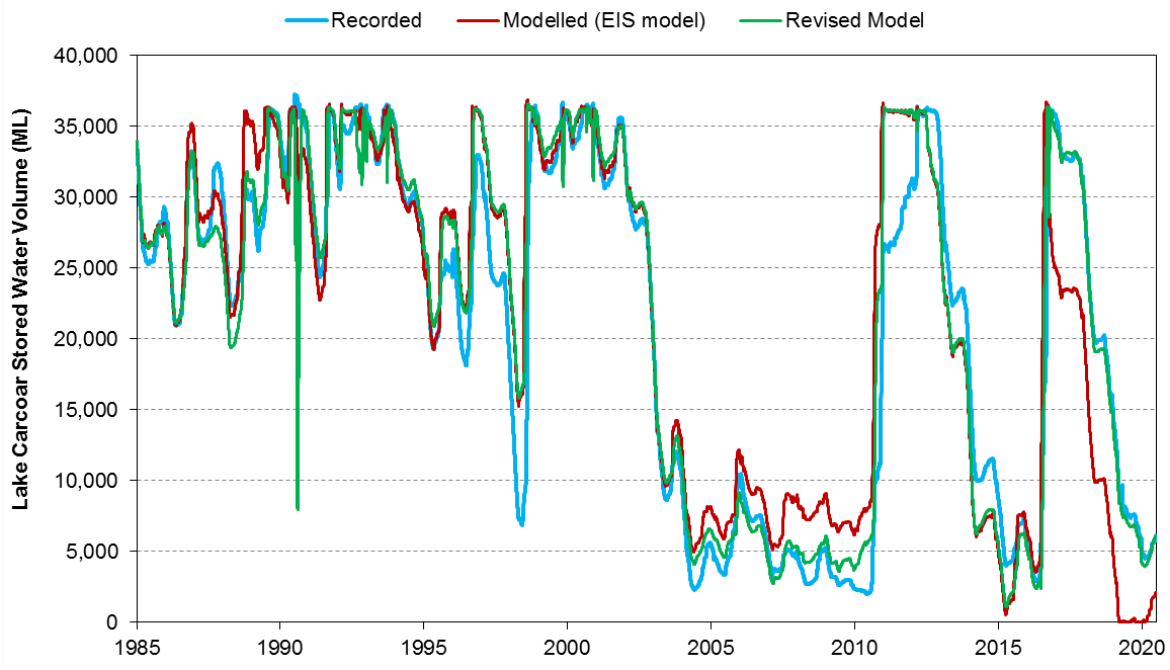


Figure 4.3 Comparison of recorded and modelled stored water volume in Carcoar Dam (HEC 2020)

c Sensitivity analysis

As recommended by DPIE-Water, sensitivity analyses have been undertaken to assess the effect that changes to the rainfall runoff model (AWBM) parameters would have on predicted inflows to Carcoar Dam. As agreed with DPIE- Water, AWBM surface store capacities were varied by +/- 20% to simulate one conservatively low estimate of runoff and one conservatively high estimate of runoff to observe the impacts on the model. Significant changes in modelled inflows in surface store capacities versus recorded Carcoar Dam volumes were observed and are illustrated in Figure 4.4. Adjusting AWBM surface store capacities by +/- 20% significantly reduces the model's ability to accurately simulate the recorded volumes in Carcoar Dam (Figure 4.4). Sensitivity analyses results for existing and project modelled inflows are provided in Section 4.1.1 of the revised surface water assessment (HEC 2020; Appendix G of the Amendment Report).

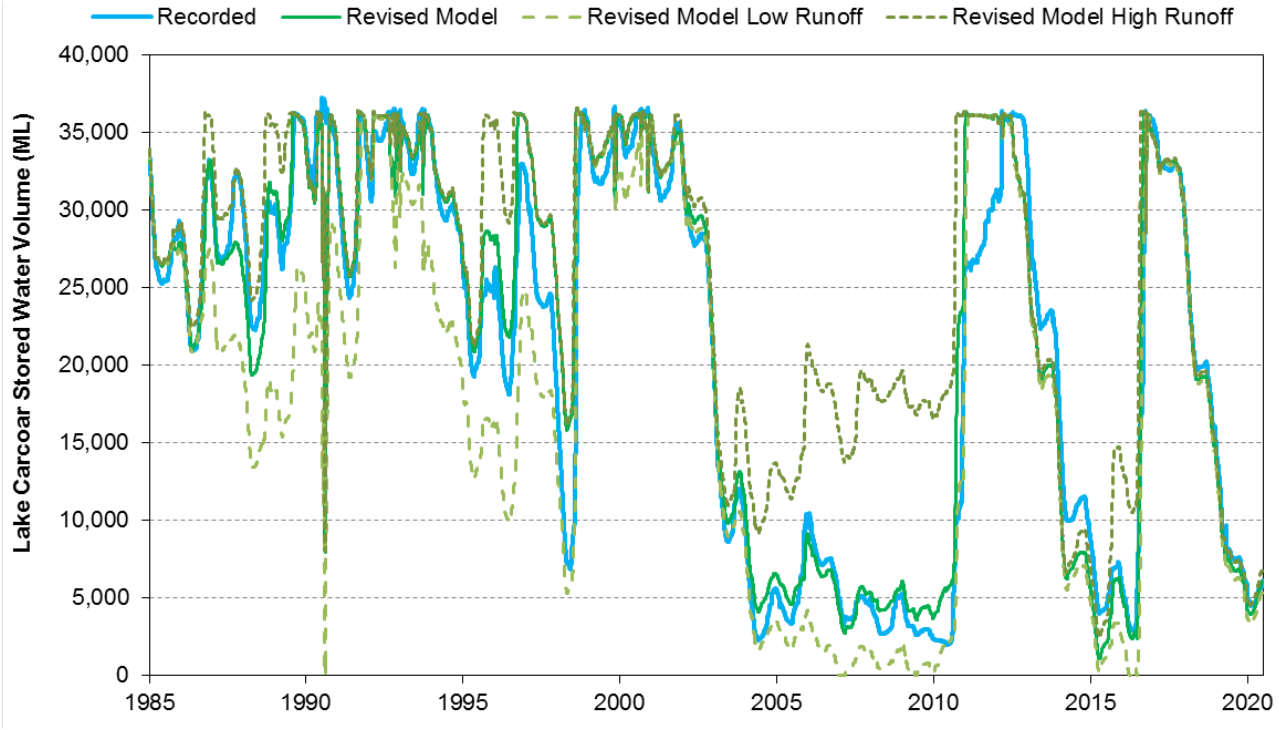


Figure 4.4 Comparison of recorded and modelled stored water in Carcoar Dam sensitivity analyses

ii Impacts to flows to Carcoar Dam

The EIS states that the mine will occupy 4.1% of the Carcoar Dam catchment, and will reduce catchment runoff and river flows that report to Carcoar Dam. It predicts a decrease in catchment inflows to range from between 60 – 2400 Ml per annum depending on the annualised climate conditions.

The analysis in the EIS (note s4.1.1 Appendix J):

- Calculates the modelled inflows when the project is operating by excising the catchment area of the project (964 Ha or 4.1% of the total catchment area).
- Compares the modelled inflows with or without the operating mine and highlights a 4.1% reduction in the median modelled flow (50% of time that flow is greater than modelled). This 4.1% reduction is then applied to all flow ranges.

The use of median or average dam inflows to guide the proponent's estimation of predicted impacts does not account for Carcoar Dam's reliance on high to flood flows to maintain adequate storage levels. These storage levels provide reliable water releases to supply high security licences and environmental flow requirements in the Belubula River downstream of the Dam. We require further analysis which better accounts for high to flood flows.

The loss of reporting catchment area to Carcoar Dam requires a risk assessment to quantify increased storage vulnerability and lower storage reliability due to reduced discharge entering Carcoar Dam and take of rainfall/runoff and stream flows downstream of the Vittoria State Forest.

DPIE Water requires further information to better understand the potential impacts to storage inflows, storage reliability and dam releases. This includes a detailed quantified analysis of existing river flows, runoff interception and consequential impacts to downstream river flow characteristics and storage volume and reliability. The analysis should explore river flow characteristics such as flow persistence and changes in catchment flow contributions to base and minimum flows, high flows and flood flows.

Recommendation:

- Revise the flow reduction predictions to Carcoar Dam based on sensitivity analyses of river flow impacts to Carcoar Dam.
- Provide a full account for flow interruptions and/or flow reductions contributing to Carcoar dam based on annual flow levels to all flow year scenarios included in the AWBM model based on the maximum 5% interception of catchment runoff contribution to river flows into Carcoar Dam, using 2016-17 as a wet year sensitivity run and 2017-18 as dry year.

a Impact to flows during operations

As noted in Section 4.1.2(i), HEC (2020) carried out a recalibration of the Carcoar Dam AWBM using additional historical storage levels and release volumes data provided by DPIE-Water. The model was then run using the full period of available historical daily climatic data from 1889-2020 to obtain a series of annual total inflows to Carcoar Dam. The same model was then run with the maximum catchment area captured by the mine development (964 ha) which equates to 4.1% of the total Carcoar Dam catchment excised. A comparison of the modelled "existing" and "with project" total annual inflows to Carcoar Dam during operations are summarised in Table 4.4 (further details are provided in the revised surface water assessment; Appendix G of the Amendment Report). For comparison, results from the modelling reported in the EIS surface water assessment (Appendix J of the EIS) are also presented in Table 4.4. A summary of the sensitivity analyses carried out to assess the effect that changes to the rainfall runoff model (AWBM) parameters would have on predicted inflows to Carcoar Dam is provided in Section 4.1.2(i)(c) above.

Table 4.4 Modelled inflow to Carcoar Dam for streamflow impact from catchment excision during operations (HEC 2020)

Percentage of time flow is greater than the modelled inflow	Existing inflow (ML/year)		With Project inflow (ML/year)		Decreased inflow due to maximum project extent (ML/year)	
	Revised Model	EIS Model	Revised Model	EIS Model	Revised Model	EIS Model
95%	1,574	1,463	1,509	1,402	65	61
90%	2,014	1,941	1,930	1,861	83	80
80%	2,554	2,408	2,448	2,308	106	100
70%	3,058	3,056	2,932	2,929	127	127
60%	3,628	3,645	3,478	3,494	150	151
50%	4,485	5,836	4,299	5,594	186	242
40%	6,236	7,917	5,978	7,590	258	327
30%	12,317	13,975	11,807	13,397	510	578
20%	22,646	24,995	21,709	23,961	937	1,034

As requested in DPIE-Water's submission, the model was used to estimate the inflows to Carcoar Dam during a wet year (using 2016-17 (July to June) flows) and a dry year (using 2017-18 (July to June) flows) with and without the mine development area. The results are summarised in Table 4.5. It is noted that "…the maximum 5% interception of catchment runoff contribution…" referred to in the DPIE-Water submission is incorrect. As stated in the EIS surface water assessment (Appendix J of the EIS) and the revised surface water assessment (Appendix G of the Amendment Report), there is a 4.1% reduction in the catchment area of Carcoar Dam at the maximum mine development disturbance area, reducing to less than 0.5% post mining. This level of change to inflows to Carcoar Dam will be imperceptible and within the natural variability in catchment conditions.

Table 4.5 Predicted modelled flows for 2016/2017 and 2017/2018

Scenario	2016-17 (ML)	2017-18 (ML)
Existing	65,648	1,299
At maximum mine development area	62,931	1,245

b Impacts to flows post closure

The potential impact on inflows to Carcoar Dam following mine closure has been modelled using the recalibrated Carcoar Dam AWBM. The model was run with the catchment area captured by the mine development area post closure excised (ie the 107 ha area reporting to the final void representing 0.46% of the total Carcoar Dam catchment). A comparison of the modelled "existing" and "post closure" total annual inflows to Carcoar Dam are summarised in Table 4.6. For comparison, results from the EIS modelling are also presented.

In addition to the reductions due to catchment excision presented in Table 4.6, groundwater modelling has been used to predict changes in interaction between surface water and groundwater (refer Appendix H of the Amendment Report). This can occur as either an increase in river leakage (to groundwater) or a reduction in baseflow (groundwater discharge to the watercourse).

Post mining, the peak increase in river leakage is predicted to occur 9 years after mining at 27.7 ML/year, and baseflow reduction is predicted to peak 5 years after mining at 13.1 ML/year (refer Section 4.1.3i)(a) and Appendix H of the Amendment Report). The combined predicted peak groundwater-induced loss is 41 ML/year 9 years after mining (consisting of 13.1 ML of baseflow reduction and 27.7 ML of increased river leakage). It is noted that baseflow reduction is an indirect take of groundwater and therefore requires a WAL from the relevant groundwater source, whereas the increases in river leakage is an indirect take from the river and therefore requires a WAL from the relevant surface water source.

The median peak predicted Carcoar Dam inflow reduction (post mining) therefore totals 62 ML/year (21 ML/year median decreased inflow plus 41 ML/year net groundwater-induced loss; refer Table 4.6).

Table 4.6 Modelled inflow to Carcoar Dam for streamflow impact from catchment excision post closure (HEC 2020)

Percentage of time flow is greater than the modelled inflow	Existing inflow (ML/year)		With Project inflow (ML/year)		Decreased inflow post closure (ML/year)	
	Revised Model	EIS Model	Revised Model	EIS Model	Revised Model	EIS Model
95%	1,574	1,463	1,566	1,456	7	7
90%	2,014	1,941	2,005	1,932	9	9
80%	2,554	2,408	2,542	2,397	12	11
70%	3,058	3,056	3,044	3,042	14	14
60%	3,628	3,645	3,612	3,628	17	17
50%	4,485	5,836	4,464	5,809	21	28
40%	6,236	7,917	6,208	7,879	29	37

Table 4.6 Modelled inflow to Carcoar Dam for streamflow impact from catchment excision post closure (HEC 2020)

Percentage of time flow is greater than the modelled inflow	Existing inflow (ML/year)		With Project inflow (ML/year)		Decreased inflow post closure (ML/year)	
	Revised Model	EIS Model	Revised Model	EIS Model	Revised Model	EIS Model
30%	12,317	13,975	12,260	13,909	57	66
20%	22,646	24,995	22,542	24,877	104	118

c Summary

The potential reduction in flows to Carcoar Dam have been minimised by clean water diversions and the inclusion of the pipeline development in the project, which will supply to the mine development otherwise surplus water from mining operations and Mount Piper Power Station near Lithgow, enabling a beneficial re-use of this water. The predicted impacts of inflows to Carcoar Dam are therefore limited to impacts associated with a small reduced catchment (a maximum of 4.1% during the operational phase and reducing to 0.46% post closure), minor increase in river leakage to groundwater and minor decrease in baseflow. This level of change is expected to be imperceptible in comparison with the natural variability in catchment conditions. Accordingly, the small loss of reporting catchment area to Carcoar Dam and project related flow reductions are considered to represent a negligible risk to increased storage vulnerability and lower storage reliability.

iii Accounting for impacts to regulated users

The Belubula River below Carcoar dam represents a reliable supply to numerous regulated river water users. Following further assessment as requested under s2 of this advice, Regis Resources may need to account for the reduction of regulated river flows as a result of mining disturbance which has reduced the reporting catchment to Carcoar Dam during the life of the mine and post mining.

As noted in Section 4.1.1iii), the mine development has been carefully designed to minimise impacts on local water resources. The vast majority of water needs for the mine development will be supplied from the pipeline development, supplying otherwise surplus water to the mine development and providing a reliable water source for the project. This will limit the water take from the Belubula River catchment to take primarily associated with catchment excision due to the disturbance footprint of the mine development.

Updated modelling of Carcoar Dam inflows has been undertaken in consultation with and using data supplied by DPIE-Water (refer revised surface water assessment, Appendix G of the Amendment Report). This has resulted in a median decreased inflow to Carcoar Dam of 186 ML/year at the maximum mine disturbance area. The maximum catchment area captured by the mine development represents 4.1% of the total Carcoar Dam catchment during mining. In the long-term, following rehabilitation, the area will significantly reduce and be 0.46% less than the current catchment area draining to Carcoar Dam. This level of change is not expected to be noticeable and will be within the natural variability of current flows.

Downstream users are most reliant on water within the river during low flow periods, and therefore this has been considered in detail. At maximum disturbance, flows in the Belubula River between the Mid Western Highway and above Carcoar Dam are expected to range between 697 and 1,509 ML/year during periods of low rainfall. This is compared with 764 and 1,574 ML/year that currently flows during low rainfall periods at Mid Western Highway and Carcoar Dam, respectively. 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.

Carcoar Dam has a catchment area of approximately 230 km^2 and a storage capacity of approximately 35.8 gigalitres (GL; HEC 2020). Carcoar Dam is managed by WaterNSW and is used primarily for regulated releases for licensed extraction, environmental, stock and domestic purposes. Only 10% of total annual flow in the Belubula River comes from Carcoar Dam releases, with the remaining 90% derived from inflows from unregulated tributaries (Department of Primary Industries 2013).

As the level of change to inflows to Carcoar Dam is expected to be imperceptible in comparison with the natural variability in catchment conditions, there will be no impact to the flows within the Regulated Belubula River below Carcoar Dam as a result of the mine development and therefore, no impacts on downstream regulated river water users.

iv Geomorphic impacts and river rehabilitation

The rehabilitation strategy presented in Appendix U of the Environmental Impact Statement does not address loss of available aquatic habitat, or propose any replacement habitat or rehabilitation of rivers on the McPhillamys mine site that will not be mined or buried. The approach to managing watercourses, and remediation strategy for impacted watercourses located on the McPhillamys mine site and on land under Regis Resources control requires improvement.

The proponent needs to demonstrate a strategic approach to riverine reconstruction which mimics pre-disturbance geomorphic processes and river types. This should generally follow the strategy outlined in A Rehabilitation Manual for Australian Streams by Rutherford, Jerie and Marsh Cooperative Centre for catchment Hydrology, LWRRDC Canberra 2000.

We require further information about site rehabilitation such as:

- the reconstruction of watercourses crossing the post-mine landform
- explanation about the application of the mining landform models such as SIBERIA mentioned in the EIS,
- drainage density or conveyance of flow south west from Vittoria State Forest to the undisturbed Belubula River

The procedures proposed for environmental monitoring of watercourses, flow alterations and geomorphic risks also require more explanation. The EIS (Appendix J ss 5.2-5.4) lacks any details as to timing, frequency, locations and justification for monitoring watercourse condition. Inspection and response to water management and erosion control structures on the site requires a longer term monitoring, maintenance and rehabilitation period than the two year period nominated by the applicant. Monitoring and maintenance periods should extend until vegetation is established and sediment transfer and channel geomorphic features are functioning. This usually requires a minimum ten year period commitment.

Recommendation – Post Determination

As part of the Water Management Plan (WMP), the proponent should:

- Develop a strategy for reconstruction of excavated or buried watercourses alongside a remediation and rehabilitation strategy for all watercourses lying within the mine project area. This must aim to recover pre-disturbance geomorphic processes and river forms where available.
- Devise a remediation and reconstruction strategy for watercourses of 3rd order and greater located within the disturbance envelope. The strategy should be consistent with Rutherford, Jerie and Marsh A Rehabilitation Manual for Australian Streams Cooperative Research Centre for Catchment Hydrology, LWRRDC, Canberra 2000.

- Develop a monitoring and response strategy that includes watercourse re-establishment, monitoring and remediation for at least ten years post-mining, to maintain responsibility for watercourse structure and integrity until riparian vegetation is established.

a Conceptual post closure clean water diversion

During the post closure phase of the mine development, it will not be possible to reinstate the reaches of the Belubula River and associated tributaries removed by the mine development due to the development of the TSF in the upper tributaries of the Belubula River valley. This location has been selected as the optimal location for the TSF through a vigorous TSF options investigations and analysis (refer Appendix G). The TSF is ideally located at the headwaters of the catchment as it will be less affected by inundation from high rainfall upstream events than downstream catchment locations, and provides a relatively efficient storage in terms of embankment construction, tailings rate of rise and control of seepage.

While it will not be possible to reinstate watercourses on the surface of the TSF (in order to maintain the integrity of the TSF capping), a final diversion structure will be constructed that generally mimics natural geomorphological features consistent with appropriate reference reaches within the catchment and guided by *A Rehabilitation Manual for Australian Streams* (Rutherford, Jerie & Marsh 2000) or current best practice natural channel design guidance. This method will ensure that, where possible, constructed waterways will have similar characteristics in terms of stream type, alignment, riparian zone width and longitudinal grade to the existing watercourses.

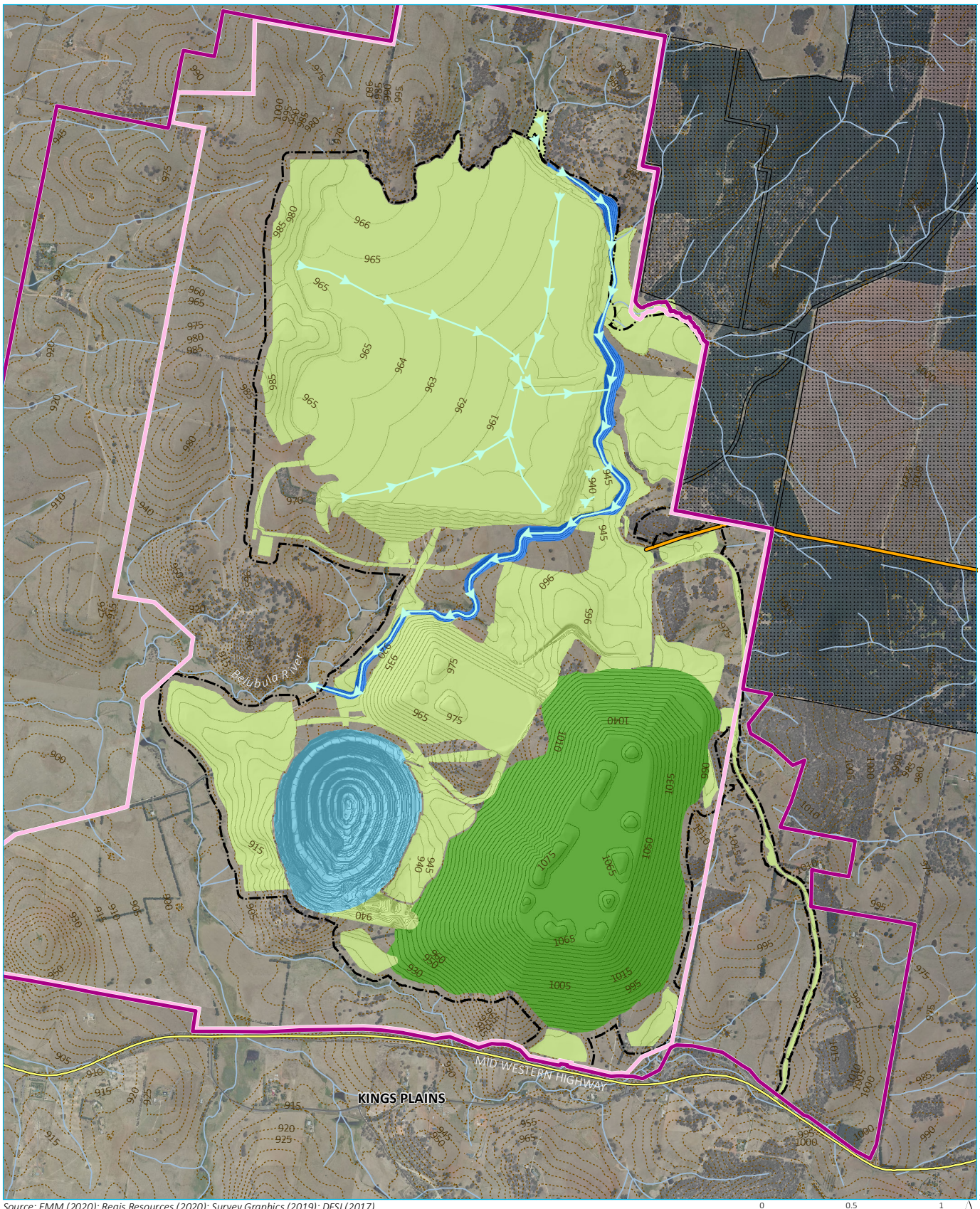
The diversion will be fenced to exclude stock (other than the crossing point) and will be revegetated with appropriate endemic riparian community species to form a riparian corridor along the diversion using the structural dominant species from the Mountain Gum-Manna Gum open forest of the South Eastern Highlands Bioregion Plant Community Type (PCT) (PCT 951).

The stability and rehabilitation of the clean water diversion will be monitored in accordance with the methods described in section 6 of the EIS Rehabilitation and Landscape Strategy using analogue sites, appropriate completion criteria and annual formal rehabilitation monitoring. The clean water diversion will not be considered stable and rehabilitated until it meets the agreed rehabilitation criteria.

The post-closure drainage system is detailed in the Amendment Report - Rehabilitation and Landscape Management Strategy Addendum (EMM 2020c) and ATCW (2020). A key component of the post-closure drainage system is a water diversion that will be constructed around the eastern side of the TSF.

Infilling of a small area of to the north of the disturbance footprint, will be required to allow water to freely drain to the constructed diversion channel. This detailed design of the diversion channel will facilitate construction of a more 'meandering' waterway which will focus on the design objectives to be implemented during the closure phase. The approach taken in terms of rehabilitation of the TSF is such that runoff from rehabilitated surfaces will drain to the final water diversion. This diversion will allow almost the entire catchment to be reinstated post mining (with the exception of a comparatively small area which will report to the final void, refer Section 4.1.1iii) above). A conceptual layout of the revised post closure drainage system is shown in Figure 4.5.

The alignment of the southern end of the water diversion has been revised for the amended project to facilitate channel gradients more consistent with the natural gradients of the Belubula River. The final 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 will be fenced to exclude stock (other than at crossing points) and will be revegetated with appropriate riparian community species to form a riparian corridor along the diversion. Species proposed for use in rehabilitation will be indigenous, and consistent with riparian communities within the local catchment.



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

Conceptual post closure drainage system

McPhillamys Gold Project
Submissions report
Figure 4.5

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_RLMS_AR\ARRLMS006_PostClosureDrainage_20200812_03.mxd 2/09/2020

b Impacts to aquatic habitat

The EIS Aquatic Ecology Assessment (EMM 2019b) included as Appendix O in the EIS assessed loss of aquatic habitat as a result of the mine development component of the project and outlined Regis was considering a range of biodiversity offset and habitat enhancement initiatives to ensure biodiversity values are maintained or improved in the long-term (EMM 2019b). The Amendment Report Aquatic Ecology Assessment Addendum (EMM 2020d) (refer to Appendix N of the Amendment Report), assessed the revised disturbance footprint of the amended project and provided further information regarding the area of aquatic habitat that will be removed as part of the amended project and the proposed aquatic offset approach. Further detail on the proposed aquatic offset strategy is provided in the response to DPI Fisheries submission on the EIS (refer Section 4.9 below). As outlined in Chapter 14 of the EIS, the biodiversity management plan will document operational and post closure requirements for ongoing monitoring of impacts on aquatic and riparian ecology and the implementation of appropriate aquatic rehabilitation programs within the mine development area outside the disturbance footprint along waterway banks and within the riparian zone.

c Landform models

The DPIE-Water submission requested further information about site rehabilitation including an explanation of the application of the mining landform models such as SIBERIA mentioned in the EIS. As outlined in Appendix U of the EIS, the waste rock emplacement design has been modelled using the Water Erosion Prediction Program (WEPP), SIBERIA and the Revised Universal Soil Loss Equation (RUSLE) to determine stable slope designs that will withstand the critical shear from overland and concentrated flows (Landloch 2019).

WEPP is used to develop slope gradient and slope length rules for the design of slopes. WEPP considers parameters for rainfall intensity and rainfall erosivity, effective hydraulic conductivity, critical shear for rills formation, rill detachment and interill detachment and sediment size (Landloch 2019). These parameters are commonly derived from rainfall simulation and flume trials of different materials.

The slope design is then tested using the SIBERIA landscape evolution model which simulates the evolution of the slope under the effect of runoff and erosion for a 500-year period using erosion rate parameters including erosion rate parameters and runoff volume per unit time at a point.

The erosion modelling for the waste rock emplacement demonstrated a very low rate of erosion primarily due to the low erosivity of rainfall and the amount and consistency of rainfall which will allow adequate vegetation cover (Landloch 2019).

The landform evolution modelling demonstrated that there were small areas of concentrated flow as a result of incorporating geomorphic features in the landform such as ridges and depressions where the critical shear of concentrated flow may exceed the critical shear value of the vegetated soil. Rock/soil matrices will be used if required, in those areas. Detailed soil characterisation and refinement of the WEPP and SIBERIA modelling will be undertaken during the development of the MOP to refine where rock/soil matrices will be required prior to commencement of rehabilitation on the waste rock emplacement.

WEPP predicted annual average erosion rates of less than 2 t/ha/y (ie no rills) for the waste emplacement area and a peak erosion rate of less than 5t/ha/y in its rehabilitated state (60 to 80% grass cover) which is equivalent to SLC 1 or very low erosion hazard as defined by Landcom (2004).

d Drainage density or conveyance of clean water flows

As described in Section 4.1.1iiib), a water balance model of the clean water diversion dams was developed to simulate the volume of water held in and pumped from the CWF1 (both CWF1A and CWF1B) (refer Figure 4.1). This model assumed a maximum design pump rate of 670 L per second to dewater the CWFs to the Belubula River. As detailed in the revised surface water assessment (Appendix G of the Amendment Report), the pipeline outfalls will be carefully designed to dissipate flow energy before allowing the flow to re-enter the Belubula River. This will involve the use of an engineered stilling basin. Erosion protection (eg rockfill riprap) will be integrated into the design to further control the risk of erosion. The stilling basin and erosion protection will be designed to ensure the flow velocity and associated flow energy is dissipated and flow returned to the Belubula River at a suitable velocity to control erosion (refer Section 4.2.3(ii) for further discussion).

v Project water management plan

The WMP for the project will be a dynamic management plan, updated as required throughout the project to meet the construction, operational and post closure water management and monitoring requirements.

The following monitoring, in addition to continued baseline surface water quality and rainfall monitoring, will be included in the WMP for the construction and operational phases of the project to monitor existing watercourse condition outside of the disturbance footprint:

- Continual stream flow monitoring of the Belubula River downstream of the disturbance footprint and Tributary A.
- Channel stability: bi-annual monitoring (spring and autumn) via established photo and assessment points on the Belubula River downstream of the proposed TSF Runoff WMF (to be established immediately prior to construction) at approximately 50 m intervals downstream to the confluence with Tributary A. The bi-annual timing is designed to assess the potential effects of high intensity summer storms and prolonged winter rainfall periods.
- Water Quality: all streamflow monitoring stations will include continuous water quality monitoring sensors for pH, EC, temperature and turbidity. Monthly monitoring of water quality for all site water storages should also be undertaken.
- Erosion and Sediment Control Structures: routine (ie monthly) inspections of sediment control structures as well as inspections following rainfall events of 20 mm or more in a 24 hour period will be conducted during operations by site personnel.
- Diverted Volumes: monthly volumes of water pumped from CWF1a/1b, CWF2 and CWF3 to the Belubula River by flow meter.

The WMP will also include provision for strategies relating to the construction of a post closure waterway to replace waterways removed by the mine development. These strategies will aim to construct a final diversion that incorporates pre-disturbance geomorphic processes and river forms where available and will be consistent with Rutherford, Jerie and Marsh (2000).

A watercourse monitoring and response strategy will also be developed as part of the overall WMP for the closure phase. This strategy will include monitoring and remediation of the final diversion, to maintain responsibility for watercourse structure and integrity until riparian vegetation is established. 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. Reviews will 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. If objectives are not substantially met within the two year period, management measures will be revised and the monitoring period extended. Monitoring and maintenance periods will continue until vegetation is established and sediment transfer and channel geomorphic features are functioning.

4.1.3 Groundwater

i Groundwater take

According to the base case modelling scenario during mining, the water take from the open cut mine is predicted to peak at a maximum of 890ML/yr from groundwater inflows, 14.6ML/yr from reduced baseflows to the surface water source, and 24ML/yr due to leakage from the surface water source. Modelling for the worst case scenario significantly increases this predicted take to 2670ML/yr from groundwater inflows. Sufficient license entitlement will need to be held to account for the predicted take from the relevant water sources.

a Predicted take

The numerical groundwater model reported in the groundwater assessment (Appendix K of the EIS) has been updated to assess the potential impacts of the revised mine schedule of the amended project. Details of the model updates are provided in the groundwater assessment addendum (Appendix H of the Amendment Report). Table 4.7 presents the groundwater inflows to the open cut pit and baseflow reduction predicted for the amended project with a comparison to that predicted in the EIS (base case). The base case represents the most likely case for the mine development project, as the hydraulic properties applied in the base case model represent the current understanding and are considered most appropriate for the hydrogeological environment.

For the amended mine plan, the predicted inflow rate peaks in mining Year 2 at 580 ML/year, with a second slightly smaller peak in Year 5 at 557 ML/year, declining to 160 ML/year in mining Year 11. The mine inflow rates correlate with volumes mined, and the periods of higher inflow correlate with mining occurring in the simulated weathered zone. The predicted peak inflows for the amended project are lower than the previous simulated mine schedule (EIS base case) due to the steadier development profile scheduled over the first years of the amended project.

Table 4.7 Predicted direct and indirect groundwater take (amended project)

Scenario	Groundwater inflows to open cut pit (peak)	Baseflow reduction (peak)
EIS base case	890 ML/year	15.7 ML/year
Amended project	580 ML/year	14.2 ML/year

Note: the peak take is predicted to occur at different times during the simulated mine development.

In addition to groundwater take (direct and indirect) associated with the open cut pit, groundwater will be extracted from bores to meet the construction water requirements in the first nine months of the project (prior to the pipeline development coming online). The construction water demand is estimated to be 15 to 20 litres per second (L/s) depending on climatic conditions, with a maximum total of 470 ML for the initial nine months (ie until the anticipated commissioning of the pipeline). This take is below the peak take that is predicted to occur in Year 2. Further details regarding use of production bores to meet the initial construction water requirements (initial nine months) is provided in Section 4.1.3(ii).

b Uncertainty analysis & Modelling for the worst-case scenario

The groundwater assessment (Appendix K of the EIS) included predictive uncertainty analysis to assess the potential range in groundwater inflows to the open cut pit and associated groundwater impacts. The uncertainty analysis was conducted in the form of 'scenario analysis with subjective probability' as defined by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) explanatory note on Uncertainty Analysis (Middlemis and Peeters 2018). This approach is viewed by Regis and the third-party technical reviewer (HydroGeoLogic) as appropriate for this low-risk project (ie a 'less productive' aquifer with few sensitive or high value receptors in the adjacent area).

The results of the uncertainty analysis are discussed in detail in the groundwater assessment (Appendix K of the EIS). The high inflow case of the uncertainty analysis reported a peak groundwater inflow to the open cut pit of 2,670 ML/year. This high inflow case is considered extremely unlikely to occur as it simulated the saprock layer with a specific yield value of 20%, compared to the more realistic (but still conservative) value of 5% applied in the base case scenario. Specific yield decreases with decreasing grain size: a specific yield of 20% is typical of coarse sand and gravel; clay material (like that observed in the saprock in the mine project area) is typically <1-5% (Johnson 1967). This simulation was conducted to assess the potential 'what-if' scenario of a very high specific yield in the weathered rock and is extremely unlikely to occur. As such, the hydraulic properties applied in the base case model represent our current understanding of the hydrogeological environment and are considered appropriate to provide an indication of most likely groundwater inflows to be observed during mining of the open cut pit.

As outlined in Section 4.1.3(iii), Regis commits to continual improvement of the numerical groundwater flow model as and when new data become available, particularly where there is a divergence of observed groundwater system response from the predicted. Information relating to volumes of water pumped from the open cut pit, groundwater level and quality monitoring (and other observations) will be collected, collated and reviewed by Regis and their specialist consultants prior to and during mine construction and development. The data will be used to review, verify and refine the groundwater model as needed. Should the groundwater inflows to the open cut pit be greater than predicted, additional groundwater licences will be acquired for the project. As shown below, there is adequate water available in the source.

c Groundwater licences held by Regis

The predicted groundwater take is sourced from the Lachlan Fold Belt Murray-Darling Basin (MDB) Groundwater Source, regulated by the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*. Based on the long-term average annual extraction limit (LTAAEL) of 253,788 ML/year and the current reported water rights in the water source (both WALs and Basic Landholder Rights), there is an estimated 104,156 ML/year of unallocated groundwater that is within the sustainable limit and available in the Lachlan Fold Belt MDB Groundwater Source.

The required volume of water (peak of 580 ML/year) would be extracted pursuant to an existing groundwater licence under the WM Act held by Regis with an entitlement of 400-unit shares for the Lachlan Fold Belt MDB groundwater source (WAL41835). Regis also lodged an expression of interest for an additional 200 unit-shares in this groundwater source under the July 2020 Controlled Allocation Order.

ii Impact of preliminary water supply production bores

Insufficient information has been provided to assess the impact of production bores proposed to supply water to the project.

The bore locations, proposed extraction rates, potential impacts on neighbouring water users and the ability to comply with the relevant water sharing plan and trading rules has not been provided.

Recommendation:

- Arrange an impact assessment of the construction and operation of proposed production bores to supply water for the project as soon as possible. This is to meet the requirements of the relevant water sharing plan and demonstrate the ability to trade the necessary entitlement to the bores.

As reported in the EIS (EMM 2019a), an external water supply pipeline (the pipeline development) will be constructed for the project and will be operational approximately nine months after commencement of the project construction. A water supply for the first nine months of the construction stage of the project is therefore required prior to the commissioning of the pipeline. The construction water demand is estimated to be 15 to 20 L/s depending on climatic conditions, with a maximum total of 470 ML for the initial nine months.

The construction water supply will be primarily sourced from groundwater via production bores within or close to the mine development area (refer to Figure 1.3).

A groundwater drilling and testing program was undertaken in the first and second quarter of 2020 to consider the potential for groundwater to provide the initial project water supply and to assess the potential impacts on groundwater users and the environment. This recent program was a follow up to previous groundwater drilling investigations completed in early 2019. The construction water supply groundwater investigation and impact assessment report is provided in Appendix D of the groundwater assessment addendum (Appendix H of the Amendment Report).

The investigation comprised the drilling and hydraulic testing of two test bores and four monitoring bores. The groundwater investigation demonstrates that groundwater can be used to meet the short-term construction water demand.

The results of the drilling and testing program have been used to select pumping rates for the operation of each test bore during the first nine months of the construction period. The recommended combined operating pumping rate for the two test bores is 15 L/s. Regis will drill and install additional bores to meet peak demands at drilling targets identified within the mine development area and on Regis-owned land to the north of the mine development project area.

The impact assessment considered the potential impacts associated with extracting 20 L/s from production bores. Potential impacts have been assessed as follows:

- localised groundwater level drawdown around the production bores extending up to 500 m from the bores. There are no third-party bores within the modelled drawdown;
- the predicted extent of drawdown will be significantly less than the predicted drawdown from the open cut pit due to the limited and one-off period of time that abstraction will occur over the construction phase of the project, and the shallower depth of pumping; 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. Based on the existing understanding of the Belubula River (Appendix G of the Amendment Report and Appendix C to this report), this is a minor change and not expected to be measurable.

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 WM Act held by Regis with an entitlement of 400-unit shares for the Lachlan Fold Belt MDB 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.

It is noted that water from production bores will be pumped to the CWMF.

iii Groundwater model upgrade

The numerical groundwater model (herein the model) reported in the EIS for making impact predictions was constructed and calibrated in steady state with transient verification. The proponent has provided a 'Class 1' model confidence classification which is appropriate for the model presented in its current form. It has been adequately peer reviewed following the Australian Groundwater Modelling Guidelines (2012), with the review confirming the model class given, but suggesting many of the model's elements can be considered "Class 2".

The model Class 1 strictly complies with the requirements of the AIP as the directly impacted water source is not classified as a "reliable water supply". However due to potential risk to adjacent groundwater and downstream surface water users it is considered that the model utilised to make predictions of surface water/groundwater take and impacts is not commensurate with the risk posed.

The proponent has committed to upgrading the model as new data becomes available. They should aim for a Class 2 or Class 3 groundwater model as defined by Australian Groundwater Modelling Guidelines (2012). A number of refinements to the model are required before the model would be considered by DPIE - Water as 'fit for purpose' for the degree of risk posed. Recommendations are given below to improve the robustness of the model predictive capacity.

The groundwater model predicts significantly higher volumes of seepage from the TSF (peak of 700 ML/year) than estimated in the TSF " Definitive Feasibility Study" (Appendix D to the EIS; peak of 117 ML/year). Because of this uncertainty, a model upgrade plan should include a commitment to improve the reliability of seepage estimates and include geochemical modelling (such as PHREEQC/MT3D) to refine estimates of leachate concentrations. Further, consideration should be given to incorporating the operation of the proposed back-up interception bores in a revised model.

Recommendation:

- Review the current model limitations and provide a model upgrade plan. The model upgrade plan is required to take into account all baseline data and develop a fully functional transient model.

Recommendation – post determination:

- Hold to its commitment to updating the model to incorporate the increasing period of baseline data in order to undertake a transient calibration of the model. The model should be sufficiently improved to a Class 2 classification as a minimum within 3 years of approval.
- Include in the model upgrade plan a commitment to improve the reliability of seepage estimates from the TSF and include geochemical modelling (such as PHREEQC/MT3D) to refine estimates of leachate concentrations. Further, consideration should be given to incorporating the operation of the proposed back-up interception bores in a revised model.

a Model classification and fitness for purpose

In the groundwater assessment (Appendix K of the EIS), EMM presented the groundwater model as Class 1 in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012; hereafter referred to as the "modelling guidelines"). The modelling guidelines suggest potential uses for a Class 1 model include:

- predicting long-term impacts of proposed developments in low value aquifers;
- estimating impacts of low-risk developments; and
- understanding groundwater flow processes under various hypothetical conditions.

The third-party reviewer (HydroGeoLogic) determined that the groundwater model is consistent with attributes of a confidence level of Class 1 with elements of Class 2 (and Class 3), and that it is fit for purpose and suitable for impact assessment scenario modelling purposes (see Appendix H of the groundwater assessment (Appendix K of the EIS)).

The groundwater model is deemed fit for purpose by EMM and the third-party reviewer, HydroGeoLogic. This is based on the low productive aquifer and low risk context. There are few groundwater users in the area, with locations of bores corresponding to proximity to road and infrastructure (eg housing, stock areas) access rather than clustered within a particular geological unit. This is consistent with the observations that the geology has generally low hydraulic conductivity and storage. The uncertainty analysis has been designed with a wide range of parameter values to account for the low coverage of calibration data and to assess potential impacts of the project.

DPIE engaged JBS&G to conduct a review of the groundwater assessment completed for the EIS. Consultation between DPIE, JBS&G, Regis, EMM and HydroGeoLogic personnel occurred in late 2019 and early 2020 to discuss the findings of the review and agree a path forward to respond to the queries raised. Additional work completed to respond to and close out queries raised by JBS&G provides further confidence in the model results (including uncertainty analysis) and confirms that the groundwater assessment completed for the EIS adequately assessed the potential risk of the project on landholders and other sensitive receptors.

The model is demonstrably fit for purpose, consistent with the modelling guidelines and the findings of third-party reviews.

b Model upgrade plan

The groundwater model will be reviewed over time and updated using additional baseline data and data from active mining. As mining progresses, a need for further model updates will be assessed every two years based on evaluation of groundwater monitoring data and findings of impact verification. Regis will apply the adaptive management approach to all environmental related aspects of the project, including assessing groundwater-related impacts.

Upgrades to the model using additional data and actual data responses to stresses will result in the model predictions becoming more accurate over time, and the model classification will also increase as per the current version of the modelling guidelines (Barnett et al 2012).

The following information will be collected, collated and reviewed by Regis and their specialist consultants prior to and during mine construction and development. The data will be used to review, verify and refine the groundwater model as needed. The additional data includes:

- additional hydrogeological data from field investigations, including where possible, hydraulic tests and estimates of aquifer storage and hydraulic conductivity;
- groundwater level and quality monitoring that continues to be collected from Regis' dedicated groundwater monitoring network, including landholder bores and from future monitoring bores installed as part of the project (discussed further in Section 4.1.3(vi));

- surface water flow monitoring – since submission of the EIS and following approval, Regis installed a weir to allow monitoring of surface water flows at the proposed location downstream of the confluence of the Belubula River and Tributary A. The weir was commissioned in March 2020 and data is collected as part of baseline monitoring. Typically, one to two years of data is required to develop adequate seasonal variation data to inform surface water modelling and associated assessments. The data collected will be used to review the existing conceptual understanding regarding surface water-groundwater interaction;

- annual monitoring via established photo and assessment points on the Belubula River downstream of the proposed TSF (to be established immediately prior to construction) at approximately 50 m intervals;

- monitoring of volumes of water pumped from the open cut pit, all production bores used by the mine development, and between selected storages in the water management system; and

- monitoring of seepage collected by the TSF seepage interception drain.

Mine construction is expected to occur over one to two years and, during this time, groundwater observations and abstraction records will be collated and reviewed. However, the greatest effect on groundwater flows (including levels) is expected to occur during mining Year 2 when the open cut pit is predicted to intercept the regional watertable. Groundwater level observations and groundwater abstraction records (from bores and the pit) during the first two years of mining will be collated and used to review, and potentially update, the groundwater model.

Regis commits to conducting a review of the groundwater model in mining Year 2, unless significant changes are made to the mine plan and schedule. As part of future improvements, the groundwater model will include assessment of:

- climate sensitivity analysis;

- river conductance sensitivity analysis;

- simulation of Regis production bores; and

- additional uncertainty analysis as appropriate.

In order to further assess potential impacts of the TSF from a hydrogeochemical perspective as part of future improvements, Regis will consider revision of how the tailings placement is simulated to refine seepage estimates and include a geochemical assessment to refine estimates of leachate concentrations.

As mining progresses, a need for further model updates will be assessed every two years based on evaluation of groundwater monitoring data and findings of impact verification. It is expected the confidence level of model predictions will increase over time as the model is updated to reflect the observed effects on groundwater from the monitoring program.

iv Groundwater impacts to 3rd parties

The project is located within the Lachlan Foldbelt NSW MDB Fractured Rock Groundwater Source. The water source is classified as a “less productive” aquifer, hence under the terms of the AIP is not a “reliable water supply”. However, this portion of the Lachlan Fold Belt is host to significant existing licenced works used for drinking water and stock water supply.

The predicted 100-year 2 m drawdown contour is entirely within lands owned by the proponent (and mine lease) therefore satisfies AIP requirements for impacts on adjacent licenced water users. Uncertainty analysis presented in Section 6.4.3 (a) for drawdown related impacts indicate that it is unlikely even under 'worst case' scenario that third party bores will experience groundwater drawdown greater than 2 m.

Recommendations – post determination:

- Improve the sensitivity and uncertainty assessment by undertaking a closer investigation of the parameters associated with the TSF and river/creek features (including adjacent Belubula River) in accordance with recommendation made in the Peer Review (Appendix H).
- Separate the river fluxes from TSF fluxes for the 10 and 100 year post mining model balance so that volumes may be accurately and individually accounted.
- Include the extraction from the identified site production bores in the model.
- Considers undertaking aquifer stress tests to measure aquifer parameters to better constrain model calibration.
- Incorporate climate change scenarios into the predictive modelling given the 100 year horizon shows the greatest impacts of the activity.

a Future modelling

As outlined in Section 4.1.3(iii), the groundwater model will be upgraded over time using additional baseline monitoring data and data collected once active mining commences. Future upgrades will take into consideration new information as it becomes available, the existing recommendations of the third-party review (HydroGeoLogic), and additional discussion with DPIE's technical reviewer (if required). Future modelling will include:

- additional monitoring data;
- climate sensitivity analysis will be assessed;
- river conductance will be assessed as part of additional sensitivity analysis;
- simulation of the TSF in the groundwater model will be reviewed;
- Regis production bores will be included in the groundwater model;
- additional uncertainty analysis will be conducted as appropriate; and
- further reviews by third party reviewers (if required).

b Separate predicted rives fluxes from TSF fluxes

The groundwater assessment addendum report (Section 6.1.1 in Appendix H of the Amendment Report) presents the predicted fluxes of the river boundary condition for watercourses separate from the fluxes of the simulated TSF. The results of the base case presented in the groundwater assessment (Appendix K of the EIS) and the amended project scenario are re-presented in Table 4.8 below. The table presents separate river fluxes from TSF fluxes at the end of mining and 100 years post mining, as well as other model water balance components.

Table 4.8 Modelled water balance comparison between the EIS base case and amended project scenario at various prediction time periods

Component	End of mining [1]				100 years after mining			
	EIS base case (Year 10)		Amended project (Year 11)		EIS base case		Amended project	
	Inflow (ML/day)	Outflow (ML/day)	Inflow (ML/day)	Outflow (ML/day)	Inflow (ML/day)	Outflow (ML/day)	Inflow (ML/day)	Outflow (ML/day)
Rainfall recharge	20	-	20	-	20.9	-	21.3	-
Evapotranspiration	-	31.2	-	31.1	-	31.6	-	31.6
Baseflow to river boundary conditions	-	5.2	-	5.2	-	5.2	-	5.2
Leakage from river boundary conditions (excluding the TSF)	13.4	-	13.4	-	13.4	-	13.6	-
Leakage from the TSF river boundary condition	1	-	1.1	-	0.8	-	0.8	-
General head	14.3	11.3	14.3	11.3	14.3	11.3	14.3	11.3
Drain (mine dewatering and TSF drain)	-	0.9	-	0.9	-	-	-	-
Storage	0.1	0.3	0.2	0.5	0	0.9	0	1.7
TOTAL	**48.8**	**48.9**	**49**	**49**	**49.4**	**49**	**50**	**49.8**
Mass balance percentage error	**-0.1%**		**0.01%**		**0.01%**		**0.02%**	

Note: 1: the mine life simulated in the EIS base case model is 10 years, compared to 11 years simulated for the amended project.

c Aquifer stress tests

As outlined in Section 4.1.3(iii), the groundwater model will be upgraded over time and with additional baseline data and data from active mining. Hydraulic tests performed at a bore (which can be carried out for periods of days or weeks at the constructed bore maximum pumping rate) provide useful and local estimates of aquifer properties, however the flow rates and stress applied to the hydrogeological units is significantly less than predicted rates of inflow to a mine.

The results of all baseline monitoring, including results of hydraulic tests conducted for the mine development (such as those completed as part of the construction water supply groundwater investigation and impact assessment; Appendix D of the groundwater assessment addendum) will be used to continue to review and update (as needed) the conceptual hydrogeological understanding of the mine development area. This information, including additional information regarding aquifer properties will be considered as part of model verification.

v Groundwater impacts to GDEs

The EIS provides information on GDEs within the mine area and concludes that the predicted impacts on these GDEs will be minimal. Water table declines are predicted to encroach upon GDE communities. A community of Mountain/Manna Gum trees are expected to have reduced access to groundwater during periods of low rainfall when soil moisture is low. The material effects of those impacts have not been described. The quantum of water table decline has also not been reported.

Recommendation:

- Provide more details on the potential water table drawdown and any material impacts this might have on GDE communities.

Vegetation that is found in the area has attributes that allow resilience and resistance to climate variability, such as being able to cope with low soil moisture levels, reduced water loss during dry periods or being able to access groundwater when the soil water reservoir is depleted. The Biodiversity Assessment (Appendix N of the EIS) documented vegetation mapping conducted in the mine development area. Due to refinements of the project and adjusted approach to the assessment, the Biodiversity Development Assessment Report has been prepared for the project (Appendix M of the Amendment Report). In addition, the numerical groundwater model has been updated to assess the potential impacts of the revised mining and tailings schedule of the amended project (groundwater assessment addendum, Appendix H of the Amendment Report).

Further information on the methodology for identifying groundwater dependent vegetation and results of the assessment are provided in the Biodiversity Development Assessment Report (Appendix M of the Amendment Report). Further information on the groundwater model update for the amended project is provided in the groundwater assessment addendum (Appendix H of the Amendment Report).

The GDE Atlas (BOM 2013) does not show any terrestrial GDEs as occurring in the project area. No high priority GDEs are identified in the water sharing plan for NSW *Murray-Darling Basin Fractured Rock Groundwater Sources 2020*. Although terrestrial GDEs are not predicted to occur in the project area, the Biodiversity Development Assessment Report has identified the following PCTs (outside of the project disturbance area) 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)[1].

[1] Note in the project area, 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 project area is within the disturbance footprint and therefore will be removed by the project.

This means that these ecosystems will use groundwater where 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 up to 20 metres below ground level (mbgl) occurs and therefore is likely to have some degree of groundwater dependence.

The EIS groundwater assessment (Appendix K of the EIS) presented the predicted change in the depth to groundwater and the potential impact of that change on the identified trees associated with PCT 951 within the disturbance area. However, vegetation within the disturbance footprint will be cleared for project development. The assessment in the Biodiversity Development Assessment Report and groundwater assessment addendum (Appendix H of the Amendment Report) have assessed the potential impacts on the identified PCTs that are retained outside of the disturbance footprint.

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 (ie moderate to very high groundwater interaction, or 0+ to 2 mbgl) by the end of mining and 100 years following mining. This is likely to range from no impact on opportunistic groundwater dependent ecosystems (GDEs) in areas where no change is predicted.

Only PCT 951 is predicted to be affected by groundwater drawdown caused by dewatering of the open cut pit. 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 low interaction and dependence on groundwater (ie between 2 – 20 mbgl), water stress is not predicted to occur.

Accordingly, no negative groundwater access impacts are expected to occur for GDEs.

vi Groundwater monitoring

The baseline monitoring network includes 23 project specific monitoring bores and 10 existing (third party) bores. Groundwater monitoring (levels and quality) has been conducted since May 2014 in accordance with NSW government requirements. A Groundwater Monitoring and Modelling Plan was presented to DPIE for review in mid-2017 with a number of recommendations made including the requirement to have 2 years of baseline data for assessment.

Baseline monitoring is adequately described in the EIS with exception of the monitoring bores to be installed around the TSF as an 'early warning of potential seepage'. We require further information on the location of these bores.

Recommendation:

- Detail the monitoring including bore locations proposed around the TSF to provide early warning of potential seepage.

Section 7.3 of the EIS groundwater assessment (Appendix K of the EIS) outlined Regis' planned approach regarding groundwater monitoring and is documented in the Groundwater Monitoring and Modelling Plan (GMMP; EMM 2017). The baseline monitoring network is discussed in Section 3.6 and 4 of the groundwater assessment (Appendix K of the EIS). The groundwater monitoring network currently includes project specific monitoring bores and third-party bores. The network comprises standpipe piezometers with a combination of single and nested monitoring sites. Monitoring coverage spans the key hydrogeological units in the mine development, including the saprock, metasediments, volcaniclastics and alluvium. Groundwater monitoring (levels and quality) has been conducted since May 2014. The Regis environmental monitoring network also includes surface water flow monitoring sites, surface water quality monitoring, dust monitoring, and weather station.

Groundwater monitoring data will continue to be collected from Regis' project specific monitoring locations throughout the life of the mine. Data loggers that currently monitor groundwater levels will continue to operate.

The monitoring program will provide an early indication of potential impacts to sensitive receptors, including the Belubula River, GDEs, and existing users.

As part of the WMP for the mine development, the existing environmental monitoring network will be reviewed and adjusted (as needed) to ensure adequate spatial coverage and collection of data to validate and update groundwater modelling predictions and to ensure that predicted impacts (ie in most cases no impact) are measured at sensitive receptors. The ongoing development and expansion of the monitoring network will occur in consultation with EPA, NRAR and DPIE-Water, and as per the guidelines for the GMMP, which will evolve as the project progresses. The monitoring program during the operations phase of the project will include monitoring and recording of groundwater abstraction (including mine water inflows), water use, pumping and handling (including water volumes pumped from and to water storages, the plant and the TSF), and the maintenance of associated flow meters.

The WMP will document the proposed mitigation and management measures for the approved project, and will include the surface and groundwater monitoring program, reporting requirements, spill management and response, water quality and level trigger levels, corrective actions, contingencies, and responsibilities for all management measures.

Groundwater quality performance triggers will be based on statistical analysis of the reported ranges in baseline concentrations of identified analytes of concern (eg pH, salinity concentrations, and concentrations of other analytes such as arsenic, cadmium, cyanide (free, WAD and Total), copper, sulphide, sulphate, selenium, fluoride and aluminium). Groundwater 'quantity' (head) performance triggers will be based on a combination of baseline head data for selected monitoring bores as well as comparison of observed and model predicted heads for different stages of mine development (operational and closure).

Two types of triggers will be defined for groundwater quality and quantity, 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 on implementing 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 measured data from model predicted heads. Triggers will also be assigned based on distance from the water affecting activity (ie TSF, open cut pit etc) and will be based on a typical Source-Pathway-Receptor assessment approach as illustrated in Table 4.9.

Groundwater monitoring bores will be installed as part of the project development, with locations to be finalised based on access, health, safety and environmental considerations. Zones where monitoring bores will be installed are presented in Figure 4.6. The monitoring zones are categorised based on the typical Source-Pathway-Receptor approach, with the areas based on the main water affecting activities: open cut pit, TSF, waste rock emplacement and WMF. Further details regarding the preliminary groundwater monitoring zones and the number of monitoring bores is provided in Table 4.10. Existing monitoring bores will be utilised for monitoring where possible, including existing third-party bores that are currently included in Regis' monitoring program. Final locations of the monitoring network will occur in consultation with EPA, NRAR and DPIE-Water.

Table 4.9 Source-Pathway-Receptor trigger level assessment approach

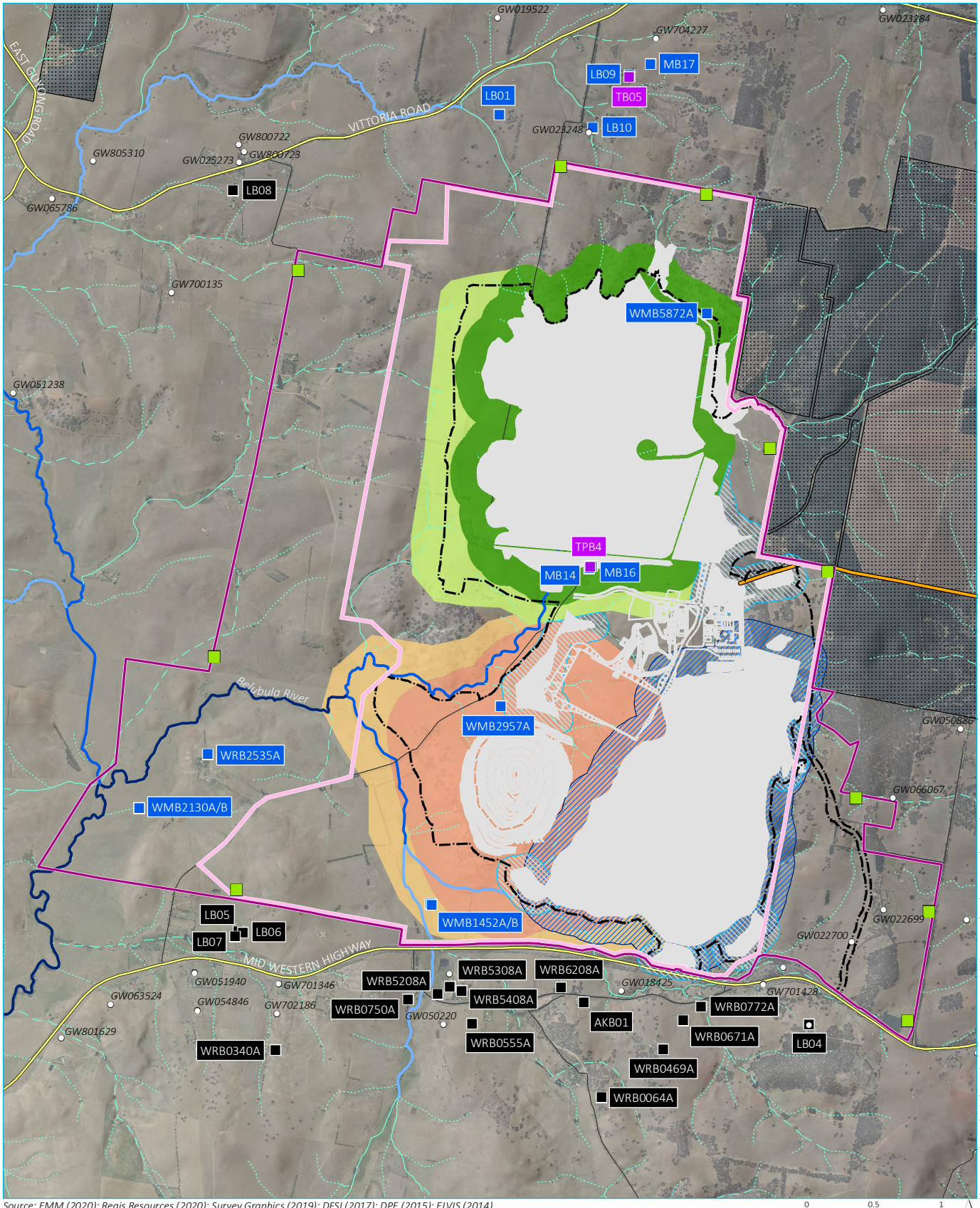
Category	Purpose	Definition and example
Source	Mine affected / performance monitoring	Bores associated with potential sources of impact. Used for diagnostic /information purposes to understand source water quality and levels (heads and flows) and potential for downgradient changes. Changes to groundwater quality and /or quantity (levels) will be observed at these locations in advance of other monitoring locations. Typically, trigger levels are not developed for monitoring bores that are in this category, but data collected from these bores is used to improve understanding.
Pathway	Early warning	Monitoring bores located downgradient of potential source and within the pathway between the source and receptor. That is, for a water affecting activity to result in a change in quality or quantity at a receptor, there must be a pathway between the source and the receptor (eg hydraulic gradient driving the movement of water). Monitoring will involve assessment of trends within the groundwater flow path and as the bore is located downgradient from the potential source, it acts as an early warning to identify unexpected changes that have the potential to affect receptors. Typically, trigger levels are developed for monitoring bores that are in this category using values that are based on site specific baseline data.
Receptor	Compliance	These monitoring bores are typically located within close proximity to identified receptors (eg landholder bores, watercourses) and are outside of the predicted area of influence of mining activities. Groundwater monitoring data provides information on groundwater conditions at receptor locations and is used for compliance monitoring. Trigger levels are developed for monitoring bores that are in this category using values that are based on site specific baseline data.

Table 4.10 Preliminary LOM groundwater monitoring zones

Water affecting activity	S-P-R	Preliminary number of monitoring bores	Purpose	Bore monitoring zone
TSF	Source	6	Monitor the performance of the seepage monitoring system (groundwater quality and levels). Monitoring locations will be based on predicted groundwater flow direction.	Combination of saprock (shallow) and metasediments (deep)

Table 4.10 Preliminary LOM groundwater monitoring zones

Water affecting activity	S-P-R	Preliminary number of monitoring bores	Purpose	Bore monitoring zone
	Pathway	4	Monitor for potential TSF seepage (groundwater quality and levels). Locations will be based on predicted groundwater flow direction.	Combination of saprock (shallow) and metasediments (deep)
Open cut pit	Source	6	Monitor groundwater level drawdown (groundwater levels). Some locations may have dual purpose to monitor potential for effects of the WRE and WMF (groundwater quality and levels), as well as effects of the pit.	Combination of saprock (shallow) and metasediments (deep)
	Pathway	4	Monitor groundwater level drawdown and surface water-groundwater interaction. Some locations may have dual purpose to monitor potential for effects of the WRE and WMFs (groundwater quality and levels), as well as effects of the pit.	Combination of saprock (shallow) and metasediments (deep)
WRE and WMF	Source and Pathway	4	Monitor potential for effects of the WRE and WMFs (groundwater quality and levels). Some locations may have dual purpose to monitor potential for effects of the WRE and WMFs.	Shallow saprock
-	Receptor	10	Monitoring at the project boundary to assess the potential for impacts (groundwater levels and groundwater quality) on receptors.	Combination of saprock (shallow) and metasediments (deep)



Source: EMM (2020); Regis Resources (2020); Survey Graphics (2019); DFSI (2017); DPE (2015); ELVIS (2014)

0 0.5 1 km

GDA 1994 MGA Zone 55

N

\\Emmsvr1\emm\Jobs\2018\J180395 - Regis McPhillamys EIS\GIS\02_Maps_GWA\GWA066_OpsMonitoringNetwork_20200903_03.mxd 3/09/2020

KEY

- Registered bore – not monitored
- Groundwater monitoring site - Regis
- Groundwater monitoring site - other landholder
- Test bore

Project application area

- Mine development project boundary
- Mining lease application area (Note: boundary offset for clarity)
- Disturbance footprint
- Mine development general arrangement
- Pipeline
- Receptor monitoring site (preliminary)

Monitoring zones

- WMF (source) monitoring zone
- WRE (source & pathway) monitoring zone
- Pit (source) monitoring zone
- Pit (pathway) monitoring zone
- TSF (source) monitoring zone
- TSF (pathway) monitoring zone

Existing environment

- Major road
- Minor road
- Vittoria State Forest

Strahler stream order

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

Preliminary groundwater monitoring network during operations

McPhillamys Gold Project
Submissions report
Figure 4.6

REGIS RESOURCES LTD

EMM creating opportunities

4.1.4 Pipeline development

i Pipeline water supply

The primary water supply for the project is to be sourced from an external licensed source via a pipeline. The proponent will need to ensure adequate arrangements are in place to secure the relevant term access to this water and that there are no restrictions on the water licence or the planning approval held by the water supplier that may impact this supply.

Recommendation:

- Confirmation be provided that there are no existing or likely future water licence or planning approval restrictions that may limit the supply via the pipeline.

The ongoing operation of the mine development relies on the continued supply of water. As noted in Section 2.14.4 of the EIS, the proposed Regis Resources Water Offtake Agreement (the agreement) with Centennial has been drafted with the intent of securing a reliable water supply to the mine development. Rights to the pipeline supply water sources will be authorised through the proposed water offtake agreement. This agreement will include provisions to ensure that there are no restrictions on the relevant WALs, or the planning approval held by the water supplier that may impact this supply.

The pipeline development will be designed and operated so that water from any single source or a combination of the three sources is always capable of delivering up to 15.6 ML/day to the mine development. This flexibility will provide ongoing water availability for the mine development in periods of low rainfall, which will affect the availability of water at the Springvale Coal Services Operation (SCSO), or operational changes at Mount Piper Power Station (MPPS).

The existing WALs held by Centennial and respective water sources relevant to the pipeline development water supply are summarised in Table 4.11.

Table 4.11 Water Access Licences held by Centennial

WAL number	Sydney Basin Coxs River (ML/year)	Sydney Basin (ML/year)
36443	585	-
36446	3,300	-
36445	2,701	-
41881	1,471	-
37340	329	-
36383		5,958
36449		2,523
37343		35
TOTAL	**8,386**	**8,516**

ii River Styles framework

The proposed 90km pipeline between Angus Place Colliery and the project site requires a significant number of watercourse crossings. The need to ensure bed and bank stability is maintained as part of construction of these crossings both in the short term and long term is critical.

Recommendation:

- Consult with DPIE Water to confirm fragile river reaches consistent with the River Styles framework that require remediation before and following pipeline installation to protect those rivers from degradation.

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). Notwithstanding, the Fluvial Geomorphology Addendum (Gippel 2020) prepared for the amended project (Appendix I of the Amendment Report) included an assessment using the River Styles framework.

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. 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). Two second order watercourse crossings along the amended pipeline route options were also included as they occurred on gullied reaches.

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 4.12. 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 determine the most appropriate construction method.

Recommended measures to protect high fragility watercourses as well as other watercourse identified as at risk of geomorphic change are outlined in Appendix I and summarised in Section 4.1.4(iii) below.

Table 4.12 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

Table 4.12 Pipeline corridor - River styles framework high fragility watercourses

ID[1]	Name	Stream order	Flow	River Style	Condition	Recovery Potential	Fragility
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 pipeline option, S: the southern pipeline option, refer to Appendix I for further details

2. Watercourses not identified in the River Styles Spatial Layer, however classified high fragility in Gippel (2020)

iii Pipeline construction

The pipeline is proposed to cross 112 watercourses between Angus Place Colliery and the mine site. Nine of these crossings are identified as perennial watercourses with the remainder as ephemeral. Two of the crossings are proposed to be constructed with directional drilling and the remainder to use open trenching methods. The individual assessments of each will be critical in understanding the risks to bed and bank stability and whether additional directional drilling sites will be required or specific mitigation measures. This will need to be addressed as part of the Construction Management Plan (CMP) development. The risk of bed incision exposing the pipeline has been raised in the EIS hence this needs to be mitigated in the detailed design and management stage.

These works need to be constructed in accordance with the "Guidelines for Controlled Activities on Waterfront Land (NRAR 2018)". Where there is an identified risk to bed and bank stability appropriate construction and rehabilitation measures will need to be applied to mitigate this risk. Minimising impact to downstream water users and the environment will be critical. Where there is the requirement to utilise coffer dams during construction, the flow downstream should be maintained via adequate diversions.

Recommendations – Post Determination:

As part of the Construction Management Plan, the proponent should:

- Addresses bed and bank stability.
- Devise a remediation and reconstruction strategy for watercourses of 3rd order and greater located within a two reach distance from the disturbance zone for pipeline crossings. The strategy should be consistent with Rutherford, Jerie and Marsh A Rehabilitation Manual for Australian Streams Cooperative Research Centre for Catchment Hydrology, LWRRDC, Canberra 2000.
- Develop a hierarchy of procedures for any excavation of watercourses to the proposed pipeline between Angus Place coal mine and the McPhillamys mine site based on the published NSW River Styles database.

This must prioritise protective mechanisms to those watercourses assigned high fragility classification and recovery potential classes.

- In addition, it is recommended that the proponent use the hierarchy of vulnerable rivers to identify the priority for protective works in any pipeline crossings that occur. The hierarchy of fragility classes is set out in the NSW River Styles database;
- Use the protection requirements set out in Guidelines for laying cables in watercourses in waterfront land (NSW Office of Water 2012) as the basis to any approval to the pipeline corridor and watercourse crossings. The geomorphic assessment in Appendix X recommends industry standard guidelines such as Witheridge (2017) Erosion and Sediment Control Field Guide for Pipeline Projects, Parts 1, 2. Geomorphologic criteria should be required to prioritise those rivers and sections/reaches that are vulnerable to degradation on disturbance.

a Overview pipeline watercourse crossings

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 (fourth order).

The Fluvial Geomorphology Addendum (Gippel 2020) (Appendix I of the Amendment Report) reiterated the findings of Gippel (2019) 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 (Gippel 2020). It is noted that, as per the EIS, the Macquarie River and Queen Charlottes Creek will be underbored to mitigate potential geomorphic impacts.

b Geotechnical investigations

Further geotechnical assessment will be carried out at crossings with multiple geomorphic risks as outlined below to assist with the selection of the most appropriate construction method or mitigation measures:

- For water crossings with a sand bed (Evans Plains Creek, McLeans Creek, Salt Water Creek and an unnamed third 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 fourth order non-perennial along the southern pipeline option 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 one 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.

c Construction environmental management plan

As part of the CEMP for the pipeline development, Regis will:

- Use the protection requirements set out in the Guidelines for laying cables in watercourses in waterfront land (NSW Office of Water 2012) and industry standard guidelines such as Witheridge (2017) Erosion and Sediment Control Field Guide for Pipeline Projects, Parts 1, 2.

- *Best Practice Erosion & Sediment Control* will be incorporated into the Construction Environmental Management Plan (CEMP) for the pipeline development construction (International Erosion Control Association (IECA) Australasia (2008)).

- 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 of 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 third order and greater. The strategy will be consistent with Rutherford, Jerie and Marsh A Rehabilitation Manual for Australian Streams Cooperative Research Centre for Catchment Hydrology, LWRRDC, Canberra 2000. Regis commits to restoration associated with the pipeline that at a minimum maintains the condition of the geomorphology at the crossing, ie no net degradation. Restoration activities beyond the disturbance activities associated with the construction of the pipeline watercourse crossings area beyond the scope of the project.

- 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.

4.2 Environment Protection Authority

4.2.1 Air quality

i Adequacy of assessment

The Air Quality Impact Assessment (AQIA) was generally prepared in accordance with *the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*. However, the EPA does not consider that sufficient information has been provided to allow a complete assessment of the impacts or that the proponent has correctly identified and modelled the impacts on local air quality, or that the proposed mitigation measures and modelled performance are realistic and achievable. Several inputs into the modelling are either not transparent in their development, completely unrealistic in their assumptions, have not considered the sensitivity of the model outputs and/or do not propose any contingency measures and actions should the actual air quality impacts of the operation vary from the model.

As demonstrated in the responses to specific issues raised by the EPA in the sub-sections below, in preparing their response the EPA misinterpreted results of the dispersion model, leading to unwarranted criticism of the air quality model and assessment prepared for the AQIA in the EIS (referred to herein as the EIS AQIA). During a meeting with EPA representatives at the Blayney office of Regis on 19 December 2019, the EPA clarified that they had made a potential misinterpretation regarding air quality results and exceedances.

Further information is provided below in relation to modelling inputs to ensure transparency in assumptions, and further discussion is provided on the sensitivity analysis to show that the results and mitigation measures are achievable and realistic.

ii Additional exceedance at receptor R38

Cumulative results predicted for year 4 operations for 24-hour average PM_{10} concentrations at receptor R38 exceed the EPA's impact assessment criterion (50 µg/m^3). In addition, a contemporaneous analysis at this receptor shows that the maximum predicted exceeds the impact assessment criteria by 29.5 µg/m^3, which represents approximately 60% of the EPA's impact assessment criterion and more than double the background level on the same day.

Although the AQIA mentions the potential for the proponent to acquire this property, there is no evidence of a real commitment to support this claim.

Requested information/actions

1. The proponent revises the air quality modelling to include additional control strategies until compliance with the EPA criterion is predicted and outline additional administrative measures to ensure that residential occupants are not exposed to excessive air quality impacts.

The EPA has misinterpreted the results of the dispersion modelling presented in the EIS AQIA (included as Appendix M of the EIS). During a meeting with EPA representatives at the Blayney office of Regis on 19 December 2019, the EPA clarified that they had made a potential misinterpretation regarding air quality results and exceedances.

The cumulative assessment results for all modelled scenarios presented in the EIS were predicted to comply with applicable EPA impact assessment criteria at all sensitive receptors, with the exception of a single additional exceedance day for cumulative 24-hour average PM_{10} at receptor R38. Regis has a legally binding option to purchase R38 and intends on exercising the option in the first quarter of 2021. This option was negotiated prior to the submission of the EIS.

Further to the above, revised dispersion modelling has been undertaken for the amended mine development, with refinements to the mine design resulting in lower emissions and impacts from the project relative to those presented in the EIS AQIA. Improving features of the amended project for air quality 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, with pit exit ramps redesigned to the north of the pit and traffic flow direction modified. In addition, the southern exit has been cut below ground level in the form of a keyway. This keyway has been specifically added for the sole purpose of reducing noise from haul trucks exiting the pit at significant cost, by moving a proportion of material haul routes further away from residential receptors, also having benefits for air quality; and
- revision and optimisation of the waste rock emplacement schedule to provide greater sheltering to southern receptors when material movements in the upper levels of the pit are at their peak.

Notably, cumulative modelling predictions, considering both the mine and ambient background levels, demonstrate compliance with applicable impact assessment criteria, and the one exceedance predicted in the EIS in Year 4 at R38 is no longer forecast to occur.

The revised AQIA for the amended project is presented in Appendix L of the Amendment Report (EMM 2020a).

iii Additional controls to address increase in air pollution

In addition to the exceedances for 24-hour average PM_{10} concentrations at receptor R38, modelling results predict large increases of air pollution at other sensitive receptors. The 24-hour average PM_{10} predicted concentrations for the year with highest periods of material extraction (year 2 and year 4) exceed the assessment criteria ranging from 2.2 to 29.6 µg/m^3.

Receptors with the largest predicted 24-hour average PM_{10} concentration increases include 35 residential homes located to the south of the project (R15 to R50) which is closer to the pit and rock waste emplacement areas. Modelling predictions for this pollutant and averaging period identify exceedances of the assessment criteria at these receptors between 10.01 and 29.6 µg/m^3.

As discussed below, there are several unrealistic or opaque inputs and assumptions in the air quality model. Should these be incorrect or inaccurate the actual emissions could double in some parts of the operation. The air quality modelling results indicate the proposal has the potential to provide and pose an unacceptable risk.

Requested information/actions

2. The proponent nominates and commits to implement controls that are consistent with best practice control of fugitive emissions to minimise potential impacts.

The EPA has misinterpreted the results presented in the EIS AQIA. The concentrations and exceedances quoted in EPA recommendation 2 do not exist in the EIS AQIA.

In relation to demonstrating that proposed dust emission controls are consistent with best practice control of fugitive emissions to minimise potential impacts, Section 7.3.1 and Table 7.1 of the EIS AQIA present a detailed review comparison of mitigation measures proposed by Regis and the EPA's examples of best practice dust control for the mining industry. The best practice review presented in the EIS AQIA demonstrated that for all significant project particulate matter emission sources, the associated control measures proposed by Regis are consistent with best practice measures wherever practicable to do so. Further to this, the particulate matter emission reduction measures committed to in the EIS AQIA remain for the amended mine development. Consequently, the consistency with best practice mitigation measures remains applicable to the amended project.

During the meeting on 19 December 2019, the EPA raised the matter of sealing unpaved haulage routes. Sealing of the haul routes is not practical for the project given the temporary nature of the routes and durability issues given the size and weight of proposed haul trucks (indicative haul capacity of 177 t was applied in the EIS AQIA). However, it is noted that approximately the first kilometre of the site access road from the Mid Western Highway will be sealed.

As discussed in the response above, revised emissions quantification was undertaken for the amended mine development accounting for a number of refinements to the project. Relative to the original mine development assessed in the EIS AQIA, predicted annual particulate matter emissions for peak year operations have decreased for the amended mine development. The primary reasons for the reduction in annual emissions include the following:

- a reduction in the material activity rates for Year 1 through Year 5 for the amended mine development;
- changes to the haul truck capacity in the amended mine development, increasing from 177 t to 221 t, which reduces the number of truck loads required to move annual material totals about site; and
- changes to the northern ramp exit strategy of the open cut pit resulting in shorter haul distances between point of loading and unloading, reducing annual vehicle kilometres travelled.

Finally, a key feature of the project is the water pipeline from Angus Place Colliery, SCSO and MPPS near Lithgow (ie the Pipeline Development), ensuring a secure water supply. The haul road dust suppression requirements of the project will be supported by water from the pipeline development. Regis has advised that there would be no discharge from the project site of pipeline water, and that any run off from unsealed haul roads would be captured in the site's water management system.

iv Model inputs for emissions inventory

Although the emissions inventory in the AQIA outlined activities related to hauling as one of the largest total suspended particulate (TSP), PM_{10} and $PM_{2.5}$ emission sources, the report does not provide detailed information regarding the calculation of the anticipated activity rates for any of these activities. There is no consideration of the sensitivity of the proposal to variations from the modelled output and no contingency planning for the impacts of such variation. For example, the impacts of increased activity rates of haulage and processing on the model outputs and the subsequent actions required to address and manage these impacts on local air quality.

Requested information/actions

3. The proponent revises the AQIA to transparently justify assumed and adopted input variables used to calculate expected emissions.

The EPA requested additional detail on how activity rates for unsealed road haulage emissions were calculated.

Revised emissions calculations and dispersion modelling have been undertaken for the amended mine development. Table 4.13 provides a specific breakdown on the activity rates (tonnes of material, haul truck capacity, haul route distance and annual kilometres travelled) for each emissions scenario. This table is also included in Appendix B (Table B.6) of the amended AQIA (refer to Appendix L of the Amendment Report).

With regards to sensitivity to rates of activity, the following is noted:

- projected annual material extracted by type (soil, waste rock and ore) were used to calculate annual kilometres travelled, with the peak years of material extraction accounted for in the modelled scenarios;
- the material processing and extraction rate is anticipated to be continuous, with little day to day variation in haulage or processing; and
- the truck unloading points on the waste rock emplacement in each scenario were selected with the intention of maximising haulage distance and predicting continual worst-case haulage lengths (ie no accounting for shorter haulage distances).

Table 4.13 Haulage calculations – amended mine development

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
Soil removal and loading to haul truck	Area of soil removal	m^2	1,672,409	1,515,224	1,004,689	724,740	0
	Depth of soil removal	m	0.3	0.3	0.3	0.3	0.3
	Density of soil	t/m3	1.5	1.5	1.5	1.5	1.5
	Amount of soil removed	tonnes	752,584	681,851	452,110	326,133	0
Haulage to soil zone	Capacity of haul truck	tonnes	78	78	78	78	78
	Loads per year	loads per year	9,649	8,742	5,796	4,181	0
	One-way distance of haulage	km	0.9	0.7	0.8	0.8	0
	Annual VKT per year	km/year	17,367	12,238	9,274	6,690	0
Blasted waste rock to haul truck	Amount of waste rock	tonnes	11,601,446	24,366,434	22,802,137	41,871,647	20,411,950
Haulage to waste rock emplacement	Capacity of haul truck	tonnes	221	221	221	221	221
	Loads per year	loads/year	52,495	110,255	103,177	189,464	92,362
	Amount to North	%	67%	41%	2%	9%	0%
	Amount to Central	%	0%	13%	23%	39%	100%
	Amount to South	%	6%	37%	56%	53%	0%

Table 4.13 Haulage calculations – amended mine development

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
	Amount to Infrastructure areas	%	27%	8%	18%	0%	0%
	One-way distance of haulage to North - water	km	0.3	0.9	0.6	1.1	0
	One-way distance of haulage to North - chem	km	2.2	2.7	2.3	2.4	0
	One-way distance of haulage to Central - water	km	0	0.9	0.6	1.2	2.4
	One-way distance of haulage to Central - chem	km	0	1.8	2.1	1.5	1.5
	One-way distance of haulage to South - water	km	0.3	1.3	0.6	1.2	0
	One-way distance of haulage to South - chem	km	1.2	2.3	1.4	1.3	0
	One-way distance of haulage to Infrastructure areas - water	km	0.3	0.9	2.5	0	0
	One-way distance of haulage to Infrastructure areas - chem	km	2.8	2.1	3.7	0	0
	Annual VKT per year - North	km/year	176,745	285,798	12,608	96,701	0
	Annual VKT per year - Central Dump	km/year	0	66,472	115,422	308,883	498,754
	Annual VKT per year - South	km/year	9,592	240,873	197,198	378,217	0

Table 4.13 Haulage calculations – amended mine development

Activity	Parameter	Unit	Activity rate by scenario				
			Year 1	Year 2	Year 4	Year 6	Year 8
	Annual VKT per year - Infrastructure areas	km/year	86,483	47,395	185,199	0	0
Blasted ore to haul truck	Amount of ore	tonnes	2,165,817	6,893,607	8,543,547	2,491,942	6,994,118
Haulage to ROM Pad	Capacity of haul truck	tonnes	221	221	221	221	221
	Loads per year	tonnes	9,800	31,193	38,659	11,276	31,648
	One-way distance of haulage - water	km	0	1	3	3	3
	One-way distance of haulage - chemical	km	1.7	2.0	1.6	1.6	1.6
	Annual VKT per year	km/year	39,200	180,918	317,000	94,716	265,840

Notes: VKT – vehicle kilometre travelled

v Emissions from metals and metalloids

Emissions from individual metal and metalloids were calculated using estimated TSP emissions and scaling factors. These scaling factors were derived from the average content by material type from analysed samples. However, it does not present the results from the materials geochemistry profiles, nor does it present the adopted methodology.

Requested information/actions

4. The proponent revises the AQIA to ensure waste rock, ore and tailings composition used for modelling is representative of worst-case metal concentrations from materials.
5. The proponent revises the AQIA to include detailed information for the calculation of the metal and metalloids emissions inventory. Adequate detail of all input data, assumptions and methods must be provided to enable the reviewer to replicate the modelled emissions.

In order to understand the likely metal concentrations in the material to be handled and stored during the operation of the project, geochemistry assay profiles for waste rock, ore and tailings material were provided by Regis for review. For the EIS AQIA, metals emissions were then generated using the following steps:

- indicative metals profiles for waste rock, ore and tailings were derived from the following:
  - for tailings material, the maximum concentration for each element across provided assays for oxide, transition and fresh tailings was selected; and
  - for waste rock and ore material, the median metal concentration for each element was selected.

- for each material type, the element concentration was converted to a percentage value of total material amount;
- for each modelling scenario, annual TSP emissions by source were grouped by waste rock, ore and tailings;
- the percentage of element by material type was applied to the TSP emissions by corresponding material type to derive an annual emission rate of each metal;
- a weighted average scaling factor was derived for each element and each modelling scenario; and
- predicted 1-hour average TSP concentrations were scaled by the corresponding derived scaling factors to determine concentrations of individual metals at site boundary and individual private receptors.

In response to comments from the EPA, the metals emissions derived for waste rock and ore material have been revised by changing the median concentration to the 90th percentile concentration. While the median profile concentrations adopted in the EIS AQIA is considered appropriate for representing likely metals emissions from the project, the use of the 90th percentile concentration is adopted to increase the level of conservatism in the modelling. For tailings, no change was considered necessary as the maximum concentration across three tailings profiles was adopted.

The profiles for waste rock, ore and tailings used in the amended AQIA and this response to EPA are presented in Table 4.14. This information is also included in Appendix B (Table B.6) of the amended AQIA (refer to Appendix L of the Amendment Report).

Modelling of the amended project design was undertaken, with metals emissions accounting for the 90th percentile metals concentrations. The results of this modelling are listed in Table 4.15 below. Despite the increase in metal emissions, concentrations of all quantified metals remain well below applicable EPA impact assessment criteria across all model scenarios.

Table 4.14 Metal concentration profiles for waste rock, ore and tailings

Element	Waste rock		Ore		Tailings
	Median (mg/kg)	90th percentile (mg/kg)	Median (mg/kg)	90th percentile (mg/kg)	Maximum (mg/kg)
Ag	0.26	1.46	0.46	2.47	0.89
As	41	172	53	196	160
Ba	70	160	70	120	190
Be	0.12	0.30	0.07	0.12	0.15
Cd	0.11	3.67	0.08	2.57	2.50
Cr	9	76	2	7	175
Cu	207	510	430	1,446	635
Fe	59,300	74,660	70,900	87,240	70,600
Hg	0.02	0.50	0.04	0.34	0.36
Mg	14,900	23,800	13,200	22,920	20,000
Mn	1,290	3,580	1,670	3,300	1,840
Ni	7.7	38.6	5.3	8.0	90.0

Table 4.14 Metal concentration profiles for waste rock, ore and tailings

Element	Waste rock		Ore		Tailings
	Median (mg/kg)	90th percentile (mg/kg)	Median (mg/kg)	90th percentile (mg/kg)	Maximum (mg/kg)
Pb	13.0	115.5	18.6	64.3	209.0
Sb	1.25	3.24	1.44	2.66	2.90
Se	2.20	12.30	6.80	15.42	7.50
Zn	96.0	1,160.0	88	545.2	707

Notes: For waste rock and ore, the median concentration profile was adopted for the amended AQIA while the 90th percentile profile was adopted for this response to EPA submission.

Table 4.15 Revised metals modelling results

Pollutant	Averaging period	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
Ag	99.9th percentile 1-hour	µg/m^3	0.0002	0.0002	0.0003	0.0003	0.0003	**1.8**
As	99.9th percentile 1-hour	µg/m^3	0.019	0.023	0.033	0.027	0.027	**0.09**
Ba	99.9th percentile 1-hour	µg/m^3	0.017	0.020	0.028	0.023	0.023	**9**
Be	99.9th percentile 1-hour	µg/m^3	0.00003	0.00003	0.00005	0.00004	0.00004	**0.004**
Cd	99.9th percentile 1-hour	µg/m^3	0.0004	0.0005	0.0006	0.0005	0.0005	**0.018**
Cr	99.9th percentile 1-hour	µg/m^3	0.008	0.008	0.012	0.010	0.010	**0.09**
Cu	99.9th percentile 1-hour	µg/m^3	0.059	0.090	0.130	0.108	0.112	**18**
Fe	99.9th percentile 1-hour	µg/m^3	8.2	10.1	14.2	11.9	11.9	**90**
Hg	99.9th percentile 1-hour	µg/m^3	0.00005	0.00006	0.00009	0.00007	0.00007	**0.18**
Mg	99.9th percentile 1-hour	µg/m^3	2.6	3.1	4.3	3.6	3.6	**180**
Mn	99.9th percentile 1-hour	µg/m^3	0.39	0.46	0.64	0.53	0.53	**18**
Ni	99.9th percentile 1-hour	µg/m^3	0.004	0.004	0.006	0.005	0.005	**0.18**
Pb	Annual	µg/m^3	0.00017	0.00037	0.00042	0.00053	0.00038	**0.5**
Sb	99.9th percentile 1-hour	µg/m^3	0.0004	0.0004	0.0006	0.0005	0.0005	**9**

Table 4.15 Revised metals modelling results

Pollutant	Averaging period	Unit	Year 1	Year 2	Year 4	Year 6	Year 8	Criterion
Zn	99.9th percentile 1-hour	µg/m^3	0.12	0.14	0.19	0.16	0.15	**90**

Notes: All 99.9th percentile 1-hour concentrations relate to the maximum predicted across the site boundary, the annual average concentration for lead relates to the maximum predicted annual average concentration across all private sensitive receptors.

vi Moisture content and availability of water

In addition, estimated TSP, PM_{10} and $PM_{2.5}$ emissions from dozing operations on waste rock and topsoil assumed a 50% control factor. Although watering travel routes and areas where dozers operations are expected could be considered an appropriate control, this assumption is the equivalent to achieving a moisture content of 6% at the waste rock area and 8% for topsoil activities. Given the current status of the region in terms of drought and water availability, EPA considers this assumption to be completely unrealistic. Failing to achieve and guarantee these moisture contents in the soil means that the estimated emissions for dozing operations could double.

Requested information/actions

6. The proponent revises the AQIA to include strategies that demonstrate that the modelled moisture content levels are achieved and maintained for all dozing operations.
7. The proponent revises the AQIA to transparently justify the quantities and sources of water used to achieve the proposed mitigation performance across the life of the project.

The comments of the EPA regarding ongoing drought conditions in the region and pressures on water availability are acknowledged. However; it is also noted that due to the external water supply from the pipeline development, the water balance clearly demonstrates there will be sufficient water available across all climatic conditions to meet the needs of the project.

As described above, a key feature of the project is the water supply pipeline from Angus Place Colliery, SCSO and MPPS near Lithgow. Dust suppression requirements of the project will be supplemented by the pipeline water, as well as groundwater bores during construction. This includes for areas where dozers are actively operating on waste rock emplacement areas. A water balance was prepared for the project, and revised for the amended project, to confirm water supply needs of the mine development. Model results indicate that, on average, imported pipeline supply will provide the greatest source of water, generally meeting over half of the mine's water supply requirements, as shown below in Plate 4.1. The water balance model predicts that rainfall/runoff will account for less than this at around 40%. The remaining water needs will be met via groundwater inflow to the open cut pit, tailings decant water, and a very small amount from groundwater bores (only around 16 ML/year on average).

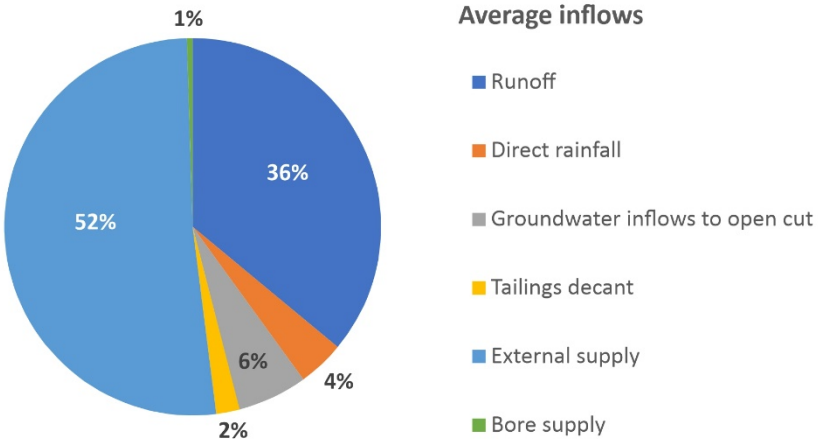


Plate 4.1 Average inflows to the mine development water balance (ML/yr) (HEC 2020)

Importantly, a peak daily rate of 15.6 ML/day from the pipeline development was set in the water balance, as per the proposed Regis Resources Water Offtake Agreement (offtake agreement). The model only sources that water on days when the stored volumes on site fall below certain trigger levels. These trigger levels were based on optimisation of the water balance to achieve a criterion of no simulated spills. On an annual basis, this resulted in the model drawing around 2,530 ML/year from the pipeline development, which on an average basis would be equivalent to around 7 ML/day. This is around half the maximum amount of water the pipeline development will supply in accordance with the offtake agreement. The pipeline development will therefore enable a secure water supply, and consequently, Regis does not anticipate any issues with meeting dust suppression requirements accounted for in the amended AQIA.

Further, to supplement water application, Regis propose to adopt a chemical suppressant on unsealed haulage routes between the open cut pit exit ramp and the waste rock emplacement or the entry point to the ROM pad. As described in the amended AQIA, the specific product for implementation is yet to be determined; however, Regis commits to the selection of a product that is both environmentally friendly and achieves the required particulate matter emission reduction.

vii Uncertainty of NO_2 predictions

The AQIA predicts no 1-hour NO_2 exceedances, however it is unclear if the concentrations presented in Table 8.1 (i.e.150.4 µg/m^3) include predicted concentrations from both blasting and combustion sources. Section 8.6.1 in the assessment shows that the highest predicted 1-hour NO_2 concentrations from blasting activities taking place every hour between 7am and 5pm is approximately is 490 µg/m^3.

Whilst the assessment states that 1-hour NO_2 concentrations from blasting are predicted to be below the criterion (246 µg/m^3) between 8am and 4pm, there is no commitment to limit blasting activities to this time frame.

Requested information/actions

8. The proponent revises the AQIA to transparently justify the results presented for NO_2 emissions in the assessment.
9. The proponent revises the AQIA to nominate and commit to specific measures to minimise the risk of potential NO2 exceedances.

Emissions of oxides of nitrogen (NOx) were quantified from the following sources:

- diesel combustion by mining fleet and trucks;
- processing circuit furnace (natural gas combustion); and
- explosives detonation.

Modelling of calculated NO_x emissions from diesel fuel combustion and the processing circuit furnace was completed for each scenario year to predict concentrations of nitrogen dioxide (NO_2) in the surrounding environment (1-hour average maximum and annual average). The NO_2 results presented in Table 8.1 and Table 8.2 of the EIS AQIA relate to emissions from the diesel fuel combustion and the processing plant circuit furnace.

No exceedance of applicable EPA impact assessment criteria for NO_2 arising from combustion emissions (diesel and natural gas combustion) was predicted at any sensitive receptor in the EIS AQIA. Measures for the control of combustion emissions are presented in Section 9 of the EIS AQIA. The assessment of blast fume emissions presented the EIS also remain applicable to the amended project, as described in Section 7.6 of the amended AQIA (refer to Appendix L of the Amendment Report).

As explosives detonation during blasting is a short-term event which is unlikely to occur coincidently with other sources of NO_x emissions, modelling of blasting emissions was conducted in a stand-alone scenario based on maximum potential blast conditions. A theoretical exercise to determine the most ideal time period for dispersion of emissions from blasting operations was completed in the EIS AQIA, with blasting emissions simulated on every hour between 7 am and 6 pm on every day of the modelling period.

The blast modelling conducted showed that the lowest NO_2 concentrations, and therefore the most ideal times for dispersion, occurred during the middle of the day. As confirmed at the meeting with EPA on 19 December 2019, Regis has advised that planned blasting is generally proposed during the middle of the day and is likely to be conducted on a one blast per day basis, unless required for safety reasons or other environmental considerations. Blasting will generally not be carried out on Sundays and public holidays. As per the recommendations of the EIS AQIA and amended AQIA, Regis will limit blasting to between the hours of 8am and 4pm.

viii Dust management measures

The emissions inventories prepared for the AQIA predict large TSP, PM_{10} and $PM_{2.5}$ emissions. Haulage on unsealed roads is identified as the most significant emissions source. The assumed control for wheel generated dust is 86%, which is based on a calculated watering rate of ~1.7 litres/m^2/hour and driving speeds of less than 60 km per hour. In addition, other activities relying on watering as a control factor in the emissions inventory include dozing (50% efficiency) and wind erosion from stockpiles (50% efficiency). Given watering is one of the main dust controls adopted in the assessment and having regard to the current status of the region in terms of drought and water availability, EPA considers these assumptions and inputs into the AQIA to be completely unrealistic.

Requested information/actions:

10. If the project is approved, conditions of approval should ensure that all the proposed dust management strategies are formalised in an air quality management plan. All proposed management practices must be consistent with best management practice and be quantifiable, measurable, auditable and enforceable. Methods for determining compliance must be clearly identified.

Regis commits to the preparation of a detailed air quality management plan (AQMP) should development consent be granted. The AQMP will detail key emission sources, baseline conditions (meteorology and air quality), mitigation methods, air quality monitoring network, roles and responsibilities of Regis personnel, actions in response to air quality issues and/or complaints, measures of compliance and reporting requirements. The AQMP will be prepared in consultation with the EPA and submitted to DPIE for approval prior to the commencement of construction for the project.

In addition to the dust emission controls presented in the best practice review of the AQIA (Section 7.3.1 of the EIS AQIA), a key mitigation strategy for the project will be the development of a real-time air quality monitoring network.

Due to land access issues and the notable expense of real-time particulate matter monitoring equipment, specific locations of monitoring stations and the exact monitoring equipment options to be installed has not yet been finalised. The finalisation of the monitoring network will be completed following project determination; although, it is anticipated that the network is likely to include a combination of high volume air samplers (HVAS), tapered element oscillating microbalance (TEOMs), depositional dust gauges and environmental beta attenuation monitors (EBAMs). Real-time noise monitoring will be used as an air quality and noise management tool and will involve the use of a real-time response protocol for ongoing performance assessment, assisting in the implementation of pre-emptive management actions to avoid potential non-compliances.

Nevertheless, as stated in Section 9.4 of the EIS AQIA, Regis commits to a minimum five real-time monitoring stations as part of the site air quality monitoring network, with three monitoring locations in the Kings Plains area and one location to both the east and the west of the project area boundary. Monitoring equipment options and siting will be consistent with relevant Australian Standard documentation wherever practical to do so. If development consent is granted, Regis commits to the detailed design of a real-time air quality monitoring network and will consult with the EPA on the location and equipment options to be installed.

The air quality monitoring network will be documented within the AQMP. The monitoring plan will detail the location of air quality and meteorological monitoring equipment, the relevant air quality impact assessment criteria for the project and reactive air quality trigger levels set for management purposes.

In relation to the comments from the EPA on assumptions around water availability and drought conditions, refer to the response above in Section 4.2.1(vi).

4.2.2 Groundwater

i TSF design

More detail regarding the TSF design, dam construction, operation and post closure seepage management activities is required to assess the suitability of the proposed design at the preferred TSF site. The EPA maintains a preference for an engineered impervious seal of at least 1,000 mm with a minimum permeability of 1 x IO^{-9} m/s preventing contained leachate material migrating to underlying strata.

a EIS design

The TSF design presented in the EIS was developed by suitably qualified technical experts in the field of tailings dam design, ATC Williams Pty Ltd (ATCW), and subject to expert review by CMW Geosciences. The design evolved over years of technical investigations, with the result being a robust, fit for purpose and leading practice design.

As described in Section 2.9.4(iii) of the EIS, the EPA's environmental assessment requirements relating to tailings management for the EIS requested that the TSF liner system proposed for the project satisfies the EPA's tailings dam "policy". Based on correspondence from the EPA to the DPIE that was appended to the EPA assessment requirements for the project, it is understood this policy was still under development at the time and it is noted there is no formal policy in place to date. Notwithstanding, the letter outlines that the tailings dam policy proposes to adopt a benchmark requirement for TSF liners to a achieve a maximum permeability of 1 x 10^{-9}m/s with a constructed clay liner of at least 1,000 mm (or a geosynthetic liner) providing *equivalent or better* protection.

Where an alternative liner system to the above is proposed and/or where the natural geology of the site is proposed to be used as part of the liner system, the EPA correspondence to DPIE notes that the tailings dam policy will require a hydrogeological investigation and impact assessment be carried out to prove the efficacy of the liner system. Both the benchmark of a maximum permeability of 1 x 10^{-9}m/s and the provision to enable proponents to propose an alternative liner system of equivalent hydraulic performance is consistent with the criteria set out in the *Environmental Guidelines: Solid Waste Landfills* (EPA 2015). The TSF design report (ATCW 2019) for the project therefore referenced the *Environmental Guidelines: Solid Waste Landfills* as the relevant design criteria for the TSF liner.

Regis accordingly engaged specialist consultants to carry out extensive hydrogeological investigations (EMM 2019a) and TSF soil classification, permeability and strength testing investigations (ATCW 2019) throughout the footprint of the TSF to determine whether an alternative TSF liner system could achieve the required hydraulic performance. These investigations found that subject to treatment (involving ripping, moisture conditioning and compaction) in-situ materials are of low permeability (typically less than 1 x 10^{-9} m/s).

Given the proposed liner and overall seepage management system for the TSF varied from EPA's benchmark of 1 x 10^{-9}m/s, ATCW (2019) also carried out a seepage control assessment to assess the value of the inclusion of various seepage management controls (including an embankment with upstream clay core, different floor lining systems, and seepage interception trench system). This assessment found that the preferred option for seepage management of an alternative liner consisting of a thickness of 300 mm and a permeability of less than 3.3 x 10^{-10} m/s, with an equivalent hydraulic performance of a 1,000 mm thick clay liner with a permeability of 1 x 10^{-9} m/s, combined with the installation of a seepage recovery system, would exceed the seepage performance (measured at the downstream toe of the TSF) of the EPA benchmark.

b Amended project design

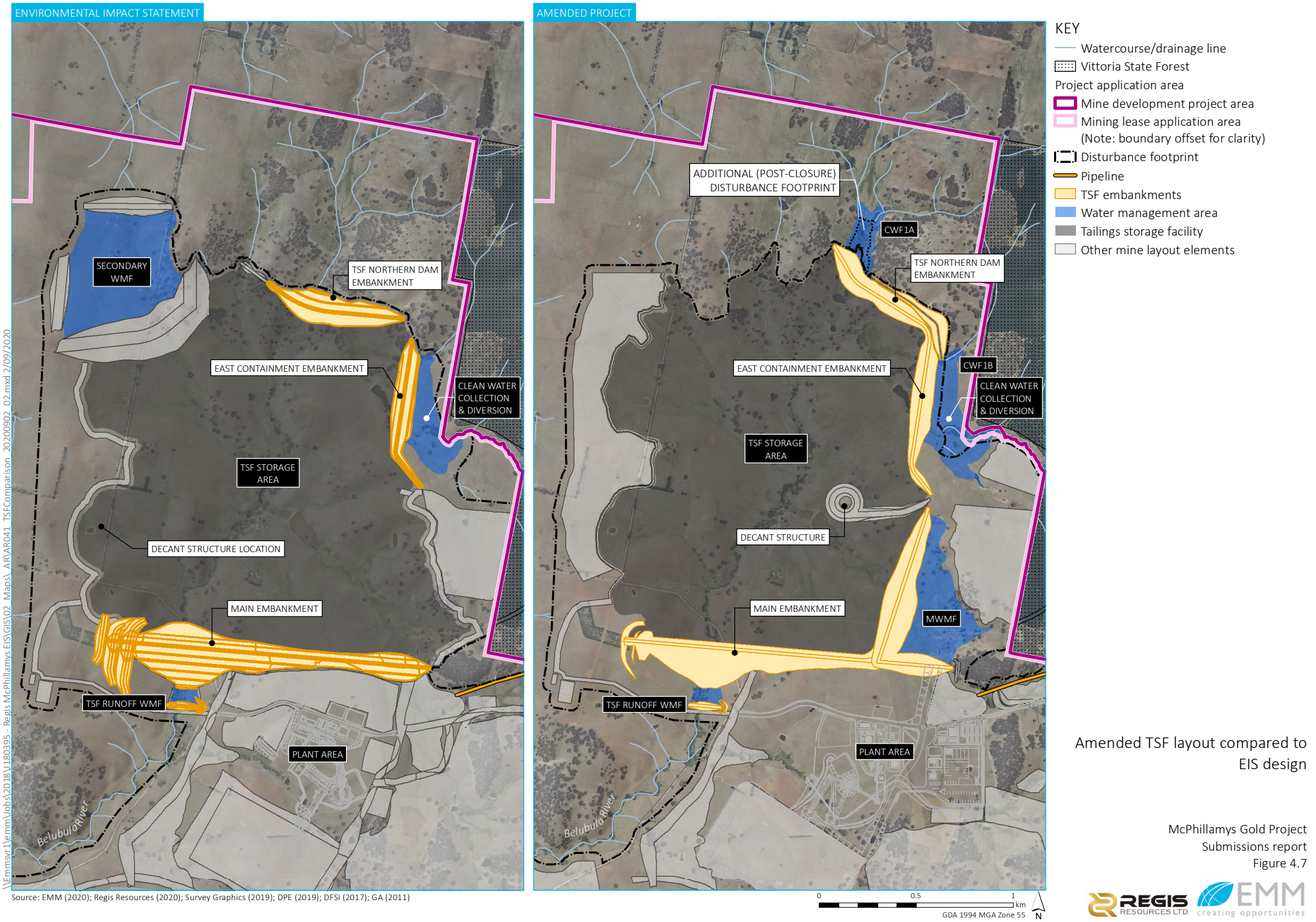
In response to the EPA's submission, and as part of ongoing detailed mine planning and optimisation, the design and layout of the TSF were re-assessed as part of the amendments to the project. While a number of refinements were made to the layout as described below, the fundamental design principles and liner design remain applicable, and have been further confirmed as leading practice.

The proposed amended layout of the TSF is shown in Figure 4.8, which illustrates the amended layout compared to the layout presented in the EIS. The revision of the TSF design has been driven primarily by the following factors:

- Revision of the water management system relating to the TSF, primarily to facilitate improved outcomes at closure in relation to the diversion of clean water around the TSF and to avoid impacts to native vegetation north of the TSF. This revision of the water management system is also linked to the avoidance of Hallwood mentioned below.

- The decision by Regis to avoid Hallwood, a potential heritage item that while not listed, was identified in the heritage assessment prepared for the project as being of potential state significance (Landskape 2019, refer to Appendix P of the EIS). The secondary WMF included in the EIS design would have directly impacted this heritage item.

The changes to the TSF are described in detail in the design review report prepared by ATCW (attached in Appendix D of the Amendment Report (EMM 2020a)). 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. Further information on the liner design is provided in the response below (Section 4.2.2(ii)).



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

Amended TSF layout compared to EIS design

McPhillamys Gold Project
Submissions report
Figure 4.7

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The revised design of the TSF has also been reviewed again, as it was for the EIS, 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. Dr Williams is a Chartered and Registered Professional Engineer with over 40 years of experience, who is internationally recognised for his expertise in tailings dams and mine waste management. Dr Williams authored the Australian Government publication *Tailings Management - Leading Practice Sustainable Development Program for the Mining Industry* (2016) and is on the working party for the Australian National Committee on Large Dams (ANCOLD) *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure*, which were published in 2012 and revised in 2019.

Summaries of both expert reviews are included as attachments to the ATCW (2020) report (refer to Appendix D of the Amendment Report).

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.

With specific reference to the liner system, Dr Williams noted in his review that:

> The EPA's response with respect to the multi-barrier approach proposed by Regis appears to negate the possibility of alternative performance-based approaches offered by the Guideline. The multi-barrier approach proposed by Regis incorporates both liners and seepage interception, monitoring and collection, if necessary, which provide superior performance to the prescribed 1,000 mm compacted clay liner.

Further discussion on the TSF design is provided in the response below.

ii TSF Lining

The proponent has detailed that lining of the TSF will be comprised of three low permeability liners:

- in drainage features such as the former Belubula River and other areas with weathered geology, a full depth storage blanket liner of clay fill with a minimum depth of 1,000 mm and a permeability of 1 x $I0^{-9}$m/s;
- in other areas and where suitable clay fill is available, the area will be conditioned by scarifying/ripping, moisture conditioning and compacting to provide a clay fill liner with a minimum depth of 300 mm and a permeability of 3.3 x10^{-10}m/s (less than or equivalent to 1,000 mm @ 1 x $I0^{-9}$ m/s); and
- in remaining areas where insufficient suitable clay fill is available, the area will be lined with a geomembrane liner with a permeability less than or equivalent to 1,000mm @ 1 x 1 x $I0^{-9}$ m/s.

The proposed spatial distribution of these alternate liner methods across the TSF is not presented in the EIS. The EPA requires a minimum permeability of 1 x 10^{-9} m/s over a 1,000 mm depth to be considered suitable to protect receiving environments as a containment barrier system (*Environmental Guidelines: Solid Waste Landfills, 2016*).

The proposal of compacting impermeable clays, where suitable, to thicknesses that are lesser than 1,000 mm is not considered suitable for the preferred TSF site. The identified site of the TSF area incorporates the headwaters of the Belubula River and adjacent weathered slopes. This alternative TSF lining method of scarifying/ripping, moisture conditioning and compacting native clays across a heterogenous weathered profile is not favoured by the EPA at this site due to the full reliance on the modelled performance of this method to mitigate the risk of seepage. The EPA believes a full depth storage blanket liner, of at least 1,000 mm is required across this identified TSF site to adequately mitigate the risk of seepage. The host geology and its weathering variability increases the potential for a weakness or high permeability zone to compromise the TSF containment efficacy. For this option to be efficient all variables of risk must be mitigated, as the likelihood of a containment failure increases in relation to variables in the TSF construction. If conditioning is proposed, it should be to a recommended guideline value of a minimum thickness of 1,000 mm.

Requested information/actions

1. The proponent revises the assessment(s) to provide further information regarding the TSF design, liner options and spatial distribution and the prevention of seepage to the underlying strata.
4. The proponent revises the assessment(s) to provide more detailed information regarding the acceptance testing regime that will be implemented to ensure the liner has been installed correctly and without material error and will meet the proposed seepage prevention specifications for all options.

a TSF design, liner options and spatial distribution

<u>TSF design</u>

In relation to the general TSF location, Dr Williams noted that:

> the location of the TSF in the headwaters of the Belubula River minimises the impact on clean rainfall runoff and the need for its diversion.

ATCW (2020) also explained that the placement of a TSF in the headwaters of a catchment is typically recommended to minimise clean water catchment and diversion, as well as avoiding likely greater groundwater (stream baseflows) in lower catchment areas. Notwithstanding, alternative options for the TSF were considered, as described in the EIS, and discussed further in the *Tailings disposal options* report prepared for the project (Regis 2020a), included as Appendix G of this report.

The most conservative Extreme Dam Failure Consequence Category rating has been adopted for the TSF embankment, requiring the most stringent design criteria, construction management, operational supervision and closure. The likelihood of dam failure is extremely low, making the overall risk ranking of the TSF embankment very low. It is noted that the region has a low level of historical seismicity, with no active faults identified (Williams 2020).

There are no permanent continuous aquifers present within 20 m depth of the ground surface, although perched watertables exist. The Anson Formation underlying the TSF has low horizontal permeability (2×10^{-8} m/s) and very low vertical permeability (1×10^{-9} m/s). The soil profile underlying the TSF is generally of high strength, of low permeability if compacted, and is moderately dispersive (erodible). The clay fraction is typically >60%, and of medium to high plasticity. Further information on the underlying clay is provided below in Section 4.2.2(iii).

The expected maximum height and combined length of the main TSF embankment is 49 m and 3,600 m, respectively. The expected ultimate inundation footprint of the TSF is approximately 273 ha, containing up to 47 Mm^3 of tailings with a maximum average depth of 17.2 m, with storage for over 5,000 ML of water. The rate of rise of tailings will approach 20 m/year in the first year but have an average rate of 2.5 m/year, and <2 m/year towards the end of the mine life.

Other features of the TSF are sufficient storage to accommodate the rate of rise of tailings, a decant structure to recover process water, downstream seepage monitoring and collection bores, if required, an emergency spillway to handle extreme flood inflows, a clean runoff collection and diversion system upstream, and a TSF runoff interception system downstream.

A change to the way the main TSF embankment will be constructed has been included in the proposed amendments to the project (which was described as a pyramid type construction in the EIS). The TSF embankment will be developed in stages constructed downstream using inert waste rock from the mine, with an upstream compacted clay cut off key and liner on the upstream face (with an underlying sand filter to prevent piping). The downstream embankment slope will be constructed at 2.5 horizontal:1 vertical (2.5H:1V) for the first two stages, flattening to 4H:1V for the last two stages, with a 2.5H:1V upstream slope, and a crest width of 15 m. Benches will not be constructed on the downstream slope, since these are not sustainable on post-closure landform slopes. A cross section of the amended TSF embankment is shown in Figure 4.18 in Section 4.5.

Stage 1 construction of the TSF embankment will occur prior to the start of processing and will be sufficient to store the first two years of tailings production. Stage 2 will accommodate a further three years of tailings production and Stage 3 will accommodate the remaining tailings production.

The tailings will be discharged as a thickened slurry sub-aerially, from multiple points (via spigots) around the perimeter of the TSF. Deposition will be cycled between spigots to limit the deposited layer thickness and allow time for consolidation and desiccation of each layer, while maintaining the tailings surface sufficiently wet from fresh tailings to limit dusting and potential oxidation. Supernatant water released from the tailings will flow to the decant pond, from which it will be recovered for re-use in the processing plant. The operation and condition of the TSF will be kept under regular surveillance and monitored.

TSF liner

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.

In its recommendation for further assessment the EPA mention the 'prevention of seepage to the underlying strata'. However, as ATCW (2020) explains in the revised TSF design review report (refer to Appendix D of the Amendment Report), due to gravitational forces, seepage will occur from any structure with elevated water, irrespective of the lining system as all materials have an inherent permeability. This is an important aspect to understand as the consideration of any lining system should be about the *acceptable rate of seepage* and *not the prevention*. In relation to the TSF design for the project, the design basis for seepage management comprises a multi-barrier approach to minimise the volume and extent of seepage, with the proposed system for this specific site found to exceed the performance of the equivalent 1,000 mm at 1 x 10^{-9} m/s liner, as shown in the presented modelling results.

Modelling by ATCW (2020) demonstrates that a 300 mm thick compacted clay liner with a permeability of 3.3 x 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 x 10^{-9} m/s, as shown in Figure 4.9, (adapted from ATCW 2020), which presents modelling seepage results from all options assessed. In fact, as noted by Dr Williams in his review, 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. All liner systems are expected to limit seepage rates to about 6 mm/year, which is less than 1% of the average annual rainfall for the site, an estimated 0.01% of the Belubula River streamflow under this average annual rainfall, and less than 1% of the lowest streamflow under extended dry conditions.

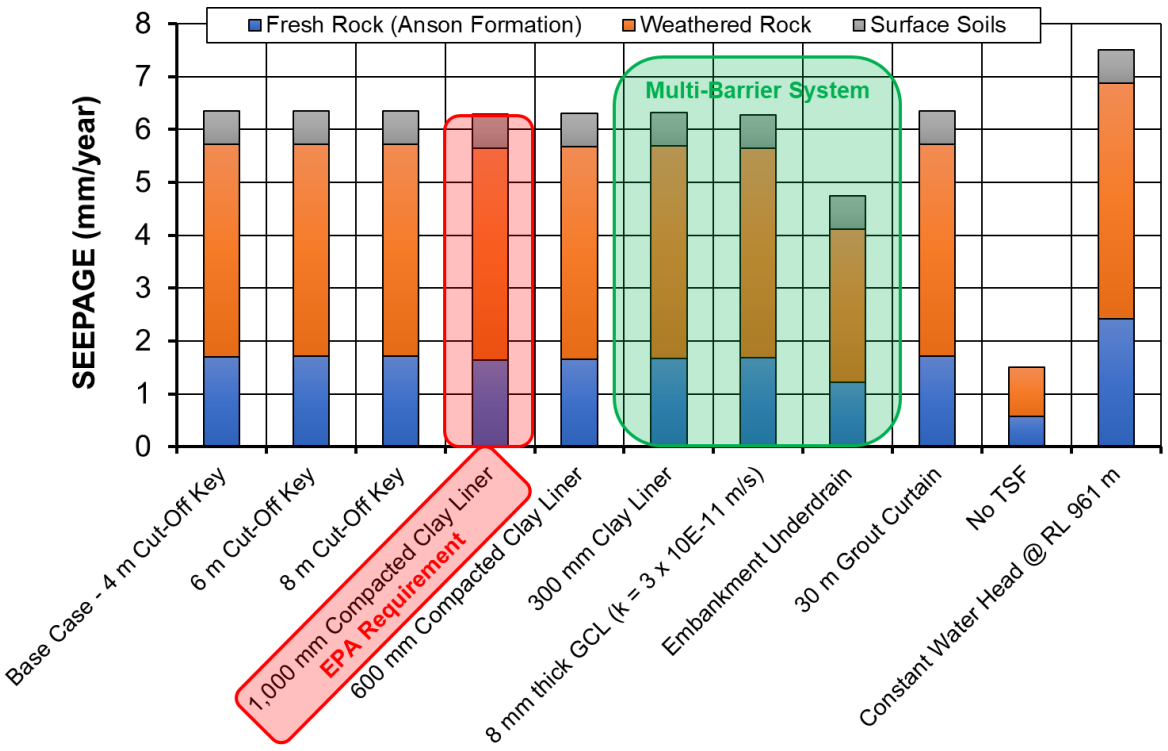


Figure 4.8 Enhanced TSF design and seepage rates

Discussion on the quality assurance (QA)/quality control (QC) for construction of the liner is provided in the response below, as well as further information on the spatial distribution of the liner, as requested by the EPA.

iii Availability and feasibility of clay material

Details regarding the availability and classification criteria for 'suitable clay material' for use in the liner construction are limited. Given that the 300mm thick liner option uses the very low permeability nature of the clay material as the basis for assuming feasibility the quantity of this material and the criteria for decision making about where and when it will be used should be further detailed.

Requested information/actions

2. The proponent revises the assessment(s) to provide more detailed information regarding the availability of 'suitable clay material'.
3. The proponent revises the assessment(s) to provide more detailed information regarding the Quality Assurance/Quality Control procedures to be used for determining the suitability of clay material for use in the non-compliant 300 mm thick lining option.

a Availability of clay

The availability and suitability of clays within the TSF storage area was investigated by ATCW as part of the TSF design report prepared for the EIS (Appendix D of the EIS) and, in response to the EPA submission, was considered further in the design review report prepared for the amended project (Appendix D of the Amendment Report).

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 in Table 4.18 (Table 3 from ATCW 2020).

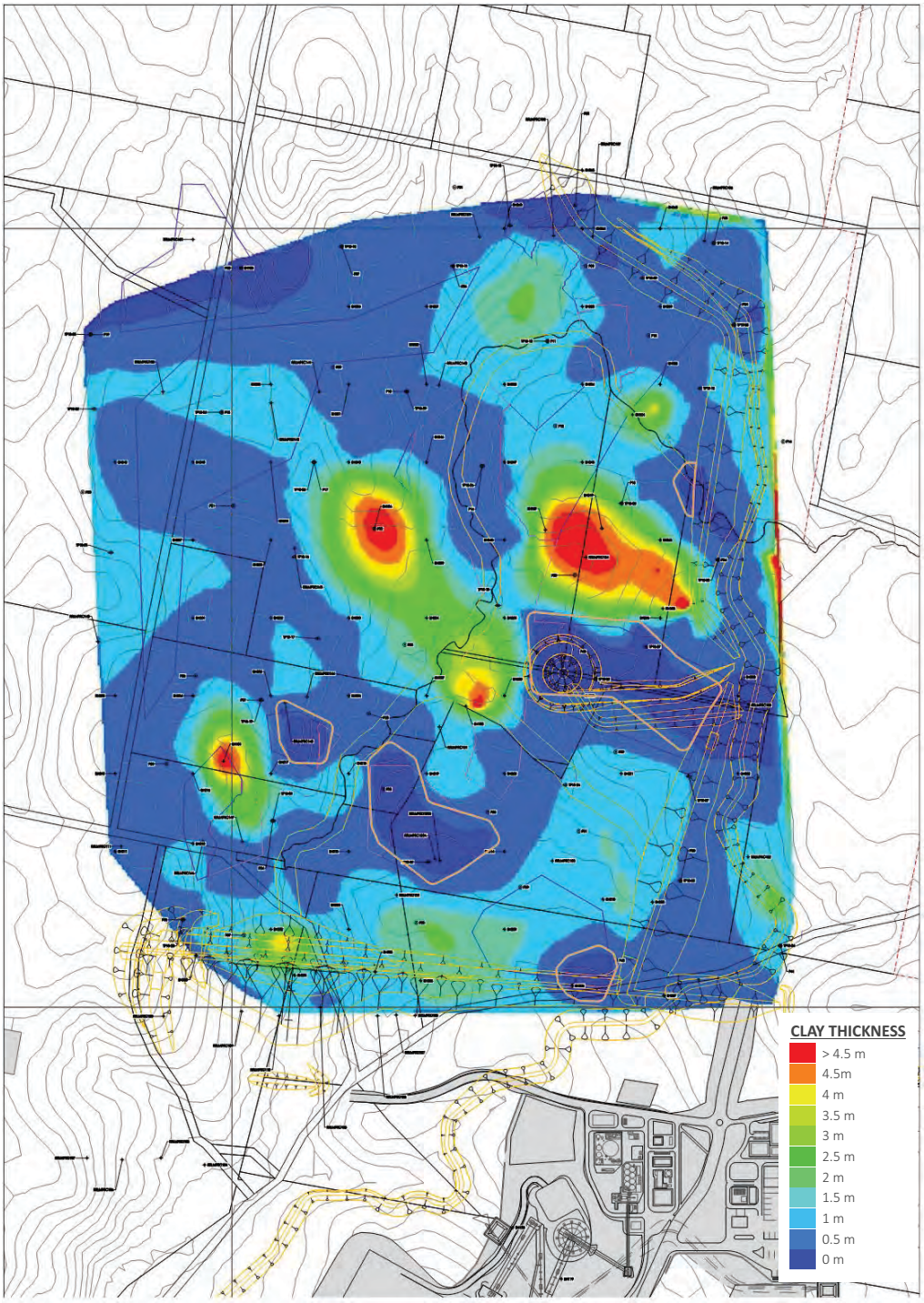
As shown below, the depth of natural clay directly beneath the revised location of the decant pond is less than optimal and will require the addition of borrowed clay from areas where there is a surplus.

However overall, the depth of natural clay is expected to be greater than originally assumed, since many test pits did not 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.

Table 4.16 TSF surface soils investigation

Investigations	Discussion
Field In-situ Permeability within Soil Horizon (Infiltration Testing) 30 Testpit Sites	The outcome of the in-situ permeabilities on the near surface soils indicated that without re-engineering (ie conditioning and compaction) the materials would not be suitable to achieve a low permeability barrier.
Engineering Testpits (deep pits to excavator reach) 37 Testpit Sites	Initial investigation to target and identify potential clay fill borrow and assess embankment foundation conditions. Outcomes were: • Clay thickness of 0.0 m to 3.9 m thick with an overall average of 1.1 m thick. • 10 of the 37 testpits (27%) did not reach base of clay, with an average of 2.05 m thickness of clay in these areas. • 16 of the 37 testpits (43%) had less than 1.0 m of clay thickness.
Shallow Testpitting (nominally 1.0 m for shallow soils sampling) 113 Testpit Sites	Systematic grid approach over the storage area to sample and test soils within the upper (nominally 1m depth) soil horizon. Outcomes were: • Clay thickness of 0.0 m to 2.4 m thick with an overall average of 1.0 m thick. • 79 of the 113 testpits did not reach base of clay, with an average of 1.0 m thickness of clay in these areas. • 20 testpits that extended through the clay horizon had less than 1 m of clay thickness.
Geotechnical Boreholes (Shallow to 10.0 m) 7 Boreholes	Investigation to assess the underlying weathered basement. All seven boreholes encountered significant depth of residual weathered basement which was logged as clays (post – disturbance condition). Outcomes were: • Clay thickness of 0.2 m to 9.6 m (limited by maximum depth of holes being 10 m) thick with an overall average of 6.7 m thick. • 4 of the 7 boreholes did not reach base of clay, with an average of 9.6 m thickness of clay in these areas. • 1 borehole had less than 1.0 m of clay thickness.

Clay thickness mapping of the storage based on the investigation outlined above in Table 4.18 is presented in Figure 4.10. 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.



TSF storage mapped clay thickness (ATCW 2020)

In addition to the thickness of in-situ clay, clay suitability for use in the TSF lining system was also investigated. Clay suitability is based on the re-engineered properties of the material; that is, conditioned to optimum moisture content and compacted to 98% maximum dry density. A total of 75 permeability tests have been completed to date, of which 49 had permeabilities of less than 10^{-9}m/s. ATCW (2020) mapped the data to show areas with unsuitable (mapped as zero/fail) and suitable (mapped as one/pass) clay permeabilities using linear interpolation between data points (refer to Figure 4.11).

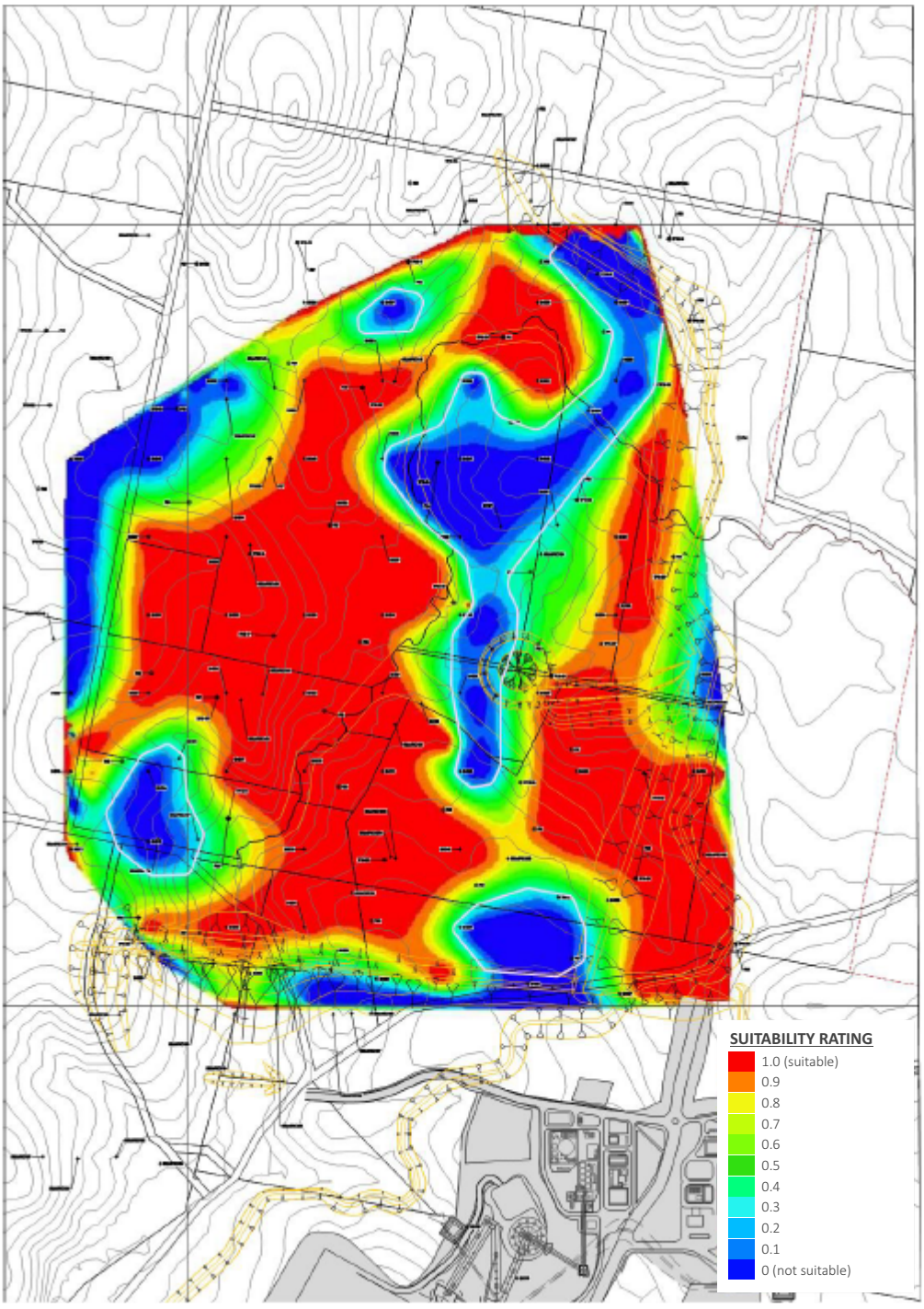
To define the suitable clay zones for lining the TSF, the clay thickness map and the clay suitability map were then overlain. The resulting map is a proposed lining plan, and is show in Figure 4.12, illustrating the areas that are suitable for providing borrow material as well as zones that will require an artificial lining system. 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 would 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 would be installed in the various stages, generally on the upper slopes/ridge areas.

Further in relation to the specific commentary provided by the EPA in its submission on the function of the liner and seepage management, it is incorrect to refer to the proposed seepage management system for the TSF as fully relying on the proposed lining works. ATCW has demonstrated in the modelling and sensitivity analyses conducted that the lining system has a limited impact on the expected seepage performance of the TSF (as shown in Figure 4.8 above) and therefore additional systems were also considered. A multi-barrier approach has been clearly demonstrated to be the most effectual in managing seepage.



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

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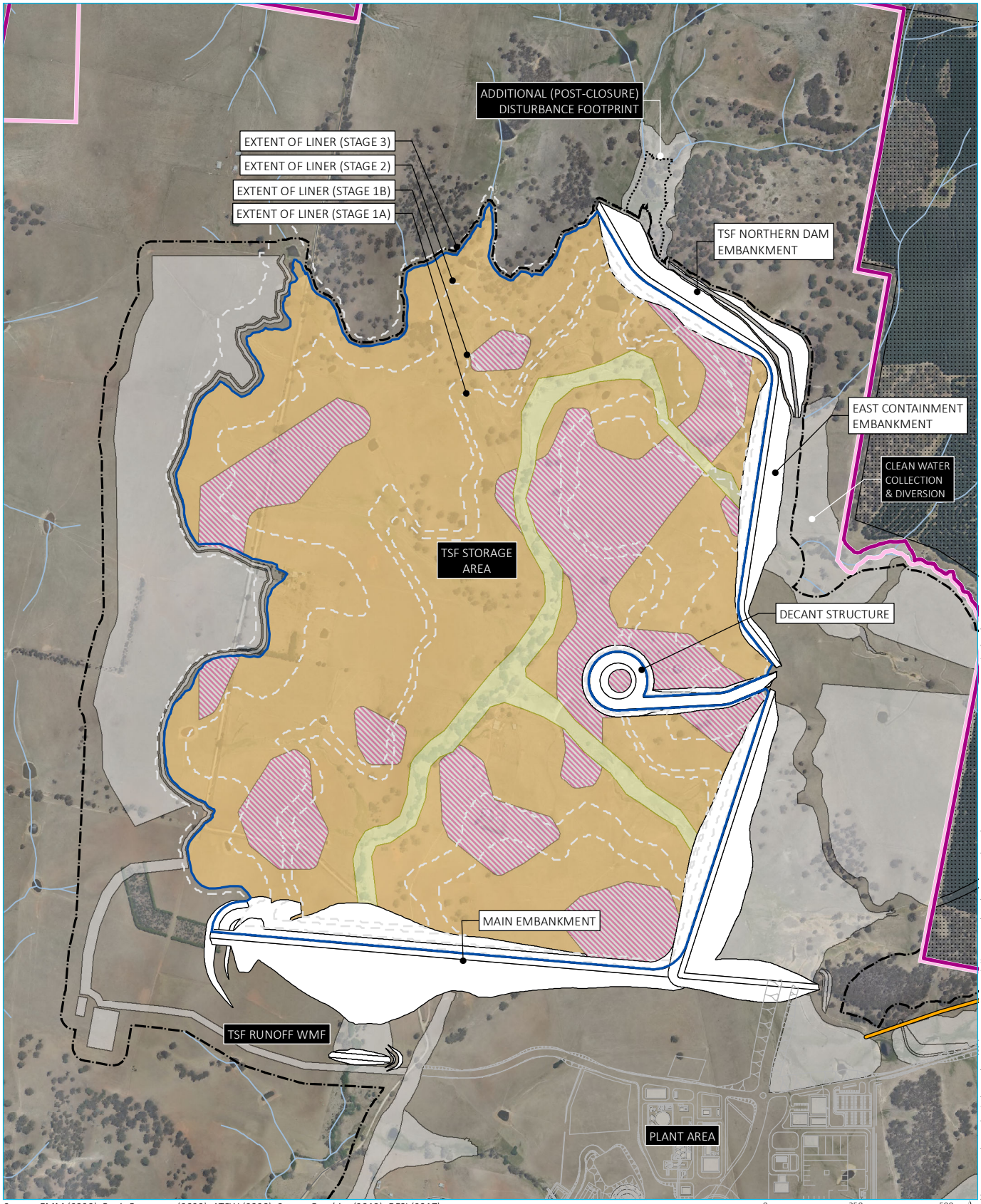
Figure 4.10



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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

McPhillamys Gold Project
Submissions report
Figure 4.11

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b Quality assurance and quality control

It is noted that QA/QC is typically addressed as part of detailed design. Notwithstanding, in response to the EPA's request, ATCW (2020) have included a description of the proposed QA/QC plan for determining the suitability of clay and constructing the TSF, as summarised below.

The process envisaged to establish and confirm the QA/QC plan for the TSF is as follows:

1. Detailed design phase to include detailed mapping, trial construction and correlation of clay characteristics (Particle Size Distribution and Atterberg Limits) to permeability testing.

2. Construction phase to include:

    - Expose clay foundations and define material thickness (test pit) and suitability (classification testing).

    - Define treatment area types:

        - In-situ material condition and compact only.

        - In-situ material condition, compact and liner.

        - Import clay materials (300 mm to 1,000 mm), condition, compact and liner.

    - In-situ conditioning and compaction to extend to a minimum 450 mm with suitable compaction equipment.

    - Testing compacted clay fill materials compatibility at suitable moisture content and achieve the appropriate compaction.

Notwithstanding the above process, current results of mapping the clay materials indicate relatively distinct areas where suitable clays exist. These areas will be further refined with additional mapping (inclusive of geophysical techniques) as part of the detailed design. The outcome of the detailed design phase will be to definitively map the areas requiring imported liner and to prepare a QA/QC for the TSF and liner construction.

The QA/QC of the earthworks will be undertaken in general accordance with Australian Standards, AS3798-2007. A typical structure for the construction QA is provided in Appendix B of ATCW (2020) (refer to Appendix D of the Amendment Report).

iv Seepage monitoring bores

Details regarding the groundwater monitoring network that is proposed to surround the TSF, waste rock emplacements and water storages are limited to single dot points when describing the monitoring of onsite seepage and risks from project related infrastructure (sections 6.5.1 and 7.3 of Appendix K). No other details are provided and the spatial distribution is unknown.

It is also noted that these monitoring bores will act as in-situ mitigation measures in order to detect seepage from mine relating infrastructure. There are sections in the EIS that suggest the need for these additional monitoring bores are not necessary as the dilution of seepage prior to offsite site discharge will create negligible effects. This possibility of employing a 'do nothing' approach is not considered suitable for the purposes of impact and risk mitigation. Further, EPA notes that the basis of the proposal is a nil discharge site meaning no discharge offsite should occur under any circumstances.

Requested information/actions

5. The proponent revises the assessment(s) to provide more detailed information regarding the number of proposed monitoring bores at the TSF, waste rock emplacements, and water storages and the proposed sampling program to be undertaken.

Regis' planned approach to groundwater monitoring is documented in the *Groundwater Monitoring and Modelling Plan* (GMMP; EMM 2017), Section 7.3 of the groundwater assessment (Appendix K of the EIS) and Section 7.1 of the groundwater assessment addendum (Appendix H of the Amendment Report). The baseline monitoring network is discussed in Section 3.6 and 4 of the groundwater assessment (Appendix K of the EIS). The groundwater monitoring network currently includes project specific monitoring bores and third-party owned bores. Monitoring coverage spans the key hydrogeological units in the mine development, including the saprock, metasediments, volcaniclastics and alluvium. Regis has collected over six years of monitoring data for the project.

Groundwater monitoring data will continue to be collected from Regis' project specific monitoring locations throughout the life of the mine.

As described in Section 4.1.2(v), the mine development WMP will document:

- the monitoring program during the operations phase of the project;
- the proposed mitigation and management measures for the approved project;
- spill management and response;
- water quality and level trigger levels (as part of a trigger action response plan);
- reporting requirements;
- corrective actions, contingencies; and
- responsibilities for all management measures.

Triggers will also be assigned based on distance from the water affecting activity (ie TSF, open cut pit etc) and will be based on a typical Source-Pathway-Receptor assessment approach. Further discussion on groundwater quantity (heads) and quality performance triggers and response is provided in Section 4.1.3(vi).

Groundwater monitoring bores will be installed as part of the project establishment, with locations to be finalised based on access, health, safety and environmental considerations. Zones where monitoring bores will be installed are presented in Figure 4.7. The monitoring zones are categorised based on the typical Source-Pathway-Receptor approach, with the areas based on the main water affecting activities: open cut pit, TSF, waste rock emplacement and water management facilities. Further details regarding the preliminary groundwater monitoring zones and the number of monitoring bores is provided in Section 4.1 and the groundwater assessment addendum report (Appendix H of the Amendment Report). Existing monitoring bores will be utilised for monitoring where possible, including existing third-party owned bores that are currently included in the monitoring program. Final locations of the monitoring network will occur in consultation with EPA, NRAR and DPIE-Water.

The EPA note that the EIS indicates the dilution of seepage will create negligible effects. While this is true, contrary to the EPA's claim in their submission, the possibility of employing a 'do nothing' approach has not been suggested by Regis in terms of monitoring. Regis remains committed, as described above, to developing a robust and fit for purpose water monitoring program, which will be developed in consultation with DPIE-Water and documented in the WMP for the mine development.

v Contingency and post closure planning

Pollutants with the potential to degrade the quality of groundwater, although identified as low in the tailing assessment, must not migrate through strata over the life of the TSF. The proposed seepage recovery proposal and nominated TSF lining options as described in the EIS do not meet this requirement, nor do they consider contingency management actions in the event that seepage rates exceed those produced by the assessment modelling. Post closure monitoring, management and recovery of seepage is also not considered in sufficient detail to allow an assessment to be made.

Details regarding contingency events and post closure management for the TSF are not provided. The lack of information regarding the TSF lining proposal places complete reliance on the modelled performance of the various liner options and the correct siting of the liner options by the proponent. This alone entails a high degree of risk however the proposal also does not address any contingency outcomes such as unexpected rates of seepage or failure of the lining systems.

Requested information/actions

6. The proponent revises the assessment(s) to provide more detailed information regarding contingency planning for unexpected rates of seepage from the TSF and the maintenance of zero-discharge operations.
7. The proponent revises the assessment(s) to provide more detailed information regarding seepage management and mitigation plans post TSF closure.

TSF design and assessment of the effectiveness of the TSF seepage management measures has been conducted by ATCW (2019 and 2020). As presented in the groundwater assessment (Appendix K of the EIS) and groundwater assessment addendum (Appendix H of the Amendment Report), the purpose of the groundwater model is limited to assessing the potential impacts of the TSF on the groundwater flow system under an unlikely but deliberately conservative scenario (to assess potential seepage), and the purpose is not to provide an accurate estimate of TSF seepage rates. 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. The simulation of the TSF in the groundwater model is therefore deliberately conservative.

a Multi-barrier approach to tailings seepage management

As reported in the EIS (Appendix K and ATCW 2019), the TSF is designed to operate effectively and efficiently, and in consideration of the requirements of the NSW Government and in accordance with the relevant regulatory standards. The TSF is designed specifically to avoid adverse impacts to the surrounding environment and contain all water during large rainfall events (no spill risk).

Regis has adopted several leading practices to produce a mine design that avoids and minimises impacts to water assets, which includes a multi-barrier approach as part of the design of the TSF. The multi-barrier approach is presented graphically on Figure 4.12.

This approach begins with the design of the process plant where a cyanide detoxification process will reduce the concentration of cyanide in the tailings before it is directed to the TSF. The tailings will pass through a tailings thickener and then be pumped to the cyanide detoxification circuit where oxygen and other reagents (lime, copper sulphate and sodium meta-bisulphite) are added. The reagents react with the free and weak acid dissociable (WAD) cyanide in the thickened slurry, so that the free cyanide is destroyed, and the level of WAD cyanide remaining is reduced to less than 30 parts per million (ppm).

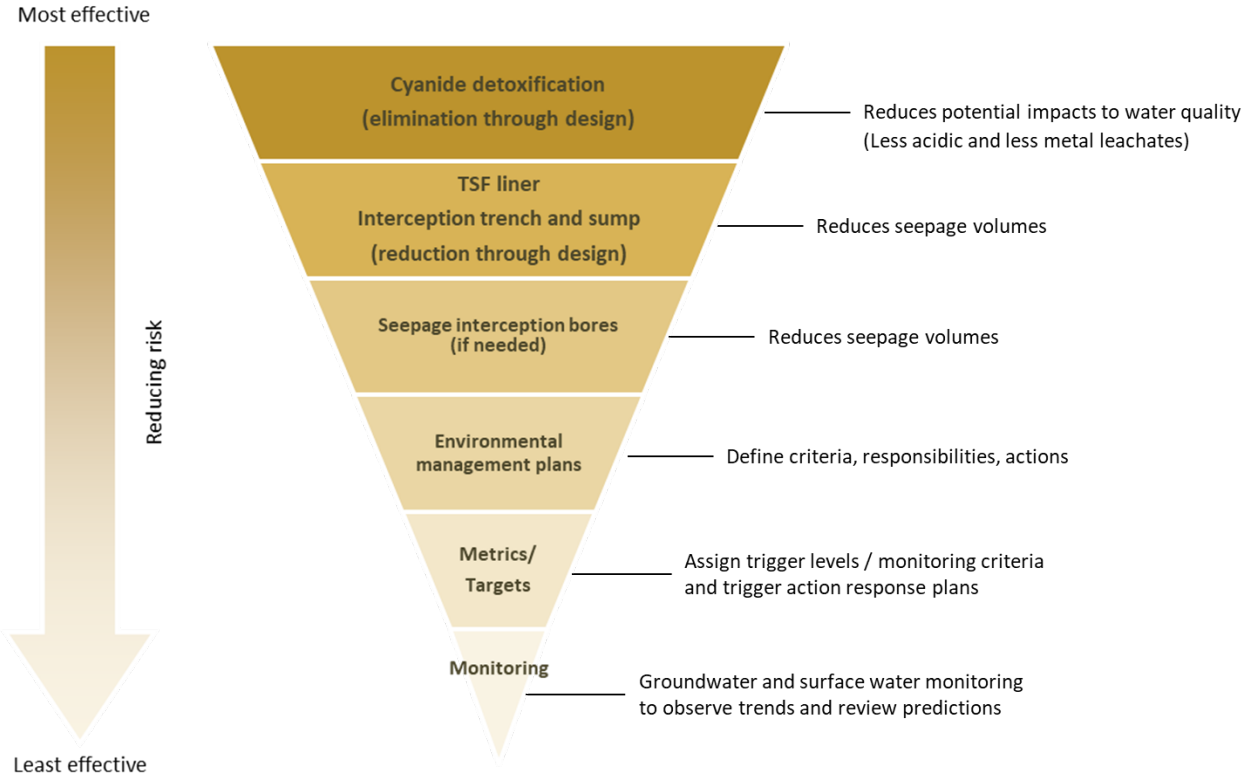


Figure 4.12 TSF multi-barrier approach

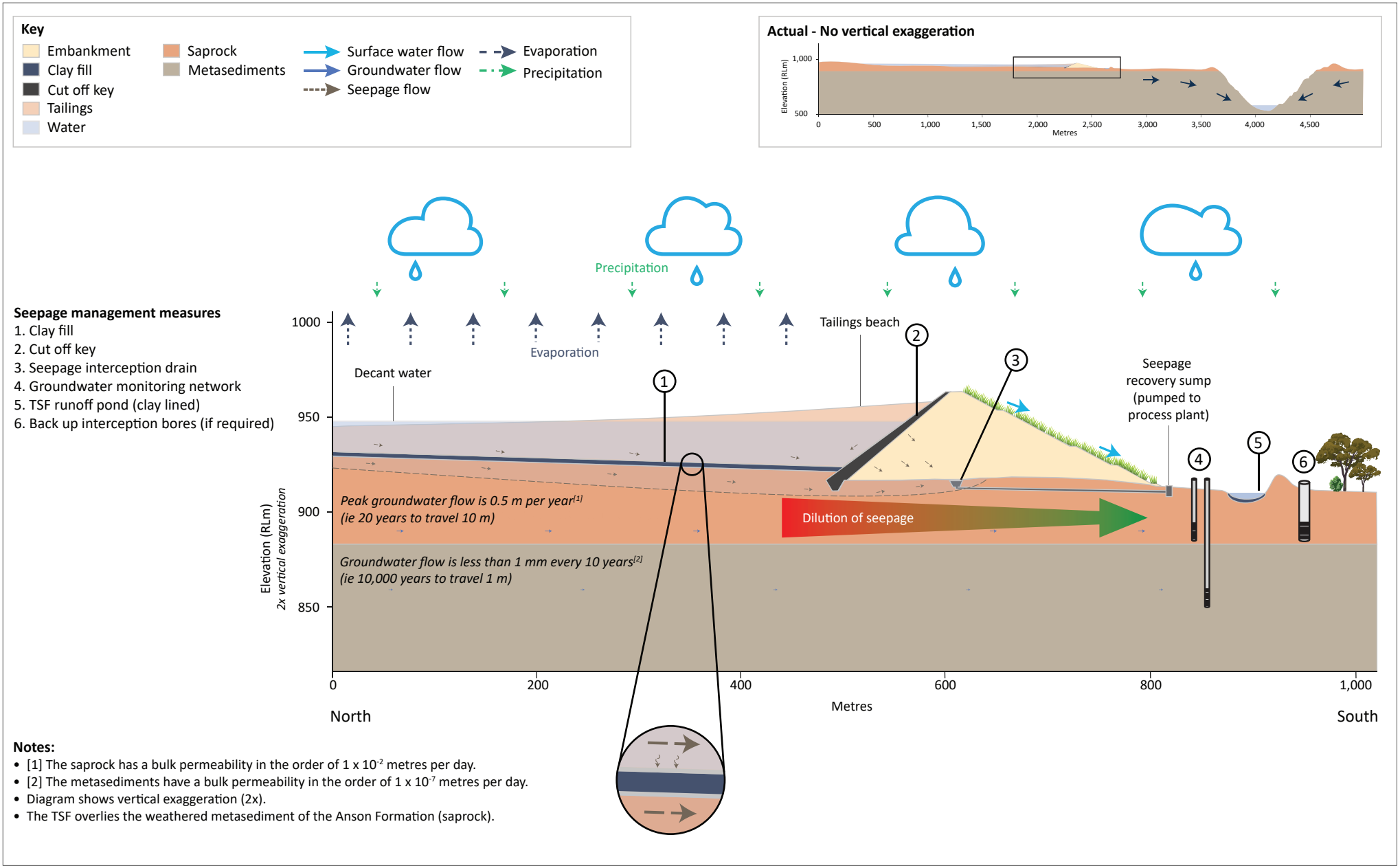
In order to reduce seepage volumes and rates, the TSF seepage management is proposed to comprise:

- A lined TSF floor using a combination of a low permeability clay liner and imported liner system. The clay liner will be constructed to a minimum 1,000 mm thick within the existing drainage areas and a minimum 300 mm thick in areas with in-situ clay that have a permeability less than the equivalent of 1,000 mm at 1 x 10^{-9} m/s.

- A low permeability core zone will be included as part of construction of the embankment and a deepened cut-off key extending to basement.
- A seepage interception trench located downstream of the cut-off key for the recovery of seepage and dewatering of the tailings mass.
- A downstream TSF runoff dam to intercept surface contact water from incident rainfall.
- Monitoring bores downstream to monitor groundwater quality and levels and, if required, the use of a recovery system.
- Construction of the TSF decant approximately 770 m away from the main embankment.

Environmental management plans will be prepared for the project, which will document the proposed mitigation and management measures for the approved project, and will include the surface and groundwater monitoring program, reporting requirements, spill management and response, water quality trigger levels, corrective actions, contingencies, and responsibilities for all management measures.

A schematic of the proposed seepage management system is presented in Figure 4.14.



Conceptual cross section of the TSF, illustrating the multi-barrier approach

b TSF design seepage modelling

TSF design and assessment of the effectiveness of the TSF seepage management measures has been conducted by ATCW (2019 and 2020). In comparison to the groundwater model, the ATCW (2019, 2020) TSF seepage model is a local scale model that specifically simulates the tailings placement, tailings material, embankment, liner, cut-off key, interception drain and sump, and is used to assess the effectiveness of the seepage management system. ATCW (2020) completed additional seepage modelling to demonstrate the different seepage rates (through the TSF footprint, ie not at the embankment) if no seepage management measures are applied, compared to 1,000 mm clay liner (at 10^{-9} m/s permeability) and the lining system proposed for the project. The predicted seepage rates are summarised in Table 4.17 (ATCW 2020). The TSF modelling completed by ATCW (2020) shows that the proposed TSF lining system (as described above) provides a robust system and is effective at managing seepage.

Table 4.17 Estimated seepage rates over total TSF footprint (ATCW 2020)

Model scenario	Median seepage rate (mm/m²/year)
No liner (in-situ conditions)	0.76-2.86
Clay liner (1,000 mm thick at 10^{-9} m/s permeability)	0.42-1.62
Proposed lining system	0.42-1.66

c Post closure

Following completion of mining and tailings placement, the TSF will be capped to facilitate surface water drainage, prevent any ponding of water and limit potential rainfall infiltration into the tailings (ATCW 2019). 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. A capillary break/trafficking layer approximately 0.5 m thick will be placed on the TSF, followed by a capping layer that will consist of approximately 0.6 m of subsoil and 0.1 m of topsoil. Prior to placing both the subsoil and topsoil layers, the capillary break/trafficking layer will be allowed to settle and if necessary, additional non-acid forming (NAF) rock and/or subsoil placed to achieve the final landform design, followed by topsoil placement and revegetation with pasture species by either drill or broadcast seeding.

Seepage from the TSF will continue post closure due to the low permeability liner, the nature of the geology and the tailings. This predicted rate of seepage post-closure is very low, at 0.011-0.015 ML/day, equivalent to 1.4 2.1 mm/year/m^2, or moving at a rate of approximately 50 m in 100 years. The majority is predicted to flow towards the final void (open cut pit) and some is anticipated to move towards the Belubula River. This volume is negligible in comparison to the Belubula River streamflow (at the gauging station downstream of the confluence with Tributary A), which is estimated to have flows of around 289 ML/day during average climate conditions and 2.7 ML/day during dry conditions (HEC 2020). That is, average flows down the Belubula River represent 10,000 times the predicted seepage rate.

The results of groundwater modelling (Appendix K of the EIS and Appendix H of the Amendment Report) demonstrate that under a highly conservative scenario, seepage from the TSF is predicted to slowly migrate south-west and south of the TSF. Seepage from the TSF is predicted to remain within the saprock zone, flowing in a horizontal direction. Discussion on water quality during and post-closure relating to seepage is provided in the response below.

d Water quality

As presented above, the tailings will undergo cyanide destruction as part of the ore processing to minimise potential impacts to the environment from elevated concentrations of cyanide and stabilise other metals. Sample results representing the tailings leachate following cyanide detoxification have been compared to ANZECC (2000) 95% species protection of freshwater aquatic ecosystem guidelines, livestock drinking water guidelines and laboratory reported concentrations for surface water and groundwater in the area.

When compared to the ANZECC (2000) livestock drinking water guideline values, the results show the tailings leachate is expected to have elevated concentrations of electrical conductivity, sulphate, fluoride (marginal) and selenium. When compared to the ANZECC (2000) 95% species protection of freshwater aquatic ecosystems, the results show the tailings leachate is expected to have elevated concentrations of pH (marginally above), electrical conductivity, aluminium, arsenic, cobalt and selenium.

However, pH, electrical conductivity, aluminium, arsenic, cobalt and fluoride are within the baseline surface water quality and/ or groundwater concentration ranges.

The groundwater assessment (Appendix K of the EIS) and the groundwater assessment addendum (Appendix H of the Amendment Report) assessed the potential changes to groundwater quality as TSF seepage water mixes with groundwater. The changed water quality (in particular: aluminium, electrical conductivity, sulphate, selenium, cyanide, cobalt) are estimated have concentrations that are:

- below or within the range of water quality concentrations currently measured in groundwater, and the Belubula River and its tributaries;
- below ANZECC (2000) livestock drinking water guideline values (with the exception of cobalt); and
- below ANZECC (2000) 95% protection level for freshwater aquatic ecosystem guideline values.

As outlined in Section 4.1, the groundwater model will be upgraded over time and with additional baseline data and data from active mining. In order to further assess potential impacts of the TSF from a hydrogeochemical perspective as part of future improvements, Regis will consider revision of the how the tailings placement is simulated to refine seepage estimates and include a geochemical assessment to refine estimates of leachate concentrations.

e Adaptive management

Regis will continue to apply the adaptive management approach to all environmental related aspects of the project, including assessing tailings seepage management. The adaptive management approach is illustrated in Figure 4.14.

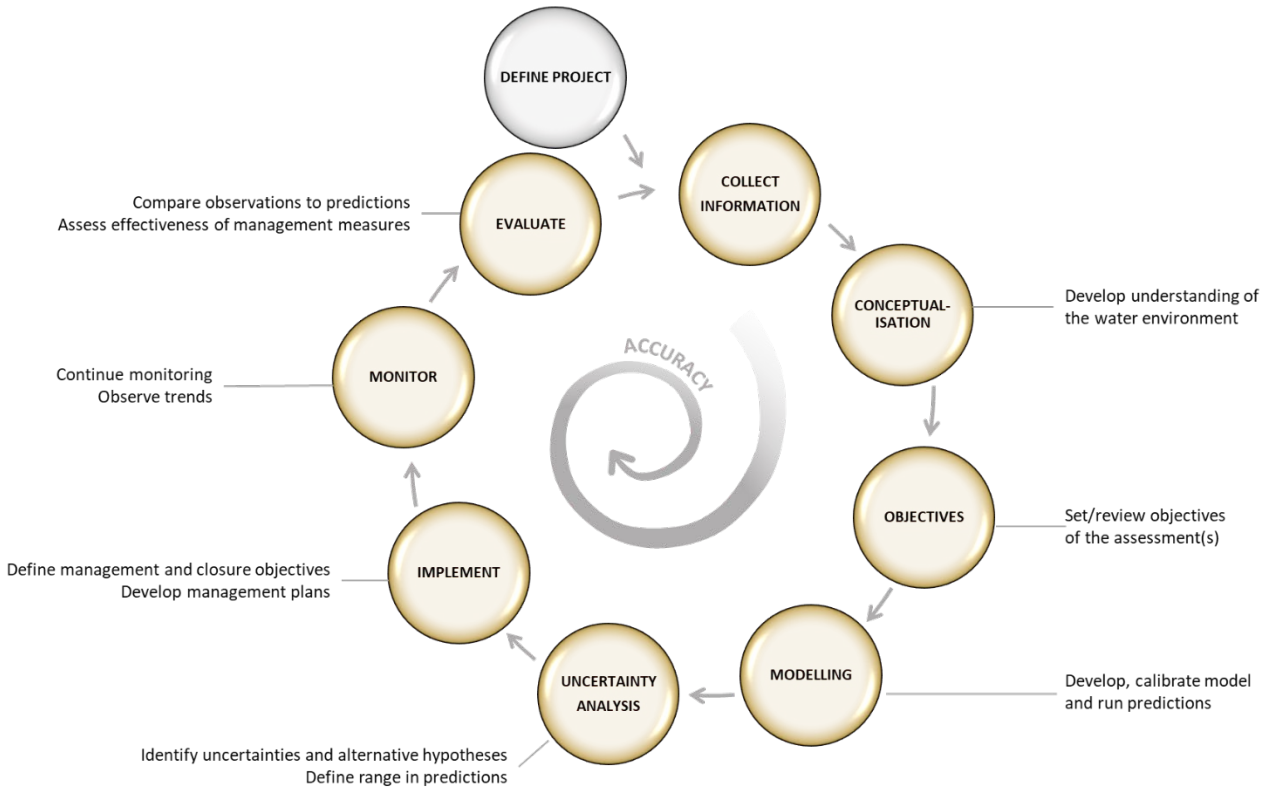


Figure 4.14 Adaptive management

As the project progresses, Regis will continue to collect additional information and improve the conceptual understanding of the water environment. This will be through testing, design refinements and monitoring. As part of the adaptive management approach, predictions associated with TSF seepage (and other environmental assessments) will be continuously reviewed and adjusted as needed, reducing the predictive uncertainty and increasing confidence in predictions. The effectiveness of the seepage management system will be monitored and assessed during operations of the project. If observations deviate from predictions, the management and mitigation measures will be adjusted and refined.

The Mining Operations Plan (MOP) that Regis will be required to prepare will outline completion criteria for the mine development, including the TSF. This completion criteria will be reviewed as part of each MOP update, and in consideration of the results of water quality and groundwater monitoring, if required. In addition, a detailed closure plan will be prepared five years prior to closure and in consultation with relevant stakeholders such as the Resources Regulator. The closure plan will further define completion criteria to be applied to the TSF.

4.2.3 Surface water

i Construction impacts on the downstream environment

A discharge impact assessment is required to inform licensing considerations consistent with section 45 of the *Protection of Environment Operations Act 1997*. Given the duration of the construction phase, the proposed sediment and erosion controls and the nature of the receiving environment, a qualitative discharge assessment is likely to be adequate.

Requested information/actions

8. The proponent revises the assessment to include a qualitative assessment of, and mitigation measures to avoid, the potential impacts of construction phase discharges to the downstream environment.

A qualitative assessment with mitigation measures to avoid construction phase discharges to the downstream environment is outlined in Section 3.1.3 of the revised surface water assessment (HEC 2020) contained as Appendix G of the Amendment Report and summarised below.

The development/construction water system will be in place during construction only and will be managed using erosion and sediment control measures designed in accordance with Landcom (2004) and DECC (2008). The following principles, which have been taken from the Landcom (2004) guidelines, underpin the approach to erosion and sediment control for the mine development:

- minimising surface disturbance and restricting access to undisturbed areas;
- progressive rehabilitation/stabilisation of mine infrastructure areas;
- separation of runoff from disturbed and undisturbed areas where practicable;
- construction of surface drains to control and manage surface runoff; and
- construction of sediment dams to contain runoff up to a specified design criterion.

Activities that have the potential to cause or increase erosion, and subsequently increase the generation of sediment, involve exposure of soils during construction of infrastructure (ie during vegetation clearance, soil stripping and earthworks activities) and ongoing mining activities involving clearing and stripping and stockpiling mine materials.

Temporary sediment traps and sediment filters (eg sediment fences) will be installed where necessary downslope of disturbance areas in accordance with Section 6.3.7 of Landcom (2004). The temporary erosion and sediment control systems will remain in place until all earthwork activities are completed and the disturbed area is rehabilitated.

Routine (eg monthly) inspections of sediment control structures and diversion drains as well as inspections following rainfall events of 20 mm or more in a 24 hour period will be conducted by site personnel. During these inspections, sediment control structures will be checked for capacity, structural integrity and effectiveness. Inspections will be documented using a check sheet as recommended in Landcom (2004) (refer Volume 1, Table 8.1) and maintenance work will be carried out as required.

Inspection and management procedures will be documented in an Erosion and Sediment Control Plan (part of the WMP for the project), within the Construction Environmental Management Plan (CEMP).

ii Clean water diversions

The EIS states that clean water would be diverted around the mine site via a series of diversion channels, dams, pumps and pipelines. Six 'clean water' dams would be constructed, sized to contain runoff from a 1% annual exceedance probability, 72-hour rainfall event with dewatering to occur within 10 days. However, the EIS does not provide a geomorphological assessment for the receiving environment to assess potential impacts associated with a concentrated flow.

The EIS does not include details of how dewatering will be managed to minimise potential downstream impacts including:

- stabilisation criteria established to determine the discharges are "clean" post construction activities; and
- monitoring of potential geomorphological impacts on the receiving environment.

Requested information/actions

9. The proponent revises the assessment to include details of how dewatering of the 'clean water' dams will be managed to avoid and minimise potential downstream impacts.

As described in the EIS, during mining, clean water will be diverted around the mine development via a series of diversion drains, dams, pumps and pipelines. The clean water management system, including size and design of storages, has been revised for the amended mine development as shown in Figure 4.1 in Section 4.1.1(iii) and described in detail in the revised surface water assessment (Appendix G of the Amendment Report).

Runoff from undisturbed areas will be captured 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. A water balance model has been developed to illustrate the operation of the pumped diversion system (refer Section 3.1.1 of Appendix G of the Amendment Report). Clean water will not be retained within CWFs for any extended period of time.

Runoff diversion drains will be constructed 'on contour' with low longitudinal gradients and designed as grassed channels or with rockfill riprap 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).

CWF pipeline outfalls will be directed to an engineered stilling basin (refer to Plate 4.2 for an example), located adjacent to the Belubula River downstream of the mine disturbance area, to ensure the flow velocity and associated flow energy is dissipated and flow returned to the Belubula River at a suitable velocity to control erosion. Baseline geomorphological monitoring has been undertaken as documented in the surface water assessment prepared for the EIS (Appendix J of the EIS) and the revised surface water assessment. Channel stability monitoring downstream of the CWF flow return to the Belubula River is proposed as outlined in Appendix G of the Amendment Report.

The upslope batters of the CWF embankments will be stabilised with hydromulch (or similar) as soon as practicable following construction, with subsequent development of a grassed cover in order to mitigate the risk of increased suspended solids in the diverted water. It is noted that baseline monitoring data from monitoring site WED4775A (located upslope of proposed CWF1b) indicates naturally elevated turbidity and suspended solids content in runoff in the vicinity of this CWF (refer Figure 4.16).

Plate 4.2 **Typical engineered pipeline outfall stilling basin**

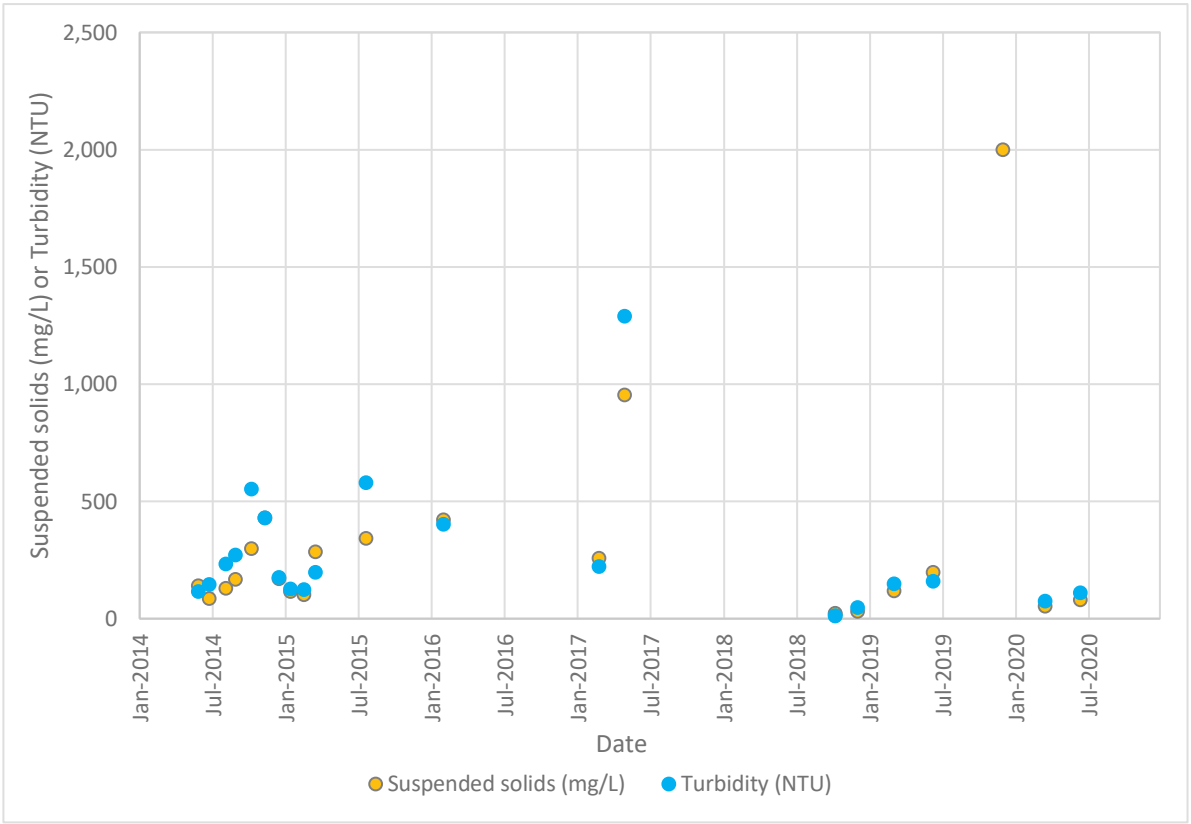


Figure 4.15 **Recorded Suspended Solids and Turbidity – WED4775A**

iii Application of Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The EIS adopts the 80% species protection guideline values to characterise the existing conditions of the receiving waterways. NSW Government policy and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality recommend that a slightly-moderately disturbed level of protection be applied to most waterways, including for highly disturbed ecosystems. For toxicants, the default guideline values for slightly-moderately disturbed ecosystems are the 95% species protection guideline values (99% for bioaccumulating toxicants).

The EIS does not adopt a guideline value for iron. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality recommends that interim working levels are adopted for some toxicants where no moderate or high reliability guideline value is available. The interim working level for iron is 300µg/L.

The EIS also states, "Site specific WQOs would be derived from monitored data as part the WMP for the project if approved and endorsement for the use of these site specific WQOs would be sought from the NSW government."

However, it is unclear how these 'site specific WQOs' are intended to be used. If the intent is to use these to assess whether water quality is likely to support the environmental values of the waterways (i.e. site-specific guideline values), then they should be derived consistent with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. If the intent is to detect water quality changes resulting from the project, then comparison of upstream and downstream monitoring results may be more sensitive to water quality changes.

The EPA queries why downstream trigger values are considered in the assessment given the project is proposed to be a NIL-discharge operation. Where site-specific studies are proposed to tailor the trigger values to reflect local conditions, and the results are to be used for regulatory purposes (e.g. to assess whether a licensed discharge impacts on environmental values), then prior agreement from the EPA on the approach and study design must be obtained. In these circumstances, the EPA will require demonstration of how the investigation is consistent with the methodology in the national Water Quality Guidelines.

Requested information/actions

10. The proponent revises the modelling to use the relevant Australian and New Zealand Guidelines for Fresh and Marine Water Quality guideline values for slightly to moderately disturbed ecosystems.
11. The proponent revises the modelling to adopt interim working levels for toxicants where no moderate or high reliability guideline value is available.
12. Any site-specific guideline values are developed consistent with Australian and New Zealand Guidelines for Fresh and Marine Water Quality ensuring that the reference sites are representative of a slightly disturbed condition.

The revised surface water assessment (Appendix G of the Amendment Report) has been updated to reference default guideline trigger values for protection of aquatic ecosystems at the 95% level of species protection. An interim indicative working level has been adopted for iron.

The intent of developing site specific water quality objectives (WQOs) (trigger values) is to develop surface water impact assessment criteria so as to assess if monitored water quality during the project life varies significantly from the baseline. Site specific WQOs will be derived from the monitored data ahead of project commencement and in accordance with ANZG (2018) guidelines as part of the approved WMP for mine development. Endorsement for use of site specific WQOs will be sought from the EPA as part of the approval of the WMP.

iv Contingency planning and post-closure management of potentially acid forming materials

The assessment of waste rock materials identifies 42% of the waste rock to be potentially acid forming (PAF) material. The proposal is to contain the PAF within non-PAF rock cells which should seal the material off from contact with ground and surface waters and prevent impacts. There is no consideration of contingency outcomes regarding waste materials, for example how impacts to ground and surface water will be avoided if the percentage of PAF turns out to be significantly more than the modelled 42% and how this will impact closure and rehabilitation management actions.

Requested information/actions

13. The proponent revises the assessment to include scenario modelling that accounts for contingency outcomes such as impacts from PAF to surface waters during the operational, closure and final landform phases of the project.

The geochemical characterisation commissioned by Regis and undertaken by SRK (2019) 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 not acid forming material, or NAF). Samples from the ore material in the centre of the open cut pit and of the tailings reported the greatest proportion of PAF material. A significant portion of the samples tested at the laboratory were unclassified (uncertain, UC) in terms of their acid generation meaning that these samples can tend to exhibit acidic and neutralising properties. The pH of the samples when mixed with pure water were near neutral, with some samples reported to have minor amounts of sulphide-sulphur which may oxidise to generate a small amount of acid, and/or can have slower reacting neutralising minerals that may exceed the acid producing capacity.

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 UC material). 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 pit 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.

Based on the model, it is estimated the PAF mixture that will make up 42% of the waste rock consisting of 27% points PAF and 15% points UC material. 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. In summary, the 'worst case' scenario was adopted in the mine plan and consideration of other scenarios would result in less PAF material that requires encapsulation.

The water management system has been designed such that the mine development will operate as a nil discharge site. Surface water runoff within the disturbance footprint will be captured by the various WMF (as shown on Figure 1.3) during operations. The water storages have been designed such that they do not spill in the simulated water balance for the mine development under all historical climate scenarios. This is a reduction in the risk of discharge from the water management system presented in the EIS (noting this too was very small), where the storages were modelled with less than a 1% spill risk (HEC 2020). A cyanide detoxification plant will be constructed to treat cyanide in tailings. The treatment process includes the addition of lime which will increase the pH and raise the buffering capacity of the treated water that will report to the TSF. Risks to surface water quality is therefore considered very low.

The potential for acidic seepage of stored water from the TSF has been considered in the TSF design (ATCW 2019 and 2020). As described above in Section 4.2.2(i) and (ii), seepage management measures include a lined based in the TSF, construction of an interception drain and installation of seepage monitoring bores and, if required, a recovery system. The water quality of the tailings liquid fraction, which was collected by separating the liquid from the solid fraction of the tailings slurry, has been compared to the baseline surface water concentration, as described in Section 6.5 of the groundwater assessment for the mine development (EMM 2019c, refer to Appendix K of the EIS). The concentrations of sulphate, aluminium, selenium and electrical conductivity exceeded the baseline surface water quality and guideline values for livestock drinking water and 95% protection of freshwater aquatic ecosystems. However, the aluminium concentration in the tailings fraction was reported within the baseline surface water quality concentration range.

4.2.4 Noise and vibration

i Mine development

a Receiver locations

A review of a selection of the nominated receiver locations in Table 1 of the noise report indicates that the receivers have not been assessed in a location consistent with NPfI Section 2.6 which states:

> *For a residence, the project noise trigger level and maximum noise levels are to be assessed at the reasonably most affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level.*

Requested information/actions

14. The proponent reviews the assessment locations for receivers and updates the assessment accordingly.

The receiver locations were identified as being at the centre of the house on each relevant property, which is considered to be the reasonably most affected point, as required by the EPA's *Noise Policy for Industry* (NPfI) (EPA 2017).

It is noted that the location of receivers (and coordinates) are at the centre of a residence/dwelling when plotted on a map. However, the calculation to each receiver location is a free field noise level with no reflection from a building façade, as one would expect when within 30 m of a receiver location and no closer than 3 m to a reflective surface. For completeness, a sensitivity calculation was conducted by moving each receiver 20 m in both the X and Y axes (>3 m and <30 m from any building). The findings result in an average difference in calculated noise level of <0.1 dB to that presented in the EIS assessment, confirming that the receiver locations are appropriate.

b Background noise monitoring

The measurement of background noise levels has not been conducted in accordance with NPfI Fact Sheets A and B. The assignment of background noise levels and subsequent derivation of Project Noise Trigger Levels at a number of receivers requires justification and/or revision.

The noise monitoring graphs in Appendix B appear to show 7 out of the 9 full days of monitoring at all MAC noise monitoring locations recorded wind speeds in excess of 5 m/s for the vast majority of the time. Section B1.1 of the NPfI states that "Monitoring should not be conducted (or monitoring data are to be excluded) when average wind speeds are greater than 5 metres per second at microphone height, or during rain." NPfI Section A1 requires that a week's worth of valid data is required to calculate a long term rating background level (RBL). When data with winds speeds above 5m/s are removed, it appears that a weeks' worth of valid monitoring data were not obtained.

Requested information/actions

15. The proponent includes the relevant reporting details for noise monitoring as required by *Noise Policy for Industry* (NPfI) (EPA, 2017) Section B3, including daily graphs of all monitoring data used and relied on in the report.
16. The proponent justifies why monitoring was carried out and included in the assessment when average wind speeds were more than 5 m/s.
17. The proponent demonstrates that the existing data is valid (ie 1 full week worth) or undertake noise monitoring in accordance with NPfI Fact Sheets A and B.
18. The proponent justifies why the minimum measured RBL has not been adopted for each catchment or amend the assessment accordingly.

Reporting of noise monitoring

The reporting of noise monitoring as required by the NPfI is included in the *Amended Noise and Vibration Impact Assessment – Mine Development* (MAC 2020a) (refer to Appendix J to the Amendment Report (EMM 2020a)); and specifically in Section 3 (receiver review, which describes the catchment areas and the dominant noise sources); Section 4 (details of noise monitoring conducted, equipment used and location, measured RBLs and adopted RBLs); and Appendix B (noise monitoring data, including daily logger graphs data from the noise monitoring terminal (NMT) deployed in Kings Plains from to mid-November 2016 to mid-February 2017).

Wind speeds during monitoring

Wind speeds shown in Appendix B of the Noise and Vibration Impact Assessment (NVIA) prepared for the EIS (MAC 2019, referred to as the EIS NVIA) are at 10 m above ground level, measured at the McPhillamys weather station within the mine development project area, near Dungeon Road. Rating Background Levels (RBLs) were determined by excluding wind speeds greater than 10 m/s (above ground level) which is equivalent to 5 m/s above ground level. 10 m/s speed wind at 10 m height is equivalent to 5 m/s at 1.5 m above ground level, as demonstrated below.

The wind profile is calculated at microphone height (1.5 m) from 10 m wind data using the Vertical Wind Profile - Logarithmic Law. The calculation is referenced in Section 2.6.2 of AS NZS 3580 *Part 14 – Methods for sampling and analysis of ambient air*.

The vertical variation of wind is calculated using the formula below:

$$v_2 = v_1 \cdot \frac{\ln\left(\frac{z_2 - d}{z_0}\right)}{\ln\left(\frac{z_1 - d}{z_0}\right)}$$

$v2$	mean wind speed at height z_2 (m/s)
$v1$	mean wind speed at height z_1 (m/s)
$z2$	height (m)
d	zero plane displacement (m)
$z0$	surface roughness (m)
$z1$	height (m)

Based on a roughness value of 0.25, 10 m/s @10 m = 4.9 m/s @ 1.5m.

Therefore, by excluding wind speeds greater than 10 m/s from the data used, it in effect excluded winds equivalent to 5 m/s above ground level. Further discussion on the validity of this data (ie more than the minimum required one weeks' worth of data recorded), is provided in the response below.

Validity of existing data and determination of RBLs

As described in the amended NVIA (MAC 2020a), the area around the mine development project area was divided into four noise catchment areas (NCA) for the purposes of the noise assessment:

- Distant Rural – rural receivers that are typically rural in nature with low background noise levels and are generally more than 2 km from the mine development project area boundary;
- Sturgeon Hill – receivers to the south west of the mine development project area;
- Walkom Road – receivers in the Kings Plains locale that are not influenced by road traffic noise from the Mid Western Highway; and
- Kings Plains – receivers situated in the Kings Plains locale that are in closer proximity to the Mid Western Highway.

Three of the four NCA's (ie all except for the Kings Plains NCA) represent predominately rural areas. Therefore, the amended noise assessment conservatively adopted the minimum RBLs as specified in the NPfI for these NCAs. However, given the proximity of residences to the Mid Western Highway in the Kings Plains catchment, long term noise monitoring was undertaken there to determine the appropriate day, evening and night RBLs.

An unattended Svantek SV200 Noise Monitoring Terminal (NMT) was deployed in the Kings Plains NCA from November 2016 to February 2017, for a total of 87 days. The NMT was situated between receivers R30 and R28a and approximately 170 m from the Mid Western Highway. On the basis of the discussion above and excluding winds greater than 10 m/s, from the total 87 days of data collected, 63 daytime, 64 evening and 60 night time valid ABL values were measured, providing a large and robust data set compared to the minimum seven days required by the NPI. Therefore, the data obtained, and the determination of RBLs (described further in the next sub-section), are in accordance with fact sheets A and B of the NPfI. The monitoring data is summarised in Table 4.18, presenting ABLs, and ambient (L_{Aeq}) noise levels with daily charts presented in Appendix B of the *Amended Noise and Vibration Impact Assessment* (MAC 2020a, refer to Appendix J of the Amendment Report (EMM 2020a)).

Table 4.18 NMT Data (Regis 2016/2017)

Date	Measured ABL dB LA90(period)[1]			Ambient Noise Level dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
Friday-18-Nov-16	30	30	34	47	52	47
Saturday-19-Nov-16	31	30	36	43	56	57
Sunday-20-Nov-16	31	32	14	49	53	57
Monday-21-Nov-16	14	35	32	52	50	48
Tuesday-22-Nov-16	35	35	31	57	50	47
Wednesday-23-Nov-16	40	28	22	50	45	43
Thursday-24-Nov-16	34	29	20	48	47	47
Friday-25-Nov-16	--	29	20	--	47	46
Saturday-26-Nov-16	33	28	--	49	48	--
Sunday-27-Nov-16	33	34	--	49	49	--
Monday-28-Nov-16	--	--	--	--	--	--
Tuesday-29-Nov-16	--	29	--	--	47	--
Wednesday-30-Nov-16	--	33	--	--	47	--
Thursday-1-Dec-16	37	32	28	52	52	54
Friday-2-Dec-16	37	34	32	51	47	46
Saturday-3-Dec-16	35	32	29	48	49	43
Sunday-4-Dec-16	36	36	32	51	48	46
Monday-5-Dec-16	39	34	--	50	45	--
Tuesday-6-Dec-16	--	30	--	--	49	--
Wednesday-7-Dec-16	36	--	--	47	--	--
Thursday-8-Dec-16	44	39	34	64	52	48
Friday-9-Dec-16	42	25	20	52	47	45
Saturday-10-Dec-16	33	29	19	47	45	44
Sunday-11-Dec-16	33	35	29	47	48	46
Monday-12-Dec-16	38	33	30	50	47	48
Tuesday-13-Dec-16	39	34	31	54	53	48
Wednesday-14-Dec-16	41	31	28	53	43	43
Thursday-15-Dec-16	39	40	34	51	49	49
Friday-16-Dec-16	38	37	32	51	50	47
Saturday-17-Dec-16	42	32	23	51	44	45
Sunday-18-Dec-16	31	45	28	44	52	47
Monday-19-Dec-16	36	34	30	49	48	45

Table 4.18 NMT Data (Regis 2016/2017)

Date	Measured ABL dB LA90(period)[1]			Ambient Noise Level dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
Tuesday-20-Dec-16	41	35	28	51	45	47
Wednesday-21-Dec-16	37	35	29	66	49	46
Thursday-22-Dec-16	35	39	29	53	49	45
Friday-23-Dec-16	34	37	32	52	56	45
Saturday-24-Dec-16	34	33	28	46	48	45
Sunday-25-Dec-16	35	34	29	47	50	41
Monday-26-Dec-16	37	33	29	48	46	46
Tuesday-27-Dec-16	38	--	30	48	--	45
Wednesday-28-Dec-16	39	31	30	49	46	44
Thursday-29-Dec-16	38	32	29	48	52	42
Friday-30-Dec-16	37	30	28	54	50	45
Saturday-31-Dec-16	35	33	--	48	50	--
Sunday-1-Jan-17	31	28	25	45	44	43
Monday-2-Jan-17	--	--	31	--	--	55
Tuesday-3-Jan-17	38	41	14	60	52	43
Wednesday-4-Jan-17	14	34	14	55	49	28
Thursday-5-Jan-17	14	37	27	44	48	44
Friday-6-Jan-17	37	40	25	49	51	46
Saturday-7-Jan-17	34	31	25	46	46	45
Sunday-8-Jan-17	35	32	29	45	49	46
Monday-9-Jan-17	32	35	25	46	47	46
Tuesday-10-Jan-17	36	33	32	47	47	45
Wednesday-11-Jan-17	38	--	21	49	--	47
Thursday-12-Jan-17	33	32	26	44	48	44
Friday-13-Jan-17	43	36	32	55	50	40
Saturday-14-Jan-17	37	28	18	49	45	45
Sunday-15-Jan-17	35	35	23	51	45	44
Monday-16-Jan-17	33	27	25	50	51	46
Tuesday-17-Jan-17	38	34	38	50	53	48
Wednesday-18-Jan-17	43	29	33	53	47	45
Thursday-19-Jan-17	--	--	--	--	--	--
Friday-20-Jan-17	--	--	--	--	--	--

Table 4.18 NMT Data (Regis 2016/2017)

Date	Measured ABL dB LA90(period)[1]			Ambient Noise Level dB LAeq(period)		
	Day	Evening	Night	Day	Evening	Night
Saturday-21-Jan-17	--	--	--	--	--	--
Sunday-22-Jan-17	--	--	--	--	--	--
Monday-23-Jan-17	--	--	--	--	--	--
Tuesday-24-Jan-17	--	--	--	--	--	--
Wednesday-25-Jan-17	--	--	--	--	--	--
Thursday-26-Jan-17	--	--	--	--	--	--
Friday-27-Jan-17	--	--	--	--	--	--
Saturday-28-Jan-17	--	--	--	--	--	--
Sunday-29-Jan-17	--	--	--	--	--	--
Monday-30-Jan-17	--	--	--	--	--	--
Tuesday-31-Jan-17	--	--	--	--	--	--
Wednesday-1-Feb-17	--	--	--	--	--	--
Thursday-2-Feb-17	--	24	23	--	51	43
Friday-3-Feb-17	37	--	--	49	--	--
Saturday-4-Feb-17	--	30	27	--	47	46
Sunday-5-Feb-17	39	31	27	51	51	47
Monday-6-Feb-17	--	--	--	--	--	--
Tuesday-7-Feb-17	--	--	--	--	--	--
Wednesday-8-Feb-17	43	31	25	56	48	44
Thursday-9-Feb-17	34	28	22	47	50	46
Friday-10-Feb-17	34	29	24	45	48	48
Saturday-11-Feb-17	36	--	--	50	--	--
Sunday-12-Feb-17	33	24	18	54	47	41
RBL and Leq Overall	36	32	28	54	50	48
No. Valid Samples	63	64	60	65	64	60

Note 1: Daily Assessment Background Level (ABL)

Note 2: 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.

Rating Background Levels

In the EIS NIVA, multiple RBLs were used across an identified NCA to represent the catchment area. The NPfI allows for a representative measurement location for multiple receivers to be used. At the initial stages of planning background measurements, the outcome is not always known, which is why the measurements are done.

Upon review of the resulting data, locations that exhibit similar features can be combined into noise catchments or noise assessment groups. This is a common and pragmatic approach for assessment, avoiding numerous catchments and over complicating the assessment.

In the EIS, the average calculated RBLs for each noise monitoring location in a catchment were used to determine the RBL for the catchment. However, in response to the EPA's request, the revised NVIA has used the minimum measured RBL where applicable to determine the RBLs, as described below.

In addition to the long term data recorded by the NMT in Kings Plains described above, supplementary monitoring was undertaken in July 2018 by MAC to capture any change in the existing environment and to validate the influence of the Mid Western Highway at receivers in the Kings Plains and Sturgeon Hill NCAs. This supplementary data, including the NMT, is summarised in Table 4.19.

Table 4.19 MAC/NMT noise monitoring data

Location	Catchment	Measured RBL dB LA90(period)[1]			Ambient Noise Level dB LAeq(period)		
		Day	Evening	Night	Day	Evening	Night
Regis NMT	Kings Plains	36	32	28	51	50	48
MAC01	Walkom Rd	34	36[2]	27	46	45	42
MAC03	Walkom Rd	35	30	24	47	43	43
MAC04	Sturgeon Hill	40[2]	31	26	54	52	51
MAC06	Distant Rural	29	25	24	53	47	47

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: Wind affected data.
Note 3: Bold figure indicate where RBLs are greater than NPI minimum applicable default RBLs or recommended ANLs.

Review of the data recorded by the NMT in Kings Plains (refer to Table 4.18) and the supplementary data in Table 4.19 shows that the long term data (36dB LA_{90}(daytime) and 32dB LA_{90}(evening)) exceeds the NPfI minimum applicable RBL of 35dB LA_{90}(daytime) and 30dB LA_{90}(evening). Furthermore, ambient noise levels exceed the recommended amenity noise levels (ANLs) for a rural receiver, indicating that the Kings Plains NCA differs from other catchments more distant from the Mid Western Highway. Therefore, the long term data confirms that receivers in the Kings Plains NCA are influenced by road traffic on the Mid Western Highway during the daytime and evening periods. Night time background levels are below the minimum applicable RBL of 30dB LA_{90}(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 31dB, refer to Table 4.7). 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.

Table 4.20 Amended project rating background levels

Noise Catchment Area	Measured RBL dB LA90(period)			Adopted RBL dB LA90(period)		
	Day	Evening	Night	Day	Evening	Night
Distant Rural (MAC06)	29	25	24	35[3]	30[3]	30[3]
Kings Plains (NMT)	36	32	30	36	32	30[3]
Walkom Road (MAC01, MAC03)	34	30	24	35[3]	30[3]	30[3]
Sturgeon Hill (MAC04)	40[2]	31	26	35[3]	30[4]	30[3]

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: Wind affected data.

Note 3: Minimum applicable RBL adopted.

Note4: Minimum applicable RBL adopted for the Sturgeon Hill evening period due to a relatively small data set of seven days valid data.

For Kings Plains, the resulting daytime RBL of 36dB LA_{90}(daytime) and evening RBL of 32dB LA_{90}(evening) are supported by the relatively high ambient levels of 51dB LA_{eq}(daytime) and 50dB LA_{eq}(evening), reflecting the influence of the Mid Western Highway, whilst night time ambient levels of 48dB LA_{eq}(night) are only slightly lower than the overall evening levels. Detailed review of the ABLs show that noise levels do vary, primarily due to the nature of the environment, which is highly affected by wind induced noise with the lower range of levels occurring when wind speeds are lower. It is acknowledged that while background levels at times are below 30dBA, the statistical variation demonstrated in a large dataset and regular presence of winds is sufficient to result in the RBLs presented.

A comparison of the RBLs in the EIS NVIA and the amended project NVIA are presented in Table 4.21.

Additionally, unlike the monitoring completed in the other NCAs, the RBLs for the Kings Plains NCA are based on an extensive dataset of more than 65 valid days of data, justifying the application of the RBLs calculated from NMT monitoring data. The result is that there is no change in daytime RBL for the Kings Plains NCA as presented in the EIS and an increase of 1dB to the evening RBL. For the Sturgeon Hill NCA there is no change in daytime or night time RBL; however, the evening RBL is reduced by 3dB.

Table 4.21 Comparison of rating background levels used in the mine development noise assessment (EIA and amended project)

Noise Catchment Area	EIS NVIA Adopted RBL dB LA90(period)			ANVIA Adopted RBL dB LA90(period)		
	Day	Evening	Night	Day	Evening	Night
Distant Rural - MAC06	35 (29)	30 (25)	30 (22)	35	30	30
Kings Plains - NMT	36	31	30 (24)	36	32	30
Walkom Road - MAC01, MAC03	35	30	30 (24)	35	30	30
Sturgeon Hill -MAC04	35 (34)	33	30 (26)	35	30	30

Note: Bracket indicates measured RBL.

c Noise catchments

The noise report has defined a number of noise catchments where receivers have been grouped into areas which have similar background noise environments. Table 8 of the noise report shows the background noise monitoring locations in each catchment area. EPA notes the following concerns regarding the grouping of receivers and the assigned background noise levels:

- It is not clear why the average of several RBLs has been used to determine the RBL in a catchment area. It appears to be contradictory that a group of receivers should have a range of different background levels for the same catchment area. If the area represents a similar background environment, there should be no requirement to use multiple monitoring locations. The use of multiple monitoring locations within an area indicates that the definition of the catchment is not appropriate and should be revised.
- The Kings Plain average RBL in Table 8 appears to show a typographical error.
- It is not clear why the whole of the Kings Plain area has been assigned an evening RBL of 31 dBA. It would appear that most of the receivers in this group have an offset to the road similar to EMM Location 7 and not the noise monitoring terminal where the 31 dBA was measured.
- EMM Location 5 was included in the distant rural group when it is located in the Walkom Road catchment.
- In the Sturgeon Hill group, the evening RBL for Location MAC01 should be set equal to the day, as per NPfI Section 2.3.
- Notes for Table 8 say that 2013 data should be used, however it is not clear which 2013 data is being referred to.
- The evening RBL at EMM Location 3 should also be set equal to the day. However, it is not clear why the lowest values recorded have not been adopted for this catchment. It appears there were a number of issues with the monitoring including being wind affected and evening RBLs being higher than the day.
- With regard to the receivers included in the noise catchments, it is not clear why a number of receivers in the Sturgeon Hill group have been assigned the same RBLs as the rest of the group. Receivers R44, R41 and R39 appear to have a similar offset to the road as R20 and R18, however the RBLs assigned to R44, R41 and R39 are higher than at R20 and R18.

Requested information/actions

19. The proponent justifies why the whole of the Kings Plains area has been assigned an evening RBL of 31dBA or amend the assessment accordingly.
20. The proponent clarifies why EMM Location 5 was included in the distant rural group when it is located in the Walkom Road catchment.
21. In the Sturgeon Hill group, the proponent sets the evening RBL for Location MAC01 as equal to the day, as per NPfI Section 2.3.
22. The proponent clarifies which 2013 data is being referred to in the notes for Table 8.
23. The proponent justifies that the adopted RBLs and EMM Location 3 are representative and also state the reasons why the minimum measured RBL should not be adopted.
24. The proponent reviews the assignment of background noise levels and provides a justification for the RBLs adopted for receivers or amend the assessment accordingly.
25. The proponent reviews and amends the RBL's adopted in Table 9 following resolution of the other RBL issues.

In relation to the first point regarding the whole of the Kings Plains area being assigned the same RBL; this is not the case. The area has been divided into two noise catchment areas; 'Kings Plains', which encompasses receivers close enough to the Mid Western Highway such that the background noise environment is influenced by noise from the highway, and the Walkom Road catchment, where houses are further away from the highway and hence the background noise environment is less influenced by highway traffic noise.

In response to points 20 to 25, all RBLs have been revised, as described in the response above in Section 4.2.4(i)(a) and in detail in Chapter 4 of the amended NVIA (MAC (2020a), included as Appendix J to the Amendment Report (EMM 2020a)). As described above, the minimum RBLs specified in the NPfI have been conservatively used for all NCAs except Kings Plains, reflective of their rural environment. The monitoring data referred to in the points above therefore did not need to be used.

d Assessment criteria

The noise management levels (NMLs) in Table 10 and project noise trigger levels (PNTLs) in Table 14 should be reviewed and amended as required when the issues with the RBLs identified above have been resolved.

Requested information/actions

26. The proponent reviews and amends the noise management levels (NMLs) in Table 10 and project noise trigger levels (PNTLs) in Table 14 following resolution of the issues with the RBLs identified above.

As described above, RBLs and subsequent PNTLs and NMLs have been revised for the amended project (refer also to the amended NVIA included as Appendix J of the Amendment Report).

e Mine development operational noise assessment

The noise report has assessed some activities as construction activities using the Interim Construction Noise Guideline (ICNG) (DECC, 2009). The clearing and grubbing of the open cut mine areas and ROM pad are not considered construction activities because they take place at the location of the open cut mining area, will use similar equipment and would therefore be generally indistinguishable from other operational activities. Therefore, they should be considered operational noise and be assessed using the NPfI.

Construction of external access roads and permanent site access can be assessed under the ICNG as they represent temporary activities to enable site access.

Requested information/actions

27. The proponent assesses the clearing and grubbing activities within the mine site as operational noise using the NPfI.
28. The proponent assesses construction of external access roads and permanent site access under the ICNG.

The construction noise assessment considered the temporal phases of the amended project. The construction phase must precede the operational phase and encompasses those activities required to enable the development to proceed. Typically, construction assessments consider the activities required prior to the operational phase which occur for a limited time. For example, clearing and grubbing of the pit area is a construction activity that occurs during initial establishment of the project to enable mining operations. While it may use similar machinery to mining operations, it is a construction activity and is no different to the construction of a road, car park, ROM pad, dam, or other infrastructure earthworks such as earthworks occurring around the processing plant location, which may also use similar machinery. As noted above, the construction noise assessment has been completed in accordance with the ICNG to assess construction activities completed during standard construction hours from the beginning of Month 1 to the end of Month 6 during Year 1.

Further, it is noted that the initial site establishment activities of clearing and grubbing will be undertaken at the same time as the construction of the site access intersection. While the EPA have requested these two activities be assessed under different noise criteria, these activities will be occurring at the same time, and will influence the noise levels at the same receptors. It is not practical, therefore, to assess these two activities under different applicable noise criteria. As such, for the reasons given above, the activities to be undertaken in the first six months have been assessed under the application construction noise criteria, and then conservatively from month 7 under the operational noise criteria, as the mine moves into a 24/7 operation.

In addition, as part of the amendments to the project careful consideration of activities planned to occur in the first six months of the project has been undertaken to reduce predicted noise levels at this time, where there is limited shielding available to the receptors to the south in Kings Plains. This has resulted in significant reduction in the predicted noise levels. As described in further detail in Section 6.5.1 of the Amendment Report (EMM 2020a), 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 in the EIS, respectively. This reduction is predominantly attributed to the use of a fleet 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).

f Sound power levels

The proponent should detail the type of mitigation and expected reductions of the proposed mitigation for each plant. This will assist EPA in assessing how achievable mitigated SWLs will be.

The proponent has nominated a maximum noise level of 121 dBA for the assessment. However, the highest sound power level (SWL) Leq,15min is 118 dBA for the primary excavator.

The proponent has used the ISO9613 method for predicting noise levels at receivers.

The noise level predictions in Appendix D appear to show a high number of C-A weighted noise level differences of 15 dB or more. This is not a typical result.

The outcomes of the assessment including those relevant to the Department of Planning Industry and Environment's Voluntary Land Acquisition and Mitigation Policy (VLMAP) are dependent on both the PNTL assigned and the final predicted noise level, including any low frequency noise adjustments.

EPA is unable to review the operational noise assessment further as the issues identified in this review may affect the outcomes.

Requested information/actions

29. The proponent details the type of mitigation and expected reductions of the proposed mitigation for each plant.
30. The proponent justifies the use of an L_{max} noise level which is only 3 dB higher than the highest Leq,15min SWL, or amend the report accordingly.
31. The proponent demonstrates that ISO9613 is suitable for use in this particular situation and include references such as, but not limited to, published scientific papers, validation studies or comparisons with measured data.
32. The proponent includes the octave band sound power levels of noise sources in the assessment.

Mitigation

As described in the amended NVIA (MAC 2020a), 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. These amendments included a general reduction in the modelled number of equipment in the mining fleet, as well as a revision of the waste schedule and development of the waste rock emplacement (ie 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). These physical changes in equipment location and numbers have reduced predicted noise levels.

In relation to the specific mitigation for each plant, as described in Section 5.1.1 of the amended NVIA (MAC 2020a), a reduction in modelled noise emissions was also achieved through the selection of mobile equipment with a larger capacity (ie haul trucks and excavators) and equipment with proven noise mitigation options available through original equipment manufacturer (OEM) fitted mitigation or aftermarket providers.

The most significant amendment with respect to equipment sound power levels is in relation to tracked dozers that are required in the pit and 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.

Table 25 in the amended NVIA (MAC 2020a) provides the sound power levels for the equipment used in the EIS, compared to the assumptions for the amended project. This table is re-produced below in Table 4.22.

Table 4.22 Comparison of EIS and Revised EIS Equipment Sound Power Levels (dB re 10^{-12} Watts)

EIS				Amended project			
Equipment	**Model**	**Lw Tot**	**Mitigation**	**Equipment**	**Model**	**Lw Tot**	**Mitigation Level[1]**
Primary Excavator	Hitachi EX3600-6 or Liebherr 9400	118	Level 3/4	Primary Excavator	Hitachi EX3600-6	115	Level 2
Secondary Excavator	Hitachi EX2600-6 or Liebherr 9250	115	Level 3/4	--	--	--	--
Primary Haul Truck	Hitachi EH3500AC-3 or Caterpillar 789D	114	Level 4/5	Primary Haul Truck 220t Electric Drive	Hitachi EH4000-AC3	114	Level 2
Secondary Haul Truck	Komatsu HD1500-8 or CAT 769C	113	Level 4/5	--	--	--	--
Track Dozer	Caterpillar D10T	119	Level 1	Track Dozer (pit)	Komatsu D475-5EO	110	OEM
Wheel Dozer	Caterpillar 854K	109	Level 2	WRE Dozer - Wheeled or Tracked	Caterpillar 854K/ Komatsu 375	112	OEM
Production Drill	Caterpillar MD6250	113	Level 2/3	Drill (mitigated with mufflers & shrouds)	Caterpillar MD6250	114	Level 2/3
Ancillary Drill	Epiroc D65	112	Level 2	--	--	--	--
Grader	Caterpillar 16M	102	Level 2	Grader	Caterpillar 16M	107	OEM
Water Cart	Komatsu HD1500-8WC	114	OEM	Water Cart	Komatsu HD1500-8WC	114	OEM
Front End Loader	Caterpillar 992K	114	OEM	Front End Loader	Caterpillar 992K	114	OEM

Note 1: Mitigation Levels starts at Level 1 (minor suppression 1-3dB) to Level 3 (Moderate suppression3-5dB) to Level 5 (heavy suppression >5dB)

Note 2: OEM – Original Equipment Manufacturer Specification

Lmax noise level

Lmax is an instantaneous or short term noise event, and in this case for the project, would be from a rock fall from a tipping truck. It is noted that Lmax and Leq are different metrics and are not comparable.

As shown in Table 23 of the EIS NVIA, the Lmax source value of 121dBA was used in the noise assessment for the mine development (associated with haul truck tipping). The EPA indicate in their submission that they are concerned that the Lmax source value of 121dBA used in the assessment is low.

An Lmax source level of 121dBA from a short term event such as rock tipping results in an Lmax of 43 dBA at the nearest receiver. This is 9dB below the maximum noise level assessment criteria (ie 52db LAmax as per Section 2.5 of the NPfI). It is also noted that this maximum assessment criterion is 15dB above the LAeq criterion (PNTL of 40dB LAeq (15min)).

For the predicted maximum noise level at a receiver in Kings Plains to be at the maximum noise level assessment criteria of 52dB LAmax, the Lmax source value would need to be increased by 9dB to 130dB LAmax.

The likelihood of an Lmax event on site at the mine development reaching 130dBA is extremely unlikely. Therefore, even if the difference between Lmax and Leq is perceived to be too small as indicated in the EPA submission, increasing this to meet that perception by as much as 9dB would result in compliance with the maximum noise level assessment criteria.

ISO 9613

ISO 9613 is a widely used method for the propagation of environmental noise. The ISO 9613 standard from 1996 is the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear direction for interpreting the ISO method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software. A declaration of conformance for iNoise software from the manufacturer is included in Plate 4.3 below.

Octave band sound power levels

In the EIS NVIA, the octave data provided were for a diesel fleet, and in particular, mechanical drive haul trucks. As part of the amendments to the project to specifically reduce predicted noise levels, a review of equipment type was undertaken, as described above. As a result, 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). Therefore, the spectra will be different, emitting lower levels in the low frequency spectra (10Hz to 160Hz). Updated equipment details including spectra modelled in the amended NVIA (MAC 2020) are presented in Table 4.23. In addition, to lower noise output equipment, further development of the project schedule has rationalised the equipment quantities and type, reducing the overall fleet by 20% to 30% at comparable project stages. This, combined with quieter equipment, has yielded an overall reduction of 3 to 4dBA in total project sound power level.

DECLARATION OF CONFORMITY

We
DGMR Software BV
(supplier's name)

Casuariestraat 5, The Hague, THE NETHERLANDS
(address)

declare under our sole responsibility that the product

iNoise 2019, Release Date December 2018
(company name, trade mark/software name, software or update package, version No. File description: Major version. Minor version. Release. Build, release date)

to which this declaration relates is in conformity with the following calculation method and/or QA report

Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-3, 2015
(Title and/or number and date of issue of the method)

following the provisions of NT ACOU 107 – Acoustics: Framework for the Verification of Environmental Noise Calculation Software.

The declared conformity applies to situations covered by the above calculation method and the situations specified in the enclosed Result Comparison Form.

The Hague, December 2018 S.E. Hartog van Banda, signature
(Place and date of issue) *(Name & signature or equivalent marking of authorized person)*

Plate 4.3 Declaration of conformity of iNoise software with ISO 9613 – Part 1

Test suite	ISO/TR 17534–3 (Technical Report) – Addendum for ISO 9613–2		
Place and date of publication	Geneva, International Organization for Standardization ISO 17534-3: 2015 ISO 9613-2: 1996		
Calculation method	Recommendations for quality assured implemenation of ISO 9613-2 in software according to ISO 17534-3		
Test case No.	Certified results in dB(A)	Software calculation result in dB(A)	Result inside tolerances(±0.05) yes/no
T 01	44,29	44,30	yes
T 02	41,53	41,53	yes
T 03	39,14	39,15	yes
T 04	42,23	42,23	yes
T 05	39,30	39,31	yes
T 06	40,59	40,60	yes
T 07	39,75	39,76	yes
T 08	32,48	32,51	yes
T 09	32,93	32,95	yes
T 10	29,30	29,34	yes
T 11	41,30	41,33	yes
T 12	43,81	43,84	yes
T 13	42,71	42,76	yes
T 14	25,38	25,42	yes
T 15	49,92	49,97	yes
T 16	32,54	32,57	yes
T 17	32,72	32,75	yes
T 18	34,89	34,90	yes
T 19	42,00*	40,62	yes

*The certified result of 42,00 for T 19 is not correct. The software result of 40,62 is the correct result. This has been reported to and acknowledged by the ISO 17534 working group.

Plate 4.4 Declaration of conformity of iNoise software with ISO 9613 – Part 2

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Table 4.23 Revised Equipment Sound Power Levels (dB re 10^{-12} Watts)

Equipment category	Equipment type used in the noise model	dBA per Octave Band Centre Frequency, Hz (A weighted)									Total
		31.5	63	125	250	500	1000	2000	4000	80000	
Primary Haul Truck 220t	Hitachi EH4000-AC3	74	89	97	105	109	109	106	101	98	114
Primary Excavator	Hitachi EX3600-6	63	86	102	108	110	109	107	102	96	115
Track Dozer (pit)	Komatsu D475-5EO	72	80	86	95	107	104	105	95	82	110
WRD Dozer - Wheeled or Track	Caterpillar 854K RTD Komatsu 375 (Track)	63	81	96	102	107	108	104	98	92	112
Drill (mitigated with mufflers & shrouds)	Caterpillar MD6250	67	81	103	104	106	109	108	100	92	114
Grader	Caterpillar 14G/16M	63	84	84	86	98	104	103	93	84	107
Water Cart	Komatsu HD1500-8WC	65	83	98	104	109	110	106	100	94	114
Front end loader (FEL)	Caterpillar 992K	76	87	103	108	107	103	108	102	96	114

g Low frequency noise

The EPA's policy for assessing low frequency noise is set out in the NPfI. The alternative methods of assessment referenced in the mine noise report are not appropriate.

Table C1 in NPfI Fact Sheet C states that where the difference between the C weighted and A weighted noise level is 15 dB or more, then further assessment using the reference spectrum is required. Table 35 and the table showing the difference between C and A weighted noise levels in Appendix D does not appear to have considered a difference of 15 dB as a trigger for further assessment.

EPA notes the comments made by the proponent in Chapter 6.3.4 with regard to the ISO 9613 method. However, as stated in NPfI Section 3.3.2 there are a number of noise prediction methods available and it is the proponent's responsibility to use a method of prediction capable of reliably predicting impacts and demonstrating a project's performance against the requirements of the NPfI.

The catchment area of the receivers in the 'Cwt-Awt' table in Appendix D does not match the rest of the report and should be amended.

Requested information/actions

33. The proponent revises the assessment to include low frequency noise in accordance with the procedure described in the NPfI.
34. The proponent revises the assessment in accordance with NPfI Fact Sheet C considering C and A weighted noise level differences of 15dB or more.
35. The proponent revises the assessment such that the catchment area of the receivers in the 'Cwt-Awt' table in Appendix D matches the rest of the report.

To meet the requirements of the NPfI Fact Sheet C and the additional correspondence with the EPA, the following methodology was used to calculate low frequency noise in the amended mine development NVIA (MAC 2020a, Appendix J of Amendment Report).

- A comparison of calculated A-weighted and C-weighted noise levels from the project for the revised mobile equipment schedule (refer to Table 25 in MAC 2020a) was completed to identify C minus A (C-A) differences of 15dB or more (refer to Appendix E in MAC 2020a).

- A weighted 1/3 octave noise levels (refer to Table 41 in MAC 2020a) were calculated at each receiver for the frequency range 25Hz to 160Hz. Where data was only available as 1/1 octave, levels in each 1/1/ band were divided equally into each 1/3 octave band. DGMR (iNoise, Version 2020.0) noise modelling software was used to predict noise levels in 1/3 octave bands down to 25Hz using ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors, Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors, Part 2: General method of calculation'. It is noted that strict conformance with ISO 9613 is not achieved when calculating 1/3 octaves below the 63Hz band.

- Given that the proposed project cannot be measured, noise emissions from several mining operations were used to understand the low frequency relationship ie 'the tail') for the lower frequency bands – ie 20Hz, 16Hz, 12.5Hz and 10Hz (refer to Table 42 in MAC 2020a).

- Adjustment of the predicted 1/3 octave values for the frequencies below 25Hz (refer to Appendix E in MAC 2020a).

- Evaluation of the 1/3 octave frequencies between 10Hz to 160Hz with reference to Table C2 of Fact Sheet C (also refer to Appendix E in MAC 2020a).

- A +2dB penalty is applied to predicted A-weighted noise levels where 1/3 octave values exceed the thresholds in Table C2 of Fact Sheet C by less than 5dB (also refer to Appendix E in MAC 2020a).
- A +5dB penalty is applied to predicted A-weighted noise levels where 1/3 octave values exceed the thresholds in Table C2 of Fact Sheet C by more than 5dB (also refer to Appendix E in MAC 2020a).

The results of the analysis found that while the C-A value at some receivers exceeded 15dB, an analysis of the low frequency content shows that the thresholds of Table C2 of Fact Sheet C are not exceeded and hence a low frequency penalty is not applicable to the predicted noise emissions.

Further, a review of the resulting noise levels show that the significance of residual noise impacts is negligible as the total industrial noise level is less than 2dBA above the relevant PNTLs for the night time period. The full results of the low frequency noise assessment are contained in Appendix E of the amended mine development NVIA (refer to Appendix J of Amendment Report).

It is also noted that the catchment area of the receivers in the tables in Appendix D are consistent with the list of noise sensitive receivers in Table 7 of the amended NVIA report (MAC 2020a).

h Mine development out of hours construction noise

The proponent must outline the activities, locations and durations of any construction activity they are proposing to undertake outside of standard hours and provide a justification that it cannot be carried out during standard hours in accordance with the ICNG.

Requested information/actions

36. The proponent outlines the activities, locations and durations of any construction activity they are proposing to undertake outside of standard hours and provide a justification for why it cannot be carried out during standard hours in accordance with the ICNG.
37. The proponent amends the construction noise assessment in light of the comments and amendments made to the operational noise assessment.

As described in the EIS, only low intensity construction activities, environmental management (eg dust control), delivery of oversized equipment, and equipment servicing, may be carried out as required outside 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. Low intensity construction activities will generally consist of:

- use of hand power tools;
- electrical and telecommunications wiring, installation and connections;
- equipment relocation;
- installation and commissioning of plant and equipment;
- use of small mobile equipment (backhoe, bobcat, truck, small mobile crane) for the following activities:
    - steel fixing,
    - concreting,
    - erection of building structures and steel work,
    - small lifts and movement of materials on site; and

- trenching and drainage.

It will be necessary to occasionally undertake some of these activities in the out of hours period. Only activities that generate minimal noise will be undertaken in this period and completing these activities will help facilitate activities during standard hours. For example, the most efficient time to undertake servicing of mobile equipment is out of hours when equipment is not being used; and environmental management activities such as dust suppression and the management of sediment basins may need to be undertaken to ensure offsite impacts are avoided.

i Mine development road traffic noise

The proponent has stated it has used a method from the US EPA to calculate road traffic noise however, no reference for this method is included in the assessment.

The construction traffic noise assessment has only considered noise levels during daytime. However, construction is proposed to start at 7am, therefore construction workers may be travelling to the site prior to 7am, during the night period.

Requested information/actions

38. The proponent provides a reference for the US EPA method for calculating road traffic noise and defines the assumptions and methods used in the assessment including adjustments for road pavement type, different vehicle types and mix, noise source heights, road gradient, propagation between source and receiver, speed and how vehicle emissions change under different speed settings and ground effects between the road and receivers.
39. The proponent confirms the times when workers will be travelling to the site and amend the assessment accordingly.

Road traffic noise calculation method

The reference for the US EPA method is the *Leq Calculation-US Environmental Protection Agency-Report 550/9-74-004, -March 1974 (as modified).*

The project is expected to increase traffic by up to 15% during the daytime and 50% during the night-time, compared to exiting traffic flows. Hence it is expected that the project will increase traffic noise levels by 0.8dB based on a simple calculation relating to the percentage change in traffic flows; ie 10 x log(future flow/existing flow). This was generally reflected in the EIS results (MAC 2019, Appendix L of the EIS).

Road traffic noise predictions in the EIS were calculated using the US FHWA method and using measured noise levels from passby events from cars and trucks at offset distances. However, to avoid further conjecture road traffic noise from construction and operational phases has been recalculated using a Bruel & Kjaer Predictor (V11.1) noise modelling software including 3D terrain data using the CRTN calculation method. Road traffic data used in calculations are presented in Table 4.24.

Table 4.24 Road traffic data used in pipeline development road traffic assessment

Projected 2019 (Existing)	**Day 15hr**	**%HV**	**Night 9hr**	**%HV**
Heavy Vehicles	125	10%	69	32%
Light Vehicles	1185		179	
All Vehicles	1310		247	

Mine Construction	Day 15hr	%HV	Night 9hr	%HV	2019 + Construction	Day 15hr	%HV	Night 9hr	%HV
Heavy Vehicles	29	23%	17	23%	Heavy Vehicles	154	11%	86	27%
Light Vehicles	96		58		Light Vehicles	1281		236	
All Vehicles	125		75		All Vehicles	1436		322	

PY1 Construction	Day 15hr	%HV	Night 9hr	%HV	2019 + PY1 Construction	Day 15hr	%HV	Night 9hr	%HV
Heavy Vehicles	25	12%	15	12%	Heavy Vehicles	150	10%	84	22%
Light Vehicles	179		111		Light Vehicles	1363		289	
All Vehicles	204		126		All Vehicles	1515		373	

PY2 Construction & Operation	Day 15hr	%HV	Night 9hr	%HV	2019 + PY2 Construction & Operation	Day 15hr	%HV	Night 9hr	%HV
Heavy Vehicles	19	9%	11	9%	Heavy Vehicles	144	10%	79	22%
Light Vehicles	182		109		Light Vehicles	1367		288	
All Vehicles	201		120		All Vehicles	1511		367	

Results showing the increase in road traffic noise above the calculated existing road traffic noise levels are presented in Table 4.25.

Table 4.25 Road traffic calculations – nearest receiver 85 m from the road

EIS Results	**Predicted Noise Level**		**Difference (dB)**	
EIS Scenario	Day dB LAeq(15hr)	Night dB LAeq(9hr)r	Day	Night
Existing	46.0	43.4	N/A	N/A
Construction	46.6	44.4	0.6	1.0
PY1	46.7	44.6	0.7	1.2[1]
PY2	46.6	44.4	0.6	1.0
Amended project results	**Predicted Noise Level**		**Difference (dB)**	
EIS Scenario	Day dB LAeq(15hr)	Night dB LAeq(9hr)r	Day	Night
Existing	46.4	42.8	N/A	N/A
Construction	47.0	34.6	0.6	0.8
PY1	47.0	43.8	0.7	1.0
PY2	47.0	43.8	0.6	1.0

Notes: 1. This value was reported as 5.5dB in Table 38 of the EIS Noise Report which upon review, was found to be in error and has been corrected.

As shown, the calculated increase in road traffic noise levels resulting from the construction and operational phases of the project stated in the EIS are between 0.7dB (day time) and 1.2dB (night time). The revised calculation using noise modelling software shows a lower variation (0.6dB to 1dB) in the increase of road traffic noise, although a similar magnitude, due to the inclusion of a terrain model. The results presented in the EIS and the above follow up calculations correlate with the expected increase in traffic flows.

Shift times

In relation to times that workers will be travelling to the site, the construction noise assessment considered the worst case night time period. As reported in Chapter 8 of the revised pipeline development NVIA (MAC 2020b), the worst case night-time assessment of road noise emissions for construction generated road traffic was found to be approximately 44dB LAeq (9hr) at a nominal offset distance of 10 m. This would satisfy relevant night time road noise criteria and not increase existing levels by more than 2dBA.

ii Pipeline development NVIA

a Noise monitoring, rating background levels and noise catchments

The pipeline noise report has nominated a number of receivers located in and around Noon Street in Blackmans Flat which were previously demolished.

The coordinates in the noise report for NM5 appear to show its location as adjacent to the Angus Place Mt Piper Haul Road and around 300 m from the closest residential receiver. In addition, it appears that there is a topographical feature between the monitoring location and the Castlereagh Highway, with residential receivers on the opposite side to the monitoring location.

Figure 4 in the pipeline noise report does not show the monitoring locations.

The rating background level (RBL) assigned to receivers based on their catchment are not necessarily representative of the noise environment at the receiver location. For example, the RBL for the Yetholme catchment has been assigned using measurements at NM0. The coordinates in Table 6 of the pipeline noise report for NM0 show the location is directly adjacent to the Great Western Highway. Receiver R156 has been assigned the RBL from NM0. However, it is nearly 2km from the highway and therefore use of NM0 is not appropriate for this receiver.

Requested information/actions

40. The proponent reviews and confirms the accuracy of receivers included in the assessment.
41. The proponent justifies that monitoring location NM5 is representative of the nearest residential receivers or amend the report using representative background noise measurements
42. The proponent amends figure 4 in the report to show the monitoring locations.
43. The proponent reviews the definitions of all catchments and RBLs assigned to all receivers and revise them based on appropriate acoustic considerations.

Receivers

A full review of receivers along the pipeline was conducted as part of the revised NVIA for the amended pipeline development (MAC 2020b). 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 confirmed receivers along the pipeline corridor are presented in Figures 4.17a to 4.17d.

NM5

The incorrect coordinates were provided for NM5 in the EIS NVIA. The correct coordinates have been provided in the revised NVIA in Table 8 (MAC 2020b); 784880m E and 6304074m S.

Figure 4

This figure has been amended to show the monitoring locations in the revised NVIA (MAC 2020b).

Catchment and RBL review

In relation to the definition of catchments and the assigning RBLs, as described in the revised NVIA (Section 5), to quantify the existing background noise environment of the area, a review of historical unattended monitoring data was conducted by MAC for the pipeline corridor. The review of previous monitoring data showed that RBLs were generally less than 35dB LA_{90} (daytime) and 30dB LA_{90} (evening) and 30dB LA_{90} (night) in several catchments. Therefore, unattended noise monitoring was conducted in the three catchments where there was no historical data available.

Unattended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, *Acoustics - Description and Measurement of Environmental Noise*. The measurements were carried out using Svantek 977 noise analysers from Friday 19 October 2018 to Tuesday 30 October 2018 at Portland Cemetery (NM8); Noon Street (NM0); and Yetholme Drive (NM5).

Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA. All equipment carried appropriate and current NATA (or manufacturer) calibration certificates. Data affected by adverse meteorological conditions have been excluded from the results in accordance with methodologies provided in Fact Sheet A4 of the NPfI.

Section 5.1.2 of the revised NVIA for the pipeline development describes the RBLs assigned to each catchment as a result of the monitoring undertaken. As described, from onsite observations, the noise environment at most residential receivers along the pipeline corridor is best described as 'rural' in accordance with the NPfI; ie one that has an acoustical environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels. An exception to this is the receivers in proximity (<50m) to the Great Western Highway in the Yetholme noise catchment. The results of the unattended noise measurements for the background monitoring locations, including derived RBLs are summarised in Table 9 in the revised NVIA for the pipeline development (MAC 2020b). Minimum NPfI RBLs have been applied to the remaining receivers where there is no monitoring data available. It is noted for assessment purposes, the resulting data from each unattended monitoring location was allocated to the respective noise catchments for the assessment. Noise monitoring charts are presented graphically in Appendix C of the revised NVIA for the pipeline development (included in Appendix K of the Amendment Report).

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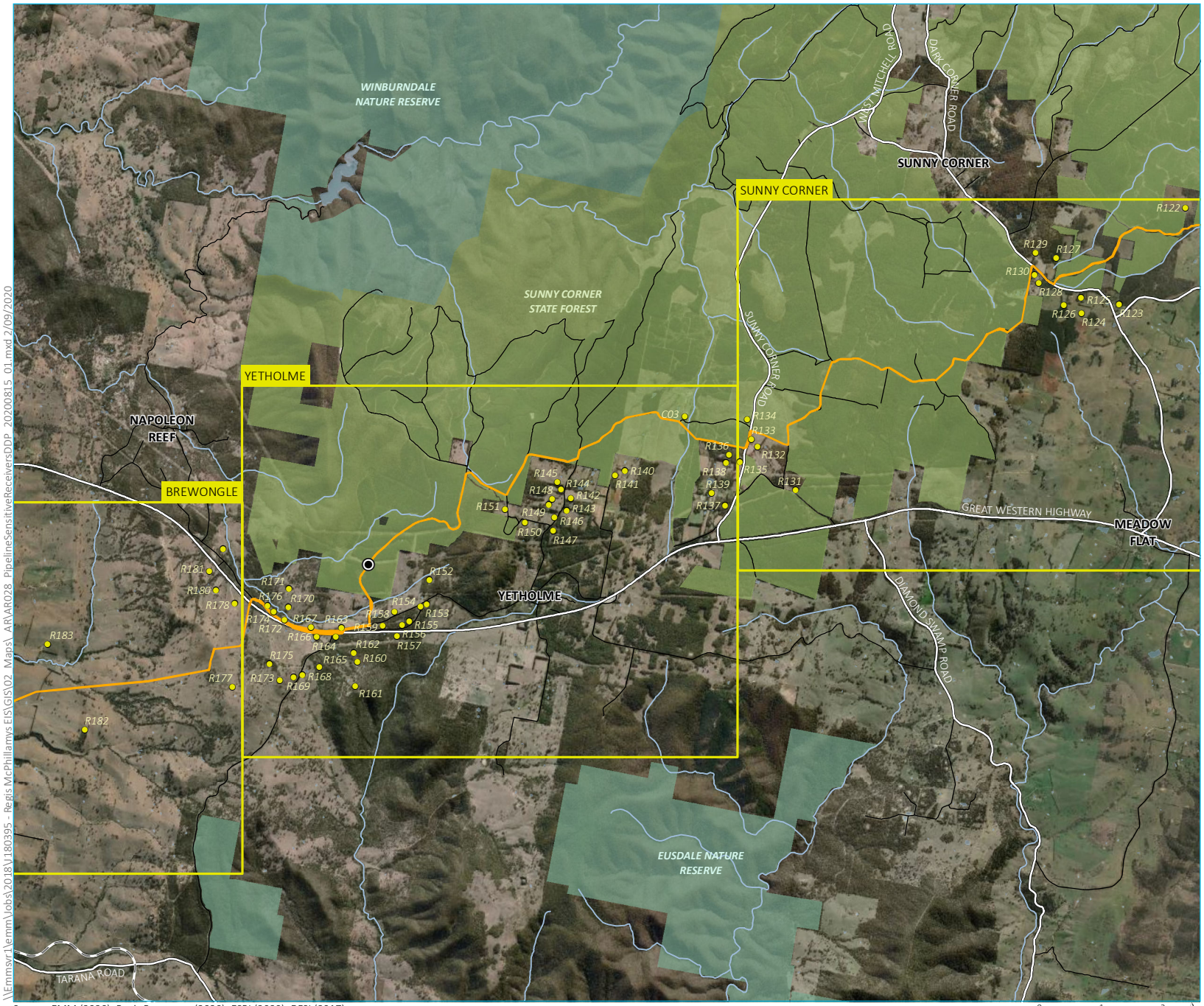
Source: EMM (2020); Regis Resources (2020); ESRI (2020); DFSI (2017)

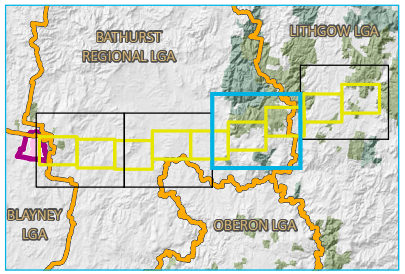
Sensitive receptors – pipeline development

McPhillamys Gold Project
Submissions report
Figure 4.16a

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
- 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
Submissions report
Figure 4.16b

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

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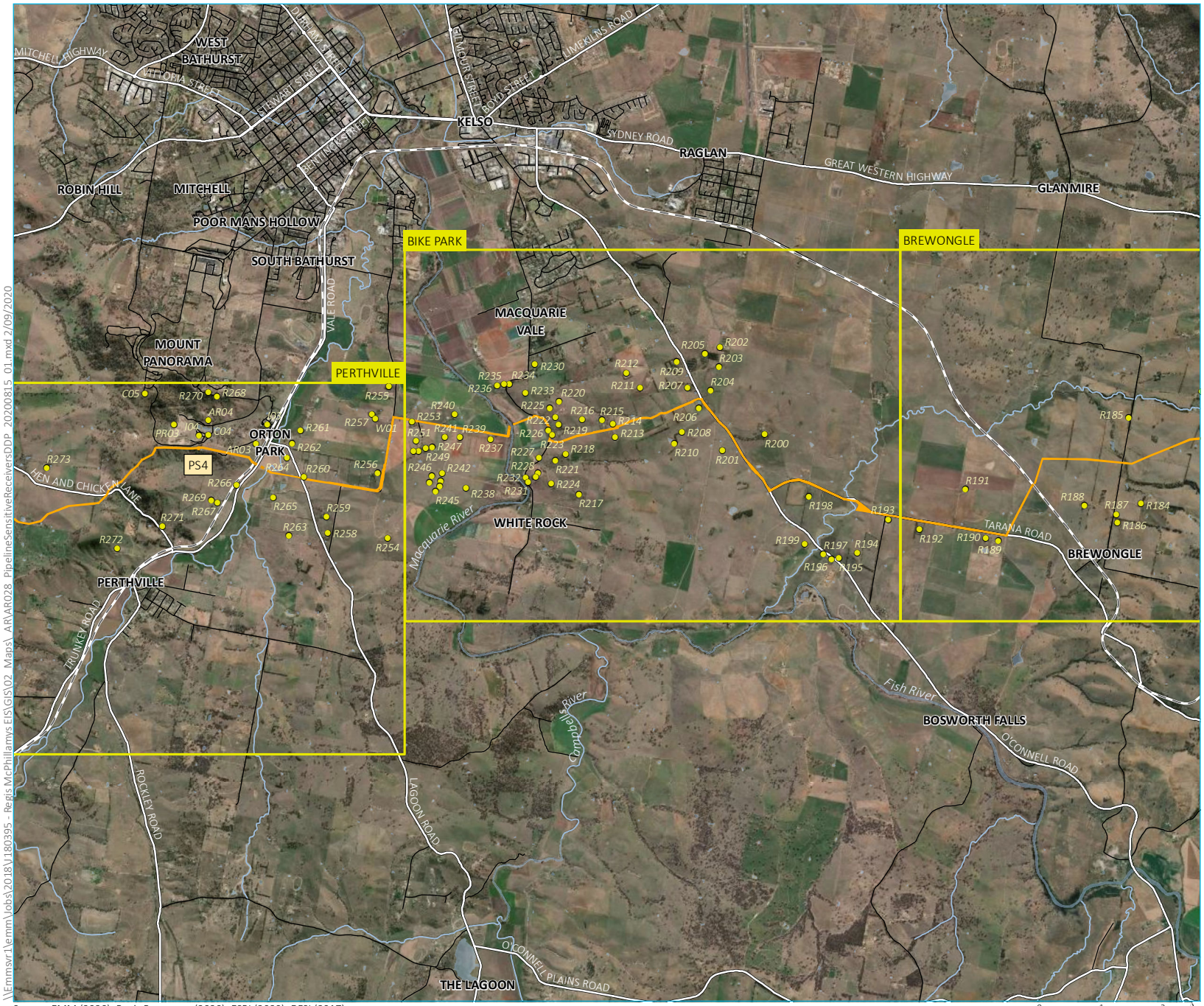

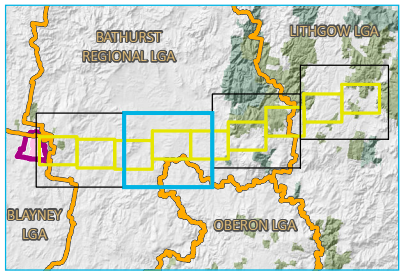

KEY

- 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)

Sensitive receptors – pipeline development

McPhillamys Gold Project
Submissions report
Figure 4.16c

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

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EMM creating opportunities

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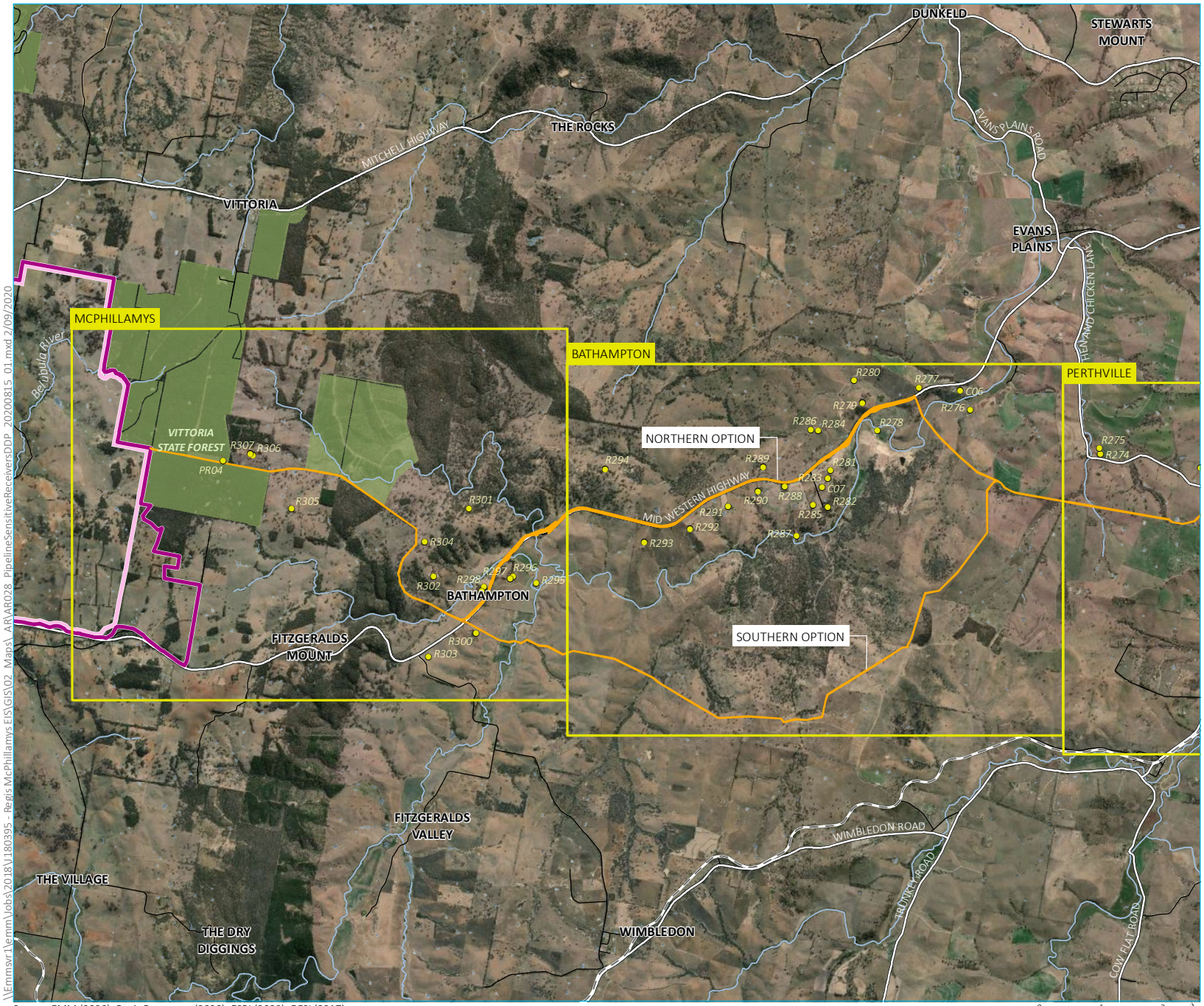

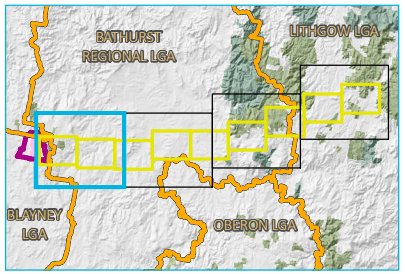

KEY

- 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)

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Sensitive receptors – pipeline development

McPhillamys Gold Project
Submissions report
Figure 4.16d

REGIS RESOURCES LTD

EMM creating opportunities

b Pipeline development construction noise assessment

There is no explanation of the abbreviations and acronyms used in the tables in Appendix F.

The pipeline noise report does not appear to have considered compounds and stockpiling activities in its assessment of static scenarios. If construction compounds are proposed to be used, the assessment should be amended to include them.

Figure 6 referred to in Chapter 7.2 of the pipeline noise report has not been included in the report.

The pipeline noise report has referred to the TfNSW Construction Noise and Vibration Strategy (CNVS) when nominating additional mitigation measures. The noise report has nominated more than 30 residential receivers as eligible for alternative accommodation as a mitigation measure for construction noise.

EPA has not reviewed the outcomes of the construction noise assessment further, as the appropriate definition of RBLs at each receiver is critical for assessment outcomes. Therefore, the report cannot be assessed further until this issue is rectified.

Requested information/actions

44. The proponent provides a list of definitions for acronyms and abbreviations used in Appendix F.
45. The proponent amends the assessment to include construction compounds and stockpiling activities.
46. The proponent includes Figure 6 as referred to in chapter 7.2.
47. The proponent clarifies if they are committed to providing the recommended mitigation measures to the 30 residential receivers identified as eligible for mitigation.
48. The proponent produces a construction noise and vibration management plan (CNVMP) prior to works commencing, and that construction activities be limited to the following standard construction hours, unless approved otherwise:
    - Monday to Friday 7am to 6pm;
    - Saturday 8am to 1pm; and
    - No work Sunday and Public Holidays.

Responses to the above dot points are as follows:

- Abbreviations are provided in Table 22 of the revised NVIA for the pipeline development (refer to Appendix K of the Amendment Report).

- Construction compounds and stockpiling activities have been considered in the pipeline NVIA (MAC 2020b), as indicated in Section 7.1. As described, equipment that may be used at these compounds has been included in the noise model, including loaders and excavators. In addition, it is noted that these compounds will be carefully sited, and away from potentially sensitive receivers (ie residential properties) wherever possible.

- Figure 6 referred to by the EPA was described in the EIS NVIA for the pipeline development as a figure showing R48. R48 was identified as potentially being affected by noise levels greater than the highly affected noise threshold as specified in the ICNG. However, as part of the detailed review of receivers along the pipeline discussed in the response in section 4.2.4(ii)(a), this receiver was verified as an outbuilding, and therefore is not a noise-sensitive receiver.

- The mitigation measures committed to by Regis in relation to construction of the pipeline are provided in Appendix C of the Amendment Report.

- As described in the pipeline development NVIA and Amendment Report, a construction noise and vibration management plan (CNVMP) will be developed as part of the CEMP, prior to construction commencing. This CNVMP will outline construction hours, and the activities to be undertaken in those hours.

c Pipeline development operational noise assessment

Operational noise mitigation measures as recommended in the report should be included in the design and operation of the pumping stations.

Requested information/actions

49. The proponent includes operational noise mitigation measures in the design and operation of pumping stations.

The pumping station facilities will be housed in (a minimum) sheet metal building/ enclosure.

4.3 Biodiversity and Conservation Division (formerly OEH)

4.3.1 Mine development

i Silky Swainsona

The BAR states that the Silky Swainsona is not identified as a threatened species requiring consideration by the BBAM calculator and therefore requires no further assessment. Section 6.5.1.2 of the FBA states that a threatened species is identified as a candidate species for the development site if the geographic distribution of the species is known or predicted to include the IBRA subregion in which the development site is located. As Silky Swainsona is predicted to occur in the Orange IBRA subregion it should be assessed and, as no targeted surveys were conducted in PCT 1298, it should either be assumed to be present or an expert report should be obtained.

Recommendation 1

- Justification for the exclusion of Silky Swainsona should be provided, or conduct targeted surveys, assume presence or obtain an expert report.

A BDAR has been prepared by EMM (2020e) in accordance with the BAM to assess the potential biodiversity impacts of the amended project and is contained within Appendix M of the Amendment Report, herein referred to as the Amendment Report BDAR. The Amendment Report BDAR considers both the mine development and pipeline development components together and supersedes the findings of the Biodiversity Assessment Report (BAR) (EMM 2019d, Appendix N of the EIS) and the pipeline development BDAR (OzArk 2019, Appendix Y of the EIS).

Native vegetation classified as PCT 1298 - Wet tussock grasslands of cold air drainage areas of the tablelands in Envirokey (2017) was reclassified by EMM to PCT 766 – Carex sedgeland of the slopes and tablelands due to the decommissioning of PCT 1375 and PCT 766 being a better fit based on landscape position and floristics (EMM 2019d and EMM 2020e).

As reported in the Amendment Report BDAR for the amended project, targeted surveys were conducted in PCT 766 for Silky Swainson-pea (*Swainsona sericea*) on 10 September 2019. Areas of PCT 766 were traversed via 33 transects spaced ten metres apart as required by the *Threatened flora survey guidelines* (OEH 2016) (as shown in Figure 5.1 of the Amendment Report BDAR, refer to Appendix M of the Amendment Report). The survey did not record any Silky Swainson-pea and therefore no offsets are required in accordance with the BAM.

ii Squirrel glider species polygon

Section 7.3 of the BAR concludes that there will be a residual impact of 129.3 ha of habitat for the squirrel glider and 75.77 ha of habitat for the koala. However, Figure 7.3 of the BAR depicts a species credit polygon that is labelled for both koala and squirrel glider totalling 75.76 ha.

It is a requirement of the FBA that species polygons for species credit species be provided in the BAR. The species polygon provided reflects the area of habitat likely to be used by the koala (75.77 ha).

Recommendation 2

- A figure showing the species polygon for the squirrel glider is required.

The species polygon for Squirrel Glider has been updated in the Amendment Report BDAR to account for changes in the mine disturbance footprint in the amended project. The revised disturbance footprint will directly impact on 127.35 ha of habitat for the Squirrel Glider compared to the EIS design direct impact of 129.32 ha. This represents a 1.97 ha reduction in direct impact on this species. The species polygon has subsequently been revised in the Amendment Report BDAR to account for both direct and indirect impacts on Squirrel Glider, as required by the BAM, and is shown in Figure 4.17. The revised Squirrel Glider species polygon presented accounts for a direct impact of 127.35 ha and an indirect impact of 7.75 ha, representing a total residual impact of 135.10 ha requiring 2,651 species credits as outlined in Section 6.7.1 of the Amendment Report BDAR.

iii Relocation of Koalas

Section 7.2 of the BAR includes a mitigation measure to "develop specific procedures for koala pre-clearance inspections and safe relocations outside the clearing area". Any planned relocation of koalas should be consistent with the Office of Environment and Heritage (OEH) Translocation Operational Policy (OEH 2019).

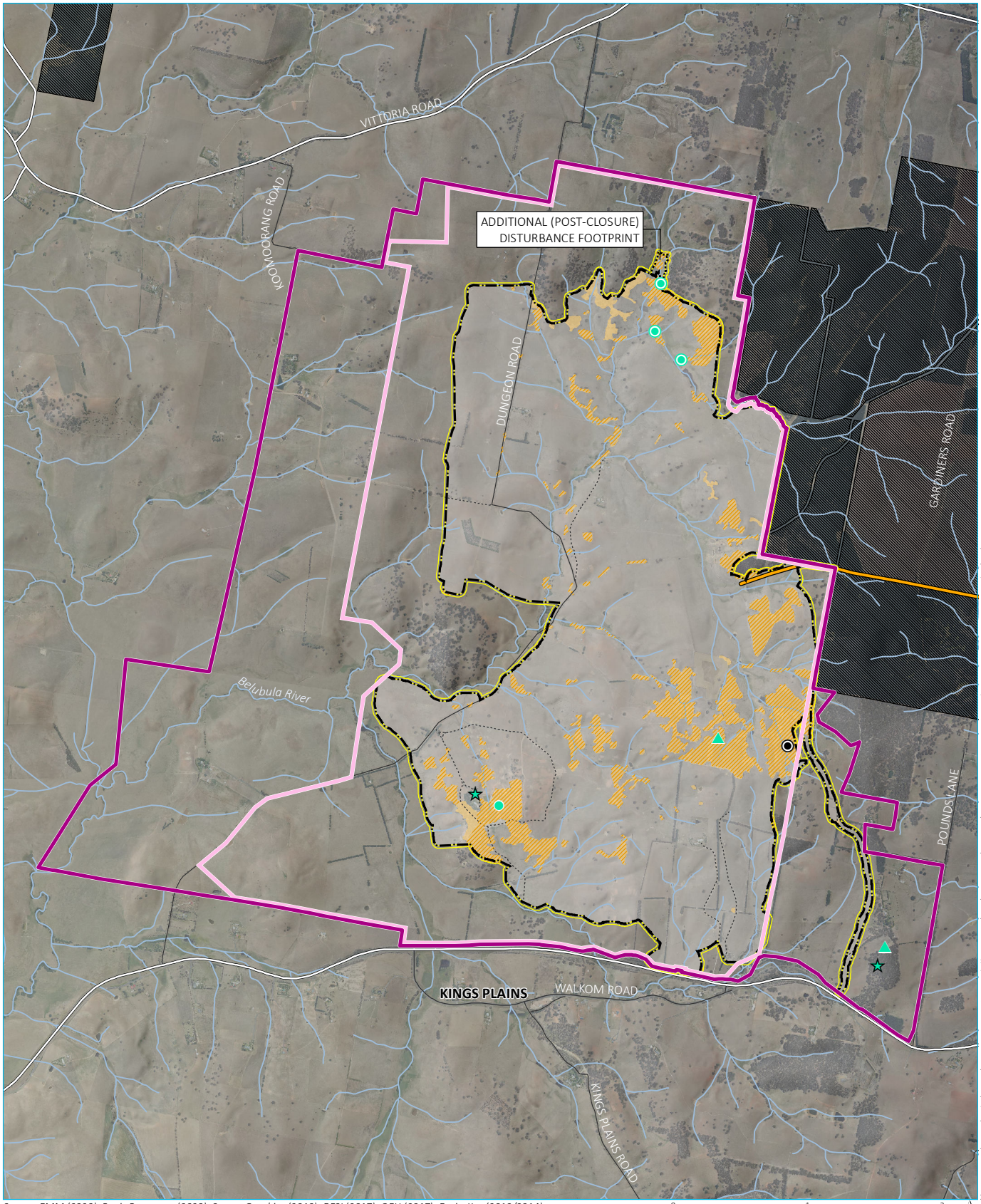
The proponent should demonstrate how they will maximise and report on animal welfare outcomes at each stage of the translocation process. Procedures for the potential relocation of koalas, including the selection of nearby habitat suitable for release and monitoring of translocation success, should be developed in consultation with BCD.

Recommendation 3

- Any planned relocation of koalas should be consistent with the OEH Translocation Operational Policy (OEH 2019) and be developed in consultation with BCD.

Pre-clearance inspections will be carried out to determine if Koalas are present in areas of native vegetation prior to clearing. In the unlikely event that Koalas are found to be present, appropriate methods (such as staged clearing) will be followed to allow any Koalas to move unassisted into adjacent retained vegetation. Where Koalas do not move unassisted, animals may be captured during clearing works and relocated to the nearest patch of retained vegetation.

As outlined in Section 6.4.2 of the Amendment Report BDAR, specific procedures will be developed for Koala pre-clearing inspections and safe relocation outside of the clearing area (as required). These procedures will be detailed in the approved Biodiversity Management Plan that would be prepared in consultation with BCD.



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

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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

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Figure 4.17

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4.3.2 Pipeline development

i PCT identification

Appendix 2 of the BDAR contains a full species list for the entire project area but the plots in which the species were present is not specified. Table 4-1 of the BDAR includes the BioNet Vegetation Classification's description of the chosen PCT's but no description of the PCT's characteristics that are present on site.

The BDAR does not provide adequate justification for the PCT identification and without field data sheets BCD is unable to assess whether the PCT conclusions are appropriate. As per section 5.2 of the BAM, the identification of PCT's must be in accordance with NSW PCT classification as described in the BioNet Vegetation Classification. As such the BDAR must justify each PCT identification by describing how the sites attributes recorded on the field data sheets meet the chosen PCT's NSW PCT classification.

Recommendation 4

- The field data sheets for each plot should be provided in the BDAR.

Recommendation 5

- Provide further justification for all PCT identifications.

There appears to be a number of locations within the pipeline footprint where areas of vegetation have been identified as a PCT by the plot data however only partly mapped as the identified PCT.

Recommendation 14

- PCT mapping must align with the plot data collected by the assessor. Where the vegetation type varies the assessor must stratify the areas into separate vegetation zones and provide justification of the identified vegetation zones and PCTs.

In response to BCD's submission a review of the PCT mapping presented in the pipeline development BDAR (OzArk 2019) has been undertaken. PCTs were reviewed through analysis of data collected during the site visits and were verified using floristic data collected during plot surveys. As a result of this review, the Amendment Report BDAR has revised the PCT mapping for the pipeline development. PCT mapping and plot locations for the pipeline development are shown on Figure 5.5 of the Amendment Report BDAR (EMM 2020e). A detailed justification for the PCTs selected is provided in Section 4.3.1 of the Amendment Report BDAR, with PCTs revised based on a combination of landscape position, geology, soils and floristics informed by detailed field surveys.

A total of six PCTs were identified in the Amendment Report BDAR comprising:

- 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).

All native plant community types recorded varied from intact patches to derived native grasslands (DNG).

Raw vegetation integrity plot data sheets and vegetation integrity plot data are provided in Appendix A and Appendix B of the BDAR respectively.

ii BDAR certification

It is unclear whether or not the exhibited BDAR is final or draft, the document control page of the BDAR indicates that the document status is draft, and it has not been certified as BAM compliant.

Section 6.15 of the BC Act states 'a biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted'

Recommendation 6

- The assessor should certify the BDAR in accordance with section 6.15 of the BC Act.

The Amendment Report BDAR has been prepared by Katie Diver (EMM Consulting), accredited assessor number BAAS17013, and reviewed by Nathan Garvey (EMM Consulting), accredited assessor number BAAS17037.

A certification in accordance with section 6.15 of the NSW *Biodiversity Conservation Act 2016* (BC Act) is provided in Section 1.8 of the Amendment Report BDAR. This certification confirms the Amendment Report BDAR has been prepared in accordance with the BAM (OEH 2017) and follows the required format prescribed by Table 25 and 26 of the BAM, including the calculation of credit requirements to compensate for the amended project's impacts that cannot be avoided or minimised.

iii Habitat suitability assessments

BCD have reviewed both the BDAR and the BAM credit calculator and note that although the project footprint spans across four IBRA subregions the assessor has only carried out an assessment for the IBRA subregion where most of the project occurs. This is not the correct method for linear shaped developments. As per section 6.4.1.7 of the BAM for linear shaped developments, the assessor must carry out a separate habitat suitability assessment for each IBRA subregion. This requires the accredited assessor to submit four separate cases in the BAM credit calculator.

As separate assessments are required for each IBRA subregion the minimum number of plots and transects required per vegetation zone area may differ from the number that were required for the single assessment that was completed. The assessor must meet the minimum plots and transects required by the BAM for each vegetation zone in each assessment that is carried out. This may also impact the species lists generated for each subregion by adding new species that would require habitat suitability assessments in accordance with section 6 of the BAM.

Recommendation 7

Separate habitat suitability assessments must be completed for each IBRA subregion. This requires the accredited assessor to submit four separate cases in the BAM credit calculator.

Recommendation 8

The assessor must meet the minimum plots and transects required by the BAM for each vegetation zone in each IBRA subregion assessment is carried out.

The Amendment Report BDAR has carried out separate habitat suitability assessments for each of the four Interim Biogeographic Regionalisation of Australia (IBRA) subregions crossed by the pipeline development: the Orange, Bathurst, Hill End and Capertee Uplands IBRA bioregions. A master case was created in the BAM calculator, with five associated child cases (one for each IBRA subregion, with two relating to the Bathurst IBRA subregion covering the two pipeline options included in the amended project).

Following a meeting with BCD representatives on 19 March 2020, the Amendment Report BDAR, as discussed and agreed with BCD, has treated vegetation zones as continuous throughout the four different IBRA subregions assessed and has completed the required number of plots in accordance with the BAM on that basis.

The Amendment Report BDAR subsequently completed separate candidate species assessments for the 15 candidate threatened flora species and 15 candidate threatened fauna species for each of the four IBRA subregions noting that not all candidate species were predicted and therefore assessed in each IBRA subregion. Candidate species assessments for the pipeline development are presented in Section 5.2.3 of the Amendment Report BDAR.

iv Plot data and BAM calculator inconsistencies

There are inconsistencies between the plot data provided on page 194 of the BDAR and the data that has been entered into the calculator. BCD has reviewed a number of plots at random against the data in the calculator and found inconsistencies, one example is provided below. The data provided in the report must be consistent with the data entered into the calculator, any errors in the calculator can have an impact on the final credit liability for the project. BCD is unable to clarify which data is correct as the field data sheets have not been provided. The assessor should ensure that the correct data is entered while addressing recommendations 7 and 8 above.

Recommendation 9:

Ensure that the correct data set is entered into the BAM calculator and that it reflects the data in the BDAR.

The Amendment Report BDAR outlines that all plot data has been entered into the BAM import template and quality assurance checks have been undertaken. The BAM import template has been uploaded directly into the BAM calculator to avoid manual data entry errors. The Amendment Report BDAR provides the raw plot data sheets in Appendix A and a summary of plot data in Appendix B.

v Native vegetation extent mapping

The native vegetation extent layer is inconsistent with the PCT vegetation mapping for the project. There are areas within the pipeline that have been mapped as a native PCT by the assessor however these areas have not been included in the native vegetation extent layer and calculation. Additionally, there are areas within the buffer area that appear to be native vegetation on the aerial imagery however they not been mapped on the native vegetation extent layer.

Recommendation 10

Any vegetation that has been mapped as native vegetation by the assessor within the project area and the buffer should be included in the native vegetation extent mapping.

Recommendation 11

All native woody and non-woody vegetation on the subject land and within the buffer should be mapped.

The Amendment Report BDAR merges the revised PCT mapping (refer Section 4.3.2(i)) identified along the pipeline development with the regional vegetation map beyond the pipeline corridor to calculate the percentage of native vegetation extent in each IBRA subregion. The native vegetation extent mapping is presented in Figure 3.2 of the Amendment Report BDAR.

vi Predicted species list

BCD note that the assessor has removed a number of species from the predicted list generated from the BAM calculator. The removal of these species is not consistent with the assessment requirements set out in steps 2 and 3 of chapter 6 of the BAM. A species can only be removed from the list if the species:

a) has habitat constraints listed in the TBDC and none of these constraints are present on the site. Documentation in the BDAR should reflect the TBDC information and evidence that the features are not present (field data); or

b) is vagrant to the area. Vagrancy is taken as the record being well outside the species range or natural distribution. The suspect record will need to be reviewed against the species known distribution and the assessor will need to confirm with species experts that it is likely to be a vagrant. If agreed by experts the assessor should contact DPIE to have the record quarantined from BioNet Atlas and re-labelled as vagrant. The BDAR will need to contain supporting information such as who was contacted, when, their credentials and the resultant response from DPIE.

The following species do not have habitat constraints listed in the TBDC and are not considered vagrant and therefore cannot be removed from the predicted list for any associated PCT regardless of the vegetation zone condition;

- regent honeyeater (*Anthochaera Phrygia*)
- brown treecreeper eastern subspecies (*Climacteris picumnus victoriae*)
- varied sittella (*Daphoenositta chrysoptera*)
- little lorikeet (*Glossopsitta pusilla*)
- swift parrot (*Lathamus discolour*)
- black-chinned honeyeater eastern subspecies (*Melithreptus gularis gularis*)

The following species do have habitat constraints listed in the TBDC and therefore could be removed from the predicted list if the assessment requirements set out in steps 2 and 3 of chapter 6 of the BAM have been met:

- glossy black-cockatoo foraging (*Calyptorhynchus lathami*)
- painted honeyeater (*Grantiella picta*)

For the above two species BCD is unable to verify whether or not the habitat constraints are absent from the vegetation zones as no field data sheets have been provided.

Recommendation 12

Any species that does not have habitat constraints listed in the TBDC must be retained in the calculator for all associated PCT's regardless of the vegetation zone condition.

Recommendation 13

All field vegetation plot and transect, and fauna survey data sheets should be provided.

As outlined in the Amendment Report BDAR, the predicted species list for the pipeline development has been revised due to the revision of PCT mapping and the creation of separate child cases for each IBRA subregion the pipeline development intersects.

Discussions with John Seidel Acting Manager, Ecosystem Assessment at BCD, have determined that peer reviewed literature including recovery plans can be used in addition to the habitat constraints in the Threatened Biodiversity Data Collection (TBDC) to undertake the predicted species assessment.

Accordingly, only species with habitat constraints absent from the site, as identified through either the TBDC or peer reviewed literature have been excluded from the predicted species list for the respective IBRA subregions as detailed in Table 5.12 of the Amendment Report BDAR. Raw data sheets and summary of plot data have been provided in the Amendment Report BDAR Appendix A and Appendix B respectively.

4.4 Heritage Council of NSW

4.4.1 Built heritage

The EIS states both the AHCHA (Landskape 2019) and the Stage 1 Report by Christo Aitken and Associates (2019) recommend that due to the potential state significance of Hallwood Farm Complex, harm must be avoided by modifying the proposed ancillary water management facility footprint. A detailed assessment and conservation management plan is also recommended. This is considered appropriate.

- The mitigation measures outlined in Section 9.2 and Table 9.2 of Appendix P relating to built heritage are considered appropriate and should be included in any approval.

Harm to Hallwood has been avoided through the revision of the water management system. While not listed on local or state heritage registers, Hallwood was identified in Landskape (2019) and Christo-Aiken and Associates (2019) as being of potential state significance.

In the EIS design, the secondary WMF was proposed adjacent to the north-western corner of the TSF with Hallwood directly within the inundation footprint of this WMF. A comparison of the amended mine development and EIS layouts is provided in Figure 1.3. Hallwood is now approximately 50 m from the amended disturbance footprint and approximately 90 m from the nearest mine development component; a soil zone to the west of the TSF.

Given Hallwood is no longer in the disturbance footprint, the revised noise and vibration impact assessment (NVIA) for the amended mine development (MAC 2020a), contained in Appendix J of the Amendment Report, assessed potential blasting and vibration impacts on Hallwood. The assessment concluded that both the overpressure criteria and a vibration criteria of 3 mm/s will be met at Hallwood.

An Addendum to the Aboriginal and Historic Cultural Heritage Assessment (AHCHA Addendum) has been prepared by Landskape (2020) to assess the potential cultural heritage impacts of the amended project. The AHCHA Addendum, contained as Appendix O of the Amendment Report, provides updated management measures for Hallwood in consideration of the fact that the amended project will avoid impacts on Hallwood. These have been included in the updated mitigation measures for the project contained in Appendix C of the Amendment Report. Archival recording will be carried out and a conservation management plan prepared for Hallwood.

4.4.2 Historical archaeology

It is recommended that the following conditions of consent be included to manage the potential archaeological resource:

a) Prior to test excavations taking place the Applicant shall submit an Archaeological Research Design and Excavation Methodology undertaken by a suitably qualified and experienced historical which outlines the nature of the archaeological programme, proposed artefact analysis and the research questions to be answered by the archaeological programme.

b) The Applicant shall submit the name of a suitably qualified and experienced Excavation Director to undertake the archaeological testing programme who is able to satisfy the Excavation Director Criteria of the Heritage council of NSW for the proposed activity and significance level.

c) Following the archaeological testing programme, the Applicant and Excavation Director must submit a report detailing the results of a testing programme which includes a re-evaluation of the significance of the archaeological sites and determines whether a salvage excavation is warranted.

The recommendations above have been included in the historic heritage section (Section 6.11) of the Amendment Report as well as the revised mitigation measures for the amended project in Appendix C.

4.4.3 Management measures

The AHCHA also recommends:

- An unexpected finds protocol if previously unidentified Aboriginal or historical cultural heritage sites are encountered during construction;
- A skeletal remains protocol for if human skeletal remains are encountered during activities associated with the mine development; and
- That these management strategies are to be integrated into a single program and document in the form of a Cultural Heritage Management Plan (CHMP) for the project which must be prepared in accordance with the guidelines in the NSW Heritage Manual.

In addition, this CHMP must clearly indicate all heritage items in the vicinity of, and in the project area, provides a statement of significance for each item and a list of the agreed impact mitigation and management strategies that will remain active for the life of the mine development.

- The above three recommendations are considered appropriate and should be included as conditions of consent.

The mitigation measures committed to in the mine development EIS AHCHA, remain applicable to the amended mine development. In addition, the Cultural Heritage Management Plan (CHMP) which will be prepared for the mine development component of the project, will provide a statement of significance for each identified heritage item within the mine development project area.

Specific management measures for historic heritage and Aboriginal cultural heritage sites have been updated in the mine development AHCHA Addendum as summarised in Table 4.1 and Table 4.2 in Landskape (2020).

4.5 Resources Regulator

4.5.1 Conceptual Final Landform Design

Agency Requirement:

Conceptual final landform design: Inclusion of a drawing at an appropriate scale identifying key attributes of the final landform, including final landform contours and the location of the proposed final land use(s).

Information required:

a) Figures provided in the EIS and Appendices do not provide an adequate level of detail for the TSF, WRE and ROM final landform. Provide drawings at an appropriate scale of the WRE and ROM final landform including, but not limited to, the following:

i. Plan view

ii. Section views, including reference to surrounding natural topography and any other proposed landforms or infrastructure.

iii. Contours including labels (where appropriate)

iv. Dimensions and slopes

v. Structures and materials

b) In support of the drawings requested above, provide an overview of the key characteristics of the final landform for the TSF, WRE and ROM. Based on the characterisation of materials, the overview should include a discussion on capping strategies; the source of associated capping material and associated volumes that may be required; and measures that will be implemented to ensure a sustainable post-mining landform that is commensurate with the surrounding natural areas is achieved.

The requested figures have been included in the Rehabilitation and Landscape Management Strategy Addendum (EMM 2020c) prepared for the amended project and are re-produced in Figures 4.18 – 4.22.

As described in the Rehabilitation and Landscape Management Strategy prepared for the EIS (EMM 2019e), careful consideration and planning went into designing a final landform for the project that will be self-sustaining and is commensurate with the surrounding topography as much as possible. Erosion and landform evolution modelling was undertaken to ensure the waste rock emplacement remains stable in the long-term.

As shown in Figure 4.19 below, key features of the final landform design to achieve the objective of a natural looking landform include micro-relief elements along the top of the landform, undulating slopes without the traditional benches that are seen on more traditional open cut mine out of pit emplacements, and rounded corners (rather than sharp edges). The modelling undertaken by Landloch (2019) demonstrated that the traditional benched design waste rock emplacement is visually inconsistent with existing landforms due to the presence of linear drainage features and sharp corners and is unlikely to be stable in the long-term due to:

- potential for benches overtopping during greater than design run-off events;
- potential for benches overtopping due to sediment accumulation as a result of upstream erosion and diversion of flow over the batter;
- tunnels forming in dispersive or non-cohesive materials; and
- tunnels and gullies forming either under or adjacent to rock drop structures.

A 'Geofluv™' waste rock emplacement design was considered but determined to be inappropriate for the project due to:

- gully erosion risk and subsequent risk to the encapsulated PAF material due to a design that maximises the concentration of flow; and
- insufficient space within the mine development project area to build such a landform, given the relatively flat gradients necessary to achieve critical shear stress values below levels capable of being withstood by site soils and waste materials in the concentrated flow paths.

The adopted design is based primarily on the ability of the site soil and waste materials to withstand the critical shear stress from overland flows. The design includes:

- linear gradient of 14 degrees;
- minimisation of flow concentration and therefore the erosion potential of run-off;
- smooth corners consistent with pre-existing and surrounding landforms;
- incorporation of ridge lines and minor drainage lines within the waste rock emplacement slope profile;
- incorporation of micro-relief and topographical features on the top of the waste rock emplacement; and
- use of topsoil, vegetation and rock matrices where necessary to provide necessary erosion protection on slopes and flow paths.

The waste rock emplacement design was refined using the Water Erosion Prediction Program (WEPP), SIBERIA and the Revised Universal Soil Loss Equation (RUSLE). WEPP is a 2-dimensional batter slope erosion model used to develop stable batter shapes. WEPP is used to refine stable batter surfaces and is parameterised using the laboratory-based assessment of erodibility.

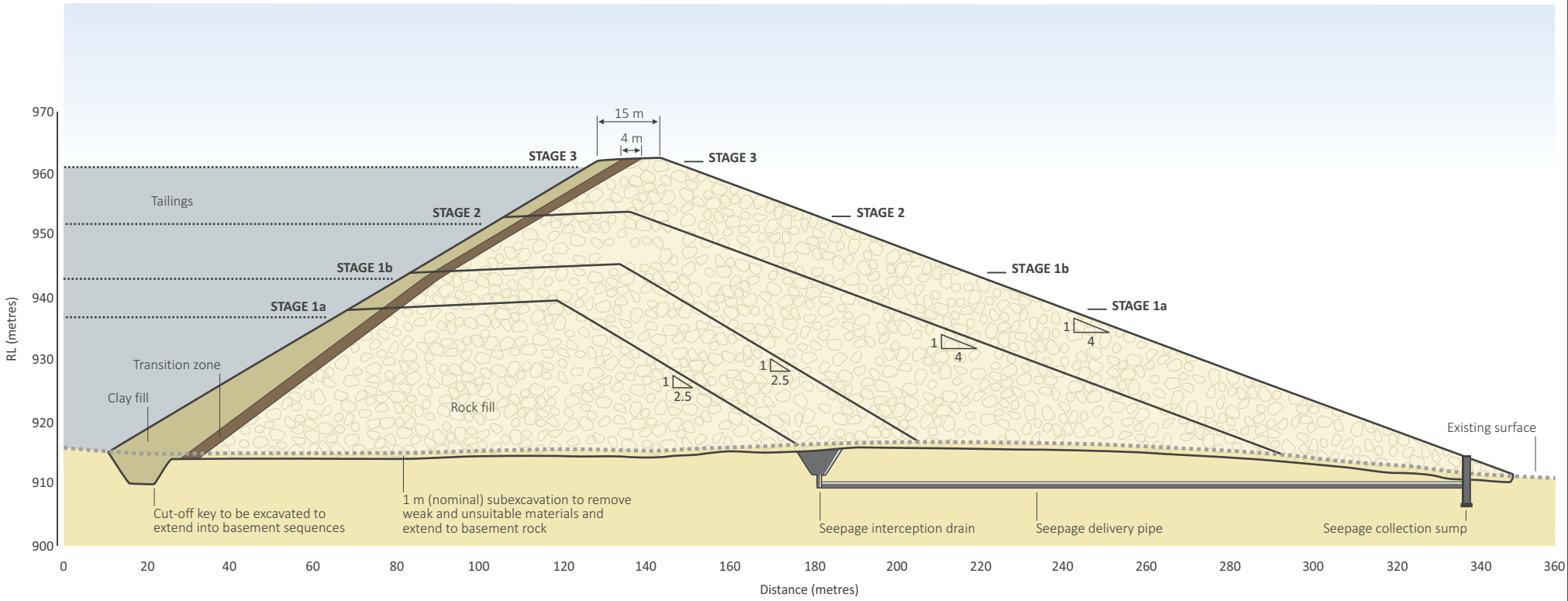
SIBERIA is a sophisticated, 3-dimensional topographic evolution model that simulates runoff, erosion and deposition. It predicts the long-term evolution of channels and slopes within a landform and is used to map and quantify the rate of gully development. This provides a method for predicting how long the PAF cell would be protected from erosion within the waste rock emplacement.

The modelling concluded that the predicted peak rates of erosion are much lower than the recommended maximum of 5 tonnes per hectare per year (t/ha/yr) and are suitable for rangeland situations, and as such provides confidence that the landform will be self-sustaining.

At closure, the bulk of the PAF cells will have been enclosed with a small area remaining open to receive PAF materials from closure operations. Once all PAF materials have been placed in the PAF cells, it will be encapsulated and remaining unrehabilitated areas shaped and revegetated.

The waste rock emplacement will be constructed to achieve a final height across the landform of approximately 1,065 m RL. As described above, micro-relief has been incorporated into this final design to facilitate a natural looking landform as much as practicable. These micro-relief features will be up to 1,075 m RL in places across the top of the landform.

Further specific details are also summarised below for key elements of the landform.



Amended TSF embankment design

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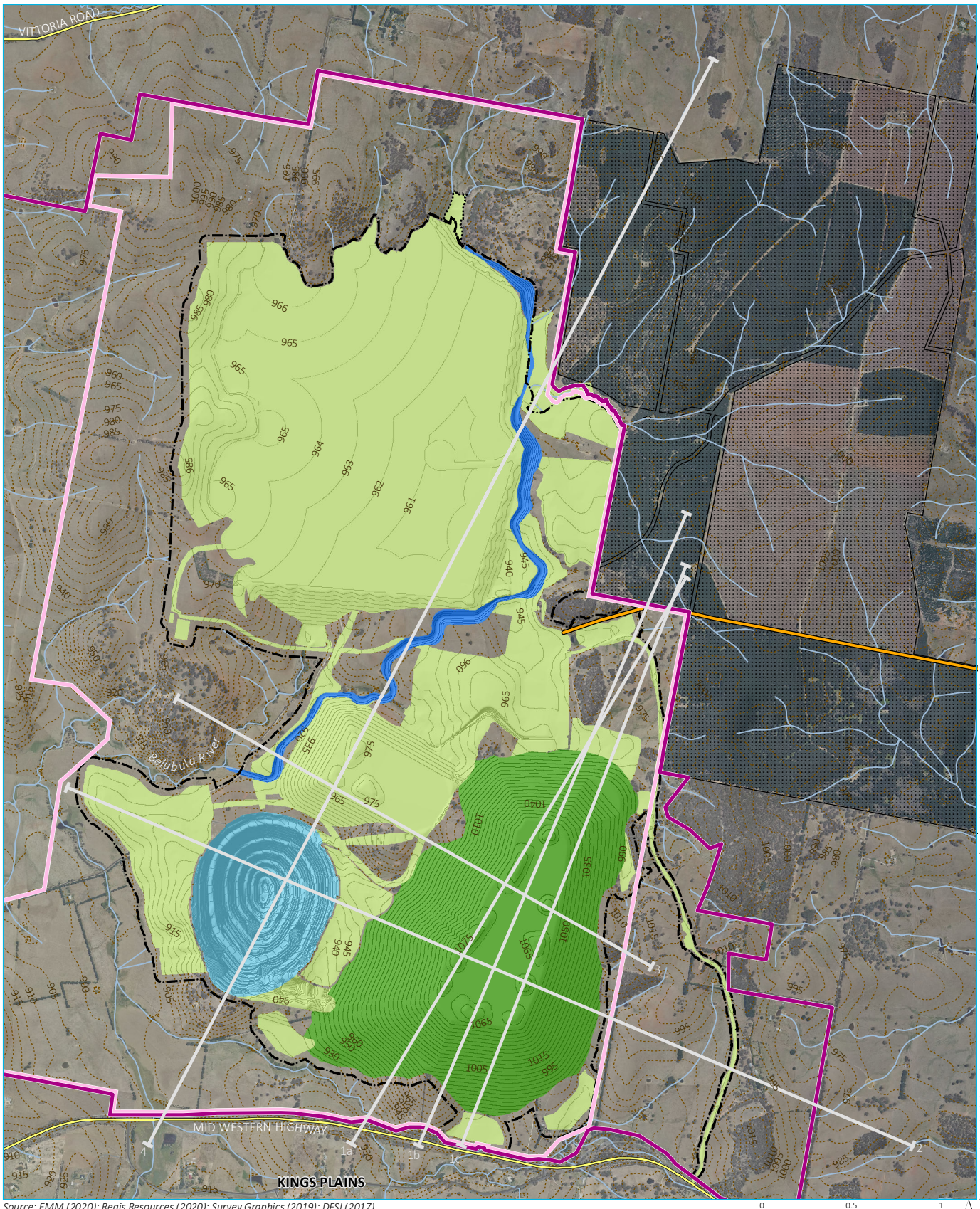
Figure 4.18



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

0 0.5 1 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
- Additional (post-closure) disturbance footprint
- Pipeline
- Mine plan contour (5 m); TSF contour (1 m)
- Cross section

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

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Figure 4.19

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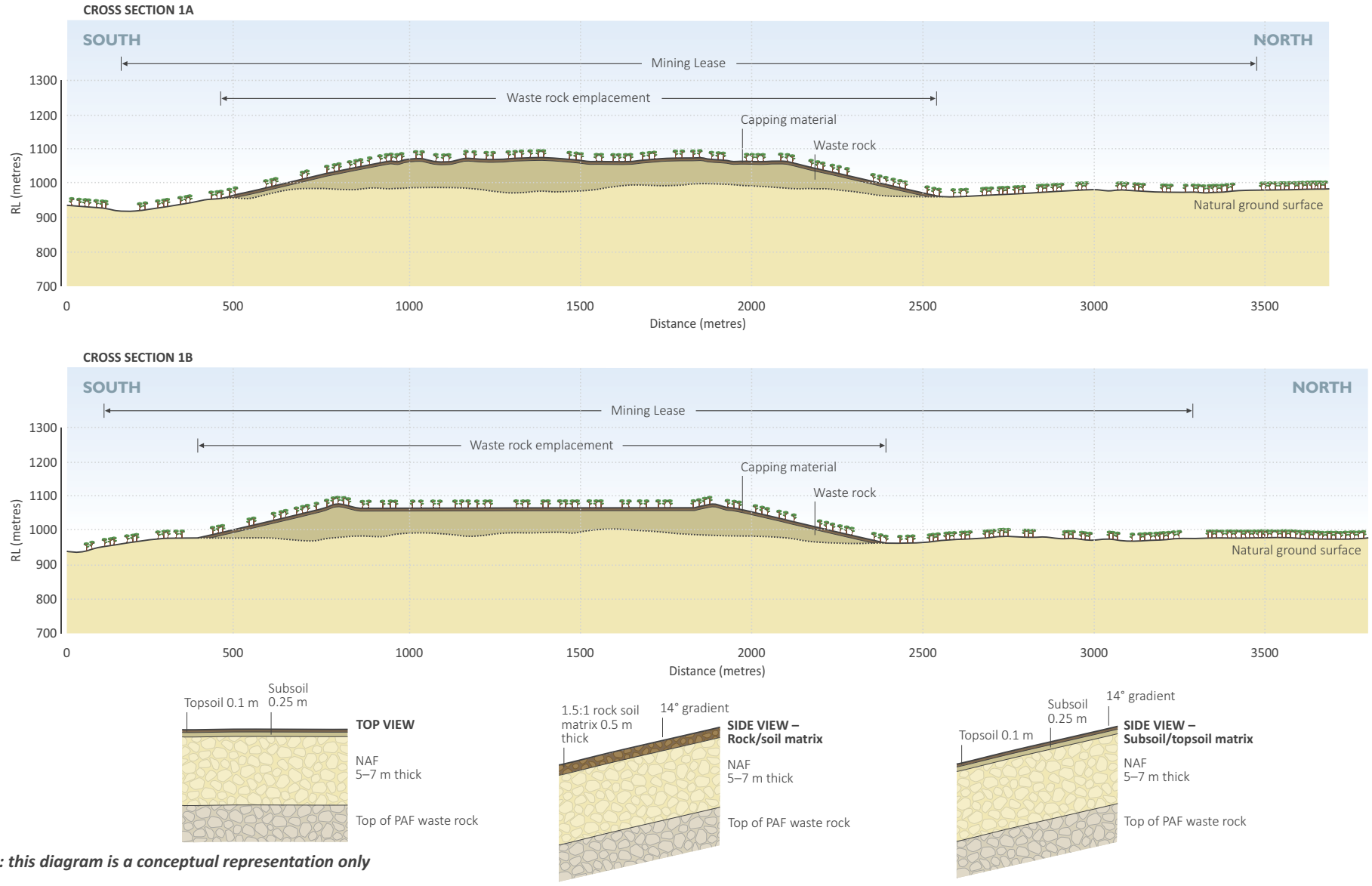

NOTE: this diagram is a conceptual representation only

Conceptual final landform cross sections: 1A and 1B

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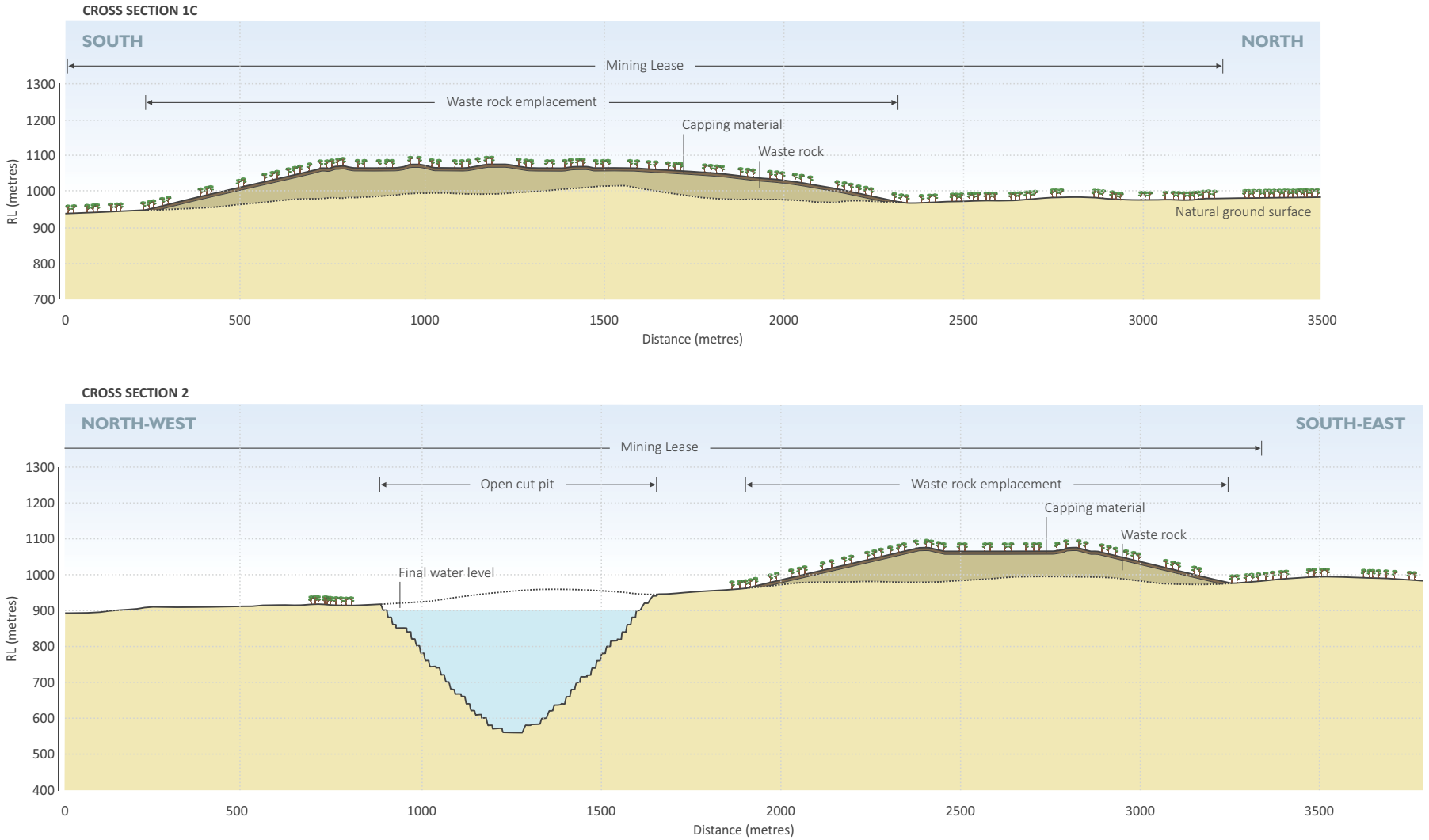
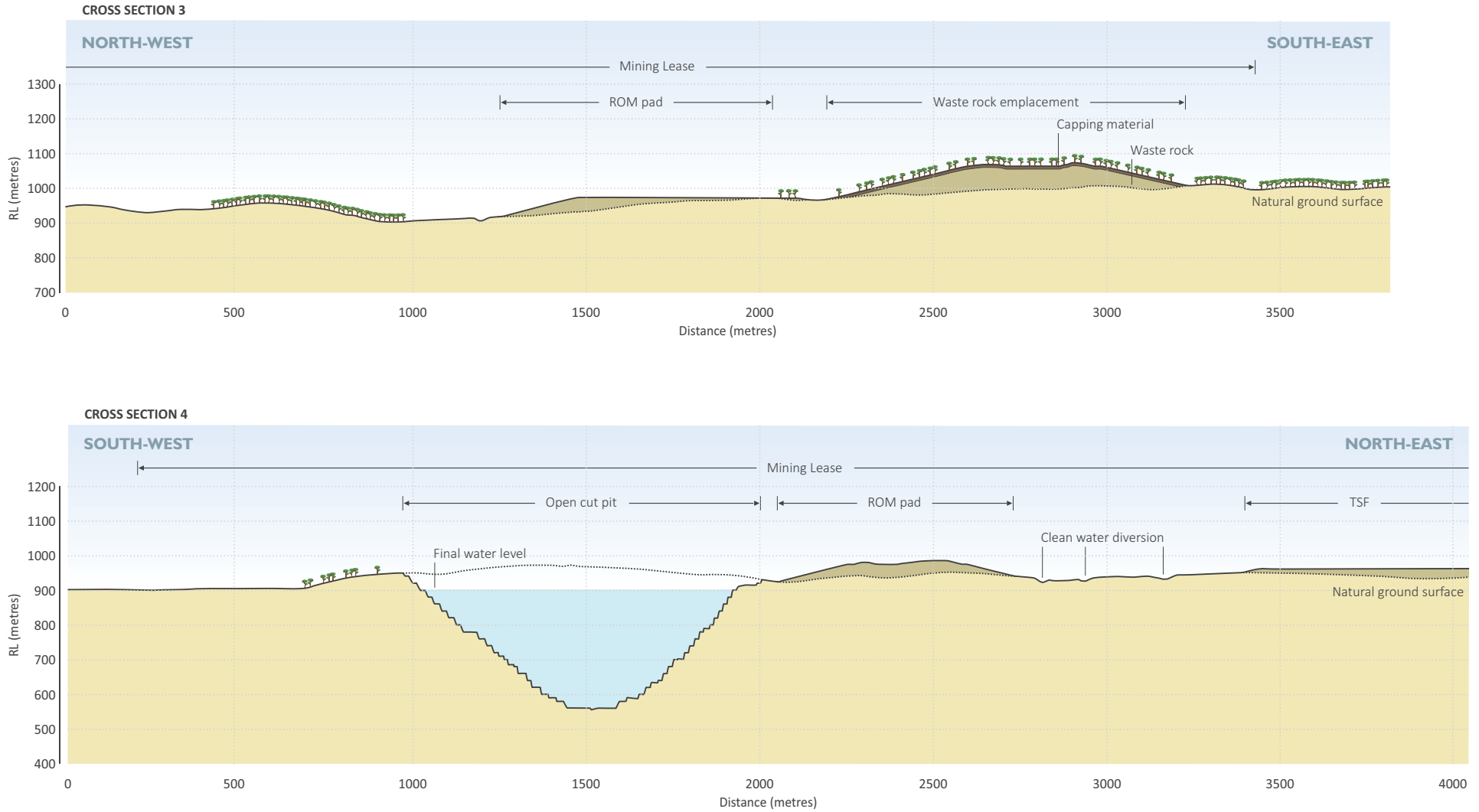
Submissions report
Figure 4.20



NOTE: this diagram is a conceptual representation only

Conceptual final landform cross sections: 1C and 2

McPhillamys Gold Project
Submissions report
Figure 4.21



NOTE: this diagram is a conceptual representation only

Conceptual final landform cross sections: 3 and 4

McPhillamys Gold Project
Submissions report
Figure 4.22

i Tailings Storage Facility

As described in the EIS and EMM 2020c, at closure, the TSF will be covered with a capillary break layer (which will also function as a trafficking layer) of NAF waste rock approximately 0.5 m thick. The capillary break will minimise the potential for capillary rise of salts and soluble metals into the above capping layers and provides a bridging layer.

The capillary break will be 0.5m (nominal thickness) covered with a capping layer consisting of approximately 0.6 m of subsoil capped with around 0.10 m of topsoil. This arrangement is shown conceptually in Figure 3.3 in EMM 2020c.

There may be periods of high rainfall where the volume of rain exceeds the infiltration rate and storage capacity of the cover. Therefore, the final surface of the TSF has been designed to drain runoff in these instances to the proposed clean water diversion on the east and south-east side of the TSF.

Material for the capillary break layer will be sourced from the temporary NAF waste rock stockpiled at the northern end of the waste rock emplacement and the Main WMF wall. The TSF storage area at full capacity area will be about 273 ha. The minimum volume of NAF waste rock required for the capillary break is therefore around 1,365,000m^3. Approximately 3.4 Mm^3 of NAF waste rock will be stockpiled for this purpose, which includes 3 Mm^3 at the northern end of the waste rock emplacement and approximately 0.4 Mm^3 in the WMF embankment.

Soil will be stripped during construction and development of the mine. Table 3.1 from the *Land Capability and Soil Assessment Addendum* (SSM 2020) details available soil resources at the mine based on a comprehensive soil sampling program. SSM (2020) estimates that 346,000 m^3 of topsoil and 1,699,000 m^3 of subsoil will be required to rehabilitation the TSF surface and embankments. It identifies that there will be an excess of 338,000 m^3 of topsoil and 308,000 m^3 of subsoil to that required for rehabilitation purposes across the mine development project area, primarily due to the final void remaining at mine closure.

Soil will be stockpiled on the western and eastern side of the TSF as shown in Figure 1.3 (refer to Chapter 1) to minimise the distance required for soil to be hauled in the rehabilitation phase for capping purposes.

The final TSF landform will have an embankment with an overall downstream gradient of 1(v):4(h), consisting of a clay core and NAF rock material covered with topsoil and vegetated with grass. It will have a very gently grading cap that drains west to east to minimise the potential for erosion and ensures sufficient soil moisture for pasture production, while preventing ponding and therefore seepage into the TSF.

Erosion modelling undertaken by Landloch (2019) for the waste rock emplacement, as described above, demonstrated that annual average erosion rates of less than 2t/ha/yr and a peak erosion rate of less than 5t/ha/yr (ie no active rills), can be achieved on the waste rock emplacement with 14° slope gradient, 60 to 80% grass cover and a longer slope length than the TSF embankment.

The outer embankment of the TSF will be constructed from the same material as the slopes of the waste rock emplacement and therefore with 60 to 80% grass cover high levels of erosion protection can be achieved.

ii Waste rock emplacement

The proposed waste rock emplacement landform includes geomorphic features such as ridge lines and depressions consistent with surrounding landforms. This is shown in the final landform figure (refer to figure 4.19)

As discussed above, erosion modelling undertaken by Landloch (2019) for the waste rock emplacement demonstrated that annual average erosion rates of less than 2t/ha/yr and a peak erosion rate of less than 5t/ha/yer (ie no active rills), can be achieved on the waste rock emplacement with 14° slope gradient and 60 to 80% grass cover. There may be potential for erosion in the depressions where flow can concentrate and in these locations rock/soil matrices may be used to provide critical shear protection from concentrated flows.

Additional soil and NAF rock characterisation, erosion modelling and landform evolution modelling will be undertaken during the Mining Operations Plan (MOP) development phase if deemed required, to refine the locations on the waste rock emplacement where rock/soil matrices will be required and these will be detailed in the MOP.

The waste rock emplacement will comprise a PAF capping layer of between 5 to 7 m of NAF, with about 0.25 m of subsoil and 0.1 m of topsoil. Detailed geochemical modelling of the McPhillamys ore body was undertaken by SRK (2019), which conservatively estimated that 58% of the waste rock will be NAF. The total volume of waste rock produced by the amended mine development will be approximately 85 Mbcm, of which at least 49 Mbcm will be NAF. Approximately 14 Mbcm of NAF will be required for:

- construction of the ROM pad;
- TSF embankments;
- haul roads and administration area;
- pit amenity bund;
- ROM capping; and
- TSF capping.

This leaves around 35 Mbcm of NAF for encapsulation of the PAF waste rock, which is in excess of requirements.

iii ROM pad

The ROM pad will require approximately 5 Mbcm of waste rock for construction, of which approximately 25% will be PAF that will be placed in an encapsulated PAF cell. Vertical capping arrangements will be identical to the waste rock emplacement and the lateral extent of the encapsulation far greater the emplacement. The outer batter will have a slope of 1:4 (14°).

At the end of mine life, additional NAF waste material will be placed on the ROM pad as shown in Figure 4.19 to provide topography and enable the inclusion of micro relief elements on the ROM pad landform for visual amenity purposes.

The erosion modelling and stability assumptions for the waste rock emplacement apply equally to the ROM pad in that erosion rates that prevent the formation of active rills can be achieved with a 60 to 80% grass cover ensuring integrity of the cap for encapsulation of the PAF waste rock.

4.5.2 Post mining land use

Agency Requirement:

(k) Description of how post-rehabilitation areas will be actively managed and maintained in accordance with the intended land use(s) in order to demonstrate progress towards meeting the rehabilitation objectives and completion criteria in a timely manner

(q) Where the intended land use is agriculture, demonstrate that the landscape, vegetation and soil will be returned to a condition capable of supporting this.

Information required:

a) Grazing is identified as being part of the post mine land use. Additional information is required to demonstrate the land use will be effective and functional post-closure, including (but not limited to):

i. Assess the capacity of the final landform to sustain grazing, including assessment of potential impacts of grazing to the integrity of rehabilitated landforms.

ii. Outline measures that may be integrated into the final landform to support a functional grazing land use. Issues to address include accessibility to water (e.g. do dams need to be constructed), shelter for domestic stock and whether infrastructure may be required (e.g. fencing etc.) to support sustainable grazing practices.

iii. Provide consideration of other post mine land use options that will ensure the sustainability of the rehabilitated landform in the long term. Currently based on the lack of detail provided, the Regulator is concerned whether grazing practices can be achieved on the final landform without compromising the long term integrity of the rehabilitation.

b) Grass cover is proposed on the TSF but consideration of trees potentially naturally establishing on the TSF post-closure has not been provided. Provide an assessment of the TSF's ability to support tree establishment post-closure, including identification of potential impacts.

The overarching rehabilitation objective for the project is to reinstate pre-mining land-uses as much as possible, while enhancing biodiversity values lost due to past agricultural clearing. Consistent with this objective, a grazing land use is proposed across most of the rehabilitated mine development project area, with woodland proposed over the waste rock emplacement.

Importantly with respect to achieving the proposed post-mining land uses, the soil balance completed for the mine development by SSM (2020) confirmed that there is adequate and suitable soil available in the mine development project area to construct the planned soil profiles required to achieve the post mining LSC classes and associated land uses.

Alternate land use options will be considered, along with any other identified options by Regis during operation of the mine as part of detailed closure planning, and in consultation with relevant stakeholders, including the NSW DPIE and Blayney Shire Council.

Further detail on the proposed post mining land uses on key landforms in the mine development project area is provided below.

i Tailings Storage Facility

SSM (2020) assessed the pre-mining LSC classes of the footprint of the TSF to be LSC classes, 4, 5 and 6 with the key limitations to agricultural production being water logging and strong soil acidity. Water logging can result in soil structure decline and anaerobic conditions. Strong soil acidity results in reduced plant nutrient availability and aluminium toxicity.

The tailings storage area will be rehabilitated to LSC class 4 with LSC class 6 on the embankments. LSC class 4 lands are suitable for a variety of land uses including restricted cultivation, pasture cropping, grazing, some horticulture, forestry and nature conservation (OEH 2012). The soil depth and low gradient of the capped TSF will be capable of withstanding cultivation by conventional agricultural equipment without risking the integrity of the cap; however, a less intrusive grazing post mine land use has been nominated for the TSF to ensure integrity of the cap.

The acidic subsoil will also be ameliorated to increase soil pH, reduce aluminium toxicity and increase plant available nutrients.

A grazing post mining land use requires access to adequate stock drinking water facilities. The mine development will result in the loss of approximately 11 farm dams within the infrastructure and TSF footprint that may have been previously used for stock water supply. However, numerous other farm dams are present, and will remain, around the mine development project area. Additional dams could also be built to service changed paddock configuration. In grassland pastures adult sheep require between 2 and 6 L of water per day and cattle between 40 and 100 L of water per day depending on the condition of the pastures and distance from watering points (DPI 2014).

In pastoral areas, sheep normally graze within a radius of about 2.5 km of a watering point, and cattle within a radius of about 5 km (DPI 2014) depending on if they are lactating and the condition of the pastures. The various farm dams to remain at closure, including in the vicinity of the TSF, will provide the required water supply for these animals under a grazing land use. Regis acknowledged that to maintain the integrity of the TSF final landform, dams for stock will not be established within the TSF footprint; however given the above grazing distances, and that the TSF is approximately 2 km long and 1.5 km wide at its longest and widest point respectively, it is considered that the requirements of a grazing land use, such as access to water around the TSF, will be met.

In addition, the grazing productivity of the TSF and infrastructure areas could be enhanced by future landowners installing a reticulated water supply system in combination with appropriate management fencing to facilitate rotational grazing.

In relation to potential tree establishment on the TSF, Dr Williams notes in his expert review of the TSF design (Williams 2020) that the capillary break layer (described above in Section 4.5.1) will also provide a self-healing layer, should the growth medium be compromised locally by erosion or volunteer trees, allowing ready repair of the growth medium. It is not anticipated then that trees would compromise the TSF cap.

ii Waste rock emplacement

SSM (2020) assessed the pre-mining LSC classes of the footprint of the waste rock emplacement to be predominantly LSC class 5 with small areas of LSC class 6. It is predominantly LSC class 5 due to limited soil depth and strong soil acidity with associated acidity (refer to Figure 3.3 in SSM 2020). The top of the waste rock emplacement will have a LSC class of 5 due to soil depth and flat gradient and the outer slopes will have a LSC class of 6 due to the slope gradients.

A woodland/biodiversity post mine land use for the waste rock emplacement has been nominated for a number of reasons:

- the practicality of providing adequate water supply at the top of the waste rock emplacement for a grazing land use;
- the erosion risk resulting from concentration of flow along stock pads and the resulting risk to the integrity of the encapsulated PAF material; and
- a desire to improve the biodiversity and visual amenity of the waste rock emplacement.

iii ROM pad

SSM (2020) assessed the pre-mining LSC classes of the footprint of the ROM pad to be predominantly LSC class 4 with small areas of LSC class 6 land. Pre-mining soil limitations in the footprint of the ROM pad include soil acidity, aluminium and soil exchangeable magnesium levels.

The majority of the surface of the ROM pad will be rehabilitated to LSC class 5 with the remainder being LSC class 6. The soil depth will be same for the surface and slopes of the ROM; however, the slope changes the LSC class. Amelioration of the subsoil and topsoil during the rehabilitation phase will mitigate the current soil chemistry limitations.

The lateral distance of the ROM pad PAF cell to the outer slope of the ROM pad is far greater than that for the waste rock emplacement and it is considered the potential for concentration of flow along stock pads eroding the cap to an extent that would impact the PAF cell to be low or negligible. This would be monitored as part of the rehabilitation monitoring process and if need be the ROM pad slopes could be fenced to exclude stock.

4.5.3 Progressive rehabilitation

Agency Requirement:

(f) Mine layout and scheduling, including maximising opportunities for progressive final rehabilitation. The final rehabilitation schedule should be mapped against key production milestones (ie ROM tonnes) of the mine layout sequence before being translated to indicative timeframes throughout the mine life. The mine plan should maximise opportunities for progressive rehabilitation;

Information required:

a) An indicative project schedule and diagrammatic representation of rehabilitation progression is provided. However, further information is required on the range of assumptions behind the life of mine rehabilitation schedule to determine whether opportunities for progressive rehabilitation have been maximised.

The opportunity for progressive permanent rehabilitation for the amended project, as was the case in the EIS, includes the waste rock emplacement, southern slope of the pit amenity bund, and TSF main embankment following the final stage of downstream construction. Temporary revegetation of WMF embankments, the ROM outer embankments, some road fill batters, and soil stockpiles will all be undertaken where possible when construction of these project elements is completed.

Progressive rehabilitation will be undertaken as per the staged mine plans provided in the Amendment Report (EMM 2020a, refer to Figures 2.3a to 2.3f).

Construction of the waste rock emplacement is now proposed to commence in the north as part of the amended project, rather than in the south and progressing north as was proposed in the EIS. Waste rock emplacement will then start at the southern end in around Year 2 when pit benches are in place to shield activities in the open cut pit. As shown on the staged mine plans referred to above, from around Year 2 emplacement will occur in both the northern and southern ends as the emplacement is constructed at either end, eventually meeting in the middle. This will include development of the floor of the PAF cells and the downslope containment bunds so that PAF waste rock is contained during mining operations.

It will be necessary to maintain benches and windrows on the outer sections of the waste rock emplacement in the active emplacement areas to minimise spillage of waste rock to the lower slopes that are being progressively rehabilitated. Some reshaping will be required to infill the benches and achieve the design slope gradient. Bulk reshaping is not anticipated.

Progressive rehabilitation planning for the project will focus on the waste rock emplacement and its schedule is driven by two key aspects:

- availability of reshaped batters adequately protected by temporary upslope benches and berms, whereby topsoiling and seeding activities can be undertaken without fear of being damaged by upslope materials during waste dumping and shaping works; and

- minimising the time that slope lengths up to 20 m are exposed without hydromulch (or similar) and grass cover to minimise potential for erosion of the slopes.

The waste rock emplacement will be rehabilitated with open woodland and open forest species for a woodland post mine land use. This will include the Yellow Box-Blakely's Red Gum grassy woodlands, South Eastern Highlands Bioregion and Broad-leaved Peppermint – Brittle Gum – Red Stringybark dry open forest of the South Eastern Highland Bioregion. Introduced and native grasses will also be used to provide short- and long-term erosion protection and improved visual amenity outcomes.

4.5.4 Tailings management

Agency Requirement:

(s) provide a detailed options analysis of tailings treatment and disposal methods that may be applicable to the type of tailings generated from this project. This analysis must provide a clear justification of the preferred tailing treatment to demonstrate the feasibility of achieving low maintenance, safe stable non-polluting rehabilitation outcomes, with specific reference to long term seepage management.

i. final capping material concept design, source of capping material and long term design considerations, taking into account the required performance of the capping material long term and likely environmental risks i.e. consolidation of underlying tailing materials.

Information required:

a) an options analysis table for tailings treatment and disposal is provided, however is brief and unclear in nature. Clarity and detail regarding treatment, disposal methods and justification in relation to low maintenance rehabilitation outcomes and long term management of each option is required.

As described in the EIS, an extensive assessment of tailings disposal options was carried out based on sound engineering design practices and minimisation of environmental impacts. This assessment was then subject to a TSF risk assessment (Risk Mentor 2019, refer to Appendix F of the EIS) and this risk assessment then underwent expert review alongside the TSF detailed design by CMW Geosciences. The Regis project team, tailings dam designers (ATCW, CMW Geosciences), processing engineers, metallurgists and groundwater, surface water, and geochemical technical specialists (among others) participated in the TSF risk assessment. The risk assessment of the tailings disposal options included but was not limited to the following:

1. Tailings disposal method options considered; and

2. Cyanide detoxification options.

The tailings disposal options considered included thickened slurry disposal, paste disposal, filtered tailings, and co-mixing of crushed waste rock with filtered tailings. Overall, sub-aerial, thickened slurry tailings disposal was found to best meet the assessment criteria established for the site. The sulphur dioxide/air method of cyanide detoxification was selected, being a proven technology (used at Cowal and Tomingley gold mines within NSW), well-suited to high tonnage/low grade gold deposits.

In response to the request by the Resources Regulator to provide more information on the option considered, reports have been produced by Regis outlining the option considered for both tailings disposal options and cyanide detoxification. These reports are included as Appendix G and H, respectively.

b) more detail regarding final capping design including how final land use can be achieved with proposed capping and cover design since grass cover is proposed on the TSF but consideration of trees potentially naturally establishing on the TSF post-closure has not been provided.

As described in Section 4.5.2(i), the final cover on the tailings dam will include a capillary break layer of NAF waste rock approximately 500 mm thick, which will also serve as a trafficking layer (ATCW 2020). The capillary break layer will minimise the potential for capillary rise of salinity and soluble metals into the growth medium placed above, which will comprise a minimum 600 mm thickness of subsoil overlain by 100 mm of topsoil.

The expert review prepared by Dr David Williams (refer to Appendix D of the Amendment Report), concluded that the rocky capillary break layer proposed as part of the TSF capping will also provide a self-healing layer should the growth medium be compromised locally by erosion or volunteer trees, with the coarse-grained rock readily filling any opening and allowing ready repair of the growth medium.

4.5.5 Mine safety

Mine Safety Operations within the Resource Regulator is responsible for ensuring mine operators manage the risk to worker health and safety though compliance with the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and the subordinate mining legislation. In particular the effective management of risk associated with the principal hazards as specified in the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

Mine Safety Operations have not identified any risk that would require comment in relation to this matter.

This comment is noted. Regis has an existing safety management system. This safety management system, which includes the management and consideration of risk, will be adapted as necessary to meet NSW requirements for both construction and operations.

4.6 Division of Resources and Geoscience

4.6.1 Resource sterilisation

The Division requests that the Proponent consider potential resource sterilisation should any future biodiversity offset areas be considered. The Proponent must consult with the Division and any holders of existing mining or exploration authorities that could be potentially affected by the proposed creation of any such biodiversity offsets, prior to creation occurring. This will ensure there is no consequent reduction in access to prospective land for mineral exploration or potential for the sterilisation of mineral and extractive resources.

As identified in Section 7.6 of the Biodiversity Assessment Report (BAR) included in Appendix N of the EIS, Regis has purchased a potential stewardship site approximately 3 km south-west of Blayney known as "Aziel". There are two exploration licences (EL) which interact with this site as detailed in Table 4.26. As shown in this table, one EL is held by Gold and Copper Resources Pty Ltd and the other by LFB Resources NL (Regis). Correspondence was sent to Gold and Copper Resources Pty Ltd by Regis on the 21 August 2019 to notify them of Regis' intention to use Aziel to meet part of the project's biodiversity offset requirements. Regis subsequently met with Gold and Copper Resources Pty Ltd in September 2019, who subsequently responded on 26 September 2019 (via email) to confirm that the area was not considered to be of high perspectivity.

Table 4.26 Exploration licences relevant to the potential stewardship site

Exploration licence	EL 8413	EL5922
Licence holder	Gold and Copper Resources Pty Ltd	LFB Resources NL
Grant date	2 December 2015	15 February 2002
Expiry date	2 December 2024	15 February 2024
Last renewal date	23 April 2019	4 May 2018

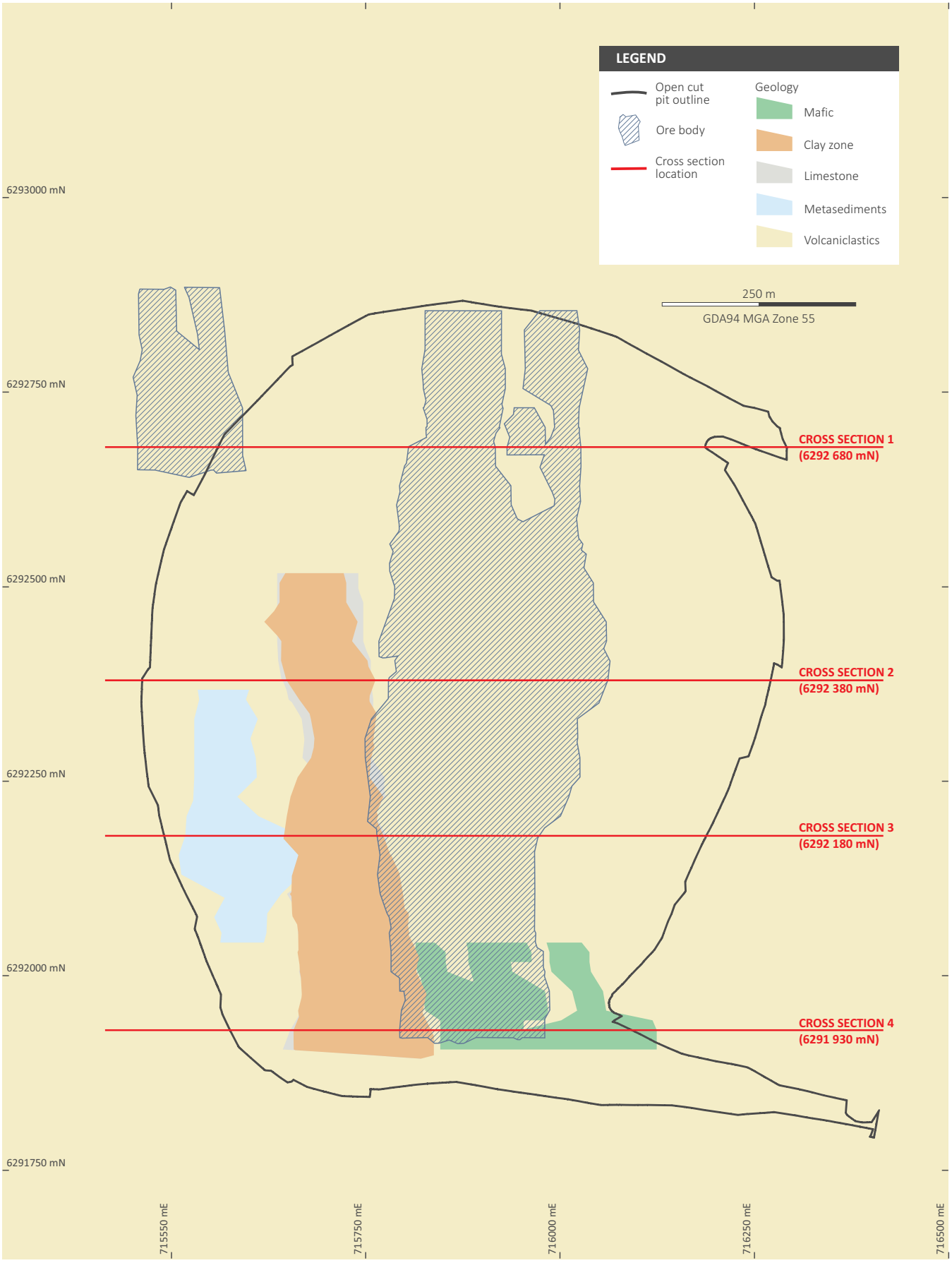
Regis will consult further with the DRG prior to the approval of the biodiversity offset strategy.

4.6.2 Project geology

The Division has no issues with the Proponents understanding of the Project geology.

However, the Division requests that a pit-scale geological plan and section be provided to the Division, which clearly shows the geological units in relation to the mineral resource.

A pit scale geological plan and cross sections are provided in Figure 4.23 and Figure 4.24 respectively.



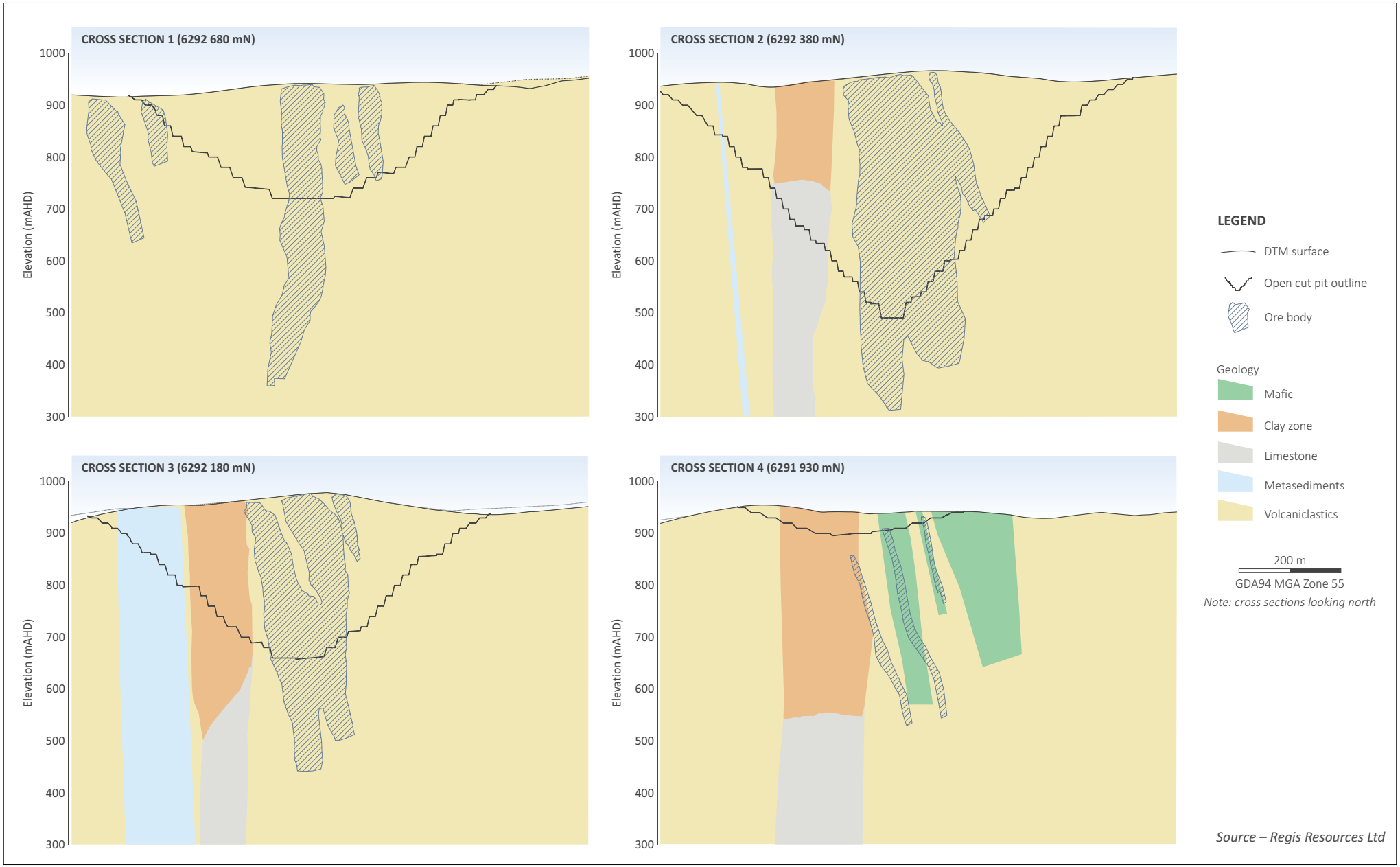
Source – Regis Resources Ltd

Pit-scale geological plan

McPhillamys Gold Project

Submissions report

Figure 4.23



Geological cross sections

McPhillamys Gold Project

Submissions report

Figure 4.24

4.6.3 Royalty calculation

One of the most important assumptions in the calculation of future royalty is the estimate of a future gold price over the life of a project. The Proponent has used a real gold price of US$1320 per ounce over the life of the Project and an exchange rate of US$0.75 to A$1.00 resulting in a price of A$1760 per ounce. The Division is of the opinion that these assumptions are reasonable.

Another important aspect of future royalty calculation for a proposed gold project is estimation of future annual production. The Proponent has estimated that around 1.73 Moz of gold would be able to be economically mined from the Project. The Division is of the opinion that this is a reasonable total based on a rigorous analysis of the geological information available.

Using the above parameters, the Division has calculated that the State will receive around A$91 million in current dollars, and around A$65 million in NPV terms (real discount rate of 7%) in royalty from the Project over its lifetime. At full production scale, the NSW Government would receive around A$11 million per year in royalties from the Project.

As noted by DRG, the economic assessment of the EIS project assumed a gold price and AUD:USD exchange rate of USD1,320 and 0.75, respectively. This was based on the average of a number of bank forecasts. Since that time, and since the DRG lodged their submission in late 2019 on the project, the forecast gold price has increased considerably.

Using the gold price that was adopted at the time the EIS was prepared (in mid 2019), the net social benefit of the amended project to NSW is estimated at $139M present value (at 7% discount rate) ($231M with employment benefits included) compared to $141M for the EIS project ($232M with employment benefits included). The net social benefit of the amended project to NSW is not materially different to the EIS project. However, with the recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be significantly greater than estimated. Conservatively applying the average annual January 2020 forecasts (ie gold price of USD1,485 and AUD:USD exchange rate of 0.71, which is pre-COVID 19), results in the net social benefit of the amended project increasing to $244M present value (at 7% discount rate) ($336M with employment benefits included). Subsequently, the royalties to be received by the State from the project are expected to be greater than that estimated in the EIS and quoted by the DRG.

4.7 Transport for NSW (formally Roads and Maritime Services)

4.7.1 Construction access

Roads and Maritime does not support the proposal to commence the first phase of construction via the existing Dungeon Road access. The new site access junction at the proposed (Option 4) location on the Mid Western Highway is to be designed and constructed to accommodate the largest vehicle accessing the intersection and include appropriate provision for access via emergency services. This access is to be constructed prior to any construction works commencing.

As outlined in the EIS and Amendment Report, Dungeon Road will be closed to public access approximately 550 m north of the Mid Western Highway following project approval. Construction traffic will initially access the mine development project area via Dungeon Road, anticipated to be for approximately the first three to six months of the project. Once the new site access is complete the Dungeon Road access could be formally closed in due course; however, access via locked gates would 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.

Extensive consultation has been carried out with TfNSW during the response to submissions phase of the project in relation to the use of Dungeon Road access as a preliminary construction access. A meeting with TfNSW and Blayney Shire Council was held at the mine development project area on Wednesday 18 March 2020 to discuss the revised site access and use of Dungeon Road as a preliminary construction access for approximately the first three to six months of the project while the construction of the new site access is carried out.

The existing turn treatments at the Dungeon Road / Mid Western Highway intersection are sufficient for predicted peak construction traffic and the existing intersection meets safe intersection site distances requirements. Notwithstanding, TfNSW expressed concern regarding the use of the intersection during construction due to inclement weather, namely fog, which frequents the area during the winter months. Subsequent email correspondence from TfNSW outlined that, subject to the outcomes of a road safety audit and SIDRA analysis of the Dungeon Road / Mid Western Highway intersection, use of Dungeon Road as a preliminary construction access prior to the construction of the new site access by approximately month 6 of the project, would be considered.

As outlined in Section 2 of the Traffic and Traffic Assessment Addendum (TTA Addendum) (Constructive Solutions 2020, included as Appendix Q of the Amendment Report), peak construction traffic movements will not occur until months 10 and 11 of the project, after the new site access has been commissioned. It should also be noted that during the first six months of the project, construction activities will be carried out during day time hours only. Peak development traffic predicted during the first four months (the expected construction time frame of the new site intersection) as well as for month 6 are shown in Table 4.27. Peak construction movements (in months 10 and 11) are also presented for information, noting that these numbers are considered to be conservative. Numbers presented in the table are one way movements accounting for both the inward and outward movements of a project traffic (ie peak number of vehicles accessing the mine development project area via the Dungeon Road in month 6 is expected to be around 115 including five heavy vehicles).

Table 4.27 Estimated peak construction vehicle movements

	Month 1	Month 2	Month 3	Month 4	Month 6	Months 10 & 11
Employee LVs and Minibuses	209	257	263	260	300	402
Light Vehicle Visitors/Deliveries	10	25	30	20	20	20
Heavy Vehicle Deliveries	5	20	20	10	10	10
Total Daily Vehicle Movements	224	302	313	290	330	432

At the request of TfNSW, the Dungeon Road intersection was analysed using SIDRA, an intersection performance simulation software package. SIDRA simulates the performance of an intersection based upon the traffic volumes of each turning movement, approach speed limits and geometric properties of the intersection. Modelling was undertaken for peak morning traffic between 5:30am to 6:30am when the majority of employees will be arriving to site during month 4 and also during month 6 in the event the construction of the new site access is delayed. The performance of the Dungeon Road / Mid Western Highway intersection for these scenarios returned the highest level of service with traffic flowing freely and with minimal delays for turning traffic.

The road safety audit carried out for the Dungeon Road / Mid Western Highway intersection in response to TfNSW requests identified 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 be mitigated by the following:

- It is estimated that 80% of the construction workforce traffic will originate from the west (Blayney). Therefore, only a small proportion of development traffic will be using the CHR(s) to turn right into Dungeon Road (a peak of approximately 33 vehicles during month 6).
- The majority (70%) of heavy vehicles deliveries are expected from the east (Bathurst). This equates to 14 heavy vehicle movements during months 2 and 3 of the project before reducing for the remainder of the construction period (refer Table 4.27 above). Therefore, it is predicted that there will be a peak (in months 1 and 2) of around seven heavy vehicles per day turning right into the mine development project area (less than one per hour).
- Construction traffic peak hour falls well before peak hour traffic on the Mid Western Highway (8.00 am to 9.00 am).
- 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.

As outlined in the TTA Addendum, the local area can receive heavy fog, particularly early in the morning during winter months. As outlined in the EIS, Regis will install fog activated flashing yellow lights (also known as wigwags) in conjunction with truck warning signs on the Mid Western Highway, in advance of the Dungeon Road / Mid Western Highway intersection (these signs will be relocated to the revised site access following commissioning of this access). In addition to the fog activated flashing lights, following consultation with TfNSW Regis will implement additional mitigation measures to mitigate the risk from inclement weather during use of the Dungeon Road / Mid Western Highway as follows:

- installation of Raised Reflective Pavement Markers (RRPMs);
- operational restrictions limiting HV 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 HV movements to daylight hours.

The road safety audit and SIDRA analysis carried out in the TTA Addendum demonstrates that subject to the implementation of the mitigation measures identified above, the existing Dungeon Road / Mid Western Highway intersection can safely accommodate the peak development traffic projected up until construction of the revised site access is completed.

Further to the above, Regis will upgrade and seal approximately 550 m of Dungeon Road from the Mid Western Highway intersection. This will reduce potential dust amenity impacts on two residences located off Dungeon Road and will improve access for these residences in the long term following closure of Dungeon Road to project related traffic. This section of Dungeon Road will be upgraded to Blayney Shire Council's Rural Collector standard in accordance with Council's Guidelines for Engineering Works.

4.7.2 New site access intersection design

Prior to the commencement of any construction work, a Channelised Right Turn Treatment (CHR) in accordance with Figure 7.7 Part 4A of Austroads Guide to Road Design (copy enclosed) and relevant Roads and Maritime supplements is to be provided at the proposed intersection with the Mid Western Highway. The intersection works are to be designed and constructed for a 100km/h posted speed zone and be able to accommodate the largest vehicle accessing the intersection.

Prior to commencement of any construction work, an Auxiliary Left turn treatment (AUL) as shown in Figure 8.4 Part 4A of Austroads Guide to Road Design (copy enclosed), and relevant Roads and Maritime supplements is to be provided at the proposed intersection with the Mid Western Highway. The intersection works are to be designed and constructed for a 100km/h posted speed zone and be able to accommodate the largest vehicle accessing the intersection.

Roads and Maritime advises the proponent that the Mid Western Highway is currently the subject of a road safety improvement investigation project. The scope of works resulting from this investigation is yet to be determined however the proposed site access may fall within the project scope and further detailed discussion will need to be undertaken between Roads and Maritime and the proponent regarding this matter. Features that may need to be incorporated and possibly undertaken as part of any required upgrade to the proposed access include:

- Wide centre line treatments.
- Continuous edge flexible barrier.
- Three metre wide sealed shoulders in front of where barriers are located and
- Where there is an adjacent through travel lane, two metre allowable shoulder adjacent to turning lanes.
- Audio tactile line marking.

Details of ancillary works are to be provided, including relocation of services, vegetation removal, transitions for drainage, batter slopes and any required road reserve acquisition.

Safe Intersection Sight Distance (SISD) requirements as outlined in the Austroads Guide to Road Design Part 4A and relevant Roads and Maritime supplements is to be provided and maintained in both directions at the intersection with the Mid Western Highway. For a 100km/h posted speed zone the minimum SISD is 262 metres.

The Walkom Road intersection and associated turning lanes will need to be accommodated for in the detailed design of the aforementioned treatments. Further discussion with Roads and Maritime and Council will need to be undertaken in this regard.

Roads and Maritime supports the provision of safety features including truck advance warning signage (sign W5-22 Size B) with distance plates under (W8-5 Size B) and vehicle or fog-activated wig wag lights on the highway approaches at least 300m from the site access intersection, with fail-safe operation. Roads and Maritime will work directly with the proponent as to the required specifications for installation.

Roads and Maritime support the initial first kilometre of the site access road from the Mid-Western Highway to be sealed with bitumen.

As outlined in Chapter 3, a new location for the main site access is proposed off the Mid Western Highway approximately 1 km east of the access presented in the EIS (refer to Figure 1.3). The revised site access has addressed issues raised in submissions and consultation with the local community, Blayney Shire Council and TfNSW and provides separation from the Walkom Road / Mid Western Highway intersection.

As noted in Section 4.7.1, a meeting with TfNSW representatives was held at the location of the revised site access on 18 March 2020 and subsequent development of the concept design for the access has been carried out in close consultation with TfNSW road designers and the TfNSW assessment team. As outlined in Section 4.7.1 above, consultation with TfNSW has subsequently indicated that preliminary site access via Dungeon Road may be accepted during the construction of the new site access pending the outcomes of a road safety audit and SIDRA analysis. These assessments have subsequently identified that subject to the implementation of the mitigation measures identified in Section 4.7.1, the existing Dungeon Road / Mid Western Highway intersection can safely accommodate the peak development traffic projected up until construction of the revised site access is completed (refer to Section 6.12 and Appendix Q of the Amendment Report).

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. Dimensional capacity at the intersection has been designed to cater for the turning movements of a 25m B-Double. Safe intersection sight distance at the revised location is greater than 350 m to the east and exceeds the minimum 262 m for a 100km/hr speed zone to the west.

An existing property access is located 50 m to the west of the proposed new access. Rather than use this existing access the proposed new intersection is located further east in order to provide separation from a curve on the Mid Western Highway to the west. The intersection configuration shortens an eastbound overtaking lane located immediately to the east but allows development traffic to commence accelerating up to speed with the provision of an eastbound acceleration lane.

It has been identified that an existing westbound acceleration lane to the east of the site does not comply with minimum length requirements. As this overtaking lane would be further shortened by the introduction of the channelised right hand turn lane, it has been agreed with TfNSW that this overtaking lane be removed.

An existing property access is located opposite the intersection. To improve safety of turning movements at this property access the following features have been incorporated in the concept design for the revised site access:

- the channelised right hand turn lane painted median west of the access has been lengthened to cater for a 19 m articulated vehicle to stop and turn right safety into the property clear of the eastbound travel lane; and

- a school bus stops to service this existing property both in the morning and afternoon. Therefore, a 3 m shoulder widening is provided to enable the school bus to pull off and stop clear of westbound traffic. Eastbound busses will be able to use the auxiliary left turn lane to decelerate and pull off onto the old highway alignment on the northern side of the Mid Western Highway.

As described in the EIS TTA, the local area, including Dungeon Road and the revised site access intersection, can receive heavy fog, particularly early in the morning when shift changeover times occur (noting that 24 hour operations are not proposed until after six months once the revised site intersection is commissioned).

Installation of fog activated flashing yellow lights (also known as wigwags) above truck warning signs on the Mid Western Highway, in advance of the intersections is therefore still proposed. Fog activated signs will be initially installed at Dungeon Road. The signs will then be permanently relocated to the revised site access once it is complete.

As described above, additional inclement weather mitigation measures proposed for the revised site access and Dungeon Road intersection include:

- installation of RRPMs;

- operational restrictions limiting HV 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 HV movements to daylight hours.

The proposed auxiliary turn lane treatments that exceed minimum requirements for the proposed revised site access will also mitigate the chance of rear end vehicular accidents as a result of vehicles waiting to turn into the mine project area in times of reduced visibility.

A concept design for the new site access is presented in Figure 6.48 of the Amendment Report and in the TTA addendum in Appendix Q of the Amendment Report. It is noted that the internal access road will be sealed to the gatehouse and inclusive of the gatehouse area (refer Figure 1.3); a length of approximately 1 km.

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 minor refinements to the internal road layout.

4.7.3 Property access

Details of closure of all existing accesses between properties that comprise the mine site and the Controlled Access Road (CAR) segment of highway are to be provided to Roads and Maritime prior to construction commencing. This is a condition of Roads and Maritime consenting to the new access to the CAR under Section 70 of the Roads Act 1993.

All existing accesses off the Mid Western Highway to the mine development project area will be closed following project approval, and all project related traffic will access the site via Dungeon Road and subsequently the revised site access once constructed. Existing accesses and the portion of Dungeon Road within the mine development project area which will be closed following commissioning of the revised site access will be gated and locked. Notwithstanding, access will be maintained via these entry points for emergency vehicles, environmental monitoring and mine inspections. Protocols around the use of these accesses will be formalised through the operational environmental management plan (OEMP) for the project, which will be made available to TfNSW.

To negate future issues with access rights (e.g. in relation to the Controlled Access Road) and servicing requirements, all lots that make up the mine site are required to be consolidated before the processing facility commences operation.

TfNSW's request to consolidate the lots making up the mine development project area has subsequently been discussed with TfNSW. It has been communicated to TfNSW that Regis does not intend to consolidate the lots that make up the mine development project area as this has the potential to restrict future land use options of the mine development project area post closure. Rather, as outlined above Regis will ensure all existing accesses to the mine development project area via the Mid Western Highway are locked and only used in the event of an emergency or for environmental monitoring and mine inspections.

Further, after the cessation mining (ie post-closure), access will be ensured to the various properties in the project area without creating additional accesses from the highway, as part of the closure planning for future uses.

4.7.4 Closure of Dungeon Road

If supported by Council, the procedure for permanently closing part of Dungeon Road is set out in Part 4 Division 3 of the Roads Act 1993, and Roads and Maritime is a notifiable authority.

The closure of Dungeon Road at the mine development project boundary, approximately 550 m north of the Mid Western Highway is supported by Blayney Shire Council (refer to Section 4.13.4), as the only access beyond this point is to service the mine development or property owned by Regis.

The partial closure of Dungeon Road will be carried out in accordance with Part 4 Division 3 of the *Roads Act 1993* and TfNSW will be notified in accordance with the *Roads Act 1993*.

4.7.5 Pipeline development crossings of rail corridor

Any works impacting a rail line or rail corridor require the relevant consent prior to works commencing.

Regis has carried out consultation with TfNSW and John Holland over the course of the development of the pipeline corridor route and concept design phase, in relation to the three rail crossings that will be required for the pipeline development. There are two crossings of the Main Western Railway and one crossing of the Wallerawang Gwabegar Railway Line. These crossings will be constructed via underboring. John Holland has confirmed that a licence (rather than an easement) will be required for these crossings.

TfNSW and John Holland will continue to be consulted through the detailed design of the pipeline development and development of detailed crossing designs for each rail crossing.

4.7.6 Classified road considerations

i Works Authorisation deed

The Mid Western Highway is a State road and the Developer will be required to undertake private financing and construction of works on a road in which Roads and Maritime has a statutory interest. A formal agreement in the form of a Works Authorisation Deed (WAD) is required between the Developer and Roads and Maritime prior to works commencing.

TfNSW and Regis have commenced the Works Authorisation Deed (WAD) process and a draft WAD has been drafted with the view of finalising the WAD prior to project approval.

ii Road Occupancy Licence

A Road Occupancy Licence (ROL) is required prior to any works commencing within three (3) metres of the travel lanes of a State classified road, or work that has potential to impact traffic flow such as the use of traffic control devices or signage. A Traffic Control Plan (TCP) is to be submitted as part of the ROL application. This is to be applied to include the proposed pipeline construction works as well as all other proposed works.

The requirement is noted. A construction traffic control plan will be submitted as part of the road occupancy licence application for construction work on the Mid Western Highway to construct the revised site access as well as pipeline development construction activities on classified roads.

iii Landscaping

Details on any proposed visual screening and or landscape plans and potential for impacts with the classified road are to be submitted and approved prior to being undertaken.

This requirement is noted and will be documented in the relevant management plans for the project.

iv Pipeline crossings

Where the pipe alignment is proposed along or crossing a classified road reserve:

- The pipeline is to be located as far from the carriageway as practicable to allow for future widening or upgrades. Crossings are to be made at or near 90 degrees to the road centreline, and at least 30 metres from road intersections, unless otherwise approved.
- For State roads, crossings are to be under bored a minimum of 1.2 metres with an outer encasing pipe. Design details are to be submitted and approved to the satisfaction of Roads and Maritime and relevant Council prior to any works commencing.
- For Regional classified roads, details of bored or trenched crossings are to be submitted and approved to the satisfaction of Roads and Maritime and relevant Council prior to any works commencing.
- Further detail is requested regarding any proposed pipeline crossings with Controlled Access Roads, under section 49 of the Roads Act 1993.

These requirements are noted and have been incorporated into the concept design for the pipeline development as amended. Detailed design of all road crossings (both trenched and underbored) will be carried out in consultation with TfNSW and the relevant council.

v Transmission line crossings

It is noted that any future proposal for electricity supply lines in connection with the development will require the concurrence of Roads and Maritime where they cross classified road reserves.

This requirement is noted. As outlined in the EIS and Amendment Report, approval for the power supply systems for the mine development and pumping station facilities will be sought under the EP&A Act. Consultation with TfNSW will be carried out for all classified road crossings as part of the approval process.

4.7.7 Traffic Management Plan

The consent holder shall implement a Traffic Management Plan (TMP), including a Construction Traffic Management Plan (CTMP), including a Driver Code of Conduct. Prior to commencement, the TMP is to be circulated for review and incorporate any requirements of Councils for their affected local roads and Roads and Maritime Services for affected classified roads.

The plan(s) shall include (but not be limited to):

- A commitment to the use of mine-operated buses and car-pooling during both construction and operation.
- An enforceable policy for staff and contractors to use Millthorpe Road (Blayney – Shadforth, a State classified road) in preference to Guyong Road where the journey is not unreasonably lengthened, as outlined in the approved Environmental Impact Statement (EIS).
- Heavy vehicle transport procedures in compliance with the requirements of the National Heavy Vehicle Regulator (NHVR) and codes for transport of hazardous materials.
- Details of origin, destination, quantity, size and frequency of heavy vehicles movements including water cart movements and Over Size Over Mass (OSOM) truck loads associated with the development and any special measures required accommodating these. This is to include the pipeline crossing as well as mine construction.
- Any OSOM will be the subject of a separate approval and relevant permits by the relevant consent authority(s).
- Fill generated by the pipeline construction is noted as requiring transportation offsite in some instances. This should be further quantified and routes identified in the CTMP.
- Potential for queuing was further noted, in particular pertaining to concrete pours. Roads and Maritime supports as part of the CTMP that mitigating measures to negate any impacts of queuing, in particular on public roads and where any rail crossings are located is to be further addressed.
- Restriction of traffic associated with construction of the pipeline to operate on public roads during daylight hours only.
- Procedures for addressing concerns raised by the community on project-related matters.
- Toolbox meetings to facilitate continuous improvement initiatives and incident awareness.
- Truckloads are to be covered at all times when being transported, to minimise dust and loss of material onto roads which may form a traffic hazard.
- Scheduling of heavy vehicle movements to occur outside of commuter peak periods, outside of school bus pick up and drop off locations is to be avoided, to avoid local events, and to minimise convoy or platoon lengths. Noting there are currently a number of school buses operating within proposed project locations consultation should be undertaken so as to avoid interactions.
- Procedures for heavy vehicle movements to mitigate the effects of local climatic conditions during all phases of the project (e.g. dust, heavy fog, wet weather, ice or snow).
- Measures to ensure responsible fatigue management and discourage driving under the influence of alcohol and/or drugs, dangers of mobile phone use, importance of driving to the conditions, and adherence to posted speed limits.

The above requirements are noted and the measures that Regis is committed to will be documented in the separate traffic management plans prepared for the mine development and pipeline developments. The above requirements have also been included in the updated mitigation measures for the project included in Appendix C of the Amendment Report. It is noted that in relation to vehicle movements to the mine development project area, Regis will investigate the use of mine-operated buses and will encourage workers to travel to the site via car-pooling.

4.8 Transport for NSW

4.8.1 Access to rail corridor for pipeline development

TfNSW advises that access to rail corridors will only be permitted by way of licence rather than an easement. Formal approval from the rail authority is required in relation to access to the rail corridors for carrying out the pipeline development.

The Applicant must consult with JHR during the Response to Submissions (RtS) stage to discuss the requirements for an infrastructure licence in relation to the works to be performed on the rail corridor and for the ongoing management and maintenance of the pipeline and decommissioning. The outcome of the discussion must be documented in the RtS report for acknowledgement.

As noted in Section 4.7.5 above, Regis has carried out consultation with TfNSW and John Holland over the course of the development of the pipeline corridor route and concept design phase in relation to the three rail crossings that will be required for the pipeline development. There are two crossings of the Main Western Railway and one crossing of the Wallerawang Gwabegar Railway Line. These crossings will be constructed via underboring. John Holland has confirmed that a licence (rather than an easement) will be required for these crossings.

TfNSW and John Holland will continue to be consulted through the detailed design of the pipeline development and development of detailed crossing designs for each rail crossing.

4.9 Department of Primary Industries - Fisheries

4.9.1 Objectives of the Fisheries Management Act 1994

For noting, the construction of large mines on the Belubula River is inconsistent with the objects of the Fisheries Management Act 1994 and several NSW Government Policies including the NSW Weirs Policy and the Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013).

A consideration of the project's consistency with objects of the *Fisheries Management Act 1994* (FM Act) is provided in Table 4.28 below.

Table 4.28 Objectives of the FM Act with reference to the project

Objective	Comment
1. The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.	The project is not considered to impact or constrain the conservation, development or sharing of fishery resources of NSW for the benefit of present and future generations (refer discussion below).
2. In particular, the objects of this Act include—	
(a) to conserve fish stocks and key fish habitats, and	Approximately 4.04 ha of generally poor condition key fish habitat will be removed as a result of the mine development (EMM 2020d). As outlined in the Aquatic Ecology Assessment Addendum (Appendix N of the Amendment Report), an ecology offsets package will be implemented in accordance with *Biodiversity Offsets Policy for Major Projects Fact sheet: Aquatic biodiversity* (DPI 2014). This offset strategy will focus on restoring degraded areas of key fish habitat within the mine project area downstream of the disturbance footprint.
(b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and	The Aquatic Ecology Assessment (Appendix O of the EIS) and Aquatic Ecology Assessment Addendum (Appendix N of the Amendment Report) found that the mine development project area did not contain suitable habitat to support threatened species, populations and ecological communities of fish.
(c) to promote ecologically sustainable development, including the conservation of biological diversity, and, consistently with those objects—	Consistent with the principles of ecological sustainable development (ESD), the project has been designed to avoid and minimise impacts where possible (refer Chapter 7 of the aquatic ecology addendum (Appendix N of the Amendment Report)).
(d) to promote viable commercial fishing and aquaculture industries, and	The project will not impact on the viability of existing commercial fishing or agricultural industries.
(e) to promote quality recreational fishing opportunities, and	Watercourses within the mine development project area does not support recreational fishing opportunities. The project will not impact on recreational fishing opportunities downstream of the mine development (ie in Carcoar Dam)
(f) to appropriately share fisheries resources between the users of those resources, and	The project will not impact on fisheries resources downstream of the project area (ie in Carcoar Dam)

Table 4.28 Objectives of the FM Act with reference to the project

Objective	Comment
(g) to provide social and economic benefits for the wider community of New South Wales, and	The project will provided considerable social and economic benefits for the wider community of NSW as outlined in Chapter 6
(h) to recognise the spiritual, social and customary significance to Aboriginal persons of fisheries resources and to protect, and promote the continuation of, Aboriginal cultural fishing.	Consultation with the Registered Aboriginal Parties has been undertaken regarding the significance of areas within the pipeline corridor and will continue throughout the preparation of relevant management plans.

As demonstrated above, the project is consistent with the objects of the FM Act.

4.9.2 Impact to aquatic ecology and aquatic offset policy

Aquatic Ecology Offset Package

The NSW Biodiversity Offsets Policy for Major Projects allows for both site based offsets to compensate for the loss of each aquatic habitat type or the payment of an amount to compensate for the value of the aquatic habitat being lost to be considered. The policy and guidelines require a minimum 2:1 offset for Type 1–3 key fish habitats to help redress both direct and indirect impacts of development.

DPI therefore requests the inclusion of consent conditions requiring the negotiation of an aquatic ecology offset package with DPI through the use of aquatic biodiversity offsets and/or supplementary measures to ensure a minimum 2:1 offset for approximately 1.8km of Type 1 highly sensitive Key Fish Habitat and 0.4km of Type 3 minimally sensitive Key Fish Habitat affected that is directly impacted by the disturbance footprint. Verification of the affected length of waterways of Type 1 and Type 3 key fish habitats within the disturbance footprint should be provided. In addition, it is unclear whether the footprint impedes Tributary A as per Figure 4.3 of Appendix O (Aquatic Ecology Assessment), as this figure differs to Figure 14.1 of the EIS Main Report.

The Aquatic Ecology Assessment also needs to identify and quantify the extent of Key Fish Habitat that has been isolated adjacent to the disturbance footprint, particularly Tributaries B in the south east, Tributary G in the north and the Belubula River in the north east for which fish passage is no longer available and assessment of fish passage trade-offs should be considered.

i Impacts of amended project on aquatic ecology

The EIS Aquatic Ecology Assessment (EMM 2019b) included as Appendix O of the EIS assessed loss of aquatic habitat as a result of the mine development component of the project. The Amendment Report Aquatic Ecology Assessment Addendum (EMM 2020d) (refer to Appendix N of the Amendment Report) assessed the revised disturbance footprint of the amended project and provided further information regarding the area of aquatic habitat that will be removed as part of the amended project and the proposed aquatic offset approach.

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.

As outlined in Appendix N of the Amendment Report, the EIS aquatic ecology assessment did not assess Tributary G due to a series of farm dams located on this Tributary, or sections or the Belubula River in the north-west of the mine development project area upstream of a large farm dam. In response to the DPI Fisheries submission, 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 of the Amendment Report). Accordingly, this has resulted in an additional watercourse (Tributary G) within the disturbance footprint being classified as key fish habitat compared to the EIS. However, it is noted that the amended mine development will avoid direct impacts on Tributary B due to the revised design of WMF6.

The Aquatic Ecology Addendum carried out spatial data analyses to further quantify the areas of key fish habitat within the disturbance footprint that will be removed by the amended project, as summarised in Table 4.29.

Table 4.29 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**

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.

ii Aquatic offsets policy

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 do not facilitate transport, mine development or closure stock watering requirements), including constructed soil dams, livestock dams, sediment alluviation, access tracks and blocked culverts.

4.9.3 Permanent clean water diversion channels

Final Landform - Permanent Clean Water Diversion Channels

There is minimal information regarding design objectives for the reinstatement of previously existing watercourses in the post mining landscape.

The post mining landscape should have waterways that have similar characteristics in terms of stream type, alignment (where possible), riparian zone width and longitudinal grade to the existing watercourses. Where existing watercourses are degraded, the reinstated watercourses in the post mining landscape should aim to improve on or at the very least maintain existing aquatic and riparian attributes.

The post-closure drainage system is detailed in Sections 2.12 and 6.16 of the Amendment Report. Further detail is provided in the Rehabilitation and Landscape Management Strategy Addendum (EMM 2020c) contained in Appendix T of the Amendment Report and the revised TSF design report (ATCW 2020) contained in Appendix D of the Amendment Report.

During the post closure phase of the project, it will not be possible to reinstate the reaches of the Belubula River and associated tributaries removed by the mine development due to the development of the TSF in the upper tributaries of the Belubula River valley. While it will not be possible to reinstate watercourses on the surface of the TSF (in order to maintain the integrity of the TSF capping), a final diversion structure will be constructed around the TSF that generally mimics natural geomorphological features consistent with appropriate reference reaches within the catchment and guided by Rutherford, Jerie & Marsh (2000) or current leading practice natural channel design guidance. This method will ensure that, where possible, constructed waterways will have similar characteristics in terms of stream type, alignment, riparian zone width and longitudinal grade to the existing watercourses.

The location of the southern end of the clean water diversion has been revised for the amended project to enable channel gradients more consistent with the natural gradients of the Belubula River. The diversion will be approximately 4.6 km in length with an average grade of approximately 1% with grades ranging between 0.5 and 2%.

The conceptual post closure drainage system is shown in Figure 4.5 in Section 4.1.2(iv) above.

The diversion will be fenced to exclude stock (other than the crossing point) and will be revegetated with appropriate riparian community species to form a riparian corridor along the diversion using the structural dominant species from the Mountain Gum-Manna Gum open forest of the South Eastern Highlands Bioregion PCT.

The stability and rehabilitation of the clean water diversion will be monitored in accordance with the methods described in Section 6 of the EIS Rehabilitation and Landscape Management Strategy using analogue sites, appropriate completion criteria and annual formal rehabilitation monitoring. The clean water diversion will not be considered and rehabilitated until it meets the agreed rehabilitation criteria.

4.10 Department of Primary Industries - Agriculture

4.10.1 Agricultural impact statement – mine development

DPI is also responsible for ensuring developments comply with the Strategic Regional Land Use Policy Guideline for AISs (Re-issued October 2012) and Agriculture Impact Statement (AIS) technical notes: A companion to the AIS guideline (April 2013). This part of the review has been informed by Section 2, 3, 4.1, 4.3 and 5 of the AIS technical notes. DPI advises that the applicant AIS does not satisfy the requirements for a socio-economic impact assessment. DPI recommends a revised assessment include the following:

- Section 2.4 Location and areas of land to be temporarily removed from agriculture – describe anticipated rehabilitation process that includes agricultural land restoration, and an indication of its availability for grazing.
- Section 4.1.4 Further Risks:
  - Biosecurity risks – implement a biosecurity risk section as part of the weed, pest and disease management plan
  - Pests and diseases - this be reported on as part of the annual reporting
  - Noise and vibration - Incidents to be recorded. Notifications of surrounding landholdings take place. Incidents that mimic lightning conditions can still create stress to horses/livestock.
- Section 4.1.2 Consequential productivity effects on agricultural enterprises:
  - address the proposed actions to restore agriculture, including land emplacement, pasture species and anticipated grazing availability (including productivity parameters that include stocking density) when developed.
- Section 4.1.5 Account for any physical movement of water away from agriculture:
  - Groundwater - Identify and seek agreement on a monitoring process as part of the WMP for the mine that considers the impacts on existing local water bores and spring flows, and inform community of any changes. What are the remedial actions should impacts be greater than those modelled?
  - Surface water - Monitoring required as part of the mine WMP. How will this impact on water availability from Carcoar impact on downstream users over each year? How will this inform agricultural water use availability?
- Section 4.3.1 Agricultural support services:
  - assess cumulative impacts in the longer term, considering other developments in the region.
- Section 4.3.1 Processing and other value adding industries, assess:
  - potential impacts on the throughput of the Central Tablelands Livestock Exchange;
  - potential impacts on other processing and value-adding industries in the region (or provide evidence that there are no such industries); and
  - cumulative impacts in the longer term, considering other developments in the region.
- Section 4.3.2 Visual amenity:
  - assess potential impacts of night lighting of the project area on The Beekeepers Inn.
- Section 4.3.2 Landscape values:
  - consider whether it would be reasonable to also offer Cottesbrook Honey access to apiary sites on Regis owned land.
- Section 4.3.2 Tourism infrastructure -substantiate why no noise or air quality impacts are anticipated at The Beekeepers Inn.
- Section 4.3.3 Local and regional employment impacts:
  - describe the "local labour recruitment practices and rates" that Regis will implement, including the percentage of recruitment to be drawn from the local agricultural workforce; and
- estimate potential impacts on agricultural support services, processing and other value-adding industries, and agricultural tourism enterprises, due to agricultural workers being employed by the project.

i Matters raised on the content of the AIS

The AIS prepared for the mine development (included as Appendix I to the EIS) has been updated to both reflect the amendments to the project, and to include the additional information requested by DPI-Agriculture. The AIS addendum is included as Appendix F to the Amendment Report, and a summary of the additional information requested is provided below. It is also noted that a separate AIS has been prepared for the pipeline development, which is included as Appendix V of the Amendment Report.

a Describe anticipated rehabilitation process that includes agricultural land restoration and an indication of its availability for grazing

A comprehensive Rehabilitation and Landscape Management Strategy for the project was prepared by EMM and included as Appendix U of the EIS. The strategy has been updated as a result of the amendments to the project and is included as Appendix T of the Amendment Report.

The proposed post mining land uses for the amended project are the same as those proposed in the EIS Rehabilitation and Landscape Management Strategy. As described in the EIS, a grazing land use is proposed across most of the rehabilitated mine development project area, with a woodland proposed over the waste rock emplacement. The final void will remain a void.

An addendum to the agricultural impact statement (AIS) has also been prepared as part of the Amendment Report (included as Appendix F of the Amendment Report). The AIS addendum provides an assessment of the impacts of the amended mine development on agricultural industries and resources and documents initiatives built into the amended project design to avoid and minimise agricultural impacts.

The carrying capacity post mining is discussed in Section 4.2.1 of the AIS addendum and the capacity to rehabilitate disturbed lands (including rehabilitation goals, completion criteria and contents of the rehabilitation plan) is discussed in Section 5.3 of the AIS addendum (Appendix F of the Amendment Report).

b Implement a biosecurity risk section as part of the weed, pest and disease management plan

It is acknowledged that the movement of machinery onto the mine development project area and associated increase in vehicle movements present an agricultural biosecurity risk as they could spread animal or plant material or diseases.

This risk will be managed by implementing appropriate machinery and vehicle washdown procedures and restricting unnecessary vehicle movements within the project area. As part of the weed management plan the project area will regular be monitored for the presence of previously unknown weeds.

A pest and weed management plan will be prepared for the project and will include:

- a weed and pathogen monitoring program to be implemented to minimise impacts to retained vegetation outside the disturbance footprint, but within the project area; and
- weed management and pest control programs to be undertaken in consultation with surrounding landholders and based on the results of the weed and pathogen monitoring program.

c Reporting of weeds and pests as part of annual reporting

Regis monitors properties for the presence of identified problem weeds and pests and implements appropriate control measures. Therefore, it is not anticipated that the project will result in an increased risk of pests or weeds.

Key outcomes of ongoing weed and pest management will be discussed as required in the project's annual environmental management reports (known as the Annual Review).

d Noise and vibration incidents to be recorded; notifications of surrounding landholdings take place; incidents that mimic lightning conditions can still create stress to horses/livestock.

The NVIA prepared for the EIS (MAC 2019) found that blast effects resulting from the mine development are predicted to be, at worst for overpressure up to 115dBZ, and for vibration between 0.1 mm/s and 1.3 mm/s. These levels are well below the regulatory criteria and considerably lower than other sources of overpressure that horses or livestock are likely to be already subjected to such as lightning strikes which are typically between 120dBZ and 130dBZ.

Further, as noted in Section 10.7.4 (noise) and Section 11.5.3 (air quality) of the EIS, blasting will be conducted in accordance with a blast management plan, which will include blast monitoring at various distances from the blast site and maintenance of a blast monitoring log. The blast management plan will also include:

- a notification procedure to notify nearby receivers prior to blasting events; and
- a complaints handling procedure to ensure queries relating to blasting are recorded and effectively responded to.

A noise management plan (NMP) will also be implemented to guide, manage, quantify and control noise emissions from the project. The NMP will detail the noise monitoring program and also a complaints handling procedure to ensure queries relating to noise are recorded and effectively responded to. The key features of the NMP are listed in Section 5.2.4 of the AIS addendum.

e Address the proposed actions to restore agriculture (including land emplacement, pasture species and anticipated grazing availability)

The carrying capacity post mining is discussed in Section 4.2.1 of the AIS addendum and the capacity to rehabilitate disturbed lands (including rehabilitation goals, completion criteria and contents of the rehabilitation plan) is discussed in Section 5.3 of the AIS addendum (included as Appendix F of the Amendment Report).

The proposed rehabilitation methods (ie soil management, establishment of vegetation, fauna and habitat enhancement measures, erosion and sediment control and post-closure maintenance) have not changed as a result of the amendments to the project and are the same as those proposed in the EIS Rehabilitation and Landscape Management Strategy (Chapter 5 of Appendix U of the EIS).

Vegetation species for rehabilitation purposes are anticipated to consist of:

- cover crop species for short-term erosion protection and weed suppression;
- introduced pasture species for stabilisation of the water storage facilities and TSF embankments, long-term soil stockpile protection and rehabilitation for grazing purposes;
- species that comprise the vegetation communities currently present within the project area (Broad-leaved Peppermint-Brittle Gum – Red Stringybark dry open forest, Yellow Box-Blakely's Red Gum grassy woodland and Mountain Gum-Manna Gum open forest species) for the pit amenity bund and waste rock emplacement; and
- riparian species for clean water diversions.

f Groundwater - identify and seek agreement on a monitoring process as part of the WMP, inform community of any changes and clarify what remedial actions will be implemented should impacts be greater than those modelled

The proposed groundwater monitoring approach is discussed in Section 6.4 and Appendix H of the Amendment Report. Groundwater monitoring (including levels and quality) has been conducted in the mine development project area 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).

The WMP for the project will document the proposed mitigation and management measures for the approved project and will include the surface and groundwater monitoring program, reporting requirements, spill management and response, water quality and level trigger levels, corrective actions, contingencies, and responsibilities for all management measures.

Two types of triggers will be defined for groundwater quality and quantity, the first will be a performance trigger and the second an early warning trigger (assigned, for example, as 75% of the performance 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 observed from model predicted heads. Triggers will also be assigned based on distance from the water affecting activity (ie TSF, open cut pit, etc) and will be based on a typical Source-Pathway-Receptor assessment approach.

Further information is provided in Section 4.4.7 and Section 5.2.2 of the AIS Addendum (Appendix F of the Amendment Report).

g Surface water - monitoring required as part of the mine water management plan, how this will impact on water availability from Carcoar, impacts on downstream users over each year and how this will inform agricultural water use availability

A water management system has been developed for the project comprising structures and associated operational procedures to manage:

- clean water (ie runoff from undisturbed or established rehabilitation areas);
- development/construction water (ie runoff from disturbed areas and unestablished rehabilitation which potentially contains elevated levels of sediment); and
- operational water (ie runoff from mining areas such as haul roads, the waste rock emplacement, hardstand areas and the open cut pit as well as imported pipeline supply water).

A temporary reduction in the inflow to Carcoar Dam (approximately 4% or 186 ML/year) will occur as a result of construction and operation of the mine. Permanently, following mine closure and rehabilitation, the reduction in 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.

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 for the project comprising baseline monitoring, operational monitoring and post closure monitoring. The water quality monitoring program for the 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, including:

- conducting additional monitoring (eg increase in monitoring frequency or additional sampling locations) to inform the proposed contingency measures;
- refinements to the water management system design such as additional sedimentation dams, increases to pumping capacity, installation of new structures as required to address the identified issue;
- the implementation of stream remediation measures and possible additional controls (eg rock armouring) to reduce the extent and effect of erosion; and/or
- the implementation of revegetation measures in conjunction with other stabilisation techniques (as required) to remediate impacts of vegetation loss due to erosion.

Further information is provided in Section 4.4.7 and Section 5.2.2 of the AIS Addendum (Appendix F of the Amendment Report).

h Agricultural support services - assess cumulative impacts in the longer term, considering other developments in the region

A number of other extractive industry/industrial developments occur in the broader region around the mine development project area (Section 37.3 of the EIS). However, based on the total area of land removed from agricultural grazing use as a result of the project, cumulative impacts on agricultural support services in the Blayney LGA are expected to be minimal.

i Potential impacts on the throughput of the Central Tablelands Livestock Exchange

The Central Tablelands Livestock Exchange is located 10 km south-west of Blayney and is the main livestock selling centre for the central tablelands area of Orange, Blayney, Bathurst, Oberon, Molong, Canowindra and Cowra. In 2018, there were 442,868 sheep and 163,993 cattle sold through the Central Tablelands Livestock Exchange. During mining, approximately 1,116 ha within the mine development project area will be removed from agricultural grazing use. Due to the large number of animals sold through the livestock exchange annually, the reduction in numbers sold caused by the removal of 1,116 ha from agricultural use, would be insignificant.

j Potential impacts on other processing and value-adding industries in the region (or provide evidence that there are no such industries)

The project's disturbance area accounts for less than 1% of the land currently used for agriculture in Blayney LGA. Consequently, there will only be a minor reduction in the demand for agriculture support services available in Blayney which include: machinery sales and service; farm supplies (animal health, seed, fertiliser, chemicals, fencing materials), stock and station agents, veterinary practices, agricultural consultants and professional services (legal and accountancy).

The economic impact assessment (Appendix DD of the EIS) found that the removal of grazing livestock from the disturbance footprint during the life of the project will be inconsequential to the regional economy and agricultural support industries.

k Processing and other value adding industries - assess cumulative impacts in the longer term, considering other developments in the region

Based on the total area of land removed from agricultural grazing use as a result of the project, cumulative impacts on processing and other value adding industries in the Blayney LGA are expected to be minimal.

l Assess potential impacts of night lighting of the project area on the Beekeepers Inn

Further assessment of the potential impact of lighting on bees has been included in Section 4.4.8 of the AIS addendum for the mine development (refer to Appendix F of the Amendment Report).

As described, views to the mine development project area from the Beekeepers Inn are contained by local topography and some screening from the Vittoria State Forest between the location and the project area northern boundary. Nonetheless, lighting protocols will be implemented and will adopt the following principles:

- operational protocols for setting up of mobile lighting plant will require lighting is directed away from external private receptors;
- lighting sources will be directed below the horizontal to minimise potential light spill;
- light systems will be designed to minimise wastage;
- screening of lighting will occur where possible, for viewers internal and external to the project; and
- lighting of light-coloured surfaces, which have greater reflectivity, will be avoided.

The mitigation measures listed in Section 19.9.4 of the EIS will help to reduce direct and indirect lighting impacts from the project.

m Consider offering Cottesbrook Honey access to apiary sites on Regis owned land

Regis has raised the option of Goldfields Honey and Cottesbrook Honey using alternate Regis-owned land (separate from the mine site) for their beehives, to ensure adequate access to pollen for the bees.

n Substantiate why no noise or air quality impacts are anticipated at The Beekeepers Inn

Due to the combination of a number of factors including distance, topography and weather conditions, no impacts relating to noise or air quality are anticipated at the Bee Keepers Inn. Predicted noise and dust levels at the property are well below government-set criteria (as detailed in the amended NVIA and amended AQIA, included in full in Appendix J and L respectively, of the Amendment Report). Therefore, adverse impacts on this business are not anticipated.

o Describe the 'local labour recruitment practices and rates' that Regis will implement (including the percentage of recruitment to be drawn from the local agricultural workforce)

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. Regis will support the local provision of education and training opportunities in the non-mining sector through initiatives established with local employment agencies and schools. Additional opportunities in the local area such as partnerships with NSW TAFE will also be investigated as project planning progresses.

p Estimate potential impacts on agricultural support services, processing and other value-adding industries and agricultural tourism enterprises (ie due to agricultural workers being employed by the project)

The social impact assessment (Appendix T of the EIS) considered the potential impacts of job creation on other sectors. There is a risk that the project could displace other economic sectors, particularly tourism, agriculture and government services, by taking up a sizeable portion of the employed and unemployed labour pool during both construction and operation, and through inflationary impacts on wages, trades and services. This impact is likely to be most significant during the construction phase due to the size of the project workforce. During this phase, the project is likely to draw on the labour pool associated with a range of trades including mechanics, electricians, welders and labourers.

People working in agriculture have transferable skills suitable to the mining industry and to the project. There is the potential for the project to attract workers from the agricultural sector, particularly from the younger age brackets (25-45 years).

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. Regis will support the local provision of education and training opportunities in the non-mining sector. Additional opportunities in the local area such as partnerships with NSW TAFE will be investigated as project planning progresses.

In addition, Regis will work with other developers (eg Newcrest Mining – as owners of Cadia Mine) and relevant stakeholders to coordinate activities and workforce management programs that minimise the cumulative impacts of temporary workforces on the community of Blayney and surrounds.

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

ii Mitigation measures

Section 5 Mitigation measures:

- Agricultural lands for the "rehabilitation plan", describe the proposed pasture species and grazing strategies, and present evidence that they can support sustainable grazing enterprises typical of the region at the proposed stocking rates; and
- Agricultural lands for the "water management plans", describe the intended content with specific reference to agricultural water use, including how management and mitigation measures would be agreed, developed, implemented, monitored and reported, and what mechanisms for dispute resolution with agricultural stakeholders would be put in place, including the role of the Community Consultative Committee in this process.
- Agricultural enterprises for the "Recruitment strategy", describe recruitment scenarios, including the percentage of recruitment to be drawn from the local agricultural workforce; and
- Agricultural enterprises for the "stakeholder engagement plan", describe the intended content with specific reference to agricultural enterprises, including how management and mitigation measures would be agreed, developed, implemented, monitored and reported, and what mechanisms for dispute resolution with agricultural stakeholders would be put in place, including the role of the Community Consultative Committee in this process.
- Agricultural infrastructure describe the intended content of the "transport management plan" with specific reference to agricultural-related traffic, including how management and mitigation measures would be agreed, developed, implemented, monitored and reported, and what mechanisms for dispute resolution with agricultural stakeholders would be put in place, including the role of the Community Consultative Committee in this process.
- Landform establishment and stability (active erosion aspect) - include an aerial assessment in addition to the ground assessment of active erosion.
- Performance indicators for the growth medium development - include water holding capacity and bulk density in addition to the chemical testing.

a Rehabilitation plan

A comprehensive Rehabilitation and Landscape Management Strategy for the project was prepared by EMM and is included as Appendix U of the EIS. The strategy has been updated as a result of the amendments to the project and is included as Appendix T of the Amendment Report. A summary is provided below. As described in the EIS, a grazing land use is proposed across most of the rehabilitated mine development project area, with a woodland proposed over the waste rock emplacement. The final void will remain a void.

The rehabilitation methods (ie soil management, establishment of vegetation, fauna and habitat enhancement measures, erosion and sediment control and post-closure maintenance) have not changed as a result of the amendments to the project and are the same as those proposed in the EIS Rehabilitation and Landscape Management Strategy (Chapter 5 of Appendix U of the EIS).

Vegetation species for rehabilitation purposes are anticipated to consist of:

- cover crop species for short-term erosion protection and weed suppression;
- introduced pasture species for stabilisation of the water storage facilities and TSF embankments, long-term soil stockpile protection and rehabilitation for grazing purposes;
- species that comprise the vegetation communities currently present within the project area (Broad-leaved Peppermint-Brittle Gum – Red Stringybark dry open forest, Yellow Box-Blakely's Red Gum grassy woodland and Mountain Gum-Manna Gum open forest species) for the pit amenity bund and waste rock emplacement; and

- riparian species for clean water diversions.

It is anticipated that the project's development consent and mining lease will require the preparation and approval of a MOP. The MOP will include objectives and criteria for rehabilitation, rehabilitation plans, risks to rehabilitation that need to be addressed, rehabilitation controls and methodologies and monitoring programs. A MOP is not required at this stage of the project as an ML has not been granted; however, the requirements of DRE (2013) have been addressed as part of the preparation of the EIS Rehabilitation and Landscape Management Strategy (Chapter 5 of Appendix U of the EIS). Accordingly, rehabilitation of the project area will be carried out generally in accordance with this strategy.

The rehabilitation criteria presented in Table 5.2 (common rehabilitation performance indicators and completion criteria), Table 5.3 (grazing rehabilitation performance indicators and completion criteria) and Table 5.4 (biodiversity rehabilitation performance indicators and completion criteria) of the EIS AIS have not changed as a result of the amendments to the project. These criteria address the following outcomes:

- restoration of a safe and stable landform that is non-polluting; and
- reinstate soil profiles and function and create landforms that are compatible with surrounding topography; and
- reestablishment of landforms that permit grazing, improved pasture and biodiversity outcomes.

The interim completion criteria will be updated during the preparation of a detailed rehabilitation plan, in consultation with relevant stakeholders. This will provide stakeholders an opportunity to review the proposed rehabilitation completion criteria and performance indicators in further detail. It is also noted that the final landform and rehabilitation strategy has been developed such that the final landform will support a post-mining land use of grazing, as described further in Section 4.5.2.

b Water management plan

WMPs will be developed for the project post-approval for both construction and operations. The WMPs will document the proposed mitigation and management measures for the approved project and will include the surface and groundwater monitoring program, reporting requirements, spill management and response, water quality trigger levels, corrective actions, contingencies, and responsibilities for all management measures.

The WMPs will be prepared in consultation with DPIE-Water, EPA and the Natural Resources Access Regulator (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 parameters;
- physical water take and pumping volumes between water storage structures (including the open cut pit);
- trigger levels for water quality parameters to assist in early identification of water quality trends (including TSF seepage migration);
- a trigger action response plan;

- an erosion and sediment control plan;
- groundwater quality performance and early warning triggers based on statistical analysis of the reported ranges in baseline concentrations of identified analytes of concern (eg pH, salinity concentrations, and concentrations of other analytes);
- groundwater 'quantity' (head) performance will be based on a combination of baseline head data for selected monitoring bores as well as comparison of observed and model predicted heads for different stages of mine development (operational and closure); and
- a program for reviewing and updating the numerical groundwater model as more data and information become available.

Further information on the WMPs is provided in Section 5.2.2 of the AIS addendum (Appendix F of the Amendment Report). It is noted that a copy of the WMP(s) will be made available to the CCC.

c Recruitment strategy

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.

d Stakeholder engagement plan

As discussed in Section 20.6 of the EIS, a stakeholder engagement plan will be developed prior to the commencement of construction to manage potential social impacts and support the realisation of opportunities across the project life. It is noted that a copy of the stakeholder engagement plan will be made available to the CCC.

In addition, the project's Near Neighbours Impact Management Framework defines a number of key actions that will be undertaken to manage predicted social impacts including:

- ongoing stakeholder engagement – ongoing engagement with the Kings Plains community and residents in relation to the progress of the project, the magnitude and extent of anticipated impacts and proposed management measures;
- property specific management plans – on request from residents, Regis will develop property specific management plans to address property owners' specific concerns relevant to the project; and
- maintenance of a community complaints and grievances system, with investigation, response and where required, management actions undertaken for all complaints.

e Transport management plan

A comprehensive transport management plan, including a driver's code of conduct, will be developed to control project-related traffic movements and driver behaviour within the project area and on the surrounding road network. This will include identification of preferred travel routes to and from the project area. The traffic management plan will encompass measures to ensure impacts on all road users, including users related to the agricultural industry, are effectively managed.

The transport management plan will be prepared in consultation with TfNSW and Blayney Shire Council and to the satisfaction of DPIE. This will provide these stakeholders an opportunity to review and provide comment on the proposed mitigation and management measures in greater detail following project determination. It is noted that a copy of the transport management plan will also be made available to the CCC.

f Landform establishment and stability

In response to feedback from DPI Agriculture, Regis will utilise aerial drone survey of rehabilitated landforms in additional to the ground-based methods described in the Rehabilitation and Landscape Management Strategy to identify and quantify any active erosion.

g Performance indicators for growth medium development

Minimum soil physical and chemical parameters to be tested were nominated in the Rehabilitation and Landscape Strategy for the EIS. In response to feedback from DPI Agriculture, Regis will include water holding capacity and bulk density to the soil testing regime as an indicator for growth medium development.

iii Consultation requirements

Section 6 Consultation:

- Future consultation should continue with landholders in the locality, with specific attention to complaint management and groundwater/surface water changes.

Further information on consultation since the public exhibition of the EIS is provided in Section 3.2 of this report, and in Chapter 6 of the AIS addendum (Appendix F of the Amendment Report). Regis intends to maintain open lines of communication with the local community throughout the assessment process, which will continue to include:

- distribution of updates via the project mailing list, project website, Community Consultative Committee and local print and electronic media (including Blayney Chronicle); and
- ongoing one on one meetings with neighbouring landholders.

As discussed in Section 20.6 of the EIS, a stakeholder engagement plan will be developed prior to the commencement of construction to manage potential social impacts and support the realisation of opportunities across the project life.

In addition, the project's Near Neighbours Impact Management Framework defines a number of key actions that will be undertaken to manage predicted social impacts, as described above in Section 4.10.1(ii)(d).

4.10.2 Agricultural impact statement – pipeline development

DPI notes that the applicant did not prepare an AIS on the pipeline development. The applicant justified this by stating that the development is outside the boundaries of the proposed mining lease application area for the project. However, the Secretary's Environmental Assessment Requirements (SEARs) at page 2 does not appear to warrant this claim. As such, DPI notes that the omission of the water supply pipeline from the AIS is a major deficiency; particularly the absence of assessments of the socio-economic impacts and the mitigation measures for minimising adverse impacts on agricultural resources from the pipeline traversing approximately 90 km of land primarily used for agriculture. In AIS Section 1.1 (p.12), it is stated that the potential impacts of the pipeline "on land and agricultural resources" are addressed in the main report of the EIS (see Part E, pp.557-689).

An Agricultural Impact Statement has been prepared for the pipeline development and is included in Appendix V of the Amendment Report.

4.10.3 Rehabilitation pipeline - development

DPI recommends that in relation to the rehabilitation process (page 94, 2.15.9 EIS) the process should also consider the stability of the area. Many of the soils that will be encountered during the pipeline's construction are erodible, for example they have sodic subsoils that are prone to tunnel erosion (as identified in Appendix W Soils Pipeline). As such, extra care and amelioration may be required in relation to the reinstatement of these soils as part of the process. Ideally specific soil analysis across the identified soil landscapes and landscape features will assist with identifying soil limitations across the site, 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 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 and Section 6.2 of the Amendment Report).

4.11 DPIE Crown lands

As mentioned in Section 3.3.10 of the EIS, an application for an easement across Crown land for the pipeline will be required to be submitted to the Department for assessment with some potential native title considerations.

This requirement is noted. As outlined in Section 3.3.10 of the EIS and Section 4.4.2 of Amendment Report, the pipeline development traverses some areas of Crown land, including waterways and several State forests where native title may exist.

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 *Native Title Act 1993* (Cth).

Consultation with DPIE Crown Lands has been ongoing and an application for a licence/easement across crown land for the pipeline development will be lodged in due course.

A number of Crown roads will require closing and purchasing.

This requirement is noted. As identified in Section 5.3.1 of the EIS, small areas of crown land (predominately crown road reserves) are located within the mine development project area.

Consultation is underway with DPIE Crown Lands regarding the closure and purchase of these Crown roads.

Part of the Crown waterway tributary for the Belubula River will also be impacted by the infrastructure and will also be required to be purchased by the Applicant.

Regis acknowledges it will need to progress the acquisition process with DPIE Crown Lands. This includes portion of Crown land within the mine development project area where native title cannot be shown to be extinguished has been identified. This has been communicated with DPIE Crown lands. This area is described as part of the Belubula River abutting the eastern boundary of Lot 1 in DP 1212978 to the centreline of the river. As outlined in Section 4.4.2 of the Amendment Report, this area will therefore be excised from MLA574, and an ancillary mining activity mining lease application (AMA MLA) will be lodged over the excluded area in accordance with the process under s 24MD(6B) of the *Native Title Act 1993*.

It is noted that there are Crown land parcels adjacent to the Project and have the potential to be impacted thus reducing their viability for tenure in the future. The Applicant is currently in discussion with the Department regarding the relevant Crown land.

This submission is noted. As discussed in Section 4.1, the clean water management system for the mine development has been updated to account for the revised layout of the TSF and is shown in Figure 4.1. Modelling of the performance of the clean water management system has determined that inundation of a Crown land parcel and a small portion of a Crown land road outside of the EIS mine development project boundary (Lot 7003 DP 1020650), immediately to the south of the Vittoria State Forest will occur from time to time. The maximum inundation level, based on the full historical climate record, is not simulated to exceed 954 m AHD. As described in Section 3.1 and shown in Figure 1.3, a small change to the mine development project area along the eastern boundary has been made (an additional 1 ha) to accommodate this inundation area.

Regis is consulting with DPIE Crown Lands regarding leasing or purchasing Lot 7003 DP 1020650. Regis is also in discussions with DPIE Crown Lands regarding the purchase or leasing of other Crown land parcels adjacent to the mine development project area, where the mine development may impact their viability for tenure in the future, namely Lot 153 DP750413 and Lot 157 DP705323 both located between the eastern boundary of the mine development project area and Pounds Lane.

4.12 DPIE - Hazards

4.12.1 Preliminary hazard analysis

It is understood that the PHA adopted an approach consistent with a Level 2 semi-quantitative risk analysis as per MLRA. This approach is considered appropriate, given the SSD is situated relatively remotely from significantly populated areas. However, further information as set out below should be request from the Applicant to:

- clarify the information provided in the PHA (ie EIS Appendix R);
- ensure that the PHA is prepared in accordance with the HIPAP 6; and
- verify that the SSD can comply with HIPAP 4.

Detailed responses to all of the DPIE-Hazards queries regarding the preliminary hazard analysis (PHA) are provided in *Responses to DPIE Queries for the McPhillamys Mine Proposal* prepared by AtomicDG (included as Appendix F) with information regarding TSF embankment stability prepared by ATCW (Appendix D of the Amendment Report). The PHA, which has prepared in accordance with HIPAP 6) has not been updated. The PHA confirmed that project can comply with HIPAP 4.

An updated summary of chemicals to be stored onsite is provided Table 4.30. This table is also presented in the updated project description contained in Appendix B of the Amendment Report. It is noted that the amount of process consumables are estimated indicative quantities, and the relatively minor changes in respective quantities to that reported in the EIS does not change the assessment of risk carried out in the PHA relating to storage of these materials.

Table 4.30 Process consumables stored onsite

Reagent	Storage (EIS Table 2.5)	Amended storage
Lime	~225 m^3 silo	No change
Sodium cyanide[1]	~33 tonnes bulk storage, ~145 m^3 storage tank and ~145 m^3 dissolution tank	No change
Sodium meta bi-sulphite (SMBS)	140m^3 storage tank	No change
Sodium hydroxide (NaOH)	30 m^3 storage tank	60 m^3
Hydrochloric acid	60 m^3 storage tank	30 m^3
Flocculant	3 m^3 silo and 350 m^3 storage tank	No change
Copper sulphate	45 m^3 storage tank and ~27 tonnes stored on site	No change
Activated carbon	500 kg bulk bag	No change
Gold fluxes including, borax, silica, soda ash and potassium nitrate	Stored in 25kg bags	No change
LPG	30 t bulk storage tank	6 x 3 kL tanks (9 t storage total)

1. Sodium cyanide will be delivered as solid and then sparged into storage tanks. It will not be stored as a solid on site.

The responses to all DPIE queries regarding the PHA are summarised below.

The Department of Planning (now DPIE) hazardous industry planning advisory papers (HIPAPs) provide a multi-level risk assessment process (DOP 2011a). The risk assessment process includes the following phases:

1. Development application stage (pre-approval):
    - PHA;
2. Design stage (post-approval):
    - Hazard and operability study;
    - Final hazard analysis;
    - Fire safety study;
3. Construction/commissioning:
    - Construction safety study;
4. Operational
    - Safety management system;
    - Emergency plan; and
    - Independent hazard audits.

The purpose of the PHA is to (DOP 2011a):

- identify all potential hazards associated with the proposal;
- analyse both their consequences (effects) on people and the environment, and their probability (likelihood or frequency) of occurrence;
- estimate the resultant risk to the surrounding land uses and environment; and
- ensure that the proposed safeguards are adequate, and thus demonstrate that the operation will not impose a level of risk which is intolerable with respect to its surroundings.

The PHA concluded (PHA Section 6.3):

> The PHA and associated risk assessment process conducted by the team was aligned with AS/NZS ISO 31000:2018 and MDG1010 Minerals Industry Safety and Health Risk Management Guideline (Department of Trade and Investment, 2011), Applying SEPP 33 and applicable HIPAP documents with the intention of identifying the key potential public health and injury issues for the Project. The PHA has found that the project does not represent an offensive or hazardous development. There are no potential loss scenarios with offsite consequences.

HIPAP 3 *Risk Assessment* (DOP 2011b) provides a summary of the objectives of the PHA as follows:

> The consent authority should be able, from the PHA and other relevant information, to assess whether the proposed development is capable of operation and is likely to be operated by the particular proponent in the particular location without unacceptable risk impacts.

The project will be designed to comply with Australian Standards applicable to the handling and storage of and hazardous materials. Dangerous goods will be transported in accordance with the Australian Code for the Transport of Dangerous Goods.

Further detailed hazard analysis will be completed post-approval as part of detailed project design. This will include a hazardous materials management plan that describes the measures that will be implemented to ensure the safe handling, storage and transportation of hazardous materials used onsite, and will document emergency procedures.

As described below, the information provided in Appendix F of this report and Appendix D of the Amendment Report (as summarised below), in combination with the information in the PHA, demonstrates that the project will not pose an unacceptable risk.

4.12.2 Dangerous goods storage

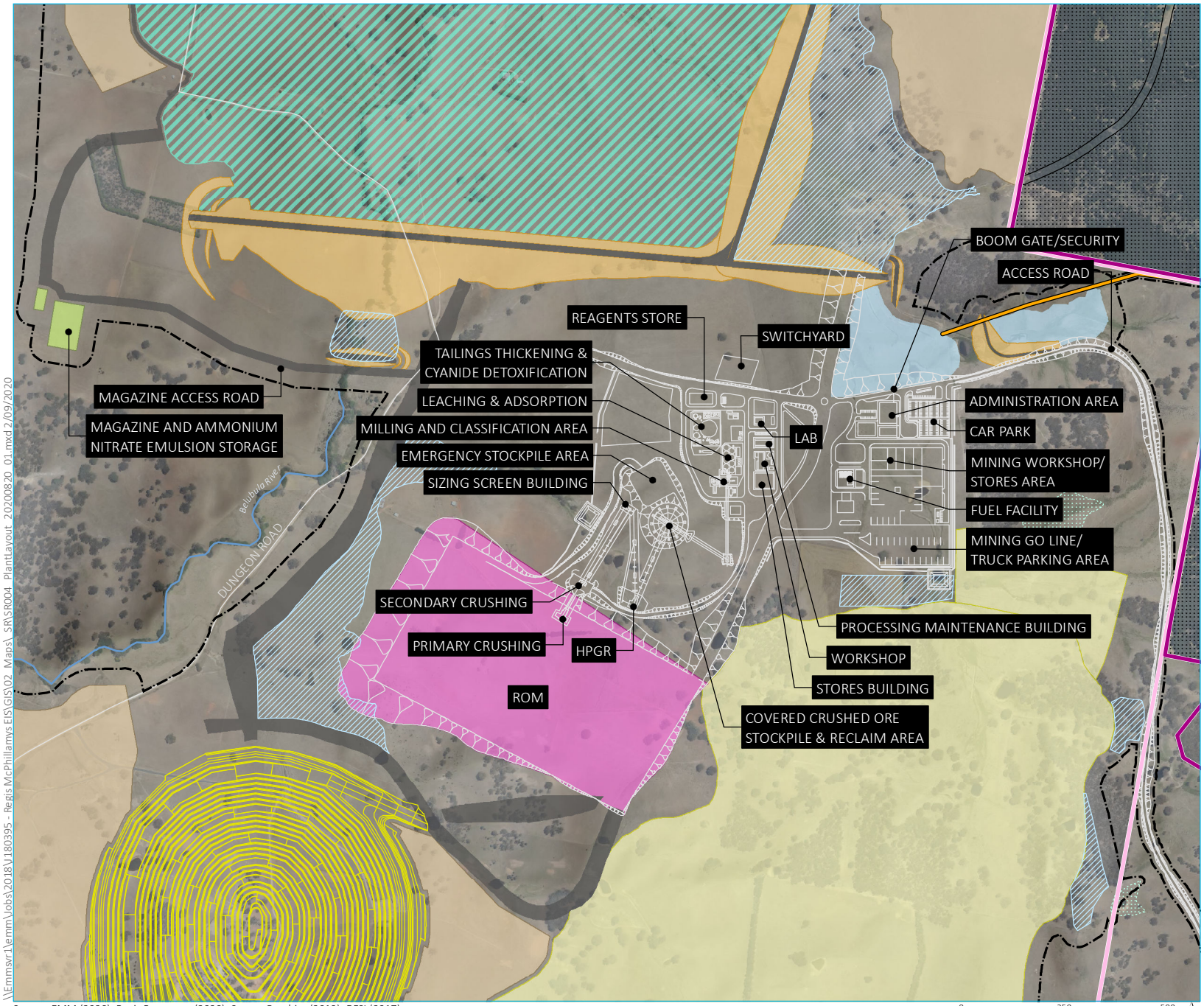
3. Provide a site layout diagram of the "magazine and ammonium nitrate emulsion storage" areas as shown in the EIS Figure 2.8, clearly showing:
   a) the location of each magazine and tank;
   b) the quantity of dangerous goods (DG) within each magazine and tank;
   c) separation distances between magazines, tanks and protected works as defined under AS 2187 and AIESG codes of practice; and
   d) how item 1c above can comply with all relevant Australia Standards and codes of practices for explosives and explosives precursors.
4. Provide a site layout diagram of the processing plant area as shown in EIS Figure 2.8, clearly showing:
   a) the location of all DG and hazardous chemicals (which may be non-DG, such as diesel) stores and tanks. "Reagents store", "reagent area" and "emergency stockpile area" are noted;
   b) the quantity of DG and hazardous chemicals with each store and tank;
   c) the separation distances between stores, tanks and protected works as defined under the relevant Australian Standards and consistent with relevant codes of practice; and

   how item above can comply with all relevant Australian Standards and relevant codes of practice.

i Magazine compound

The magazine compound will include an explosives magazine that will provide storage for all explosives (including primer/boosters and detonators), and the ammonium nitrate prill/ammonium nitrate emulsion (AN/ANE) store. These will be separated by greater than 59 m unless other engineered structures (eg earthen bunds) are constructed. The location of the magazine compound is shown in Figure 4.26.

The ammonium nitrate prill is referred to a ‘precursors’ as they need to be mixed with a fuel to form an explosive mixture (ammonium nitrate fuel oil, ANFO). The ANFO cannot be detonated using a standard detonator alone but requires a detonator to initiate an explosion in a primer that then initiates the explosion of the ANFO. Hence, the requirements for the two stores within the magazine.



KEY

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

Project general arrangement
- Open cut mine
- Site infrastructure
- Site access roads
- Magazine and ammonium nitrate emulsion storage
- Soil zone
- Embankments
- ROM pad
- Waste rock emplacement
- Tailings storage facility
- Water management facility - continuous storage
- Water management facility - infrequent storage
- Clean water facility

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

\\Emmsvr1\emm\Jobs\2018\I180395 - Regis McPhillamys EIS\GIS\02 Maps\ SR\SR004 PlantLayout 20200820 01.mxd 2/09/2020

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

0 250 500 m

GDA 1994 MGA Zone 55

N

Amended conceptual processing plant and administration area layout

McPhillamys Gold Project
Submissions report
Figure 4.25

REGIS RESOURCES LTD

EMM creating opportunities

The maximum quantities of the materials that will be stored in the magazine compound are provided in Table 4.31.

Table 4.31 Materials stored in the magazine and ammonium nitrate store

Item	Mass strength value[1]	Quantity (kg)	Adjusted net explosive quantity[2] (kg)
Explosives[3]	100%	36,000	36,000
Ammonium nitrate prill	32%	400,000	128,000
Ammonium nitrate emulsion	100%[4]	160,000	160,000

1. The mass strength value is the percent of the item's mass that is equivalent to a unit of TNT.
2. The adjusted net explosive quantity (NEQ) is the net explosive quantity of the item in equivalent kilograms of TNT. This is calculated by multiplying the raw quantity with the mass strength value.
3. Including primers, boosters and detonators.
4. Can be less than 100% as provided by the emulsion supplier but 100% assumed.

ii Store locations

A layout of the process plant area that shows all storage areas for dangerous goods is shown in Figure 4.26 with a detailed plan provided in Appendix F.

The separation distances between the magazine and the ammonium nitrate store and protected works defined under AS 2187 and AIESG codes of practice are provided in Appendix F. In summary, the required separation distances have been demonstrated to be met based on the current layout (for distances >400 m), or where required distances are small (<60 m) will be met during detailed design.

4.12.3 Explosives

5. In view of item 1 above, provide:
   a) the TNT-equivalency for precursors (ie ammonium nitrate emulsion, ANE), boosters and detonators;
   b) the quantity and type of explosive (TNT?) for estimating the worst case explosive impacts in PHA Section 4.3.2.1; and
   c) verification that suitable ANE quantities are included in item 2b above. Please note that ANE presents explosive risks, although classified as DG Class 5.1, conforming to UN 3375. From prior assessments of ANE plants, the Department understands that the TNT-equivalency for ANE could be as high as 68%.
6. In view of items 1 and 2 above, verify if the appropriate quantity and type of explosives have been considered in the PHA for assessing the explosives impacts. Particularly, verify if the explosive impacts would not significantly impact the tailings storage facility (ie structural damage causing loss of containment) and processing plant area (ie would not escalate beyond the worst case described in PHA Sections 4.2.3.2 (hydrogen cyanide) and 4.3.2.3 (flammable materials)). In addition, assessment with the HIPAP 4 Section 2.4.4 (environmental risk) must be included in the PHA with regards to risks to the tailings storage facility.

The PHA (see PHA Section 3.3) was based on the storage of:

- 1,000 tonnes of pre-cursors (ie ammonium nitrate or similar);
- 20 tonnes of boosters (mid-strength/high velocity of detonation (VOD) explosives); and
- 10 tonnes of detonators.

Therefore, it is proposed to store less explosives and AN/ANE than assessed in the PHA.

This has been amended to storing a total of 36 tonnes of explosives and 560 tonnes of AN/ANE on site (Table 4.31). The adjusted net explosive quantity (NEQ), of explosives will be 36 tonnes and of ammonium nitrate will be 288 tonnes on site (Table 4.31).

The exact types of explosives and proprietary forms of ammonium nitrate stored will depend on detailed blast designs and commercial contracts. However, the total NEQ will remain well within that assessed by the PHA.

The estimated blast overpressure resulting from an explosion of the material in the explosives magazine or ammonium nitrate store (when at capacity) at the following key site components is presented in Appendix F:

- mine process plant; and
- sodium cyanide and LPG tanks.

The explosives magazine and AN/ANE store will be designed to prevent an explosion propagating from one to the other.

The estimated blast overpressure at the mine process plant (5.5 kPa) and at the sodium cyanide and LPG tanks (5.12 kPa) is below the HIPAP4 level where irreparable damage to buildings is expected (14 kPa) and well below the level where failure of storage tanks is expected.

Section 2.6.6 of the *Tailings Storage Facility, Design Review and Response to Submissions Received in Relation to the Development Application and Associated EIS* prepared by ATCW (2020) specifically considered embankment stability from an explosion of the AN/ANE store. This found that a blast at the AN/ANE store would be directed to the downstream face while the upstream side of the embankment will be buttressed by tailings and would not result in movement of the embankment. The embankment crest will have a shear strength of 300 kPa at 1 m depth, ie, the full supply level. This is significantly greater than the estimated over blast pressure/force of 34 kPa (or 39 kPa estimated in Appendix F) acting on the embankment face.

4.12.4 Worst case scenario

7. considering separation distances between 14 tonnes of LPG and 240 tonnes of diesel (only quantities and not locations are indicated in PHA Table 2, and Sections 4.3.1 and 4.3.2.3), provide verification that the fire impacts as shown in PHA Figure 6 would not escalate beyond the worst case described in PHA Sections 4.2.3.2 (hydrogen cyanide) and 4.3.2.3 (flammable materials).

A layout of the process plant area that shows all storage areas is provided in Figure 4.25 in Section 4.11.2 above while a detailed plan is provided in Appendix F.

i Diesel/LPG

Diesel (a combustible liquid) will be stored in self-bunded tanks. The diesel tanks will have fire protection in accordance with AS1940:2017 - *The Storage and Handling of Flammable and Combustible Liquids*. Combustible liquids that are isolated from flammable liquids are generally omitted from fire safety studies as they are not credible “tanks on fire” risk.

The LPG site location, operational and fire protection requirements will meet AS1596:2014 - *The Storage and Handling of LP Gas.* This will include:

- designing pipes so that relief valves are directed away from tanks;
- separating tanks from accumulations of combustibles/vegetation;

- locating the LPG tanks such that if a boiling liquid, expanding vapour explosion (BLEVE) occurred, it would have to be preceded by a fire large enough to be noticed, ie it would be a “with warning” event – a “no warning” BLEVE (a large fire impinging on an LPG tank is not noticed) is unlikely.

- as credible causes of a “no warning” BLEVE include a vehicle impacting an LPG tank, providing traffic impact protection (including to the design of roadway near the LPG tanks) and implementing traffic management measures to prevent vehicle impacting with enough speed to puncture a tank and to prevent sharp edges of vehicles puncturing a tank at low speed.

Jet fires from leaking pipe joints or unseated relief valves are possible, but these have a lower heat flux.

ii Fire risk to sodium cyanide solution

The PHA considers the risk of a hydrogen cyanide gas plume being generated as a result of a theoretical scenario where sodium cyanide is exposed to an acid. It found “The complete extent of this plume is contained within the disturbance area and so cannot pose any threat to members of the public.”

As described in Appendix F, sodium cyanide will be stored as a solution in water. The fire/explosion hazard associated with the plume resulting from of sodium cyanide solution being exposed to a fire will be negligible compared the toxicity hazard from a plume of hydrogen cyanide gas described above.

4.13 Blayney Shire Council

4.13.1 Voluntary Planning Agreement

Should the project be approved, the mining extraction site and impact is completely within the Blayney Local Government Area. Council expects that a Voluntary Planning Agreement for the life of the project, would be successfully negotiated and agreed upon prior to the assessment process being completed.

Blayney Shire Council does not believe a VPA should include; Cabonne, Orange City or Bathurst Regional Councils. Cabonne, Orange and Bathurst will receive only benefits from this project, whereas Blayney Shire will receive 100% of the impact, potentially ongoing post mine closure.

The VPA proposed will likely be based on a % of total Capital Investment Value (CIV) and allocated to one off and annual contributions; as negotiated and agreed upon by Council and Regis Resources prior to public exhibition as required by the regulations.

Contributions could be allocated to community, sporting, environmental and local roads infrastructure projects identified in the various Blayney Shire strategic planning documents as determined by Council for the duration of the VPA.

Regis is currently negotiating a Voluntary Planning Agreement (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.

The VPA will be linked to the anticipated increase in demand on infrastructure and services of the mine development, which are only expected to occur predominantly in Blayney.

4.13.2 Workforce accommodation

As noted in the Social Impact Assessment (SIA), Blayney LGA does not have the capacity to meet the construction or even production workforce demands.

Mining production, whilst a significant economic driver will impact housing availability and affordability which Blayney has experienced with operations at Cadia Gold Mine. Council is cognisant of the inflated housing market that may result and the need to facilitate affordable and diverse options for people to relocate to the shire. Blayney and the villages have the capacity for additional population and the Community Strategic Plan recognises the need for sustainable growth.

Council notes the SIA does not propose a Mining Camp. Council supports the preference for supporting existing and new local accommodation options to encourage greater longer term and sustainable housing diversity and growth.

Council recommends that in addition to any VPA, that Regis Resources provide funding for an Accommodation Coordinator role.

As outlined in Chapter 20 of the EIS, prior to the commencement of construction, a detailed Construction Workforce Accommodation Strategy (CWAS) will be developed. The strategy will be prepared in consultation with Blayney Shire Council, Orange360, key accommodation providers and where necessary proponents of existing or new major projects in the Blayney LGA. The strategy will:

- demonstrate how the construction phase workforce will be accommodated across the local area;
- demonstrate how workforce accommodation requirements will be managed during periods of high demand, such as during key regional events like the Bathurst 1000;

- document the approach to informing accommodation providers of predicted project workforce accommodation demands including anticipated timing;
- enable the coordinated placement of the workforce in tourism accommodation throughout the local area; and
- keep key stakeholders informed of predicted project accommodation demands across the construction phase.

In addition to the CWAS, Regis will:

- focus on securing local contractors during the construction phase, to reduce the size of the NLH workforce;
- monitor local and regional housing market activity in the period prior to construction to inform the CWAS, and make changes to the workforce accommodation strategy as necessary to manage potential impacts;
- engage further with Orange360 and accommodation providers in Bathurst and Orange LGAs to confirm occupancy rates and availability in short-term accommodation options in these locations;
- manage workforce demands during periods of high regional accommodation demand, such as the Bathurst 1000, to free up short-term accommodation for the tourism industry sector;
- following commencement of operations, provide Orange360 with the long-term maintenance shutdown schedule for the mine, and where necessary ensure alignment of shutdown periods outside of periods of high accommodation demand eg Bathurst 1000;
- communicate with larger operating companies such as Purina and Cadia Mine to understand any expansion/reduction in services that may impact short-term accommodation availability in Blayney during the construction phase and take necessary action through the CWAS and in coordination with these companies to minimise any adverse impacts;
- undertake further engagement with Housing Plus and other relevant housing support services to identify suitable actions to offset potential short-term impacts on low to medium income households in the Blayney LGA; and
- establish joint meetings with representatives of other major projects or existing significant operations, such as Cadia Mine, in relation to any expansion work regarding management and monitoring cumulative impacts to the Blayney housing market.

Further to this, it is noted that an Accommodation Coordinator position in Orange360 is currently funded. Regis has committed to contributing to the ongoing funding of this role.

4.13.3 Transport – traffic management plan

The project if approved, will create a significant number of traffic movements particularly during the construction period. These movements have the potential to significantly impact on both the community and Council's local road network.

Council requests that should the project be approved a condition of consent is included requiring Regis Resources to:

- Develop a Transport Management Plan that requires all construction traffic and transport to only utilise the NSW State Road network, and also minimise transport movements during school zone times on roads adjoining; Blayney Public School, Blayney High School, St Joseph's Primary School Blayney and Millthorpe Public School.

As outlined, in the EIS and Amendment Reports, separate traffic management plans will be prepared for the mine development and pipeline development components of the project. The requirements specified in TfNSW's submission (refer to Section 4.7.7) have been incorporated into the updated mitigation measures for the project (refer Appendix C of the Amendment Report). The traffic management plan will contain provisions to ensure all heavy vehicle movement use the State and regional road network rather than local roads. Similarly, all contractors and subcontractors based in Orange and Cabonne will be contractually required to use the State and regional network.

Daily peak project related traffic is not expected to coincide with the peak travel times on the Mid Western Highway currently occurring between 8:00 am to 9:00 am and 4:00 pm to 5:00 pm or with school zone times.

4.13.4 Dungeon Road

i Closure of Dungeon Rd

The southern boundary of the Mine Development Project Area intersects with Dungeon Road approximately 550m north of the intersection with the Mid Western Highway, being the southern boundary of Lot 12 DP 531188 and Lot 14 DP562837. Blayney Shire Council in principle agrees to the partial closure of Dungeon Road from this point, as the only access beyond this point is to service the proposed development or property owned by the proponent.

Council notes access for local residents on Dungeon Road, south of the Mine Development Project Area will remain by public road as currently is the case.

Council notes that the disposal of this Council asset is subject to an agreed Purchase Price. Council propose that the formula approved will be the combined value of the Road Valuation plus Land Value. Land Value will be calculated on the median sale price for rural land in the district, undertaken by an independent Certified Practising Valuer.

- Council requests that should the proposal be approved a condition of consent be included requiring Regis Resources to undertake the following prior to construction:
  - Undertake the closure of Dungeon Road from 550m North of the intersection with the Mid Western Highway to the boundary between the Local Government Areas of Blayney and Cabonne.
  - Purchase the remaining portion of Dungeon Road (being from the Mine Development Project Area boundary at Ch.550m) to the Local Government Area boundary between Blayney and Cabonne, at the predetermined combined value of the Road Valuation as at June 2020 plus Land Value as per Independent Valuation from a Certified Practising Valuer.

Regis acknowledge and support the above requests. Negotiations relating to the closure of Dungeon Road have commenced with Blayney Shire Council. Further discussion on the closure of Dungeon Road is provided in the response to TfNSW (refer to Section 4.7).

ii Use of Dungeon Road during construction

There are 2 properties with dwellings in close proximity to the Mine Development Project Area off Dungeon Road. It is highly likely these 2 properties will be impacted by dust from increased traffic on Dungeon Road until the new mine access off the Mid Western Highway is constructed. To mitigate dust impacts on these 2 properties Council seeks that Dungeon Road is sealed for an extended distance (potentially 1,000m) north of the intersection with the Mid-Western Highway.

- Council requests that should the proposal be approved a condition of consent be included requiring Regis Resources to undertake the following prior to construction:
  - Upgrade a minimum 550m of Dungeon Road from the intersection with the Mid Western Highway to the Mine Development Project Area boundary to Council's Rural Collector standard, in accordance with Council's Guidelines for Engineering Works.
  - Seal Dungeon Road an extended distance (potentially 1,000m) north of the Mid-Western Highway intersection to reduce dust impacts on the properties at the Southern end of Dungeon Road or alternatively outline to the satisfaction of Council and the 2 residents how dust impacts will be mitigated during the main entrance contraction.
  - Prioritise the construction of the new main site access to the Mine Development Project Area, at the preferred location on the Mid-Western Highway to minimise traffic noise and dust impacts on existing residents on Dungeon Road.
- Council requests that upon commissioning of the new main site access to the Mine Development Project Area, a dilapidation report for the upgraded section (550m) of Dungeon Road be prepared in conjunction with Blayney Shire Council, and Regis Resources be required to make any repairs to the upgraded section to return it to Council's Rural Collector standard upon commissioning of the new main site access.

As noted in Section 4.7 above, Regis will prioritise the construction of the new site access as soon as possible following project approval (approximately by month 6) and have commenced the WAD process with TfNSW to facilitate timely approval of the WAD.

Regis will upgrade and seal approximately 550 m of Dungeon Road from the Mid Western Highway intersection. This will reduce potential dust amenity impacts on two residences located off Dungeon Road and will improve access for these residences in the long term following closure of Dungeon Road to project related traffic. This section of Dungeon Road will be upgraded to Blayney Shire Council's Rural Collector standard in accordance with Council's Guidelines for Engineering Works.

Subsequent consultation with Blayney Shire Council has determined it is not appropriate to extend sealing of Dungeon Road beyond the portion of Dungeon Road that will remain open following commission of the new site intersection. Accordingly, Regis will use alternative methods of dust suppression (ie a water cart) to manage dust impacts associated with the use of unsealed portions of Dungeon Road during the first six months of the project.

Regis agrees to carrying out a dilapidation report for the upgraded section of Dungeon Road be prepared in conjunction with Blayney Shire Council and agree to making any repairs to the upgraded section to return it to Council's Rural Collector standard upon commissioning of the new main site access.

4.13.5 Guyong and Vittoria Roads

Regis identify that 'the majority of traffic originating from the north-west (ie Orange) are anticipated to use Vittoria Road and Guyong Road' and 'Project related traffic represents a maximum of 18% increase above background traffic along Guyong Road (during Year 1 of the project)'.

Council remains concerned the EIS makes no specific reference to metrics on expected changes in traffic along Vittoria Road.

Council reiterates its request outlined earlier in the submission that if the project is approved that transport associated with the development primarily uses the NSW State Road network, during the construction phase. If this cannot be achieved or undertaken, a Road Safety Audit has been completed, which identified a small number of safety issues which could be undertaken to improve both Vittoria Road and Guyong Road and Council would request Regis fund the safety improvements.

Council's primary concern with the use of Guyong Road for mine traffic is the current poor alignment and lack of line marking as identified within the Audit. Council will undertake the line marking prior to construction, however still holds concerns with the alignment of Guyong Road. With the proposed increase in traffic, the risk of collision between vehicles will increase along Guyong Road.

If the project is approved, Council would seek to facilitate a joint grant application in the future for a major upgrade to Vittoria Road between the Mitchell Highway and Millthorpe village. Vittoria Road is already under significant pressure particularly being utilised by workers travelling to Newcrest's Cadia Valley Operations mine. The McPhillamys Gold Project would likely further accelerate the deterioration of Vittoria Road.

Council is not seeking Regis to fully fund a major upgrade to Vittoria Road, but is identifying as a key stakeholder expected to be a joint stakeholder, together with; Blayney Shire Council, Cabonne Council and Newcrest seeking to obtain NSW and/or Federal Government funding for a major upgrade to Vittoria Road.

- Council requests that Regis Resources be required to upgrade the final 3.8km of Guyong Road to ensure suitable curves are provided for the safety of all road users if the NSW road network is not primarily utilised during the construction phase of the development.

As outlined in the Chapter 17 of the EIS, project-related traffic on Guyong Road and Vittoria Road will consist only of workers travelling to the mine development project area who live adjacent to Vittoria Road and Guyong Roads or north-east of the project area. It is estimated that these movements will be approximately 11% of total project-related traffic movements. There will be no heavy vehicles on these roads.

To ensure that impacts to Guyong Road and Vittoria Road are minimised, a policy will be implemented by Regis that requires all workers that do not live adjacent to Vittoria Road and Guyong Road, or where an alternative route to the mine project area would take significantly longer, will be required to travel an alternate route to the mine project area. For example, from Orange, an alternative route with a similar travel time is available via Millthorpe Road to Blayney, then along the Mid Western Highway to the new access intersection.

The traffic management plan for the mine development will be prepared in consultation with TfNSW and local councils.

4.13.6 Noise and air quality

It is acknowledged by all parties that many of the residents at Kings Plains will potentially be living extremely close to the proposed mine. The mine development and earthworks required in the first few years will have an adverse impact and affect their quality of life that they currently enjoy. If the McPhillamys Gold Project is approved it is critical that the proponents support and work with each resident to develop individual solutions to mitigate the negative impacts on their lifestyles especially in regards to dust and noise.

While the EIS broadly concludes that the proposal will have impacts in regards to noise, dust and vibration, Council emphasises the importance of and Councils reliance on various NSW Government Agencies undertaking a robust assessment to ensure that the McPhillamys Gold Project would not have more than a minimal impact on Kings Plains residents.

Council also emphasises the importance to the Department that if approval is granted Council and the community are highly reliant on multiple NSW Government organisations to ensure the ongoing operational compliance of the mining operation.

i Noise

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 residence to the mine development project area have been achieved, primarily through optimisation of mobile equipment and the mining schedule as discussed in Section 6.5 and Appendix J of the Amendment Report.

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 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.

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 amended mine site access intersection (R15).

It is also 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). This takes the number of agreements being progressed by Regis to 20.

ii Air quality

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), the amended mine development 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 demonstrated compliance with applicable impact assessment criteria. The one exceedance predicted in the EIS in Year 4 is no longer forecast to occur.

4.13.7 Visual amenity

If the McPhillamys Gold Project is approved it is critical that the proponents support and work with each resident to develop individual solutions to mitigate the negative impacts on their lifestyles especially in regards to visual amenity.

Given that the project development area is located within a visually sensitive location, Council emphasizes the importance that the DPIE ensure that suitable controls and measures be implemented to ensure that any potential visual impact is minimized.

Negotiated agreements are being offered to those property owners within Kings Plains who will experience high visual amenity impacts from the mine development. 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.

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 effective at reducing potential visual amenity impacts.

4.13.8 Lighting

Whilst Blayney is 338km from the closest Dark Sky Park and distance is outside the 200km radius prescribed in The Dark Sky Planning Guideline (NSW DPIE, 2016) light pollution from Central Tablelands extractive industries at 800 metres above sea level has the potential to impact the night sky. The light pollution impact on Kings Plains residents given comparative dark skies, the night time glow may be significant if not addressed. It is anticipated that light pollution be minimised by appropriate mitigation measures, LED lighting and best practice fittings on plant, buildings and machinery.

Council requests that the project, if approved, ensures the impact of lighting is considered and addressed in accordance with industry best practice and Australian Standards.

Relative to the outcomes of the EIS visual impact assessment (VIA) (Appendix S of the EIS), the findings of the Amendment Report VIA in relation to direct lighting indicate that the revised mine schedule results in lowering of most direct lighting effects from night time operations on the southern and eastern face of the southern amenity bund. This is because all night time waste emplacement activities will occur in the northern portion of the waste emplacement prior to the completion of the southern amenity bund.

Diffuse lighting effects will be more widespread than direct lighting impacts due to the dome of the sky glow effect from the mine operations at night. Atmospheric conditions, such as dust and local seasonal fog will intermittently exacerbate this impact. Local natural and constructed topographic features ie ridgelines, hills and southern amenity bund may shield some of the light emitted from the sources along the line of sight of the observer. Accordingly, diffuse lighting impacts will be experienced in varying degrees. With the amended mine development there may be a slight increase in diffuse effects from operations within the infrastructure areas above the lowered pit bund as viewed from the south.

Lighting during construction and operation will comply with AS/NZS:4282:2019 *Control of the Obtrusive Effects of Outdoor Lighting*.

4.13.9 Natural environment

i Groundwater

While it is acknowledged that the mine project development area is within an area of low groundwater vulnerability, it must be acknowledged that the key risk to groundwater sources is contamination by leakage into the water table of pollutants.

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 (0.011-0.015 ML/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 average flows that represent 10,000 times the predicted seepage rate (around 289 ML/day during average climate conditions and 2.7 ML/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 therefore very slow with the majority of seepage being directed to the final pit void, 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.

ii Assessment of impacts

While the EIS broadly concludes that the proposal will have no serious or irreversible harm, Council emphasises the importance of the DPIE undertaking a robust assessment to ensure that the McPhillamys Gold Project would not have more than a minimal impact on the natural environment to both individual elements and the cumulative natural environment.

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 (refer Chapter 6).

4.13.10 Aboriginal Cultural Heritage and Historic Heritage

The EIS appears to contain a robust assessment of the potential impacts on Aboriginal Cultural Heritage and post European historic heritage, including proposed management measures.

Council emphasises the importance of the DPIE undertaking a robust assessment to ensure that the McPhillamys Gold Project would not have a detrimental impact on Aboriginal Cultural Heritage and post European historic heritage.

Additional Aboriginal cultural heritage and historic heritage assessments have been carried out to assess the changes of the amended project compared to the EIS design. Sections 6.10 and 6.11 of the Amendment Report provide a summary of the updated assessment and revised management measures for the mine development Aboriginal and Historical Cultural Heritage Assessment Addendum (Appendix O of the Amendment Report) and the Aboriginal Cultural Heritage and Historical Heritage Assessment Addendum for the Mine Access Road and Pipeline Options (Appendix P of the Amendment Report). Consultation has also been undertaken with the Registered Aboriginal parties, as described in Chapter 2 of Appendix 0.

4.13.11 Agriculture

While the Central West and Orana Regional Plan identifies that the mineral resources sector underpins many local economies and continues to drive growth, it articulates the sustainable management of mineral resources must consider and balance varying impacts to produce long-term economic, social and environmental outcomes.

In this regard, Council seeks to emphasise the importance of the DPIE ensuring that if the proposed McPhillamys Gold Project is to be approved, the impacts of a relatively short total project life do not disproportionally affect ongoing sustainable primary production in the immediate area.

As a result of the removal of land from agricultural production, the amended project is estimated to contribute to a decline in the gross value of agricultural production of approximately $361,706/yr during the life of the mine and $110,114/yr following rehabilitation. This equates to approximately 0.9% and 0.3%, respectively, of the total annual income from agricultural production within the Blayney LGA.

4.13.12 Post mine use, rehabilitation and closure strategy

Council does not accept nor endorse the default position for closure and rehabilitation strategy to be livestock grazing. There is an opportunity, given the infrastructure required for the mine project to provide Blayney Shire and the region with a long lasting positive economic legacy through identification and master planning of a suitable post mining land use.

- Council requests that should the project be approved a condition of consent requires the proponent; prior to any Rehabilitation and Closure Strategy and/or Rehabilitation and Closure Plan being approved, the proponent must demonstrate to the satisfaction of the Secretary of the NSW DPIE evidence that it has considered and investigated in partnership with Blayney Shire Council and other key NSW Government agencies the feasibility for alternate land uses that will utilise the site and associated infrastructure.

Regis acknowledges Council's request. 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, Blayney Shire Council, relevant stakeholders (including the nearby community) and applicable guidelines and standards at the time.

Further, it is recognised that due to the project-related infrastructure that will be available post-mining, there may be a number of possible alternative post-mining land uses, and these will be considered in consultation with relevant stakeholders as part of detailed mine closure planning.

4.13.13 Workforce strategy and local business

Council notes that if the project is approved the workforce strategy that is proposed by Regis is to have a recruitment program that maximise local employment with employment numbers averaging around 260 FTE during operations. Council supports this position to encourage increased employment opportunities within and for residents of the Shire.

If the project is approved, the management of mine closure is as important as the commencement. In this regard it is important, Council and the community are involved prior to closure to create a smooth transition for worker redeployment and ensuring other local businesses can adjust to the potential removal significant GDP which will no longer be in the region.

Blayney Shire Council would encourage Regis mining to adopt a program of continuous training for their workforce to make sure that all employees as far as possible have real transferable skills that they can use towards future employment after mining.

Regis committed to maintaining positive, long-term connections with the local community, which has been demonstrated through the project design process, commitments outlined throughout the EIS and community engagement undertaken to date, which will continue throughout the subsequent stages of the project.

Regis is committed to the employment of a majority local workforce. As noted in Section 2.12 of the EIS, the project will provide direct employment for up to:

- 590 workers at peak construction (for the mine development, noting there will be a further 120 totalling 710 when the pipeline is also at peak construction), with 55% anticipated to already reside in the local area (ie within a 1-hour commute of the mine project area, based on the investigation undertaken as part to the SIA into the existing skills of workers); 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 (ie within a 1-hour commute of the mine project area, again based on available skills).

The SIA included a detailed assessment of potential sources of workers for the project to develop an understanding of the availability of local workers on which the above numbers are based, and the impact that employment of these local workers may have on other business in the area.

Businesses that can provide the inputs to the production process required by the project and/or the products and services required by employees will directly benefit from the project by way of an increase in economic activity. Further, because of the inter-linkages between sectors, many indirect businesses will also benefit. A local procurement policy will be adopted, which will require local goods and services to be used in the project's construction and operation where possible, thereby maximising opportunities for local businesses.

The additional project-induced population is anticipated to introduce new and additional skills into the Blayney LGA which may support existing services and businesses and strengthen community cohesion.

As acknowledged in Section 6.2.9 of the SIA (Appendix T of the EIS), the project has the potential to adversely impact labour supply in the non-mining sector in the Blayney LGA by taking up a portion of the employed and unemployed labour pool during construction and operation. Regis will monitor local labour supply and adjust local labour recruitment practices and rates accordingly. In addition, Regis will support the local provision of education and training opportunities in the non-mining sector through community initiatives and will investigate additional opportunities (eg partnerships with TAFE NSW) as project planning progresses.

4.14 Cabonne Council

Council would be seeking to liaise with the proponent during design and construction phases, and during the life of the project, to ensure environmental protection of the surrounding area, and to represent any concerns of the Cabonne local residents, to ensure any such matters arising are addressed promptly and effectively (ie operational noise, dust, impact upon ground water, etc).

Regis will continue to liaise with Council during the detailed design, construction, operational and closure phases of the project. It is noted that a representative from Cabonne Council is part of the CCC.

4.14.1 Closure of Dungeon Road

Council notes that the proposal will impact Dungeon Road and will be seeking to liaise with the proponent on this matter, and any traffic generator impacts affecting Vittoria Road.

Council's submission is noted. As outlined in the Chapter 17 of the EIS, project-related traffic on Guyong Road and Vittoria Road will consist only of workers travelling to the mine project area who live adjacent to Vittoria Road and Guyong Roads or north-east of the project area. It is estimated that these movements will be approximately 11% of total project-related traffic movements.

To ensure that impacts to Guyong Road and Vittoria Road are minimised, a policy will be implemented by Regis that requires all workers that do not live adjacent to Vittoria Road and Guyong Road, or where an alternative route to the mine project area would take significantly longer, will be required to travel an alternate route to the mine project area. For example, from Orange, an alternative route with a similar travel time is available via Millthorpe Road to Blayney, then along the Mid Western Highway to the new access intersection.

The traffic management plan for the mine development will be prepared in consultation with TfNSW and local councils.

4.14.2 Hallwood Farm Complex

The EIS identifies a historic building in the vicinity of the proposed secondary water storage facility. The structure has not been identified in any of the council's heritage studies, in particular the 2003-2006 community based heritage study and the associated thematic study. The building appears to have been adapted and altered over time. Council requires that the structure and its curtilage be surveyed and photographically recorded, and a copy provided to council, prior to any construction work impacting the site.

As outlined in Section 4.4 above, impact to Hallwood has now been avoided through the redesign of the mine development's operational water management system and removal of the secondary WMF from the design. The AHCHA Addendum, contained as Appendix O of the Amendment Report, provides updated management measures for Hallwood in consideration that the amended project will avoid impacts on Hallwood and these have been included in the updated mitigation measures for the project contained in Appendix B of the Amendment Report. Archival recording will be carried out and a conservation management plan prepared for Hallwood. This management plan will be made available to council.

4.15 Orange City Council

4.15.1 Voluntary Planning Agreement

I encourage you to recognise the impacts this mine will have on those areas and to press for a fair and equitable VPA (voluntary planning agreement).

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.

Pretty Plains Road lies within the Orange LGA. I encourage decision makers to include conditions of consent that will make the applicant utilise regional roads rather than local roads such as this. If not, I would seek maintenance funding for this road as part of the approval conditions.

A Drivers' Code of Conduct will be prepared as part of the overarching traffic management plan for the project. This Drivers' Code of Conduct will be prepared in consultation with local councils (including Orange City Council) and will seek to regulate driver behaviour on the surrounding road network. This will include stipulating that drivers who do not live in the area of Pretty Plains Road are to use other regional roads.

As outlined in Section 17.4 of the EIS, workers travelling to the mine project area from the Orange and Cabonne LGAs will be encouraged to use Millthorpe Road to Blayney, then along the Mid Western Highway to the new site access intersection. Workers that do not live adjacent to Vittoria Road and Guyong Road or where an alternative route to the mine project area would take significantly longer, will be required to use an alternate route to the mine project area. Similarly, all contractors and subcontractors based in Orange and Cabonne will be contractually required to use the alternate route to the mine project area. Mini buses used to transport workers will also use this route.

4.16 Bathurst Regional Council

4.16.1 Traffic

In terms of the direct impacts associated with the proposed water pipeline, Bathurst Regional Council notes that this route traverses' public roads under Councils care and control. Appropriate conditions would need to be put in place during construction in these areas to limit disruption, environmental impact and restorations.

As outlined in Chapter 30 of the EIS, 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 comparatively small portion of the overall construction period.

A CTMP will be prepared prior to construction of the pipeline as part of the CEMP. A draft of the CTMP is set out in section 5 of the Pipeline Traffic Impact Assessment contained in Appendix BB of the EIS. The CTMP will identify management strategies to be adopted during the pipeline construction and will include the following factors for consideration:

- proposed work hours – including work hours that minimise disruption to road network;
- construction vehicle access route – establishing routes to the construction sites and any deficiencies that will impact the road network;
- vehicle diversion routes – detour routes implemented to maintain traffic flow in the unlikely event public roads will require temporary closure;
- traffic control for partial road closures – maximise safety by ensuring traffic control complies with best practice with vehicle movement, signage and warnings signs assessed;
- route maintenance – road network will be maintained to its pre-construction condition, and in accordance with the inventory to be documented with relevant agencies;
- construction staff parking – parking to be provided on-site and staff transported by group transport where possible;
- driver code of conduct and inductions – all drivers to adhere to the driver code of conduct and subcontractors are to be inducted with procedures for vehicles entering the construction areas;
- development of monitoring program – project manager on site to monitor and document the effectiveness of the CTMP; and
- communications strategy – notify and engage all stakeholders and landowners of traffic changes anticipated prior to works commencing.

The CTMP will be prepared in consultation with DPIE and TfNSW, as well as Lithgow, Bathurst and Blayney Shire Councils.

Further to the CTMP, a CEMP will be prepared which will outline environmental management measures to be implemented during construction.

4.16.2 Bathurst Copper Butterfly

The area around Yetholme is home to the Bathurst Copper Wing Butterfly being an Endangered Species. Populations of the Butterfly are known to occur near the corner of Sibleys and Yetholme Drive. Road corridors and disturbed areas present important areas of Bursaria, being the host plant of the butterfly. Particular care will need to be taken during construction to limit potential impact.

As outlined in Chapter 6 of the EIS, biodiversity assessments have been carried out in parallel with, and have informed the evolution of, the pipeline corridor design. The pipeline corridor was rerouted during the detailed project planning phase to avoid areas to the greatest extent possible, of the Bathurst Copper Butterfly host plant Blackthorn (*Bursaria spinosa* sub-species *lasiophylla*), which is used by the as a larval food. While host plants have been identified with the pipeline corridor, the pipeline disturbance footprint has been narrowed to avoid direct impacts.

The Amendment Report BDAR outlines key avoidance measures, including the commitment to avoid direct impacts by avoiding the known location of Bathurst Copper Butterfly host plants during detailed design, and by incorporating measures to control the introduction and spread of weeds and pest species in the CEMP.

4.16.3 Voluntary planning agreements

Council would anticipate being party to any proposed planning agreements.

Regis, in consultation with DPIE, is currently progressing a single 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. The VPA will be linked to the anticipated increase in demand on infrastructure and services of the mine development, which are only expected to occur predominantly in Blayney.

Due to the temporary nature of construction impacts on the Bathurst LGA during construction of the pipeline development ,which will be carried out over a one year period (in comparison to the overall 15 year project life of the mine development), Regis does not intend to progress a VPA with Bathurst Regional Council.

4.17 Lithgow City Council

4.17.1 Approval to carry out work within Council road reserve

The assessment covers issues of construction and rehabilitation in Council's road reserves. Actual permission to construct and any commercial arrangements (eg licence) will need to be discussed and agreed to separately with the proponent. Council would ask that this be reflected in the conditions of consent if the development is approved.

This requirement is noted. Further consultation with Council will be carried out during the detailed design of the pipeline development.

4.17.2 Portland Cemetery

The Portland Cemetery (Heritage Listed under Council's Local Environmental Plan 2014) is located directly adjacent to the proposed pipeline. There is the potential that the cemetery could be indirectly impacted upon during the construction process. Management and monitoring strategies shall be implemented and submitted to Council as to how the cemetery will be protected and monitored throughout the construction stage.

The pipeline corridor does not intersect the curtilages of Portland General Cemetery and there will be no ground disturbance impacts outside of the pipeline corridor. Potential indirect impacts on Portland General Cemetery will be managed through the CEMP. The CEMP will include a measure outlining that the Portland General Cemetery will be signposted as 'no go zones' all contractors will be made aware to avoid the site.

As described in the amended pipeline NVIA (refer to Appendix K of the Amendment Report), Portland Cemetery is adjacent to the pipeline corridor and within 25 m. If vibration generating equipment is to be used while the pipeline construction is adjacent to the cemetery, the safe working distance for the relevant plant item will be sought as outlined in the Construction Noise Strategy (Transport for NSW 2012). If there is no data pertaining to the type of equipment in use, then vibration monitoring will be undertaken while vibration generating works are within 50 m (twice the safe working distance for large vibratory roller) of the cemetery.

4.17.3 Emergency management

An emergency Management and Monitoring plan addressing the potential impacts such as leaks and breakages shall be prepared. The plan is to detail responsible parties, emergency contact details and noise and lighting impact mitigation. The plan is to be submitted to Council prior to the commencement of works on the pipeline.

During operation, isolation or section valves will isolate the pipeline into discreet sections and allow individual sections to be dewatered for maintenance, or to provide security in an event such as a pipe leak. Isolation valves will also be installed on either side of major watercourse crossings.

Fault detection systems will be incorporated within the pipeline design. If a pipeline leak occurs, the fault detection systems will shut down the water transfer and notify the operator that an inspection of the system is required. The maintenance team will undertake any repairs and will remain in the cleared pipeline easement to avoid disturbance to the natural environment.

Operation (opening) of the scour valves will allow dewatering of the pipeline for emergency repairs and maintenance. Dewatering will involve release of water to scour pits via the scour valves. Scour water will be transferred from the pits via a suction tanker truck and taken to the mine site or to an appropriately licensed wastewater treatment facility such as Bathurst Regional Council's sewage treatment plant or pumped to the nearest pumping station or the next appropriate pipeline section.

Operational management of the pipeline development, including emergency management and monitoring, will be incorporated into the overarching OEMP for the project.

Measures to address noise and lighting impacts during construction of the pipeline development will be contained in the CEMP.

4.17.4 Survey Plans

Prior to works commencing, the applicant is to submit to Council a survey plan as to the exact location of the pipeline. The plan is to include any potential services and infrastructure in the vicinity and the zone of influence from these services.

The requirement is noted, and Regis will submit the required survey plans to council when the pipeline is constructed.

4.17.5 Air quality

The applicant shall ensure that during construction works all measures are taken to eliminate/suppress any dust nuisance emanating from the pipeline project area. This includes an onsite sprinkler and/or water truck being available at all times during construction works. Trucks are to be covered with a tarp or other material that would prevent dust emissions when leaving the vicinity.

A risk assessment approach was applied to the assessment of potential air quality impacts of the pipeline construction using the United Kingdom-based Institute of Air Quality Management (IAQM) document *Guidance on the Assessment of Dust from Demolition and Construction* The assessment concluded that proposed mitigation measures will adequately control emissions and therefore the potential for dust related impacts from this temporary activity. The recommended measures outlined in council's submission are reflected in the existing mitigation measures for the project (Appendix C).

4.17.6 Traffic management plan

A fully certified traffic control plan and road works signage will be required where machinery may obstruct traffic on any Public Road whilst construction work is being undertaken. A traffic control plan and certification of fully qualified contractors/persons will be required to be submitted to Council prior to any work commencing. Failure to comply may result in Work Cover Intervention and may also include Council stopping all work immediately until such time the developer complies with suitable traffic management procedures.

As outlined in Section 4.16 above, a CTMP will be prepared prior to construction of the pipeline as part of the pipeline development CEMP. A draft of the CTMP is set out in section 5 of the Pipeline Traffic Impact Assessment contained in Appendix BB of the EIS. The CTMP will identify management strategies to be adopted during construction of the pipeline development. The CTMP will be prepared in consultation with DPIE and TfNSW, as well as Lithgow, Bathurst and Blayney Shire Councils.

4.17.7 Engineering requirements

i Maintenance bond

A maintenance bond, that is agreeable by both parties for the pipeline project, shall be paid to Council for any potential damage to Council's road reserve and infrastructure prior of commencement of work.

The requirement is noted.

ii Work-As-Executed plan

A "Work-As-Executed" (WAE) plan is required to be prepared by a Registered Surveyor or professional engineer and forwarded to Council. The WAE is to include, as a minimum:

- certification that all works have been completed generally in accordance with the approved plans and specification;
- any departure from the approved plans;
- any additional/deleted work;
- the location of conduits, subsoil lines, stub mains and inter-allotment drainage lines;
- pipeline long sections showing the constructed invert levels of each pipe at each pit and pipe dimensions;
- details of overland flow provisions;
- site regrading areas by new contours; and
- all other details which have a bearing on the extent of works and their acceptance by Council.

This requirement is noted.

iii Soil and rehabilitation

The applicant shall submit a soil erosion and sedimentation control plan with the engineering design for Council approval. Such shall address both short and long term management of all disturbed areas and specified methods and structures to be employed to minimise any impact.

All fill for the trenches shall be clean material; no foreign building materials or contamination of the soil will be permissible for the filling of this land or access creation. Contamination testing maybe required to be submitted to Council for assessment and approval.

All filled areas must be compacted to a minimum 95% standard, with certification from a NATA registered laboratory.

Any excess fill waste shall be removed from the site and disposed of at an appropriately licensed facility. No earthworks will be permitted to be taken to any other property or location without prior approval from Council.

A Rehabilitation Management Plan is to be submitted to Council prior to any works commencing within Council's Road Reserves.

The above requirements are noted and will be incorporated into the pipeline development CEMP as appropriate.

iv Draft Lithgow Roadside Vegetation Management Plan

All works within the public road reserves shall take place having regard to the Draft Lithgow Roadside Vegetation Management Plan dated 1 May 2019.

This requirement is noted and will be incorporated into the pipeline development CEMP.

4.17.8 Pipeline development decommissioning

What happens in 15 years time to the pipeline? Will it be removed and rehabilitated or will it be used by others

As outlined in Section 2.16 of the EIS, it is anticipated that the pipeline will remain in the ground at the end of the mine operating period. 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. At the end of the mine life, the pipeline development will be prepared for long term (mothball) shutdown. The above ground components will be removed, if after a reasonable time period, no additional users for the water or pipeline are identified.

The ultimate removal or otherwise of the pipeline will be confirmed as part of the preparation of the detailed closure plan for the project, which will be prepared within five years of mine closure, and in consultation with key stakeholders.

4.17.9 Pipeline water supply

Council would also like an information session from Centennial Coal outlining the water issues and the sources for this development.

This requirement is noted and has been communicated to Centennial Coal. As outlined in Section 2.14 of the EIS, the water to be pumped to the mine development via the pipeline will originate from the following three sources:

1. surplus groundwater at Angus Place which is currently discharged by Centennial into the Coxs River via licensed discharge point LDP001;

2. water at SCSO that is currently discharged by Centennial via licensed discharge point LDP006 into Wangcol Creek; and

3. water from the existing Blowdown Pond 1 (Blowdown Pond) at MPPS originating from the new Springvale water treatment plant (SSD 7592) and MPPS cooling towers. This water will be pumped from the existing Blowdown Pond at MPPS to the Regis pumping station facility No.3.

From each of these three sources, water will be pumped to storage tanks (approximately 750 kL) at each of the Regis pumping station facilities at Angus Place, SCSO, and MPPS.

4.18 Forestry Corporation of NSW

4.18.1 Bushfire

FCNSW requests to be consulted on part of the (pipeline development) CEMP that addresses bushfire management.

FCNSW requests to be included in notification of any accidental ignition (following notification to RFS and FRNSW). FCNSW also request to be consulted for the Bushfire Management Plan.

These requests are acknowledged and have been included in the updated mitigation measures table contained in Appendix C of the Amendment Report.

4.18.2 Clean water diversion system

Appendix J [of the EIS] addresses flooding in relation to the mine and states "The proposed clean water diversion dams are the most notable area where inundation of land will increase during the operational period of the mine development...". As several dams are proposed on the boundary with Vittoria State forest, FCNSW would like to see modelling of the inundation area to determine the potential effects on the plantation and further discuss inundation management.

The clean water management system for the mine development has been updated to account for the revised layout of the TSF and is shown in Figure 4.1 in Section 4.1 above.

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. 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. The maximum extent of modelled inundation is shown in Figure 4.1. As described in Section 3.1 and shown in Figure 1.3, a small change to the mine development project area along the eastern boundary has been made (an additional 1 ha) to accommodate this inundation area.

4.18.3 Aboriginal heritage

FCNSW requests to be notified of the outcome of final artefact location for those previously within State forest following the construction of the pipeline.

This request is acknowledged and has been added to the mitigation measures outlined in Section 6.10.2 of the Amendment Report and the updated mitigation measures table for the project contained in Appendix C of the Amendment Report.

4.19 WaterNSW

WaterNSW has reviewed the EIS and considers the proposed development is likely to have a negligible impact on water quality within Sydney drinking water catchment and WaterNSW lands, assets and infrastructure, provided that appropriate mitigation measures are incorporated into the design, construction, and operations and implemented.

This submission is noted. The pipeline development water assessment contained as Appendix X of the EIS found no residual surface water quality impacts are expected as a result of the construction and operation of the pipeline development.

WaterNSW requests to remain as a stakeholder for the proposal and any updates to relevant plans. WaterNSW would also appreciate being notified when the application has been determined.

WaterNSW requests that the following documents are prepared in consultation with WaterNSW:

- the consequence assessment of the tailing dams in accordance with the NSW Dams Safety Committee guidance notes;
- the construction stage erosion and sediment control plan of the section of mine water transfer pipeline within Sydney drinking water catchment;
- the pipeline WMP; and
- the rehabilitation plan of the pipeline corridor.

The above requests are noted and have been included in the updated mitigation table for the project contained in Appendix C of the Amendment Report.

4.20 NSW Rural Fire Service

4.20.1 Emergency and bushfire management

1. An Emergency Management and Operations Plan is to be prepared and shall identify all relevant risks and mitigation measures associated with the construction and operation of the facility. a copy of the Plan shall be provide to the local NSW RFS Fire Control Centre and shall include the following:
   - detailed measures to prevent or mitigate fires igniting;
   - work that should not be carried out during total fire bans;
   - availability of fire-suppression equipment, access and water supply points;
   - storage and maintenance of fuels and other flammable materials;
   - notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation, proposed to be carried out during a bush-fire fire danger period, to ensure weather conditions are appropriate;
   - appropriate bush fire emergency management and evacuation planning;
   - site access points and internal road network.
2. A Bush Fire Emergency Management and Evacuation Plan shall be prepared for the facility by an appropriately qualified and experienced person, and shall be consistent with the guidelines, Development Planning - A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan December 2014.
3. All internal roads shall be shown on the Emergency Management and Operations Plan.

Section 5.8.2 of the Bushfire risk and hazard assessment prepared for the EIS (Appendix EE) outlined what will be included in the Emergency Response Plan (ERP) for the mine development. Section 5.8.2 of Appendix EE is reproduced below. As shown, NSW Rural Fire Service (RFS)'s requirements above have generally been captured in Appendix EE, the mitigation measures in Appendix C the Amendment Report have been updated to explicitly address the above requirements.

The ERP will address all requirements as detailed in the development consent, and may include:

- requirements for pre-bushfire season and continual fire awareness of staff and contractors;
- requirements for immediate notification to the local RFS and Fire and Rescue NSW (FRNSW) of accidental ignition of surrounding grassland;
- the appropriate risk control measures that would need to be implemented in order to safely mitigate potential risks to the health and safety of fire fighters and other first responders (eg first attack fire-fighting operations by project staff members);
- the circumstances under which different evacuation types are to be implemented, in response to a bushfire or fire emergency;
- a mechanism for the early relocation of staff in the event of a bushfire in the locality, noting that on days of catastrophic fire weather, RFS recommends leaving early as the only safe option;
- detailed plans of all Emergency Assembly Areas including 'on-site' and 'off-site' arrangements;
- requirements for appropriate on-site refuge area signage and communications;

- details of infrastructure layout that show all relevant information (ie access points, fences, locked gates, water supply, areas of electrical hazard);
- transportation arrangements (eg number of vehicles required), designated assembly points and time required to have transportation available;
- the specific structure and role of emergency control on-site (eg fire wardens) - relevant staff will require training consistent with their responsibilities within the emergency control organisational structure and with the equipment provided;
- the requirements for training in preparation for response to an emergency, including trial emergency evacuations;
- the requirements for clarifying a safe egress route and an understanding of the extent/spread of local fires before allowing the evacuating persons to leave the site;
- the requirements for egress and communication in the scenario that persons are leaving the project as emergency services are attending;
- mechanisms for communication with RFS and FRNSW on suitable egress routes and an understanding of the impacts that the egress of high numbers of project staff may have on the local road network and the local community's ability to safely egress from the locality; and

During the preparation of the ERP, Regis or its contractors will make contact with:

- the relevant local emergency management officer (LEMO) and local emergency management committee (LEMC), via Blayney Shire Council. This is required to proactively develop a comprehensive inter-agency local emergency procedure for the project;
- Kings Plains RFS; and
- liaise with Canobolas Bushfire Management Committee (BFMC) in regard to the Canobolas Bushfire Regional Management Plan (BFRMP) to ensure that the project is incorporated into future risk management plans.

Copies of the ERP for the project should be provided to RFS, FRNSW, the LEMO/ LEMC and the Canobolas BFMC for information prior to commencement of construction. Any subsequent versions of the ERP, as a result of updates to the plan (as a minimum on a yearly basis), should be re-issued to the agencies and committees.

4.20.2 Defendable space

4. From the start of works, a minimum 10 metre APZ shall be provided around any building / infrastructure, and shall be managed as an inner protection area (IPA).

   The IPA shall comprise:

   – Minimal fine fuel at ground level;
   – Grass mowed or grazed;
   – Trees and shrubs retained as clumps or islands and do not take up more than 20% of the area;
   – Trees and shrubs located far enough from buildings so that they will not ignite the building;
   – Garden beds with flammable shrubs not located under trees or within 10 metres of any windows or doors;
   – Minimal plant species that keep dead material or drop large quantities of ground fuel;
   – Tree canopy cover not more than 15%;
   – Tree canopies not located within 2 metres of the building;
   – Trees separated by 2-5 metres and do not provide a continuous canopy from the hazard to the building; and
   – Lower limbs of trees removed up to a height of 2 metres above the ground.

As outlined in Section 5.1 of Appendix EE of the EIS, AS 3959 - 2009 and associated asset protection zones (APZs) are not considered as a set of 'deemed to satisfy' provisions for commercial and industrial facilities. However, in many instances, these types of developments will require access roads, on-site parking and hardstand/loading areas. In these cases, it is prudent to place these facilities in the most appropriate location in order to establish defendable space for fire-fighting purposes, as well as to mitigate the potential for ignition of surrounding grassland from project sources.

Planning for Bush fire Protection 2018 (RFS 2018), provides further advice on APZs for 'other development', including mining (underground and open cut). As a minimum, a 10 m APZ from the structures, associated buildings and infrastructure is recommended to be maintained to the standard of an Inner Protection Area (IPA) for the life of the development.

In consideration of the above, a minimum 10 m defendable space will be provided around project infrastructure that is at risk of bushfire or has potential to ignite surrounding vegetation. The defendable space will permit unobstructed fire vehicle access and be maintained to the standard of an IPA. This will be in the form of perimeter roads, hardstand areas, car parks or mown grass. As a guide, grass within an IPA will be kept to no more than 100 mm in height, with leaves and vegetation debris removed (RFS 2018).

4.20.3 Construction standards and design

5. The proposed Administration building shall be constructed to comply with Sections 3 and 5 (BAL 12.5) Australian Standard AS3959-2009 Construction of buildings in bush fire-prone areas or NASH Standard (1.7.14 updated) 'National Standard Steel Framed Construction in Bushfire Areas – 2014' as appropriate and section A3.7 Addendum Appendix 3 of Planning for Bush Fire Protection 2006.

As outlined in Section 5.6 of Appendix EE of the EIS, the project infrastructure comprises industrial and commercial uses and, therefore, do not have bushfire construction levels specified in AS 3959 – 2009. Notwithstanding, RFS (2018) requires that such buildings comply with the general bushfire construction requirements in section 3 of AS 3959 – 2009. Further, to prevent embers, buildings that enclose combustible infrastructure will include ember protection similar to AS 3959 - 2009 BAL 12.5 standards.

4.20.4 Internal roads

6. Internal roads at a minimum, shall comply with following requirements of section 4.1.3 of Planning for Bush Fire Protection 2006:
   - Internal roads are two wheel drive, all weather roads.
   - A minimum carriageway width of 4 metres is provided.
   - Access roads have passing bays every 200 metres that are 20 metres long by 2 metres wide, making a minimum trafficable width of 6 metres at the passing bay.
   - Internal perimeter roads are at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) with shoulders on each side, allowing traffic to pass in opposite directions.
   - Traffic management devices are constructed to facilitate access by emergency services vehicles.
   - A minimum vertical clearance of 4 metres to any overhanging obstructions, including tree branches, is provided.
   - Curves have a minimum inner radius of 6 metres and are minimal in number to allow for rapid access and egress.
   - The minimum distance between inner and outer curves is six metres. Curves have a minimum inner radius of 6 metres and are minimal in number to allow for rapid access and egress.
   - Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.
   - Crossfall of the pavement is not more than 10 degrees.
   - Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).
   - Roads are clearly signposted and bridges clearly indicate load ratings.
   - The internal road surfaces and bridges have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).

As outlined in Section 5.3 of Appendix EE of the EIS and reiterated in Section 4.20.1 above, emergency access points will be identified as part of the project's emergency response plan (ERP). The primary site access point, emergency access points and project roads will comprise of a combination of sealed and unsealed roads, detailed design of which will consider:

- minimum carriageway width of 4 m;
- the capacity for fire fighting vehicles to pass by;
- avoiding grades greater than 15 degrees (°) if sealed and 10° if unsealed;
- minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches;
- will not have a cross fall of more than 10°;
- the capacity to carry a fully loaded fire fighting vehicle (which may be up to 28 tonne);
- appropriate drainage and erosion controls; and
- all weather access is provided.

As part of the detailed design, and in consultation with RFS and FRNSW, requirements for emergency access points will be determined to provide additional emergency access and egress points in those areas that are a distance from the main project access point.

Once inside the disturbance footprint, the defendable space (perimeter roads, hardstands, carparks, mown grass) will provide access around project infrastructure.

The requirement relating to access roads having passing bays every 200 metres that are 20 metres long by 2 metres wide, making a minimum trafficable width of 6 metres at the passing bay is noted. Where this is not possible, Regis will ensure traffic flow is in one direction.

4.20.5 Location and adequacy of services

7. Water, electricity and gas must comply with the following:
   - All above ground water pipes external to the building must be metal including and up to any taps / outlets / fittings.
   - Electrical transmission lines should be located underground where possible.
   - Overhead electricity lines must have short pole spacing (i.e. 30 metres) except where crossing gullies, gorges or riparian areas. No tree may be closer to an electricity line than the distance set out in in ISSC3 Guideline for Managing Vegetation Near Power Lines.
   - Gas must be installed and maintained as set out in the relevant standard and all pipes external to the building must be metal including and up to any taps/outlets/fittings. Polymer-sheathed flexible gas supply lines must not be used.
8. A minimum 20,000 litre static water supply shall be provided for fire fighting purposes.
   - If a tank is provided it shall be located and designed so that it is easily accessible by fire fighting appliances.
   - Above ground tanks must be manufactured of concrete or metal. Raised tanks must have their stands protected.
   - Tanks on the hazard side of a building must be provided with radiant heat shielding to protect the tank from bush fire impacts and maintain safe access to the water supply for firefighters.
   - A standard 65mm metal Storz outlet with a gate or ball valve must be provided to the tank. The gate or ball valve, pipes and tank penetration of any tank must be adequate for full 50mm inner diameter water flow through the Storz fitting and made of metal.
   - All associated fittings to the tank must be metal.

   The location of the static water supply shall be shown on the Emergency Management and Operations Plan.

The requirements outlined above are noted. As outlined in Section 5.4 of Appendix EE of the EIS, the following objectives will be applied to project infrastructure in relation to water and services:

- to provide adequate supplies of water for the protection of project infrastructure during and after the passage of bushfire; and
- to locate electricity supply so as not to contribute to the risk of bushfire.

i Power supply

The mine development will have an electricity requirement of 26 megawatts (MW) to 28 MW. Power will be supplied to the mine development from a new above ground power line to be constructed between the mine development and the Transgrid 132 kV system Line 948 which passes between Bathurst and Orange approximately 15 km to north of the processing plant. The vegetation within the 132 kV line corridor proposed for the project will be:

- managed by the relevant network service provider, so as to limit the possibility of ignition of surrounding vegetation; and

- managed as per the specifications in ISSC3 Guide for the management of vegetation in the vicinity of electricity assets (Resources and Energy NSW 2016).

ii Fire water

There is a raw WMF and construction WMF located within the disturbance footprint that may be accessible to fire-fighting vehicles.

Fire water will be stored in designated tanks (a minimum of 20,000 L supply) in the processing plant. The fire water system will comprise of a fire water main around the processing plant and infrastructure buildings including administration offices and mining equipment area and workshop. It is expected that the source of the fire water will be raw water from the pipeline development. The fire water ring main will be fed by an electric and diesel fire water pumps. These pumps will be arranged in a duty/standby arrangement and will include a jockey pump to maintain the fire ring main system pressure. The fire water pumps and ring main will be designed to provide discharge pressures and flows to meet the required Australian Standards for fire system design. This static water supply will be accessible to fire fighting appliances.

The fire water system will provide:

- static water supply (in the form of fire water tanks) that comply with the provisions as set out in RFS (2018) and in liaison with RFS and FRNSW - the fire water tanks should be positioned so as to provide strategic areas of fire protection advantage for fire-fighting vehicles and should comply with the provisions as set out in RFS (2018) in terms of construction materials, fittings and access for fire trucks; and

- procedures for fire water tanks to be topped up at the beginning of the fire season and repeatedly throughout the season as required.

The BFMP for the project will detail the specifications and maintenance of dedicated fire water sources to assist in fire suppression and to prevent bushfires igniting during the construction, operation and decommissioning of the project.

4.21 Dams Safety NSW

Dams Safety New South Wales (DSNSW) has reviewed the Environmental Impact Statement for McPhillamys Gold Mine Project (SSD 9505) and has the following comments. The project proposes construction of a Raw Water Dam (RWD), Clean Water Dam (CWD) and a Tailings Storage Facility (TSF). Prior to building these dams McPhillamys Gold Project will need to supply further information regarding their dams to DSNSW using D1 forms found on the organisations website at https://www.damsafety.nsw.gov.au/.

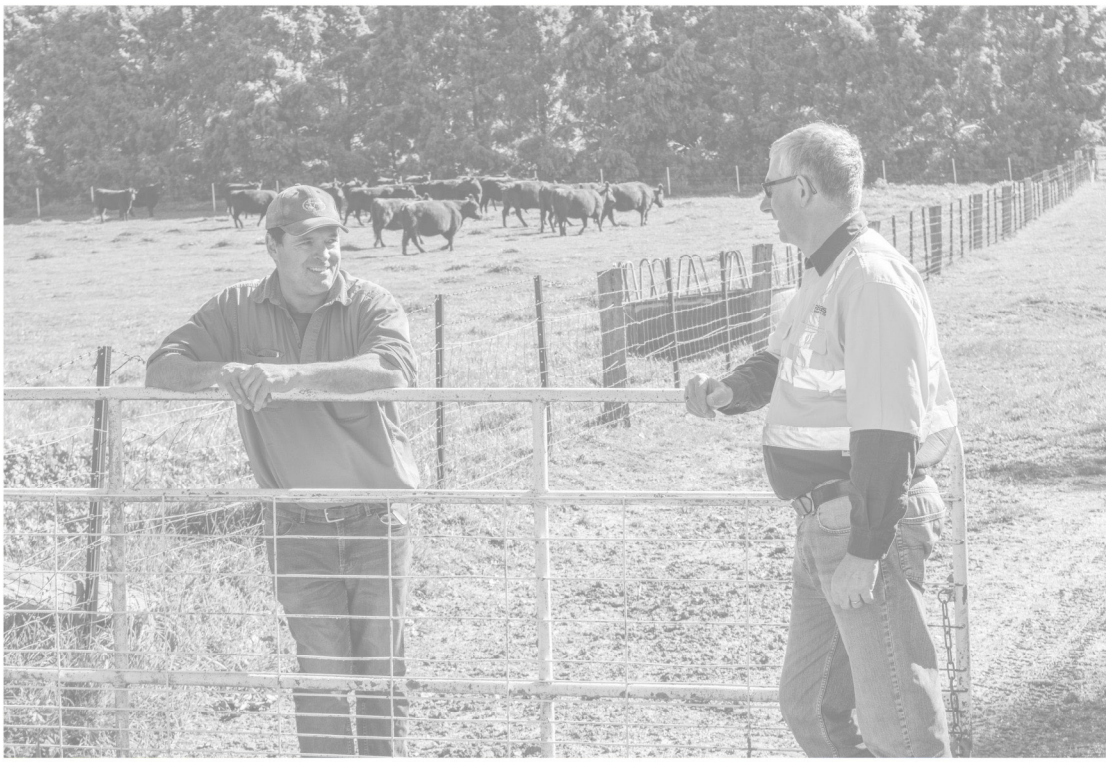
If DSNSW decides that one or all of the dams need to be 'declared' then a notification area will be defined around the 'declared' dam/dams within which mining may be regulated. This will be unlikely to limit the mining extent but may result in additional monitoring of the dams being required.

This submission is noted. Detailed designs of the TSF and respective water storages are in progress and Dams Safety NSW will be consulted with further with regard to these storages in due course.

It is noted that the TSF design has been based on the Dams Safety NSW (formally dams safety committee (DSC)) guide (DSC3F) and ANCOLD (2012 and 2019). Two independent expert reviews have been carried out on the TSF design and determined that the proposed TSF design is robust and therefore is suitable to be progressed to detailed design (CMW Geosciences 2020) and that the TSF embankment has been designed to have a margin of stability up to twice as high as typical TSF embankments under Australian conditions (Williams 2020).

Chapter 5

Response to organisation and community submissions



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5 Response to organisation and community submissions

5.1 Water resources

The area of water resources was one of the community's most often raised concerns, not only in the EIS submissions, but also prior to the EIS during the community consultation process, in particular during the open days when the community were afforded the opportunity to speak with the technical specialists that prepared the EIS. Although the community's interest extended to both surface water and groundwater, the reliance on surface water for local agricultural activities made this area one of prime concern.

As part of the surface water and groundwater assessments, a detailed study of the springs (and seeps) was also completed. This was an area that the community had a considerable interest in prior to, during and after the EIS lodgement. It was also an area that the community had a wide and varied interpretation of, with respect to how springs originate and subsequently operate.

The following sections aim to provide technical answers to the community submissions regarding the project's potential impact on water resources as is required by the regulatory guidelines. However, where warranted, a lay description has also been included to assist in providing a better understanding of what can be complex issues that are often difficult to understand without the benefit of a considerable amount of specialist training.

Surface water and groundwater assessments were undertaken as part of the EIS to assess the potential effects of the mine development on existing water resources and sensitive receptors (Appendices J and K of the EIS). A separate water assessment was undertaken as part of the EIS to assess the potential impacts of the construction and operation of the pipeline development on water resources (Appendix X of the EIS). A revised surface water assessment and groundwater assessment addendum have been carried out for the amended mine development and are contained in Appendix G and Appendix H of the Amendment Report. The findings of the revised assessments are not materially different to the findings of the assessments carried out for the EIS and demonstrate that the project will have a minimal impact on water resources.

This section provides responses to submissions regarding the project's potential impacts on water resources.

5.1.1 Impacts on groundwater users

Of the objections received, 78% (14) of organisations, 45% (106) of unique community submissions and form letters 1 and 3 raised concerns about the project's potential impacts on other groundwater users. This included concerns relating to:

- potential impacts on groundwater availability (due to potential drawdown associated with proposed mining activities);
- potential impacts on groundwater quality; and
- adequacy and applicability of proposed management measures (including 'make good' principles).

i Groundwater resources

Groundwater is a key water resource within the Lachlan Catchment and within the Upper Belubula, providing both environmental water, such as baseflow to streams, and water supply for stock and domestic users. The assessment of groundwater impacts from the mine development commenced with establishing robust monitoring networks.

Routine water monitoring commenced at the project in May 2014 across a network of landholder bores and surface water features. Up to five years of baseline hydrogeological data has been collected across the mine development site. A project specific groundwater monitoring network has been installed in the mine development area and comprises 23 monitoring points distributed across 14 locations (refer to Figure 4.1 of Appendix K of the EIS). Over two years of continuous groundwater level data and water quality data has been collected from the dedicated monitoring bores.

The mine development is within the LFB Murray Daring Basin (MDB) Groundwater Source. Groundwater in this source is managed by the WSP for the *NSW Murray-Darling Basin Fractured Rock Groundwater Sources 2011.* There are five key groundwater hydrostratigraphic units in the mine development and surrounding area summarised below:

- shallow, disconnected alluvial sequences, typically perched;
- weathered rock (saprock) low permeability;
- Byng and Blayney Volcanics;
- Silurian Anson Formation and Devonian Cunningham Formation;
- Orange Basalt – a well-developed aquifer system to the north-west of the mine development and outside of the area of influence of the proposed McPhillamys project.

Within the Lachlan Fold Belt MDB Groundwater Source, 75% of the average annual recharge each year is reserved for the environment. The other 25% is available to be allocated to extractive users and is termed the Long Term Annual Average Extraction Limit (LTAAEL) and is 875,652 ML/year. Of this volume only 70,051 share components (ML) are currently allocated to users, with the remainder still available to be issued via controlled allocations by the NSW Government over coming years. Therefore, the regional water resources within the groundwater system regionally are under allocated and under utilised.

The groundwater source is generally not highly productive (ie flows generally less than 5-10 litres per second (L/s)) and groundwater extraction within the Silurian and Ordovician formations is mostly for stock and domestic purposes (EMM 2020f, Appendix H of the Amendment Report). Due to the low permeability of the rocks, impacts from extraction of groundwater from bores within this water source is localised and isolated (ie drawdown impacts do not extend laterally very far from the bore).

ii Groundwater assessment and availability

To assess the potential for the mine development to affect groundwater availability (changes in groundwater levels) at neighbouring bores and at other receptors (eg groundwater dependent vegetation and/or surface water), significant baseline data was collected and analysed and a conceptual groundwater model developed for the upper catchment. This conceptual model is presented in detail in the EIS and is reproduced here in Figure 5.1.

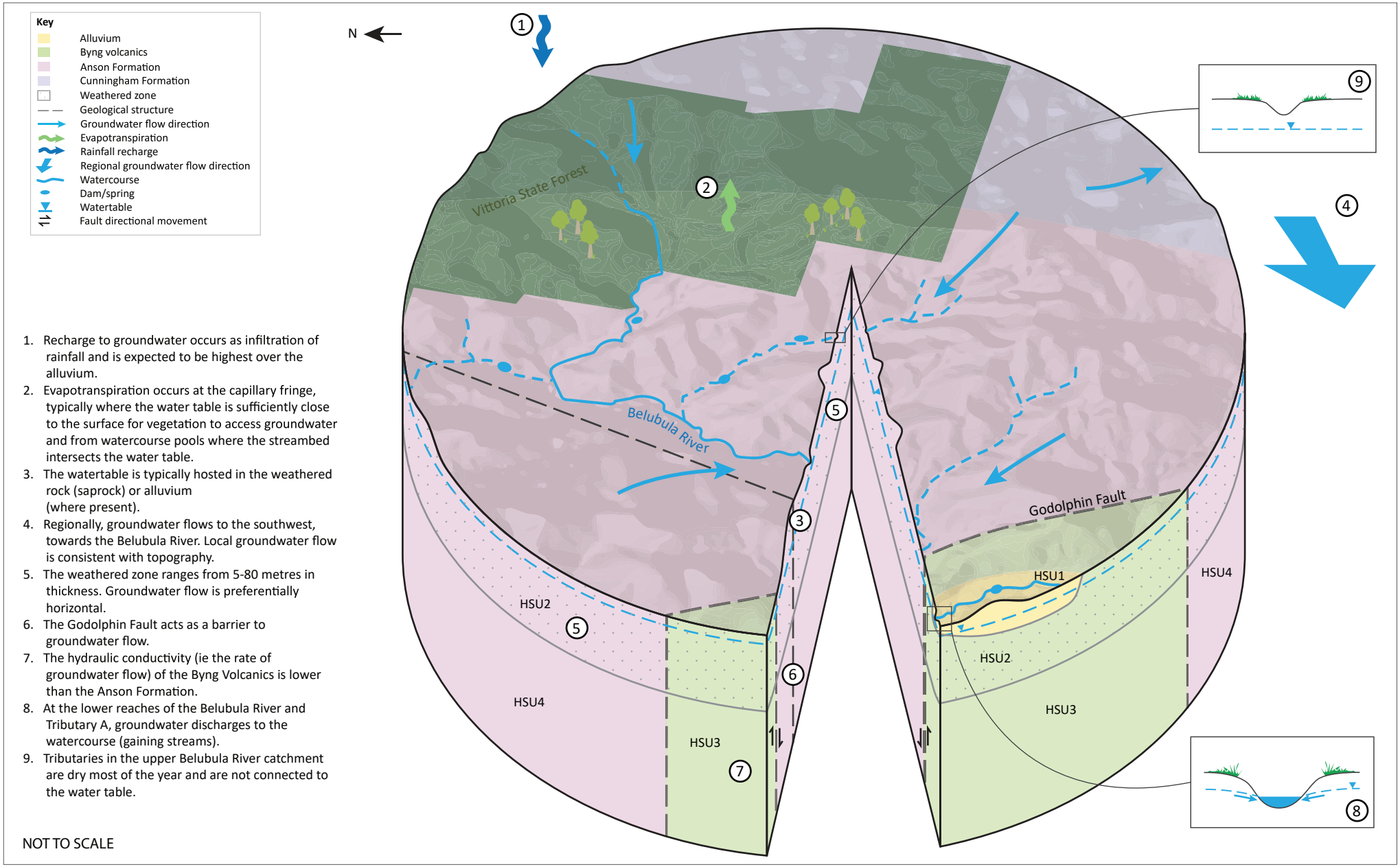
Following consultation with the regulator, a numerical groundwater flow model was then developed. The modelling approach is discussed in detail in Appendix K to the EIS and Appendix H of the Amendment Report and is also summarised in Section 5.1.6.

The results of the groundwater modelling show that the groundwater drawdown is localised and does not extend laterally very far from the pit. The Aquifer Interference Policy (AIP; DPI Water 2012) outlines the minimal impact criteria as being 2 m or less drawdown on a neighbouring bore. This means that drawdown of less than 2 m at a landholder bore is considered an "acceptable" impact (as it is considered to be less than the natural variation), while drawdown of 2 m or more typically requires make good provisions (refer to the next section for more discussion on 'make good'). There are no neighbouring bores that are predicted to have 2 m or more drawdown. This means, as per the AIP definition, neighbouring properties (including properties within the localities of Kings Plains and Vittoria) will not have reduced access to groundwater at their bores. In addition, the project will not result in reduced groundwater quality at neighbouring registered bores. As such, NSW AIP make good provisions will not be triggered. This is explained further in the following section.

As part of the groundwater assessments completed for the project, Regis has conducted bore census surveys on landholdings in the project and Blayney area. The census identified that the majority of groundwater bores in the project area are used for stock and domestic purposes, with unmetered extraction. There is minimal data available regarding pumping rates, bore lithology, or screened interval, and there is limited water level data from landholder bores (except for those included in Regis' existing monitoring program).

During operations, groundwater that seeps into the open cut pit will either evaporate or be pumped from the open cut pit to allow safe and dry mining conditions. Following completion of mining and pumping of water that flows into the open cut pit, groundwater will seep into the base of the open cut pit and remain there, gradually rising over time until a state of equilibrium is reached.

During and post mining, groundwater levels will decline in the immediate area surrounding the open cut pit due to the flow and capture of groundwater into the open cut pit. The results of the groundwater modelling show that the area where the watertable declines remains within a close distance from the open cut pit (refer to Figures 6.1 and 6.2 of Appendix H of the Amendment Report). This is mostly due to the 'tight' (low permeability) geology within the project area.



1. Recharge to groundwater occurs as infiltration of rainfall and is expected to be highest over the alluvium.
2. Evapotranspiration occurs at the capillary fringe, typically where the water table is sufficiently close to the surface for vegetation to access groundwater and from watercourse pools where the streambed intersects the water table.
3. The watertable is typically hosted in the weathered rock (saprock) or alluvium (where present).
4. Regionally, groundwater flows to the southwest, towards the Belubula River. Local groundwater flow is consistent with topography.
5. The weathered zone ranges from 5-80 metres in thickness. Groundwater flow is preferentially horizontal.
6. The Godolphin Fault acts as a barrier to groundwater flow.
7. The hydraulic conductivity (ie the rate of groundwater flow) of the Byng Volcanics is lower than the Anson Formation.
8. At the lower reaches of the Belubula River and Tributary A, groundwater discharges to the watercourse (gaining streams).
9. Tributaries in the upper Belubula River catchment are dry most of the year and are not connected to the water table.

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Project Conceptual Hydrogeology

McPhillamys Gold Project
Submissions report
Figure 5.1

iii Make good provisions

The groundwater assessment has been completed in accordance with the NSW Government requirements, including the AIP (DPI Water 2012). Thresholds for 'minimum impact' considerations are defined in the AIP for different groundwater sources. For this area, the 'minimum impact' criteria is defined 2 m or less drawdown at a water supply work (ie neighbouring bore). As defined in the AIP, if an activity is predicted to be 'greater than minimal impact' and the long-term viability of the water-dependent asset is compromised, then the impact is subject to 'make good' provisions. In NSW, 'make good' means that proponent is required to "ensure third parties have access to an equivalent supply of water through enhanced infrastructure or other means" (DPI 2013).

The groundwater modelling predicts that groundwater levels at existing third-party bores (ie bores located on land adjacent to the mine project area) will experience little to no change (<1 m drawdown) as a result of the project. Therefore, make good provisions do not apply. However, Regis will undertake monitoring of bores and verification of the model during mining and operations to ensure that the actual impacts align to the predicted impacts.

iv Groundwater quality

Without management and mitigation measures, there is the potential for leachate from the TSF to seep to the watertable aquifer. To reduce the potential for the tailings seepage to affect groundwater and surface water quality, a multi-barrier seepage management system has been designed and will be implemented (refer to Section 4.2.2). The design and assessment of the multi-barrier seepage management system, completed by ATCW (2019 and 2020), demonstrates that any potential seepage from the TSF will be effectively managed using design controls, including a liner, seepage interception drain and installation of seepage monitoring bores and, if required, a recovery system. Prior to placing any tailings in the TSF area, and before leaving the plant, the tailings will undergo treatment (cyanide destruction) to greatly reduce concentrations of cyanide and stabilise other metals in tailings water, minimising potential impacts to the environment through project design.

The groundwater modelling completed for the project (refer Appendix H of the Amendment Report) looked at the potential but unlikely worst case TSF seepage scenario to see how this might change groundwater levels and groundwater flow directions in the area of the TSF.

TSF seepage is very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final pit void, 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.

The work completed for the project predicts that groundwater and surface water quality will not be adversely affected by the TSF (refer Appendix H of the Amendment Report).

v Ongoing monitoring and adaptive management

Regis will continue to apply an adaptive management approach to tailings seepage management. Adaptive management can be used to monitor potential or perceived risks as well as adapting to actual information and data from the ongoing monitoring at the site. As the project progresses, Regis will continue to collect additional information and improve the conceptual understanding of the water environment. This would be through testing, design refinements, and monitoring. As part of the adaptive management approach, predictions associated with groundwater level changes, TSF seepage and other environmental assessments will be continuously reviewed and adjusted as needed, reducing the predictive uncertainty and increasing confidence in predictions.

The effectiveness of the TSF seepage management system will be monitored and assessed during operations of the project. If observations deviate from predictions, the management and mitigation measures will be adjusted and refined.

5.1.2 Impacts on surface water users

Of the objections received, 83% (15) of organisations, 79% (183) of unique community submissions and form letters 1, 2 and 3 raised concerns about the project's potential impacts on other surface water users. This included concerns relating to:

- potential impacts on surface water quality (including contamination of the Belubula River as a result of surface water runoff, seepage and reduced flows);
- potential impacts on surface water availability including flow reductions (namely reductions in flow in the Belubula River and subsequent flow-on effects to downstream users and/or the Lachlan and Murray Darling Basin);
- the project's compliance with the harvestable rights principles defined under the WM Act; and
- the extent of consultation with other licensed water users.

i Overview

Community members have raised concerns about the potential impacts that the mine development may have on waterflows in the Belubula River and potential risk of contamination of the watercourse due to uncontrolled TSF seepage.

Regis recognises that landholders along the Belubula River and its tributaries rely on access to the river for stock and domestic purposes. This is why Regis has undertaken specialist technical studies prior to and since the submission of the EIS to understand the characteristics of the Belubula River and its interaction with groundwater, and has conducted surface water flow modelling to assess the potential impact of the development on flows in the Belubula River. Reports providing technical detail on the related assessments are:

- surface water assessment completed for the EIS (Appendix J to the EIS);
- revised surface water assessment completed for the amended project (Appendix G to the Amendment Report);
- surface water – groundwater interaction assessment completed for responding to submissions on the EIS (Appendix C to this report);
- groundwater assessment completed for the EIS (Appendix K to the EIS); and
- groundwater assessment addendum completed for the amended project (Appendix H to the Amendment Report).

In addition to these reports, the following section provides a description in technical and lay terms as to the potential impacts of the mine development.

In summary, the findings of the assessments show that changes to the Belubula River downstream of the mine development area will only have a minor effect on the overall volume of waterflow to the Belubula River.

ii Surface water flow

The mine development is located 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 area and flows to the south-west into Carcoar Dam (approximately 26 km from the mine development area). The mine development area is within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012*.

The main potential impact to surface water during the operational phase of the development is the effect of the reduced catchment area draining to the Belubula River. This reduced catchment area leads to a small reduction in the streamflow in the Belubula River and hence inflows to Carcoar Dam. The mine development also has the potential to change how groundwater interacts with surface water (Belubula River and its tributaries; refer Appendix C).

During the operations phase of the project, the catchment area of the headwaters of the Belubula River will be reduced because rainfall that falls in the disturbance footprint will be captured as part of the mine water management system and not flow into streams or the Belubula River. Any rainfall and runoff that falls upstream of the disturbance footprint will be diverted back into the Belubula River, downstream of the mine development – reducing the impact on streamflows.

Changes to streamflow in the Belubula River, and subsequent changes in flows to Carcoar Dam during mining and post closure have been reassessed using a GoldSim water balance model (refer Appendix G of the Amendment Report). The rainfall-runoff component of the model was calibrated against available surface water flow data. 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.

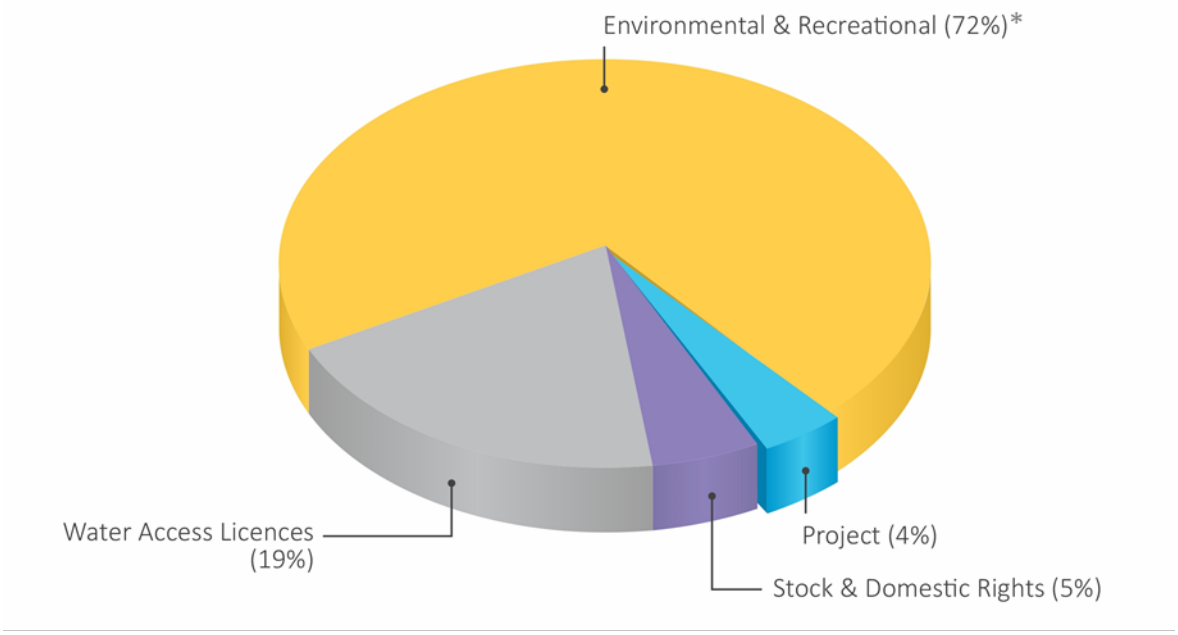
The mine development's influence on streamflow will not be consistent for the entire length of the project but, rather, will be short-lived and will increase gradually during the operational phase, until all the project infrastructure, stockpiles and TSF are built and the mining is developed; at which point the maximum impact would occur (also called "maximum disturbance"). Following this time, as mining ceases and closure and rehabilitation commences, the mine development's influence on streamflow will decrease. The maximum catchment area captured by the mine development represents 4.1% of the total Carcoar Dam catchment. In the long-term, following rehabilitation, the area will significantly reduce and be 0.46% less than the current catchment area draining to Carcoar Dam. This level of change is not expected to be noticeable and the change will be within the natural variability of current flows.

Downstream users are most reliant on water within the river during low flow (low rainfall) periods, and therefore this was considered in detail. At maximum disturbance, flows in the Belubula River between the Mid Western Highway and above Carcoar Dam are expected to range from 697 to 1,509 ML/year during periods of low rainfall (the flows will depend on the location along the river, with flows increasing along the river towards Carcoar Dam). This is compared with 764 and 1,574 ML/year that currently flows during low rainfall periods (refer Appendix G of the Amendment Report for further details) at the Mid Western Highway and Carcoar Dam, respectively. 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 in accordance with the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*, and known licences that are not accounted for in the water sharing plan, are as follows:

- domestic and stock rights: 68 ML/year;
- share components of domestic and stock access licences: 5 ML/year; and.
- 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 5.2.



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

Figure 5.2 Proportions of water use from the unregulated Belubula River above Carcoar Dam water source (during operations)

Groundwater will continue to naturally discharge to the Belubula River and its tributaries during and after mining. At the time when the mine development has the most impact on groundwater, groundwater contribution to streamflow above Tributary A is estimated to be around 4.25% (compared to the estimate contribution of 5% in the current situation – ie 0.75% reduction). There is no predicted change in groundwater discharge to the Belubula River downstream of the mine development.

The mine development 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 mine development area who rely on and access water within the Belubula River will not experience reduced access to water and are not expected to be affected by the mine development. In addition, as Carcoar Dam is used to regulate flows in the Regulated Belubula River and because the predicted change in flows in the Belubula River above Carcoar Dam will be within the current natural variability of the system, users downstream of Carcoar Dam will not be affected by the mine development.

iii Surface water quality

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

- accidental spills of hazardous materials contained on site (ie fuel, reagents, ore stockpiles, tailings);
- uncontrolled 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);
- uncontrolled seepage from the TSF to groundwater and the Belubula River;
- uncontrolled seepage from the waste rock emplacement (including acid mine drainage risk), water management facilities or runoff from the ROM pad to groundwater;
- introduction of varying water quality via the pipeline development; and
- production of brine from the on-site reverse osmosis (RO) plant.

a Risks from erosion and sediment

Potential impacts to 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 in accordance with Landcom (2005) and DECC (2008). This includes minimising surface disturbance and restricting access to undisturbed areas; progressive rehabilitation/stabilisation of mine infrastructure areas; separation of runoff from disturbed and undisturbed areas where practicable; construction of surface drains to control and manage surface runoff; and construction of sediment dams to contain runoff up to a specified design criterion (refer Appendix G of the Amendment Report).

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 in the EIS and the results of those assessments show that no impacts are expected to occur.

b Risks from uncontrolled TSF seepage

Concerns were raised by some community members about the potential risk of contamination of groundwater resulting from uncontrolled TSF seepage, in turn affecting downstream surface water quality. The potential changes to water quality as a result of TSF seepage has been discussed in Section 5.1.1(iii), however, to respond to concerns raised about surface water quality, it is included below to assist the reader.

A multi-barrier approach has been developed as part of the TSF design and is described in more detail in Section 4.2.2. This includes a clay and GCL liner that is designed, constructed and tested to ensure that it will achieve the design seepage rate. Following this, a seepage interception drain collects and returns this controlled seepage to the processing facility. Downstream of this are monitoring bores that will test the groundwater to confirm that the above is operating as per design, and if required function as a recovery system.

The design and assessment of the multi-barrier seepage management system has been completed by ATCW (2019 and 2020) and demonstrates that any potential seepage from the TSF will be effectively managed.

In addition to the above, prior to placing any tailings in the TSF area, and before leaving the plant, the tailings will undergo treatment (cyanide destruction) to greatly reduce concentrations of cyanide and stabilise other metals in tailings water, minimising potential impacts to the environment through project design. In areas where there is a higher potential for vertical seepage from the TSF to the watertable, including areas with minimal clay, drainage lines or seep areas, additional lining (as clay or GCL liner) will be used as part of the multi-barrier approach to seepage management.

The groundwater modelling completed for the mine development (refer Appendix H of the Amendment Report) assessed the potential worst case TSF seepage scenario, to see how this might change groundwater levels and groundwater flow directions in the area of the TSF. Using the highly conservative results of the groundwater model, a mixing calculation was conducted to estimate concentrations of selected water quality parameters.

The results show that groundwater and surface water quality will not be adversely affected by the TSF (refer Appendix H of the Amendment Report).

c Risk of spills

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

The risk of spill from the amended operational water management system has therefore been reduced compared with the EIS. Water management facilities within the operational water management system have been designed to not spill under all modelled historical climate scenarios.

The mine development has been designed to be a nil discharge operation and water quality objectives will be established for downstream water quality in consultation with the EPA as part of the WMP for the mine development. Monitoring against these water quality objectives will confirm that no impacts to the downstream environment are occurring as a result of the mine development.

iv Harvestable Rights

Harvestable Rights in NSW refers to the capture, storage and use of rainfall runoff from a landholder's property in accordance with the Harvestable Rights Order published in the NSW Government Gazette on 31 March 2006. In the Central and eastern Division of NSW where the mine development is situated, landholders can collect (store and use) up to 10% of the 'average annual regional rainfall runoff' as the MHRDC for a landholding without a licence or approvals, provided the dam/s are located on an unmapped or mapped minor stream and sized to industry standards. Minor streams are defined as first or second order streams according to the Strahler system as outlined below. Non-minor streams are third order and above.

The Strahler system assigns stream orders according to a hierarchy of streams from the top to the bottom of the catchment (Strahler 1952). A first order stream is the first segment of a watercourse at the top of the catchment. Where two first order streams intercept, the new stream segment becomes second order. When two second order streams join, they form a third order stream, and so on. Streams of lower order joining a higher order stream do not change the order of the higher stream. This is presented graphically in Figure 5.3.

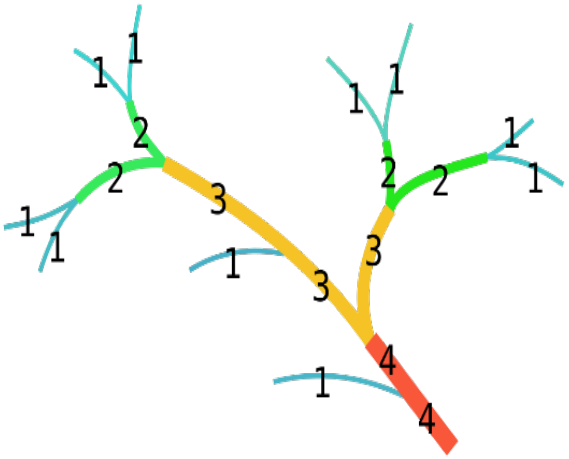


Figure 5.3 Strahler stream order (Strahler 1952)

The calculation of the MHRDC for a property is provided via an online calculator on the NSW Government website (WaterNSW 2019) and is based on the property location (to define the average annual regional rainfall) and also the property area (to calculate the volume based on 10% rainfall runoff).

The total current and proposed landholding area of Regis property associated with the mine project area is 2,908 ha and the average annual rainfall runoff from the NSW Government 'harvestable rights calculator' for the Regis property is 0.75 ML/ha per year. As outlined in Section 4.1.1ii), the harvestable right rate for Regis owned land is 0.75 ML/ha per year (10% x 0.75 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 is calculated separately to the Lachlan Catchment due to them being different water sources. Using the online maximum harvestable right calculator (WaterNSW 2019) for each landholding area, the MHDRC was assessed as shown in Table 5.1.

Table 5.1 Summary of harvestable rights calculations

Water Sharing Plan	Total landholding area – current and proposed (ha)	Maximum Harvestable Right Dam Capacity[1] (ML)	Volume of existing dams (ML)	Remaining dam capacity volume allowed under harvestable rights (ML)
Water Sharing Plan for Macquarie Unregulated and Alluvial Water Sources 2012	148.4	11	1.5	9.5

Table 5.1 Summary of harvestable rights calculations

Water Sharing Plan	Total landholding area – current and proposed (ha)	Maximum Harvestable Right Dam Capacity[1] (ML)	Volume of existing dams (ML)	Remaining dam capacity volume allowed under harvestable rights (ML)
Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012	2,759.8	207	77.2	129.8
Total	**2,908.2**	**218**	**78.7**	**139.3**

Note: 1: based on 0.75 ML/ha per year
ML = Megalitres

The mine disturbance area is located solely within the *Water Sharing Plan for Lachlan Unregulated and Alluvial Water Sources 2012*. The construction and operation of the mine development will result in diversions and unavoidable capture of rainfall runoff. The proposed water management system seeks to maximise the construction of clean water diversions to actively divert clean water runoff around the mining area. However, runoff within the active mining area must be captured, managed and recycled to ensure that the water quality of the greater catchment is not impacted.

The volume of 'incidental take' for the mine development has been calculated and accounted for, and assessed against the calculated MHRDC, and the rules and exemptions that apply. Further detailed discussion on surface water licensing is provided in Section 4.1.1.

v Consultation

Consultation on the water related aspects of the project has been at the forefront of engagement with the local community throughout the entire development of the project. In particular, Regis has and will continue to carefully consider the potential and measured surface water related impacts of the mine development on downstream users and the environment.

Members of the community have and continue to raise questions and concerns about the potential effect of the project on local water resources. Regis welcomes this ongoing discussion and commissioned an additional assessment, the surface water groundwater interaction assessment (contained in Appendix C) to provide an update and additional detail to the information presented in the EIS on the local groundwater and surface water environment, including additional water monitoring data, to further add to the conceptual understanding of the water environment in the mine development and broader Blayney area.

As outlined in Section 3 above, Regis held two community open days during the public exhibition period, on 14 and 15 October 2019. These open days were held in Blayney at the community hall and were attended by 120 community members over the two days. The groundwater specialists (hydrogeologists) and surface water engineer who prepared the groundwater assessment (and subsequent addendum), EIS, surface water assessments and Amendment Report for the mine development attended these open days to answer the community's questions.

During the community open days, Regis and technical specialists spoke with many local landholders, and some expressed interest in Regis visiting their property to collect information related to springs, their bores, flow in local creeks and the Belubula River. Following these discussions, EMM visited a number of landholder properties to survey these areas of interest. During these surveys, water samples were collected to assist with the surface water-groundwater interaction assessment and overall characterisation of the water environment in the Blayney area. This information is valuable and enhances the overall conceptual understanding of the water resources of the greater catchment. The data and analysis have been considered carefully and reviewed and included in the preparation of the Submissions Report. In particular, this data and information was incorporated into the surface - groundwater interaction assessment (refer Appendix C).

Regis has also consulted with the holders of WALs within the Belubula River above Carcoar Dam surface water source.

The Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources defines the access rules for water sharing within the Belubula River above Carcoar Dam surface water source. The Water Sharing Plan identifies different categories of water sharing including basic landowner rights providing for domestic and stock water extraction without the need for a water access licence, and unregulated water licences. Three WALs for unregulated water access were identified within this water source comprising share units of 22 ML, 50 ML and 192 ML. Regis representatives have approached the holders of licenses and Regis has subsequently acquired 70 ML of the available entitlements (WAL43105 and WAL31476). Regis has further sought information on the 192 ML licence.

5.1.3 Impacts on springs

Of the objections received, 33% (6) of organisations and 29% (68) of unique community submissions raised concerns about the project's potential impacts on springs, of which 36 have been identified within the mine project area. This included concerns related to:

- availability of adequate baseline information to develop an understanding of the project's potential impacts on spring water quality and quantity, as well as downstream impacts; and
- accuracy of predicted impacts on springs and the Belubula River.

The topic of springs (and seeps) and the potential impacts that the mine development may have was a common concern of community members, in particular neighbours downstream of the proposed development. Open days that were held prior to and after the submission of the EIS focussed on the potential impacts of the mine development on surface water and groundwater, in particular springs. There was a wide variation in terms of understanding of how springs originate and operate and what impacts them.

Regis recognises the value of springs to the local landholders and to the local and regional environment. This is why Regis has undertaken several specialist studies prior to and since the submission of the EIS to specifically understand the springs within the mine development and the greater catchment. The surface water – groundwater interaction assessment report (refer Appendix C) has been developed specifically to provide an update and additional detail to the information presented in the EIS on the local groundwater and surface water environment. This report includes additional water monitoring data, and further analysis of springs, which adds to the conceptual understanding of the water environment in the mine development and broader Blayney area. In addition to this report, the following section provides a thorough description in technical and lay terms as to how springs originate and operate in and around the mine development and the greater catchment, and the impacts of the mine development.

In summary, the findings of the assessments show that changes to springs in the mine development area are expected to occur, however the mine development will only have a minor effect on the overall volume of waterflow to the Belubula River.

i Types of springs

A spring is an area where groundwater emerges naturally from the rock or soil and flows onto land or into a body of surface water. A seep is generally regarded as a type of spring where water emerges from the ground, not from any definite opening, but instead through the pores of the ground, creating a damp / wet area. In contrast to springs, seeps generally do not have any visible or measurable flow coming from their source.

Regis has conducted six field surveys over a period of six years in and surrounding the mine development area to identify spring and seep areas, and to collect information to increase the understanding of these areas. The first survey occurred in May 2013 and the most recent occurred in November 2019. Each survey aimed to identify and describe springs active at the time of the survey. It should be noted that these spring and seep areas do not include every location where groundwater discharges directly into the Belubula River (or associated tributaries). To develop an understanding of the interaction between groundwater and surface water, including springs, detailed assessments of geology, groundwater levels, groundwater quality, surface water quality and field observations have been conducted.

Six spring types are described in Appendix C to assist with the categorisation of springs identified within the mine development area and others found in Australia. Most springs in the mine development area are associated with abrupt changes in the topographic gradient and intercept shallow groundwater flow. These main springs types are described as ‘break of slope’ and ‘outcrop’ seep/springs and are illustrated in Figure 5.4 and Figure 5.5.

Many of these springs and seeps have been excavated by landholders over the years into dams to provide water access for stock. Whilst some springs in the mine development area do contribute water to the Belubula River, most of the spring water does not reach the river as it evaporates first or is used by vegetation or for stock and domestic purposes.

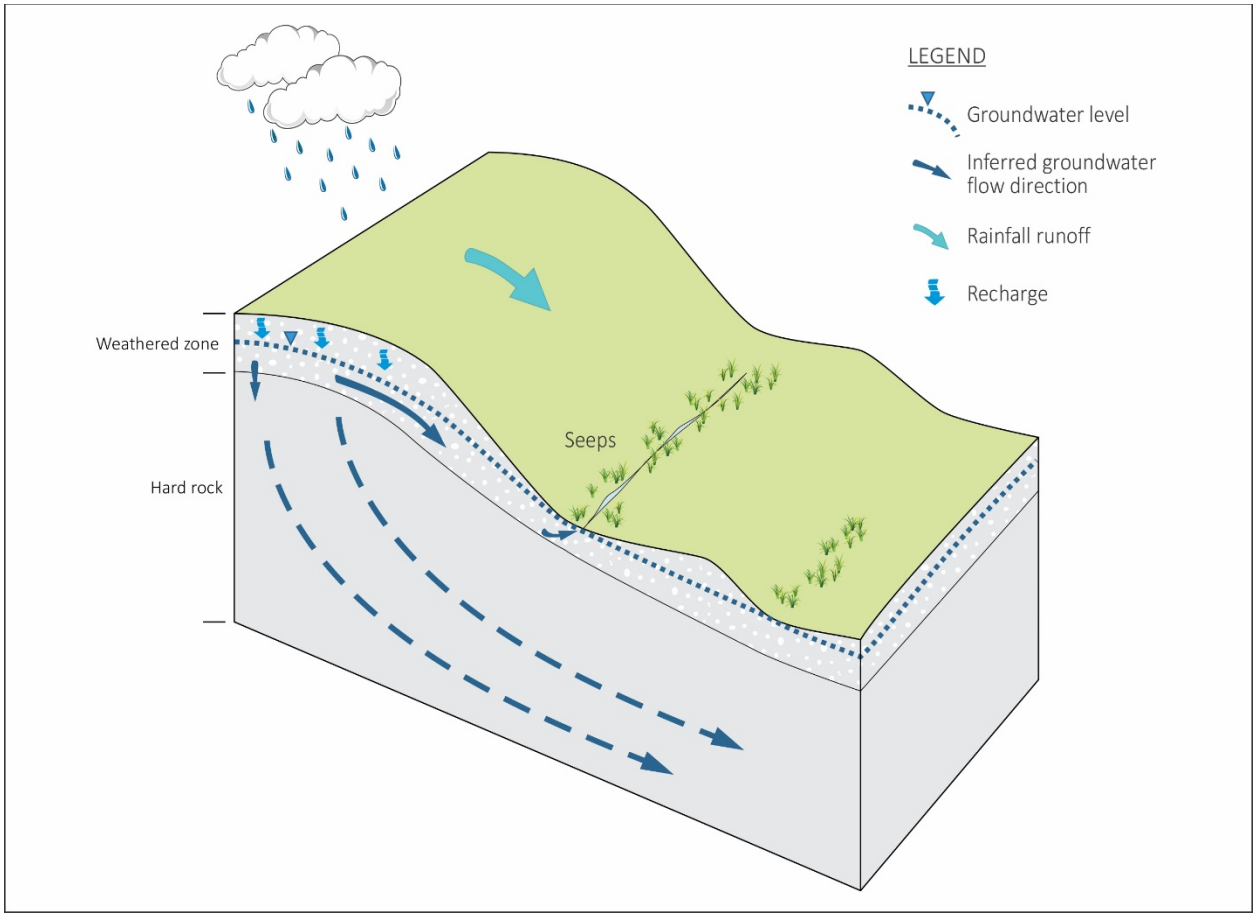


Figure 5.4 Break of slope seep/ spring schematic

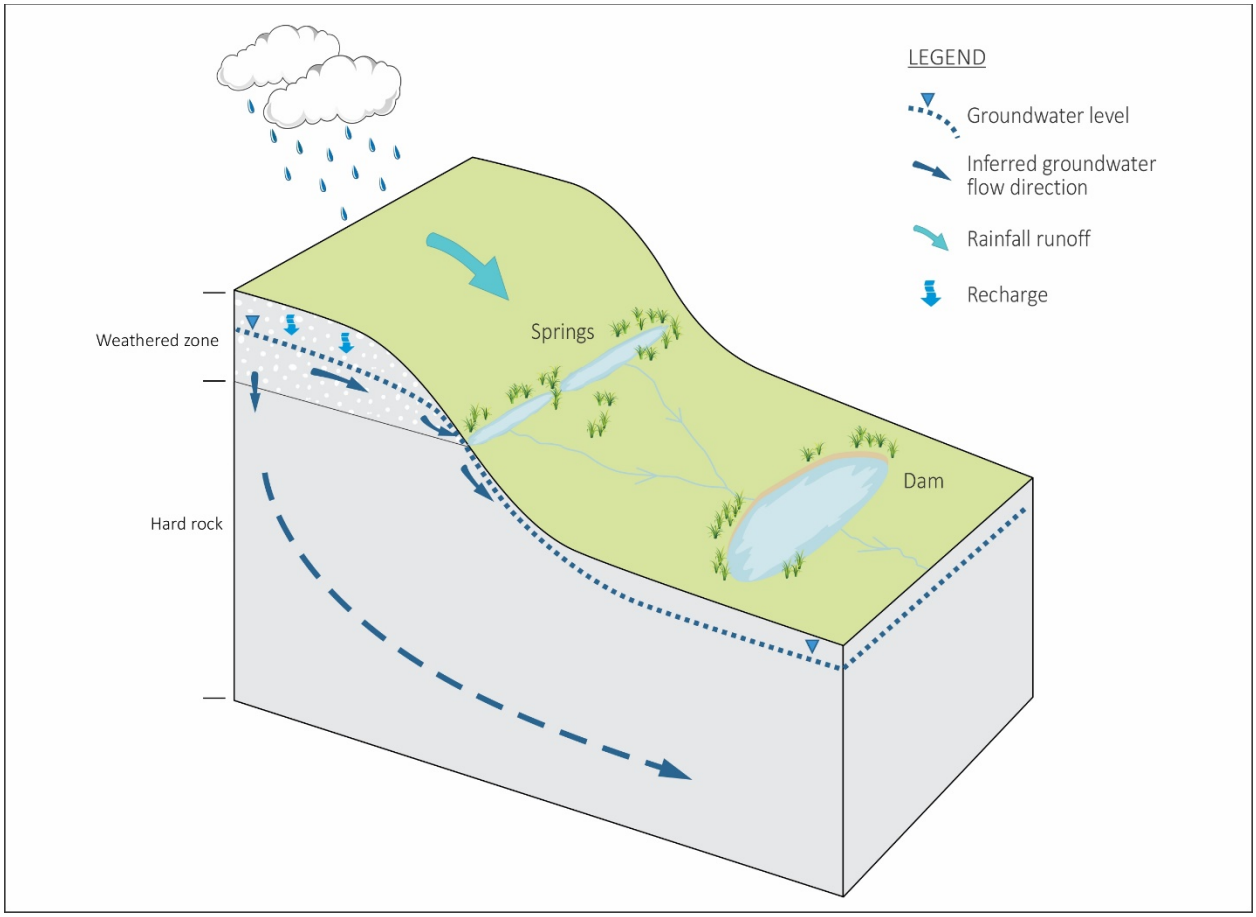


Figure 5.5 Outcrop spring schematic

ii Spring flow and flows in the Belubula River

The results of the surface and groundwater assessments show that, overall, the Belubula River (from the top of the catchment to Carcoar Dam) receives water from the following sources, in order of largest contribution to smallest:

1. Runoff of 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). But along Tributary A and downstream of Tributary A, groundwater is inferred to contribute around 5% of flows in the Belubula River. Downstream of the Mid Western Highway, the contribution from groundwater is inferred to increase to around 20% and will vary with climate conditions. During drought periods, flow of local groundwater to the Belubula River has been observed to sustain flows in the watercourse along the length of the river from the Mid Western Highway to Carcoar Dam.

a Accuracy of assessment of potential impacts

In the groundwater assessment (Appendix K of the EIS), EMM presented the groundwater model as Class 1 in accordance with the Australian Groundwater Modelling Guidelines (Barnett et al 2012; hereafter referred to as the "modelling guidelines"). The modelling guidelines suggest potential uses for a Class 1 model to include:

- predicting long-term impacts of proposed developments in low value aquifers;
- estimating impacts of low-risk developments; and
- understanding groundwater flow processes under various hypothetical conditions.

The third-party reviewer (HydroGeoLogic) determined that the groundwater model is consistent with attributes of a confidence level of Class 1 with elements of Class 2 (and Class 3) and that it is suitable for impact assessment scenario modelling purposes (see Appendix H of the groundwater assessment (Appendix K of the EIS)). The groundwater model is deemed fit for purpose by EMM and the third-party reviewer, HydroGeoLogic. This is based on the low productive aquifer and low risk context.

DPIE engaged JBS&G to conduct a review of the groundwater assessment completed for the EIS. Consultation between DPIE, JBS&G, Regis, EMM and HydroGeoLogic personnel occurred in late 2019 and early 2020 to discuss the findings of the review and agree a path forward to respond to the queries raised. Additional work was conducted to respond to and close out the queries raised by JBS&G and included:

- conducting additional sensitivity analysis;
- providing additional information regarding selected boundary conditions, model extent and predictive uncertainty; and
- conducting additional scenarios to further assess predictive uncertainty.

The additional work completed provides further confidence in the model results (including uncertainty analysis) and confirms that the groundwater assessment completed for the EIS adequately assessed the potential risk of the project on landholders and other sensitive receptors.

The model is demonstrably fit for purpose, consistent with the modelling guidelines and the findings of third-party reviews.

<u>Springs/seeps within the mine disturbance footprint</u>

During the operational phase of the mine development, the use of the land in the disturbance footprint will change from farming to mining. The TSF and other project infrastructure will be constructed in areas where springs/seeps have been observed, potentially changing the ground conditions.

Shallow groundwater that currently discharges at surface as a seep or spring may no longer discharge at that location (ie underneath the TSF) but, instead, will continue to move underground until a new discharge point is reached (ie this water will remain in the greater catchment).

Instead of discharging at ground surface, the shallow groundwater may either continue to move underground discharging in the Belubula River, the open cut pit or at new or existing spring locations downstream, or it may be intercepted by the TSF seepage interception drain. Any groundwater that may continue to discharge into the infrastructure area will be captured and picked up by the water management system.

The location of the discharge depends on the groundwater flow direction, the location in the landscape and the changes at the surface. However, it is important to note that groundwater will continue to discharge to the Belubula River downstream of Tributary A and along Tributary A during mining operations and following closure.

Springs/seeps outside of the mine development area

Some community members raised concerns that the project will cause springs outside of the mine development area to be impacted, or potentially 'dry up', affecting either their landholder supplies or flow in the Belubula River and/or its tributaries.

Outside of the mine development area, groundwater levels are not predicted to change materially as a result of the project. The assessments completed highlighted the very localised nature of the groundwater flow path (ie local recharge and local discharge) for springs throughout the greater Lachlan River catchment (refer Appendix C).

Within the project area, the water that currently discharges from existing springs and seeps mostly either evaporates or is used by vegetation or for stock and domestic purposes rather than contributing significantly to streamflow. Groundwater that currently discharges at springs/seeps in areas where the TSF and other project infrastructure is planned, will no longer be able to discharge at that location and instead will continue moving underground, until a new discharge point is reached. In this area, the TSF seepage interception drain will capture most of this shallow groundwater. Otherwise, the shallow groundwater will continue moving underground, as it currently does, eventually discharging at the Belubula River, the open cut pit or at new or existing spring locations downstream.

Therefore, springs and seeps outside of the mine development project area will not undergo any material changes to their recharge or groundwater flow, therefore they will not be altered as a result of the mine development. This has been assessed in detail through field surveys, water quality and sampling and extensive groundwater modelling, which has enabled the specialist consultants to establish a robust understanding of the local geology and groundwater systems, and in turn the mine development's groundwater model and overall water conceptual model (refer to Appendix K of the EIS and Appendix H of the Amendment Report). The robustness of the groundwater model is discussed further in Section 5.1.6(i).

Belubula River

As mentioned in Section 5.1.2, flows within the Belubula River will be reduced slightly during mining as a result of the mine development, but this will not be due to changes in springs/seeps in the mine development area. The change is predominantly due to the reduced catchment size at the headwaters of the Belubula River, which reduces the volume of rainfall and runoff flowing into the watercourse and its tributaries, which are the main sources of water to the Belubula River (refer to Appendix C). The effect of the reduced catchment area results in a reduced, temporary reduction of streamflow in the Belubula River. This equates to approximately 4% reduction of streamflow in the Belubula River at Carcoar Dam and approximately 9% reduction in the Belubula River at Mid Western Highway during operation of the mine development. Following completion of the project, streamflows in the Belubula River to Carcoar Dam will be 0.46% less than existing flows. This level of change will be imperceptible in comparison with the natural variability in catchment conditions.

iii Water quality

Concerns were raised by some community members about the potential risk of contamination of groundwater resulting from uncontrolled TSF seepage, in turn affecting downstream spring water quality. The potential changes to groundwater quality as a result of TSF seepage is discussed in detail in Section 5.1.1(iii), however, in simple terms the following protection measures manage this risk.

A multi-barrier approach has been developed as part of the TSF design. This includes a clay or GCL liner that is designed, constructed and tested to ensure that it will achieve the design seepage rate. Following this, a seepage interception drain collects and returns this controlled seepage to the processing facility. Downstream of this are monitoring bores that will test the groundwater to confirm that the above is operating as per design, followed by a recovery system if required. Any TSF seepage is predicted to move very slowly with the majority of seepage being directed to the final pit void, 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.

The multi-barrier seepage management system is described in more detail in Section 4.2.2. The design and assessment of the multi-barrier seepage management system has been completed by ATCW (2019 and 2020) and demonstrates that any potential seepage from the TSF will be effectively managed.

In addition to the above, prior to placing any tailings in the TSF area, and before leaving the plant, the tailings will undergo treatment (cyanide destruction) to greatly reduce concentrations of cyanide and stabilise other metals in the tailings water, minimising potential impacts to the environment through project design. In areas where there is a higher potential for vertical seepage from the TSF to the watertable, including areas with minimal clay, drainage lines or seep areas, additional lining (as clay or GCL liner) will be used as part of the multi-barrier approach to seepage management.

The groundwater modelling completed for the project (refer Appendix H of the Amendment Report) assessed the potential worst case TSF seepage scenario, to see how this might change groundwater levels and groundwater flow directions in the area of the TSF. Using the highly conservative results of the groundwater model, a mixing calculation was conducted to estimate concentrations of selected water quality parameters (refer Section 5.1.1(iii)).

The results show that groundwater and surface water quality will not be adversely affected by the TSF (refer Appendix H of the Amendment Report).

iv Monitoring

Concerns were raised by some community members about the duration of the mine development's water monitoring period and the ability to understand the local surface water and groundwater environment from this data. Routine water monitoring commenced for the project in May 2014 across a network of landholder bores and surface water features. Since then, Regis has drilled and installed additional groundwater monitoring bores, and has increased the monitoring locations to include springs, dams and other sections of the Belubula River.

Up to six years of baseline water (surface water and groundwater) data has been collected across the mine development area. Regis has conducted six field surveys over a period of six years in and surrounding the project area to identify seep and spring areas, and to collect information to increase the understanding of these areas. The first survey occurred in May 2013 and the most recent occurred in November 2019.

This monitoring has been undertaken in order to develop a robust understanding of the water environment, establish baseline conditions and inform the impact assessments.

The NSW government requires that projects require a minimum of two years of monitoring data (to understand seasonal variation), however Regis has now collected data for approximately six years, exceeding the NSW Government's minimum monitoring requirement.

Groundwater and surface water monitoring data will continue to be collected from Regis' project specific monitoring locations throughout the life of the mine, and as part of closure commitments. The data collected from the monitoring program during operations will provide an early indication of potential impacts to sensitive receptors, including the Belubula River, GDEs and existing users. In addition, the data will be used to review and verify the predictions of the groundwater modelling. As outlined in the EIS, through Regis' commitment to adaptive management, Regis will continue to collect additional information and improve the understanding of the water environment.

5.1.4 Pipeline development water

Of the objections received, 44% (8) of organisations, 28% (65) of unique community submissions and form letters 2 and 3 raised concerns about the quality of water being transported within the proposed pipeline. This included concerns related to:

- the level of salt (or brine) and heavy metals within water to be transported via the pipeline;
- the use of this water on-site during project operations;
- the potential failure of pipeline infrastructure and flow-on effects on other waterways; and
- the use of this water and pipeline infrastructure following mine closure.

i Pipeline supply water quality

Regis understand that some community members are concerned about the pipeline transported water spilling and adversely affecting the land, groundwater, and/or surface water because of the perceived poor water quality. The quality of water sourced from Centennial's Angus Place, SCSO and MPPS near Lithgow currently ranges from around 600 mg/L total dissolved solids (TDS) to 7,000 mg/L with a likely average of approximately 3,500 mg/L.

As outlined in pipeline water assessment (Appendix X of the EIS), water quality specifications for each water source will vary over time as a result of climatic conditions, operational circumstances at SCSO and the operational philosophy of the , recently commissioned, reverse osmosis (RO) water treatment plant at the MPPS. For reference, the NSW Department of Primary Industries fact sheet on the water requirements for sheep and cattle (DPI 2014a) identifies the maximum salinity suitable for stock drinking water (TDS in mg/L) in the following ranges (depending on the type of feed):

- sheep: 5,000 – 10,000 mg/L generally, and up to 13,000 mg/L for limited periods; and
- beef cattle: 4,000 – 5,000 mg/L generally, and up to 10,000 mg/L for limited periods.

The imported water will be contained within the proposed operational water management system, with the mine development area designed to be a nil discharge site. The purpose of the externally sourced water supply is for use in ore processing and dust suppression. The site water management system will operate as a closed system, with water transferred, reused and stored in water management facilities that are designed not to spill in any climate scenario assessed by the surface water modelling (refer Appendix G of the Amendment Report).

The site will also be equipped with a reverse osmosis plant for the production of higher quality water. It is noted that the operational water management system will remain in place during the closure period until such time as closure rehabilitation criteria are met. This means that Regis will monitor water quality and soil quality, and if the quality is above acceptable levels (to be derived as part of the WMP and MOP), the soil will be remediated or encapsulated, and / or removed offsite to a licensed facility.

In the unlikely event of any spill of raw water along the pipeline development, this would trigger remedial action. Fault detection systems will be incorporated within the pipeline design. If a pipeline leak occurs, the fault detection systems will shut down the water transfer and isolate the leak via isolation or section valves. So, if a spill did occur, it would likely be a relatively small volume (refer to Section 5.1.4(iii) for further details). Given the water quality mentioned above, the fault detection and isolation systems in place and the design of the site water management system (as nil discharge), it is unlikely that a spill from the pipeline will cause material impact to the land, groundwater or surface water.

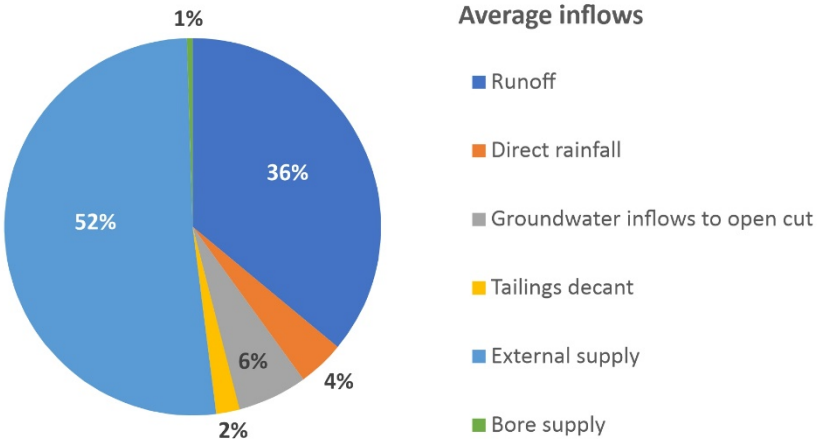
ii Operational use of pipeline water

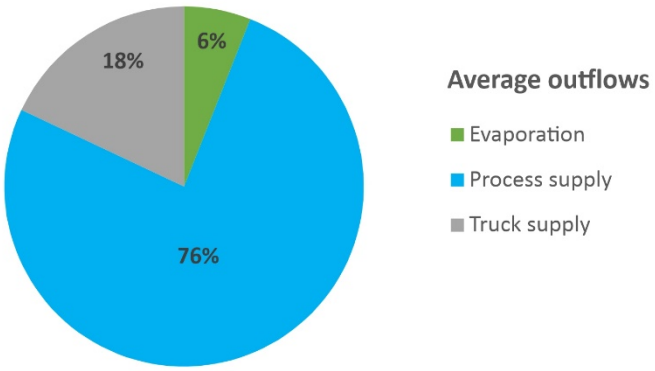
The water balance model has been updated in Appendix G of the Amendment Report to simulate the operation of the amended mine water management system over the life of the mine under a number of varying climate scenarios (131). The model enables assessment of mine development water supply/demand and risks, 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 pit;
- the risk of spill from externally spilling dams; and
- the external supply requirement.

Model predicted average inflows and outflows (averaged over the mine life and all climate scenarios) are shown in Figure 5.6 below. Model results 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. As mentioned in Section 5.1.4(i) above, pipeline water will be used in ore processing operations and for dust suppression on haul roads.

External water drawn from the pipeline development will vary through the project life. Median annual external supply is predicted to peak in Year 6. Model results indicate that, during periods of lower rainfall (indicated by the 90^{th}/95^{th} percentile results), the mine development would use up to approximately 3,900 ML of imported pipeline supply. This amounts to approximately two thirds of the imported pipeline supply capacity. Modelling indicates that under most circumstances, the external supply pipeline will not need to be utilised to its full capacity on an annual basis. Refer to Appendix G of the Amendment Report for further details of the water balance modelling.





Note: total average inflows will not equal average outflows due to statistical variation with climate and the change in water stored on site.

Figure 5.6 Average predicted mine water balance

iii Potential for pipeline leaks and impacts on watercourses

Regis understands that some community members are concerned about possible leaks from the pipeline and how that will affect land and watercourses along the alignment. Regis understand the value of the watercourses and environment along the pipeline alignment and has conducted specialist studies to ensure the pipeline and operational system has been designed to effectively reduce the potential for leaks and therefore potential impacts on the environment (refer Appendix X of the EIS). In addition, it is Regis' own interest to design and construct a robust pipeline that will deliver the required water supply for the mine development.

During operation, isolation valves will be used to isolate the pipeline into discreet sections and allow individual sections to be dewatered for maintenance, or to provide security in an event such as a pipe leak. Isolation valves will also be installed on either side of major watercourse crossings.

As outlined Section 5.1.4(i), any water spill along the pipeline development will trigger remedial action. Fault detection systems will be incorporated within the pipeline design. If a pipeline leak occurs, the fault detection systems will shut down the water transfer and notify the operator that an inspection of the system is required.

In the event of a pipeline leak, the volume discharged into the local landscape would vary depending on the severity of the leak and the time taken to activate isolation valves. This has been assessed and described technically in Appendix X of the EIS, which included a conservative calculation of the volume of water which would be released to the environment in the event of a pipeline leak. The calculation is very conservative and provides over-estimated, worst case volumes as it is extremely unlikely that all the water held between the isolation valves would be released. For a 300 mm diameter pipe, the maximum loss would be 0.4 ML, and for a 650 mm diameter pipe, the maximum loss would be 0.9 ML.

Operation (opening) of the scour valves will allow dewatering of the pipeline for emergency repairs and maintenance. Dewatering will involve release of water to scour pits via the scour valves. Scour water will be transferred from the pits via a suction tanker truck and taken to the mine development or to an appropriately licensed wastewater treatment facility or pumped to the nearest pumping station or the next appropriate pipeline section.

Operational management of the pipeline development, including emergency management and monitoring, will be incorporated into the overarching OEMP for the project.

These fundamental management measures will be part of the design and construction of the pipeline and will be incorporated into the overarching OEMP.

Based on the management measures and the findings of the assessments, it is unlikely that a spill from the pipeline will cause material impact to the land, groundwater or surface water.

iv Use of pipeline post closure

Some community members raised queries about the intended use of the pipeline development following completion of mining. As outlined in Section 2.16 of the EIS, it is anticipated that the pipeline development will remain in the ground at the end of the mine operating period. 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. At the end of the mine life, the pipeline development will be prepared for long term (mothball) shutdown. If no additional users for the water or pipeline are identified, the components that are above ground will be removed.

The ultimate removal or otherwise of the pipeline will be confirmed as part of the preparation of the detailed closure plan for the project, which will be prepared five years before mine closure, and in consultation with key stakeholders.

5.1.5 Use of water resources

Of the objections received, 39% (7) of organisations, 37% (86) of unique community submissions and form letters 1 and 3 raised concerns about the project's use of surface water resources (primarily due to rainfall/runoff being captured within the mine project area). A number of submissions also raised concerns about the use of water resources during a drought and, more generally, a changing climate.

Community members have raised concerns about the potential impacts that the mine development may have on waterflows in the Belubula River, particularly during drought periods.

Streamflow Impacts

Regis recognises that landholders along the Belubula River and its tributaries rely on access to the river for stock and domestic purposes. This is why Regis has undertaken specialist technical studies prior to and since the submission of the EIS to understand the characteristics of the Belubula River and its interaction with groundwater, and has conducted surface water flow modelling to assess the potential impact of the development on flows in the Belubula River. This has been described above in Section 5.1.2, but is discussed again in this section to specifically address this concern.

The mine development has the potential to affect streamflows in the Belubula River through change in catchment area size and altered interaction with groundwater. The potential effects of the mine development have been assessed and documented in the revised surface water assessment (Appendix G of the Amendment Report) and groundwater assessment addendum (Appendix H of the Amendment Report). The results of the assessments demonstrate that the mine development will not have a significant impact on streamflow in the Belubula River. The changes that are predicted to occur are within the current natural variability of the Belubula River flows. Users downstream of the mine development area who rely on and access water from the Belubula River are not expected to experience reduced access to water.

The predicted change to streamflow is mainly due to a reduction in the catchment size reducing surface runoff to the river. The catchment size will reduce because the infrastructure of the mine development will occupy a portion of the original catchment; rainfall that falls into this area will no longer runoff and form streamflow but will instead be captured by the mine water management system – ie the area of the mine development is removed from the catchment. The modelled maximum reduction of streamflow is approximately 4% at Carcoar Dam, which reduced to approximately 0.5% following closure. The modelled reduction of streamflow is approximately 9% at Mid Western Highway during project operation.

Impacts during low flow periods

Regis understands that downstream users are most reliant on water within the river during low flow periods. The mine development's influence on streamflow will not be consistent for the entire length of the project but, rather, will be short-lived and will increase gradually during the operational phase, until all the project infrastructure, stockpiles and TSF are built and the mining is developed; at which point the maximum impact would occur (also called "maximum disturbance"). Following this time, as mining ceases and closure and rehabilitation commences, the mine development's influence on streamflow will decrease. At the maximum disturbance time, flows in the Belubula River between the Mid Western Highway and above Carcoar Dam are expected to range between 697 and 1,509 ML/year during periods of low rainfall (Appendix G of the Amendment Report). This is comparable to the 764 and 1,574 ML/year currently expected during low rainfall periods (ie without the project) at the Mid Western Highway and Carcoar Dam, respectively. During periods of low rainfall, groundwater discharge to the Belubula River in the Mid Western Highway area and further downstream is predicted to remain the same, with or without the project.

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

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

A total of 337 ML/year is allocated to 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. This is presented graphically, as percentages, in Figure 5.2.

The surface water modelling completed considered the full period of available historical daily climatic data from 1889-2020. This was undertaken to ensure a full range of climatic variably was assessed.

5.1.6 Adequacy of water modelling

Of the objections received, 11% (2) of organisations and 3% (8) of unique community submissions raised concerns about the adequacy of the water modelling provided within the EIS and supporting technical assessments. This included concerns related to:

- the level of detail provided on modelling assumptions; and
- the validity of data used within modelling (including river flows and water quality).

Some community members have raised concerns about the reliability of the surface water modelling and groundwater modelling completed for the project. As these models have been used to inform the impact assessments, Regis has engaged technical specialists with experience completing these types of models and assessments, and understand the requirements of the NSW and Commonwealth Government expectations.

As outlined in the EIS, technical specialists have completed this work in consultation with Regis, using all available data which has enabled the specialist consultants to establish a robust understanding of the local surface water, geology and groundwater systems. The models have undergone technical third-party reviews and have been completed in accordance with the requirements of the NSW Government, and the work has been found fit for purpose and appropriate for assessing potential impacts of the mine development. This is discussed further below.

i Groundwater modelling

The groundwater modelling work completed for the mine development has been described in detail in the groundwater assessment prepared for the EIS (Appendix K of the EIS) and the groundwater assessment addendum (Appendix H of the Amendment Report). The approach to the modelling work is consistent with industry standard and meets the requirements of the relevant national and relevant NSW Government guidelines, specifically it has been completed in accordance with:

- Australian Groundwater Modelling Guidelines (Barnett et al 2012);
- Groundwater Monitoring and Modelling Plan (EMM 2017) prepared for the project in accordance with the NSW guideline '*Groundwater Monitoring and Modelling Plans – Information for prospective mining and petroleum exploration activities*' (DPI 2014b);
- NSW Aquifer Interference Policy (DPI Water 2012); and
- the Uncertainty Guidelines (Middlemis and Peeters 2018) developed by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC), although not strictly required.

The groundwater modelling completed for the project has undergone technical review by leading groundwater modelling specialists, including a third-party review by Mr Hugh Middlemis of HydroGeoLogic (Middlemis 2019). DPIE also engaged Dr Justin Bell of JBS&G (2019) to conduct a review of the groundwater assessment completed for the EIS (Appendix K of the EIS).

The review by HydroGeoLogic concluded (Middlemis 2019):

> "… the McPhillamys Gold Project groundwater modelling assessment is fit for the purpose of mine dewatering environment impact assessment and informing management strategies and licensing."

The third-party reviewer (HydroGeoLogic) determined that the groundwater model has a confidence level of Class 1 with elements of Class 2 (and Class 3).

Consultation between DPIE, JBS&G, Regis, EMM and HydroGeoLogic personnel occurred in late 2019 and early 2020 to discuss the findings of the review (by JBS&G) and agree a path forward to respond to the queries raised. Regis' formal response to the review by DPIE's expert is provided in Appendix C of the groundwater assessment addendum (Appendix H of the Amendment Report).

Regarding the validity of data used in the modelling, as stated above, routine water monitoring commenced for the project in 2014 across a network of landholder bores and surface water features. Since then, Regis has drilled and installed additional groundwater monitoring bores, and have increased the monitoring locations to include springs, dams and other sections of the Belubula River. Up to six years of baseline water (surface water and groundwater) data has been collected across the project area.

This is a considerable amount of data that is used to establish a baseline dataset. Most projects require a minimum of two years of monitoring data (to understand seasonal variation), however Regis has collected data for over six years, far exceeding this minimum requirement.

As described in the EIS, future improvements to the numerical groundwater flow model will be undertaken as and when new data become available, particularly where there is a divergence of observed groundwater system response from that predicted by the model. Regis' approach to adaptive management is discussed in Section 4.2.2 and Appendix H of Amendment Report.

ii Surface water modelling

a Carcoar Dam AWBM

The surface water modelling work completed for the mine development has been described in detail in the surface water assessment prepared for the EIS (Appendix J of the EIS) and the revised surface water assessment (Appendix G of the Amendment Report). The approach to the modelling work is consistent with industry standards and meets the requirements of the relevant national and relevant NSW Government guidelines. In addition, the surface water model has undergone third-party review during the EIS stage of the project (refer Appendix J of the EIS) and more recently by DPIE-Water surface water modellers.

As outlined in Section 4.1.2, consultation has been held with DPIE-Water during the response to submissions phase of the project in relation to the Carcoar Dam Australian Water Balance Model (AWBM). DPIE-Water subsequently provided additional advice in writing on the 23 April 2020 outlining DPIE-Water had reviewed the Carcoar Dam AWBM and confirmed the model is generally fit for purpose for assessing flow interception and reduction of river flow inputs to Carcoar Dam. The letter noted, however, that extension of the period of record used to test and calibrate the model (including previous dry periods) would increase the confidence in the model's predictions of river flows above Carcoar Dam.

Accordingly, DPIE-Water provided data records of historical storage levels and release volumes which have subsequently been incorporated into the revised modelling. DPIE-Water subsequently provided additional advice in writing on the 23 April 2020 outlining DPIE-Water had reviewed the Carcoar Dam AWBM and confirmed the model is generally fit for purpose for assessing flow interception and reduction of river flow inputs to Carcoar Dam.

b Modelling assumptions for operational and clean water management systems

A description of the operational water balance model is contained in Section 3.2.1 of the revised surface water assessment (Appendix G of the Amendment report). Key model data and assumptions are provided in Section 3.2.2 of that report.

A description of the water balance model of the clean water management system is contained in Section 3.1.1 of the revised surface water assessment (Appendix G of the Amendment report). It is noted that an independent technical review of the EIS surface water assessment was carried out (contained as Appendix D to Appendix J of the EIS). This review found the approach and methodology of the assessment (which has been subsequently applied to the revised assessment) was appropriate and consistent with industry standards.

5.2 Air quality and greenhouse gas

An air quality impact assessment (AQIA) was undertaken as part of the EIS (Appendix M of the EIS) to assess potential air quality and greenhouse gas (GHG) impacts associated with the mine development and the pipeline development on the surrounding environment, particularly at neighbouring sensitive receptors (referred to as the EIS AQIA). The assessment has also been updated to reflect the amendments to the project (refer to Appendix L of the Amendment Report). This section provides responses to submissions received regarding air quality and GHG.

5.2.1 Quantity and composition of dust and emissions

Of the objections received, 72% (13) of organisation submissions, 56% (131) of unique community submissions and form letters 1 and 3 raised concerns about the quantity and composition of dust and emissions generated by the project. This included concerns related to the presence of hazardous materials and/or heavy metals in dust and emissions.

The predicted levels of dust particles and other emissions from the project were quantified via dispersion modelling. The EIS AQIA modelled four stages over the proposed life of the mine (years 1, 2 ,4 and 8). An additional stage (year 6) was modelled as part of the revised AQIA prepared for the amended project (ie the Amendment Report). The results of the modelling show that, for all assessed stages of the amended project, the 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 predicted to be below the applicable impact assessment criteria at nearby residences, throughout the life of mine. The assessment criteria, which are specified within the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA 2016) (Approved Methods), are designed to maintain air quality that allows for adequate protection of health and amenity.

In relation to the potential presence of hazardous material and/or heavy metals, emissions of individual metals and metalloids were estimated for the different material types generated by the mine development; that is:

- waste rock – unsealed road sources, waste rock handling in pit, waste rock dump operations, drill and blast operations, wind erosion of waste and soil stockpiles, soil activities;
- ore – ore material handling in pit, ROM pad operations, processing plant releases, ROM stockpile wind erosion; and
- tailings – TSF wind erosion.

To understand the likely metal concentrations in the material to be handled and stored during the operation of the project, geochemistry assay profiles for waste rock, ore and tailings material were reviewed as part of the AQIA preparation (EMM 2019f). The median (or average) metal concentrations were used in the dispersion modelling undertaken for the EIS AQIA.

While the median profile concentrations adopted in the EIS AQIA are considered appropriate for representing likely metals emissions from the amended project, the use of the 90th percentile concentration has been adopted for metal emissions for waste rock and ore material in the revised AQIA to increase the level of conservatism in the modelling. This approach was adopted in response to comments received from the EPA on the EIS and concerns about metal emissions raised in the community submissions. For tailings, no change was considered necessary as the maximum concentration across three tailings profiles was adopted in the EIS AQIA. A more detailed discussion on the comments from the EPA on metal concentrations and the additional assessment undertaken to address the EPA's requests is provided in Section 4.2.1v.

The revised modelling results for metal emissions generated by the project, accounting for the 90th percentile metals concentrations, are reported in the revised AQIA (EMM 2020g, refer to Appendix L of the Amendment Report). Despite the increase in metal emissions due to an increased assumed concentration of metals and metalloids in material to be handled at the mine site, predicted concentrations of all quantified metals remain well below applicable EPA impact assessment criteria across all model scenarios.

Notwithstanding all of the above, Regis will develop and implement a comprehensive Air Quality Management Plan (AQMP), which will be prepared in consultation with the EPA and to the satisfaction of DPIE, in accordance with the recommendations of the AQIA. The AQMP will document management practices and mitigation measures to minimise air emissions from all stages of the project. Regis will continue to undertake a comprehensive air quality monitoring program throughout the life of the project, as per the commitments in the EIS and Amendment Report, including installation of a real time monitoring network during the life of the project. The results of this air quality monitoring program will be reported in the annual environmental management report (referred to as the Annual Review), which will be required as a condition of the development consent. This Annual Review will be submitted to relevant government agencies on an annual basis and will be made publicly available on the McPhillamys website. The AQMP will also include a Trigger Action Response Plan (TARP) for responding to air quality results where levels are recorded that exceed the triggers identified. Triggers will be set below relevant NSW EPA criteria, so that any increasing dust emissions can be managed effectively prior to exceedances occurring.

5.2.2 Dust contamination of surrounding waterways

Of the objections received, 17% (3) of organisations, 13% (31) of unique community submissions and form letters 1 and 3 raised concerns about the potential for dust generated by the project to contaminate surrounding waterways (including the Belubula River, Carcoar Dam and the greater Lachlan River catchment). This included concerns related to flow-on impacts from this contamination on surface water users (including farmers and irrigators).

As described above in Section 5.2.1, the results of the air quality modelling for the amended project show that the 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 predicted to be below the relevant NSW Government criteria at nearby residences throughout the life of the mine. These criteria, which are specified within the EPA's Approved Methods document, are designed to protect health and amenity.

The design of the mine development incorporated a range of dust mitigation measures. A review of these dust control measures was undertaken in the EIS AQIA, which identified that the proposed mitigation and management measures will be in accordance with accepted industry best practice. Further, the effectiveness of these measures is demonstrated by the results of the dispersion modelling which has predicted levels of emissions within the EPA's applicable criteria.

Examples of the dust mitigation measures include:

- chemical suppressants will be applied to high traffic haul road routes from pit exits to the waste rock emplacement area and ROM pad. All other unsealed transport routes (eg pit, ramps, waste rock emplacement tip heads, soil haulage) will be controlled through water suppression;
- a road speed limit of 60 km/hr will be posted to all internal roads; however, it is noted that the average travel speed of haul trucks is nominally less than 40 km/h;
- the design of all crushers, screens and associated transfer points at the processing circuit will include dust control, dust extraction and/or filter systems;
- all exposed conveyors at the processing circuit will be covered;

- water sprays will be utilised at the ROM pad hopper/primary crusher dump pocket;
- ROM pad operations will be controlled through the use of water trucks and/or water sprays;
- the fine ore stockpile will be covered;
- in-pit drill rigs will be fitted with dry filter capture devices, nominally cyclones;
- wet suppression through watercarts will be applied to dozer activity areas for waste rock and soil operations; and
- soil stockpiles, waste rock emplacements and TSF walls will be progressively rehabilitated through hydro mulching or hydro seeding (or similar).

As described above in Section 5.2.1, the potential concentration of pollutant metals and metalloids in dust from the site has been conservatively modelled, using 90th percentile metal concentrations. Notwithstanding the highly conservative nature of the modelling assumptions, the predicted concentrations of all quantified metals remain well below applicable NSW EPA impact assessment criteria across all model scenarios.

A comprehensive surface water monitoring program, which includes chemical testing of waterways directly impacted by the project, is proposed to be undertaken during operation of the project. This program is discussed further in Section 5.1.

As demonstrated by the air quality modelling predictions in both the EIS and Revised AQIA (EMM 2020g), the proposed mitigation measures will effectively control emissions from the project such that contamination of waterways due to dust emissions is not predicted to occur.

5.2.3 Dust contamination of harvested rainwater and drinking water

Of the objections received, 33% (6) of organisations and 22% (52) of unique community submissions raised concerns about the potential for dust generated by the project to contaminate harvested rainwater and drinking water. There is a concern that dust generated by the project will accumulate on surfaces used to capture rainwater with flow-on impacts for those dependent on this water for potable use.

There is negligible potential for dust generated by the project to contaminate harvested rainwater and/or drinking water. As described in Section 5.2.2, the modelled dust emissions from the mine at all nearby residences are below relevant EPA criteria which, as also mentioned above, are based on maintaining an ambient air quality that adequately protects health and amenity. Concentrations of all quantified metals in dust emissions are also predicted to be well below applicable EPA impact assessment criteria across all modelled scenarios.

Notwithstanding, Regis will implement measures to minimise dust, as described in the revised AQIA (EMM 2020g) and as discussed in Section 5.2.2 above. These measures include (but are not limited to) the use of a water cart on high trafficked areas, enforcing speed limits on unsealed internal roads, enclosing crushing and screening components of the processing plant, not clearing areas until necessary to reduce the extent of exposed surfaces at any given time, rehabilitating disturbed areas as soon as possible and the installation and maintenance of a real time monitoring network. The mitigation and management measures committed to are in accordance with accepted industry best practice. On the basis of the above, there is negligible potential for dust generated by the project to contaminate harvested rainwater and/or drinking water.

5.2.4 Adequacy of air quality modelling

Of the objections received, 6% (1) of organisations and 3% (7) of unique community submissions raised concerns about the adequacy of the air quality modelling completed as part of the EIS and supporting technical assessment. This included concerns related to:

- adequacy of modelling assumptions (primarily wind levels, particularly in Kings Plains);
- potential cumulative impacts, and whether these were accounted for in the modelling; and
- adequacy of proposed mitigation and management measures (including proposed real time air quality monitoring).

i Modelling assumptions – background air quality

The AQIA prepared for the EIS and revised for the Amendment Report was conducted in accordance with the guidelines specified by the EPA in the Approved Methods. Consistent with Section 2.1 of the Approved Methods, the AQIA is classed as a 'Level 2' assessment, consisting of a refined dispersion modelling approach using site-specific and/or representative inputs.

Key inputs to the modelling were obtained from a variety of sources. Background air quality was quantified through a combination of local air quality monitoring data and regional air quality monitoring data. Regis has commissioned and currently operates an air quality monitoring network for the project area. The network consists of the following monitoring equipment:

- one high-volume air sampler (HVAS) for the recording of PM_{10} concentrations on a one-in-six day routine;
- four dust deposition gauges for recording monthly dust deposition rates; and
- one meteorological station recording weather conditions, including wind speed and direction, temperature, solar radiation, rainfall and atmospheric pressure.

The locations of the air quality monitoring equipment are illustrated in Figure 11.4 of the EIS. Data collected over four years from this monitoring network was used to characterise the existing air quality environment in the dispersion modelling for the mine development.

To supplement the project-specific monitoring data, hourly average concentrations of PM_{10} and $PM_{2.5}$ for the period 2014-2018 were obtained from the BCD air quality monitoring station at Bathurst, approximately 23 km east-north-east of the project area.

Further discussion on the adequacy of modelling assumptions relating to wind speed and direction is provided below.

ii Modelling assumptions – Wind speed and direction

Data from the on-site meteorological monitoring station was the primary resource for representing meteorological conditions at the project area and surrounding land (ie Kings Plains) in the air quality dispersion modelling. Measurements of wind speed, wind direction, standard deviation of wind direction, temperature (2 m and 10 m above ground level), relative humidity and solar radiation were used in the modelling. This station is maintained as per EPA requirements, including regular calibration by a suitably qualified technician.

This data was supplemented with corresponding observations of station-level pressure and cloud cover taken from the Bureau of Meteorology (BoM) automatic weather station (AWS) at Orange Airport, located 20 km north-west of the project area meteorological station.

The onsite meteorological station was installed in the mine development project area in 2014. The air quality model requires a complete set of meteorological data for one year. At the time of preparation of the EIS AQIA in 2019, there were five years of data available (2014-2018) from this on-site station. This data was, therefore, analysed to determine the most representative year for modelling (as presented in Appendix B of the AQIA for the EIS (EMM 2019f)), and to ensure the data was consistent with long term trends as recorded by BoM operated weather stations.

The analysis assessed interannual trends relating to wind direction, wind speed, temperature and relative humidity, and demonstrated a similarity across all years in the most important parameters for pollutant dispersion, such as wind speed and wind direction. The interannual profiles for air temperature and relative humidity were also comparable between 2014 and 2017 with only the 2018 dataset showing slightly higher temperatures and lower relative humidity, which are indicative of the strong drought conditions during that year. Concentrations of particulate matter were also relatively high during 2018 and not considered to be representative of the area relative to the previous four years.

The meteorological data set for 2017 was close to 100% complete for all parameters, meeting the minimum 90% data completeness requirement for all parameters specified with Section 4.1 of the Approved Methods (EPA, 2016). Therefore, the 2017 calendar year was adopted as the 12-month modelling period for the purpose of the EIS AQIA (and for the revised AQIA) as it was the most recent, complete and representative dataset.

iii Cumulative (background + mine development) results

Cumulative air quality impacts were assessed in the AQIA for the EIS and revised AQIA for the Amendment Report by combining background air quality with predicted emissions for the project for each pollutant at each receptor location, in accordance with the Approved Methods (EPA 2016).

The cumulative results presented in the revised AQIA (Appendix L of the Amendment Report) demonstrated compliance with applicable impact assessment criteria, despite a range of conservative assumptions in the emission calculations and dispersion modelling techniques, at all receptors (noting the one exceedance predicted in the EIS in Year 4 is no longer forecast to occur).

iv Adequacy of mitigation and management measures

As described above in Section 5.2.2, the design of the mine development incorporated a range of dust mitigation measures. A review of dust control measures was undertaken in the AQIA, and this identified that the proposed mitigation and management measures will be in accordance with accepted industry best practice. The effectiveness of these measures is demonstrated by the fact that all predicted modelling results are within the EPA's applicable criteria.

In addition, Regis will implement a robust air quality monitoring network, including real-time monitoring to enable the proactive management of air quality and dust emissions. The AQMP to be developed for the project will also include a TARP for responding to air quality results, where levels are recorded such that they exceed the triggers identified. Triggers will be set below relevant NSW EPA criteria, so that any increasing dust emissions can be managed effectively and proactively, prior to exceedances occurring.

5.2.5 Contribution to greenhouse gas emissions

Of the objections received, 8% (19) of unique community submissions and Form Letters 1 and 3 raised concerns about the project's contribution to greenhouse gas emissions (including those generated by project-related plant and equipment).

Total GHG emissions from the project were quantified in the EIS and presented in full in Appendix M and have been updated to reflect the amended project (presented in Appendix L of the Amendment Report). The estimation of GHG emissions for the amended project was based on the Australian Government DoEE National Greenhouse Accounts Factors workbook (DoEE 2018).

Total GHG emissions from the project 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 project (including both the mine development and pipeline 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 2017 (which was the most recent National inventory available at the time the GHG assessment was prepared). Further discussion on climate change impacts is provided in Section 5.21.

GHG emissions from the project are principally associated with on-site energy consumption, specifically diesel combustion and consumption of purchased electricity. In order to minimise GHG emissions, Regis will:

- adopt energy efficient lighting technologies and hot water and air conditions systems wherever practical;
- use alternative energy sources where feasible, such as solar power;
- undertake periodic audits and reviews on the amounts of materials used, amount of mine waste and non-mine waste generated and disposed; and
- source materials locally where feasible to minimise emissions generated from upstream activities.

Further, Regis will measure energy consumption, and calculate and report Scope 1 and Scope 2 GHG emissions in accordance with the requirements of the NGER Act. Under NGERs requirements, relevant sources of greenhouse gas emissions and energy consumption must be measured and reported on an annual basis, allowing major sources and trends in emissions/energy consumption to be identified.

5.3 Noise, vibration and blasting

A noise and vibration impact assessment (NVIA) was undertaken as part of the EIS to assess potential noise and vibration impacts associated with the construction and operation of the mine development on the surrounding environment, particularly at neighbouring sensitive receptors (Appendix L of the EIS). A separate NVIA was prepared for the pipeline development (Appendix AA of the EIS). Both assessments have been updated to reflect the amendments to the project and are included as Appendix J (mine development NVIA) and Appendix K (pipeline development NVIA) respectively.

5.3.1 Application of VLAMP

Of the objections received, 6% (1) of organisations and 5% (12) of unique community submissions raised concerns about how the NSW Government's *Voluntary Land Acquisition and Mitigation Policy* (VLAMP) has been applied in the noise and vibration impact assessment (Appendix L of the EIS). This included concerns related to:

- the number of receivers recommended to be covered by VLAMP and consistency with the findings of other assessments; and
- the notification requirements for potentially-affected landholders (ie those identified as covered by VLAMP).

No properties were predicted to experience noise levels in the EIS such that acquisition would be required; however, the operational noise assessment predicted that 15 residences in Kings Plains would experience noise levels such that they would have been entitled to the implementation of voluntary mitigation measures upon request (MAC 2019a).

As described in more detail below in Section 5.3.3, the number of receivers predicted to require mitigation under VLAMP has significantly reduced under the amended project, due to the reduction in predicted noise levels from the mine development.

In relation to the issue of mitigation and acquisition, the relevant NSW Government policy is the *Voluntary Land Acquisition and Mitigation Policy (VLAMP)* (NSW Government 2018). This policy sets out how mitigation and acquisition rights are assigned to landholders in relation to State significant resources projects in NSW. Defined criteria are set by the policy, above which landholders are assigned the right to request that the proponent (such as a mining company), acquire their property. The noise and air quality models developed for the amended project do not predict any properties will experience noise or dust levels that trigger this acquisition requirement. Predicted levels are also below the triggers for mitigation requirements, with the exception of one property (R28a), which is predicted to experience levels up to 3 dB above the relevant noise criteria for a short period in Year 1 of the project.

Regardless of the significant reduction in noise levels described above, Regis remains committed to negotiating agreements with landholders in Kings Plains as identified in the EIS, which will outline tailored mitigation plans for each property. It is also noted that these agreements are in recognition of potential noise and/or visual amenity impacts. Further, agreements are also being offered to additional landholders; one is an additional landholder with council approval to build a house on their property; another is in the vicinity of the new location of the site access road, as well as an additional four properties to mitigate visual impacts.

Notably, Regis has voluntarily included the option for 15 of these landowners to request that Regis purchase their property at any time within five years of the grant of development consent (provided the consent remains in force).

5.3.2 Impacts from blasting and vibration

Of the objections received, 22% (4) of organisations, 32% (74) of unique community submissions and form letters 1 and 3 raised concerns about potential impacts associated with blasting and vibration. This included concerns related to:

- the extent and implementation of blast clearance zones; and
- requirements for dilapidation or structural surveys.

Blasting activities will be designed and carried out to meet EPA blasting criteria and to manage potential impacts upon adjacent land uses. Blasting is likely to be conducted on a one blast per day basis with blasting carried out generally between the hours of 8:00 am to 4:00 pm Monday to Saturday. Blasting will generally not be carried out on Sundays and public holidays.

The results of the blasting assessment in the amended mine development NVIA (Appendix J of the Amendment Report) demonstrate that all receptors will meet the relevant overpressure and vibration criteria (including for heritage structures). There will be no requirement for blast clearance zones outside of the mine development project area. In consideration of the size of the blast, Regis propose to implement a nominal approximate 500 m blast clearance zone.

A blast management plan will be prepared and implemented prior to the commencement of blasting activities. This blast management plan will include a notification procedure to notify nearby receivers prior to blasting events and detail requirements for real time monitoring of overpressure and vibration that will be carried out during blasting activities. The blast management plan will also include consideration of the need for structural surveys (noting that based on the blasting assessment, these are unlikely to be required but may be considered by Regis on a case by case basis as required).

5.3.3 Noise impacts on sensitive receptors (including pipeline)

Of the objections received, 56% (10) of organisations, 43% (101) of unique community submissions and form letters 1 and 3 raised concerns about the potential for noise generated by the project to adversely impact sensitive receptors (including residences and livestock). This included concerns related to noise generated during the construction and operations of both the mine and pipeline developments.

i Mine development noise impacts

Regis recognises the concerns the local community have raised in relation to potential noise impacts from the mine development. In response to these concerns, as described in Chapter 3 of this Submissions Report, specific amendments have been made to the project to reduce predicted noise levels at neighbouring properties, particularly in the early few years of the mine development.

The key amendments that have reduced predicted noise levels from the mine development 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 (WMFs and the pit amenity bund) are undertaken generally in sequence to avoid a high concentration of activity in areas closest to residences;
- 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 previously proposed in the EIS; and

- utilisation of equipment with a reduced noise output on the southern end of the mine development project area.

As a result of these project amendments, a significant reduction in predicted noise levels has been achieved.

Predicted daytime noise levels are expected to comply with the construction noise criteria (also referred to as noise management levels NML) at all receivers throughout the construction phase of the amended project.

Predicted operational noise levels during the daytime are also not expected to exceed the operation noise criteria (referred to as Project Noise Trigger Levels (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 in Years 2, 6 8 and 10. In Year 1, negligible exceedances of up to 2 dB of the PNTLs are predicted to occur at 6 receivers during the evening period and 12 receivers during the night-time period. In Year 4, negligible exceedances of up to 2 dB of the PNTLs are predicted to occur at 1 receiver during the evening period and 7 receivers during the night-time period. At one property, (R28a) where there is currently no dwelling; however, development approval has been granted to build a residence, noise levels are predicted to marginally exceed the PNTLs by up to 3 dB during the evening and night-time periods in Year 1.

This is a significant improvement from the EIS, where the operational noise asssessment predicted that 15 residences in Kings Plains would experience noise levels that exceeded the PNTLs during the early few years of the mine development, such that they would be entitled to the implementation of voluntary mitigation measures upon request.

Notwithstanding the significant improvements in predicted noise levels associated with the amended project, Regis remains committed to implementing negotiated agreements with the 15 landholders identified in the EIS as being entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted. Notably, 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). Regis are also in the process of negotiating agreements with five more landholders in Kings Plains in recognition of predicted visual impacts.

Potential impacts of the project on livestock is addressed in Section 5.6.4 of this Submissions Report.

ii Pipeline development noise impacts

In relation to noise from the pipeline development, it is recognised that predicted construction noise levels for transient activities have the potential to be above the standard NMLs at most residential receivers in proximity to the work. This is not uncommon for a construction activity of a substantial piece of linear infrastructure such as the pipeline. Importantly however, for the most part activities are expected to be only for a very short duration (ie either one to two shifts or up to a few days).

Furthermore, the highly affected LAeq (15min) noise management level of 75 dBA is expected to be satisfied at all receivers during all pipeline transient construction activities (clearing and grading, trenching and backfill). The CEMP to be prepared for the pipeline will outline notification procedures for potentially impacted residences. Noise and vibration management will be considered and addressed as part of the CEMP. This plan will document mitigation measures to be implemented, as well as a complaints register and complaints handling and escalation procedures.

Strategies to minimise noise impacts on sensitive noise receivers documented in the CEMP are likely to include the following:

- ensure that construction activities meet construction NMLs within the allowable hours of operation as far as practicable;

- where feasible, avoid completing construction activities adjacent to residential receivers between 6pm to 7am (especially vegetation clearing and rock breaking);
- where noise levels are above relevant NMLs, implement reasonable and feasible best practice noise controls to minimise noise emissions and/or exposure duration at affected receivers; and
- where the use of implemented noise controls does not adequately address exceedance of noise management levels, adopt alternative measures to minimise impacts on the community.

The Australian Standard AS 2436-2010 (R2016) *Guide to Noise Control on Construction, Maintenance and Demolition Sites* also sets out numerous practical recommendations to assist in mitigating construction noise emissions. These recommendations include operational strategies, source noise control strategies, noise barrier control strategies, and community consultation, and will be considered in the CEMP and implemented where appropriate.

Once construction of the pipeline is completed, noise modelling predicts there will be no significant impacts to surrounding residences. There is very little above-ground infrastructure associated with the pipeline, which will be limited to the four pumping station facilities, three of which are in the vicinity of existing industrial and mining operations (ie Centennial mines and MPPS). 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.

Potential impacts of the project on livestock is addressed in Section 5.6.4 of this Submissions Report.

5.3.4 Adequacy of noise modelling

Of the objections received, 6% (1) of organisations and 7% (16) of unique community submissions raised concerns about the adequacy of the noise modelling undertaken as part of noise and vibration impact assessment (Appendix L of the EIS). This included concerns related to the:

1. results presented for various receivers (namely how neighbouring residences may experience different results and why some residences have not been considered);
2. adequacy of the data collected to support the noise modelling assumptions (including measured noise levels);
3. effect of temperature inversions on the results presented within the assessment;
4. adequacy of proposed mitigation and management measures to address identified impacts; and
5. the absence of a peer review of the noise model and associated assessment report.

Responses to each of the points above are addressed in the following sections.

i Results presented for various receivers

One of the first steps undertaken in assessing noise and air quality impacts of the project is to identify the nearest potential sensitive receptors (ie surrounding privately owned residences). Residences were identified through review of aerial imagery and subsequent ground truthing. All residences with the potential to be adversely affected by the project have been identified in this process, and potential impacts modelled at those residences. Residences beyond where impacts are predicted to be within the relevant criteria, such as air or noise, are not all identified as they are considered a sufficient distance from the project where no significant impacts would occur. Neighbouring properties can have different results predicted due to differing land topography at the receiver and between the receiver and the modelled noise source.

The receptors identified for the mine development and the pipeline development are illustrated in Figure 6.21 and Figure 6.33, respectively, in the Amendment Report (EMM 2020a).

ii Adequacy of data

Detailed discussion on the noise monitoring data collected and used to support the noise model is provided in the amended NVIA (refer to Appendix J of the Amendment Report) and in Section 4.2.4 of this Submissions Report (in response to EPA comments). Notably, in Kings Plains where the residences closest to the mine development are located, Regis deployed a Svantek SV200 Noise Monitoring Terminal (NMT) to measure existing noise levels from November 2016 to February 2017; a total of 87 days. From the total 87 days of data collected, 63 daytime, 64 evening and 60 night time valid values were measured, providing a large and robust data set to use in the noise model, which is well in excess of the minimum seven days required by the NPfI (EPA 2017).

iii Temperature inversions

The NPfI requires the percentage occurrence of F and G Class inversions during the night time period to be determined. Where the occurrence of F and G Class inversions is determined to be 30% or more, the NPfI requires that noise-enhancing meteorological conditions be adopted in an assessment. For less than 30% occurrence, standard meteorological conditions are to be adopted. The occurrence of F and G Class inversions for the night-time period for the project was found to be less than 20%. Hence, standard meteorological conditions were adopted and inversions were not considered further in the EIS noise assessment.

A noise monitoring program combining (unattended) real time noise monitoring terminals (NMT) and meteorological forecasting will be developed to assist in quantifying noise emissions and provide warnings for noise enhancing conditions. The noise monitoring network, enabled with SMS/email alarms when noise levels are approaching noise criteria (PNTLs) will enable mine operators to manage equipment quantities and work locations (ie manage equipment usage if necessary) and maintain noise emissions within the required limits, including the requirement to meet the PNTL +5dB limit for noise enhancing conditions such as winds and temperature inversions.

iv Adequacy of mitigation/management measures

As previously described, substantial amendments have been made to the project to reduce noise levels. This includes the incorporation of various mitigation measures as listed below. The reduction in the predicted noise levels from the amended project demonstrates the effectiveness of these mitigation measures in minimising noise emissions from the mine.

- 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 SPLs and spectral content).
    - 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 SPL 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 3 dBA in total project SPL.

- Amended mining and waste rock emplacement schedule:
    - As described in Chapter 3, 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.
    - 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 also occur in the daytime period only.

v Technical review

The mine development and pipeline development NVIAs prepared for the EIS were technically reviewed by DPIE's noise specialist and EPA noise specialists during the exhibition of the EIS. Comments and recommendations from these reviews have been addressed and incorporated into the amended mine development and pipeline development NVIAs (refer Appendix J and Appendix K of the Amendment Report) in consultation with DPIE and the EPA. Detailed responses including how the EPA's recommendations have been addressed in the amended NVIAs are included in Section 4.2 of this Submissions Report.

5.4 Social

A social impact assessment (SIA) was undertaken as part of the EIS to assess potential social impacts from both the mine (Chapter 20 and Appendix T) and pipeline developments (Chapter 33 and Appendix T). This assessment was updated to address the impacts of the amended project (refer to Appendix S of the Amendment Report). The SIA was undertaken in accordance with the relevant guidelines; *Social Impact Assessment Guidelines for State Significant Mining, Petroleum and Industry Development* (DPE 2017a) (the SIA guidelines).

This section provides responses to submissions regarding potential social impacts.

5.4.1 General social impacts

Of the objections received, 22% (4) of organisations and 4% (10) of unique community submissions raised concerns about potential adverse social impacts associated with the project, including impacts on the local community, schools and sporting clubs.

The SIA found that there will be significant net positive social benefits as a result of the project for the local community, largely due to:

- local workforce recruitment;
- the flow-on benefits of this employment;
- the requirement for workers to live within 1-hour of the mine, ensuring that flow-on benefits from employment stay in the local community;
- the commitment by Regis to local procurement, using local business and contractors where possible;
- the resulting direct and indirect population growth and employment generation;
- investment in education and training as Regis seeks to build a local skill base to support labour supply for the project; and
- the establishment of a VPA with Blayney Shire Council, which can be used by council for the benefit of the local community.

Regis has already demonstrated its commitment to being an active member of the local community. Regis opened a local office in Blayney in 2013, where Regis staff are available to discuss the project with the community. Since 2013, Regis has given support to local charities, schools, health, sporting and other local groups. Regis is also actively involved in the local business community, including sponsoring the Orange Business Chamber and Blayney Rotary Club. Examples of other activities that Regis has been involved in, supporting local schools and the community, include:

- hosting school excursions for the collection of seeds to propagate from Regis owned land;
- working with Skillset Land Works to also collect and propagate seeds;
- restoration of the hot house (eg greenhouse) at the Blayney High School;
- Regis employees are active members of Kings Plains and Springside RFS.

The SIA acknowledges that the project will result in some social impacts, the most significant of which will occur to residents in closest proximity to the mine development project area, particularly within the community of Kings Plains. These impacts relate to a range of factors including changes in rural amenity and potential outmigration of residents.

As described in the EIS and Amendment Report, an extensive amount of work has been undertaken by Regis to the project design to avoid and/or reduce amenity-related impacts on the Kings Plains community. As described in Chapter 3 of this report, following the feedback received on the EIS after public exhibition, Regis undertook extensive and detailed mine planning to specifically reduce the predicted noise impacts. Measures to reduce amenity related impacts are discussed further below in Section 5.4.2.

A range of mitigation measures have been proposed to mitigate and/or manage the social impacts associated with the project (outlined further in section 6.14 of the Amendment Report) on the broader community. For example, prior to commencement of construction, Regis will develop a Construction Workforce Accommodation and Management Strategy (CWAS) to address the predicted impacts of the construction phase workforce on housing and short-term accommodation supply in the Blayney LGA. The strategy will be prepared in consultation with Blayney Shire Council, Orange360 and key accommodation providers.

A Social Impact Management Plan will also be developed, which will outline measures to be implemented throughout the mine life to ensure effective implementation of the commitments outlined in the SIA for positive social outcomes. This Social Impact Management Plan will include a suite of plans as follows:

- Stakeholder Engagement Plan;
- Corporate Volunteer Strategy;
- Local Content Plan;
- Indigenous Participation Plan; and
- Recruitment and Training Strategy.

In summary, the project will provide substantial direct and indirect employment opportunities, which will in turn provide a significant boost to the regional economy and local communities. The Blayney LGA in particular will benefit from investment in community infrastructure and services made possible through a 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.

5.4.2 Impacts on lifestyle

Of the objections received, 33% (6) of organisations, 39% (92) of unique community submissions and Form Letters 1 and 3 raised concerns about the potential for the project to adversely impact the lifestyles and quality of life of neighbouring residents and the local community. This included concerns relating to potential amenity impacts associated with the construction and operation of the project (namely noise, vibration, blasting, lighting, air quality, health and traffic).

The project's potential impacts on lifestyle and the quality of life of neighbouring residents and the local community were carefully considered as part of the SIA (Chapter 20 and Appendix T of the EIS) and other amenity-related assessments (ie noise and vibration, air quality, traffic and visual). Regis recognises that the community is concerned about loss of amenity due to the project's construction and ongoing operation and how this could affect their rural lifestyle.

Detailed technical assessments completed as part of the EIS to investigate the potential for amenity related impacts to occur on the local community identified residual impacts of the project and appropriate mitigation measures to effectively address these impacts, so that these residual impacts would be reduced to an acceptable level. Further discussion on each of these aspects is provided in the sub-sections below.

i Air quality

Emissions to the atmosphere from the mine will be well within relevant Government set criteria, as described in detail in the AQIA prepared for the amended project (Appendix L of the Amendment Report). As described above, these criteria are designed to protect human health and amenity. Therefore, no significant off-site air quality impacts are anticipated. This is due to a number of aspects built into the design of the project and the dust control measures that Regis are committed to, including the use of watercarts, sealing the main site access road for the first kilometre, the use of large capacity trucks to limit the heavy vehicle movements around the site, and progressive rehabilitation of disturbed areas. Further, the majority of the mine's water supply will come via the 90 km pipeline to be installed as part of the project from mines near Lithgow. This not only enables the beneficial use of otherwise surplus water, but also means that a secure water supply will be available for dust suppression that does not rely on rainfall or weather conditions.

In addition, Regis will install and operate a real time air quality monitoring network, so that dust emissions can be continuously monitored, and operations proactively managed to keep dust levels low.

ii Traffic

The traffic assessment concluded that vehicle movements generated during the construction and operation of the project will not have a significant adverse impact on the local and regional road network. Notably, all ore extracted by the mine will be processed onsite and as a result, there will be no heavy vehicle haulage of ore from the mine on public roads. Heavy vehicle movements to and from the site will be limited to the delivery of goods required at the mine. A drivers code of conduct will also be put in place, outlining requirements for workers use regional roads to travel to and from the site where possible, rather than local roads.

Regis has also directly responded to concerns relating to the location of the originally proposed intersection location on the Mid Western Highway from both the community and government agencies (TfNSW), moving the intersection around 1 km east of its original location. The benefits of this change are discussed above in Section 4.7.

iii Noise and vibration

In relation to noise, some elevated levels were predicted by the noise assessment prepared for the EIS to occur on occasion at a number of residences in Kings Plains. Notably, the noise assessment also found that these exceedances would reduce to within 2 dB of the noise criteria applicable to the mine by Year 4, predominantly as a result of the amenity bunds being in place by this time.

However, as described above and in Chapter 3, significant amendments have been made to the project to further reduce these noise levels. In response to concerns raised in submissions on these predicted impacts of the project, since the public exhibition of the EIS Regis has undertaken more detailed mine planning to investigate project design alternatives to further minimise impacts. The focus of this process was to specifically address the amenity related aspects where residual impacts were identified in the EIS and that raised particular concern in submissions, namely noise and visual amenity.

This process was an iterative one, where the noise consultant who prepared the noise impact assessment (MAC) worked with Regis' mining engineers to investigate alternatives such as equipment type and numbers, the location of exit ramps out to the pit (where haul trucks generate significant noise as they leave the pit) and the timing of construction of the waste rock emplacement. This process, and the associated revised predicted noise levels, are discussed in detail in Section 4.2.2, and in Section 6.5 of the Amendment Report. As described, the outcome of this process was a mine design and schedule that is predicted to have a much lower level of noise impact on residences in Kings Plains compared to what was presented in the EIS. Only one receptor is now predicted to experience exceedances of the relevant noise criteria by more than 2 dB, which is predicted to occur for a short period of time in Year 1. There is also no house on this property at present; however, as the landholder has a DA to build a residence, this property was included in the noise model as a potential sensitive receptor.

This is a considerable improvement from the results presented in the EIS, where 15 properties were identified as having the potential to experience noise levels above the PNTLs such that they would be entitled to request the implementation of mitigation measures at their property. Notwithstanding this significant improvement, Regis are continuing the negotiation of agreements with landholders in Kings Plains as described further in part (v) of this response below.

The amended project therefore has substantial noise benefits compared to the design presented in the EIS. However, this improvement in noise has meant that there will be some additional impacts related to visual amenity (as discussed below) and a slightly extended period of operations into Year 11 (rather than finishing in around Year 10 as described in the EIS).

In relation to blasting, activities will be limited to a maximum instantaneous charge (MIC) of 300 kg to avoid exceedances of the relevant criteria for air blast overpressure and ground vibration occur at the closest residences.

iv Visual amenity

The EIS also concluded that there would generally be a high level of visual impact as a result of the mine development to residences in Kings Plains, rural residences and the Mid Western Highway up to Year 4 following the completion and progressive rehabilitation of the southern amenity bund, which has been designed to specifically address visual impacts. The amendments to the project have also had implications for visual amenity impacts. To achieve an improvement in noise levels, the southern portion of the waste rock emplacement (ie the southern amenity bund) will now take longer to build primarily due to the use of reduced equipment numbers and the early placement of waste at the northern end of the waste rock emplacement. As a result, the southern amenity bund will now be completed in approximately Year 6 rather than Year 4. The residents in Kings Plains will therefore have a view of active earthworks for longer than described in the EIS.

To address this impact and ensure changes in view can be effectively mitigated, Regis has commenced investigation into site specific mitigation measures, including development of tailored landscape plans involving soft treatments (such as tree planting) and hard treatments (such as the construction of screens, pergolas etc.), at the nearby residences in Kings Plains. This investigation and negotiation of treatments at residences in Kings Plains has continued post the exhibition period (refer to Section 5.4.4). Mitigation measures are also discussed further below.

v Health

Concerns discussed above in relation to amenity impacts were also raised in some community submissions relating to the potential for these amenity impacts to effect human health. Regis recognised these concerns as raised during community consultation on the project, and therefore while not required by the SEARs, engaged Environmental Risk Sciences Pty Ltd (enRiskS) to prepare a health impact assessment (HIA) for the project. This HIA is included in full in Appendix F of this report, and includes consideration of potential impacts related to air quality, noise and vibration, water quality and hazardous incidents. No health risk issues of concern were identified by this study for the local community. Further discussion on health related matters, including the HIA, is provided below in Section 5.5.

vi Mitigation and management

As described, Regis remains committed to the implementation of site-specific mitigation measures for residences identified in the EIS as requiring mitigation in Kings Plains with respect to noise and visual amenity. While the results of the revised noise assessment for the amended project indicate that these mitigation measures are no longer necessary in accordance with relevant government policy (ie the *Voluntary Land Acquisition and Mitigation Policy* (NSW Government 2017)) to manage noise impacts at residences in Kings Plains, they will be beneficial in reducing visual impacts, and in doing so will further mitigate noise levels, albeit levels that are predicted to be within EPA criteria. A total of 20 agreements are being progressed.

Regis is also going a step further in the negotiation of these agreements, by including a clause in 15 of these agreements that states landowners may request Regis purchase their property at any time within five years from the date that development consent is granted (provided that it remains in force).

In addition to tailored mitigation measures at neighbouring properties, Regis has continued implementing on-site visual screening. In July 2019, approximately 5,400 native trees were planted in corridors around the mine development area (refer to Plate 5.1). The trees were planted by staff and trainees from Skillset Land Works as part of the longer-term plan to provide visual screening and create wildlife corridors around the site. Almost a year later, most of the trees are growing well, despite the dry, hot summer, as illustrated in Plate 5.2, which shows a tree screen planted in the mine development project area in 2014.

Plate 5.1 **Planting visual screens around the mine project area (July 2019)**

Plate 5.2 **A visual screen in the mine development project area, planted in 2014 (August 2020)**

5.4.3 Intergenerational equity

Of the objections received, 17% (3) of organisations, 26% (60) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to impact future generations. This included concerns related to the:

- future land use potential of the mine project area at the completion of mining and rehabilitation; and
- long-term impacts on surrounding landholders and the local community (including concerns relating to the TSF, open cut void and the potential for 'long lasting residue' long after the mine has closed).

i Benefits to future generations

As defined in Section 3A of the EPBC Act, intergenerational equity is one of five principles of ecologically sustainable development and is the concept that, "the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations."

A direct result of the project will be the removal of a natural resource (ie gold) from the mine development. Approximately 1.7M ounces of gold will be extracted over the life of the mine. Gold is a recyclable metal that can be reused for generations, meaning there will be no disadvantage to future generations from the removal of valuable materials. Further, the revenue generated by the project will be used to employ and up-skill the mine workforce and provide more community facilities and other social infrastructure for the local community, which will benefit present and future generations.

As noted in Section 39.7.2 of the EIS, the project will therefore allow natural capital (ie gold) to be transformed into economic capital (ie greater personal and public income), social capital (ie better public facilities) and human capital (ie a more skilled and wealthier workforce).

Most notably with respect to potential long-term benefits for the community, after the mine ceases the pipeline development could remain in place and in doing so would become a valuable infrastructure asset, providing enhanced water security for future generations in the wider Central West region. The potential use of the pipeline post closure of the project will be determined in consultation with relevant stakeholders such as NSW Government, council, water infrastructure owners and the local community.

The project will incorporate a range of physical and operational controls and environmental management and mitigation measures (including biodiversity offsets) to minimise potential impacts to the environment. The cost of these measures will be met by Regis.

ii Future land use potential

As also described in Section 39.7.2 of the EIS, the only beneficial land use that could be affected in the long-term by the project post-mining, is agriculture. However, in this regard, the agricultural capability of the land to be disturbed will be progressively reinstated so that, with the exception of the final void, the mine development project area will be suitable for the continuation of agricultural land uses at the end of the mine life resulting in minimal ongoing impacts to future generations (Section 5.6.2).

The primary goal of the project's rehabilitation strategy is to return disturbed land to a condition that is stable and non-polluting and supports the proposed post mining land use, including a mixture of grazing on improved pasture and woodland areas. Further discussion on the site's closure and rehabilitation strategy is provided in the response to the Resources Regulator submission in Section 4.5.

iii Long term impacts

Some impacts on natural resources will occur as a result of the mine development, primarily through the removal of 130.39 ha of native vegetation. In relation to potential impacts on habitat, a number of avoidance and mitigation measures have been incorporated into the project design that minimise potential impacts on biodiversity and will ultimately result in net beneficial gains in biological resources. With the incorporation of these measures, the project is not likely to have a significant impact on any threatened species and communities listed under the BC Act or the EPBC Act, such that a local population would be lost. In addition, the proposed biodiversity offset strategy will address the potential residual impacts on biodiversity values associated with the project, such that biodiversity values are maintained or improved in the medium to long-term in the broader region (ie for future generations). As discussed further in Section 5.7.6, Regis has already secured land to be used as a biodiversity offset, which will be established as a stewardship site.

The Groundwater Assessment and Surface Water Assessment prepared for the EIS (and their associated revisions for the Amendment Report) include long-term modelling of post-mining conditions to inform assessment of potential long-term impacts on water resources that may affect future generations. The project is not expected to result in a significant or long-term impact on water resources. A conservative water management system has been designed so that the mine can operate as a nil discharge site. There will be some effects on groundwater during and in the immediate years after mining due to water flowing into the open cut pit from the adjoining aquifer; however, no impacts greater than 2 m will occur at any privately-owned bore. Further, a robust TSF design has been developed so that during operation it can be effectively managed to ensure no significant on-site or off-site impacts occur to water resources.

At the end of decommissioning and rehabilitation, a stable, non-polluting final landform will remain. As described in the EIS, erosion modelling was undertaken of the waste rock emplacement final landform, demonstrating the landform will remain safe and stable in the long term.

A final void will remain at closure and will cover an area of approximately 66 ha. This void is not predicted to adversely impact groundwater resources. As described in the groundwater assessment prepared by EMM for the amended project (included in full in Appendix H of the Amendment Report), groundwater modelling demonstrates that the void will slowly fill with water over time. The water level in the final void will remain below ground surface and will not over top.

As the final void will act as a groundwater sink, dissolved salts and metals are expected to become concentrated with time due to evaporation and exposure to potentially acid forming material within the void. However, salinity within the void is predicted to reach an electrical conductivity of approximately 1,600 µS/cm after 1,000 years, which is within the current groundwater salinity range in the area.

A detailed closure plan will also be developed within five years of closure of the mine. This detailed closure planning will be undertaken in consultation with relevant stakeholders, councils, NSW Government agencies, and the local community.

The potential contribution of the project to global climate change effects and greenhouse gases was described and assessed in the EIS and is considered further in Section 5.2.5 above.

5.4.4 Compensation for neighbouring landholders

Of the objections received, 7% (16) of unique community submissions raised concerns about the lack of compensation for neighbouring landholders with potential to be adversely impacted by the project. Concerns relating to compensation were raised with respect to compensation if a pollution event or loss of water supplies occurred, as well as the development of individual property landscape management plans to address noise and visual amenity impacts.

The EIS assessed a range of potential impacts associated with the construction and ongoing operation of the project. Where potentially significant impacts to neighbouring landholders were identified, the project has been refined and/or management and mitigation measures have been proposed in consultation with landholders, to further reduce potential impacts, as described above. This consultation with identified residents commenced during the preparation of the EIS and continued throughout EIS public exhibition and during the preparation of this Submissions Report and the Amendment Report. This consultation is ongoing.

In particular, in relation to amenity impacts predicted dust emissions are all within relevant EPA criteria. Noise emissions from the amended project have been reduced such that operational noise levels during the daytime are expected to comply with the relevant criteria throughout the life of the mine. Noise levels during evening and night time periods are predicted to be below criteria for all receivers except for some residents in Kings Plains during Year 1 and Year 4, where exceedances of up to 2 dB of criteria are predicted. Levels are predicted to exceed criteria 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. In relation to water supply, groundwater levels at existing privately-owned bores will experience little to no change as a result of the project.

To address residual environmental impacts, mitigation or compensation measures will be implemented by Regis so that impacts are either avoided or readily managed and are within acceptable, government-set criteria. Importantly, Regis has already commenced the negotiation of compensation measures with identified neighbouring residents in Kings Plains, as described above. These compensation measures include the development and implementation of tailored treatments (such as landscaping) at 20 properties, which will form part of the agreements being negotiated with these landholders (refer also to Section 5.4.4 below). Regis has also voluntarily included the option for landholders to request Regis purchase their property within five years of the grant of development consent. This clause is in 15 of the agreements being progressed with residences identified by the noise and visual assessment.

Regis will continue to undertake engagement activities so that near neighbours remain informed of the progress of the project approvals process, and opportunities to participate in further consultation. Regis will also continue to meet with the McPhillamys Community Consultative Committee throughout the assessment process.

Should the project be approved, Regis will continue to engage with the local community. There are multiple communication methods available for neighbouring landholders and the broader community to contact Regis if they would like further information about the project, including the measures committed to, to effectively manage off-site impacts. This includes the local Blayney project office, community relations phone numbers, website and email address.

Specific concerns raised in relation to the compensation of neighbouring landholders are addressed in further detail in the sub-sections below.

i Loss of water supplies

In relation to the security of water supply, the water assessment prepared for the EIS and again for the amended project, considered in detail the potential for offsite impacts on water supplies from privately owned bores. The conclusions of the updated assessment prepared for the amended project (EMM 2020f) were consistent with the findings of the EIS water assessment (EMM 2019c), which concluded that groundwater levels at existing privately owned bores in the vicinity of the proposed mine will experience little to no change as a result of the project.

The *NSW Aquifer Interference Policy* (NSW DPI - Office of Water 2012) defines a series of 'minimal impact considerations'; that is, thresholds below which any impact is considered minimal. If these thresholds are exceeded, then the AIP states that the impact is to be rectified through the implementation of 'make good' measures. With respect to bores, a decline in the water table of less than 2 m (at any water supply work) is defined as a 'minimal impact'.

The predicted change in groundwater levels at nearby privately-owned bores as a result of the project are well below 2 m, and therefore will not trigger the AIP impact criteria for make good requirements. The suitability of these bores as a water supply will therefore be unchanged by the project and no loss of water supplies is anticipated.

Notwithstanding, groundwater monitoring will be undertaken to closely monitor groundwater levels around the mine. In the unlikely event that monitoring results indicate greater than 2 m drawdown at a privately-owned bore, and the drawdown is attributable to the mine, 'make good' provisions for the affected groundwater user would be implemented in accordance with the AIP, and may include deepening the affected groundwater bore, construction of a new groundwater bore and/or provision of an alternative water supply of appropriate quality and quantity.

The water assessment prepared for the EIS and revised for the amended project also considered in detail the potential effect of the project on surface water availability. The predicted reduction of flow in the Belubula River as a result of less rainfall/runoff from a reduced catchment, as well as a reduction in baseflow, was assessed; finding that any changes in flow will be minor and within the natural variability of the catchment. This is discussed in more detail in Section 5.1.2.

ii Pollution event

Pollution is regulated in NSW by the EPA in accordance with the provisions of the POEO Act, for the scheduled activities listed in Schedule 1 of the Act. The project involves the activities of mineral processing and mining for minerals, and therefore in accordance with Schedule 1 will require an environment protection licence (EPL), which will be administered by the EPA. Regis will be required to submit an Annual Return each year to the EPA, reporting on the mine's performance in accordance with the conditions on the EPL, and will be required to prepare and maintain a Pollution Incident Response Management Plan for the project.

Potential mechanisms for offsite pollution events may include accidental discharges from the mine site's water management system and from groundwater seepage containing unacceptable levels of pollutants from the TSF, PAF cells or the final void. The mine has been designed to specifically eliminate the risk of these events occurring.

The water management system has been designed with sufficient capacity, considering the full range of rainfall events, such that it will be a nil discharge site (as described in detail in Section 6.4 of the Amendment Report).

With respect to the TSF, a robust design reviewed by technical experts has been developed, specifically to avoid adverse impacts to the surrounding environment. A life cycle approach to TSF planning, design, construction, operations, closure and rehabilitation has been applied to the TSF, incorporating a combination of measures to manage seepage; that is, a "multi barrier' seepage management approach. This multi-barrier approach includes a TSF main embankment with clay core and cut off key, a main embankment seepage interception trench, a liner in accordance with industry guidelines and best practice comprising in-situ clay and an engineered liner based on specific site characteristics equivalent to or better than a permeability of 1,000 mm of clay at 1 X 10^{-9} m/s, a groundwater monitoring network. The TSF design report (ATCW 2020) shows that the seepage interception trench is predicted to be highly effective at intercepting seepage from the TSF. Further, TSF seepage will be very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final pit void, and by the time the residual seepage migrates through the ground, 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.

WMPs (surface and groundwater) for the construction and operational phases of the mine development will be prepared and implemented for the life of the project. These will include monitoring programs with a trigger action response plan to effectively and rapidly deal with any unexpected issues as they arise.

iii Landscape management plans

The residual impacts of the project will mostly accrue to the residences closest to the mine project development area, particularly in the settlement of Kings Plains. Mitigation measures for these impacts have been proposed particularly for noise, dust and visual amenity, so that these residual impacts are reduced to an acceptable level. For example, to reduce the project's potential visual amenity impacts on neighbouring landholders, Regis has committed to:

- construction of amenity bunds that have been incorporated into the project design;
- on-site treatments including progressive rehabilitation of landforms and land cover at the open cut pit, waste rock emplacement area and ROM pad, as well as measures to reduce direct and diffuse lighting; and
- off-site treatments, including:
    - landscaping and tree planting at residences to the south and south-west of the mine site supplemented with appropriate landscape management strategies (including water supply, weed control and fertilising options to assist during the establishment of vegetation screens); and
    - tree planting along the Mid Western Highway, Walkom Road and Guyong Road to enhance local visual amenity post-mining (especially in Kings Plains).

All off-site visual amenity mitigation activities will be carried out in consultation with neighbouring landholders and the broader community.

As described above, the development of tailored landscape management plans for individual properties is underway. These landscape plans have been developed based on initial designs prepared by the landscape architects who undertook the visual assessment of the project (VPA 2019, 2020), the landholder, and a local builder. Community workshops and face to face consultations were held in October 2019 with local residents, VPA and members of the Regis team. This resulted in the development of conceptual landscape plans for 10 residences within Kings Plains.

Concept plans for three representative residences are now in advanced stages with eight more contracted and plans are progressing. An example of a residential amenity mitigation plan is provided in Plate 5.1.

Plate 5.3 Residential mitigation concept plan example (VPA 2020)

5.5 Health

Since the submission of the EIS, a health impact assessment has been prepared by Environmental Risk Sciences Pty Ltd (EnRisks) (Appendix E). The assessment focuses on impacts associated with the mine development and provides an assessment of the project's potential impacts on human health, specifically impacts related to air quality, noise and vibration, hazardous materials, water, lighting and stress/anxiety.

The HIA, in conjunction with other studies, has been used to provide responses to submissions regarding the mine development's potential impacts on human health.

5.5.1 Dust health impacts

Of the objections received, 22% (4) of organisations and 21% (48) of unique community submissions raised concerns about the potential for dust generated by the project to adversely affect human health. This included concerns related to the:

- potential for the project to exacerbate existing respiratory health issues for neighbouring residents; and
- lack of baseline investigations of potential dust-related health impacts (including inhalation and ingestion).

i Exacerbation of existing respiratory health issues

The results of the AQIA and the HIA show that, there will be no significant impact on the local community in relation to dust.

For all assessed stages of the mine development, the concentrations and deposition rates for particulate matter are predicted to be below the applicable impact assessment criteria at nearby residences. These criteria are designed to maintain an ambient air quality that allows for adequate protection of health and amenity. It follows therefore, that if criteria are met then there will be no significant impact on the local community in relation to dust.

Nonetheless, the health impact assessment considered potential health impacts as a result of the emissions to air of dust or particulate matter, metals bound to these particulates and dust that comprises naturally occurring asbestos. The assessment also considered potential health impacts from exposure to gaseous emissions (including nitrogen dioxide from fuel combustion and blasting and hydrogen cyanide from on-site processing).

The assessment followed the general principles outlined in enHealth (2012), *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*. The methodology is discussed in further detail in Section 1.4 of Appendix E.

The assessment considered the baseline health of the community (Chapter 3 of Appendix E) along with the potential for emissions of dust to result in health impacts within the community (Chapter 4 of Appendix E). As shown in Figure 5.7 below (reproduced from Figure 4.2 of Appendix E), the assessment considered potential for community exposure through:

- air (ie direct inhalation of fine dust or particulate matter);
- soil and dust (ie dust deposited on soil that may be ingested or make contact with skin);
- food (ie dust deposited on soil and produce grown in that soil may be ingested); and
- water (ie water in tanks potentially affected by dust deposited on roofs or other surfaces may be ingested or make contact with skin).

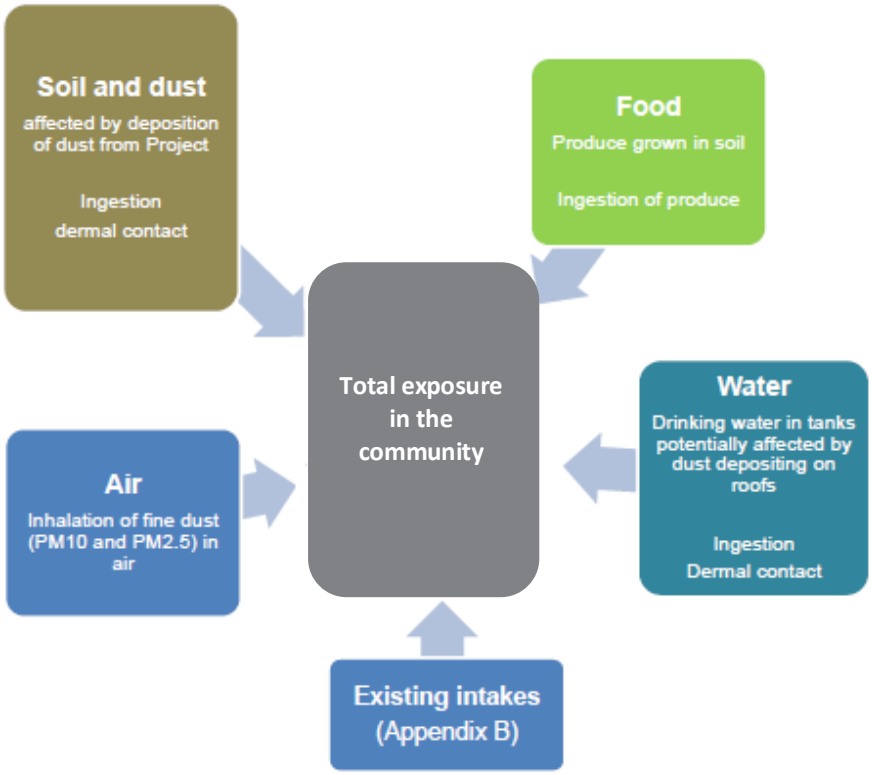


Figure 5.7 Media and pathways evaluated for assessing community exposures to dust emissions

Based on available data and information on the mine development's potential emissions of dust, naturally occurring asbestos, metals and metalloids, nitrogen dioxide and hydrogen cyanide, the assessment concluded that there are no health risk issues of concern relevant to the mine development.

Notwithstanding all of the above, Regis will develop and implement a comprehensive AQMP, which will be prepared in consultation with EPA and to the satisfaction of DPIE, in accordance with the recommendations of the AQIA. The AQMP will document management practices and mitigation measures to minimise air emissions from all stages of the project.

ii Lack of baseline investigations of potential dust-related health impacts

As part of the development of the AQIA, extensive baseline monitoring was conducted in accordance with the SEARs and the Approved Methods (EPA 2016).

Existing sources of air pollution in the local area have been identified based on data from the National Pollutant Inventory (NPI) and NSW EPA environment protection licence database. The key sources are the natural gas pipeline (APA Moomba to Sydney) located 5 km to the west-southwest of the site, the Cadia Valley Operations Dewatering Facility located 5 km to the south-southwest of the site and the Nestle Purina Pet Care factory located 7 km to the west-southwest of the site. Particulate emissions from these facilities are low. Other sources of particulate emissions in the local area include extractive industries, agricultural practices, unsealed roads, combustion from on-road and non-road engines, seasonal emissions from household wood burning, vegetation fires and wind-blown dust (particularly during drought conditions).

Data on existing air quality in the local area has been derived from Regis monitoring of PM_{10} and dust deposition, as well as data on PM_{10} and $PM_{2.5}$ from the NSW Office of Environment and Heritage (OEH) air quality monitoring station at Bathurst. It is noted that the data reported from Bathurst reflects more influences from urban sources within Bathurst, which are not expected to be present in the project area.

Regis will continue to undertake a comprehensive air quality monitoring program throughout the life of the project, as per the commitments in the EIS and Amendment Report, including installation of a real time monitoring network during the life of the project. The results of this air quality monitoring program will be reported in the annual environmental management report (referred to as the Annual Review), which will be required as a condition of the development consent. This Annual Review will be submitted to relevant government agencies on an annual basis and will be made publicly available on the Regis website.

5.5.2 General health impacts

Of the objections received, 21% (50) of unique community submissions raised concerns about the potential for the project to adversely affect human health. This included concerns that the EIS did not contain a standalone human health assessment prepared by a suitably qualified professional.

The key findings of the HIA were that:

> *Based on the available information, and with consideration of the uncertainties identified no health risk issues of concern have been identified for the off-site community*.

Since the submission of the EIS, a health impact assessment has been prepared by Environmental Risk Sciences Pty Ltd (enRisks) (Appendix E). The assessment focuses on impacts associated with the mine development and provides an assessment of the project's potential impacts on human health, specifically impacts related to air quality, noise and vibration, hazardous materials, water, lighting and stress/anxiety.

Based on the available information, and with consideration of the uncertainties identified in Appendix E, no health risk issues of concern have been identified for the off-site community as a result of the mine development. A summary of the health impact assessment and mitigation measures relevant to ensuring impacts are minimised or mitigated is presented in Table 5.2. Further discussion of the mine development's potential impacts on human health are addressed in:

- Section 5.5.1 – dust;
- Section 5.5.3 – lighting;
- Section 5.5.4 – mental health and stress;
- Section 5.5.5 – naturally occurring asbestos; and
- Section 5.5.6 – noise.

Table 5.2 Summary of health impacts

Air emissions	
Impacts	Based on the available data and information in relation to emissions to air of dust, naturally occurring asbestos (NOA), metals and metalloids that may be present on the dust, nitrogen dioxide and hydrogen cyanide from the project, potential impacts on the health of the community have been assessed. The impact assessment has concluded there are no health risk issues of concern relevant to the project.
Mitigation	A range of mitigation measures have been identified in the EIS and Amended Project report that would minimise dust emissions, diesel combustion emissions and blast fumes. In addition, air quality monitoring is proposed to be continued for the duration of the project, which includes dust-deposition monitoring and real-time particulate monitoring. An air quality management plan which includes a monitoring plan, would be developed for the project, documenting locations, monitoring methods and reporting responsibilities.
Noise emissions	
Impacts	Based on the predicted noise levels and the proposed mitigation and management measures, including additional monitoring and management as detailed in the EIS and Amended Project report, the potential for adverse health impacts within the off-site community associated with noise generated during construction and operations is considered to be negligible.
Mitigation	A range of noise mitigation and management measures, including monitoring and additional management measures are outlined in the EIS and Amended Project report. These mitigation and management measures would be detailed in a site Noise Management Plan relevant to the mine development site and the pipeline (construction phase) to guide, quantify and control noise emissions from the project. These plans may include provisions to undertake noise monitoring. In addition, a complaints handling process will be implemented for the mine development site and the works associated with the pipeline construction.
Water	
Impacts	Based on the assessments undertaken, the potential for adverse health impacts within the off-site community associated with impacts to surface water and groundwater (in relation to quantity and quality of water) as a result of the project, including the pipeline, is considered to be negligible.
Mitigation	Implementation of the proposed WMP which would include a monitoring program covering both onsite and neighbouring bore/water sources plus regular public reporting.
Hazardous materials	
Impacts	Based on the assessments undertaken there are no impacts to the off-site community. This includes the transport, storage and use of a range of dangerous goods, including explosives, cyanide and LPG. Where there are no impacts, there are no risks to community health.
Mitigation	Transport in accordance with the Australian Transport Code and the storage and use of dangerous goods in accordance with all relevant regulations and codes.
Lighting	
Impacts	Based on the assessments undertaken, it is expected that lighting would be visible in various areas surrounding the site, however the potential for lighting to directly intrude into residential homes and adversely affect sleep and hence health is considered negligible.
Mitigation	A range of mitigation measures related to lighting are outlined in the EIS and Amended Project report to minimise the potential for light spill that may affect off-site areas.

Table 5.2 Summary of health impacts

Stress and anxiety	
Impacts	The potential for the project to result in increased levels of stress and anxiety in the community has been identified by the community and recognised as an area of key concern in the SIA.
Mitigation	Management measures, principally related to engaging in and maintaining transparent, evidence based and ongoing dialogue with concerned property owners and other community members based on the outcomes of the EIS and Amendment Report.

The project's potential impacts on lifestyle and the quality of life of neighbouring residents and the local community were carefully considered as part of the SIA (Chapter 20 and Appendix T of the EIS) and SIA Addendum (Section 6.14 and other amenity-related assessments (ie noise and vibration, air quality, traffic and visual)) and are discussed further in Section 5.4.2.

To ensure the HIA was prepared by suitably qualified professionals Regis engaged enRisks to produce the report. The main authors of the report were:

- **Jackie Wright** who has over 25 years' experience in human health and environmental risk assessment in Australia. Experience includes leading and developing a national risk practice group for a major consultancy, training of staff, providing technical (and toxicological) direction, developing national guidance (including the 2013 NEPM Revision and CRC Technical Reports), participating in the development on industry guidance and standards, developing appropriate risk models and providing high level peer-review.

- **Therese Manning** who has over 25 years' experience in human health and ecological risk assessment in Australia and has worked in the area of analytical and environmental chemistry since 1987. Experience includes undertaking risk assessments, reviewing risk assessments, training staff, providing a centre of excellence within the NSW EPA in risk assessment, environmental chemistry, ecotoxicology, the regulatory context for technical issues and technical policy development.

5.5.3 Lighting health impacts

Of the objections received, 6% (1) of organisations and 2% (5) of unique community submissions raised concerns about the potential for lighting impacts associated with the project to adversely impact people's health. This included concerns that light pollution from the project will cause sleep disturbance resulting in a number of health problems.

The project's potential impacts on visual amenity, including direct and diffuse light pollution, were described in the visual impact assessment (VIA) prepared for the EIS, which has been updated to reflect the amended project (Chapter 6.13 and Appendix R of the Amendment Report).

The presence of light that directly intrudes into residential homes has the potential to disrupt sleep and adversely affect health and wellbeing. The assessment undertaken has identified that lighting required for the project, will result in sky glow that would be visible from surrounding areas, particularly given the existing dark night skies. Sky glow effects also occur from lighting in local towns. A sky glow does not provide sufficient light to affect sleep. More specific lighting sources include:

Lighting from the processing plant and mining infrastructure – these areas are separated from residential areas of Kings Plains by the prevailing topography (combined with the waste rock emplacement as it progresses) hence there would be no direct lighting impacts from these sources.

Light impacts result from machinery moving on the waste emplacement, and trucks entering the pit. Detailed mine scheduling will aim to build up temporary bunds on the waste emplacement during daytime for the night time shift to dump behind to try and mitigate direct lighting impacts as far as practicable. The amended project has trucks exiting and entering the pit from a northern exit plus there will be a vegetation screen (of existing vegetation) maintained around the edge of the pit. These activities would be expected to contribute to the project related sky glow, and specific mobile light sources may be visible from some locations at times, however direct intrusion of lighting into surrounding residential homes would not be expected to be significant.

Lighting around the mine site will be established in accordance with AS/NZS 4282:2019 – *Control of the Obtrusive Effects of Outdoor Lighting*, which sets out guidelines for the control of the obtrusive effects of outdoor lighting and gives recommended limits for relevant lighting levels to contain these effects within tolerable levels. Measures to enable avoidance and/or mitigation of any impacts associated with night lighting on neighbouring residents, passing motorists and fauna are listed in Section 5.8.3.

During operations, compliance monitoring will be undertaken to ensure that the proposed mitigation measures are implemented effectively. A protocol will also be established to handle lighting-related complaints that will include recording, reporting and acting on complaints.

Given the proposed mitigation measures, while there would be expected to be some visual impacts of lighting, direct intrusion of lighting into residential homes is not expected to occur and hence the potential for sleep disturbance, and impacts on health, is considered negligible.

5.5.4 Mental health and stress

Of the objections received, 50% (9) of organisations and 19% (45) of unique community submissions raised concerns about the potential for the project to adversely affect people's mental health and contribute to stress.

Consideration of factors that may more generally affect community wellbeing, in particular changes in levels of stress and anxiety associated with the project have been assessed in the SIA (Appendix T of the EIS). The SIA was prepared in accordance with the SIA guidelines (DPE 2017a) and identified the potential impacts and opportunities associated with both the construction and operation of the project, as well as appropriate measures for managing adverse social impacts and enhancing potential benefits.

As part of the SIA, stress and anxiety linked to the project and associated uncertainties were identified as key issues. More specifically, these uncertainties related to:

- whether the project will proceed;
- how long the mine will operate;
- potential impacts and the extent to which they may be impacts;
- the ability of Regis to suitably manage or control impacts;
- the opportunity for property acquisition and/or compensation; and
- potential impacts on property values and saleability of neighbouring properties (ie in the event that residents seek to relocate during the approvals process or following project determination).

Residents also expressed frustration with the amount of time the project was taking up in their daily lives at the expense of more enjoyable or necessary activities.

Increased levels of stress and anxiety are known to affect health and wellbeing. Individuals respond to changes in stress and anxiety in different ways and hence it is difficult to quantify how the project has/will affect stress and anxiety levels in the community. The potential for the project to impact on community stress and anxiety is acknowledged to be of high significance in the SIA.

The primary strategy to manage stress and anxiety in relation to the project is for Regis to engage in and maintain transparent, evidence-based and ongoing dialogue with concerned property owners and other community members.

Regis acknowledges that the planning and development stage of any major project can cause stress for local communities and landholders, especially associated with uncertainty over the project's potential impacts. Therefore, Regis has remained committed to an extensive engagement process for the project throughout the planning and environmental phase; aimed at providing the timely provision of factual and relevant information and to create a process that provides opportunities for stakeholders to express their views and enable timely feedback on matters raised.

Engagement will continue throughout the assessment and approval process as reflected by the continued operation of the Blayney office. This office will continue to function during the next phase of the project.

An outcome of effective engagement is anticipated to be a minimisation of stress and anxiety associated with the project. Further, since the submission of the EIS, a health impact assessment has been prepared by enRisks (Appendix E). The assessment focuses on impacts associated with the mine development and provides an assessment of the project's potential impacts on human health, specifically impacts related to air quality, noise and vibration, hazardous materials, water, lighting and stress/anxiety. It is anticipated that this assessment will further assist in addressing community concerns, which will assist in managing stress and anxiety.

5.5.5 Naturally occurring asbestos

Of the objections received, 6% (1) of organisations, 6% (13) of unique community submissions and Form Letter 2 raised concerns about the potential disturbance of naturally occurring asbestos within the mine project area. This included concerns related to:

- exposure of workers to naturally occurring asbestos during ongoing operations; and
- the absence of asbestos management measures from the EIS.

NOA may form in a wide range of rock types; however, larger accumulations of asbestiform minerals are typically associated with ultramafic rocks. Regis has undertaken a review of the mine development project area, in conjunction with information and mapping on the potential presence of geological materials that have potential to include NOA. This review identified that the mine development is within intermediate rocks of the Anson formation (categorised as low potential for NOA).

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 noted that the unit constitutes less than 1% of the total rock mass proposed to be mined.

Nonetheless, there is the potential for asbestos fibres in NOA to be released to air within dust generated during project-related disturbance works. Potential health impacts associated with exposure to NOA derived from the project have been considered as part of the health impact assessment (Appendix E). It was assumed that NOA would be present in 1% of the materials proposed to be mined. Further assumptions are discussed in detail in Section 4.5.2.3 of Appendix E.

The maximum exposure concentrations of NOA relevant to the project were compared with World Health Organisation (WHO) guideline values in Table 4.1 of Appendix E.

The results indicate that the maximum predicted exposure concentrations (despite the conservative assumptions used) are below the adopted guideline values from the WHO. Hence risks associated with potential exposure to NOA in air as a result of the project are considered to be low and acceptable. Notwithstanding, Regis will actively monitor NOA in sections of the pit where the geology indicates it may occur. Mitigation and management measures for the unlikely event NOA is found will be outlined in the AQMP.

The health and safety of onsite workers will be managed separately through application of the NSW *Work Health and Safety Act 2011* and NSW *Work Health and Safety (Mines and Petroleum Sites) Act 2013*. Regis will follow appropriate procedures for naturally occurring asbestos as recommended by SafeWork NSW and in accordance with Regis' naturally occurring asbestos procedure. This procedure will include an ongoing monitoring of workplaces, training programs/employee education and appropriate Safe Work Procedures.

5.5.6 Noise health impacts

Of the objections received, 17% (3) of organisations and 6% (15) of unique community submissions raised concerns about the potential for noise impacts associated with the project to adversely impact people's health.

Overall, based on the predicted noise levels and the proposed mitigation and management measures, including additional monitoring and management, the potential for adverse health impacts associated with noise generated during construction and operations is considered to be negligible at all receptors.

Nonetheless, the health impact assessment considered potential health impacts as a result of noise generated by the project, including the mine and pipeline developments, road traffic and blasting:

- Mine development - no noise impacts have been identified that would be considered to be of concern to community health. There were no exceedances of the maximum noise level, at any of the receptors, for any of the project years and time periods evaluated. As these noise criteria are protective of health, there would be no health impacts of concern in relation to the maximum noise levels related to the mine development.

- Pipeline development – construction noise levels are predicted to satisfy the highly affected LAeq(15min) noise management level of 75dBA at all receivers for all pipeline transient construction activities. Therefore, no health impacts of concern are anticipated as a result of noise derived from the construction and operation of the pipeline.

- Road traffic noise – noise at all receptors along Dungeon Road and the Mid Western Highway is predicted to comply with the relevant criteria within the NSW Road Noise Policy (DECCW 2011) (RNP). A separate assessment of road traffic noise was undertaken for the pipeline development. The assessment found that road traffic noise during pipeline construction is predicted to comply with the relevant criteria within the RNP. Therefore, there are no noise impacts of concern to community health.

- Blasting – for the mine development area, air blast overpressure and vibration levels are predicted to be below the adopted guidelines at all receptors. For the pipeline, the assessment of construction activities has identified offset distances at which the air blast overpressure and vibration guidelines are met. These offsets will be used to adjust the blasting activities at different locations such that the guidelines can be met at all receptors. Based on the above, and assuming the recommended management measures are implemented, there are no health impacts related to blasting activities (should they be required) relevant to the surrounding community.

A range of noise mitigation and management measures will be detailed in separate NMPs for the mine and pipeline developments to guide, quantify and control noise emissions from the project. These plans may include provisions to undertake noise monitoring. In addition, a complaints handling process will be implemented.

5.6 Agricultural resources

An agricultural impact statement (AIS) was undertaken as part of the EIS to assess the potential impacts of the mine development on agricultural resources and/or industries within and surrounding the mine development project area (Appendix I of the EIS). This section provides responses to submissions regarding agricultural resources.

5.6.1 Impacts to agricultural production (off-site)

Of the objections received, 17% (3) of organisations, 22% (51) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to impact agricultural production off-site. This included concerns related to the potential for pollution (including emissions to water and air) generated by the project to adversely affect agricultural production. Claims were made that with the increasing importance of food and water security, preserving prime agricultural land should be of paramount importance over the short-term gains offered by the mine.

The project's potential impacts on the agricultural industry arise from the occupation of agricultural land by a non-agricultural enterprise. This is limited to the land on which project infrastructure will be located, with no anticipated constraints on the current or potential agricultural uses of nearby land. Notably, the mine disturbance area accounts for less than 1% of the land currently used for agriculture in the Blayney LGA. Consequently, there will be a negligible impact on agricultural production in the LGA during the operation of the mine when this land is not available for agricultural production. Similarly, the reduction in the demand for agriculture support services available in Blayney as a result of the mine development would also be negligible.

Noting the concerns of the community relating to water security, and as described previously in Section 5.1, after cessation of mining the project has the potential to boost long term water security for the area if the pipeline development were to remain in place. In doing so, the pipeline would become a valuable infrastructure asset, increasing water security in the wider Central West region, including for agricultural production in the area.

The mine development's potential impacts on local and regional agriculture were considered through the preparation of an AIS, which was summarised in Chapter 8 and attached as Appendix I of the EIS. This AIS has been updated to reflect the amended project and is included as Appendix F to the Amendment Report. In response to DPI Agriculture's submission on the EIS, an AIS has also been prepared for the pipeline development and is contained as Appendix V of the Amendment Report.

A risk assessment was conducted as part of the preparation of the AIS to identify potential risks to agriculture from the mine development. The highest potential risks to agricultural production surrounding the mine project area were identified as primarily relating to water resources, as follows:

- overflows from WMF in the mine project area resulting in the pollution of water used for agricultural purposes downstream of the mine;
- seepage from the TSF contaminating groundwater; and
- erosion of landforms, resulting in sedimentation of waterways, or failure of the final landform.

Management and mitigation measures to address these risks are listed in Table 8.2 of the EIS.

As described in Section 5.1, the mine's water management system has been revised as part of the amended project. The amendment has responded to concerns relating to the potential for offsite discharges by revising the size of water management structures, ensuring further conservatism is built into the design so that the mine project area is a nil discharge site. Further, WMPs (surface water and groundwater) will be developed and implemented for the construction and operational phase of the mine development. These plans will include monitoring programs with TARPs to ensure potential issues are identified early enough to effectively manage and avoid off-site impacts.

The potential impact as a result of the mine development on the availability of water was also considered as part of the EIS and further in the Amendment Report. The updated surface water assessment found that, with the excision of 964 ha of the catchment (captured by the operational water management system), the existing median annual modelled inflow to Carcoar Dam reduces by 186 ML/year to 4,299 ML/year. This is a 4.1% reduction in median annual inflow to Carcoar Dam, and this level of change is expected to be minor in comparison with the natural variability in catchment conditions.

Other potential impacts on agricultural production off-site have been considered as follows:

- Noise, vibration and blasting (Section 6.5 and Appendix J of the Amendment Report) – The noise and vibration assessment considered potential impacts on sensitive receptors (including neighbouring agricultural operations) and concluded that overpressure and vibration levels from blasting activities at the mine will be well below the regulatory criteria and considerably lower than other sources of overpressure that livestock are likely to be already subjected to, such as lightning strikes. Further, it is generally acknowledged that livestock are likely to acclimatise to any new noise sources introduced as part of the project.

- Dust (Section 6.6 and Appendix L of the Amendment Report) – Dispersion modelling conducted as part of the AQIA considered potential impacts on sensitive receptors (including neighbouring agricultural operations) and concluded that emissions to the atmosphere from the mine will be well within relevant EPA criteria. No significant off-site air quality impacts to surrounding land uses, including agriculture, are anticipated.

- Light (Section 6.13 and Appendix R of the Amendment Report) – The VIA concluded that two types of lighting effects (direct and diffuse) may result from the project. These lighting effects have potential to impact neighbouring agricultural operations. The proposed suite of mitigation measures will help to reduce direct and indirect lighting impacts from the project (refer to Section 6.13 of the Amendment Report). All external lighting associated with the project will comply with AS/NZS 4282:2019 – *Control of the Obtrusive Effects of Outdoor Lighting* and will be directed downwards wherever it is safe to do so.

- Groundwater availability (Section 6.4 and Appendix H of the Amendment Report) – As the mine 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 mine project area.

5.6.2 Impacts to agricultural production (on-site)

Of the objections received, 22% (4) of organisations, 33% (78) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to impact agricultural production on-site (ie within the mine project area). This included concerns that the project will remove prime agricultural land from production and that this land will not be able to be returned to its current agricultural production potential at the completion of mining.

The main impact of the mine development on agricultural resources will be the removal of grazing livestock from disturbed land during the life of the mine and the reduced carrying capacity of some land after the site is rehabilitated. However, as noted above in Section 5.6.1, the mine disturbance area accounts for less than 1% of the 132,592 ha used for agriculture in Blayney LGA. As reported in the AIS (refer to Appendix F of the Amendment Report), more than half of the 2,514 ha mine development project area, comprising 1,398 ha, will remain undisturbed by the mine development during operations, with the majority of this land to continue being used for agricultural (grazing) purposes. In many cases this land will be leased back to the original owner/leasee, and as a result agricultural practices should remain unchanged.

The value of agricultural production loss in the mine project area was quantified as part for the AIS. It found that, based on a reduction in carrying capacity of 8,962 dry sheep equivalent (dse), the gross value of agricultural production of the mine project area will decline by $361,706/yr during the life of the mine. This is a negligible reduction when compared to the gross value of production in the region, equating to just under 1% of the $42.7M of gross value of agriculture production in the Blayney LGA in 2015/16 (AIS 2020).

While some reduction in LSC class will occur as a result of the project (refer to Section 6.2 of the Amendment Report), disturbed areas within the mine development project area will be rehabilitated and returned to a land use suitable for agriculture at the completion of mining, with the exception of the final void. The impacts to agricultural land within the mine project area are therefore predominantly temporary with agricultural land uses possible across the majority of the mine development project area at the completion of rehabilitation.

The primary goal of the project's rehabilitation strategy is to return disturbed land to a condition that is stable and non-polluting and supports the proposed post mining land use, which is a mixture of grazing on improved pasture and woodland areas. As described in the rehabilitation and closure strategy for the mine development, erosion modelling of the final landform of the waste rock emplacement was undertaken, confirming this landform will remain stable in the long term. Post mining, the rehabilitated landform will predominantly be a combination of LSC 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 majority of the mine site will therefore be suitable for the continuation of an agricultural land use post mining. The ability of the mine site to be returned to an agricultural land use is discussed in further detail in the response to DPI Agriculture's submission in Section 4.10.

In addition, the land on which the mine is located is not biophysical strategic agricultural land (BSAL) as it does not meet the requirements for high value or prime, agricultural land.

The LSC classes of the project area were assessed in accordance with the requirements of the *Land and Soil Capability Assessment Scheme* (OEH 2012). Land is assigned to an LSC class based on its agricultural capability with good quality, high capability land likely to be classes 1 to 3 and poorer quality, lower capability likely to be classes 5 to 8.

The LSC assessment found that the project area is predominantly LSC classes 4 (moderate land capability) and 5 (moderate-low capability land), which is consistent with the historic land uses of growing naturalised pasture to support grazing by cattle and sheep. As described in Table 7.3 of the EIS, land classified as LSC classes 4 and 5 is considered to have moderate to high limitations for high impact land uses (such as cropping, high-intensity grazing and horticulture). These limitations can only be managed through specialised land management practices.

As noted above, land mapped as LSC class 1, 2 or 3 is considered good quality, high capability land with minimal limitations and is capable of supporting a wide variety of agricultural land uses (OEH 2012). There is no LSC class 1, 2 or 3 land in the project area.

Further, a detailed BSAL assessment of the mine project area was undertaken in accordance with the *Interim Protocol for the Site Verification and Mapping of Biophysical Strategic Agricultural Land* (NSW Government 2013). The area within the disturbance footprint of the mine development was verified as not being BSAL (refer Appendix C of the EIS), and Site Verification Certificate was subsequently issued for the project by the NSW DPIE.

A portion of BSAL was identified in the south-west corner of the project area. Once identified, this area of land was excised from the mine development footprint and mining lease application area, to ensure no direct impacts to BSAL occur as a result of the project.

Regis has therefore refined the project to avoid impacts on BSAL and as a result there is no BSAL in the mining lease application area and proposed disturbance area associated with the mine development. The mining land use proposed for the site will not remove any BSAL from agricultural production.

5.6.3 Impacts on bees and honey production

Of the objections received, 33% (6) of organisations, 15% (35) of unique community submissions and form letters 1, 2 and 3 raised concerns about the potential for the project to adversely impact bees and honey production. This included concerns relating to the:

- potential for dust generated by the project to contaminate honey;
- potential for the project to contaminate surface water resources utilised by local bee populations;
- potential for lighting generated by the project to attract bees; and
- potential for the project to adversely affect businesses dependent on bees and honey production.

Two local honey producers are in the vicinity of the mine project area; Cottesbrook Honey, on Kellys Road approximately 2 km south-east of the mine project area, and Goldfields Honey, which is produced at the Beekeepers Inn, approximately 3 km to the north. Regis engaged with representatives from both Cottesbrook Honey and Goldfields Honey as part of the preparation of the EIS and actively sought to address the matters raised during this consultation.

Potential impacts to apiarian activities in the area were identified in Section 8.3.6 of the EIS and include:

- a loss of habitat in the mine project area as a result of vegetation clearance activities; and
- impacts on water resources used by the bees, and the potential for cyanide toxicity from TSF water.

Box Gum Woodland in the mine project area is understood to provide pollen for the bees managed by Goldfields Honey. The BDAR (Appendix M of the Amendment Report) found that the mine development will result in a reduction of around 1.68% in the extent of Box Gum Woodland within a 5 km radius of the mine project area. It is therefore anticipated that the mine development will not result in a significant loss in foraging habitat for bees. A significant amount of Box Gum Woodland in the northern part of the project area has been avoided by the design of the TSF.

Regis has also commenced an extensive vegetation or tree planting program to reduce potential visual amenity impacts from the mine development. Once established, this will be a new source of vegetation for local bees to forage. In addition, there will be a reduction in grazing pressure on remnant Box Gum Woodland within the mine development project area. This will allow understory plants to return, further increasing the amount and variety of vegetation available for local bees to forage.

It is considered unlikely that bees would use the TSF as a water source given their general avoidance of large bodies of water. However, as discussed below, 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. The surface of the TSF will be maintained regularly to avoid build-up of debris thereby reducing potential for bees to gather water in this manner. Smaller bodies of water (such as farm dams) will be retained within the mine development project area and the clean water diversions proposed as part of the mine development will also be suitable for bees.

Notwithstanding, in response to the submissions received relating to bees during the public exhibition of the EIS and ongoing stakeholder engagement, Regis engaged enRiskS to undertake a further review of the project's potential to impact on bees and the local honey industry. The report produced by enRiskS is attached as Appendix D, and includes consideration of the potential impacts on Bees from dust blown from the mine site directly onto plants that bees visit, as well as indirectly when bees drink water that may be impacted by dust from the mine site. The report also considered the potential impact of Bees being exposed to water within the TSF.

The assessment relies upon the outcomes of the AQIA (Appendix L of the Amendment Report) to characterise potential exposure of bees to dust generated by the mine and the outcomes of the geochemical assessment (Appendix G of the EIS) to estimate potential exposure via water in the TSF.

As part of the preparation of the assessment, enRiskS undertook a review of scientific literature including;

- metal levels in honey, nectar, pollen and/or bees generally worldwide and around specific locations where metal contamination is known to be present; and
- metal concentrations that may cause impacts on the survival and health of bees.

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 project 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 project 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 area 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.

In relation to lighting effects, the proposed suite of mitigation measures will help to reduce direct and indirect lighting impacts from the project (Section 19.9.4 of the EIS, and Section 6.13 of the Amendment Report). Further, based on a review of available literature it is noted that:

- forager bees are more likely to be asleep during the night than day (Klein et al 2014) and are therefore less active during this period and less likely to be exposed to lighting from the project; and

- a number of honey bee species have been classified as 'high light active' or diurnal (Gaston et al 2012) and are therefore more active during the day period and less likely to be exposed to lighting from the project.

The project will not result in a significant loss in foraging habitat for bees and metals in dust or water from the mine are not expected to adversely impact the bee industry. Subsequently, the project is unlikely to adversely affect businesses dependent on bees and honey production.

5.6.4 Impacts on horses and livestock

Of the objections received, 17% (3) of organisations, 18% (41) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to adversely impact horses and livestock. This included concerns that dust, light, contamination, noise and vibration from the project may adversely affect horses and livestock on properties adjacent to the mine project area.

As noted in Section 5.6.1, the mine development's potential impacts on local and regional agriculture were considered through the preparation of an AIS, which has been updated to reflect the amended project. A response to concerns about the potential for the project to impact agricultural production off-site is provided in Section 5.6.1.

Sheep and cattle grazing are a common land use surrounding the mine project area. In addition, there is an alpaca stud west of the mine project area and a small number of residences also keep horses in and around Kings Plains.

Potential impacts on horses and livestock surrounding the mine development project area have been considered as follows:

- Noise, vibration and blasting (Section 6.5 and Appendix J of the Amendment Report) – Overpressure (up to 115 dBZ) and vibration levels (between 0.1 mm/s and 1.3 mm/s) from blasting activities at the mine will be well below the regulatory criteria and considerably lower than other sources of overpressure that horses and livestock are likely to be already subjected to, such as lightning strikes (typically between 120 dBZ and 130 dBZ).

- Dust (Section 6.6 and Appendix L of the Amendment Report) – The dispersion modelling conducted as part of the AQIA concluded that emissions to the atmosphere from the mine will be well within relevant EPA criteria. No significant off-site air quality impacts to surrounding land uses, including agriculture, are anticipated.

- Light (Section 6.13 and Appendix R of the Amendment Report) – The VIA Addendum concluded that two types of lighting effects (direct and diffuse) may result from the project. The potential impact of lighting on horses and livestock was not a focus of the VIA; however, the proposed suite of mitigation measures will help to reduce direct and indirect lighting impacts from the project (Section 19.9.4 of the EIS). All external lighting associated with the project will comply with AS/NZS 4282:2019 – Control of the Obtrusive Effects of Outdoor Lighting and will be directed downwards wherever it is safe to do so. Lighting shields will also be used (where required) and mobile lighting sources will be directed away from sensitive receivers, where practicable.

- Contamination of water resources (Section 6.4 and Appendix G and Appendix H of the Amendment Report) – The potential for seepage from the TSF to contaminate groundwater resources has been considered as a potential risk to agriculture from the project. As outlined in Section 5.1, TSF seepage is very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final void, 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.

5.7 Biodiversity

In accordance with the SEARs issued for the project, a biodiversity assessment report (BAR) and aquatic ecology assessment were prepared as part of the EIS to assess potential terrestrial biodiversity and aquatic ecology impacts associated with the construction and operation of the mine development (Appendix N and Appendix O of the EIS). A separate biodiversity development assessment report (BDAR) was undertaken to assess potential biodiversity impacts associated with the construction and operation of the pipeline development (Appendix Y of the EIS).

While the EIS was prepared strictly in accordance with the SEARs issued by DPIE, a separate BDAR has been prepared in accordance with the BAM (OEH 2017) to assess the potential biodiversity impacts of the amended project, considering both the mine development and pipeline development components together. The BDAR assessment considers and outlines the differences in impacts associated with the amended project compared to the original project as presented in the EIS. The purpose of the BDAR of the amended project is to allow assessment of the amended project under the EP&A Act and the BC Act.

Further, a revised BAR has been prepared for the mine development component of the amended project in accordance with the FBA, for the purposes of DAWE's assessment (ie the varied federal referral action needs to be assessed under the FBA and Major Projects Policy in order to be compliant with the 2015 bilateral agreement referenced in the controlled action determination and SEARs).

This section provides responses to submissions regarding biodiversity.

5.7.1 Impacts on aquatic ecology

Of the objections received, 22% (4) of organisations, 6% (13) of unique community submissions and Form Letter 2 raised concerns about the project's potential impacts on aquatic ecology. This included concerns that:

- the assessment focused on potential impacts on protected species rather than all aquatic ecology;
- offset requirements for impacts to aquatic species have not been included in the EIS; and
- the assessment has not considered potential for contamination from the mine to adversely impact aquatic ecology.

The EIS Aquatic Ecology Assessment (EMM 2019b), included as Appendix O in the EIS, assessed impacts to aquatic habitat as a result of the mine development component of the project. The Aquatic Ecology Assessment Addendum (EMM 2020d) (refer to Appendix N of the Amendment Report) assesses the potential impacts of the amended project, including the revised disturbance footprint, in relation to aquatic ecology and provides further information regarding the area of aquatic habitat that will be removed as part of the amended project. The addendum report also outlines the proposed aquatic offset approach.

i Impacts to aquatic ecology

Overall, the existing aquatic and riparian environment within the mine development project area is 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. Upstream sections of the Belubula River, within the disturbance footprint, upstream of the dam above site BR-02 (see Figure 2.1 of EMM 2020d), consist of a minimally defined channel with little aquatic vegetation. There is some erosion of bank edges occurring due to access by stock and past land use practices. Towards the edge of the project area boundary, the channel becomes less define and grades to a grassy swale. Notwithstanding this, the EIS Aquatic Ecology Assessment classified the majority of surveyed sites within the mine development project area as Type 1 (highly sensitive) key fish habitat due to the presence of aquatic habitat features such as instream aquatic vegetation and in channel debris. The assessment of key fish habitat covers not only threatened species, but also general aquatic fauna species.

As outlined in Appendix N of the Amendment Report, the EIS aquatic ecology assessment did not assess Tributary G, due to a series of farm dams located on this tributary, or assess a portion of the Belubula River in the north-west of the mine development project area upstream of a large farm dam. In response to the DPI Fisheries submission, 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. However, it is noted that the amended mine development will avoid direct impacts on Tributary B due to the revised design of WMF6 and this has resulted in in a small reduction in the extent of waterway, and therefore key fish habitat, that will be directly impacted by mine development infrastructure construction and operation.

The aquatic ecology assessments carried out for the EIS and Amendment Reports concluded that aquatic habitat within the mine development project area is unlikely to support threatened species habitat, including habitat to support breeding or migration, due to the low level of connectivity between pools and the highly disturbed condition of the aquatic environment.

ii Aquatic ecology offsets

The amended project will impact on 4.04 ha of key fish habitat. The addendum report outlines a number of proposed rehabilitation and remediation measures to offset potential impacts on aquatic ecology and fish habitat, with these measures to be implemented:

- within the Belubula River catchment;
- within “like for like” habitat;
- within the same or a similar habitat in the same catchment that is more threatened than the habitat being impacted on; and/or
- as part of an offset site, as versus implementing supplementary measures.

The Aquatic Ecology Addendum (Appendix N of the Amendment Report) 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.

The aquatic ecology offset package will developed in consultation with DPI Fisheries in accordance with *Biodiversity Offsets Policy for Major Projects Fact sheet: Aquatic biodiversity* (DPI 2014) to offset impacts to key fish habitat that will be removed by the mine development.

iii Impacts to downstream environments

As detailed in Section 5.1, the project is not predicted to impact on downstream water quality and therefore downstream aquatic habitat. Modelling of the revised operational water management system demonstrates the operational water management system (including the TSF and WMFs) will not spill for all modelled climate scenarios. Furthermore, assessments completed for the project predict that groundwater and surface water quality will not be adversely affected by TSF seepage (refer Appendix H of the Amendment Report).

5.7.2 Adequacy of the biodiversity assessment and field survey effort

Of the objections received, 28% (5) of organisations and 4% (9) of unique community submissions raised concerns about the adequacy of the biodiversity assessment and associated field surveys. This included concerns that:

- field surveys for aquatic and terrestrial biodiversity were undertaken during drought and therefore results may not be representative of species diversity within the mine project area;
- the results presented in the biodiversity assessment and EIS were inconsistent; and
- survey coverage was inadequate (including potential koala habitat).

As outlined in Section 4.3, the Amendment Report BDAR has been prepared by EMM (2020e) in accordance with the BAM to assess the potential biodiversity impacts of the amended project and is contained within Appendix M of the Amendment Report. The Amendment Report BDAR considers both the mine development and pipeline development components together and supersedes the findings of the Biodiversity Assessment Report (BAR) (EMM 2019d Appendix N of the EIS) and the pipeline development BDAR (OzArk 2019 Appendix Y of the EIS).

i Field surveys and drought conditions

Extensive and detailed biodiversity surveys been carried out in the mine development project area since 2013 and therefore surveys have occurred over a range of climatic conditions and are therefore considered representative of the species diversity within the mine project area.

Native vegetation was assessed in the field by EnviroKey on the following dates:

- 22 – 25 May 2013;
- 10 – 13 September 2013;
- 23 -24 October 2013;
- 6 -7 November 2013;
- 20 – 26 November 2013;
- 24 – 29 March 2014; and
- 27 – 28 April 2017.

Additional surveys were carried out by EMM on the following dates:

- 4 – 8 February 2019; and
- 11 – 15 March 2019.

Aquatic ecology surveys were also carried out in November 2018.

Rainfall deficiency maps (http://www.bom.gov.au/climate/drought/archive) in all the months that survey was conducted do not indicate a severe or serious rainfall deficiency. Accordingly, results are representative of species diversity in the mine development project area.

Surveys for the pipeline development were carried out over a much shorter timeframe with native vegetation assessed in the field by OzArk during from August 2018 to May 2019. Rainfall deficiency maps (http://www.bom.gov.au/climate/drought/archive) indicate drought conditions in the pipeline corridor from August to December 2018, with recovery during the January and May 2019 surveys. Subsequent surveys were conducted by EMM from February to June 2020. The EMM surveys, carried out during wetter conditions, recorded comparatively higher vegetation integrity scores in some PCTs (grassy woodlands) compared to vegetation integrity scores recorded during the drier conditions of 2018 and 2019. It is noted that some species have been assumed present for the pipeline development where surveys carried out during drought conditions could not discount presence. This approach is considered conservative and addresses concerns raised about drought conditions.

EMM has conducted a preliminary analysis of vegetation integrity (VI) scores resulting from recorded plots. Comparatively lower VI scores were observed in some grassy woodland vegetation zones in the pipeline corridor (PCT 1330_Intact, 277_Intact, 1197_Shrubland, 1330_Sparse, 277_DNG), which may be indicative of the drought conditions experienced when earlier plots were undertaken in 2018/2019. Some grass species and forbs may not have been present during these dry conditions, compared with when vegetation zones and mapping were revised for the BDAR, following higher rainfall. EMM has discussed the implications of drought conditions with the Biodiversity and Conservation Division (BCD) on plot data and VI scores.

ii Koala habitat impacts

Detailed surveys have been undertaken for the Koala, including both spotlighting and scats surveys. A total of 12 spotlighting surveys were undertaken across the mine development area with 24 Spot Assessment Technique (SAT) surveys undertaken for Koala scats. These surveys exceed NSW and Commonwealth survey guidelines for the Koala. Despite this, only a single Koala was opportunistically identified in the mine project area during surveys. Considering the above, Koalas are likely to occur in low densities in the mine project area.

Despite a single record of the species within the mine development, a relatively conservative approach was taken to assessing impacts, with the Koala considered to be present within suitable woodland habitats.

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 2008). 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.

The method for calculating Koala impacts has been updated since the EIS, in line with the introduction of *State Environmental Planning Policy (SEPP) (Koala Habitat Protection) 2019* (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 which results in an additional PCT in the mine disturbance footprint now considered Koala habitat (PCT 727). 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.

Koala habitat along the pipeline development is much more fragmented, with disturbance much more limited and highly unlikely to significantly decrease the habitat available for the species. Overall, the pipeline development will directly impact on 4.77 ha of Koala habitat across 124 fragmented patches of vegetation.

5.7.3 Contribution to land clearing and habitat loss

Of the objections received, 61% (11) of organisations, 42% (99) of unique community submissions and form letters 1 and 3 raised concerns about the project's potential contributions to land clearing and habitat loss within the mine project area. This included concerns that:

- the project will further contribute to fragmentation of native vegetation;
- there are no plans to establish a wildlife corridor or buffer zone within the mine project area; and
- the project will remove foraging and breeding habitat for threatened species (including hollow-bearing trees).

The mine development area is located at the western edge of a moderately vegetated area. East of the mine development remnant vegetation extends from Kings Plains north to The Rocks and the Macquarie River. Small pockets of highly fragmented vegetation extend west from this area to the mine development area. However, west of the proposed mine development vegetation is largely cleared for agricultural purposes and connectivity is highly limited. Clearing at the edge of a highly fragmented landscape is unlikely to result in any further significant fragmentation of habitat.

Despite this, significant efforts have been made to avoid and minimise clearing of native vegetation and fauna habitat wherever possible to reduce clearing and fragmentation, particularly higher quality areas. Regis has carried out annual biodiversity surveys within the mine project area since 2013, after acquiring Exploration Licence (EL) 5760 in 2012. These surveys have been carried out in parallel with, and have informed the evolution of, the mine development design. This process has ensured the avoidance of environmental constraints, including impacts on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands (Box Gum Woodland) and threatened species habitat, as far as practicable. As shown in Figure 1.3, the mining lease application area is relatively constrained within the mine development project area. The mining lease application area was reduced to avoid potential biophysical strategic agricultural land (BSAL) in the western portion of the mine development project area.

Iterative project planning, informed by the baseline studies outlined above, has allowed a range of impacts to be avoided and others to be minimised throughout the life of the project. To compensate for unavoidable disturbance, biodiversity offsets will be provided.

Key avoidance measures that have been implemented by Regis comprise:

- avoidance of the majority of White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC in High condition apart from a small area (1.47 ha) in the direct footprint of the open cut pit and tailings dam;
- minimisation of impacts to PCT 1330 (Medium condition) wherever feasible; and
- development of a tailings storage facility which avoids almost all White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grasslands CEEC (EPBC Act) identified within the TSF investigation area identified in the Preliminary Environmental Assessment (PEA).

In addition to the avoidance and minimisation measures already incorporated into the mine development's design, a number of management and mitigation measures will be implemented to minimise the potential for unacceptable mine development-related impacts on biodiversity, including:

- revegetation to increase the connectivity of fragmented patches of Koala habitat within the mine development project area throughout the mine life and increase connectivity for Koala;
- aquatic riparian vegetation establishment and regeneration
- boundary plantings and visual screening; and
- staged clearing of native vegetation and fauna habitat to minimise impacts to native fauna species.

The impacts of the mine development were assessed according to the BAM. This method allows for impacts on native vegetation and threatened flora and fauna to be quantified, so that a suitable and proportionate offset can be identified, providing for a net positive biodiversity outcome. The method details the offset requirements in terms of ecosystem and species credits. A biodiversity offset strategy has been developed and will be implemented by Regis with the aim of ensuring the project does not result in a net loss of biodiversity.

As a part of this offset strategy, Regis has purchased and conducted detailed studies to assess native PCTs and threatened species at a future stewardship site near Blayney (the Aziel property). The property is approximately 388 ha and contains some of the required ecosystem and species credits, including PCT 951, PCT 1330 (Box Gum Woodland) and the Koala. Revegetation of cleared areas within the offset property is proposed as a part of this offset strategy. 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 either purchasing and retirement of the required ecosystem and species credits from the biodiversity credit market or payment into the Biodiversity Conservation Fund.

5.7.4 Impacts on biosecurity (including weed and pest management)

Of the objections received, 1% (3) of unique community submissions and Form Letter 2 raised concerns about the project's potential impacts on biosecurity. This included concerns that:

- there is limited information provided about weed and pest management practices to be implemented as part of the project to help mitigate or manage potential biosecurity impacts; and
- weed management may include the use of chemicals with potential for flow-on effects to neighbouring properties.

The project's potential impacts on biosecurity, including impacts on weeds and feral pests, are described in:

- Section 22.5.5 and Appendix U of the EIS (mine development – closure and rehabilitation);
- Section 35.3 (pipeline development – closure and rehabilitation) of the EIS.

The Amendment Report BDAR (Appendix M of the Amendment Report) also considers biosecurity in Section 7.3 and proposes weed management measures that have been incorporated into the updated mitigation measures for the project (Appendix C).

Regis has committed to the following mitigation measures in relation to weed and pest management:

- implement a weed and pathogen monitoring program;
- undertake weed management and pest control programs in consultation with surrounding landholders, based on the results of the weed and pathogen monitoring program;
- undertake progressive rehabilitation where possible;
- to avoid potential land use impacts relating to weeds, the following control measures will be implemented for the pipeline development;
- appropriate weed hygiene for machinery and vehicles during pipeline construction, rehabilitation and operation that may include inspection and wash-down prior to entry to the pipeline corridor, after working in areas of known weed infestation and prior to entry into different properties;
- herbicide spraying or scalping weeds prior to construction works; and
- rehabilitation inspections to identify potential weed infestations.

Many of the controls proposed are a standard part of land management in agricultural landscapes.

5.7.5 Impacts on threatened species

Of the objections received, 39% (7) of organisations, 32% (74) of unique community submissions and form letters 1, 2 and 3 raised concerns about the project's potential impacts on threatened species. This included concerns that the project will contribute to direct and indirect impacts to threatened species through habitat loss, contamination and amenity impacts (including dust, noise and lighting).

i Mine development

The Amendment Report BDAR (Appendix M of the Amendment Report) notes impacts on biodiversity have changed for the mine development 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, there will be a decrease of 1.97 ha in the extent of clearing for the mine development, reducing from 132.36 ha for the EIS mine disturbance footprint to 130.39 ha in the amended project mine disturbance footprint.

Following the implementation of avoidance and minimisation measures, the project will remove 130.39 ha of native vegetation. The project will remove 45.84 ha of vegetation (PCT 1330) that represents White Box Yellow Box Blakely's Red Gum Woodland EEC listed under the NSW BC Act; 20.43 ha of which also represents Box Gum Woodland CEEC listed under the Commonwealth EPBC Act. These impacts will be compensated through the implementation of the project's biodiversity offset strategy.

The method for calculating Koala impacts has changed since the EIS, with the introduction of the Koala Habitat Protection SEPP. 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 2008). 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 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 project reduces direct Squirrel Glider impacts by 1.97 ha to 127.35 ha.

It is noted that under the BAM, indirect impacts also need to be offset. An allowance for this has been included in the currently proposed biodiversity offset strategy and credit calculations.

ii Pipeline development

Impacts on biodiversity have changed for the pipeline development, partly relating to a change in the project disturbance footprint, but largely due to revision of vegetation mapping undertaken as a part of the amended project by EMM. The amended project also includes two pipeline options in the Bathurst IBRA subregion (although only one will be constructed).

Impacts to native vegetation have increased by 7.54 ha for the northern option and 10.22 ha for the southern option. Overall, species impacts have increased by 12.50 ha for the northern option and 13.57 ha for the southern 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.

It is noted that under the BAM, indirect impacts also need to be offset. An allowance for this has been included in the currently proposed biodiversity offset strategy and credit calculations.

5.7.6 Suitability of proposed biodiversity offsets

Of the objections received, 39% (7) of organisations and 4% (9) of unique community submissions raised concerns about the suitability of the proposed biodiversity offsets. This included concerns that:

- the proposed offset site will not provide suitable habitat for biodiversity directly impacted by the project; and
- the offset strategy is inadequately defined and will not assist with the conservation of biodiversity.

Under the BC Act, 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, including PCT 951, PCT 1330 and the Koala. Revegetation of cleared areas within the is proposed as a part of this offset strategy.

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. The disturbance footprint may shift within the pipeline corridor. This is designed to allow Regis with some degree of flexibility to microsite the pipeline route 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.

Importantly, BCD has not raised any concerns regarding the proposed offsetting approach, given it is in accordance with the BAM and the BC Act.

5.8 Visual amenity

A visual impact assessment (VIA) was undertaken as part of the EIS to assess potential visual amenity impacts associated with the mine development, particularly at neighbouring sensitive receptors (Appendix S of the EIS). The VIA was updated to assess the amended project (included in full in Appendix R of the Amendment Report). This section provides responses to submissions regarding visual amenity.

5.8.1 Far field visual impacts

Of the objections received, 17% (3) of organisations and 6% (13) of unique community submissions raised concerns about the potential for the project to result in far field visual impacts (ie changes to the visual landscape within the locality).

Visibility depends on a combination of factors; topography and vegetation. Topography is particularly important when considering far field visual effects. The undulating nature of the topography surrounding the mine development project area means that visibility will generally be limited from far field viewpoints.

As described in the VIA prepared for the EIS (VPA 2019, Appendix S of the EIS), a number of topographic features contribute to limiting the visibility of the mine development project area from far field views. These features limit views to the north, east, south and west in different ways.

The VIA defines the Primary Visual Catchment (or PVC) in which the mine development project area is located. The PVC is shown in Figure 5.8. The ridgeline that defines the PVC generally limits views from beyond the visual catchment in all directions. The gently undulating hills that occur across the PVC are an important feature in relation to visibility across the area, creating local view sheds and changing view angles and glimpses dependent on location in relation to the project area. Notably, the limited number of accessible high points limit overviews across the catchment. The VIA found that views are more likely when near the mine development project area as longer views are screened by the consistent rolling hills.

Local features that limit views include:

- *Bushrangers Hill* – a north-south ridge within the mine development project area that creates a minor viewshed to the east and west of the ridge when viewed from Guyong Road (shown in Figure 5.8).
- *Sturgeon Hill* – an isolated hill, also within the mine development project area, used for local meteorological measurements near Kings Plains north of the Mid Western Highway. It creates partial screening of views from the west, especially from Guyong Road and the Mid Western Highway.
- *Rolling hills and ridge lines to the north and west of the project area* – these topographic features provide significant screening to areas in the north and north west of the mine development project area.

Potential for views to the project area from the Mid Western Highway are therefore limited to locations in close proximity or from elevated locations along the PVC.

Beyond the Mid Western Highway, the elevation rises gently to further undulating hills that provide enough elevation to contain most views to the north.

Significant screening is provided by the extensive areas of plantation forestry in the east of the PVC and by areas of roadside tree and shrub planting mainly along the Mid Western Highway. These examples filter or screen views into the mine development project area from some view locations. Some higher points to the south, such as Smiths Hill (1,093 m AHD), will have longer views being higher than the undulating hills within the PVC.

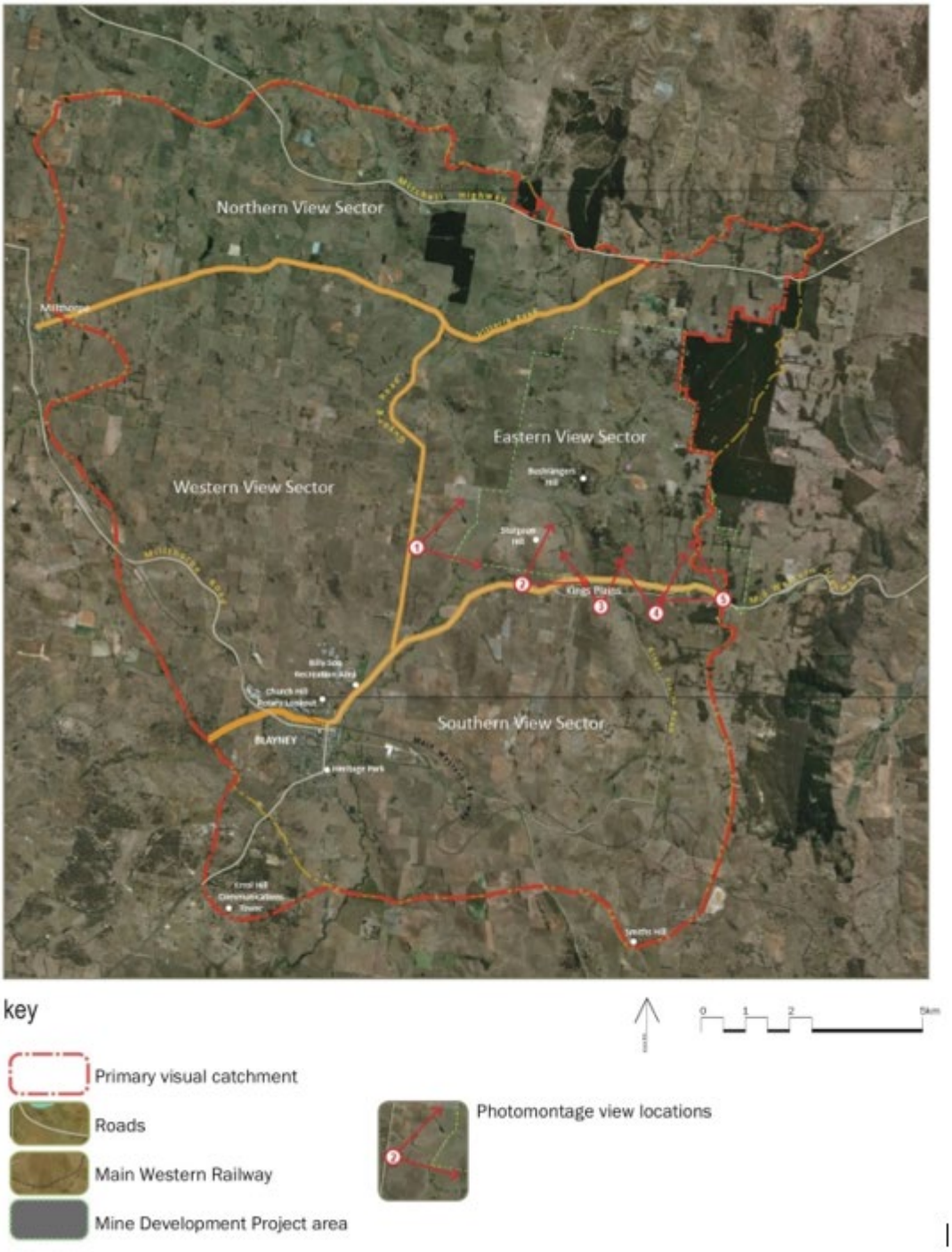


Figure 5.8 Primary visual catchment of the mine development

To the west, while the communications tower hill at 1,060 m AHD to the south-west in Blayney will have broad extensive views across the PVC, there is limited public access from this elevated location. Church Hill Rotary Lookout, also to the south-west in Blayney, has an elevation of 935 m AHD and is an accessible location with views to the north, east and south. However, this viewpoint is a considerable distance from the mine development project area, at over 6 km away from the mine disturbance footprint boundary.

The VIA considered potential visual impacts from public view points distant from the mine development project area, such as the Billy Soo Rest Area, Heritage Park Rest Area and the Church Hill Rotary Lookout in Blayney mentioned above (refer to Figure 5.8). As expected, the far field visual effects will be lower than the impacts close to the mine. When viewed from these areas, the mine development will result in a moderate to low visual impact during construction and operation, especially given that these view points are over 6 to 8 km away from the mine disturbance footprint boundary, reducing to a low visual impact once the mine development is rehabilitated and the final landform is achieved.

The most dominant visual feature in the post-closure landform of the mine development will be the waste rock emplacement. This emplacement has been designed to incorporate micro-relief features so that it is sympathetic with the surrounding topography, again minimising impacts relating to far field views.

In summary, far field views of the mine development will be limited. Where elevated views will be possible, such as lookout points in Blayney, these views will be over a significant distance. Intervening vegetation will also contribute to limited visibility.

5.8.2 Near field visual impacts

Of the objections received, 17% (3) of organisations, 27% (62) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to result in near field visual impacts (ie changes to the visual landscape experienced from neighbouring landholders). This included concerns that project infrastructure will be visible from neighbouring residences and public roads within the vicinity of the mine project area.

It is acknowledged there will be some visual effect of the project on neighbouring residences and public roads, particularly to the south in Kings Plains. The VIA found the levels of impact will vary depending on the distance to the mine development and the phase of the project. The closest residences to the south will experience a high visual impact during construction, particularly while there are active earthworks occurring in the south of the project area over the first few years of the project as the southern amenity bund is constructed, and a high to moderate impact during establishment of rehabilitation. The final landform will have low visual impact and over time will have very low visual impact after woodlands and cultural plantings mature.

Two amenity bunds have been incorporated into the mine design to minimise the visual impacts of the mine development; the pit amenity bund and the southern amenity bund. The pit amenity bund will, as its name suggests, will shield views of the pit and partially of infrastructure areas such as the ROM pad. The southern amenity bund is the southern face of the waste rock emplacement and will act to shield active mining activities from the residences in Kings Plains and from motorists travelling along the Mid Western Highway. While the southern amenity bund is being constructed, work on the front face (ie in the direction of residences in Kings Plains) will only take place during daylight hours. Night works will be avoided so that there are no direct lighting impacts or noise impacts on neighbouring residents in the night-time period.

Careful consideration of the waste rock emplacement construction schedule has been undertaken as part of detailed mine planning; particularly in response to feedback on the project following public exhibition of the EIS. This landform is the most visually prominent feature closest to residences. The design has been revised to minimise noise, resulting in a significant reduction in the predicted noise levels in Kings Plains compared to the EIS, although this has meant that the southern amenity bund will take longer to construct (due to factors such as the use of lower numbers of equipment and waste emplacement scheduling). On balance, it is considered that the amended project has an overall reduced impacted, recognising that there will be some visual effects in the early years of the development.

In recognition of and to mitigate identified visual impacts, Regis is committed to negotiating agreements with identified landholders in the Kings Plains area. Twenty agreements are being progressed. These agreements will include tailored landscape plans, which will be developed with each landholder to suit their individual property. Development of these plans has commenced and involve working with the landholder and a local builder to develop a mitigation plan tailored to the individual property, which may include physical screening, tree planting, or other landscaping features.

Regis has also planted tree screens around the mine development project area boundary to screen views from public vantage points.

5.8.3 Light pollution

Of the objections received, 56% (10) of organisations, 26% (60) of unique community submissions and form letters 1 and 3 raised concerns about the potential impacts of light generated by the project on neighbouring residents, motorists and fauna. This included concerns that:

- light pollution from the project will impact the night sky both in a local and regional setting;
- modelled images illustrating the potential impact of lighting have not been provided in the visual assessment or EIS; and
- inadequate light mitigation and management strategies have been proposed in the visual assessment and EIS.

The project's potential impacts on visual amenity, including direct and diffuse light pollution, were described in the VIA prepared for the EIS, which has been updated to reflect the amended project (refer to Section 6.13 and Appendix R of the Amendment Report).

The VIA acknowledges that lighting associated with the mine infrastructure area and the movement of mine fleet will be visible to residents surrounding the mine development project area and to motorists travelling along the local road network. These impacts are factored into the assessment of visual impacts at the identified viewpoints. Distance will reduce the visual impacts from more distant view locations in the west as it becomes part of the greater sky glow prevalent around Blayney. Sky glow is caused by light escaping upward from unshielded light fixtures of lights that indiscriminately aim upwards and is more prevalent around built-up or urban areas, such as the towns of Blayney, Bathurst and Orange.

The mine development design incorporated numerous visual mitigation measures which are detailed in the VIA. Onsite and offsite visual treatments have also been recommended in the VIA to reduce visual impacts of the project. These mitigation measures would have the effect of reducing both views during the daytime and lighting impacts at night. In addition, specific lighting mitigation measures were proposed in the VIA. All lighting around the mine site will be established in accordance with AS/NZS 4282:2019 – *Control of the Obtrusive Effects of Outdoor Lighting*, which sets out guidelines for the control of the obtrusive effects of outdoor lighting and gives recommended limits for relevant lighting levels to contain these effects within tolerable levels.

As detailed in the VIA, the following measures will enable avoidance and/or mitigation of any impacts associated with night lighting on neighbouring residents, passing motorists and fauna:

- night lighting will be reduced where appropriate to the minimum level required for operational and safety requirements;
- use of unidirectional lighting techniques and adequate aiming of lights (including consideration of mounting heights);
- use of shielded fittings to limit the spill of lighting where appropriate and safe to do so;
- use of anti-reflective paint to light spill surfaces (where the designer has a choice of surfaces, it is desirable that a surface with the lowest practical reflectance be selected, compatible with the function of the area);
- upward spill light will be minimised, and lighting will generally be directed either downwards, or away from the south and Kings Plains where safe to do so;
- energy efficient lighting will be used for any new fixed lighting installed, where available and safe to do so;
- where floodlights are required, asymmetric beams will be used and fixed lights will not be directed towards reflective surfaces;
- where necessary, and in consultation with affected landholders, screening (eg curtains, cladding, natural or physical screening) will be provided on private properties; and
- use of warm white colours for fixed lighting, where available and if compliant with industrial lighting standards.

During operations, compliance monitoring will be undertaken to ensure that the measures outlined above are implemented effectively. A protocol will also be established to handle lighting-related complaints that will include recording, reporting, and acting on complaints.

It is anticipated that, with the adoption of the relevant lighting protocols detailed above, light spill and skyglow impacts associated with the project will be minimised.

5.9 Closure and rehabilitation

A rehabilitation and landscape management strategy was prepared as part of the EIS, which has been updated to reflect the amended project and is included in full in Appendix T of the Amendment Report. The overarching objective of this strategy is to create a safe, stable and non-polluting post-mining landform. This section provides responses to submissions regarding mine closure, rehabilitation and the final landform.

5.9.1 Closure planning

Of the objections received, 17% (3) of organisations, 9% (22) of unique community submissions and form Letter 1 raised concerns about the project's proposed closure planning. This included concerns related to:

- the adequacy of the proposed rehabilitation management strategy; and
- long-term impacts of the project within the mine project area following the completion of operations.

The overarching objective of the rehabilitation strategy (Appendix U of the EIS and Appendix T of the Amendment Report) is to create a safe, stable, and non-polluting post mining landform that is consistent with agreed post mining land uses (ie grazing on improved pasture in combination with some woodland areas). The post mining land use nominated for the site is consistent with both the use of the land within the mine development project area, and the surrounding area. The rehabilitation strategy has also been prepared recognising that, if the project is approved, a mining operations plan (MOP) which would incorporate a Rehabilitation Plan will need to be prepared and submitted to DRG for approval prior to commencement of mining.

The majority of rehabilitation will target an agricultural (grazing) final land use, which as mentioned above is consistent with the existing land use across the project area. Of the approximately 1,116 ha to be disturbed by the mine development, around 66 ha (or just 6%) will be permanently removed from agricultural production associated with the final void, which will form a pit lake following the completion of mining. The impacts to agricultural land within the mine development project area will, therefore, be predominantly temporary with agricultural land uses possible across the majority of the project area at the completion of rehabilitation.

Post mining, the rehabilitated landform will predominantly be a combination of land and soil capability (LSC) class 4, class 5 and class 6 land. LSC class 4 and 5 land is land that can be used for a variety of uses, such as cropping with restricted cultivation, pasture cropping and grazing. LSC class 6 land has a more limited range of uses but can be used for grazing and forestry use. 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 majority of the mine development project area will, therefore, be suitable for the continuation of an agricultural land use post mining. The ability of the mine site to be returned to an agricultural land use is discussed in further detail in the response to DPI Agriculture's submission in Section 4.10.

A detailed soil balance was undertaken across the proposed disturbance footprint of the mine development, as part of the Land and Soil Capability Assessment (SSM 2019 and 2020) for the EIS and the amended project. This confirmed there will be sufficient soil available to strip such that sufficient soil depth can be replaced to achieve the nominated LSC classes and post mining land uses. Further, landform modelling undertaken as part of development of the rehabilitation and landscape management strategy demonstrated that the landform as proposed will remain long term stable.

The rehabilitation concepts presented in the rehabilitation strategy provided with the EIS and Amendment Report will be reviewed over time to allow for the consideration of a number of factors, including the outcomes of future rehabilitation trials on site, as well as the outcomes of consultation with relevant stakeholders during the detailed closure planning phase, which will occur within five years of planned closure.

Final rehabilitation and closure requirements will ultimately be developed as part of a detailed closure plan, in consideration of input from key government agencies, relevant stakeholders (including the nearby community) and applicable guidelines and standards at the time. This approach is consistent with relevant legislation, guidelines, policies and industry requirements. Further, there are safeguards in place in NSW to ensure mine closure and rehabilitation costs are met, such as the rehabilitation bond regime administered by the NSW government. Regis will be required to submit a security bond to the state government which would cover the cost of rehabilitation, prior to mining commencing.

The EIS and Amendment Report include consideration of the project's potential long-term impacts, particularly on water resources and with respect to the long term behaviour of the TSF within the mine development project area. As described in response to the EPA's submission in Section 4.2, following completion of mining and tailings placement, the TSF will be capped to facilitate surface water drainage, prevent any ponding of water and limit potential rainfall infiltration into the tailings. Seepage from the TSF will continue post closure due to the low permeability liner, the nature of the geology and the tailings. However, TSF seepage is very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final void, 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.

It is also noted that as part of the project amendments, the design of the clean water diversion system has been revised including improvements to the design of the post-closure clean water diversion. A diversion will be constructed to convey water from the north-east through the mine development project area to the south-west, allowing water to continue flowing into the Belubula River catchment.

5.9.2 Final landform and void

Of the objections received, 33% (6) of organisations and 18% (43) of unique community submissions raised concerns about the proposed final landform and void design. This included concerns that:

- the proposed void will adversely impact groundwater resources; and
- inadequate information is provided about proposed remediation activities.

The final void, which will cover an area of approximately 66 ha and will be approximately 450 m deep, is not predicted to adversely impact groundwater resources. As described in the groundwater assessment prepared by EMM for the amended project (included in full in Appendix H of the Amendment Report), groundwater modelling demonstrates that the void will function as a groundwater sink (ie the void will slowly fill with water over time). The water level in the final void will remain below ground level and will not spill.

As the final void will act as a groundwater sink, dissolved salts and metals are expected to become concentrated with time due to evaporation and exposure to potentially acid forming material within the void. There is potential for water with elevated salts and metals to migrate from the void approximately 500 years after the completion of mining, though the rate that this water is predicted to flow from the void is very low (ie 11 ML/year). Salinity within the void is predicted to reach an electrical conductivity of approximately 1,600 µS/cm after 1,000 years, which is within the current groundwater salinity range in the area.

The mine development's groundwater model will continue to be reviewed and updated as additional data becomes available (ie during construction and ongoing operations) and closure planning will continue to be refined. This approach is consistent with relevant legislation, guidelines, policies and industry requirements.

The proposed final landform and void design has been considered extensively as part of project design and the preparation of the EIS, Amendment Report and supporting technical assessments. 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 (subject to further consultation with key stakeholders) and all disturbed areas will be rehabilitated to integrate with natural landforms as far as practicable. The conceptual final landform is illustrated in Figure 4.19 (included in Section 4.5.1).

Rehabilitation monitoring will be carried out throughout the mine life, as will be detailed in the MOP, to monitor the progress of vegetation establishment over time and to identify and implement remediation measures as necessary to enhance vegetation establishment. Management of any contaminated areas, if present at closure, may include:

- on-site remediation;
- removal to an appropriately licensed waste disposal facility; or
- encapsulation on-site to prevent the release of contaminants.

The final landform, apart from the final void, will support the current land use practices (which is predominantly grazing). Several permanent clean water diversion channels will be constructed to allow for a free-draining landform. A clean water diversion channel will be constructed adjacent to the eastern side of the TSF and the northern boundary of the open cut pit to divert upslope runoff to the Belubula River.

5.10 Economic

An economic assessment was undertaken as part of the EIS to assess potential economic impacts associated with the mine and pipeline developments (Appendix DD of the EIS) and updated to reflect the project amendments. The economic assessment addendum is provided in Appendix U of the Amendment Report. This section provides responses to submissions regarding potential economic impacts.

5.10.1 Property values

Of the objections received, 17% (3) of organisations and 23% (53) of unique community submissions raised concerns about the potential for the project to contribute to a reduction in property values for neighbouring landholders. A number of submissions requested that mandatory acquisitions be enforced.

As outlined in the SIA (Hansen Bailey 2019) prepared for the project and included as Appendix T of the EIS, one of the most frequently raised issues during consultation with neighbouring landholders was the potential for the mine development to adversely impact property values. This included concerns around the saleability of properties in the locality in the event that residents seek to relocate during the approvals process or following determination. Similar concerns were also raised in organisation and community submissions lodged with the DPIE during the public exhibition of the EIS.

A wide range of factors affect property values over time, including factors at an individual property, local, regional and macroeconomic level. The characteristics of the property, attributes of the neighbourhood and the broader environmental characteristics of the surrounds can also influence property values.

As the project is a greenfield development, neighbouring property values may adjust to the presence of the mine. Mining and the creation of additional employment opportunities and subsequent potential for population growth can increase median dwelling and property prices. On the other hand, reductions in dwelling and property prices can occur as a result of adverse amenity impacts from mining activities (such as noise and vibration, dust and visual impacts).

As acknowledged in the SIA, the primary action Regis can take to minimise long-term impacts on neighbouring property values is to demonstrate to the public that the mine's noise and dust emissions can be confined to the mine development project area with negligible impacts on neighbouring properties.

In this regard, and as described in Section 5.4.2, the EIS assessed a range of potential amenity related impacts associated with the construction and ongoing operation of the project. Where the potential for significant impacts to neighbouring landholders was identified, the project has been refined and/or management and mitigation measures proposed to reduce the potential for impacts to an acceptable level. Appendix C of the Amendment Report prepared for the project (EMM 2020a) provides a summary of the management and mitigation measures that Regis are committed to, as well as subsequent management plans that will be prepared to document the implementation of these mitigation measures. A real time noise and air quality monitoring network will be established to enable Regis to proactively manage operations such that impacts are avoided or minimised to within relevant government set criteria.

As described in Chapter 6 of the EIS, extensive investigations were carried out in the project planning phase to explore all reasonable and feasible noise and visual mitigation measures, which have been incorporated into the project design. Further amendments have been made in response to submissions received on the EIS. This has resulted in minimising, and almost eliminating, the number of adjacent landholders that will experience exceedances of relevant noise criteria, and Regis has commenced negotiations with landholders regarding further appropriate mitigation measures to be implemented. No exceedances of government-set air quality criteria are predicted at any neighbouring property.

As described above in Section 5.3.1, in relation to the issue of acquisition, the relevant NSW Government policy is the VLAMP (NSW Government 2018). This policy sets out how mitigation and acquisition rights are assigned to landholders in relation to State significant resources projects in NSW. Defined criteria are set by the policy, above which landholders are assigned the right to request the proponent (such as a mining company), acquire their property. The noise and air quality models developed for the project do not predict any properties will experience noise or dust levels that trigger this acquisition requirement. In fact, the levels are well below. Notwithstanding, Regis is committed to, or is in the process of, negotiating agreements with identified landholders in the Kings Plains area, and has voluntarily included the option for 15 of these landowners to request that Regis purchase their property at any time within five years of the grant of development consent (provided the consent remains in force).

It is anticipated that if development consent is granted, consent conditions will include a requirement for Regis to provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any management plans or programs approved under the conditions of the consent. This transparency will also assist in eliminating uncertainty relating to environment performance affecting neighbouring property values.

5.10.2 Employment opportunities for locals

Of the objections received, 6% (1) of organisations, 18% (42) of unique community submissions and form Letter 1 raised concerns about the limited number of employment opportunities available for locals. This included concerns that adverse impacts associated with the project will impact the ability of other neighbouring businesses to sustain current employment levels.

Submissions from the community raised conflicting concerns with regards to local employment. A number of submissions raised concerns there would be minimal employment opportunities for local workers. In contrast, other submissions were concerned that a high level of local employment would affect the ability of other businesses to retain workers. Each issue is discussed below.

Regis is committed to the employment of a local workforce. As noted in Section 2.12 of the EIS, the project will provide direct employment for up to:

- 590 workers at peak construction of the mine development, with 55% anticipated to already reside in the local area (ie within a 1-hour commute of the mine development project area, based on the investigation undertaken as part to the SIA into the existing skills of workers); 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 (ie within a 1-hour commute of the mine development project area, again based on available skills).

A further 120 workers will also be employed during the construction of the pipeline development.

The SIA included a detailed assessment of potential sources of workers for the project to develop an understanding of the availability of local workers on which the above numbers are based, and the impact that employment of these local workers may have on other business in the area.

The SIA found that the Blayney LGA has a highly constrained labour market, with a relatively small labour force, low unemployment and a corresponding small pool of unemployed labour. It is expected, therefore, that the Blayney LGA will only absorb a small number of the construction phase and operations phase jobs created directly by the project. Further analysis of labour market data undertaken by Hansen Bailey and described in Section 5.4.6 of the SIA, showed that the Blayney LGA is a significant importer of mining workers, reinforcing labour market constraints for the project in the LGA.

Most of the construction and operational phase workforces will, therefore, be drawn from outside the Blayney LGA but in the neighbouring LGAs of Orange, Bathurst, Cowra and Cabonne, with a small portion also drawn from Lithgow. Bathurst and Orange LGAs each have a significantly larger labour force and a sizeable pool of unemployed labour. Within the SIA (Appendix T of the EIS), it was reported that outside of the Blayney LGA, and with the exception of the Cowra LGA, all LGAs within a 1-hour commute of the mine site (ie Bathurst, Cabonne and Orange LGAs) had unemployment rates equal to or below the Central West and Orana Region of 5.2%. As at December 2019 (DESE 2020), unemployment rates for the assessed LGAs were reported as:

- Blayney LGA – 2.5% (100 people);
- Bathurst LGA – 2.8% (660 people);
- Cabonne LGA – 1.7% (131 people);
- Cowra LGA – 5.0% (302 people); and
- Orange LGA – 3.2% (733 people).

It is anticipated that unemployment rates within these LGAs may also have been impacted by the COVD-19 pandemic; likely increasing from the numbers quoted above.

Given all the above, it is considered very unlikely that the project will impact the ability of other neighbouring businesses to sustain current employment levels.

Employees will be required to live within a 1-hour commute of the mine. Therefore, if workers are employed outside of the local area due to the requirement for specialised skills, then they will be required to move into the region, providing flow on effects to the local economy as they establish themselves, and possibly a family, in the area.

The project will also provide indirect employment in the regional economy from employee and project expenditure. 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.

Further, as described in Chapter 20 of the EIS, the following plans will be developed prior to the start of project construction 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.

The implementation of these plans, and in particular the recruitment and training strategy and local content plan, will ensure local employment opportunities are realised as much as possible. Regis will focus on securing local contractors during the construction phase, to reduce the size of the non-local workforce and is committed to supporting local businesses to participate in the project procurement process.

The potential impact of this employment of locals on other business is discussed in Section 5.10.4.

5.10.3 Local economic growth

Of the objections received, 6% (1) of organisations, 14% (33) of unique community submissions and form letters 1 and 3 raised concerns about the limited potential for the project to contribute to local economic growth. This included concerns that:

- the economic benefits presented within the EIS and supporting technical assessment have been over exaggerated;
- the project will have little economic benefit to the region and NSW with profits to be distributed overseas; and
- adverse impacts associated with the project will negatively impact the profitability of existing industries (eg tourism and agriculture).

The economic impact assessment (Appendix DD of the EIS) of the project was prepared by Dr Rob Gillespie of Gillespie Economics, a suitably qualified expert in the field of environmental and resource economics, in accordance with the SEARs and consistent with the relevant guidelines published by the NSW Government; notably the *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* published in 2015 (the Guidelines). The economic assessment was also peer reviewed by BIS Oxford Economics, who were engaged by DPIE to review the assessment. This review found that:

> ,,, the CBA is well-researched and generally well presented. The work is obviously the product of considerable effort and much of the approach is reasonable. Close attention has been paid to the stipulations laid down in the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas proposals* ("the Guidelines") in most instances.

Therefore, it is considered that the economic benefits of the project have been presented accurately in a manner consistent with the Guidelines.

In completing the cost benefit analysis (CBA) for NSW, the guidelines require that the cost of any environmental externalities be accounted for that have not already been offset and that "all costs and benefits should be quantified and monetised if feasible and material" (NSW Government 2015, p. 2). The methodology used to assess the project's potential economic impacts is summarised in Section 36.2 of the EIS and presented in detail in Chapter 3 of the economic impact assessment (Appendix DD of the EIS).

As required by the Guidelines, the economic assessment accounted for the level of Australian versus foreign ownership in Regis. The economic benefits quoted in the assessment are the net social benefits that are anticipated to flow to NSW and the local community. Specifically, the net social benefit of the amended project to NSW (using the same gold price as was assigned in the EIS (USD1,320), is estimated at $139M present value (at 7% discount rate) ($231M with employment benefits included). It is noted that this is compared to $141M for the EIS project ($232M with employment benefits included) and, therefore, the net social benefit to NSW of the amended project 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 (ie the January 2020, pre-COVID forecast of USD1,485), results in the net social benefit of the amended project increasing to $244M present value (at 7% discount rate) ($336M with employment benefits included).

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

- direct and indirect employment generation;
- investment in community infrastructure and services, made possible through a VPA, negotiated 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.

The mine development will provide substantial direct and indirect employment opportunities, which will in turn provide a significant boost to the regional economy, including the Blayney LGA in particular.

As noted in Section 5.10.2, it is anticipated that unemployment rates within these LGAs may be impacted by the COVID-19 pandemic. Similarly, local economic activity is likely to have been adversely affected by COVID-19, largely due to a significant reduction in domestic and international tourism (associated with restrictions on local, interstate and international travel) and potential reduction in local discretionary spending (associated with increased economic uncertainty).

If approved, the project's direct and indirect local employment opportunities and subsequent local and regional economic boost may help to reduce the longevity and/or severity of economic impacts realised in the Blayney LGA and surrounds as a result of the COVID-19 pandemic.

The project's impacts on the profitability of existing industries, including tourism, have been considered in Sections 5.10.4 and 5.10.5.

5.10.4 Impacts on local businesses

Of the objections received, 44% (8) of organisations, 26% (61) of unique community submissions and Form Letters 1 and 3 raised concerns about the potential for the project to negatively impact local businesses. This included concerns that:

- the project will attract skilled workers in the local area, removing them from existing positions with other local businesses; and
- adverse amenity impacts associated with the project (eg noise, dust, lighting and contamination) will affect the ability of businesses to continue their existing operations.

As described in the response above, the project is not expected to take workers from other positions, such that businesses are negatively affected.

Adverse environmental, social and cultural impacts (including impacts on local businesses) have been minimised through project design and mitigation and offset measures. The costs of implementing these measures have already been incorporated into the economic impact assessment (Appendix DD of the EIS) and the estimate of net production benefits, including:

- the cost of using land and water resources;
- noise and visual mitigation;
- provision of biodiversity offsets; and
- costs associated with a site access intersection upgrade.

The technical assessments prepared as part of the EIS indicate no material impacts are anticipated in relation to air quality, public infrastructure or loss of surplus to other industries. Impacts that were quantified included greenhouse gas generation and historic heritage. However, these are minor compared to the estimated net production benefits of the project.

No significant negative impacts on local businesses are expected from the project and there is no evidence to suggest that there will be negative flow-on effects on other businesses that would materially offset the significant secondary employment and household income benefits to the region that have been estimated in the economic impact assessment (Appendix DD of the EIS). The input of the project to the local and regional economy, particularly construction and subsequent technical services, will assist in the diversification and strengthening of the local and regional economic base.

Regis has a genuine intention to establish positive, long-term connections with the local community, which has been demonstrated through the project design process, commitments outlined throughout the EIS and community engagement undertaken to date, which will continue throughout the subsequent stages of the project.

It is noted that, of the submissions received from organisations during the public exhibition of the EIS, 7 (26%) supported the project (including businesses from the Blayney, Bathurst and Orange LGAs). These submissions referenced the potential for the project to provide increased opportunities for local businesses and boost the local economy.

Businesses that can provide the inputs to the production process required by the project and/or the products and services required by employees will directly benefit from the project by way of an increase in economic activity. Further, because of the inter-linkages between sectors, many indirect businesses will also benefit. A local procurement policy will be adopted, which will require local goods and services to be used in the project's construction and operation where possible, thereby maximising opportunities for local businesses.

The additional project-induced population is anticipated to introduce new and additional skills into the Blayney LGA which may support existing services and businesses and strengthen community cohesion.

As acknowledged in Section 6.2.9 of the SIA (Appendix T of the EIS), the project has the potential to adversely impact labour supply in the non-mining sector in the Blayney LGA by taking up a portion of the employed and unemployed labour pool during construction and operation. Regis will monitor local labour supply and adjust local labour recruitment practices and rates accordingly. In addition, Regis will support the local provision of education and training opportunities in the non-mining sector through community initiatives and will investigate additional opportunities (eg partnerships with TAFE NSW) as project planning progresses.

5.10.5 Impacts on tourism

Of the objections received, 11% (2) of organisations, 18% (41) of unique community submissions and form letters 2 and 3 raised concerns about the potential for the project to adversely impact tourism (both within proximity of the mine project area, as well as downstream areas).

It is acknowledged that tourism is an increasing industry sector in the Blayney LGA. The LGA is growing in popularity as a weekend and short stay destination with the historic buildings and streetscapes of Carcoar and Millthorpe (which are 22 km and 13 km from the mine development project area, respectively) being among the key attractions. There will be no adverse impacts on these streetscapes as a result of the project. The tourism industry in the Blayney LGA contributes an estimated $4.75M in wages and salaries, equivalent to 1.84% of all wages and salaries paid in the Blayney LGA (Section 5.4.6 of Appendix T of the EIS). Blayney Shire Council recently partnered with Orange City Council and Cabonne Council to form Orange360, a regional tourism initiative, to market the regional area and grow the tourism industry.

Sustained demand for short-term accommodation in the Blayney LGA as a result of the project's construction has the potential to adversely impact the local tourism industry sector by reducing accessibility to short-term accommodation for visitors to the LGA. To address this, Regis will manage construction workforce demands during periods of high regional accommodation demand, such as the Bathurst 1000, to free up short-term accommodation for the tourism industry sector. Further, the CWAS will seek to facilitate the coordinated placement of the project's construction workforce in short-term accommodation throughout the Blayney LGA and neighbouring LGAs to ensure adequate supply of short-term accommodation remains available to the local tourism industry.

Permanent mine employees will be required to live within a 1-hour commute of the mine and, therefore, the project's operation is unlikely to reduce accessibility to short-term accommodation.

Some community submissions indicated a perception that the presence of a mine will negatively impact tourist numbers and the amount of time tourists are likely to stay in the local area. However, given the limited businesses that rely on tourism in the area surrounding the mine development, and that the mine development area will not be accessed by the general public, there is no tangible reason to conclude that there will be a net negative impact on local tourism as a result of the project.

The nearest tourism operator to the mine development project area is the BeeKeepers Inn, approximately 3 km from the northern boundary of the project area on the Mitchell Highway. This property comprises a commercial honey business and includes a café and farm shop. As discussed in detail in the response to the submission from DPI Agriculture (refer to Section 4.10), this property is not predicted to experience adverse impacts as a result of the mine. Predicted noise and dust levels at the property are well below government-set criteria, and the property will not have any views of the mine, with significant vegetation in the Vittoria State Forest in between. Therefore, adverse amenity impacts on this tourism business are not anticipated.

Recent assessment of other mining projects in NSW have considered the impact of mining on tourism. Judith Stubbs & Associates (2017) prepared a report to respond to community concerns regarding the impact of the Hume Coal Project on local tourism. The report provided quantitative evidence that mining (specifically coal) and tourism-related industries can coexist. JSA (2017) reported that at a national scale, there is little evidence that the presence of mining is related to either increases or decreases in employment in tourism industries. Notwithstanding, a number of NSW LGAs with active mining (open cuts and underground) have significant employment in tourism industries, suggesting that the two uses are not incompatible. This includes the Hunter Valley, Lake Macquarie, Wollongong and Lithgow.

Views of the project from the Mid Western Highway were assessed in the visual assessment prepared for the amended project (included in full as Appendix R of the Amendment Report). The assessment found that, when viewed from the Mid Western Highway, the mine development will result in a high visual impact during construction of the pit amenity bund and southern amenity bund; however, this impact will reduce over time as these visual bunds are rehabilitated, reducing to a low visual impact once construction of the final landform is complete and rehabilitated (anticipated to be in around Year 6 of the project).

In relation to downstream water users, as previously described, the project is anticipated to have a negligible impact on flows downstream into Carcoar Dam. The loss of flow in an average rainfall year is predicted to be just 4%. In the surface water assessment prepared for the amended project (HEC 2020), HEC states that this level of change is expected to be imperceptible in comparison with the natural variability in catchment conditions.

It is acknowledged that adjoining landholders will primarily bear any residual environmental impacts from the project's construction and operation, particularly associated with noise and visual amenity. As described in Chapter 6 of the EIS and Chapter 2 of the Amendment Report, extensive investigations have been carried out in the EIS project and amended project planning phases to explore all reasonable and feasible noise and visual mitigation measures, which have been incorporated into the project design. A range of commitments have been made by Regis to mitigate predicted residual impacts on surrounding land uses.

5.11 Aboriginal cultural heritage

Aboriginal cultural heritage assessments (ACHAs) were prepared as part of the EIS to assess potential impacts on Aboriginal cultural heritage associated with the construction and operation of the mine and pipeline developments (Appendix P and Appendix Z of the EIS). Addendums have been prepared for these respective assessments and are contained in Appendix O and Appendix P of the Amendment Report. This section provides responses to submissions regarding potential impacts on Aboriginal cultural heritage, noting that a detailed consideration of the submission received from the Orange Local Aboriginal Land Council (OLALC) is provided in Appendix O of the Amendment Report.

5.11.1 Adverse impacts on Aboriginal cultural heritage

Of the objections received, 11% (2) of organisations, 7% (16) of unique community submissions and Form Letter 2 raised concerns about the project's potential impacts on items of Aboriginal cultural heritage within the mine project area, as well as the cultural significance of the area more generally to the local Aboriginal community.

The amended mine development will potentially impact on 30 Aboriginal cultural heritage sites within the mine development project area, consisting entirely of isolated finds and artefact scatters. The pipeline development will potentially impact on eight Aboriginal cultural heritage sites if the southern pipeline route option is constructed, and seven if the northern pipeline route option is constructed (also consisting entirely of isolated finds and artefact scatters).

The ACHAs prepared for both the mine and pipeline developments concluded that none of the Aboriginal cultural heritage sites identified were of high scientific (archaeological) significance. Notwithstanding, Regis recognises that the mine development project area, and the broader regional area within which the project is located, has cultural significance to members of the Aboriginal community, as outlined in the OLALC submission.

In order to effectively mitigate and manage potential impacts on Aboriginal cultural heritage, a Cultural Heritage Management Plan (CHMP) would be prepared for the project, in consultation with the local Aboriginal community. The CHMP would reflect the proposed management of the Aboriginal cultural heritage sites within the project area and would outline requirements for the recording, collection, curation, storage and replacement of salvaged Aboriginal objects.

Regis is committed to involving the local Aboriginal community in the management of Aboriginal cultural heritage values associated with the project. Regis will continue to actively consult with Aboriginal stakeholders throughout the life of the project, including the OLALC. In particular, pending grant of development consent, Regis in consultation with the OLALC, will commission an appropriate social and cultural mapping study with the local Aboriginal community.

5.11.2 Adequacy of Aboriginal cultural heritage assessment

Of the objections received, 6% (1) of organisations, 2% (5) of unique community submissions and Form Letter 2 raised concerns about the adequacy of the Aboriginal Cultural Heritage Assessments (ACHA). This included concerns that the ACHA(s) and EIS:

- contained an inadequate level of consultation with Aboriginal stakeholders;
- inaccurately characterised the Aboriginal cultural heritage significance of the mine project area;
- did not identify potential Aboriginal ancestral remains or an ochre quarry thought to be present within the mine project area; and

do not acknowledge the role of the Kings Plains landscape in historic frontier wars.

i Inadequate consultation

As described above, ACHAs were prepared as part of the EIS to assess potential impacts on Aboriginal cultural heritage associated with the construction and operation of the mine and pipeline developments (Appendix P and Appendix Z of the EIS). The ACHA for the mine development was prepared by Landskape (2019), and the ACHA for the pipeline development was prepared by OzArk (2019). Both of these assessments were prepared having regard to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010a).

In relation to the ACHA for the mine development (Landskape 2019), staged consultation was undertaken with the OLALC (the only Registered Aboriginal Party (RAP) for the assessment. Consultation with the OLALC took place: before the field assessment, to assess preliminary community views and organise a field survey teams; during the field surveys with the Aboriginal team members; and after the field surveys, to discuss the findings and recommendations for Aboriginal cultural heritage management (Appendix P of the EIS). Further Dr Cupper (the archaeologist who prepared the ACHA for the mine development) and representatives of Regis met with the OLALC CEO (Annette Steele) and Natural Resource Coordinator (Lisa Paton) in Orange on 24 June 2019, to discuss the submissions of the OLALC in detail.

In relation to the ACHA for the pipeline development (OzArk 2019), staged consultation was undertaken with the twelve RAPs registered for the assessment. Consultation was extensive including review and comment on the proposed methodology, involvement of Aboriginal community representatives in field surveys and review and discussions associated with the draft ACHA and key assessment findings (Appendix Z of the EIS).

Addendums have been prepared for the mine development and pipeline development respective assessments, and are contained in Appendix O and Appendix P of the Amendment Report. Copies of these draft addendums have been provided to the RAPs for review and comment and will be finalised following completion of this consultation period.

Further, a social impact assessment (SIA) was prepared for the EIS (Hansen Bailey 2019) which included consideration of the potential social impacts of the project on the local Aboriginal community. While not directly part of the ACHAs prepared for the project, it is noted that Wiradjuri representatives participated in the assessment.

ii Inaccurate characterisation of Aboriginal cultural heritage significance

As described above, the ACHAs prepared for both the mine and pipeline developments concluded that none of the Aboriginal cultural heritage sites identified within the project area were of high scientific (archaeological) significance. The mine development project area was not identified to contain culturally sensitive landforms such as lunettes or source bordering sand dunes where subsurface Aboriginal cultural deposits (eg burials) have been recorded previously. Notwithstanding, Regis recognises that the mine development project area, and the broader regional area within which the project is located, has cultural significance to members of the Aboriginal community.

As described in the EIS ACHA for the mine development (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 those identified within the mine project area can also provide information about past lifestyles and strengthen the links between Aboriginal people and the land.

The OLALC submission on the EIS indicates that the study area and Kings Plains area more broadly, meet several criteria for inclusion on the State Heritage Register and even a national listing. Notwithstanding that the mine project area has cultural significance to the Aboriginal community, only one potentially State-significant historical heritage site was identified in the mine development project area. Other identified features and landscapes do not meet the prescribed thresholds for inclusion on the State Heritage Register. A detailed analysis was provided in Section 7.3 of the cultural heritage assessment prepared for the EIS (Appendix P of the EIS).

iii Consideration of potential Aboriginal ancestral remains

The OLALC submission on the EIS notes the potential presence of Aboriginal ancestral remains within the mine development project area (Landskape 2019). Section 3.2.4 of Appendix P of the EIS considered a submission from the OLALC (dated 3 June 2019) noting an 1896 reference to a body exhumed during works on the railway line "a few miles from Blayney". The railway line at Blayney is approximately 3-4 km outside the mine development project area and is not located in proximity to the proposed disturbance footprint for the project.

The submission from the OLALC on the EIS referred to a different identification from 1912 of potential Aboriginal ancestral remains located on 'The Dungeon' property. This property is located approximately 600 m west of the proposed disturbance footprint within the mine development project area, and will not be directly or indirectly impacted by the project (i.e. no surface disturbance works are proposed in proximity to this location). In this regard, there would be no direct or indirect impacts to known Aboriginal ancestral remains as a result of the project.

iv Consideration of potential ochre quarry

The OLALC submission on the EIS notes the presence of an ochre quarry at the locality of Pounds Lane, to the east of the mine development project area.

It is noted that the locality of Pounds Lane is outside of the mine development project area and therefore was not assessed as part of the ACHAs for the project. Notwithstanding, it is noted that two pieces of red ochre were identified within the study area for the revised mine access road, which has been considered as part of the Amended Project (Ozark 2002). Neither piece of ochre had evidence of having been utilised. Both pieces were also in secondary contexts, and no Aboriginal cultural heritage sites were recorded in conjunction with them. On this basis, the ACHA prepared for the Amended Project (OzArk 2020) concluded that the pieces of ochre were not part of an Aboriginal cultural heritage site and accordingly neither piece was recorded with the Aboriginal Heritage Information Management System (AHIMS).

v Consideration of Kings Plains historic frontier wars

Sections 3.2.4 and 5.1.1 of Appendix P of the EIS considered conflict events at Kings Plains and the wider region. While Regis acknowledges the importance of conflict events at Kings Plains, it is noted that historically Kings Plains referred to the broad region either side of the Belubula River (Dixon 1837, Baker 1843-46, Conner 2002). The modern locality of Kings Plains is inset in this region (see Figure 5.9). None of the conflict events are known to occur in the mine project area.

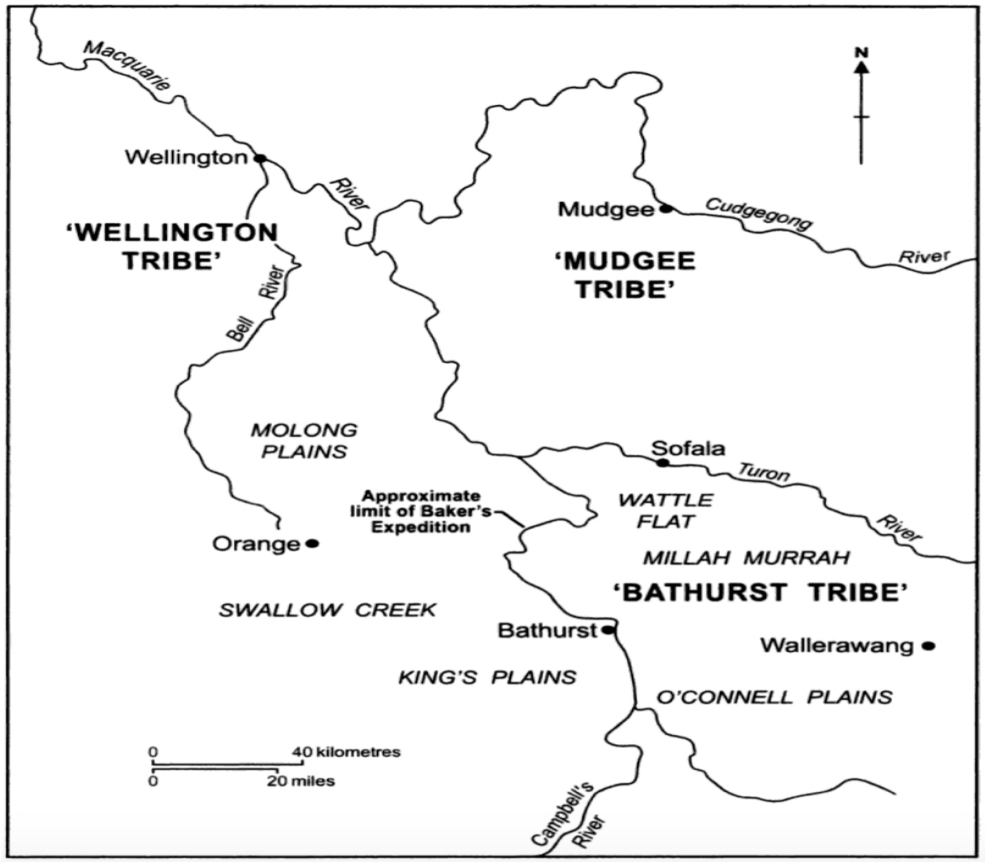


Figure 5.9 Map of the historical Kings Plains region (Conner 2002)

5.12 Historic heritage

Historic heritage assessments (HHAs) were prepared as part of the EIS to assess potential impacts on historic heritage associated with the construction and operation of the mine and pipeline developments (Appendices P and Z of the EIS). These assessments have been updated to reflect the amended project and are included as Appendix O and P of the Amendment Report. This section provides responses to submissions regarding potential impacts on historic heritage.

5.12.1 Impacts on items of historic heritage

Of the objections received, 6% (1) of organisations, 2% (5) of unique community submissions and form letters 1 and 3 raised concerns about the project's potential impacts on items of historic heritage. This included concerns that blasting and vibration from the project may damage historic heritage buildings

i Mine development project area

The project's potential impacts on historic heritage are described in Chapter 16 and Appendix P (mine development) and Chapter 29 and Appendix Z (pipeline development) of the EIS. Changes to predicted impacts as a result of the amended project are described in Section 6.11 of the Amendment Report, and Appendix O (mine development) and Appendix P (pipeline development).

No listed heritage items occur within the mine development area.

As part of the HHA, Landskape (2019) concluded that with the exception of the Hallwood Farm Complex (historic heritage item MGP-23 – Plate 16.3 of the EIS) disturbance to the identified historic heritage items of interest within the mine development project area would not greatly impact the historical heritage value of the project area or region or cause cumulative impact. Hallwood was identified as possibly being of State significance (Landskape 2019). Since the submission of the EIS, Regis has continued to explore alternative designs for the project's water management system, and this has resulted in an amended mine design that avoids direct impacts to this item.

A range of mitigation and management measures will be implemented to appropriately manage the sites identified in the mine development project area. These measures include some further subsurface testing, archival recording and/or salvaging and the fencing of some historic heritage sites outside of the disturbance footprint to ensure no inadvertent impacts occur. These measures will be detailed in the cultural heritage management plan (CHMP). The CHMP will also outline the protocol for unanticipated finds such as artefacts and skeletal remains. In addition, archival recording will be undertaken, and a conservation management plan will be prepared for Hallwood.

Community concerns relating to the project's impact on heritage tourism and recreation are considered in Section 5.10.5.

ii Pipeline development area

No historic heritage items will be directly impacted by the pipeline development (OzArk 2019, 2020). The CEMP will include measures to ensure impacts to historic heritage items that may be located in proximity to the development are avoided as a result of the pipeline construction.

iii Blasting and vibration assessment

The blasting assessment presented in Section 10.6.4 and Appendix L of the EIS included consideration of potential air blast overpressure and ground vibration at nearby heritage items including a number of items listed in Schedule 5 of the Blayney LEP, namely:

- I201 – Anglican Church – 2935 Mid Western Highway, Kings Plains;
- I202 – 'Iralee' (inclusive of the homestead, gardens and outbuildings) – 3011 Mid Western Highway, Kings Plains;
- I203 – 'Lynfern' (inclusive of the homestead, garden, stables and woolshed) – 3293 Mid Western Highway, Kings Plains;
- I204 – 'Springfield' (inclusive of the woolshed) – 3506 Mid Western Highway, Kings Plains;
- I205 – Woolshed – 222 Pounds Lane, Kings Plains;
- I206 – 'Kareela' (inclusive of the homestead and garden) – 61 Walkom Road, Kings Plains; and
- I208 – Public school and teacher's residence (former) – 2942 Walkom Road, Kings Plains.

The assessment considered blasts of up to 300 kg maximum instantaneous charge (MIC). All predicted values for air blast overpressure and ground vibration are predicted to remain within the criteria provided in Table 10.11 of the EIS and will not impact nearby infrastructure including the aforementioned Blayney LEP-listed heritage items.

Air blast overpressure and ground vibration at the potential historic heritage site Hallwood were assessed as part of the amended project (MAC 2020b) and are also predicted to remain within the relevant criteria.

Although not explicitly considered in the blasting assessment, air blast pressure and ground vibration impacts are not expected on the BeeKeepers Inn (listed under the Cabonne LEP) due to the distance of this heritage item from blasting activities (ie greater than 6 km from the northern edge of the open cut pit).

As described in Section 10.7.4 of the EIS, blast monitoring will also be conducted at various distances from the blast sites through the construction and operation of the project.

5.13 Hazards and risk

A number of assessments were prepared as part of the EIS to assess the potential hazards and risks associated with the project, including a preliminary hazard analysis (PHA) and bushfire risk and hazard assessment (BRHA). Potential geochemical risks were also considered in the geochemical characterisation which informed the TSF design report and groundwater assessment. This section provides responses to submissions regarding the potential hazards and risks associated with the project.

5.13.1 Bushfire hazards

Of the objections received, 6% (1) of organisations and 1% (3) of unique community submissions raised concerns about the project's potential to contribute to bushfire hazards in the local area. This included concerns that the EIS and supporting technical assessments did not include adequate consideration of bushfire management measures during operations or post closure (such as procedures to prevent ignition from project activities).

A bushfire hazard assessment was completed for the project by a suitably qualified bushfire assessor and ecologist, and was prepared in consideration of the NSW *Rural Fires Act 1977* and the relevant guidance documents from the Rural Fire Service (RFS); *Planning for Bushfire Protection* (RFS 2006 and 2018). The assessment was summarised in Section 18.2.2 and Section 18.2.3 and included as Appendix EE of the EIS.

The bushfire hazard assessment was completed in recognition of the potential bushfire risks associated with the site; in relation to both the bushfire risk to the surrounding environment associated with potential ignition sources from mine operations, and conversely the potential threat bushfires originating in areas outside the mine project area could pose to infrastructure at the mine site and the safety of staff and contractors on site. In this regard, the eastern boundary of the mine project area and the Vittoria State Forest, north-east of the project area, are mapped as bushfire prone.

To ensure the identified bushfire-related risks can be effectively mitigated, the bushfire hazard assessment proposed a number of bushfire management measures which Regis are committed to implementing. A bushfire management plan (BFMP) will be prepared and implemented for construction, operation and decommissioning, which will govern the implementation of these bushfire management measures, identified in Section 18.3.2 of the EIS. The BFMP will be prepared in consultation with emergency service organisations such as RFS, Fire and Rescue NSW and the Canobolas Bushfire Management Committee and will include provisions for the location of hazardous materials as well as specific measures and procedures to prevent ignition from project activities.

A number of Regis staff are active members of the local RFS, and it is understood that they intend to continue their involvement throughout the construction and operation of the project.

With the implementation of the BFMP, the risk of a fire on Regis-owned land initiating a bushfire which moves onto adjacent properties will be effectively controlled.

5.13.2 Exposure to PAF material

Of the objections received, 6% (1) of organisations and 1% (3) of unique community submissions raised concerns about the potential for the project to expose potentially acid forming (PAF) material. This included concerns that:

- it will not be possible to contain PAF material within the mine project area; and
- the EIS does not contain sufficient information about how PAF material will be managed if the proposed management strategies fail to contain the material on-site.

As discussed as part of the response to the EPA's submission (Section 4.2.3), the geochemical characterisation commissioned by Regis and undertaken by SRK (2019) included a robust testing program of material to be excavated during mining in accordance with applicable guidelines. The results of this assessment 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 (UC) material). 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 pit, the material has capacity to neutralise some acid.

To help with mine planning, the central zone from where the majority of the PAF samples were collected was 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 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.

Regis will implement a field testing program to distinguish PAF 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 cells.

In summary, the 'worst case' scenario was adopted in the mine plan and consideration of other scenarios would result in less PAF material that requires encapsulation.

5.13.3 Transportation of hazardous goods

Of the objections received, 6% (1) of organisations and 1% (3) of unique community submissions raised concerns about the transportation of hazardous goods (including cyanide) during the construction and ongoing operation of the project. This included concerns that:

- heavy vehicles transporting hazardous goods will pose a risk to other road users; and
- it will not be possible to contain spills of hazardous goods on-site.

A preliminary hazard analysis (PHA) was completed for the project, which considered risks associated with the transport and storage of hazardous goods. The PHA was summarised in Section 18.2.1 and Section 18.3.1 and included as Appendix R of the EIS, and was undertaken in accordance with relevant government guidelines and Australian standards as follows:

- *Applying SEPP 33* (DoP 2011a);
- DPIE's risk criteria in *Multi Level Risk Assessment* (DoP 2011b);
- Hazardous Industries Planning Advisory Papers (HIPAPs) produced by the Department of Planning (DoP) (now the DPIE), including No. 3 Risk Assessment (DoP 2011c) and No. 6 Hazard Analysis (DoP 2011d); and
- risk assessment guidelines including *AS/NZ ISO 31000:2018 Risk Management – Principles and Guidelines* (Standards Australia 2018), *HB 203:2006 Environmental Risk Management – Principles and Process* (Standards Australia 2006) and *MDG1010 Minerals Industry Safety and Health Risk Management Guideline* (DoTI 2011).

Preliminary screening of hazardous and dangerous goods to be stored and transported as part of the project identified the following materials:

- reagents for ore processing, such as lime, sodium cyanide, sodium hydroxide, hydrochloric acid and copper sulphate;
- explosives; and
- fuels and other flammable materials, such as LPG, diesel, oils for lubrication and hydraulic systems.

A risk assessment was completed as a component of the PHA, which involved identifying scenarios related to the hazardous materials stored on-site or transported to site which could pose a risk to public safety or the environment. In the presence of control measures which will be implemented by Regis as described below, all scenarios (including where a vehicle transporting reagents is involved in an accident and ignition of fuels and other flammable materials during transportation) were found to represent a 'low' or 'medium' risk.

All potentially hazardous materials will be transported to site by road in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (NTC 2018). Regis will use a suitably qualified supplier for the delivery of potentially hazardous materials to site. Site-specific measures relevant to the transport of all potentially hazardous materials will be included in individual supply contracts and implemented by onsite personnel. The following measures will be implemented during the transportation of explosives:

- containers will be protected against static electricity, suitably robust and adequately labelled; and
- explosives will be appropriately separated during transportation and threshold quantities maintained.

Sodium cyanide will be stored consistent with the International Cyanide Code. The compound will be dry, bunded, locked and remote from any flammable materials. Liquid form sodium cyanide will be stored in bunded tanks and rated and labelled pipelines.

Fuels, oils and chemicals will be stored in appropriate storage containers as specified in relevant Australian Standards. The CEMP and OEMP will contain specific mitigation measures such as:

- spill response kits to be provided in construction compounds, refuelling areas and vehicles;
- protocols for hydrocarbon storage and actions to be taken if spills or leaks are identified;
- a requirement to report spillages to the appropriate officer and immediately deploy spill containment kits to restrict their spread.

A hazardous materials management plan will be prepared prior to construction and will describe the measures that will be implemented to ensure the safe handling, storage and transportation of hazardous materials used on-site. The hazardous materials management plan will be prepared in accordance with relevant regulations, and in consultation with relevant stakeholders.

5.13.4 Use and storage of hazardous goods (including cyanide)

Of the objections received, 6% (1) of organisations, 21% (49) of unique community submissions and Form Letters 1 and 3 raised concerns about the use of hazardous goods such as cyanide during the ongoing operation of the project. This included concerns that:

- the use of cyanide leach technology is not justified, and questioned whether alternatives such as thiosulphate be used instead;
- the EIS and supporting technical assessments did not include adequate information about what hazardous goods will be stored on-site and where; and
- protocols have not been included to trigger further investigations if fauna are found dead within the mine project area.

i Use of cyanide

There are a number of processing options that can be used for the extraction of gold from an ore deposit; however, not all of those options are either desirable from a health, safety and environmental perspective, or commercially viable. Notwithstanding the many options available, only two types of processing options are generally used in larger scale commercial operations; cyanide leaching and flotation.

Carbon-in-leach (CIL) is the most widespread cyanide leaching process, both in Australia and throughout the world. As the name suggests, there is a leaching or dissolving process using cyanide and as part of that leaching process, activated carbon is used, where it is mixed with the ore and water (slurry) where it adsorbs (attracts) the gold onto its surface.

Gold is very difficult to dissolve and there are only a handful of chemicals that can dissolve it, and all of these generally need exacting conditions, which are not always easy to maintain on a large scale.

Cyanide, under typical leaching conditions is reactive and has an affinity for gold which means that gold is preferentially leached first before the cyanide then complexes (or associates) with other metals such as copper, silver, zinc and iron. The metal cyanide complexes formed during the gold leaching process are quite stable and low levels of cyanide salt (200 – 500 ppm) are required. The process to extract gold from the ore involves dissolving the gold particles. Once the gold particles have been dissolved and have formed gold cyanide, there are two main methods by which the gold is then recovered, namely CIL or Merrill Crowe.

Merrill Crowe is rarely applied as a recovery method in modern day facilities as it requires a much higher cyanide concentration in the leaching (dissolving) and recovery process, and because there is a need to separate the solution from the solid so that the next part of the process can work, where the addition of fine zinc powder causes the gold to precipitate as a solid.

Cyanide can be manufactured, stored, transported, utilised and disposed of in a safe manner. It occurs naturally, with over 3,000 species of plants known to synthesize cyanogenic compounds (such as cassava, lima beans and almonds). It is not toxic in all forms or concentrations and does not persist/accumulate in the environment.

Approximately 1.1 million tonnes of cyanide are produced annually worldwide, with 6% utilised for mining. The other 94% is utilised in industrial applications, such as the production of nylon, plastics, adhesives, fire retardants, cosmetics and as an anti-caking agent in salt.

ii Storage of dangerous goods

Detailed information on the use and storage of hazardous goods is provided in the response to the matters raised by DPIE – Hazards in Section 4.12 and in Appendix G.

All potentially hazardous materials will be stored onsite away from the project area boundaries to prevent any impact to members of the public. Explosives will be stored in a magazine facility designed to meet the separation and design requirements in *AS2187.2 2006 Explosives – Storage, Transport and Use*. As shown on Figure 4.25, the magazine is located more than 2,200 m from the nearest sensitive receiver (R76) and over 1,000 m from the open cut pit, processing plant and administration areas. The diesel and LPG storage locations will be located separately to prevent unwanted interaction. They will also be located away from ignition sources, including machinery and vegetation.

Sodium cyanide will be stored consistent with the International Cyanide Code. The compound will be dry, bunded, locked and remote from any flammable materials. Liquid form sodium cyanide will be stored in bunded tanks and rated and labelled pipelines.

As also described in the EIS, Regis will prepare a hazardous materials management plan which will describe the measures that will be implemented to ensure the safe handling, storage and transportation of hazardous materials used onsite. This plan will also document appropriate emergency procedures.

iii Fauna Investigation Protocols

Protocols for the handling of fauna deaths and the general management of fauna within the project area will be developed as part of the Biodiversity Management Plan. This will include investigation protocols and escalation mechanisms in consultation with relevant stakeholders.

5.14 Tailings management

A TSF definitive feasibility study and TSF risk assessment were undertaken as part of the EIS and included consideration of tailings composition and management and potential for TSF failure. This section provides responses to submission regarding tailings management.

It is noted that the design of the TSF has been revised since the submission of the EIS. Subsequently, as part of the preparation of the Amendment Report, a revised design review report has been prepared by ATCW (Appendix D of the Amendment Report). A summary of the changes to the TSF design is provided in Section 2.8 of the Amendment Report. Further, Figure 2.6 of the Amendment Report provides a comparison of the amended TSF design with that which was presented in the EIS.

5.14.1 TSF design (including failure risk and location)

Of the objections received, 44% (8) of organisations, 49% (115) of unique community submissions and form letters 1, 2 and 3 raised concerns about the proposed design of the TSF. This included concerns related to:

- the location of the TSF and associated water management facilities at the headwaters of the Belubula River;
- how extreme conditions (under which discharges from the TSF may be possible) have been defined;
- the adequacy of the peer review and TSF risk assessment process;
- the rehabilitation of the TSF at the completion of mining; and
- follow-up actions if the TSF fails resulting in flow-on impacts to the surrounding environment.

i Overview

As noted above, the TSF design has been amended since the submission of 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 revised design of the TSF has been reviewed by a Dam Safety Engineer at CMW Geosciences. In addition, in recognition of the significance of the TSF and the issues raised in community and regulatory submissions, the revised TSF design report has been reviewed by Dr David Williams, a Professor of Geotechnical Engineering and Director of the Geotechnical Engineering Centre at University of Queensland. Both reviews concluded that the TSF design is robust and appropriate for the site. Dr Williams found the TSF design is consistent with leading practice and the required Australian and international standards.

ii Location

It is acknowledged that the mine development project area is in the headwaters of a catchment (ie the Belubula River) which, as ATCW (2020) notes is typically the recommended placement for a TSF to minimise clean water catchment and diversion as well as avoiding likely greater groundwater (stream baseflows) in lower catchment areas.

As part of TSF design investigations, four locations for the TSF were considered:

- valley-type TSF in the headwaters of the Belubula River Valley;
- side-valley turkey's nest;
- side-valley TSF at the top of the catchment; and
- valley-type TSF on a tributary of the Belubula River to the south.

The first option was preferred, primarily due to the low basement permeability, but also due to its visual shielding and engineering efficiency. As acknowledged within the expert reviews, the location also minimises the need for clean water diversions around the TSF.

iii Application of extreme conditions

As described in Appendix D of the Amendment Report (ATCW 2020), the comprehensive design review of the TSF, which was undertaken partially in response to community and regulatory submissions on the EIS, has led to a further improved TSF design.

The design scenarios for earthquake loading relate to operating basis earthquake (OBE) and safety evaluation earthquake (SEE) conditions. In order to achieve the highest regulatory loading requirement, the consequence category of the TSF has been assessed as 'extreme'. Seismic design criteria for the TSF have therefore been adopted as 1 in 1,000 Annual Exceedance Probability (AEP) for OBE and 1 in 10,000 AEP for SEE.

Adopting an 'extreme' dam failure consequence category and conservative design parameters requires the most stringent design criteria, construction management, operational supervision and closure.

The amended TSF satisfies design criteria through to post-closure and in perpetuity.

iv Adequacy of peer review and risk assessment process

As noted above, the revised design of the TSF has been reviewed by an expert Dam Safety Engineer at CMW Geosciences (Chris Hogg), and by Dr David Williams of the University of Queensland. Dr Williams is a Chartered and Registered Professional Engineer with over 40 years of experience, who is internationally recognised for his expertise in tailings dams and mine waste management. Dr Williams authored the Australian Government publication *Tailings Management - Leading Practice Sustainable Development Program for the Mining Industry* (2016) and is on the working party for the Australian National Committee on Large Dams (ANCOLD) *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure*, which were published in 2012 and revised in 2019. Dr Williams and Chris Hogg are therefore considered suitably qualified to provide expert reviews of the TSF design for the project. Both expert reviews are provided as part of the TSF design review report (attached as Appendix D in the Amendment Report).

The independently-facilitated TSF risk assessment concluded that the risks associated with the TSF were in the lowest risk category (that is, acceptable). This assessment was undertaken in accordance with ANCOLD Guidelines.

Importantly, the expert review concludes:

> Tailings dam stability is an understandable community concern, given recent tailings dam failures, including that not far away at Cadia. However, the community can be reassured that the proposed TSF embankment will be a very effective and stable containment for the tailings and is designed and constructed for the more demanding closure return intervals for flooding and earthquake loadings, at the outset. In addition, the downstream embankment slope will be progressively rehabilitated.

v Rehabilitation of the TSF at completion of mining

TSF closure is described in detail in Section 2.6 of Appendix D of the Amendment Report. As acknowledged by the expert review, in NSW, the Resources Regulator will have ultimate responsibility for approving the closure of the TSF and the relinquishment of the site.

The TSF has been designed to comply with post-closure design criteria and proposes to progressively rehabilitate the downstream slope of the TSF embankment. The rehabilitation of the TSF is designed to achieve close to the pre-existing land and soil capability post-closure.

As noted previously, revisions to the water management system since the submission of the EIS will facilitate improved outcomes at closure in relation to the diversion of clean water around the TSF and will also help avoid impacts to native vegetation north of the TSF.

The TSF has been redesigned such that runoff from the rehabilitated surface will report to the clean water diversion system on the eastern extent of the TSF. This is a reversal of the landform drainage presented in the EIS and presents the following benefits:

- post-closure drainage will be more centrally aligned within the catchment providing greater integration into the surrounding topography;
- final discharge 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 as part of the closure planning for use in post-mining land use, such as agriculture; and
- grading of the final closure channel will range from 0.5% to 2%.

Permanent revegetation of the TSF main embankment will be completed once the TSF embankment has reached maximum height around Year 5. 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. Subsoil from within the footprint of the TSF that isn't used to construct the liner in the floor of the TSF will either be used to construct the eastern embankments or stockpiled for capping purposes. Where necessary, the subsoil and topsoil will be ameliorated to address soil chemistry constraints.

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. A capillary break/trafficking layer approximately 0.5 m thick will be placed on the TSF, followed by a capping layer that will consist of approximately 0.6 m of subsoil and 0.1 m of topsoil. Prior to placing both the subsoil and topsoil layers, the capillary break/trafficking layer will be allowed to settle and if necessary, additional NAF rock and/or subsoil placed to achieve the final landform design, followed by topsoil placement and revegetation with pasture species by either drill or broadcast seeding.

vi Proposed actions following TSF failure

The expert review (Williams 2020) concludes that the community can be reassured that the proposed TSF embankment will be a very effective and stable containment for the tailings and is designed and constructed for the more demanding closure return intervals for flooding and earthquake loadings, at the outset.

As noted in the EIS, a comprehensive consequence category assessment will be carried out as part of the detailed design phase of the project and will include a dam break study. An appropriate safety under earthquake study will also be prepared during the detailed design phase of the project in accordance with NSW Dams Safety requirements.

5.14.2 TSF impacts on groundwater

Of the objections received, 17% (3) of organisations, 21% (50) of unique community submissions and form letters 1 and 2 raised concerns about the potential impact of the TSF on groundwater (namely the potential for contamination of the water table). This included concerns about how any identified groundwater impacts will be monitored and managed during operations.

The groundwater assessment prepared as part of the EIS has been updated to assess the potential impacts of the amended project (including changes to the TSF design) on groundwater resources (Appendix H of the Amendment Report). Two of the key objectives of groundwater modelling performed as part of this assessment were to:

- predict potential changes to groundwater flow as a result of the TSF during operations and post-mining; and
- provide information for the assessment of potential TSF impacts on groundwater quality.

The design and assessment of the TSF seepage management measures demonstrate that seepage from the TSF will be effectively managed using design controls, including an embankment with upstream clay core, different floor lining systems, and seepage interception trench system. Following completion of mining and tailings placement, the TSF will be capped to facilitate surface water drainage, prevent any ponding of water and limit potential rainfall infiltration into the tailings.

Nonetheless, the groundwater flow model included simulation of the TSF using a deliberately conservative approach to assess potential changes to groundwater movement under a 'worst-case' seepage scenario. This process is described in detail in Section 6.2 of Appendix H of the Amendment Report.

TSF seepage is very slow (moving at a rate of approximately 50 m in 100 years) with the majority of seepage being directed to the final pit void, 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.

The results indicate that even under a conservative simulation of the TSF, groundwater and surface water quality will not be adversely affected by the TSF.

Nonetheless, a comprehensive groundwater monitoring program will be implemented as part of the project development. Specific to the TSF, groundwater monitoring will include the following:

- upstream and downstream groundwater monitoring bores to assess water quality and groundwater levels;
- downstream/downgradient shallow seepage monitoring; and
- surface water monitoring.

5.14.3 TSF seepage

Of the objections received, 28% (5) of organisations, 28% (66) of unique community submissions and Form Letters 1 and 3 raised concerns about potential impacts associated with seepage from the TSF. This included concerns related to the:

- potential contamination of the surrounding environment from leaks and/or leaching originating at the TSF;
- accuracy of groundwater flow assumptions used to determine the risks associated with a leak or spill from the TSF;
- application of monitoring to detect seepage and subsequent implementation of appropriate management measures; and
- post-mining stability of the TSF and integrity of proposed containment strategies.

The matters outlined above are addressed in Section 4.2.2 in the response to the EPA.

As acknowledged by the expert review, the objectives of the TSF design are to efficiently store tailings, while maintaining an operational and post-closure landform that is stable and minimises contamination of the environment. The amended TSF:

- will be in the upper tributaries of the Belubula River valley, having very low to low ground permeability that will protect the catchment downstream;
- is furthest and shielded from the nearest properties; and
- provides a relatively efficient storage in terms of embankment construction, tailings rate of rise and control of seepage.

The TSF risk assessment concluded that that identified risks associated with the TSF were in the lowest risk category (that is, acceptable). A detailed summary of the proposed TSF has been provided as part of the expert review (Appendix D of the Amendment Report).

In summary, the management of seepage from the TSF will include:

- a liner to meet EPA's permeability requirements (Regis propose a multi-barrier liner system over the entire TSF footprint, which is expected to match or exceed the liner system specified by the EPA);
- a low permeability compacted clay cut-off beneath the TSF embankment;
- lining on the upstream side of the embankment with low permeability compacted clay;
- a drain at the downstream toe of the embankment;
- groundwater monitoring and seepage collection around the TSF; and
- further seepage monitoring bores downstream of the monitoring network as an extra backup.

It Is acknowledged within the expert review that TSF seepage and stability have been demonstrated to be more than adequately addressed and catered for at the current feasibility stage of design, with appropriately conservative conditions and parameters adopted.

5.15 Traffic

Traffic and transport assessments (TTAs) were prepared as part of the EIS to examine potential impacts on the safety and efficiency of the local and regional road network as a result of the mine and pipeline developments (Appendices Q and BB of the EIS). The TTA for the mine development has also been updated to consider the amendments to the mine development and is included in full as Appendix Q of the Amendment Report. This section provides responses to submissions regarding potential impacts on the road network and other road users.

5.15.1 Increased traffic volumes on road network

Of the objections received, 28% (5) of organisations, 15% (34) of unique community submissions and form letters 1 and 3 raised concerns about the potential for the project to contribute to increased traffic volumes on the local road network. This included concerns that the project will contribute to traffic congestion on, and further degradation of, local roads.

In relation to submissions regarding the potential for damage to local roads as a result of increased project-related traffic and the funding of repairs, it is noted the low heavy vehicle traffic volumes will not trigger the requirement for road maintenance contributions. No significant adverse traffic impacts have been identified for the future traffic movements generated by the project for either the road network traffic capacity, intersection traffic operations; the road network condition; road safety and the efficiency of operation of the road network. The maintenance of public roads is the responsibility of the relevant government authority; that being the local council for local and regional roads and TfNSW for State roads. Potential local road improvements, not directly related to the project, may occur as part of the VPA to be established between Blayney Shire Council and Regis.

Once operational, all material extracted from the mine will be processed on-site and as a result, there will be no heavy vehicle haulage of ore from the mine development project area. Heavy vehicle movements required for the project will be limited to those required during the construction phase and regular deliveries during the operations phase. Heavy vehicle deliveries are expected to peak at 20 heavy vehicles a day within the first few months of the project commencing, before tapering back to 10 heavy vehicles for the remainder of the construction and operational phases of the project. During operations, the ratio of heavy vehicles to light vehicles is anticipated to be 3%. There will be no project related heavy vehicle movements along Guyong Road or Vittoria Road.

Project related traffic will peak in Years 1 and 2 of the project, as construction and mining operations occur concurrently. During these years, project related traffic will represent an increase of up to 14% above background traffic on the Mid Western Highway.

Potential project impacts on Guyong Road were considered in the TTA, specifically Section 4.3.2. Project related traffic on Guyong Road and Vittoria Road will only consist of workers travelling to the mine project area who live adjacent to Vittoria Road or Guyong Roads or north-east of the mine project area. It is estimated that these movements will be approximately 11% of total project related traffic movements. To ensure impacts to Guyong Road and Vittoria Road are minimised, a Drivers Coder of Conduct will be implemented by Regis that requires all workers that do not live adjacent to Vittoria Road and Guyong Road or where an alternative route would take significantly longer, to travel an alternative route to the mine project area.

To minimise the impact of project-related traffic on the surrounding road network, the majority of construction personnel are expected to be transported to the mine project area via mini bus with the remainder using light vehicles with some workers anticipated to car pool.

During the construction and operation of the mine development, significant adverse impacts on local and regional traffic movements are not expected based on:

- low heavy vehicle movements associated with the project;

- the road network traffic capacity;
- current intersection traffic operations; or
- the prevailing levels of traffic safety on the road network.

A traffic management plan (TMP) will be developed to manage the potential impacts of project-related traffic on the surrounding road network during construction and operations. The TMP will include strategies to manage and monitor driver fatigue, road hazards and driver behaviour. The TMP will be prepared in consultation with relevant authorities. Fog-activated advance warning signs and speed advice signage are proposed to be installed on the Mid Western Highway to reduce potential traffic conflicts/accidents.

5.15.2 Safety of road users

Of the objections received, 17% (3) of organisations and 9% (20) of unique community submissions raised concerns about the potential for the project to impact the safety of other road users. This included concerns that the:

- proposed primary access point is not suitable and will cause a major safety hazard;
- increase in heavy vehicle numbers will adversely affect the safety of other road users;
- blasting from the project may increase the amount of debris on the road network; and
- preferred access route travels through urban streets and past residences.

The location of the site access off the Mid Western Highway has been amended to address concerns raised in submissions from the local community and TfNSW about the suitability of the primary access intersection nominated in the EIS. 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. This move has reduced the predicted noise impacts on a house in Kings Plains that was in close proximity to the originally proposed intersection.

Regis representatives have been in ongoing consultation with TfNSW to ensure the revised site access concept design meets TfNSW requirements in terms of intersection design and road safety.

As noted in the TTA Addendum (Constructive Solutions 2020), it is desirable for the mine to have its own dedicated access directly from the Mid Western Highway. This will eliminate the need for project related traffic to detour to the mine development project area via Council local roads and will limit the numbers of additional traffic on these roads. The revised site access concept design includes a short Auxiliary Left Turn Lane (AUL(s)) and Channelised Right Turn Lane (CHR) on the Mid Western Highway and has been designed with dimensional capacity to cater for the turning movements of a 25 m B-Double. The proposed intersection has been designed to cater for the worst-case scenario of peak background traffic and project-related traffic. Safe Intersection Sight Distance (SISD) 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 at the proposed location.

Other features have been added to the design to ensure it operates safely and effectively. For instance, a property access is located opposite the intersection, and so to improve safety of turning movements at this property access the following features have been incorporated in the revised site access concept design:

- the CHR painted median west of the revised site access has been lengthened to cater for a 19 m articulated vehicle to stop and turn right safety into the property clear of the eastbound travel lane; and

- a school bus stops to service this property both in the morning and afternoon. Therefore, a 3 m shoulder widening will be provided to enable the school bus to pull off and stop clear of westbound traffic. Eastbound buses will be able to use the AUL to decelerate and pull off onto the old Highway alignment on the northern side of the Highway.

Signage for the intersection will consist of a give way sign and sight board opposite the intersection and truck advanced warning signage with fog activated wig wags 300 m in advance of the intersection in both directions along the Mid Western Highway.

In addition to the fog activated flashing lights, Regis, will implement additional mitigation measures to mitigate the risk from inclement weather during use of the Dungeon Road / Mid Western Highway as follows:

- 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

- operational restrictions such as limiting all heavy vehicles movements to daylight hours.

The road safety audit and SIDRA analysis carried out in the TTA Addendum, demonstrates that subject to the implementation of the mitigation measures identified above, the existing Dungeon Road / Mid Western Highway intersection can safely accommodate the peak development traffic projected up until construction of the revised site access is completed.

As noted in Section 5.14.1 above, there will be no heavy vehicle haulage of ore from the mine development project area. Heavy vehicle movements associated with the project will predominantly use the Mid Western Highway and the Great Western Highway, both of which are classified State roads designed to function as heavy vehicle transport routes between regional areas of NSW.

In relation to blasting, a blast management plan will be prepared and approved prior to the start of blasting activities. This management plan will contain blast design and control measures to ensure fly rock does not pose a danger to onsite employees or mining contractors. Blasting will be carried out in accordance with Australian Standard (AS) 2187.2:2006 Explosives – Storage and Use and therefore there will be no risk to fly rock to the Mid Western Highway or other land uses outside of the mine development project boundary.

5.16 Waste

The EIS included consideration of waste management during the construction and operation of the mine and pipeline developments. This section provides responses to submissions regarding waste management.

Of the objections received, 6% (1) of organisations and 1% (2) of unique community submissions raised concerns about the project's proposed management of waste products. This included concerns related to:

- the limited amount of detail provided on the proposed waste management plan; and
- the disposal of hazardous goods and contaminated waste materials.

Regis will be required to produce a suite of environmental management plans post approval, one of which will be a waste management plan (Waste MP). While the EIS provides an outline of the key management measures that will form the basis of these plans, the plans will produced in consultation with the relevant government authority post the granting of development consent, and will have to be prepared to the satisfaction of the Secretary, or delegate, of DPIE.

An outline of the Waste MP which will be developed prior to construction, is provided in Section 21.3 (mine development) and Section 34.3 (pipeline development) of the EIS. The Waste MP will be prepared in consultation with DPIE and Blayney Shire Council and will detail estimated annual quantities, types and classifications of waste generated by the project, as well describing how these waste streams will be effectively and appropriately disposed of. A key aim of the Waste MP will be to ensure that the use of local waste facilities does not disadvantage local businesses or the local community.

All waste produced by the project will be managed in accordance with the requirements of the:

- POEO Act;
- NSW *Waste Avoidance and Resource Recovery Act 2001* (WARR Act);
- NSW *Protection of the Environment Operations (Waste) Regulation 2014*;
- *Waste Classification Guidelines* (EPA 2014a); and
- *Waste Avoidance and Resource Recovery Strategy 2014-21* (EPA 2014b).

A hazardous materials management plan will be prepared prior to construction and will describe the measures that will be implemented to ensure the safe handling, storage and transportation and disposal of hazardous materials used on-site. The proposed management of hazardous goods is discussed further above in Section 5.13.

Management of any contaminated areas post closure may include on-site remediation, removal to an appropriately licensed waste disposal facility or encapsulation on-site to prevent the release of contaminants. It is noted that operational water management system will remain in place to avoid potential offsite impacts until such time as completion criteria (as determined by the approved closure plan to be prepared five years prior to closure) are achieved.

The management of product waste streams is considered in Section 5.16 (tailings) and Section 5.13.2 (waste rock).

5.17 Stakeholder engagement

As outlined in Section 3.2 above, Regis has been actively engaging with stakeholders since acquiring the exploration lease (EL 5760) for McPhillamys in 2012. The purpose of this engagement has been to inform and to obtain feedback about the project. This engagement continued throughout the preparation of the EIS, into the public exhibition period and remains ongoing. Regis' stakeholder engagement has been comprehensive to date and reflects the importance Regis places on this aspect of its business and the project. This section provides responses to submissions regarding stakeholder engagement.

5.17.1 Adequacy of community consultation

Of the objections received, 6% (1) of organisations and 11% (25) of unique community submissions raised concerns about the adequacy of community consultation undertaken by the proponent. This included concerns related to:

- the adequacy of face-to-face consultation with neighbouring landholders;
- the number and timing of public meetings and information sessions held during the preparation of the EIS;
- the extent of advertising of community consultation events; and
- distribution of conflicting information about potential impacts to different members of the community.

i Adequacy of consultation with neighbouring landholders

A number of the public submissions provided positive feedback on Regis's approach to community engagement, commended the team's openness and transparency during engagement activities and acknowledged the work that has been done to manage and mitigate potential impacts. Some submissions commended the amount of time taken to listen to the feedback received and incorporate this feedback into continued project refinements and ongoing project design. This feedback is further supported by the extensive record of stakeholder engagement provided in the project's consultation register with well over 1,000 individual meetings held with community members since the establishment of the stakeholder engagement and consultation plan. Community engagement, including inputs from neighbouring landholders and the local community more generally, played a pivotal role in the ongoing refinement of the project design. For example, the location of the site access intersection off the Mid Western Highway has been shifted 1 km east (refer to Section 4.8), and the construction sequence of the waste rock emplacement has been amended to provide for improved noise outcomes in Kings Plains (refer to Section 4.2).

ii Community Information sessions and public meetings

Community information and drop-in sessions have been held during the project planning phase and the lead up to the EIS including in month 2018 and April 2019. Two community information open days were also held during the EIS exhibition. At all of these information sessions, Regis staff and the specialists who prepared technical assessments for the EIS were present and available to answer any questions from community members. The information sessions were scheduled at key stages at the project schedule as follows:

- October 2018 – scheduled to present the project to the community and communicate the findings of the preliminary environmental assessment;
- April 2019 – scheduled to coincide with the finalisation of EIS technical assessments. The objective of the April 2019 open days was to communicate the findings of the EIS technical assessments to the community and to respond to the community's concerns and/or questions in relation to the project; and

- October 2019 – held during the EIS exhibition period. The objectives of the EIS exhibition open days were to provide further information to the community regarding the project benefits and to give the community access to the technical specialists who had prepared the EIS, Regis personnel (including the Regis CEO) and technical assessments in order to ask any questions in relation to the methodology or results of the respective assessments. EIS summary booklets and USBs of the complete EIS and technical assessments were also distributed to interested community members.

A Community meeting, independently chaired by the CCC Chair, was also held at the Blayney Community Centre in May 2019. Similar to the April 2019 information sessions, this community meeting was held to communicate the findings of the technical assessments and to listen to the community's concerns in relation to the project.

All of the information sessions were held in the afternoon and extended into the evening (generally from 12.00 pm to 7.00 pm to enable as many people in the community to visit as possible around work and family commitments while not intruding on the community's weekend.

The information sessions were advertised in the Blayney Chronical, on the radio, via letter box drops and through email project updates.

iii Conflicting information on project impacts

Regis acknowledges that throughout the project evolution, there has on occasion been conflicting information provided to the community regarding the results of technical assessments and the extent of impacts. As the project has evolved from the design presented in the PEA to the design presented in the EIS, the results of technical studies were progressively updated as a result of the ongoing and iterative design process.

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. Issues raised in submissions included concerns relating to offsite amenity impacts (such as noise, air quality and visual amenity), potential impacts to water resources, the TSF, impacts to surrounding land uses such as agriculture, and potential impacts to biodiversity.

The amended mine development layout, compared to that assessed in the EIS, is shown in Figure 1.3 and the amended pipeline development layout is shown in Figure 1.4. An Amendment Report (EMM 2020a) has been prepared to outline these changes that have been made since the public exhibition of the EIS, as well as to present an updated assessment of the impacts and benefits of the project, as amended. Further discussion on amendments made to the project is provided in Chapter 3.

The impacts of the amended project with reference to the impacts predicted for the EIS design are outlined in Chapter 6 of the Amendment Report.

iv Community consultation since the EIS

It is acknowledged that the COVID-19 pandemic and subsequent social distancing requirements and restrictions on large gatherings have resulted in changes to Regis's ongoing engagement activities in 2020. For example, an additional open day would have been held to inform the broader community of the project amendments; however, this was cancelled due to COVID-19 restrictions. Notwithstanding, Regis has maintained appropriate and active engagement activities during this period including:

- amendments to the project design, as described in Section 3.1 and detailed in the Amendment Report (EMM 2020a);

- by commissioning additional technical studies and providing further information to alleviate concerns about certain aspects, including two expert reviews of the TSF design, a health impact assessment (enRiskS 2020b) and a review of the potential impact of the project on European honey bees and local honey production (enRiskS 2020a);
- community information open days in Blayney;
- community newsletters are sent out quarterly and are distributed via Australia Post (letterbox drop) within the Blayney LGA to approximately 3,000 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 residents;
- Regis information stall at the Blayney farmers markets (monthly prior to COVID-19);
- Blayney winter markets held at the Blayney community centre;
- Local office, where community members could come to talk to members of the Regis team;
- website containing CCC minutes, community newsletters, project updates and environmental assessment documentation;
- face to face meetings and phone calls focused on near neighbours (within an approximate 2 km radius); 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 detail on stakeholder consultation carried out by Regis during the evolution of the project is contained in Chapter 4 of the EIS. In addition, this Submissions Report (refer Section 3.2) and the Amendment Report (refer Chapter 5), both provide summaries of the additional stakeholder engagement activities that have been undertaken by Regis both during and after the public exhibition of the EIS. Engagement with Aboriginal stakeholders as part of the ACHAs is discussed in Section 5.11.2.

5.18 Approvals and legal process

As described in Section 1.2, two major planning approvals are required for the project. The first is SSD consent under Part 4 of the EP&A Act. The second is an approval under the EPBC Act.

Regis is seeking development consent under Part 4 of the EP&A Act for the project. The project is SSD pursuant to Schedule 1 State and Regional Development SEPP. A DA and EIS was submitted to DPIE, which was publicly exhibited. This Submissions Report has been prepared to respond to the issues raised in the submissions received. This report will accompany the Amendment Report which outlines the changes made to the project in response to submissions received and ongoing mine planning.

Following receipt of this report and the Amendment 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. The 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.

5.18.1 Quality of EIS and insufficient exhibition period

Of the objections received, 11% (2) of organisations and 23% (53) of unique community submissions raised concerns about the quality of the EIS and supporting technical assessments. In addition, this included concerns that:

- technical assessments understated the potential impacts of the project;
- the terminology used to describe potential impacts was not prescriptive; and
- the public exhibition period for the EIS was insufficient

i Quality of the EIS

Regis submitted its draft EIS for the project to DPIE on 15 July 2019 for DPIE review. DPIE reviewed the draft EIS to ensure it adequately met its requirements in the SEARs. The EIS was then finalised addressing some minor adequacy review comments and the DPIE deemed that it adequately met the SEARs.

A robust EIS was prepared over a number of years in accordance with the requirements of the DPIE, DAWE and other government agencies, as set out in the SEARs. The EIS and Amendment Report provide assessments of the impacts of the project based on detailed environmental and socio-economic assessments prepared by technical specialists. As requested in the SEARs, the EIS includes an assessment of likely impacts of the development on the environment, including likely impacts at all stages of the development, cumulative impacts and specific issues identified in the SEARs, taking into account relevant legislation, planning instruments, guidelines, policies, plans and codes of practice.

Further, extensive baseline studies have been undertaken since 2014, enabling a thorough understanding of the existing environment on which to base environmental assessments of the project. The project evolved progressively with input from detailed geological, engineering, environmental, financial and other technical investigations, and has been amended further in response to even more detailed mine planning and issues raised in submissions on the project during the public exhibition period.

Technical assessments were prepared for the EIS by qualified, experienced and well-respected industry professionals, in accordance with the relevant guidelines and policies. They were prepared in consultation with government agencies and other stakeholders, and assessments accounted for baseline environmental conditions based on extensive datasets of monitoring results. The assessment methodology for each technical study is described in the relevant appendix of the EIS and/or Amendment Report. A SEARs checklist was also included in Appendix B of the EIS to demonstrate the requirements were met. It is noted that in some instances the language in some technical assessments are not prescriptive, given some assessments are by their nature, qualitative, such as the visual impact assessment, others such as noise, air quality and biodiversity have prescribed methodologies resulting in clearly quantifiable impacts.

To ensure the EIS rigour and independence, aspects requiring more complex technical studies and/or identified as a potential area of community concern were reviewed by independent experts and their input incorporated in the assessment; in particular the TSF design and groundwater model. The expert review reports for the TSF are appended to the Amendment Report (refer to Appendix C of the revised TSF design report contained in Appendix D of the Amendment Report), while the independent review of the EIS groundwater assessment is contained as Appendix H of that report (refer to Appendix K of the EIS).

An issue raised in a couple of community submissions in relation to the quality of the EIS related to the methodology adopted for the economic impact assessment (EIA) (refer Chapter 36 and Appendix DD of the EIS), which included a cost benefit analysis (CBA). This is one of the primary tools used by economists to evaluate the net benefits of projects and policies, provide economic justification for a project and address the public interest. The EIA (Gillespie Economics 2019) was prepared by a suitably qualified expert in the field, in accordance with the SEARs and consistent with relevant guidelines published by the NSW Government; notably the *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals* published in 2015.

DPIE commissioned BIS Oxford Economics to prepare a peer review of the EIA. The review concluded the following:

> This review finds that the CBA is well-researched and generally well presented. The work is obviously the product of considerable effort and much of the approach is reasonable. Close attention has been paid to the stipulations laid down in the NSW Government (2015) *Guidelines for the economic assessment of mining and coal seam gas proposals* ("the Guidelines") in most instances.

ii EIS exhibition

In relation to concerns about the public exhibition period, all SSD applications in NSW must be exhibited for at least 28 days. This acknowledges that SSD projects are large, complex and can have major economic, environmental and social impacts, and gives the community the opportunity to have a say on these projects before any final decision is made.

The public exhibition period for the project was extended by DPIE from the standard 28 days to 43 days, allowing community members additional time to comment on the EIS in recognition of the scale and complexity of the project (ie 12 September 2019 to 24 October 2019).

The EIS was publicly exhibited from 12 September 2019 to 24 October 2019 at the following locations:

- Blayney Shire Council Chambers;
- Cabonne Council Chambers;
- Bathurst Regional Council Chambers;
- Lithgow City Council Chambers;

- Regis Resources Blayney Office;
- Nature Conservation Council office (14/338 Pitt Street, Sydney) – electronic copy only; and
- NSW Service Centres (electronic copies only).

The EIS was also available for review online on DPIE's Major Projects planning portal. Hard copies and/or USBs with electronic copies were also made available to Orange City Council, members of the project's Community Consultative Committee (CCC), near neighbours and the broader community.

5.18.2 Site suitability

Of the objections received, 22% (4) of organisations, 36% (83) of unique community submissions and form letters 1, 2 and 3 raised concerns about the poor suitability of the mine project area for the project (particularly due to its proximity to residences and its agricultural production and water supply potential).

A detailed discussion on site suitability is provided in Section 39.6 of the EIS.

A factor relating to site suitability is that the project will target a valuable gold mineralisation within the mine project area, approximately 200 m in diameter beginning near the surface and extending near vertically to depth. As described in Section 39.6 of the EIS, the project is located in a region where mining is identified as one of the top three economic opportunities (DPE 2017b). Mining has a long history in the Blayney LGA, and many of the towns in the LGA owe their existence and growth to the early gold mining industry. The mine project area also shares this mining history, where historical gold mining activity occurred for many years.

Regis recognise 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. Accordingly, Regis is committed to, and is actively progressing, the negotiation of agreements with the key affected landholders within Kings Plains. 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.

The project area currently comprises mostly cleared open paddocks utilised for cattle grazing and some limited cropping, consistent with the dominant agricultural land use in the surrounding area. This is also consistent with the land use zoning of the locality. The proposed land use (ie mining) represents a significantly higher value land use when compared with the existing agricultural land use. The area within the disturbance footprint of the mine development has been verified as not BSAL (refer to Appendix C of the EIS). A small portion of BSAL was identified in the south-west corner of the project area; however, this has been excised from the mine development footprint and mining lease application area. The mine development will therefore not impact any BSAL.

Whilst some reduction in LSC class will occur as a result of the project, disturbed areas within the mine project area will be rehabilitated and returned to an agricultural land use at the completion of mining, with the exception of the final void.

The project will efficiently recover an economic gold resource from privately-owned land where mining is permissible. That there has been a granting of the right to explore with the intent to develop a mine in the area over a long period of time indicates the area is deemed suitable for mining activities, provided environmental and social impacts can be managed or mitigated. A range of commitments have been made by Regis to mitigate predicted residual impacts on surrounding land uses.

In relation to water supply potential, it is noted that 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.

5.19 Project design and justification

5.19.1 Closure of Dungeon Road

Of the objections received, 2% (5) of unique community submissions raised concerns about the closure of Dungeon Road. This included concerns that the closure of Dungeon Road will:

- impact travel times for local residents; and
- impact the connectivity of the local road network particularly during emergencies and/or road closures on surrounding roads.

The traffic and transport assessment prepared for the EIS (Appendix Q) included an assessment of Dungeon Road and existing background traffic using Dungeon Road.

Considering the current low traffic volumes on Dungeon Road and the alternate options available to local traffic to access Vittoria Road and the Mitchell Highway from the Mid Western Highway (ie Guyong Road or Gardiners Road/Pounds Lane), closure of Dungeon Road is not expected to significantly impact on local travel times for local residents or impact on the local connectivity of the local road network.

Dungeon Road is an unsealed local road that is approximately 9.3 km long and joins the Mid Western Highway in the south and Vittoria Road to the north. Dungeon Road provides access to rural properties and the mine development project area. With the exception of two rural properties which are accessed by the portion of Dungeon Road in the south that will not be closed, all properties accessed off Dungeon Road are owned by Regis.

Background traffic counts carried out on Dungeon Road found the annual average daily traffic (AADT) count for Dungeon Road south of the existing entrance to mine site off Dungeon Road was 68 vehicles a day while 32 vehicles a day were found to use Dungeon Road north of the existing mine site access of Dungeon Road reflecting that over half of the vehicles currently using Dungeon Road are associated with the project (noting some of the traffic north of the mine site access would also be project related).

It is noted that, while Dungeon Road will be closed to the public, access via locked gates will be available in the event of an emergency. In an emergency situation, Regis would work with the emergency services to provide access as required.

5.19.2 Construction workforce accommodation

Of the objections received, 6% (14) of unique community submissions and Form Letters 1 and 3 raised concerns about the availability of sufficient accommodation to house the project's construction workers and how an influx of construction workers may impact rental prices in the local area.

As detailed in Section 4.13.2 of this report, Chapter 20 and Appendix T of the EIS, prior to the commencement of construction, a detailed CWAS will be developed. The strategy will be prepared in consultation with Blayney Shire Council, Orange360, key accommodation providers and where necessary proponents of existing or new major projects in the Blayney LGA.

The strategy will:

- demonstrate how the construction phase workforce will be accommodated across the local area;

- demonstrate how workforce accommodation requirements will be managed during periods of high demand, such as during key regional events like the Bathurst 1000;
- document the approach to informing accommodation providers of predicted project workforce accommodation demands including anticipated timing;
- enable the coordinated placement of the workforce in tourism accommodation throughout the local area; and
- keep key stakeholders informed of predicted project accommodation demands across the construction phase.

Further actions Regis will take to manage potential impacts associated with housing the construction workforce are outlined in Section 4.13.2 and in the updated mitigation measures table contained in Appendix C.

5.19.3 Consideration of alternatives

Of the objections received, 6% (1) of organisations, 3% (8) of unique community submissions and form letters 1 and 3 raised concerns that the EIS and supporting technical assessments contained inadequate consideration of project alternatives. This included concerns that:

- other technologies with better environmental outcomes have not been considered as they may not be financially viable; and
- the proposed site layout (including the location of the TSF) has not been adequately justified.

i Project evolution and alternatives considered in EIS

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.

Chapter 6 of the EIS outlined and included a detailed evaluation of the key alternatives that were considered during the planning, design and environmental assessment phase of the project. The key elements of the project where alternatives were considered leading up to lodgement include:

- extent of the mine project area and mining lease (ML) application area boundaries;
- site layout, including location of mine infrastructure areas and topsoil stockpile;
- waste rock emplacement, including;
  - the number and location of waste rock emplacements;
  - construction and emplacement schedule of the waste rock emplacement;
- gold extraction ore method;
- tailings storage facility, including:
  - tailings disposal method;
  - tailings detoxification method;

- location and design of the TSF;

- location of the main site access;
- operational water management storage;
- water supply; and
- pipeline corridor alignment options.

ii Tailings disposal options

In response to submissions received, Regis has prepared a short report presenting and evaluating in further detail the different tailings disposal options considered in the project planning phase (contained as Appendix H).

Tailings Management: Leading Practice Sustainable Development for the Mining Industry (Tailings Management Leading Practice) states that "optimal strategies for tailings management are very much site specific" and "may be stored in a variety of ways, depending on their physical and chemical nature, the site topography, climatic conditions, regulations and environmental constraints, and the socioeconomic context in which the mine operations and processing plant are located (Commonwealth of Australia, 2016: 2.) Tailings Management Leading Practice further considers that:

> The selection of the appropriate and optimal tailings disposal method for a particular project is a function of the extent of pre-disposal dewatering applied to the tailings, which in turn is a function of the rheology and transportability of the tailings, the chemical and biological reactivity of the tailings, the return water requirements, the process water quality and its suitability for recycling to the processing plant, and the availability of raw water for processing. The selection is also influenced by the site climatic conditions, the topography, the distance to and elevation of the selected TSF site relative to the plant, and the conditions imposed by the regulator (Commonwealth of Australia: 2016: 14.)

Regis has, based on the technical, natural and engineered criteria for various tailings disposal options, selected conventional thickened tailings disposal as the most appropriate for the type and volume of tailings produced.

Thickened tailings provide a robust solution to disposal where water conservation is important and the need for a long term stable landform is paramount. In conjunction with an engineered clay (or similar) lining system as proposed for the project, it allows for accurate seepage rate control so that the tailings can in turn consolidate for long term stability. It provides for low to moderate water consumption and is compatible with conventional cyanide detoxification processes and it provides optimal conditions for further cyanide breakdown after the tailings have been deposited.

Conventional thickened tailings disposal also satisfies the natural geographical, geological, geotechnical and geochemical conditions found at site. The geography of McPhillamys, including the undulating landscape is well suited to a natural valley style TSF location. Further to this, it is ideally located at the headwaters of the catchment and is therefore less affected by inundation from high rainfall upstream events than downstream catchment locations. The underlying geology and design for controlled seepage allows for long term consolidation and stability and the TSF design enables efficient use of the natural (valley style) topography in the area.

The proximity of residences to the project raises potential impacts from noise and dust generation with associated socio-economic considerations. The location of the processing plant in close proximity to both the ore body and the TSF reduces truck movements for processing and TSF embankment construction with associated noise and air quality benefits. Pumping of thickened tailings to the TSF generates less noise than additional conveyors or trucks required for depositing paste or dry stacked tailings. The close proximity of the waste rock emplacement and topsoil/subsoil stockpiles also facilitates access to TSF capping materials for closure.

iii Site layout

a General site layout

The mine development general arrangement has evolved considerably from the conceptual site layout presented in the PEA. This has been in response to the findings of technical assessments and mine design optimisation.

- the main administration area, mine support services and equipment laydown areas were shifted to the eastern side of the project area, north of the main waste rock emplacement and in the vicinity of the processing plant and workshop;
- the western waste emplacement/amenity bund was removed altogether from the project;
- relocation of soil zones;
- removal of land from the MLA area as described in Section 6.3 above.

The removal of the western waste rock emplacement area from the design greatly reduced noise and visual amenity impacts on sensitive receptors residing in the western area of the Kings Plains locality, particularly three rural dwellings located to the north-east of the Mid Western Highway and Dungeon Road intersection.

b Location of the TSF

As outlined in Section 5.16, it is acknowledged that the mine development project area is in the headwaters of a catchment (ie the Belubula River) which, as ATCW (2020) notes is typically the recommended placement for a TSF to minimise clean water catchment and diversion as well as avoiding likely greater groundwater (stream baseflows) in lower catchment areas.

As part of TSF design investigations, four locations for the TSF were considered:

- valley-type TSF in the headwaters of the Belubula River Valley;
- side-valley turkey's nest;
- side-valley TSF at the top of the catchment; and
- valley-type TSF on a tributary of the Belubula River to the south.

The first option was preferred, primarily due to the low basement permeability, but also due to its visual shielding and engineering efficiency. As acknowledged within the expert reviews, the location also minimises the impact on clean rainfall runoff and the need for its diversion.

The alternative options for the TSF comprised large elevated structures requiring significantly greater embankment volumes (to the point that they would exceed available mine waste to build) and were considered to present greater risks/adverse effects for associated environmental management aspects (ie greater elevations exposes greater potential for dusting, dam break consequences, multiple seepage paths and final landform usability).

iv Project evolution post EIS lodgement

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. The amendments have been described in detail throughout the 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 (particularly from a noise perspective);
- 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; and
- revision of the water management system will avoid impacting Hallwood, a potential item of historic heritage significance and to achieve a reduced likelihood of discharge in wet weather events from the storages as part of a nil discharge design;

5.19.4 Operation and construction hours

Of the objections received, 11% (2) of organisations, 25% (59) of unique community submissions and Form Letters 1 and 3 raised concerns about the proposed operation and construction hours (primarily the proposed operation of the mine 24 hours per day, 7 days per week). There was also concern that the mining schedule will vary during operations based on changes in mining method, market conditions and timing.

i Construction and operation hours

Mining operations generally are very capital intensive and the production and processing systems are not conducive to stop-start operations, therefore they generally operate 24 hours a day, 7 days a week.

The mine has been designed to minimise potential impacts on nearby residences. As noted in Section 5.3.3 above noise levels during evening and night time periods are predicted to be below the relevant criteria for all residences 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 2 dB 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. Furthermore, the sleep disturbance assessment concluded that the predicted noise levels at sensitive receptors are below those likely to cause awakenings (MAC 2020a).

This is a significant change from the EIS, where the operational noise asssessment predicted that 15 residences in Kings Plains would experience noise levels that exceeded the PNTLs during the early few years of the mine development, such that they would be entitled to the implementation of voluntary mitigation measures upon request.

The rescheduling of the waste rock emplacement has also resulted in the removal of activities in the southern portion of the waste rock emplacement during night time activities removing the potential direct lighting impacts from waste emplacement activities.

Notwithstanding the significant improvements in predicted noise levels associated with the amended project, Regis remains committed to implementing negotiated agreements with the 15 landholders identified in the EIS as being entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted. Notably, 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). Regis are also in the process of negotiating agreements with five more landholders in Kings Plains in recognition of predicted visual impacts.

ii Mining schedule

As noted in the EIS and Amendment Report, the project schedule may vary from the indicative schedule presented to account for detailed mine design, mine economics, geological conditions, market conditions or relevant approval conditions. Notwithstanding the environmental assessment has been based on the maximum extraction and processing rate for which approval is being sought and therefore environmental impacts identified and assessed in the EIS and Amendment Report are considered worst case scenario.

5.19.5 Location of primary access point

Of the objections received, 6% (1) of organisations and 2% (5) of unique community submissions raised concerns about the location of the proposed primary access point for the project. This included concerns that:

- the proposed access point from the Mid-Western Highway will impact the safety of other road users; and
- suggestions to relocate the primary access point further east along the Mid-Western Highway have been ignored.

As outlined in Section 4.7 above, in response to community consultation and submissions received on the EIS as well as further consultation with TfNSW and Blayney Council, the location of the site access has been revised as part of the amended project.

5.19.6 Project justification

Of the objections received, 17% (3) of organisations and 6% (14) of unique community submissions raised concerns that the project was not justified, generally stating the associated benefits did not outweigh the adverse impacts.

An updated evaluation of merits is included in Chapter 6 below.

Given its significance to the State, the project is deemed to be SSD under the provisions of the EP&A Act. Under these provisions, 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 due to the provisions of the Mining SEPP, the EP&A Act and pursuant to relevant local environmental plans. 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 2017b), 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.

5.19.7 The public interest

Of the objections received, 2% (5) of unique community submissions raised concerns that the project is not in the public interest. This included concerns that the project:

- is contrary to the principles of ecologically sustainable development;
- does not complement surrounding land uses; and
- does not align with the values of the local area.

i 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. As reported in the EIS (Appendix DD), including flow-on effects, it is estimated that 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. The net social benefit to NSW is estimated at $139M present value (at 7% discount rate). Further, with recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be much greater. Adoption of conservative, contemporary gold price forecasts results in the net social benefit of the amended project increasing to $244M 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 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 McPhillamys Gold 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.

ii Ecologically sustainable development

The project's compatibility with the principles of ecologically sustainable development (ESD) is discussed in Section 39.7 of the EIS, including:

- The precautionary principle: project planning included multiple rounds of design, conservative assessment and refinement to avoid impacts or, if unavoidable, minimise or offset them. For all potential impacts, no serious or irreversible harm will occur.

- Inter-generational equity: the only beneficial land use that could be affected by the project is agriculture. In this regard, the agricultural capability of the land to be disturbed will be progressively rehabilitated so that, with the exception of the final void, the project area can be used for agriculture at the end of the mine life. Some impacts on natural resources will occur (including clearance of native vegetation); however, an offset strategy has been developed and, once implemented, will mean a net beneficial gain in biological resources. The gold extracted by the project is a recyclable material that can be reused for generations. The project will allow natural capital (gold) to be transformed into economic capital (greater personal and public income), social capital (better public facilities) and human capital (a more skilled and wealthier workforce).

- Conservation of biological diversity and maintenance of ecological integrity: the potential impacts of the project have been described in the EIS and Amendment Report, including the potential impact of the project on biodiversity, and identifies measures to address residual impacts. For the areas of vegetation where clearing is required, offsets will be provided to compensate along with conservation of certain patches of vegetation within the mine disturbance footprint, progressive rehabilitation and revegetation programs.

- Improved valuation and pricing of environmental resources: The costs and benefits of the project have been compared transparently to provide an estimate of the project's net benefit. The result is a reliable estimate of the project's economic value that provides useful guidance to decision-makers and other interested parties about the project's overall merit.

iii Surrounding land uses

The project is responsive to its surroundings. As described in Chapter 6 of the EIS, the project design evolved throughout the environmental assessment process in response to findings of various technical studies so as to minimise impacts on surrounding land uses. These uses predominantly comprise agricultural-related land uses. As discussed in detail in Chapter 8 of the EIS, the mine development has been designed such that it will not unduly restrict or significantly impact these uses. Where residual impacts are predicted to occur, mitigation measures have been proposed to address these impacts. This will ensure that the project will not displace other beneficial uses in the locality. Following public exhibition and as a result of further detailed mine planning, the project has been amended even further to reduce impacts to surrounding landholders, particularly with respect to noise.

It is recognised that residents surrounding the mine development project area have a strong attachment to a specific vision of life in the locality, which emphasises its rural character and amenity. The project's potential impacts on lifestyle and the quality of life of neighbouring residents and the local community were carefully considered as part of the SIA (Appendix T of the EIS and Appendix S of the Amendment Report) and other amenity-related assessments (ie noise and vibration, air quality, traffic and visual). Regis recognises that the community is concerned about loss of amenity due to the project's construction and ongoing operation and how this could affect their rural lifestyle. A detailed response to concerns raised about the project's potential impacts on lifestyle is provided in Section 5.4.2.

Regis remains committed to the implementation of site-specific mitigation measures, such as negotiated agreements containing tailored landscape plans and noise mitigation for residences in Kings Plains.

5.20 Cumulative impacts

Of the objections received, 11% (2) of organisations and 1% (3) of unique community submissions raised concerns about the potential for the project to contribute to cumulative impacts along with surrounding developments. This included concerns related to cumulative impacts from the project, Discovery Ridge and Cadia Valley Operations, including impacts on the Belubula River.

Chapter 37 of the EIS provides a summary of the impacts of the project (ie inclusive of the mine and pipeline developments) and considers the potential for cumulative impacts to arise from the project and other developments in the region.

There are other extractive industry/industrial developments that occur in the region around the mine development project area (eg Cadia Mine, Blayney Industrial Estate and various quarrying operations). The potential for cumulative impacts from the project with these developments was considered in Table 37.2 in Chapter 37 of the EIS. As demonstrated in Table 37.2, due predominantly to the limited number and locations of other industrial and extractive industry developments in the region, the project is not expected to result in significant cumulative impacts with other developments.

As noted previously, prior to commencement of construction Regis will develop a workforce accommodation and management framework address the predicted impacts of the construction phase workforce on housing and short-term accommodation supply in the Blayney LGA. Regis will work with Newcrest (as operators of Cadia Mine) and other relevant stakeholders to coordinate activities and workforce management programs that minimise the impact of the temporary workforce on the community of Blayney and broader region.

The groundwater model predictions (refer Section 6.4 and Appendix H of the Amendment Report) indicate that groundwater levels at existing privately-owned bores will experience little to no change as a result of the project. The project will therefore not contribute to cumulative impacts on groundwater extracted from bores in the region. Construction and operation of the mine development will result in a reduction in the inflow to Carcoar Dam of 4%, which represents a small change in flow. Subsequently, the project's contribution to cumulative impacts on water resources will be minor.

Discovery Ridge does not form part of the development application for this project and as a result, impacts associated with Discovery Ridge have not been assessed as part of the EIS or Amendment Report. The Discovery Ridge project, if deemed feasible, would be subject to separate environmental approvals and the environmental assessment documentation would likely need to consider potential for cumulative impacts from that project and the mine development.

5.21 Other

5.21.1 Contribution to climate change

Of the objections received, 17% (3) of organisations and 3% (6) of unique community submissions raised concerns about the project's potential to contribute to climate change. This included concerns related to the project's:

- demand for water;
- requirements for clearing of native vegetation;
- impact on productive agricultural land; and
- potential to impact groundwater and surface water resources.

Concerns raised about the project's potential to contribute to climate change are addressed in the following sections, and are related primarily to the project's:

- demand for water (refer to the discussion in Section 5.1.5);
- requirements for clearing of native vegetation (refer to Section 5.7.3);
- impact on productive agricultural land (refer to Section 5.6.2); and
- potential to impact groundwater and surface water resources (refer to Section 5.1.1 and Section 5.1.2).

As described in Section 5.2.5 above, the total GHG emissions from the project are predicted to be minimal and make only minor contributions to the total GHG emissions for NSW and Australia. Further, the project's contribution to projected climate change, and the associated environmental impacts, would be in proportion with the project's contribution to global GHG emissions.

5.21.2 Ownership model and structure

Of the objections received, 11% (2) of organisations and 9% (21) of unique community submissions raised concerns about the proponent's ownership model and structure. These concerns primarily related to how the project and associated profits or royalties will be managed.

LFB Resources NL is a 100% owned subsidiary of Regis Resources Ltd. Regis is a publicly-listed Perth-based gold production and exploration company trading on the Australian Stock Exchange (ASX:RRL).

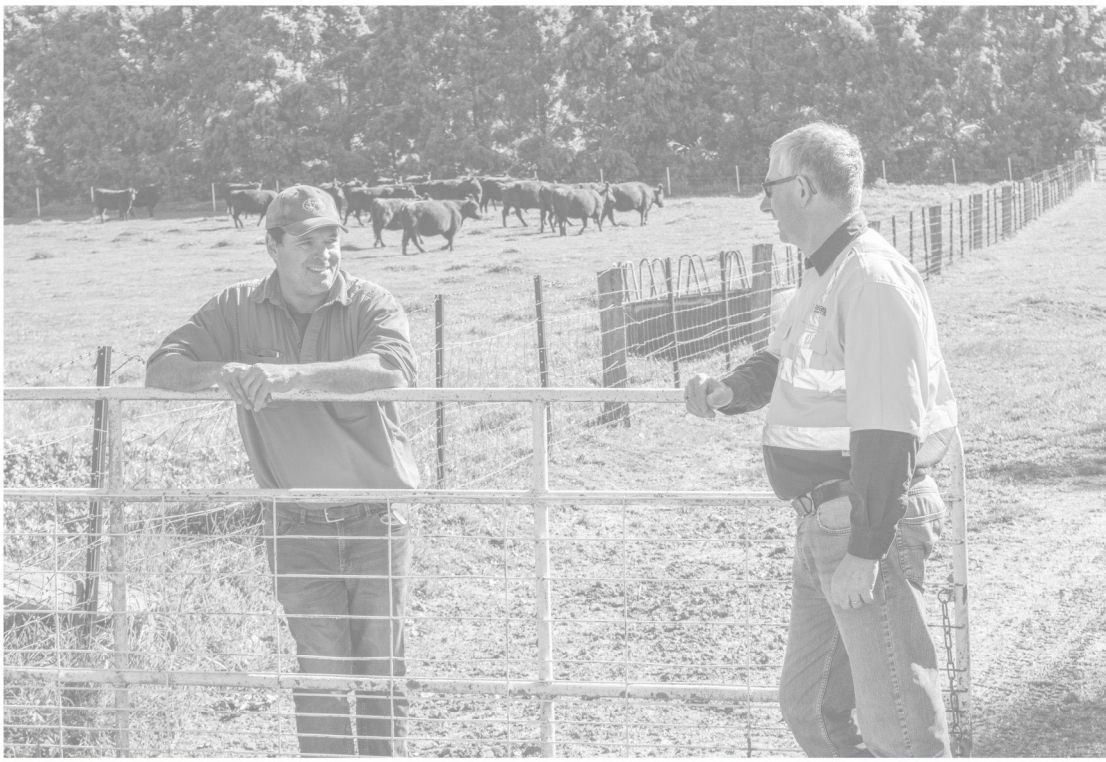
Regis has a proven record of developing gold mining operations and is one of the top five Australian gold companies by market capitalisation and production. The company owns and operates the Duketon Project, comprising three gold mines in the North Eastern Goldfields in Western Australia, with gold production of approximately 360,000 oz/annum. Regis has established a local office in Blayney and is committed to making a positive contribution to the local community.

The main potential economic benefit is the producer surplus, as well as royalties and company tax payments generated by the project, wage benefits, non-market benefits to employment, economic benefits to existing landholders and benefits to suppliers.

The net production benefits that accrue to Australia are estimated at $347M (present value at 7% discount rate), comprising $47M in royalties, $98M in company tax and $202M in residual producer surplus. The project will therefore enhance community resources by generating employment and public revenues through royalties and taxes, contributing to the local, State and National economies.

Chapter 6

Updated evaluation of merits



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6 Updated evaluation of merits

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.

6.1 Project design

6.1.1 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.

6.1.2 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 for the community. The alternatives considered and design changes made as part of the EIS compared to the preliminary environmental assessment design included:

- a reduction in the mining lease application area and site layout to avoid an area of potential BSAL that was identified in the western portion of the mine development project area;
- optimisation of 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 to reduce the visibility of the project to neighbouring properties;
- 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 to further optimise the operation of the nil discharge design, which also enabled the avoidance of impacts to Hallwood, a potential item of historic heritage significance;
- 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.

6.2 Strategic and statutory context

Given its significance to the State, the project is deemed to be SSD under the provisions of the EP&A Act. Under these provisions, 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 due to the provisions of the Mining SEPP, the EP&A Act and pursuant to relevant local environmental plans. 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.

The project has been carefully and deliberately designed to ensure minimal impact on the relevant surface and groundwater sources with the majority of water needs supplied from the pipeline development. As described in Chapter 4 and Section 6.4, the project is likely to require additional surface water licences to account for the relatively small take of water as a result of the mine development. Regis has continued discussions with NSW Government since the submission of the DA and EIS to determine an appropriate pathway for securing these residual required water entitlements. Discussions are ongoing, and to date indicate there is a good and reasonable prospect of obtaining the water licences required for the project.

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 2017b), 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.

6.3 Submissions and community views on the project

A summary of the matters raised in unique community submissions, and how they have been addressed, is presented in Table 6.1. As demonstrated, Regis has spent considerable effort in amending the project to effectively respond to community feedback on the project.

Table 6.1 Summary of matters raised by community submissions objecting to the project

Matter raised	Unique community submissions		How addressed/relevant project amendments
	Quantity	Percentage	
Water resources			
Impacts on surface water users	183	79%	The use of surplus water from mines in Lithgow means the mine will not take water from the local catchment. The project has been specifically designed to divert as much clean water around the mine as possible, keeping it available for other water users. The peak groundwater inflow to the open cut mine has reduced as a result of project amendments. No third party bores will be affected above the minimal impact considerations specified in the AIP. The water management system has been designed as a nil discharge system and has been revised to further reduce the risk of any spill.
Impacts on groundwater users	106	45%	
Use of water resources	86	37%	
Impacts on springs	68	29%	
Pipeline water quality	65	28%	
Air quality			
Quantity and composition of dust and emissions	131	56%	No exceedance of any NSW EPA air quality criteria is predicted at any neighbouring residences.
Dust contamination of harvested rainwater and drinking water	52	22%	
Dust health impacts	48	21%	
Tailings storage facility			
TSF design (including failure risk and location)	115	49%	Regis commissioned two expert reviews of the TSF design (included as attachments to the TSF report (Appendix D)), finding that the design is consistent with best practice.
TSF seepage	66	28%	

Table 6.1 Summary of matters raised by community submissions objecting to the project

Matter raised	Unique community submissions		How addressed/relevant project amendments
	Quantity	Percentage	
TSF impacts on groundwater	50	21%	
Noise			
Noise impacts on sensitive receptors	101	43%	The mine design has been specifically amended to significantly reduce noise impacts on neighbouring properties. The 15 properties predicted to experience noise to a level where they would be entitled to the implementation of mitigation measures upon request in the EIS, has reduced to 1. However, Regis are still progressing agreements, including property specific mitigation plans, with these properties.
Impacts from blasting and vibration	74	32%	
Biodiversity			
Contribution to land clearing and habitat loss	99	42%	The disturbance footprint of the mine has been further reduced as a result of project amendments from 1,135 ha to 1,116 ha, including a reduction of 2 ha in the disturbance of native vegetation. The footprint has been designed to avoid native vegetation as much as possible, with only 12% of the disturbance footprint comprising native vegetation. An offset site has been secured by Regis to sufficiently compensate for biodiversity loss as a result of the project.
Impacts on threatened species	74	32%	
Agricultural impacts			
Impacts to agricultural production (on-site)	78	33%	The project will not impact any BSAL.
Impacts to agricultural production (off-site)	51	22%	The AIS concluded the project will not have any significant impacts on agriculture, including the apiary industry. A specific risk assessment with reference to the apiary industry has been prepared (refer to Submissions Report EMM 2020a).
Impacts on horses and livestock	41	18%	Impacts on livestock are not anticipated.
Visual amenity			
Near field visual impacts	62	27%	The amended project includes a commitment to not work on the southern amenity bund in the night-time period, thereby avoiding direct lighting impacts that could occur to neighbouring residences. Negotiated agreements are being progressed with 20 landholders to mitigate noise and visual impacts.
Light pollution	60	26%	

Table 6.1 Summary of matters raised by community submissions objecting to the project

Matter raised	Unique community submissions		How addressed/relevant project amendments
	Quantity	Percentage	
Social impacts			
Impacts on lifestyle, local businesses, property values, tourism, general health, mental health and stress, and minimal employment opportunities.	92	39%	Regis commissioned a health impact assessment to address community concerns in this regard. The assessment considered potential impacts on community health in relation to air quality, noise, water, hazardous materials, lighting and stress/anxiety. Based on the available information, and with consideration of the uncertainties identified, the study identified no health risk issues of concern for the off-site community (enRiskS 2020b). The amendment to the waste rock emplacement schedule, open cut pit truck exits and site access location have all contributed to a reduction in amenity related impacts of noise and traffic, therefore reducing potential impacts on surrounding businesses and landuses.
Other matters			
Poor site suitability	83	36%	Site suitability is described in detail in the EIS and remains applicable to the project. As mentioned above, amendments have further reduced offsite impacts relating particularly to noise, biodiversity and visibility.
Use and storage of hazardous goods (including cyanide)	49	21%	A preliminary hazard analysis found that the project does not represent an offensive or hazardous development.
Final landform and void	43	18%	Amendments to the final landform include the addition of micro-relief elements to the ROM pad so that it is more sympathetic to the surrounding landscape. A revised clean water diversion drain had been incorporated into the amended project to safely and effectively convey rainfall runoff from the upstream catchment through the site.

6.4 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 up to 3 dB above the project specific noise criteria, compared to 15 properties in the EIS.

Notwithstanding the significant improvements in predicted noise levels associated with the amended project, Regis remains committed to implementing negotiated agreements with the 15 landholders identified in the EIS as being entitled to the implementation of voluntary mitigation measures upon request if the EIS project design was adopted. Notably, 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). Regis are also in the process of negotiating agreements with five more landholders in Kings Plains in recognition of predicted visual impacts.

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 B). 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 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 to the neighbouring properties. 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, enabling a beneficial re-use of otherwise excess water. Adequate groundwater and surface water licences are available to account for the project's interception of water. Again, the capture of surface water is relatively small due to the intent of the project design to avoid and minimise impacts. 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 practice.

6.5 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, it is estimated that 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. The net social benefit to NSW is estimated at $139M present value (at 7% discount rate). Further, with recent significant increases in the forecast gold price, the net social benefits of the amended project are likely to be much greater. Adoption of conservative, contemporary gold price forecasts results in the net social benefit of the amended project increasing to $244M present value (at 7% discount rate), and $336M 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 the Amendment Report demonstrates that the McPhillamys Gold 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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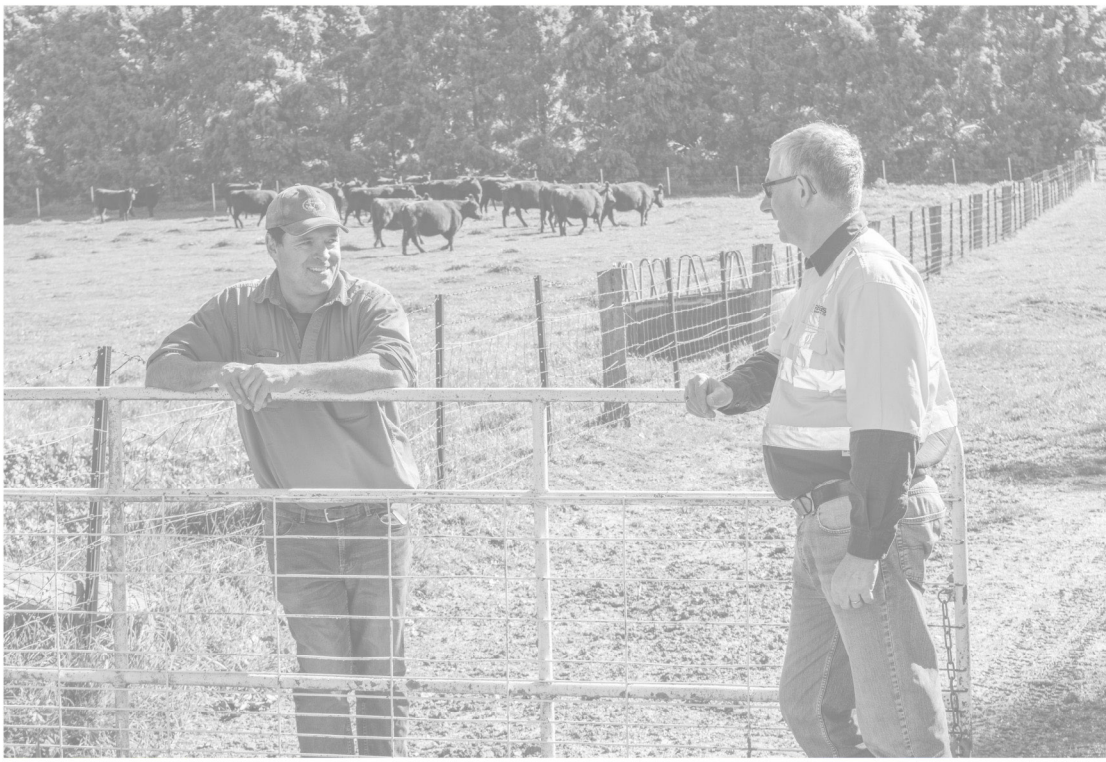

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Abbreviations

ABL	Assessment background level
ACHAS	Aboriginal cultural heritage assessments
AHIMS	Aboriginal Heritage Information Management System
AIS	Agricultural impact statement
AMA	Ancillary mining activity
AN	Ammonium nitrate prill
ANCOLD	Australian National Committee on Large Dams
ANE	Ammonium nitrate emulsion
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZMEC	Australian and New Zealand Minerals and Energy Council
Angus Place	Centennial Coal's Angus Place Colliery
APZ	Asset protection zone
ASL	Above sea level
ATCW	ATC Williams Pty Ltd
AUL(s)	Auxiliary Left Turn Lane
AWBM	Australian Water Balance Model
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
AWS	Automatic weather station
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
BDAR	Biodiversity development assessment report
BFMC	Canobolas Bushfire Management Committee
BFRMP	Canobolas Bushfire Regional Management Plan
bgl	Below ground level
BLEVE	Boiling liquid, expanding vapour explosion
BOM	Bureau of Meteorology
BRHA	Bushfire risk and hazard assessment
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
CHR	Channelised right turn lane
CHR(s)	Channelised right turn lane (short)
CIV	Capital Investment Value

CLNSW	Crown Lands NSW
CNVMP	Construction noise and vibration management plan
CNVS	Construction Noise and Vibration Strategy
CMP	Construction management plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CWAS	Construction Workforce Accommodation Strategy
CWF	Clean water facility
CWMF	Clean water management facility
DA	Development application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DG	Dangerous Goods
DNG	Derived native grassland
DSNSW	Dams Safety NSW
DPE	NSW Department of Planning and Environment (now DPIE)
DPIE	NW Department of Planning, Industry and Environment
DPI	NSW Department of Primary Industries
DoI Water	NSW Department of Industry – Water (now DPIE – Water)
DRE	NSW Division of Resources and Energy
DRG	NSW DPIE - Division of Resources & Geoscience
DSC	Dams Safety Committee (now Dams Safety NSW)
EA	Energy Australia
EARs	Environmental assessment requirements
EBAMS	Environmental beta attenuation monitors
EC	Electrical conductivity
EEC	Endangered ecological community
EIA	Economic impact assessment
EIS	Environmental impact statement
EL	Exploration lease
EMM	EMM Consulting Pty Limited
enRiskS	Environmental Risk Sciences Pty Ltd
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*
EPI	Environmental planning instrument
EPL	Environmental planning licence
ERP	Emergency response plan
ESD	Ecologically sustainable development
FCNSW	Forestry Corporation of NSW
FEL	Front end loader
FM Act	NSW *Fisheries Management Act 1994*
FRNSW	Fire and Rescue NSW
GAA	Groundwater assessment addendum
GADDC	Guidance on the Assessment of Dust from Demolition and Construction

GCL	Geosynthetic clay liner
GDE	Groundwater dependent ecosystem
GHG	Greenhouse gas
ha	Hectares
GWA	Groundwater assessment
HCNSW	Heritage Council of NSW
Heritage Act	NSW *Heritage Act 1977*
HHAs	Historic heritage assessments
HIA	health impact assessment
HIPAPS	Hazardous industry planning advisory papers
Hydroline	Hydroline spatial data
HVAS	high volume air samplers
IAQM	Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation of Australia
ICNG	Interim Construction Noise Guideline
IECA	International Erosion Control Association
IESC	Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development
IPA	Inner protection area
IPC	Independent Planning Commission
K	Hydraulic conductivity
kg	Kilograms
kL	kilolitres
km	Kilometre
LEP	Local environmental plan
LEMC	Local emergency management committee
LEMO	Local emergency management officer
LFN	Low frequency noise
LGA	Local government area
LoS	Level of service
LTAAEL	Long-term average annual extraction limit
L/s	Litres per second
mbgl	Metres below ground level
MDB	Murray Darling Basin
MEG	Mining Exploration and Geoscience
MHRDC	Maximum Harvestable Rights Dam Capacity
MIC	Maximum instantaneous charge
ML	Megalitres
MLA	Mining lease application
MOP	Mining operations plan
MPPS	Energy Australia's Mount Piper Power Station
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Megawatts

MWMF	Main water management facility
NAF	Non-acid forming
HRV	National Heavy Vehicle Regulator
NaOH	Sodium hydroxide
NCA	Noise catchment areas
NML	Noise management level
NMP	Noise management plan
NOA	Naturally occurring asbestos
NOx	Nitrogen oxide
NO2	Nitrogen oxide
NMT	Noise monitoring terminal
NpfI	NSW Noise Policy for Industry
NEQ	Net explosive quantity
NPI	National Pollutant Inventory
NRAR	NSW DPIE – Water and Natural Resources Access Regulator
NSW	New South Wales
NVIA	Noise and vibration impact assessment
OBE	Operating basis earthquake
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
OLALC	Orange Local Aboriginal Land Council
OSOM	Over Size Over Mass
oz	ounces
PAF	Potentially Acid Forming
PCT	Plant community type
PEA	Preliminary Environmental Assessment
PHA	Preliminary hazard analysis
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
ppm	Parts per million
PNTL	Project noise trigger level
PVC	Primary visual catchment
QA	Quality assurance
QC	Quality control
RAP	Registered Aboriginal Party
RBL	Rating Background Level
Regis	Regis Resources Ltd
RFS	NSW Rural Fire Service
RMS	NSW Roads and Maritime Services (now part of TfNSW)
RNP	NSW Road Noise Policy
Roads Act	NSW Roads Act 1993
RO	Reverse osmosis

ROM	Run of mine
RR	NSW Resources Regulator
RRPM	Raised Reflective Pavement Markers
Rural Fires Act	NSW *Rural Fires Act 1997*
RUSLE	Revised Universal Soil Loss Equation
RWMF	Raw water management facility
SCSO	Centennial Coal's Springvale Coal Services Operations
SEARS	Secretary's Environmental Assessment Requirements
SEE	Safety evaluation earthquakes
SHR	State Heritage Register

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