REGIS RESOURCES LTD

ABN: 28 009 174 761

Preliminary Environmental Assessment

for the

McPhillamys Gold Project

July 2018

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

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Prepared for:

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CONTENTS

Page

PROJECT SUMMARY ..... **IX**

LIST OF COMMONLY USED TERMINOLOGY AND ACRONYMS ..... **XIII**

1. INTRODUCTION **1**
1.1 SCOPE 1
1.2 OBJECTIVES 3
1.3 THE APPLICANT 3
1.4 APPLICATION AREA 3
1.5 SUMMARY OF THE MINE DEVELOPMENT 5
1.6 BACKGROUND TO THE MINE DEVELOPMENT 7
1.7 APPROVALS, LICENCES AND CONSENTS REQUIRED 8
1.8 ANCILLARY DEVELOPMENT 9
1.9 DEVELOPMENT SCHEDULE 9

2. DESCRIPTION OF THE MINE DEVELOPMENT – MINE SITE **11**
2.1 INTRODUCTION 11
2.2 MINE SITE ESTABLISHMENT 11
2.2.1 Introduction 11
2.2.2 Vegetation Clearing Operations 11
2.2.3 Soil Stripping and Stockpiling Operations 12
2.3 MINING OPERATIONS 12
2.3.1 Introduction 12
2.3.2 Design of the Proposed Open Cut 12
2.3.3 Mining Method 12
2.3.4 Mining Rate and Sequence 13
2.3.5 Mining Fleet 13
2.4 WASTE ROCK MANAGEMENT OPERATIONS 13
2.4.1 Introduction 13
2.4.2 Waste Rock Characteristics 14
2.4.3 Design of the Proposed Waste Rock Emplacements 14
2.4.4 Waste Rock Emplacement Procedures 14
2.5 PROCESSING OPERATIONS 15
2.5.1 Introduction 15
2.5.2 ROM Pad Operations 15
2.5.3 Crushing Circuit 15
2.5.4 Grinding and Gravity Recovery Circuit 15
2.5.5 Carbon-in-Leach Circuit 17
2.5.6 Gold Desorption Circuit 17
2.5.7 Tailings Thickening and Detoxification Circuit 18
2.5.8 Reagent Management 18
2.6 TAILINGS MANAGEMENT OPERATIONS 21
2.6.1 Introduction 21

CONTENTS

Page

2.6.2 Tailings Characteristics 21
2.6.3 Tailings Storage Facility Design 21
2.6.4 Tailings Storage Facility Construction 22
2.6.5 Tailings Storage Facility Operation 22
2.7 TRANSPORTATION OPERATIONS 23
2.7.1 Introduction 23
2.7.2 Modifications to the Local Road Network 23
2.7.3 Site Access Road 23
2.7.4 Mine Site Entrance 23
2.7.5 Traffic Types, Routes and Volume 24
2.8 WATER MANAGEMENT 25
2.8.1 Classes of Water 25
2.8.2 Surface Water Management 26
2.8.3 Operational Water Supply and Water Balance 27
2.9 NON-PRODUCTION WASTE MANAGEMENT 28
2.10 INFRASTRUCTURE AND SERVICES 29
2.11 HOURS OF OPERATION AND LIFE OF THE MINE DEVELOPMENT 29
2.11.1 Hours of Operation 29
2.11.2 Life of the Mine Development 30
2.12 EMPLOYMENT, ECONOMIC CONTRIBUTIONS AND CAPITAL COST 30
2.13 DECOMMISSIONING AND REHABILITATION 30
2.13.1 Introduction 30
2.13.2 Rehabilitation Objectives 31
2.13.3 Final Landform and Land Use 32
2.14 BIODIVERSITY OFFSET STRATEGY 32

3. STRATEGIC CONTEXT 33

3.1 TARGET RESOURCE 33
3.1.1 Regional Geological Setting 33
3.1.2 Deposit-scale Geological Setting 33
3.1.3 Mineral Resources and Reserves 33
3.1.4 Efficiency of Resource Recovery 37
3.1.5 Potential Impacts on Surrounding Mines and Industries 37
3.2 PERMISSIBILITY AND STRATEGIC PLANNING 38
3.2.1 Permissibility and Local Planning Matters 38
3.2.2 State and Regional Planning Matters 40
3.2.3 Commonwealth Planning Matters 41

4. PROJECT RATIONALE AND ALTERNATIVES CONSIDERED 42

4.1 INTRODUCTION 42
4.2 MINING OPERATIONS 42
4.3 WASTE ROCK MANAGEMENT 43
4.4 PROCESSING OPERATIONS 43
4.4.1 Processing Methodology 43

CONTENTS

Page

4.4.2 Processing Plant Location 44
4.5 TAILINGS MANAGEMENT OPERATIONS 44
4.6 TRANSPORTATION OPERATIONS 44
4.6.1 Mine Site Access and Dungeon Road 44
4.6.2 Mine Site Entrance 45
4.7 WATER MANAGEMENT 45
4.7.1 Avoidance of Surface Water Impacts 45
4.7.2 Operational Water Supply 46

5. PRELIMINARY ENVIRONMENTAL ASSESSMENT 47
5.1 INTRODUCTION 47
5.2 REGIONAL CONTEXT 47
5.2.1 Introduction 47
5.2.2 Topography 47
5.2.3 Climate 50
5.2.4 Land Ownership, Residences and Land Use 53
5.3 SURFACE WATER 55
5.3.1 Introduction 55
5.3.2 Existing Environment 55
5.3.3 Potential Impacts 56
5.3.4 Management Commitments 56
5.3.5 Proposed Assessment 57
5.4 GROUNDWATER 58
5.4.1 Introduction 58
5.4.2 Existing Environment 58
5.4.3 Potential Impacts 59
5.4.4 Management Commitments 59
5.4.5 Proposed Assessment 60
5.5 BIODIVERSITY 60
5.5.1 Introduction 60
5.5.2 Existing Environment 60
5.5.3 Potential Impacts 64
5.5.4 Management Commitments 64
5.5.5 Proposed Assessment 64
5.6 HERITAGE 65
5.6.1 Introduction 65
5.6.2 Existing Environment 65
5.6.3 Potential Impacts 68
5.6.4 Management Commitments 68
5.6.5 Proposed Assessment 68
5.7 NOISE AND VIBRATION 70
5.7.1 Introduction 70
5.7.2 Existing Environment 70
5.7.3 Potential Impacts 71

CONTENTS

Page

5.7.4 Management Commitments 71
5.7.5 Proposed Assessment 72
5.8 AIR QUALITY 72
5.8.1 Introduction 72
5.8.2 Existing Environment 72
5.8.3 Potential Impacts 73
5.8.4 Management Commitments 73
5.8.5 Proposed Assessment 74
5.9 VISUAL AMENITY 74
5.9.1 Introduction 74
5.9.2 Existing Environment 74
5.9.3 Potential Impacts 75
5.9.4 Management Commitments 75
5.9.5 Proposed Assessment 75
5.10 TRAFFIC AND TRANSPORTATION 76
5.10.1 Introduction 76
5.10.2 Existing Environment 76
5.10.3 Potential Impacts 77
5.10.4 Management Commitments 77
5.10.5 Proposed Assessment 77
5.11 SOILS AND LAND CAPABILITY 78
5.11.1 Introduction 78
5.11.2 Existing Environment 78
5.11.3 Management Commitments 82
5.11.4 Proposed Assessment 83
5.12 HAZARDS 83
5.12.1 Existing Environment 83
5.12.2 Potential Impacts 84
5.12.3 Management Commitments 84
5.12.4 Proposed Assessment 84
5.13 SOCIAL AND ECONOMIC IMPACTS 84
5.13.1 Introduction 84
5.13.2 Existing Environment 84
5.13.3 Social Impact Assessment Scoping Consultation 86
5.13.4 Potential Impacts 87
5.13.5 Management Commitments 88
5.13.6 Proposed Social and Economic Impact Assessment 89

6. REFERENCES 91

APPENDICES

Appendix 1 McPhillamys Pipeline Development – Preliminary Environmental Assessment A1

CONTENTS

Page

FIGURES

Figure 1 Locality Plan 2
Figure 2 The Mine Site 4
Figure 3 Conceptual Mine Site Layout 6
Figure 4 Indicative Process Flow Sheet 16
Figure 5 Regional Geological Setting 34
Figure 6 Interpreted Basement Geology 35
Figure 7 Geological Section 36
Figure 8 Land Zoning 39
Figure 9 Regional Topography and Drainage 48
Figure 10 Local Topography and Drainage 49
Figure 11 Mine Site Topography and Drainage 51
Figure 12 Annual Wind Roses 53
Figure 13 Surrounding Residences and Land Uses 54
Figure 14 Vegetation Communities 62
Figure 15 Preliminary Aboriginal Heritage Sites 67
Figure 16 Preliminary Historic Heritage Sites 69
Figure 17 Local Soil Landscapes 79
Figure 18 Mine Site Soil Associations 81

TABLES

Table 1 Mine Site 5
Table 2 Indicative Development Schedule 10
Table 3 Proposed Traffic Levels 25
Table 4 Non-Production Waste Management 28
Table 5 Indicative Hours of Operation 29
Table 6 Mineral Resource Estimate and Ore Reserve Estimate 37
Table 7 Mean Monthly Temperature 50
Table 8 Bureau of Meteorology Stations – Rainfall 52
Table 9 Mean Monthly Rainfall and Evaporation 52
Table 10 Endangered Ecological Communities 61
Table 11 Background Traffic Volumes 76
Table 12 Proposed Social Impact Assessment Methodology 89

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PROJECT SUMMARY

Component	Summary	PEA Section
Mining Method	Conventional drill and blast open cut covering an area of approximately 70ha.	2.3
Resources and Reserves	Gold mineralisation hosted by felsic to intermediate volcanic, volcaniclastic and intrusive rock complex (Silurian aged).	3.1
	Mineral Resource Estimate (indicated + inferred) - 68.9Mt @1.04g/t gold for 2.3M ounces. Ore Reserve Estimate (Probable) – 60.1Mt @ 1.05g/t gold for 2.0M ounces.	3.1.3
Disturbance Area	Approximately 700ha.	2.3 – 2.8
Annual Production	Processing of approximately 7Mt of ore per year.	2.5
Project Life	10 to 15 years.	2.11.2
Processing	Ore would be processed through crushing, grinding and carbon in leach (CIL) circuits.	2.5
Mining Waste Management	Emplacement of waste rock in out-of-pit waste rock emplacements which would be constructed to encapsulate all potentially acid forming material	2.4
Processing Waste Management	Placement of tailings within a valley-fill style tailings storage facility.	2.6
General Infrastructure	• Buildings for administration offices and facilities, lunch/crib rooms and ablutions facilities. • Workshops and stores facilities, including associated plant parking, laydown and hardstand areas. • On-site laboratory. • Vehicle wash down bays. • Fuel, oil and flammable goods storage areas. • Non-production waste management facilities (including waste water from ablutions facilities). • Site access and internal road network. • Power supply, water supply, explosives magazines, communications and related infrastructure.	2.10
Product Transport	Regular collection of gold doré bars by fit for purpose vehicle	2.7
Water Management	• Raw water – imported to the Mine Site via the Water Transfer Pipeline from Springvale and sourced from Centennial's Angus Place Mine, Springvale Coal Services Operations, and brine from the Mt Piper Power Station operations to meet the Proposal requirements. • Mine water – retained on site and used for mining purposes. • Process water – retained on site and used for mining purposes. • Clean water – diverted around disturbed areas. • Dirty/sediment-laden water – captured and used for mining purposes or treated and discharged.	2.8
Workforce	Construction workforce of more than 200 people and operational workforce in the order of 250 people.	2.12

PROJECT SUMMARY (Cont'd)

<table>
<tr><th>Component</th><th>Summary</th><th>PEA Section</th></tr>
<tr><td>Indicative Hours of Operation</td><td>
<table>
<tr><th>Activity</th><th>Indicative Days of Operation</th><th>Indicative Hours of Operation</th></tr>
<tr><td>Site construction activities</td><td rowspan="8">7 days per week</td><td></td></tr>
<tr><td>• Earthworks</td><td>6:00am to 6:00pm</td></tr>
<tr><td>• Plant construction</td><td>24 hours per day</td></tr>
<tr><td>Mining operations</td><td></td></tr>
<tr><td>• blasting operations</td><td>7:00am to 7:00pm</td></tr>
<tr><td>• all other mining operations</td><td>24 hours per day</td></tr>
<tr><td>Processing operations, including ROM pad, crushing and grinding operations</td><td>24 hours per day</td></tr>
<tr><td>Transportation operations</td><td>24 hours per day</td></tr>
<tr><td>Maintenance operations</td><td>24 hours per day</td></tr>
<tr><td>Rehabilitation operations</td><td>24 hours per day</td></tr>
</table>
</td><td>2.11.1</td></tr>
<tr><td rowspan="4">Key Environmental Challenges and Mitigation Measures</td><td><u>Surface Water</u>
• Implement best-practice erosion and sediment control.
• Implement a comprehensive surface water monitoring program and ensure the data is made publicly available.
• Obtain all required licences and approvals.</td><td>5.3.4</td></tr>
<tr><td><u>Groundwater</u>
• Construct all tailings and process and mine water storages in a manner consistent with relevant guidelines.
• Obtain appropriate groundwater allocation licences and approvals.
• Monitor groundwater levels and quality.
• Ensure continued water supply to water users who are adversely impacted by the proposed Mine Development.</td><td>5.4.4</td></tr>
<tr><td><u>Biodiversity</u>
• Ensure that all ground disturbing activities are only undertaken within approved areas.
• Manage weeds and pests.
• Undertake progressive rehabilitation.</td><td>5.5.4</td></tr>
<tr><td><u>Heritage</u>
• Undertake a test program for potential archaeological deposits and recover and appropriately catalogue objects of Aboriginal heritage significance within areas to be disturbed.
• Appropriately store and secure all recovered objects in accordance with the wishes of the Aboriginal community.
• Record and/or salvage objects of historic heritage significance.</td><td>5.6.4</td></tr>
</table>

PROJECT SUMMARY (Cont'd)

Component	Summary	PEA Section
Key Environmental Challenges and Mitigation Measures (Cont'd)	**Noise and Vibration** • Construct amenity bunds as required. • Preferentially operate equipment in a manner that would reduce impacts on surrounding residents. • Install frequency modulated reversing alarms. • Maintain an open dialogue with the surrounding community. • Ensure blasts are suitably designed and that near neighbours are notified prior to a blast occurring.	5.7.4
	Air Quality • Disturb only the minimum area necessary for the proposed activities. • Ensure dust suppression measures are consistent with relevant guidelines. • Undertake regular monitoring of dust emissions.	5.8.4
	Visual Amenity • Construct and progressively rehabilitate amenity bunds. • Establish visual screens at key locations as early as practicable. • Install suitable lighting that would minimise the potential for light spillage and only operate those lights that are required for the safe operation of the Mine Development.	5.9.4
	Traffic and Transportation • Construct the site entrance intersection in a manner that is consistent with the relevant guidelines. • Close and/or realign Dungeon Road in consultation with the Blayney and Cabonne Shire Councils and surrounding residents and landholders.	5.10.4
	Soils and Land Capability • Identify soil stripping depths and storage requirements and procedures. • Stockpile and respread soil over final landforms in such a way as to best mirror the soil profile of the pre-disturbance environment. • Progressively rehabilitate disturbed areas.	5.11.3
	Hazards • Transport, use and store all chemicals in accordance with the relevant guidelines. • Undertake all activities in a manner which minimises the potential for initiation of fire.	5.12.3
Capital Investment Value	To be confirmed, however, Applicant's investment is expected to be approximately A$250 million. It is noted that the Applicant's investment and the Capital Investment Value estimated under the relevant planning guidelines may not exactly match.	2.12

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LIST OF COMMONLY USED TERMINOLOGY AND ACRONYMS

COMMONLY USED TERMINOLOGY

Applicant	LFB Resources NL (100% owned subsidiary of Regis Resources Ltd)
Application Area	The area in which ALL Proposal-related activities would occur, including the Mine Site and the Pipeline Corridor
Mine Development	Incorporating all activities within the Mine Site, but excluding the Pipeline Development
Mine Site	The land that will include all Mine Development-related activities
Pipeline Corridor	The land that will include the Pipeline Development, including all pipeline easements
Pipeline Development	Incorporating all activities within the Pipeline Corridor, but excluding the Mine Development
Proposal	McPhillamys Gold Project, comprising BOTH the Mine and Pipeline Developments
Regis	Regis Resources Ltd

COMMONLY USED ACRONYMS

AADT	Annual Average Daily Traffic
AHD	Australian Height Datum
ANCOLD	Australian National Committee on Large Dams
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016 (NSW)
bcm	Bank Cubic Metre
BSAL	Biophysical Strategic Agricultural Land
C	Celsius
CCC	Community Consultative Committee
CIL	Carbon in Leach
CIV	Capital Investment Value
CN	Cyanide

CPDP	Conceptual Project Development Plan
CVO	Cadia Valley Operations
dBA	A-Weighted Decibels
DEE	Department of the Environment and Energy (Commonwealth)
DPE	Department of Planning and Environment (NSW)
DPI Water	Department of Primary Industries - NSW Office of Water
DRG	Department of Industry - Division of Resources and Geoscience (NSW)
DSC	NSW Dams Safety Committee
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPL	Environment Protection Licence
ERP	Estimated Resident Population
g/t	Grams per Tonne
ha	Hectare
HCN	Hydrogen Cyanide
HEC	Hydro Engineering and Consulting Pty Ltd
HV	Heavy Vehicles
HVAS	High Volume Air Sampler
JORC	Joint Ore Reserve Committee
km	Kilometre
lcm	Loose Cubic Metre
LEP	Local Environmental Plan

LFB	LFB Resources NL (100% wholly owned subsidiary of Regis Resources Limited)
LGA	Local Government Area
m	Metre
m/s	Metres per Second
MAC	Muller Acoustic Consulting Pty Ltd
ML	Mining Lease
MLA	Mining Lease Application
MOP	Mining Operations Plan
Mt	Million tonnes
Mtpa	Million tonnes per annum
NAF	Non-Acid Forming
OEH	Office of Environment and Heritage (NSW)
Oz	Ounces (troy)
PAD	Potential Archaeological Deposit
PAF	Potentially Acid Forming
PCT	Plant Community Types
PHA	Preliminary Hazard Assessment
PM	Particulate Matter
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
ppm	Parts per Million
RFS	NSW Rural Fire Service
ROM	Run of Mine
SCSC	Specialist Consultant Studies Compendium
SD Fund	Sponsorship and Donations Fund
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SLCAPA	Soils, Land Capability and Agricultural Productivity Assessment
SMBS	Sodium meta-bisulphite
SSM	Sustainable Soils Management Pty Ltd
TSC Act	Threatened Species Conservation Act 1995 (NSW)
TSF	Tailings Storage Facility
UC	Unclassified
VPA	Voluntary Planning Agreement
WAD	Weak Acid Dissociable
Water Act	Water Act 1912
WM Act	Water Management Act 2000 (NSW)

1. INTRODUCTION

1.1 SCOPE

This document has been prepared by RW Corkery & Co Pty Limited on behalf of LFB Resources NL ("the Applicant"), a 100% wholly owned subsidiary of Regis Resources Ltd (Regis), to describe the McPhillamys Gold Project located approximately 8km northeast of Blayney in the Central West of NSW (**Figure 1**).

The McPhillamys Gold Project would comprise the following.

1. A single open cut;
2. Waste rock emplacements, including amenity bunds;
3. A Run-of-mine (ROM) Pad for storage of ore prior to processing;
4. A Carbon-in-leach (CIL) Processing Plant;
5. A tailings storage facility;
6. A raw water storage facility;
7. Ancillary infrastructure, including soil stockpiles, water management infrastructure, site access road, mining equipment area office facilities, electrical supply switchyard, laydown area and stores; and
8. A Water Transfer Pipeline from Springvale

For the purposes of this document, the following terminology is used.

- **The Proposal** – comprising the McPhillamys Gold Project as a whole, namely items 1 to 8 above.
- **The Mine Development** – comprising the mining-related components of the Proposal, namely items 1 to 7 above. This document describes the Mine Development only.
- **The Pipeline Development** – comprising the water transfer pipeline, namely Item 8 above. That component of the Mine Development is described in a separate document prepared by Blakelys Environmental presented as **Appendix 1**.

This document has been prepared in accordance with the *Mine Application Guideline* published by the Department of Planning and Environment (DPE) dated October 2015 and, to the extent practicable, draft document *Scoping an Environmental Impact Statement* prepared by the DPE. Reference is also made to the *Social Impact Assessment Guideline* dated September 2017.

The intent of this document is to provide an overview of the Mine Development. The document has been prepared in sufficient detail to enable relevant regulators to provide their requirements for inclusion in the *Secretary's Environmental Assessment Requirements* (SEARs) for the *Environmental Impact Statement* ("EIS") to accompany the application for development consent. This document is also intended to allow the community surrounding the Mine Site to develop an understanding of the proposed activities as they are currently understood to facilitate ongoing consultation and discussions with the Applicant.

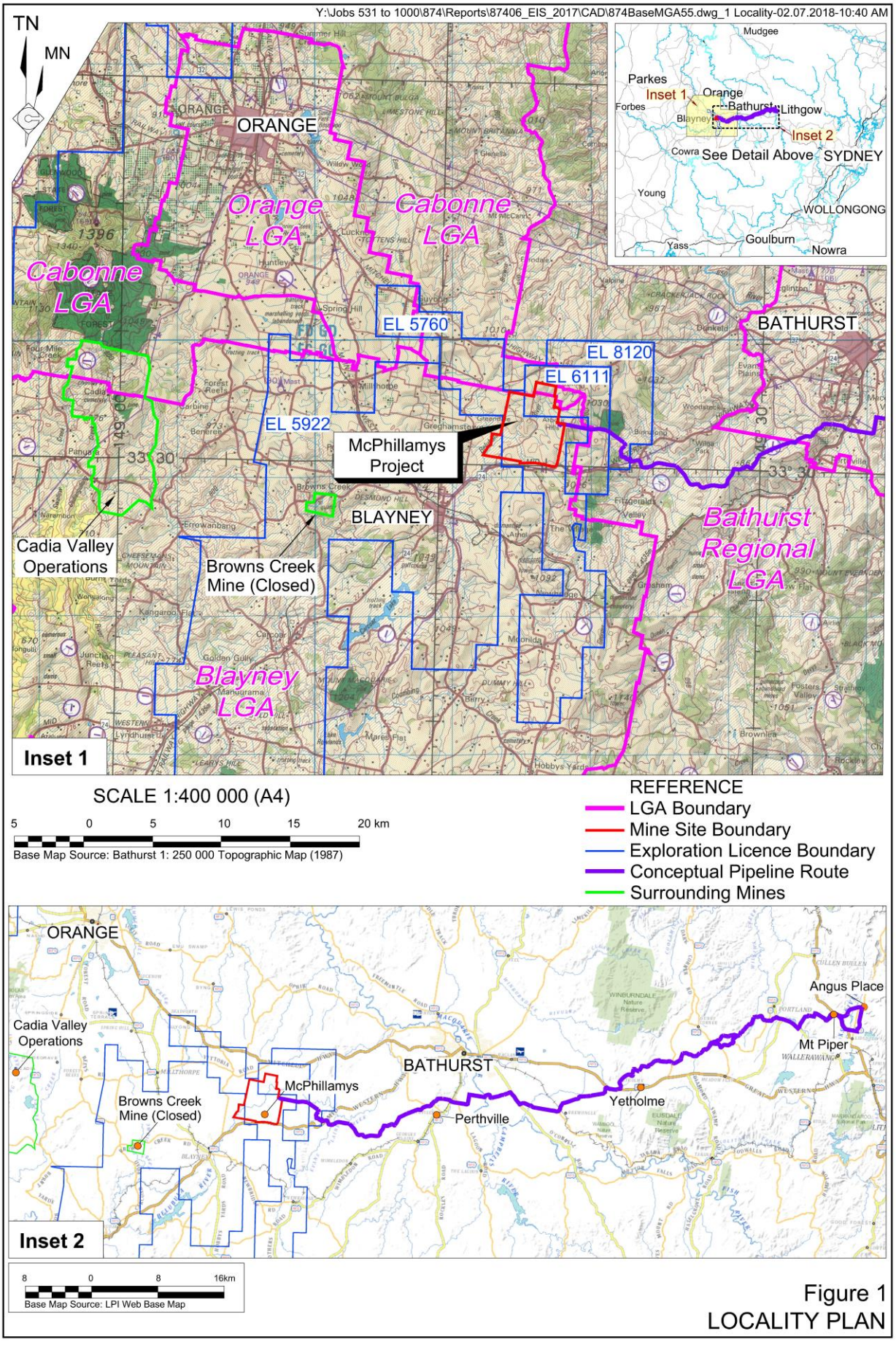

Figure 1
LOCALITY PLAN

1.2 OBJECTIVES

The objectives of the Applicant in the construction and operation of the Mine Development include:

- to safely mine the economically extractable resources;
- to provide ongoing, stable, secure employment to its workers and to generate economic activity and wealth for the local, regional and State communities;
- to manage impacts on surrounding residents and the local environment during construction and operations;
- to continue to communicate and maintain transparent relationships with the community and relevant agencies;
- to implement a level of management control and mitigation measures that ensures compliance with relevant statutory requirements and reasonable community expectations;
- to utilise surplus water available from mining and electricity production at Springvale;
- to create a final landform, with the exception of the final void, for a post-mining land use that would include a mixture of biodiversity conservation and agriculture; and
- to achieve the above objectives in a cost-effective manner to ensure security of employment and the continued economic viability of the Applicant.

1.3 THE APPLICANT

The Applicant, LFB Resources NL is a 100% owned subsidiary of Regis Resources Ltd (Regis). Regis is a publicly listed mining company trading on the Australian Stock Exchange (ASX:RRL). The Applicant has a proven record of developing gold resources into producing operations which include the 100% owned and operated Moolart Well, Rosemont and Garden Well Gold Mines located within the Duketon Gold Project area, approximately 130km north of Laverton in Western Australia. Production at the Duketon Gold Project is currently 300,000 to 360,000 ounces per annum.

The Applicant is controlled by a board of directors with a comprehensive range of skills and experience in mine development and operations, exploration, finance and administration. Further information in relation to the Applicant is available on its website at *www.regisresources.com*.

1.4 APPLICATION AREA

The land which is the subject of the development application includes both:

- the Mine Site, namely land on which the proposed mining, processing and ancillary activities would be undertaken; and
- the Pipeline Corridor, namely the land to be incorporated into a corridor for the construction and operation of a pipeline to transfer water to the Mine Development.

The Mine Site, which is located within the Blayney and Cabonne Local Government Areas, comprises an area of approximately 2,250ha. **Figure 2** and **Table 1** identify the land within the Mine Site.

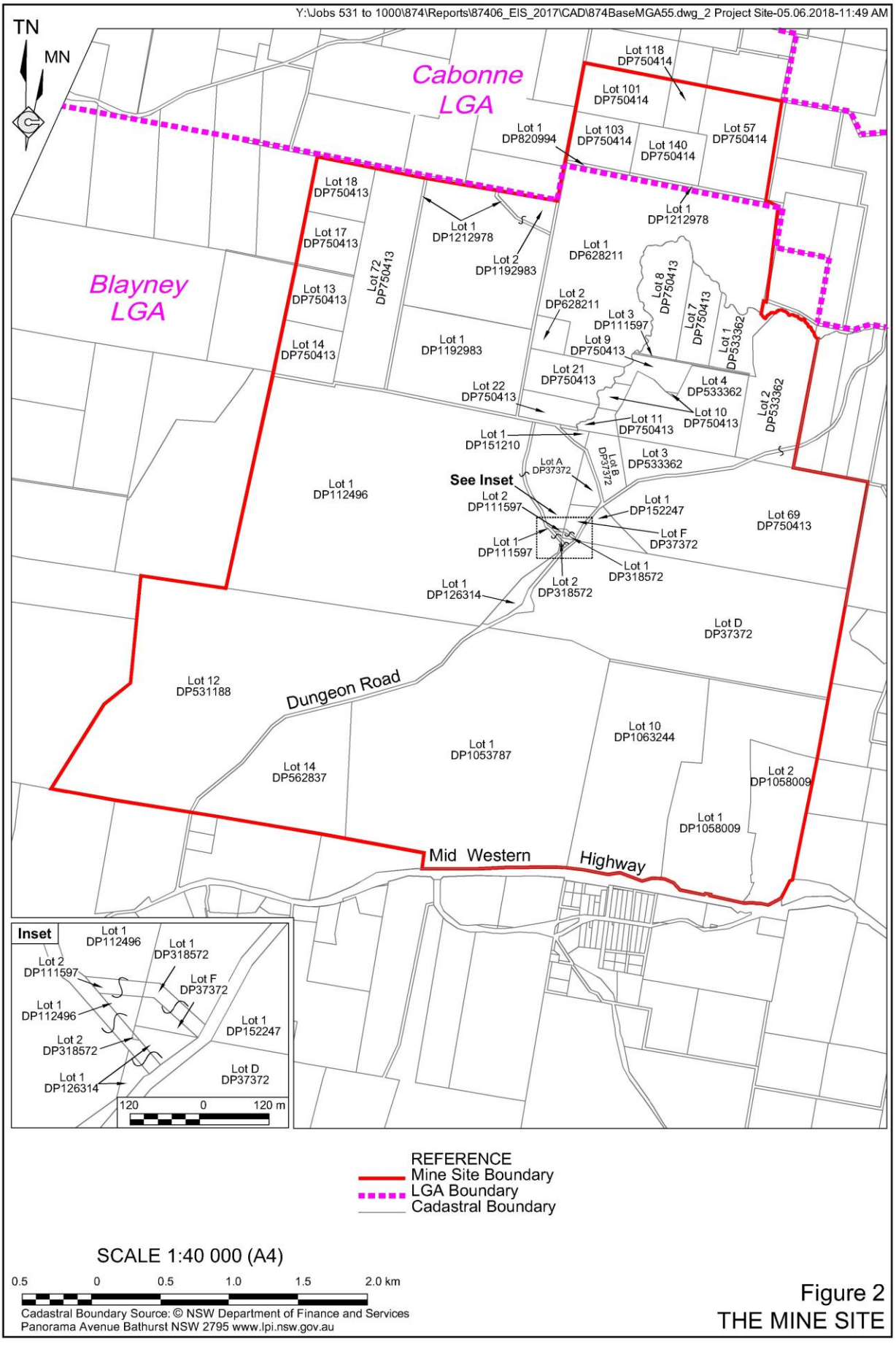

Figure 2
THE MINE SITE

Table 1
Mine Site

Lot	DP	Lot	DP	Lot	DP
1	DP1053787	1	DP152247	2	DP628211
1	DP1058009	1	DP318572	7	DP750413
2	DP1058009	2	DP318572	8	DP750413
10	DP1063244	A	DP37372	9	DP750413
1	DP111597	B	DP37372	10	DP750413
2	DP111597	D	DP37372	11	DP750413
3	DP111597	F	DP37372	13	DP750413
1	DP112496	12	DP531188	14	DP750413
1	DP1192983	1	DP533362	17	DP750413
2	DP1192983	2	DP533362	18	DP750413
1	DP1212978	3	DP533362	21	DP750413
1	DP126314	4	DP533362	22	DP750413
1	DP151210	14	DP562837	69	DP750413
57	DP750414*	1	DP628211	72	DP750413
101	DP750414*	103	DP750414*	140	DP750414*
		118	DP750414*	1	DP820994*
Note *: Properties under Option Agreement					
Road reserves associated with Dungeon Road and various formed and unformed roads					

The Pipeline Route is fully described in *McPhillamys Pipeline Development – Preliminary Environmental Assessment* presented in **Appendix 1**.

1.5 SUMMARY OF THE MINE DEVELOPMENT

The Mine Development would include the following key components to be undertaken within the Mine Site (**Figure 3**).

- Construction of a single, approximately circular open cut with a diameter of approximately 1 050m and a final depth of approximately 460m.
- Placement of waste rock into waste rock emplacements that would include encapsulation for material with the potential to produce a low pH leachate. The waste rock emplacements would be constructed and rehabilitated in a manner that they would, to the extent practicable, act as amenity bunds, shielding surrounding residents from activities within the Mine Site.
- Construction and use of a conventional carbon-in-leach processing facility comprising a run-of-mine (ROM) pad and crushing, grinding, gravity, leaching, gold recovery, tailings thickening, cyanide destruction and tailings management circuits.
- Construction and use of an engineered tailings storage facility to store tailings material.

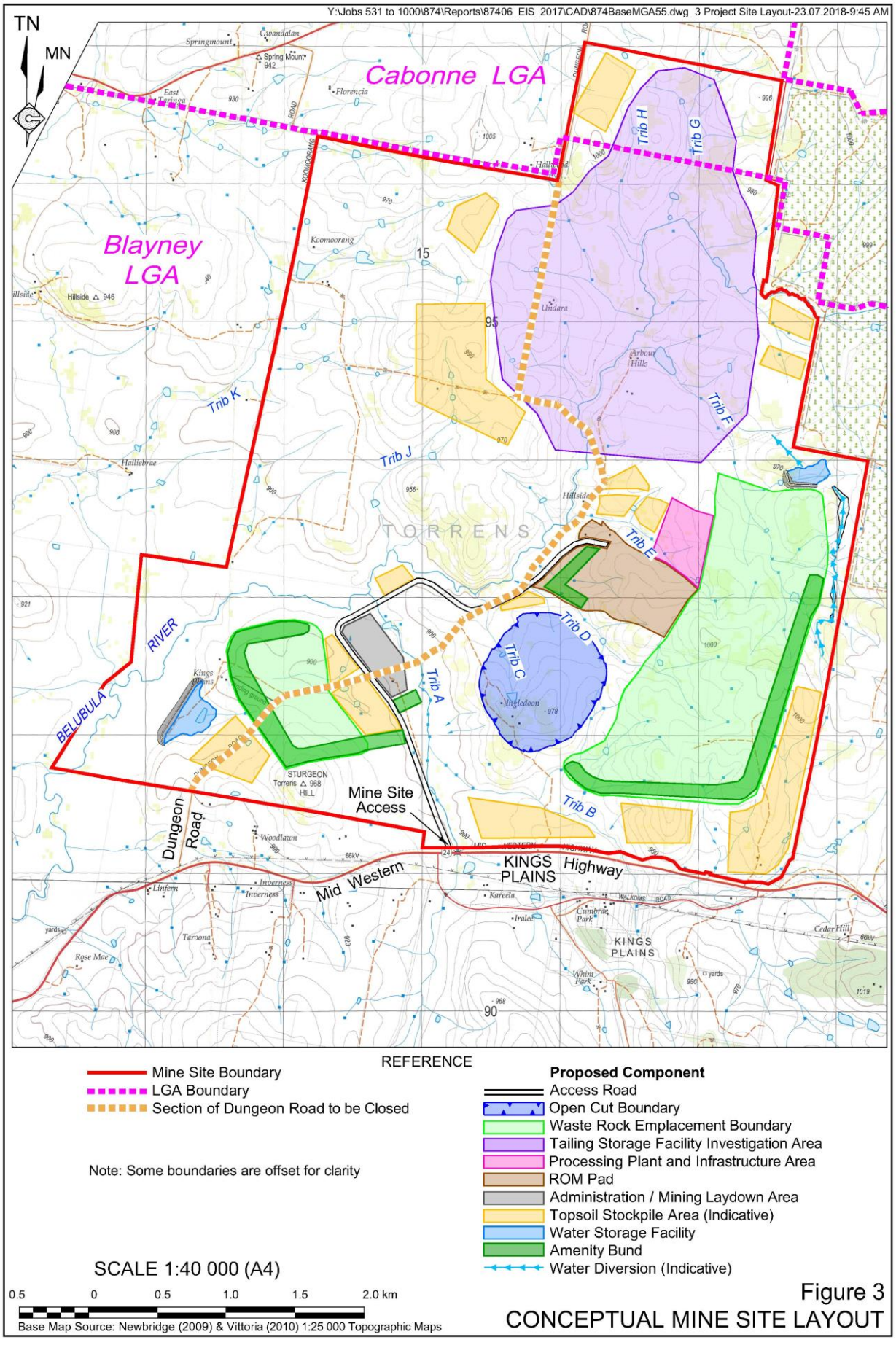

Figure 3
CONCEPTUAL MINE SITE LAYOUT

- Establishment and use of a site access road and intersection with the Mid Western Highway.
- Construction of water management infrastructure, including water diversions and storages, and sediment control infrastructure.
- Establishment and use of ancillary infrastructure, including soil stockpiles, administration, workshop, stores, water supply, power supply and other infrastructure.
- Establishment of a final landform that is stable, secure, non-polluting and requiring ongoing land management equivalent to surrounding undisturbed land. The final landform, with the exception of the final void, would be suitable for a final use of agriculture or biodiversity conservation. The final void may be suitable for a final land use as water storage for a number of purposes.

The Mine Development would also incorporate a range of biodiversity offset and habitat enhancement initiatives to ensure biodiversity values in the vicinity of the Mine Site are maintained or improved in the long term.

Finally, the Applicant holds a range of Exploration Licences in the vicinity of the Mine Site. It is anticipated that if a suitable gold resource be identified within those licence areas, the material would, subject to another application for development consent, be transported to the Mine Site for processing and tailings storage. The Mine Site entrance, ROM pad and tailings storage facility have been designed to cater for the additional traffic movements and ore volume. A separate application for development consent would be sought for the mining and transportation of that material to the Mine Site should a suitable resource be identified.

Sections 2 provides a more detailed description of the proposed Mine Development.

1.6 BACKGROUND TO THE MINE DEVELOPMENT

The Blayney – Kings Plains district has been the subject of alluvial and hard rock mining in the mid to late 19th century and sporadic exploration for gold and base metals over various exploration licences since the 1960s. Nine different exploration licence holders have explored the area since that time, leading up to the discovery of the McPhillamys deposit.

More recently, between 2006 and 2009, exploration targeting gold mineralisation at McPhillamys on EL5760 was undertaken by LFB Resources NL, which at that time was a joint venture between Newmont Exploration Pty Ltd and Alkane Resources Ltd, referred to as the Newmont Alkane JV.

Having identified the McPhillamys deposit, a program of diamond core drilling was undertaken in 2010 by the Newmont Alkane JV to further define the known mineralisation and metallurgical characterisation of the deposit. At the completion of this exploration program, a potentially economic resource was confirmed subject to further feasibility assessment. In November 2012, Regis acquired LFB Resources NL from the Newmont Alkane JV. The Applicant then completed an infill resource drilling program in the first half of 2013 to confirm the earlier exploration results and to increase the confidence level of the resource model. A resource estimate was prepared in July 2014. In mid-2016, the Applicant commenced a further round of drilling to refine the resource estimate and to obtain additional information required to complete a Definitive

Feasibility Study. That study has culminated in an updated mineral resource estimate and maiden ore reserve estimate released in September 2017. The September 2017 Mineral Resource Estimate and Ore Reserve Estimate are described in Section 3.1.3.

Regis' Board anticipates making a decision to commence development of the Mine Development following the receipt of all required approvals.

1.7 APPROVALS, LICENCES AND CONSENTS REQUIRED

In order to construct and operate the Mine Development, the Applicant will require the following approvals, licences and consents.

- Development Consent from the Minister for Planning and Environment and under Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Mine Development is classified as State Significant Development in accordance with Clause 5 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional Development SEPP) as it would have a capital investment value of more than $30 million.
- An Environment Protection Licence[1] issued by the Environment Protection Authority (EPA) under Section 47 of the *Protection of the Environment Operations Act 1997*.
- A Mining Lease[1] issued by the Department of Planning and Environment – Division of Resources and Geoscience under the *Mining Act 1992*. LFB Resources NL, a wholly-owned subsidiary of Regis Resources Ltd, holds Exploration Licences (EL) 5760 and (EL) 6111 over the full area of the Mine Site (**Figure 1**).
- Section 138 Permit and a Work Authority Deed issued by the Roads and Maritime Service under the *Roads Act 1993*, for construction of the intersection of the site access road and Mid Western Highway.[1]
- Water Access Licences (WAL) issued by the DoI – Water under the *Water Management Act 2000* for water intercepted and or used due to open cut mining activities within the fractured rock groundwater source and induced flow from adjacent water sources. WALs will also be required for surface water in excess of harvestable rights.

In accordance with the operation of Section 4.41 of the *Environmental Planning and Assessment Act 1979*, the following authorisations are not required.

- A Water Supply Works Approval and Controlled Activity Approval under Sections 90 and 91 respectively of the *Water Management Act 2000* for excavation of the open cut and for activities on waterfront land.

[1] By virtue of Section 4.42 of the EP&A Act, such an authorisation or approval cannot be refused if it is necessary for carrying out State Significant Development that is authorised by a development consent under Division 4.1 of the EP&A Act. The authorisation or approval must be substantially consistent with the development consent.

- An Aboriginal Heritage Impact Permit under Section 90 of the *National Parks and Wildlife Act 1974*.

As the Proposal is classified as a State Significant Development, Clause 50A of the *Environmental Planning and Assessment Regulation 2000* requires that the development application for consent for mining or petroleum development on certain identified land (including land shown on the Biophysical Strategic Agricultural Land Map) must be accompanied by either:

- a "Gateway Certificate", where the development occurs on land which meets the requirements of Biophysical Strategic Agricultural Land (BSAL); or
- a "Site Verification Certificate" that certifies that the land on which the proposed development is to be carried out is not BSAL.

As is described in Section 5.11, a Soil and Landscape Assessment has been prepared to support an application for a Site Verification Certificate from the DPE. This assessment has been prepared in accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land 2013* ("the Interim Protocol") (Office of Environment and Heritage [OEH] and Office of Agricultural Sustainability and Food Security [OASFS], 2013). The Applicant considers that BSAL is not present on the Mine Site and that a Site Verification Certificate should therefore be issued.

Finally, the Applicant anticipates that a range of additional approvals, licences and consents will be required. These may include electrical supply/connection certificates, explosive use and storage permits, etc. As these approvals are unrelated to the assessment of the application for development consent, they have not been separately identified here.

1.8 ANCILLARY DEVELOPMENT

The Applicant does not, at the time of finalising this document, propose to make an application for consent for ancillary development other than for the Pipeline Development. This aspect of the Proposal is fully described in **Appendix 1**. Should ancillary development, such as construction of temporary accommodation, be proposed, it will be fully described in the EIS.

The Applicant anticipates that approvals will be required for upgrades and amendments to the power supply infrastructure for the Mine Development, but that the relevant applications and work would be undertaken by the relevant energy provider (e.g. Essential Energy), or contractors approved by the relevant energy provider and will not form a component of this application.

1.9 DEVELOPMENT SCHEDULE

Table 2 presents the indicative development schedule for the Proposal, including both the Mine Development and the Pipeline Development. It is noted that the development schedule is the subject of a substantial number of variables and that the schedule, as presented, is likely to vary.

Table 2
Indicative Development Schedule

Development Stage	Indicative Timing
Application and approvals.	
• CPDP Meeting	September 2017
• Planning Focus Meeting	December 2017
• Granting of SEARs	2018
• Finalisation of EIS	2018
• EIS Exhibition	2018
Finalisation of all approvals, licences and consents, etc.	2019
Construction and commissioning	
• Mine Development construction and commissioning	2019/2020
• Pipeline Development construction and commissioning	2019/2020
Operation	
• Mining operations	2019 to 2029
• Processing and tailings management operations	2019 to 2030
Rehabilitation	
• Biodiversity enhancement operations.	2019 and beyond
• Progressive rehabilitation (outer faces of waste rock emplacements, visual screens, amenity bunds, etc.)	2019 and beyond
• Decommissioning and final rehabilitation	2031 to 2035
Closure and relinquishment	Not determined

2. DESCRIPTION OF THE MINE DEVELOPMENT – MINE SITE

2.1 INTRODUCTION

This subsection provides an introduction to the proposed activities associated with the Mine Development. The information provided in this subsection is conceptual and / or preliminary and is provided to a level of detail that reflects the Applicant's current understanding of the Mine Development.

2.2 MINE SITE ESTABLISHMENT

2.2.1 Introduction

Prior to the commencement of the Proposal, the Applicant would undertake a range of site establishment activities. These would include part or all of the following.

- Vegetation clearing (Section 2.2.2).
- Soil stripping and stockpiling (Section 2.2.3).
- Construction of the Site Access Road and intersection with the Mid Western Highway (Section 2.7.3 and 2.7.4).
- Construction of the Raw Water Storage Dam and connection to the Water Transfer Pipeline (Section 2.8).
- Construction of the on-site electricity supply network and switchyard (Section 2.9).
- Construction of the Processing Plant (Section 2.5) and Tailings Storage Facility (Section 2.6).
- Construction of ancillary infrastructure (Section 2.9).

2.2.2 Vegetation Clearing Operations

The Applicant has designed and will continue to refine the layout of the Mine Development in a manner that would, to the extent practicable, minimise the extent of vegetation to be disturbed. In order to minimise potential impacts associated with vegetation clearing operations, the Applicant would implement the following.

- Clearly mark on the ground approved areas of disturbance and ensure that only vegetation within approved areas is cleared.
- Check all hollow-bearing trees for nesting or roosting fauna prior to disturbance.
- Remove larger vegetation with a bulldozer or excavator or using a chain saw. Recover where practicable hollows and habitat timber for subsequent relocation to areas undergoing rehabilitation or to biodiversity offset areas. Remaining vegetation would, where practicable, be stockpiled for use during rehabilitation operations within the Mine Site or elsewhere.
- Remove groundcover with the topsoil.

2.2.3 Soil Stripping and Stockpiling Operations

Sustainable Soils Management Pty Ltd (SSM) have been engaged to undertake a Soils and Land Capability Assessment. The Applicant would comply with the soil stripping and stockpiling recommendations prepared as part of that assessment. However, in order to minimise potential impacts associated with soil stripping and stockpiling operations, the Applicant would indicatively implement the following. **Figure 3** presents indicative soil stockpile locations. The EIS will include refined locations for the proposed soil stockpiles, as well as a soil balance.

- Strip soil material to the depths recommended in the Soils and Land Capability Assessment.
- Use soil materials immediately in areas undergoing progressive rehabilitation or place into stockpiles.
- Construct topsoil and subsoil stockpiles in a manner that would ensure the viability of the material for use during rehabilitation operations.
- Revegetate soil stockpiles with suitable groundcover species to facilitate stabilisation of the surface material and ongoing viability of the stockpiled soil.

2.3 MINING OPERATIONS

2.3.1 Introduction

Development consent is to be sought for extraction of ore and waste rock from a single open cut. This section provides an overview of the layout of the open cut, a description of the proposed mining methods, mining rate and sequence and the equipment that would be used during mining operations.

2.3.2 Design of the Proposed Open Cut

It is noted that the final layout of the open cut has yet to be determined and a detailed description will be provided in the EIS. Notwithstanding this, the Applicant anticipates that the open cut would have the following indicative design criteria (**Figure 3**).

- Depth: ..... approximately 460m below surface
- Width:..... between 800m and 1 200m at surface
- Bench height:.....between 10m and 20m
- Overall wall angles (including berms): ..... between 43º and 50º
- Contained volume: ..... approximately 113Mbcm

2.3.3 Mining Method

Following the stripping of soil material, mining would commence with the removal or pre-stripping of waste rock. This material would be primarily used for the construction of infrastructure required for the Mine Development, including amenity bunds, hardstands, site access road, raw water storage facility, ROM pad, tailings storage facility embankment and other infrastructure.

The Applicant anticipates that initial mining operations would involve conventional load and haul operations, with excavators used to load material into a series of off-road haul trucks.

Once mining operations have progressed to the point where, due to increasing rock hardness with depth, material to be excavated requires fragmentation, conventional drill and blast techniques would be used. Drill and blast operations would be supervised by a suitably experienced and qualified blasting specialist and would be designed to ensure that the relevant blast criteria are achieved at surrounding residences and other sensitive receivers. The Applicant would also ensure that the risk of flyrock is minimised and does not pose a threat to the Mid Western Highway.

2.3.4 Mining Rate and Sequence

The EIS will provide a detailed overview of the proposed mining rate and sequence throughout the life of the Mine Development. However, the Applicant anticipates that over the life of the Mine Development, approximately 60Mt of ore and 230Mt of waste rock would be moved. Ore would be extracted at an average rate of approximately 7Mtpa. Waste production would be greatest in the early years of operation, averaging approximately 40Mtpa for the first 4 to 5 years (peaking at 60mtpa) and reducing thereafter.

2.3.5 Mining Fleet

The Applicant anticipates that the mining fleet to be used throughout the life of the Mine Development would vary depending on the size and depth of the open cut, the volume of material to be moved and the distance to the waste rock emplacement location. The EIS will include a detailed list of likely mining equipment; however, the Applicant anticipates that the following mining equipment would be used.

- Excavators or face shovels.
- Off road haul trucks.
- Bulldozers.
- Graders.
- Water Carts.
- Drill rigs.
- Ancillary equipment, including lighting plants, generators, pumps, service vehicles.

2.4 WASTE ROCK MANAGEMENT OPERATIONS

2.4.1 Introduction

During mining operations, material that has insufficient gold to justify processing would be extracted and placed within the waste rock emplacements (**Figure 3**). This section provides an overview of the characteristics of the waste rock material, as well as the design of the waste rock emplacements, including amenity bunds, and the procedures that would be implemented during emplacement operations.

2.4.2 Waste Rock Characteristics

A program to determine the characteristics of the waste rock material is currently underway and the results will be presented in the EIS. However, the Applicant anticipates that between 20% and 25% of the waste rock to be recovered may be classified as potentially acid forming (PAF).[2] As a result, the waste rock emplacements would be designed to encapsulate all PAF material encountered.

2.4.3 Design of the Proposed Waste Rock Emplacements

The EIS will present detailed design criteria for the waste rock emplacements. In summary however, the Applicant anticipates that the following design criteria would be implemented.

- Lift height.....up to 20m
- Berm width between lifts .....up to 20m
- Overall slope of final faces (toe to crest, including berms) 15º
- Storage capacity[3].....minimum 115Mlcm

In addition, the Applicant would, wherever possible, design the waste rock emplacements so that they provide an amenity barrier between surrounding residences and the proposed mining operations. In particular, the Applicant would ensure that relevant sections of the waste rock emplacements, in particular the amenity bunds, would be shaped, covered and revegetated as early as practicable during the life of the Mine Development.

Finally, the Applicant would ensure that the final waste rock emplacements are designed in a manner that is sympathetic with the surrounding topography and landforms.

2.4.4 Waste Rock Emplacement Procedures

Waste rock would be transported to the waste rock emplacements using haul trucks. This material would initially be 'paddock dumped,' within the footprint of each of the waste rock emplacement. Subsequent layers would be built by establishing and progressing a tip head on top of the paddock dumped material. Final emplacement profiles would be shaped during and after mining operations using ancillary equipment.

A potentially acid forming (PAF) encapsulation area (or cells) would be established. The PAF cell(s) would be constructed using non-acid forming (NAF) and unclassified (UC) waste rock to minimise exposure of the PAF to air and water, thus reducing the risk of potentially low pH leachate being produced.

As soon as practicable following completion of construction of the outer section of each lift, the face would be profiled and rehabilitated.

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[2] Potentially acid forming material is material containing certain minerals, generally pyrite (FeS_2), that in the absence of neutralising minerals, can potentially produce a low pH leachate when oxidised in the presence of water and air/oxygen

[3] Waste rock would also be used to construct the tailings storage facility embankments. The Applicant would ensure that the combined volume of the waste rock emplacements and the tailings storage facility embankments would be adequate to store all waste rock likely to be produced throughout the life of the Mine Development.

2.5 PROCESSING OPERATIONS

2.5.1 Introduction

Ore material would be processed within a conventional carbon-in-leach (CIL) processing plant. The proposed processing plant would have a nominal throughput of approximately 7Mtpa. **Figure 4** presents an indicative process flow sheet for the proposed processing operations. In summary, the processing operations would include the following.

- Stockpiling and blending of ore at the ROM Pad.
- Crushing, screening and stockpiling of the ore.
- Grinding and gravity recovery.
- Leaching of the gold from the ore using conventional carbon-in-leach (CIL) processing.
- Recovery of the gold from the leach solution.
- Tailings thickening and detoxification.

This section provides a brief description of each of the above components, as well as a description of the proposed reagent management procedures that would be implemented. Further details in relation to each of the above will be provided in the EIS.

2.5.2 ROM Pad Operations

Ore from the open cut would be transported from the proposed open cut to the ROM Pad using haul trucks. The material would then be either direct tipped into the primary crusher hopper or stockpiled within the ROM Pad. Stockpiled ore would then be fed as required into the primary crusher hopper using a front-end loader.

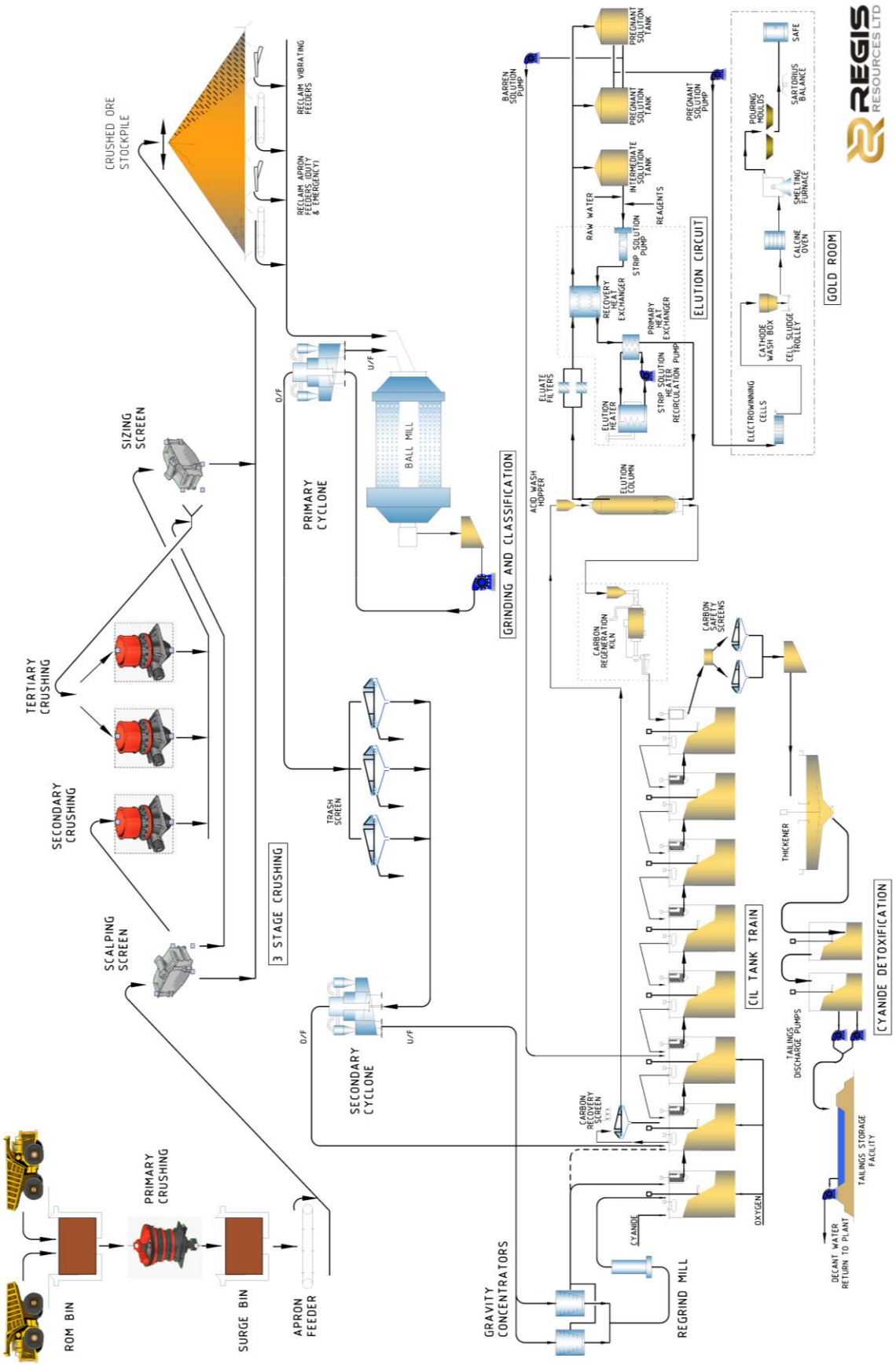
Material that has a gold content that is not considered economic at the time it is mined, but which may be considered economic at a later date (low grade ore) may be stockpiled in a manner such that it could be extracted and processed in the future.

2.5.3 Crushing Circuit

The crushing circuit would comprise a primary crusher to reduce the size of the ROM ore from up to 800mm in diameter to less than 250mm. The primary crushed ore would then be directed to a series of screens and one or more secondary and tertiary crushers, to reduce the size of the ore particles to less than 20mm in size after which the crushed ore would be stockpiled on a crushed ore stockpile.

2.5.4 Grinding and Gravity Recovery Circuit

An under-stockpile conveyor would transport the ore to the grinding circuit. Lime would be added to the crushed ore on the conveyor prior to the grinding mill to elevate the pH within the CIL circuit. The crushed ore would then be combined with water in the grinding mill and the rotating action of the mill would reduce the ore particle size.



Source: Regis Resources Limited

Figure 4
INDICATIVE PROCESS FLOW SHEET

The ground ore slurry would then be passed through a hydrocyclone classification circuit where coarser particles would be separated and reintroduced to the grinding mill, whilst finer particles, approximately 150µm (0.15mm) or less, are directed to the gravity recovery circuit.

The gravity recovery circuit would separate higher density particles from the slurry for regrinding to a finer size prior to being directed to the CIL circuit, whilst the lower density particles from the slurry would be directed to the CIL circuit without any additional grinding.

2.5.5 Carbon-in-Leach Circuit

CIL processing is a gold recovery method used in NSW, Australia and around the world for the recovery of gold and other metals, including by Regis at its Duketon Gold Project operations in WA.

The proposed CIL circuit would consist of eight agitated leach tanks to which the ground ore slurry streams are added to the first and second leach tanks after which they progressively flow to the final leach tank. Oxygen and cyanide solution is added to the leach tanks to leach (or dissolve) the gold particles into solution.

The addition of lime prior to the grinding mill ensures that sufficient cyanide (diluted to approximately 0.03% concentration) is maintained over the approximate time frame of 16 hours that it takes for the slurry to flow through the eight leach tanks.

Activated carbon granules (nominally 2mm to 4mm in size) originating from coconut shell (similar to those used for water purification) are added to each of the eight leach tanks. Screens with an aperture of approximately 1mm are located at the outflow point of each of the leach tanks and act to contain the larger activated carbon particles within each of the leach tanks, whilst at the same time allowing the finer slurry particles (less than 0.15mm) to pass through the screens to each successive leach tank.

The activated carbon particles in each leach tank adsorb the soluble gold cyanide from the solution onto their large porous surface. The activated carbon particles are then pumped in the opposite direction to the ore slurry each day, from the final leach tank ultimately to the first leach tank over a one to two week period. From there, a proportion of the activated carbon particles can be removed and directed to the desorption circuit on a daily basis.

2.5.6 Gold Desorption Circuit

Activated carbon particles that have adsorbed soluble gold and which have been removed from the first leach tank (loaded carbon) are then washed clean of slurry and added to the desorption column. The soluble gold which is readily adsorbed to the porous activated carbon particle surface at lower temperature (less than 50^{o}C) can then be desorbed (removed) from the porous activated carbon surface at higher temperature (greater than 100^{o}C).

The higher temperature solution is passed through the desorption column containing the activated carbon particles and the soluble gold is released back into solution from the porous surface of the activated carbon particle and this solution is then stored in several tanks (eluate tanks).

This solution containing the dissolved gold is then passed through electroplating (electrowinning) cells where the gold plates to either steel or stainless steel wool. The gold on the steel or stainless steel wool is then removed using high pressure water or heat and the gold powder (or sludge) is dried. The dried gold sludge material has fluxes added to it and is heated in a small furnace to produce a doré (unrefined gold) bar, which is securely stored prior to transport from the Mine Site.

The activated carbon particles, with the soluble gold removed, are then returned to the final leach tank and the soluble gold adsorption process repeated.

The Applicant would ensure that all emissions from the gold desorption circuit comply with the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2010* for Group 6 plants

2.5.7 Tailings Thickening and Detoxification Circuit

Once the ore slurry streams have passed through the leach tanks and have had the majority of gold removed, they are described as tailings. The tailings slurry then flows to a thickener, where the slurry is mixed with a flocculant solution. The flocculant solution assists the finer particles to coagulate and settle in the thickener.

The action of the flocculant solution and a slow moving rake within the thickener causes the solid particles to settle to the base of the thickener where they can be pumped to the next stage. At the same time, the upper section of the thickener contains clear process water, which has not settled with the solid particles. This clear process water is decanted from the surface of the thickener for reuse in the process. Approximately 60% of the process water still containing lime, oxygen and dilute cyanide is able to be recycled using this equipment.

The thickened slurry removed from the base of the thickener is then 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).

International guidelines formulated in conjunction with the United Nations stipulate that a level of 50ppm WAD cyanide in the tailings discharge is safe to terrestrial fauna (e.g. birdlife).

The resultant detoxified slurry is then pumped to the tailings storage facility (see Section 2.6).

2.5.8 Reagent Management

2.5.8.1 Introduction

The Mine Development would require the use of a range of reagents. The key reagents used in CIL processing include the following.

- Lime.
- Oxygen.
- Sodium cyanide.
- Hydrochloric acid.
- Sodium hydroxide.
- Flocculant.
- Copper sulphate.
- Sodium meta-bisulphite (SMBS).

The EIS will include a detailed description of the measures that would be implemented to manage these materials. The EIS will also include a risk screening and assessment in accordance with the requirements of *State Environmental Planning Policy No 33 – Hazardous and Offensive Development* for the principal reagents proposed to be used within the Mine Site.

Notwithstanding this approach, this section provides a brief overview of the measures that would be implemented to manage these reagents generally within the Mine Site, as well as the measures that would be implemented to manage sodium cyanide specifically.

2.5.8.2 Reagent Management Measures

The Applicant would implement the following management and mitigation measures for all reagents used within the Mine Site.

- Transport reagents in accordance with the requirements of the *Australian Dangerous Goods Code*.
- Store and handle all reagents in accordance with the manufacturer's instructions, the relevant Safety Data Sheet and, where relevant, Australian Standard AS 4452 *The Storage and Handling of Toxic Substances*. This would include the following.
  - Store all reagents in bunded areas, or in double skinned tanks with adequate capacity to retain 110% of the volume of the largest container within the bund or outer liner.
  - Store incompatible reagents separately.
- Ensure that adequate spill detection and clean up systems are in place and that plant operators are adequately trained and experienced in managing these materials.
- Store the minimum practicable quantity of reagents required for ongoing operations.
- Control access to reagent and storage areas to prevent accidental or deliberate discharge or misuse of reagents.

2.5.8.3 Cyanide Management Measures

Cyanide Facts

Cyanide is a simple ion of carbon and nitrogen. The most toxic form of cyanide is free cyanide, which includes the cyanide ion and hydrogen cyanide. In CIL processing, the pH of the solution or slurry is elevated beyond 9.5 to ensure that the cyanide ion (CN^-) is dominant in the slurry, not hydrogen cyanide (HCN), which as a gas can be extremely toxic.

In addition to free cyanide, certain metals (e.g. copper, zinc) can form cyanide complexes described as weak acid dissociable (WAD) cyanide. Although WAD cyanide complexes are by themselves much less toxic than free cyanide, at lower pH, their dissociation can release free cyanide (as well as the metal ion), which can be toxic.

Cyanide is produced naturally in the environment by various bacteria, fungi and numerous species of plants including beans (chickpeas and lima), fruits (seeds and pits of apple, cherry, pear, apricot, peach and plum), almond and cashew nuts, vegetables of the cabbage family, grains (alfalfa and sorghum), roots (cassava, potato, radish and turnip), white clover and young bamboo shoots. Incomplete combustion during bush fires is believed to be a major environmental source of cyanide. Once released in the environment, the reactivity of cyanide provides numerous pathways for its rapid degradation.

Cyanide can be toxic to people and wildlife. Cyanide can enter the body through inhalation, ingestion or absorption through the eyes and skin. The toxicity to humans is dependent on the nature and the concentration of the exposure. Despite its potential toxicity at elevated concentrations, cyanide is produced in the human body and exhaled in extremely low concentrations with each breath.

There is no evidence that chronic cyanide exposure has any teratogenic (birth), mutagenic (genetic damage) or carcinogenic (cancer causing) effects.

Approximately 1.1 million tonnes of hydrogen cyanide are produced each year, with approximately 6% used to produce reagents for gold and silver processing. The remaining 94% is used in industrial applications including production of plastics, adhesives, fire retardants, cosmetics, pharmaceuticals, food processing and as an anti-caking additive for table salt and road salt. Cyanide is manufactured and distributed in a variety of physical and chemical forms, including solid briquettes, flake cyanide and liquid cyanide.

Cyanide Specific Management Measures

The Applicant would implement the following cyanide-specific management measures throughout the life of the Mine Development.

- Ensure that sodium cyanide is only sourced from reputable suppliers and transported in accordance with the requirements of the Australian Dangerous Goods Code and *Australian Standard AS 4452 The Storage and Handling of Toxic Substances*.
- Ensure that sodium cyanide is stored and mixed within a dedicated, secure, bunded mixing and storage area.
- Ensure that cyanide-containing solutions are maintained at an adequate pH (~9.5 or higher) and that pH monitoring equipment is provided.
- Ensure that HCN monitoring equipment is available to detect emissions of HCN gas that may be harmful to employees or the environment.
- Ensure that critical components of the reagent storage area and processing plant are inspected regularly, with alarms and automatic shutdowns, as required, and that emergency response plans and procedures are developed with plant operators trained in their implementation.
- Ensure that all cyanide-containing solutions to be discharged to the tailings storage facility are treated using the cyanide detoxification circuit.
- Ensure that in the unlikely event that a spill occurs, that it is promptly cleaned up, investigated and remedial action to prevent a recurrence is implemented.

2.6 TAILINGS MANAGEMENT OPERATIONS

2.6.1 Introduction

Following completion of processing operations, thickened tailings would be directed to the cyanide detoxification circuit and then pumped to the tailings storage facility. This section provides an overview of the characteristics of the tailings and the proposed design and operation of the tailings storage facility.

2.6.2 Tailings Characteristics

The detailed geochemical characteristics of the tailings material will be presented in the EIS. Preliminary geochemical test work indicates that a proportion of the ore may be classified as potentially acid forming (PAF). However, the Applicant anticipates that the elevated pH within the CIL circuit will neutralise the majority of the tailings material.

2.6.3 Tailings Storage Facility Design

The Applicant has engaged ATC Williams to complete the tailings storage facility design. As a prescribed dam, that design is required to be prepared to the satisfaction of the NSW Dams Safety Committee (DSC), based on the following.

- DSC3A Consequence Categories for Dams.
- DSC3B Acceptable Flood Capacity for Dams.
- DSC3C Acceptable Earthquake Capacity for Dams.
- DSC3G General Dam Safety Considerations.
- DSC3F Tailings Dams.
- Australian National Committee on Large Dams (ANCOLD) Guidelines on Tailings Dams.
- ANCOLD Design Guidelines for Earthquakes
- ANCOLD Guidelines on Risk Assessment.

Detailed design work for the tailings storage facility has yet to be completed. **Figure 3** presents the tailings storage facility investigation area. This area represents the area that the Applicant is currently investigating for placement of the tailings storage facility. The final tailings storage facility would have an approximate surface area of 260ha or three quarters of the current investigation area.

The EIS will include a detailed description of the design of the tailings storage facility. In summary, the design storage capacity would be approximately 50Mm^3 or 70Mt at a settled density of 1.4t/m^3, 15% more than the current ore reserve. The primary embankment would have an approximate height of 60m. This would allow adequate storage capacity in the event that additional resources are identified or if the assumed tailings settled density is not reached.

The inner face of all embankments would be sealed with a clay lining constructed to the appropriate engineering specification and would have an effective permeability of less than 1 x 10^{-9}m/s. The floor of the tailings storage facility would be conditioned to the appropriate engineering specification following final hydrogeological modelling and risk assessment.

The seepage management system would incorporate a seepage interception system (embankment under-drainage system) that would intercept if necessary, shallow seepage flows and drain to a series of interception sumps from which seepage could be monitored and recovered for use in the process and/or returned to the tailings storage facility.

Tailings would be discharged via multiple spigots around the perimeter of the tailings storage facility, with a decant and water reclaim facilities located away from any constructed walls within the tailings storage facility.

Finally, the tailings storage facility would incorporate a range of monitoring piezometers which would be designed to monitor fluctuations in groundwater conditions, should they occur.

2.6.4 Tailings Storage Facility Construction

The tailings storage facility would be constructed in a series of stages. A description of each stage will be provided in the EIS, however, construction operations would typically comprise the following.

- All exploration and sterilisation drill holes within the footprint of the facility would be backfilled with bentonite or similar.
- Installation of erosion and sediment control structures in accordance with *Managing Urban Stormwater*, including engineered clean water diversions/storages, dirty water containment structures and sedimentation basins and procedures to control the discharge of water with the potential to pollute surface waters.
- Vegetation and soil would be removed as described in Section 2.2.
- The foundations of all embankments would be excavated to remove weak, compressible or over-saturated soils. A cut-off key trench would then be excavated and any areas of potential seepage would be sealed.
- The embankments would be constructed using three materials as follows.
  - Rock fill – to be used for the main structural support for the embankment.
  - Clay fill – to be used for construction of the low permeability zones and for backfilling cut-off trenches.
  - Select rock fill – to be used as a protective layer against the inner face of the clay fill and for wearing surfaces on embankment crests.

2.6.5 Tailings Storage Facility Operation

Tailings would be discharged to the tailings storage facility via a series of spigots or discharge pipes located around the perimeter of the facility. The discharge locations would be varied regularly, up to multiple times per day, to ensure that the tailings are evenly distributed and to maximise the area of damp tailings to minimise dust emissions.

Supernatant water, or water remaining after the tailings solids have settled out, would be permitted to flow to a centrally located decant pond where it would be recovered for reuse within the processing plant.

The Applicant would ensure that the concentration of WAD cyanide at the discharge point to the tailings storage facility would be less than 30ppm. As cyanide is readily and rapidly broken down in sunlight and through natural degradation, the concentration of WAD cyanide in the decant pond is expected to be substantially less than the concentration at the discharge point.

2.7 TRANSPORTATION OPERATIONS

2.7.1 Introduction

The Applicant has engaged Constructive Solutions to complete the traffic assessment for the Mine Development. The following subsections describe the proposed transportation operations, incorporating feedback received from Constructive Solutions. Section 5.10 presents a brief overview of the traffic and transportation assessment completed to date.

2.7.2 Modifications to the Local Road Network

The Mine Development would result in the section of Dungeon Road within the Mine Site being closed (**Figure 3**). Dungeon Road is an unsealed local road which traverses the Blayney and Cabonne Shire LGAs. The road links the Mid Western Highway with Vittoria Road and caters primarily for local traffic.

The Applicant proposes to close a section of Dungeon Road during construction and operation and then realign Dungeon Road if required to permit continuous access to non-Project related properties post mine closure. The proposed realigned road would be constructed on land owned by the Applicant and / or within existing road reserves. The Applicant would ensure that those sections of the realigned road on freehold land would be subdivided and passed into the control of Council on completion of the road.

The Applicant has commenced consultation with both Blayney and Cabonne Shire Councils in relation to closure of sections of Dungeon Road and the proposed realignment and would ensure that the requirements of both Councils are achieved.

2.7.3 Site Access Road

The site access road would be a sealed, two lane road suitable for B-double trucks and would permit access to an on-site parking area adjacent to the administration building. No vehicle parking would be permitted within the Mid Western Highway road reserve. Access to the active section of the Mine Site would be restricted to approved persons and vehicles only.

2.7.4 Mine Site Entrance

Access to and from the Mine Site would be via the Mid Western Highway, a sealed, two lane State road approved for use by B-double trucks. The road is under the control of the Roads and Maritime Service. The sign posted speed limit in the vicinity of the Mine Site is 100km/h.

The Applicant would construct an intersection between the Highway and the Site Access Road (**Figure 3**). The Applicant has investigated a range of intersection locations and has consulted with the Roads and Maritime Service. The Applicant will continue to consult with the Roads and Maritime Service, Council and surrounding residents in relation to the location of the intersection to ensure a safe, convenient and cost effective final location.

The proposed intersection would be suitable for vehicles up to and including B-double trucks operating at the sign posted speed limit in accordance with the *Austroads Guide to Road Design.* Intersection designs are typically determined based on the worst case or busiest 1-hour period during a typical day, likely around shift change. The proposed intersection would be designed to cater for traffic that may be required to access the Mine Site should the Applicant identify and seek approval to mine and transport ore from elsewhere to the Mine Site. Notwithstanding this, the Applicant notes that further approvals, including an application for a separate development consent, would be required to permit such transportation.

Constructive Solutions advise that the proposed intersection would indicatively include the following.

- A rural auxiliary left turn in lane and left turn out lane for east-bound traffic into and from the Mine Site; and
- A channelised right turn in lane and right turn out lane for west-bound traffic turning right into and from the Mine Site.

The EIS will include a detailed location and design of the Mine Site entrance.

The existing intersection of Dungeon Road and the Mid Western Highway is proposed be closed to all except local traffic associated with three to four rural holdings located at the southern end of Dungeon Road near to the Mid Western Highway turnoff. As a result, the Proposal would not result in an increase to the number of substantial intersections accessing the Mid Western Highway.

The Applicant is also aware that fog occurs in the vicinity of the Mine Site during the cooler months. The EIS will also include a range of measures to manage traffic movements during fog events.

2.7.5 Traffic Types, Routes and Volume

The Applicant anticipates that the largest vehicle that would access the Mine Site would be B-double trucks. Other vehicles that may access the Mine Site would include the following.

- Cars and vans (Class 1 and 2) – associated with employee and visitor transport.
- Medium length vehicles (Class 3 to 7) – including rigid trucks and truck and dogs, associated with delivery of products and assorted consumables.
- Articulated vehicles (Class 8 to 11) – including semi-trailers and B-doubles, associated with delivery of bulk consumables and supplies.
- Mobile cranes and low loaders carrying large scale mining equipment intermittently during construction and mining operations.

The Applicant anticipates that most light vehicles would access the Mine Site from the west via the Mid Western Highway, transporting personnel from Blayney, Millthorpe, Orange and surrounding areas (**Figure 1)**. Smaller numbers of light vehicles would access the Mine Site from the east via the Mid Western Highway, transporting personnel from Bathurst and surrounding areas.

The Applicant anticipates that most heavy vehicles would access the Mine Site from the east via the Mid Western Highway, transporting products from Sydney and the ports at Newcastle, Botany Bay and Wollongong. A smaller number of vehicles would access the Mine Site from the west via the Mid Western Highway, transporting products from the Blayney rail facilities and further afield, including products transported via the Olympic and Newell Highways.

Table 3 presents the indicative traffic levels that would be generated by the Mine Development.

Table 3
Proposed Traffic Levels

Vehicle Type	Trips / Movements per day	Assumptions
Light vehicles	117 trips or 234 movements	• 250 total employees, with 70% accessing the Mine Site each week day and an average of 1.5 persons per vehicle
		• 20 visitors per day
Heavy Vehicles	4 loads or 8 movements	• 2 reagent deliveries per day
		• 1 diesel delivery per day
		• 1 other delivery per day

2.8 WATER MANAGEMENT

The Proposal is unique in that the vast majority of the water supply for the project will be provided from an outside source at Springvale via the Pipeline Development, and as a result, the Mine Development will therefore have a minimal impact on the local surface water and groundwater.

In addition to this, the Proposal will assist with environmental compliance requirements in the Springvale catchment from where the surplus water is to be sourced.

2.8.1 Classes of Water

The Mine Development would include differing classes of water as follows.

- Raw water – water utilised primarily by the Processing Plant and supplied to the Mine Development via the Water Transfer Pipeline. This water would be sourced from the Centennial's Angus Place Mine, Springvale Coal Services Operations, and brine from the Mt Piper Power Station operations and would be stored within the water dam/s at the Mine Site. The water quality specification would vary according to the contribution from each of the water sources outlined above. This water would also be used for mining-related purposes, including dust suppression and would not be permitted to be discharged.

- Mine water – water sourced from the proposed open cut or from sections of the Mine Site and be used for mining-related purposes, including processing and dust suppression. If areas of the open cut are likely to produce water with a low pH leachate, including PAF encapsulation areas, then this water would be used for processing and dust suppression within areas of the Mine Site which are isolated from natural drainage. Mine water would not be permitted to be discharged.
- Process water – water reclaimed from the processing plant or tailings storage facility decant pond with the potential to contain processing chemicals or salt or to have a higher or lower pH. This water would be used for processing purposes and would not be permitted to be discharged.
- Clean water – water within undisturbed watercourses and runoff through undisturbed sections of the Mine Site. This water would where practicable, pass through the Mine Site without mixing with other classes of water, including via surface water block diversions around disturbed sections of the Mine Site. This water would typically not be captured or used within the Mine Site.
- Dirty or sediment-laden water – surface water runoff from disturbed or active sections of the Mine Site with the potential to contain suspended sediment but unlikely to contain chemicals or salt. This water would be managed in accordance with *Managing Urban Stormwater* and would only be permitted to discharge from the Mine Site following a rainfall event that exceeds the rainfall depth identified in *Managing Urban Stormwater*. In order to ensure that these basins are emptied within the required period identified under *Managing Urban Stormwater*, dirty water may be removed from the sediment basins and used for mining-related purposes or discharged following treatment and testing to ensure compliance with the relevant criteria.

2.8.2 Surface Water Management

The Applicant would prepare and implement a *Water Management Plan* for construction, operation and closure aspects of the project that would include the following design components. The EIS will include a description of the following components, with detailed design and volume estimates prepared following the receipt of development consent.

- The Applicant would ensure that the appropriate guidelines are met for captured water and clean water as part of the overall design.
- Sediment and erosion control structures to manage dirty or sediment-laden water.
- Raw water storage structures, including control mechanisms to ensure that water transfer pumps are shut off once the raw water dam reaches a defined capacity.
- Mine water and process water containment structures to minimise the potential for surface water contamination. This would include measures to prevent discharge of water from the process plant area and all pipelines, including the tailings and decant return pipelines. The process water dam would be sealed and a minimum freeboard requirement within the tailings storage facility would be maintained to prevent incidental discharge.

Furthermore, as indicated in Section 5.3.5, a flood assessment will be undertaken, with the results to be presented in the EIS.

2.8.3 Operational Water Supply and Water Balance

The Applicant anticipates at this stage that it would require approximately 4.75GL of makeup water per annum for the Mine Development.

Approximately 90% of the water requirement is to be sourced externally from Springvale, minimising any local impact on surface water and groundwater. The remaining approximate 10% of the water requirement would be sourced from dewatering activities in the open cut mine and to a lesser extent, water that is captured within the Mine Site and is not suitable for discharge.

To ensure that the externally sourced raw water from Springvale is sustainable for operational requirements, raw water storage dams utilised primarily for the Processing Plant with a capacity of 300ML to 400ML would be constructed to allow for short to medium term interruptions in raw water supply of up to two weeks. If the water storage dams are close to capacity, then the Applicant would cease transferring water through the Water Transfer Pipeline.

In addition to this, the transfer of this water to the Proposal would assist with the environmental compliance requirements in the Springvale catchment from where the surplus water is to be sourced.

The proposed water supply option would provide the capability to manage the volume of water imported to the Mine Site via the water supply pipeline. As a result, the Applicant anticipates that it would be able to manage water levels within the Mine Site to ensure that the potential for unplanned discharge of raw, dirty, mine or process water is minimised to an acceptable level.

The EIS will include a detailed site water balance under average, dry and wet conditions. In summary, water inputs to the Mine Site will include the following.

- Water imported via the water supply pipeline.
- Incidental rainfall and runoff within disturbed and undisturbed sections of the Mine Site.
- Groundwater inflows to the proposed open cut.

Water losses from the Mine Site would include the following.

- Evaporation from the various water storages, including the process and raw water dams and the surface of the tailings storage facility.
- Interstitial pore water retained within placed tailings.
- Discharge from undisturbed sections of the Mine Site and discharge of treated dirty or sediment-laden water, if required.

2.9 NON-PRODUCTION WASTE MANAGEMENT

The underlying principle for all non-production waste management would be to minimise waste generation, to recover, re-use and to recycle waste materials as much as possible, and to reduce environmental harm in accordance with the principles of ecologically sustainable development.

Table 4 lists the non-production wastes that would be generated throughout the life of the Mine Development and briefly describes how each class of waste would be stored or managed on site and subsequently removed from the Mine Site.

Table 4
Non-Production Waste Management

Waste Type	Storage	Removal Method
General solid waste (non-putrescible)	Collected in skips and bins with lids located in sections of the Mine Site where general solid wastes will be generated.	Collected by a suitably licenced contractor and transported off-site for disposal at a licenced facility under a commercial arrangement.
Cardboard and other recyclables	A suitable recycling skips, including for paper/cardboard, metal, timber and other recyclables will be located in sections of the Mine Site where recyclables will be generated.	Collected by a suitably licenced contractor and transported off-site for recycling at a suitable facility under a commercial arrangement.
Waste oils and greases	Placed within bunded area(s) within or in the vicinity of the workshop areas.	Collected on a regular basis by a licensed waste contractor and transported to an appropriately licensed facility.
Oily water	All oily water would be collected in sumps (in the case of workshops and wash down bays) or in tanks (in the case of compressors and other plant).	All oily water would be passed through an oil-water separator, with the produced water used for mine-related purposes and the produced oily fraction added to the waste oil stream.
Batteries	Batteries would be placed within a covered and marked used battery storage area until removed from site.	Batteries would be collected as necessary by a licensed disposal contractor and recycled.
Tyres	Tyres, where practicable, would be removed from site by the supplier. Where this is not possible, or temporary storage is required, tyres would be placed within a marked used tyre storage area until removed from site or used for another purpose.	Tyres would be removed from site for recycling, where practicable, or reused on site for construction of retaining walls, erosion protection, traffic control, etc.
Waste Water	Waste water, comprising water from crib rooms, showers and toilets, would be collected and treated using one or more suitable waste water treatment facilities. The produced water would be used to irrigate gardens and vegetated areas and the treatment facilities would be serviced as required by a suitably qualified contractor. The waste water treatment facilities would comply with the requirements of Blayney Shire Council and further approvals, if required, would be obtained prior to commissioning the facilities.	

2.10 INFRASTRUCTURE AND SERVICES

The Applicant would undertake a range of ancillary activities throughout the life of the Mine Development. These would include, but not be limited to the following.

- Construction and use of:
  - mine access roads;
  - administration offices and meeting/training facilities;
  - lunch/crib rooms and ablutions facilities;
  - mechanical infrastructure for the process plant, reverse osmosis plant, and process plant buildings;
  - workshops and stores facilities, including associated plant parking, laydown and hardstand areas;
  - a laboratory;
  - vehicle wash down bays;
  - explosives magazines and storage areas; and
  - fuel, oil and flammable goods storage areas.
- Management of non-production waste, including waste water from ablutions and sewage treatment facilities.
- Establishment of power and water supply, communications and related infrastructure.

2.11 HOURS OF OPERATION AND LIFE OF THE MINE DEVELOPMENT

2.11.1 Hours of Operation

Table 5 presents the indicative hours of operation. These hours of operation will be reviewed with consideration to noise, air quality and visual amenity related impacts and specific restrictions on some activities may be imposed.

Table 5
Indicative Hours of Operation

Activity	Indicative Days of Operation	Indicative Hours of Operation
Site construction activities • Earthworks • Plant construction	7 days per week	 6:00am to 6:00pm 24 hours per day
Mining operations • blasting operations • all other mining operations	7 days per week	 7:00am to 7:00pm 24 hours per day
Processing operations, including ROM pad, crushing and grinding operations		24 hours per day
Transportation operations		24 hours per day
Maintenance operations		24 hours per day
Rehabilitation operations		24 hours per day

2.11.2 Life of the Mine Development

The Applicant anticipates that mining operations would, based on known ore reserves, require approximately 10 years to complete. Taking into account the time required to seek additional approvals, finance and construct the required infrastructure, and the fact the rate of production may be slower than anticipated, the Applicant proposes to seek development consent for construction and mining operations for a period of 15 years from the date of granting of consent.

Decommissioning, rehabilitation and mine closure activities are expected to require up to 5 years following the completion of mining operations.

2.12 EMPLOYMENT, ECONOMIC CONTRIBUTIONS AND CAPITAL COST

The Applicant anticipates that the Mine Development would employ more than 200 people during the construction phase and in the order of 250 people during the operational phase.

The Applicant anticipates that the Mine Development would contribute each year between approximately:

- $30 million to $35 million annually ($300 million to $350 million in total) in wages and salaries to the local community;
- $150 million and $170 million annually ($1.5 billion to $1.7 billion in total) in goods and services to the local, regional, State and National economies; and
- $8 million annually in royalties ($75 million in total) and $23 million annually ($230 million in total) in taxes, rates and other government fees and charges.

Regis' anticipated investment for the Mine Development is expected to be approximately A$250 million. A detailed justification of the final investment value will be provided confidentially to the Department of Planning and Environment with the application for development consent.

2.13 DECOMMISSIONING AND REHABILITATION

2.13.1 Introduction

The EIS will include a detailed description of the proposed decommissioning and rehabilitation activities. That description will be consistent with the requirements of *ESG3: Mining Operations Plan (MOP) Guidelines, September 2013*.

As far as practicable, the Applicant would adopt a progressive approach to the rehabilitation of disturbed areas within the Mine Site to ensure that areas no longer required for mining-related activities are promptly shaped and rehabilitated to provide a stable landform. While the nature of the Mine Development dictates that opportunities for progressive rehabilitation would be limited because the majority of areas of disturbance would be required for the life of the Mine Development, the Applicant would promote the rehabilitation of those sections of the Mine Site visible from Kings Plains and the Mid Western Highway within the initial stages of the Mine Development.

2.13.2 Rehabilitation Objectives

The indicative rehabilitation objectives for the Mine Development would be as follows.

Active Mining, Decommissioning and Landform Establishment

- To progressively stabilise all disturbed areas and minimise erosion and dust generation.
- To progressively reduce the visual impact upon surrounding residents by early shaping, covering and establishment of vegetation in areas that are highly visible from outside the Mine Site.
- To remove all infrastructure not required for future land uses.
- To blend the created landforms with the surrounding topography.
- To provide a low maintenance, geotechnically stable and safe, non-polluting landform which provides land suitable for the final land use of biodiversity conservation or agriculture.

Growth Media Development and Ecosystem and Land Use Establishment

- To provide for soil management over the life of the Mine Development which addresses the constraints related to the extended period between stripping and replacement on the final landform.
- To achieve a soil profile capable of sustaining the specified final land use.
- To provide for surface micro-habitats such as fallen timber, surface rocks or other features which would encourage colonisation by targeted native flora and fauna.
- To establish native vegetation with the species diversity commensurate to the ecological communities disturbed.

Ecosystem and Land Use Sustainability and Relinquishment

- To protect, enhance and extend those sections of the Mine Site with remnant native vegetation, focusing particularly on that vegetation classified as endangered ecological communities.
- To develop habitats on the final landform which encourage colonisation by native flora and fauna with specific niche requirements.
- To implement biodiversity enhancement measures within sections of the Mine Site so as to extend, improve, protect and link areas of remnant native vegetation and generally improve the biodiversity value of the Mine Site.
- To retain areas on the Mine Site amenable to future agricultural or industrial activities.

2.13.3 Final Landform and Land Use

The EIS will include a detailed description of the final landform, however, the final landform would indicatively comprise the following.

- Shaped and covered waste rock emplacements sympathetic to the existing topography in terms of slopes and profiles. The emplacements would be suitable for a final land use of biodiversity conservation or agriculture.
- A shaped and covered tailings storage facility suitable for a final land use of agriculture.
- Shaped and rehabilitated infrastructure areas suitable for a final land use of agriculture.
- A fenced and bunded open cut area suitable for future potential use, e.g. for water storage.

2.14 BIODIVERSITY OFFSET STRATEGY

The Applicant has engaged EnviroKey Pty Limited (EnviroKey) to undertake the biodiversity assessment for the Mine Development. Section 5.5 provides a brief overview of the preliminary results of that assessment.

The Applicant anticipates that while it has and will continue to implement actions to avoid and mitigate adverse biodiversity-related impacts, some impacts on biodiversity will be unavoidable and require the development of an offset strategy.

The Applicant notes that at the time of commencement of the *Biodiversity Conservation Act 2016* on 25 August 2017, the Applicant had undertaken substantial environmental assessment. As a result, the Applicant has sought and been granted a declaration from the Secretary that the Mine Development represents a "pending or interim planning application" under Clause 27 of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*.

The EIS will present a detailed description of the Biodiversity Offset Strategy, including a description of both the vegetation to be disturbed, as well as the proposed Biodiversity Offset Area.

3. STRATEGIC CONTEXT

3.1 TARGET RESOURCE

3.1.1 Regional Geological Setting

The McPhillamys deposit is located within the Silurian-aged Anson Formation of the eastern sub-province of the Lachlan Fold Belt B (**Figure 5**). The deposit occurs on the eastern side of the Sherlock Fault, part of the Godolphin-Copperhania thrust fault zone.

The deposit lies along one of a series of north-south trending splays/horsetail structures that occur at the inflection of the Godolphin-Copperhania Fault Zone where the orientation changes from NNW-SSE to SSW-NNE. The splays are defined by strong shearing and faulting and continue to the south for over 6km.

3.1.2 Deposit-scale Geological Setting

The McPhillamys gold deposit is hosted by dacite-rich volcaniclastic rocks of the Silurian-aged Anson formation which vary in composition from crystal tuffs to agglomeratic, matrix-supported accretions (**Figure 6**). The gold mineralisation is largely hosted by a north-south striking, east dipping, altered, coarse grained (strongly foliated) felsic to intermediate volcanic, volcaniclastic and intrusive rock complex.

The gold mineralisation is structurally controlled by the shear zone within the dacitic volcaniclastics. Stratigraphic variation in this unit is not a controlling factor for gold mineralisation. The gold mineralisation is well constrained on the western footwall by the Sherlock Fault and less well defined on the hanging wall where the shear zone appears to break up along a parallel north-south trending structure. The mineralised shear zone is over 200m wide and sub-parallel to stratigraphy, dipping steeply at 75º to 80° to the east (**Figure 7**).

The volcaniclastics have undergone greenschist facies metamorphism which has produced a mineral assemblage of biotite/chlorite, muscovite, quartz, k feldspar. This assemblage has been overprinted at by a hydrothermal alteration assemblage of quartz + white mica (phengite) + carbonate (ankerite) along with gold and sulphide mineralisation.

3.1.3 Mineral Resources and Reserves

As indicated in Section 1.6, the Applicant completed an updated Joint Ore Reserve Committee (JORC) compliant Mineral Resource Estimate and Ore Reserve Estimate in September 2017. **Table 6** presents the results of that assessment.

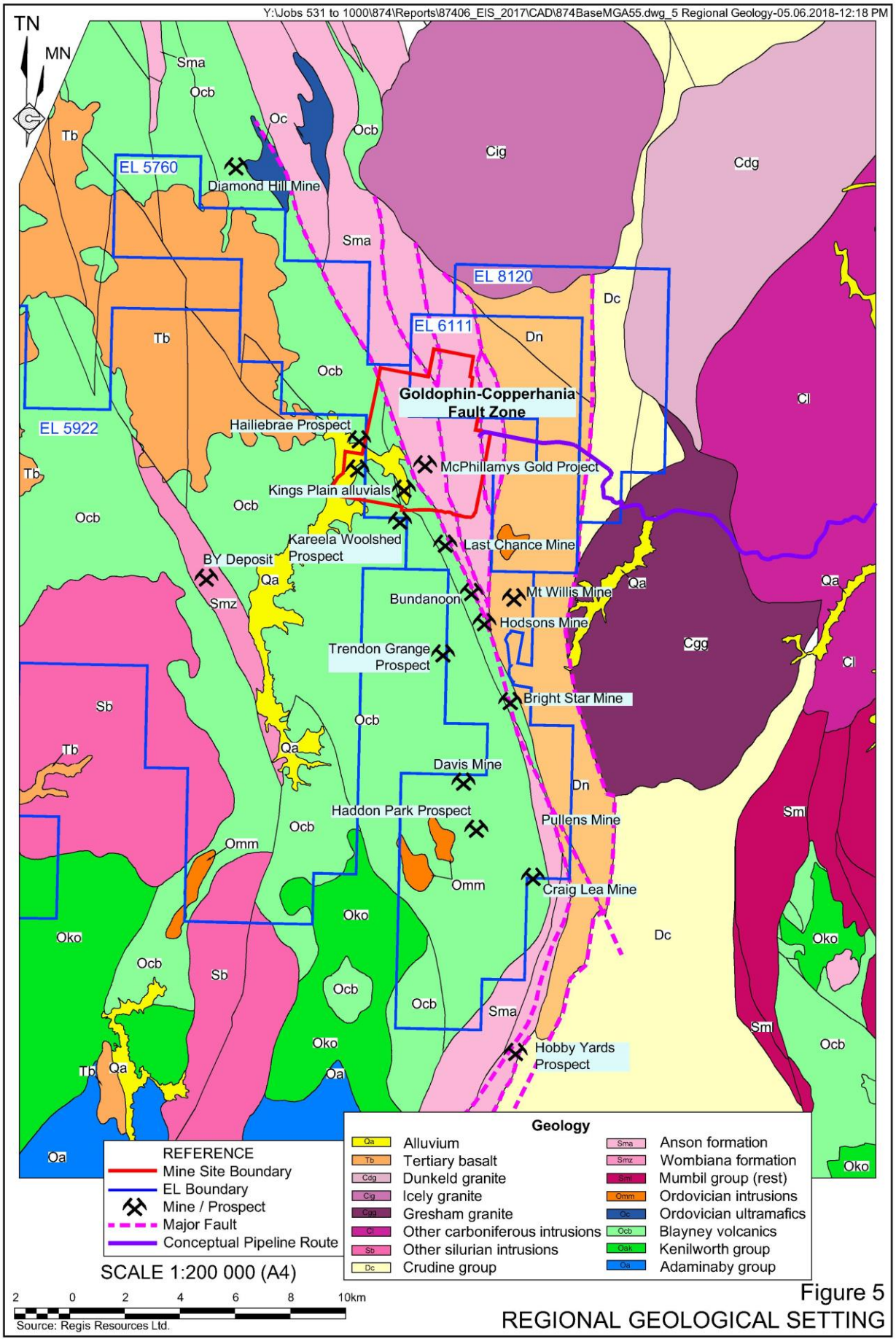


Figure 5
REGIONAL GEOLOGICAL SETTING

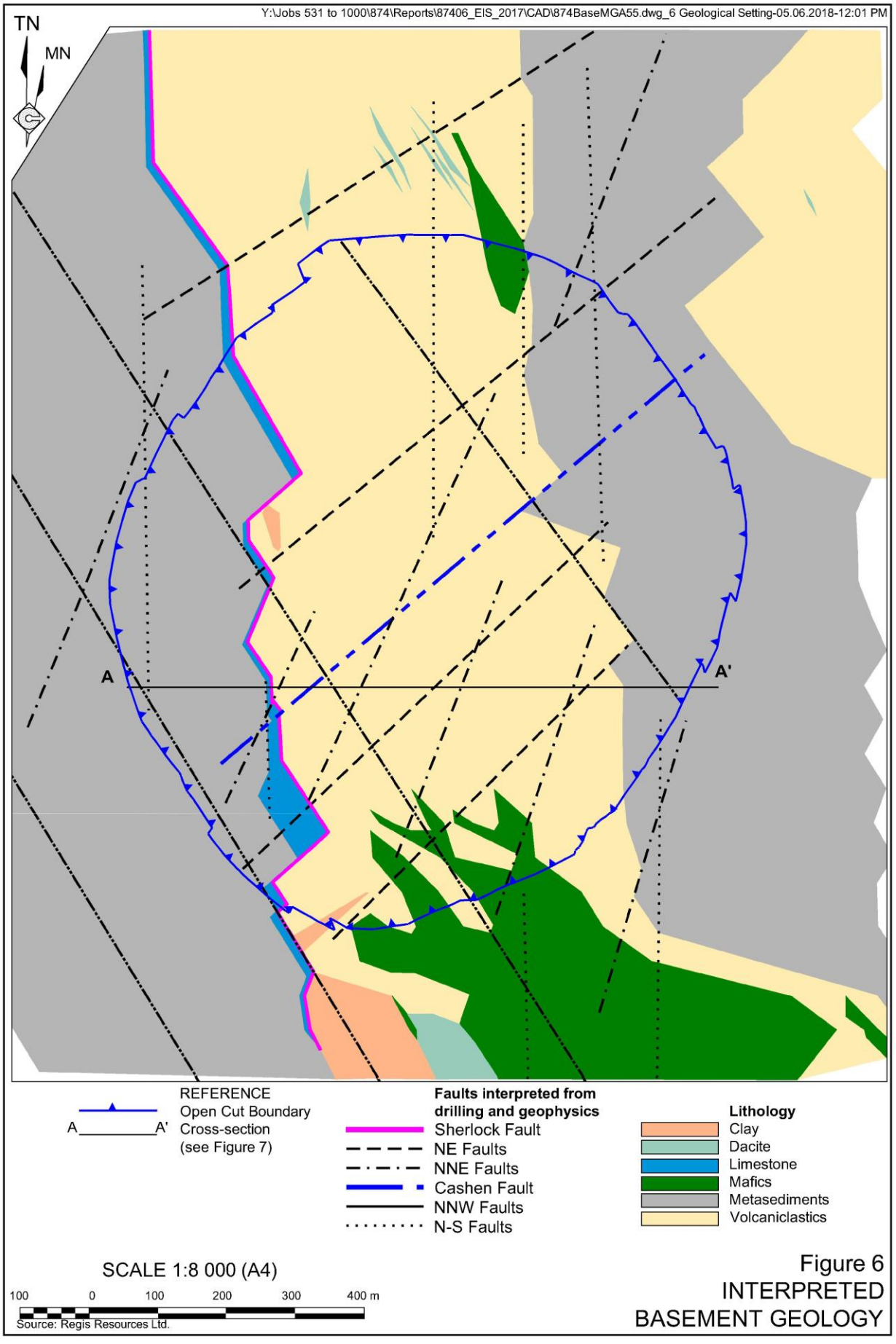


Figure 6
INTERPRETED
BASEMENT GEOLOGY

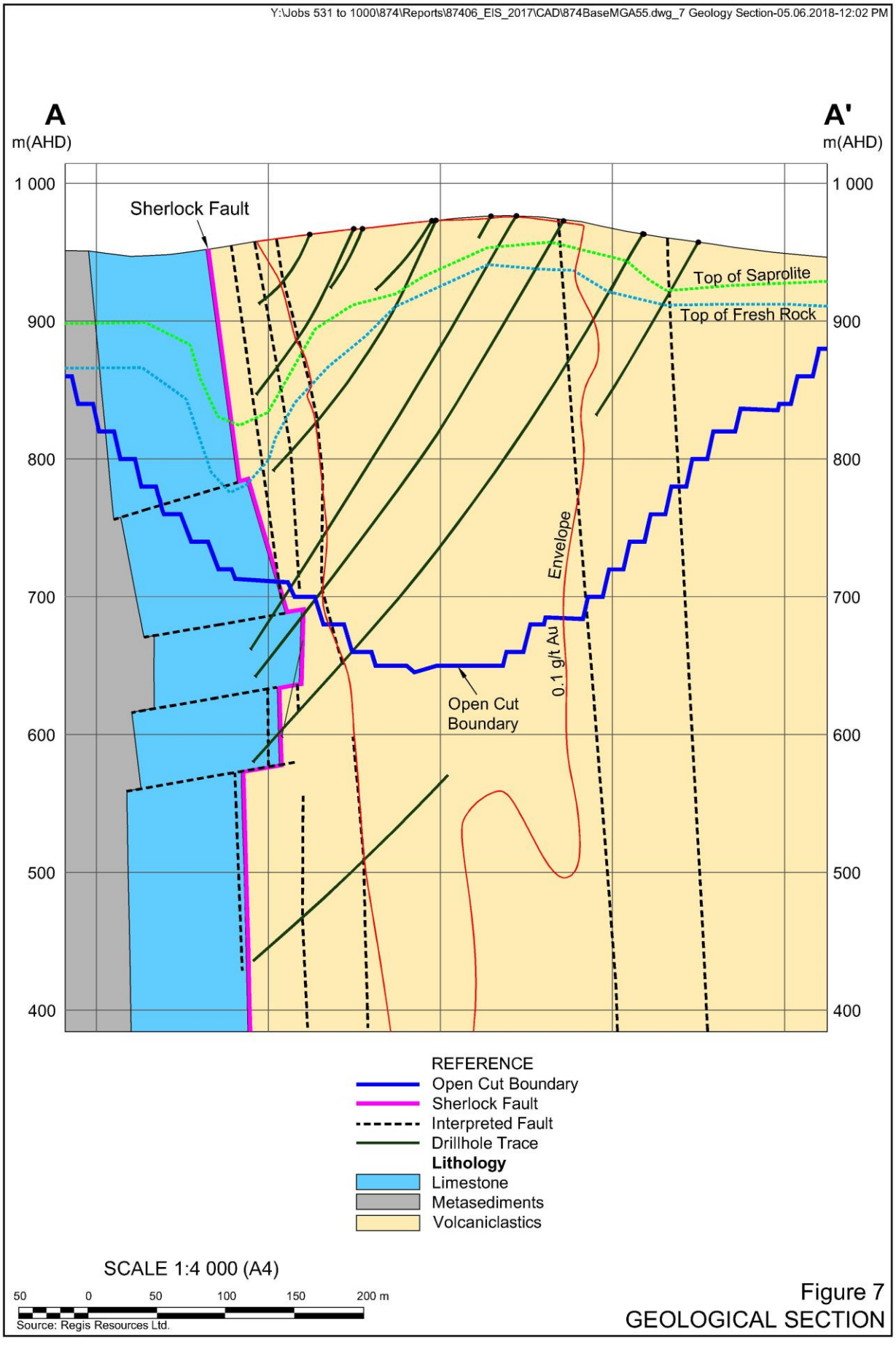


Figure 7
GEOLOGICAL SECTION

Table 6
Mineral Resource Estimate and Ore Reserve Estimate

Category	Tonnes (Mt)	Gold Grade (g/t)	Contained Gold (Oz)
Mineral Resource[1]			
Indicated	67.7	1.05	2,282,000
Inferred	1.2	0.64	25,000
Total	68.9	1.04	2,307,000
Ore Reserve[2]			
Probable Ore Reserve	60.1	1.05	2,034,000

Note 1: A Mineral Resource is defined under the JORC Code as a geological concentration of material which has a reasonable prospect for eventual economic extraction. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. A Mineral Resource is not constrained by likely mining limitations and simply describes the amount of known material in the ground.

Note 2: An Ore Reserve is defined under the JORC Code as is the economically mineable part of a Measured and/or Indicated Mineral Resource, including diluting materials and allowances for losses. An Ore Reserve is that component of a Mineral Resource that may realistically and economically be mined.

Source: Regis Resources Limited – ASX Announcement – 8 September 2017

3.1.4 Efficiency of Resource Recovery

Figure 7 presents a section through the geological resource showing the 0.1g/t gold envelope. The mineralised envelope is sub-vertical, and the proposed mining method would not result in sterilisation of resources.

3.1.5 Potential Impacts on Surrounding Mines and Industries

Mining operations, by their nature, require a workforce comprising a mix of qualified professional staff, experienced supervisors and range of competent and skilled operators, as well as a network of support services and industries. It is acknowledged that there is substantial overlap with potential social and economic impacts to individuals and businesses described more fully in the EIS. This subsection has been prepared to address the requirements of bullet points 4 and 5 of *Section 3.1* of the *Mine Application Guideline* dated October 2015 and, as a result, focuses solely on potential impacts, both positive and negative, to surrounding mining operations and "industries or projects that may be dependent on the development of the resource."

The only other active mining operation within proximity to the Mine Site is the Cadia Valley Operations (CVO) (**Figure 1**). That significantly larger operation is located approximately 28km to the west of the Mine Site and mines between 26Mtpa and 32Mtpa of copper-gold ore from the Cadia East deposit. Previously CVO have operated the Cadia Hill Open Cut and the Ridgeway Underground Mine, both of which have ceased operations. The Mine produces approximately between 250,000tpa and 350,000tpa of concentrate which is transferred to a facility in Blayney where it is transferred to the rail network. The Mine, in late 2017:

- employed approximately 1,200 people, of which approximately 14%, 60%, 18% and 3% live within the Blayney, Orange, Cabonne and Bathurst Local Government Areas respectively;
- contributed approximately $100 million per year in wages and salaries to employees and approximately $56 million per year to contractors, much of which is spent in surrounding communities;

- expended approximately $200 million per year on goods and services;
- contributed approximately $250,000 per year supporting community projects and initiatives through grants and in-kind support; and
- provided approximately $250,000 per year to the Blayney, Orange and Cabonne local Councils through voluntary contributions and local government rates.

Potential impacts on CVO as a result of the Mine Development include the following.

- Competition for skilled and semi-skilled workers, resulting in lower availability and higher costs for such workers for existing and potential businesses.
- Increased infrastructure utilisation, including power networks, rail and road transportation, water supply networks, etc resulting in reduced availability for existing and potential businesses.
- Increased demand for services, including specialist and general contracting firms,
- Increased demand for environmental resources.

The Applicant has consulted with CVO since 2014. Based on that consultation, the Applicant believes that CVO does not consider that the Mine Development would result in adverse impacts to CVO's operations.

The only other significant mining operation in the vicinity of the Mine Site is the Browns Creek Gold Mine, which is no longer in operation. The site is now operated as a horticultural processing facility and would not be adversely impacted by the Mine Development.

There are no other mining operations in the vicinity of the Mine Site that may be adversely impacted by the Mine Development.

Similarly, as the Mine Development is to be a stand-alone mining operation, no other industries or operations are dependent on the development of the resource other than the benefit to the Springvale mining operations and Mt Piper Power Station of transferring their surplus water to be used as the primary water source for this Proposal.

3.2 PERMISSIBILITY AND STRATEGIC PLANNING

3.2.1 Permissibility and Local Planning Matters

The Mine Site is located within the Blayney and Cabonne Local Government Areas and all land within the Mine Site is zoned RU1 – Primary Production (**Figure 8**).

Open cut mining is permissible within this zone under both LEPs.

Land adjacent to or in the vicinity of the Mine Site includes land zoned as follows under the Blayney LEP.

- RU2 – Rural Landscape (Blayney LEP).
- RU3 – Forestry (Blayney and Cabonne LEP).
- SP2 – Infrastructure (Blayney LEP).

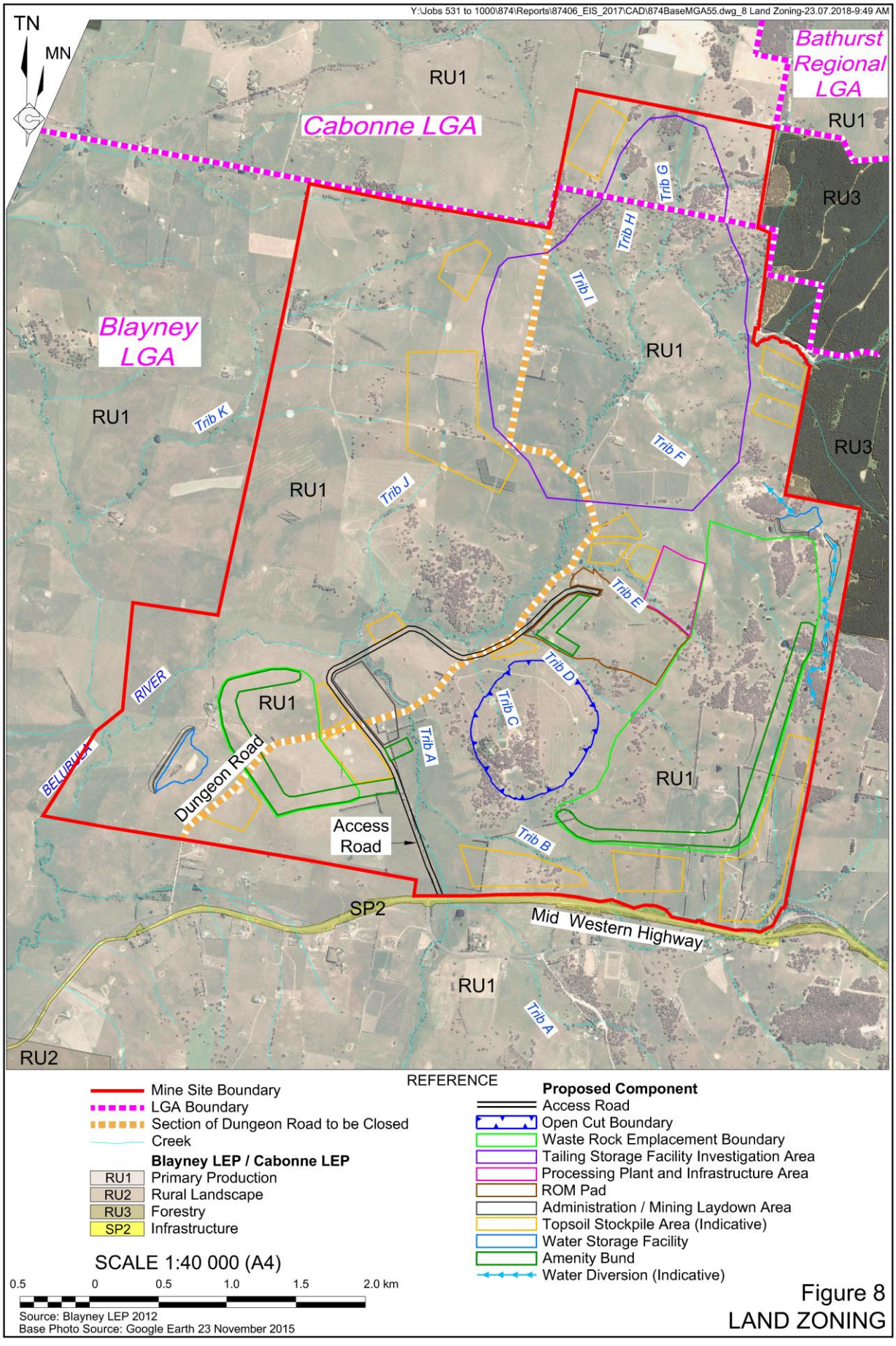


Figure 8
LAND ZONING

3.2.2 State and Regional Planning Matters

A range of State legislation, regulation and policies apply to the Mine Development. The following presents a brief overview of the principal State planning matters relevant to the Mine Development.

State Environmental Planning Policy (State and Regional Development) 2011

This SEPP was gazetted on 28 September 2011 and applies to all projects satisfying nominated criteria made following that date. One of the purposes of this SEPP is to define those developments of State significance and therefore require Ministerial approval under the provisions of the EP&A Act.

The Proposal would exceed the $30 million threshold identified under Clause 5(1)(c) of Schedule 1 of the SEPP and hence is designated as 'State Significant Development.'

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

This SEPP was gazetted on 17 February 2007 in recognition of the importance to NSW of mining, petroleum production and extractive industries. The SEPP specifies matters requiring consideration in the assessment of any mining development. The *Environmental Impact Statement* will provide a full assessment of all matters identified under the SEPP, including those identified in Parts 1, 3 and 4AA of the SEPP.

State Environmental Planning Policy (Infrastructure) 2007

This SEPP identifies, amongst other things, the matters to be considered in the assessment of development for and in the vicinity of particular types of infrastructure. In particular, the Applicant notes the following.

- Division 5 - Electricity supply.
  - Applications in relation to the supply of power for the Mine Development will be prepared and managed by the supply authority. As a result, this Division is not relevant.
- Division 17, Subdivision 2 – Development adjacent to road corridors
  - The EIS will demonstrate compliance with the requirements of Clauses 101 and 104 of the SEPP. In summary, however, the Applicant contends that:
    - the proposed access via the Mid Western Highway is the only practicable access to the Mine Site; and
    - the operation of the Mid Western Highway would not be adversely impacted by the Mine Development.
- Division 24 – Water supply systems.
  - This division applies only to public authorities.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

This SEPP identifies that hazardous or potentially hazardous industries may, without the implementation of appropriate impact minimisation measures, pose a significant risk to human health, life or property, or to the biophysical environment.

The Mine Development includes the use of cyanide for processing operations. A risk screening of the Mine Development undertaken in accordance with the document *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* will be presented in the *Environmental Impact Statement.*

State Environmental Planning Policy No. 44 – Koala Habitat Protection

This SEPP aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas. The Blayney and Cabonne LGAs identified in Schedule 1 of the SEPP and, as a result, the SEPP will be considered in the *Environmental Impact Statement.*

State Environmental Planning Policy No. 55 – Remediation of Land

This SEPP aims to promote the remediation of contaminated land. As all land within the Mine Site has been used for agricultural purposes, there is no contaminated land within the Mine Site and this SEPP is not relevant.

Other State-based legislation that will be addressed in the *Environmental Impact Statement* will include the following.

- *Mining Act 1992*
- *Protection of the Environment Operations Act 1997*
- *Water Act 1912*
- *Water Management Act 2000*
- *Roads Act 1993*
- *Heritage Act 1977*

3.2.3 Commonwealth Planning Matters

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) covers 'matters of national environmental significance'. The Applicant intends to refer the Mine Development to the Commonwealth Minister for the Environment to determine whether it represents a Controlled Action under the EPBC Act. If deemed a Controlled Action requiring approval under the EPBC Act, an application to invoke the bilateral agreement will be prepared to enable the assessment of any application under the EPBC Act to be undertaken concurrently with the assessment of the development application under the EP&A Act.

The Mine Development does not trigger the water trigger under the EPBC Act because it is neither a coal seam gas nor a large coal mine.

4. PROJECT RATIONALE AND ALTERNATIVES CONSIDERED

4.1 INTRODUCTION

In reviewing and assessing an application for a mining or other proposal, it is it important to understand the rationale behind the proposed activities. In this case the Proposal includes a mining operation that would, consistent with the objects of the *Mining Act 1992*, extract a State-owned resource for the benefit of the State, the community and the Applicant. This rationale is embodied in the Proposal's objectives identified in Section 1.2.

In addition, it is also important to demonstrate the process by which the Applicant has arrived at the final project description for which consent will be sought and the alternatives considered and rejected along the way. This will invariably involve multiple iterations of every component of the Proposal as additional information comes to hand.

The Applicant notes that the Proposal will continue to evolve during preparation of the EIS in response to:

- more detailed mine planning and scheduling;
- community consultation; and
- constraints identified by the specialist consultant team.

This section provides a brief overview of the rationale behind the various components of the Proposal and the alternatives considered to date and rejected. For convenience, the structure of this section mimics that of Section 2. The EIS will include a detailed rationale and justification of the proposed activities.

4.2 MINING OPERATIONS

Section 3.1 presents a description of the target resource. In summary, the resource is a large, low grade gold deposit exposed close to surface. The Applicant considered a range of mining methodologies and alternatives as part of its Preliminary Feasibility Study, including various underground and open cut mining scenarios. Based on that assessment, the Applicant determined that underground mining of the resource would not be feasible for the following reasons.

- The higher costs of underground mining (when compared to open cut mining), when taken in conjunction with the relatively low resource grade, would make underground mining non-viable.
- Substantial, lower grade sections of the resource would be sterilised, contrary to the object of the *Mining Act 1992* to ensure efficient development of mineral resources in NSW.

In light of the above, the Applicant contends that open cut mining is the only feasible mining method available.

4.3 WASTE ROCK MANAGEMENT

In preparing the design for the proposed waste rock emplacements the Applicant took into account the following.

- The total volume of waste rock anticipated to be produced throughout the life of the Mine Development.
- The characteristics of the waste rock to be produced, including the proportion of that material likely to be classified as potentially acid forming.
- The volume of material required to construct Mine Site infrastructure, including the tailings storage facility embankments, internal roads, hardstands, etc.
- Requirements to manage surface water within the Mine Site.
- Surrounding landforms, residence locations and publicly accessible vantage points.

In light of the above, the Applicant assessed numerous waste rock emplacement locations and designs, including designs that placed waste rock on the northern side of the Belubula River, immediately southeast and north of the proposed open cut. In each case, the alternative designs were rejected and the waste rock emplacement design presented in Section 2.4.3 is considered, based on available information, to be the optimal design.

4.4 PROCESSING OPERATIONS

4.4.1 Processing Methodology

Gold within the McPhillamys deposit typically occurs as fine free gold on the boundaries of other mineral grains/crystals or as occlusions within sulphide minerals. As a result, gravity separation and fine grinding of the sulphide minerals containing occluded gold has been identified as a low cost and effective method to optimise gold recovery.

Due to the nature of the gold within the orebody, the alternative processing method of flotation[4] would not achieve the required recoveries because the majority of the gold is not intimately bound up with sulphide minerals. As a result, that alternative was rejected. The Applicant's test work has identified that carbon-in-leach processing is, together with gravity separation and fine grinding, expected to recover approximately 85% of the contained gold. As a result, that alternative was rejected.

[4] Flotation is a mineral processing technique commonly used to recover valuable sulphide minerals. The ore is ground in slurry form and combined with flotation reagents. The flotation reagents cause the surface of the sulphide minerals to become hydrophobic (rejects water) allowing air bubbles to adhere to them and float them to the surface of the slurry from where they can be recovered. Flotation is used at Cadia Valley Operations because the style of mineralisation associated with those deposits is suitable for the processing methodology. Flotation is not suitable for many classes of mineral deposits.

4.4.2 Processing Plant Location

The Applicant considered various plant locations within the Mine Site and considers the proposed location the most suitable as it provides surrounding residences the greatest buffer to any potential noise, dust and other impacts and minimises the impact on existing natural drainage systems.

4.5 TAILINGS MANAGEMENT OPERATIONS

Following completion of processing operations, the remaining tailings must be placed into a suitably designed storage facility. The Applicant investigated a range of potential locations and designs for that facility. Alternatives considered and rejected included:

- valley-fill facilities[5] to the north and south of the proposed facility; and
- turkeys-nest facilities[6] to the west, north and east of the proposed facility.

The proposed tailings storage facility investigation area was determined to be the most appropriate for the following reasons.

- It provided the most suitable engineering option with respect to floor and wall construction.
- It minimised the surface area disturbance while still allowing for the design settling rate to be achieved.
- It provided the best option in terms of minimising visual impact to nearby residents.

The Applicant notes that the design of the proposed tailings storage facility will continue to be developed during preparation of the EIS in response to:

- more detailed hydrogeological and geotechnical studies;
- community consultation; and
- constraints identified by the specialist consultant team.

The Applicant anticipates that the final tailings storage facility will be approximately 260ha**.**

4.6 TRANSPORTATION OPERATIONS

4.6.1 Mine Site Access and Dungeon Road

The Applicant engaged with the surrounding community, Blayney Shire Council and Roads and Maritime Service during the initial planning stages for the Mine Development and preparation of this document. In preparing for those discussions, the Applicant formed the opinion that using Dungeon Road to access the Mine Site from Mid Western Highway would not be appropriate for the following reasons (**Figure 3**).

- Access via the southern end of Dungeon Road would impact on residents located on Dungeon Road near to Mid Western Highway.

[5] A valley-fill tailings storage facility is one where natural topography forms one or more walls of the facility.
[6] A turkeys-nest facility is one where all sides of the facility are engineered structures or embankments.

- The entrance to Dungeon Road near to Mid Western Highway is currently narrow and includes a number of culverts and creek crossings that would require substantial reconstruction to permit safe use by the class of vehicles that would be used.
- Continued use of Dungeon Road in its current form would interfere with the proposed location of site infrastructure and constrain development of the Tailings Storage Facility.

Initial consultation identified different options as to whether Dungeon Road should be closed or realigned. The need and design of any realigned section of Dungeon Road would be the subject of further consultation with surrounding residents and Council.

4.6.2 Mine Site Entrance

In selecting a suitable location for the Mine Site entrance, the Applicant has balanced the need to provide appropriate sight distances and road safety standards with the most efficient and cost-effective design of the intersection. The Applicant considered an alternative location in the southeastern section of the Mine Site, however, that option was rejected because it was too far from the proposed administration and mining laydown area.

The Applicant contends that the proposed site entrance location provides an optimal safe location for the Mine Site entrance, subject to further consultation with residents, Council and the Roads and Maritime Service.

4.7 WATER MANAGEMENT

4.7.1 Avoidance of Surface Water Impacts

The Applicant investigated a substantial range of site layout and surface water management options to ensure; impacts on existing natural drainage were minimised, and appropriate separation of the various classes of water as identified in Section 2.8.1. The following presents a brief overview of options considered and the rationale behind the proposed site layout.

- Tailings storage facility.

  The tailings storage facility investigation area has been located as close as practicable to the headwaters of the catchment to minimise the need for diversion of watercourses.
- Minimising impacts on the Belubula River.

  Infrastructure has, wherever practicable, been positioned to minimise impacts on the River or its tributaries so as to minimise the need for diversion of water.

Further justification of the final layout will be provided in the EIS.

4.7.2 Operational Water Supply

The estimated volumes of groundwater and surface water in the vicinity of the Mine Site are on a standalone basis inadequate for the purpose of an operational water supply to the Proposal.

In providing a solution to the operational water supply, numerous alternatives were assessed and pursued. Two options currently exist for the operational water supply for the Mine Development. Both require the construction of a water transfer pipeline, with the preferred option from Centennial's Angus Place and Springvale Coal Services Operations and Energy Australia's Mt Piper power station operations near Springvale. The second option would be to source water from groundwater aquifers in the Lachlan Upper Alluvium Zone 2 near Cowra, which the Applicant holds licences for.

A third alternative, namely use of the recycled and treated effluent from Bathurst Regional Council, was assessed but the Council were unwilling to make a decision to proceed with this.

A significant advantage of the preferred alternative of the water supply being piped from Springvale is that:

- the water is surplus to the requirements of the Springvale Joint Venture (Centennial Coal);
- it reduces the need for Energy Australia to crystallise brine water; and
- eliminates that water being discharged into the Sydney catchment.

To utilise that water for the Proposal the Applicant proposes to construct the Water Transfer Pipeline from Springvale to the Mine Site. The Pipeline Development is described in *McPhillamys Pipeline Development – Preliminary Environmental Assessment* presented in **Appendix 1.**

The Applicant will continue to consult with interested parties and agencies with regard to the Pipeline Development throughout preparation of the EIS and the results of that consultation will be presented in the EIS.

5. PRELIMINARY ENVIRONMENTAL ASSESSMENT

5.1 INTRODUCTION

This section provides a brief overview of the regional context of the Mine Development, as well as a preliminary assessment of the anticipated impacts of the proposed activities, the management commitments that the Applicant would implement to minimise those impacts and the anticipated studies that have been or will be commissioned to assess the anticipated impacts. The order in which issues are presented in this section broadly reflects the significance or risk ranking of each based on the Applicant's understanding at the time of finalisation of this document. The level of information presented in this section reflects the work that has been completed to date and additional information will be presented in the EIS.

5.2 REGIONAL CONTEXT

5.2.1 Introduction

This subsection provides a brief overview of the regional context of the Mine Development to enable relevant government agencies and interested community members to develop an understanding of the environment surrounding the Mine Site. This information provides context for the preliminary impact assessments presented in the subsequent subsections.

5.2.2 Topography

5.2.2.1 Regional Topography

The Mine Site is located on the western slopes of the Great Dividing Range (**Figure 9**). The most significant regional topographic feature is Mt Canobolas with an elevation of 1,395m AHD, located approximately 35km to the west-northwest of the Mine Site. Other significant topographic features include:

- Mt Bulga (1,062m AHD) – located approximately 29km to the northwest of the Mine Site.
- Crackerjack Rock (967m AHD) – located approximately 14km to the northeast of the Mine Site.
- Mt Macquarie (1,204m AHD) – located approximately 24km to the southwest of the Mine Site.

5.2.2.2 Local Topography and Drainage

Topography immediately surrounding the Mine Site tends to be undulating, with rolling hills with maximum elevations typically between 900m AHD and 1,000m AHD and open valleys. Slopes are typically moderate to gentle (**Figure 10**). North of the Vittoria Road, there are a number of steeply incised valleys associated with Ragans, Swallow and Oaky Creeks. To the east of the Mine Site, a north-south orientated ridgeline forms the catchment divide between the Macquarie and Lachlan Catchments. To the southwest of the Mine Site and south of Blayney, an unnamed hill has a maximum elevation of 1,058m AHD.

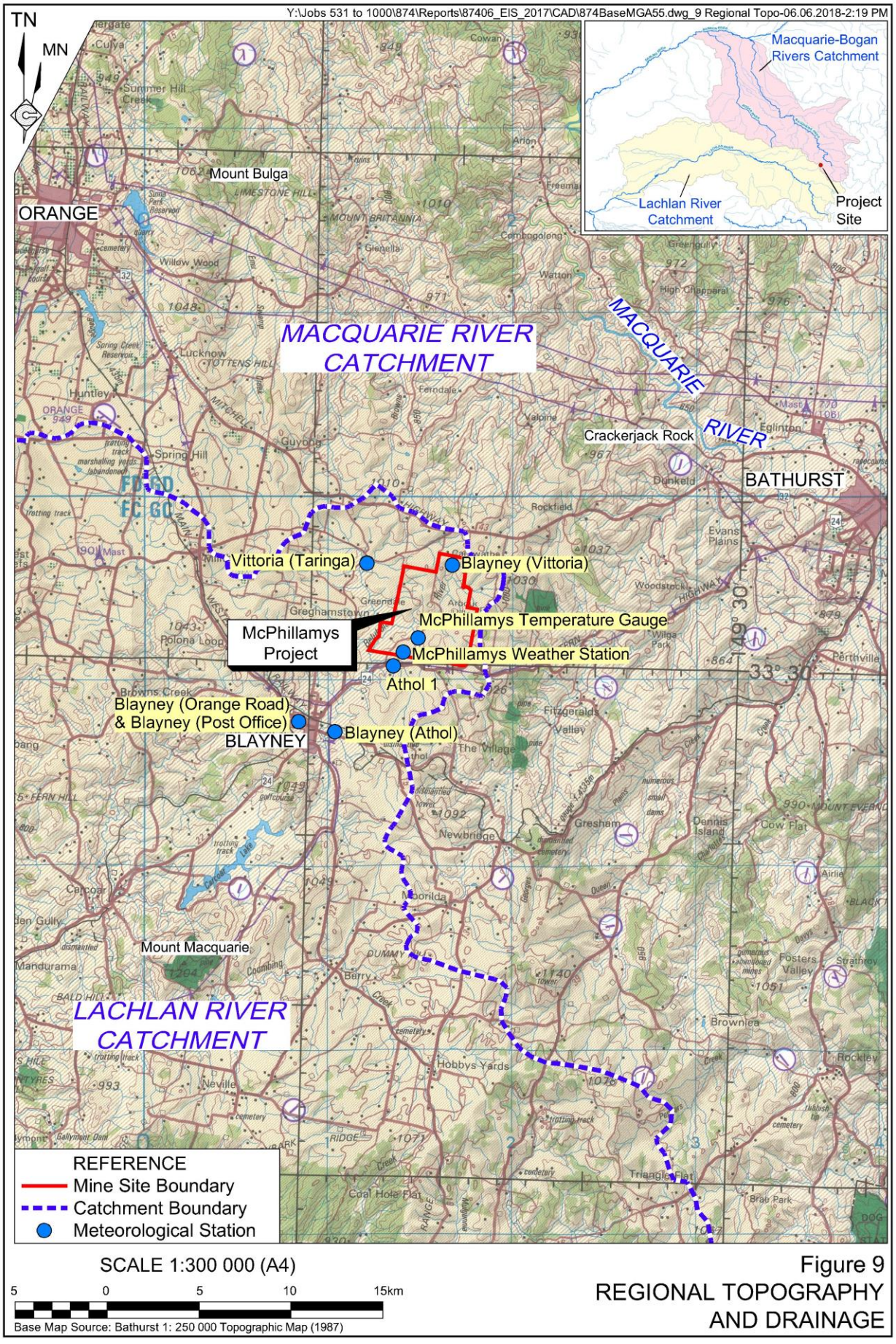


Figure 9
REGIONAL TOPOGRAPHY AND DRAINAGE

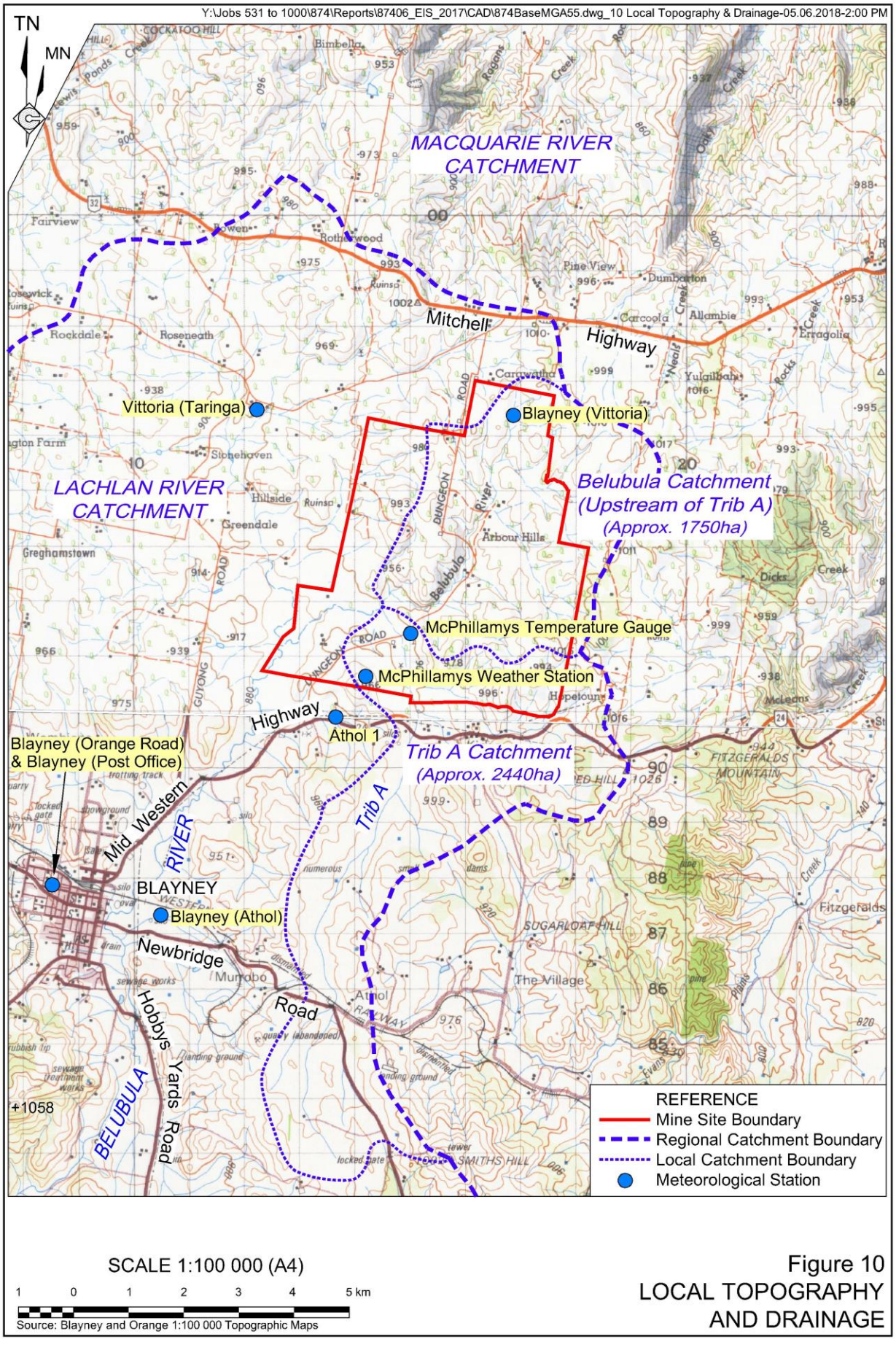


Figure 10
LOCAL TOPOGRAPHY AND DRAINAGE

5.2.2.3 Mine Site Topography and Drainage

Topography within the Mine Site is dominated by a series of rounded hills with maximum elevations ranging between 920m AHD and 980m AHD (**Figure 11**). Valleys between the hills are typical open, with slopes varying between 1:50 (V:H) and 1:10 (V:H), increasing to up to 1:4 (V:H) on sides of the more substantial hills. Areas with slopes of less than 1:50 (V:H) are typically associated with flood plains to the Belubula River and associated tributaries.

Drainage of the highly modified agricultural land is characterised by topographical depressions providing drainage pathways comprising overland flows and ephemeral streams with only the downstream sections of the Belubula River exhibiting flow, pools or standing water between rainfall events.

5.2.3 Climate

5.2.3.1 Temperature

The Applicant has established a climate station at the Mine Site and has available sources of climatic data from nearby meteorological stations. The EIS will determine the most appropriate reference points for analysis of the climatic data, however as a preliminary reference, temperature data sourced from Data Drill[7] is provided in **Table 7**.

Table 7
Mean Monthly Temperature

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Temperature (C°)													
Mean maximum temperature	26.7	25.9	23.2	18.7	14.1	10.5	9.5	11.1	14.5	18.3	21.7	24.9	**18.2**
Mean minimum temperature	12.1	12.1	9.7	6.0	2.8	1.3	0.2	0.9	2.8	5.4	7.8	10.3	**5.9**
Source: Data Drill (Hydro Engineering and Consulting Pty Ltd)													

5.2.3.2 Rainfall and Evaporation

Long-term rainfall and evaporation data in the vicinity of the Mine Site is available from six Bureau of Meteorology-operated stations (**Figure 10** or **11** and **Table 8**).

Table 9 presents the rainfall and evaporation sourced from Data Drill data which sources the stations identified in **Table 8**.

[7] Data Drill is a system which provides synthetic data for a specified point in Australia by interpolation between surrounding point records held by the Bureau of Meteorology. Refer to https://legacy.longpaddock.qld.gov.au/silo/datadrill/.

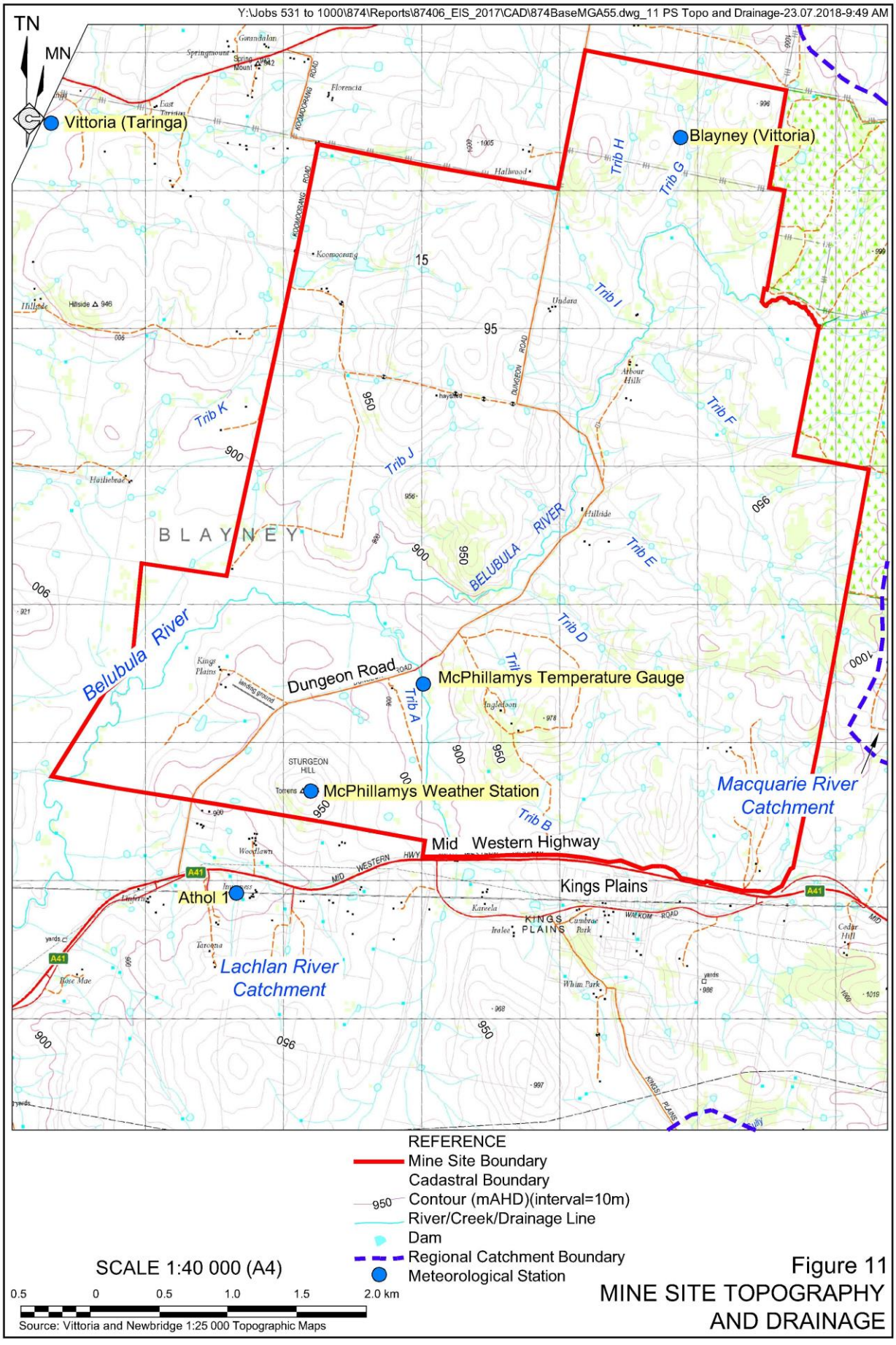


Figure 11
MINE SITE TOPOGRAPHY AND DRAINAGE

Table 8
Bureau of Meteorology Stations – Rainfall

Station Number	Station Name	Location		Elevation (m AHD)	Period of Record
		Latitude	Longitude		
063258	Athol 1	-33.5000	149.3000	Unknown	1879 – 1930
063279	Blayney (Athol)	-33.5330	149.2667	870	1885 – 1901
063294	Blayney (Orange Road)	-33.5284	149.2454	880	1990 – present
063010	Blayney (Post Office)	-33.5350	149.2600	863	1885 – 1992
063086	Blayney (Vittoria)	-33.4500	149.3333	975	1902 – 1977
063129	Vittoria (Taringa)	-33.4500	149.2833	910	1962 – 1977
Source: Hydro Engineering and Consulting Pty Ltd					

Table 9
Mean Monthly Rainfall and Evaporation

Month	Rainfall DataDrill 1889 - present	Evaporation DataDrill
January	65.3	209
February	55.9	164
March	53.9	139
April	46.9	83
May	50.5	51
June	61.4	31
July	62.3	34
August	65.1	54
September	58.7	85
October	65.9	126
November	58.2	159
December	61.9	202
Annual	**706.0**	**1,337**
Source: Data Drill (Hydro Engineering and Consulting Pty Ltd)		

Rainfall in the vicinity of the Mine Site is generally associated with frontal systems in winter and depressions in summer and autumn months. Rainfall is generally higher during winter months and is strongly influenced by topography with average rainfall being higher in more elevated areas.

5.2.3.3 Wind Speed and Direction

Figure 12 illustrates wind roses sourced from the onsite weather station (**Figure 10**) for the period June 2013 to December 2016. In summary, winds are typically from the east or the west, with easterly winds more common in the warmer months, while westerly winds are more common in the colder months. The average recorded wind speed ranging from 5.9m/s to 6.3m/s, while the frequency of calm conditions (wind speeds less than 0.5 m/s) occurring less than 0.1% of the time. This data indicates that winds, including winds with speeds greater than 3m/s (10.8km/h) are a common feature of the environment. This would influence the noise and air quality impacts experienced by surrounding residents.

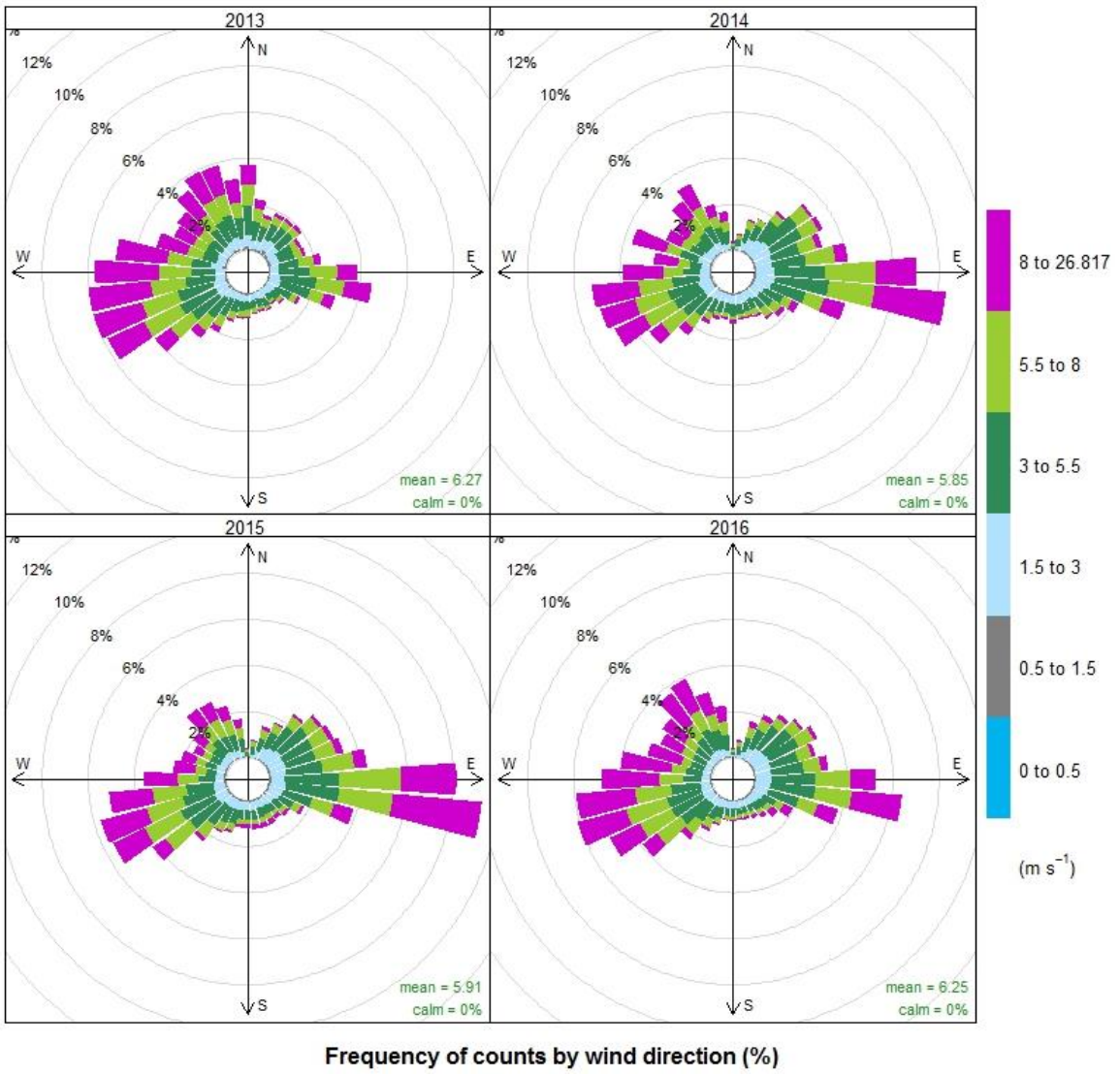


Figure 12
Annual Wind Roses

Source: Ramboll

5.2.4 Land Ownership, Residences and Land Use

5.2.4.1 Land Ownership and Residences

The Applicant owns or holds an option to purchase all freehold land required for the Proposal (**Figure 13)**. **Figure 13** also presents the location of surrounding residences.

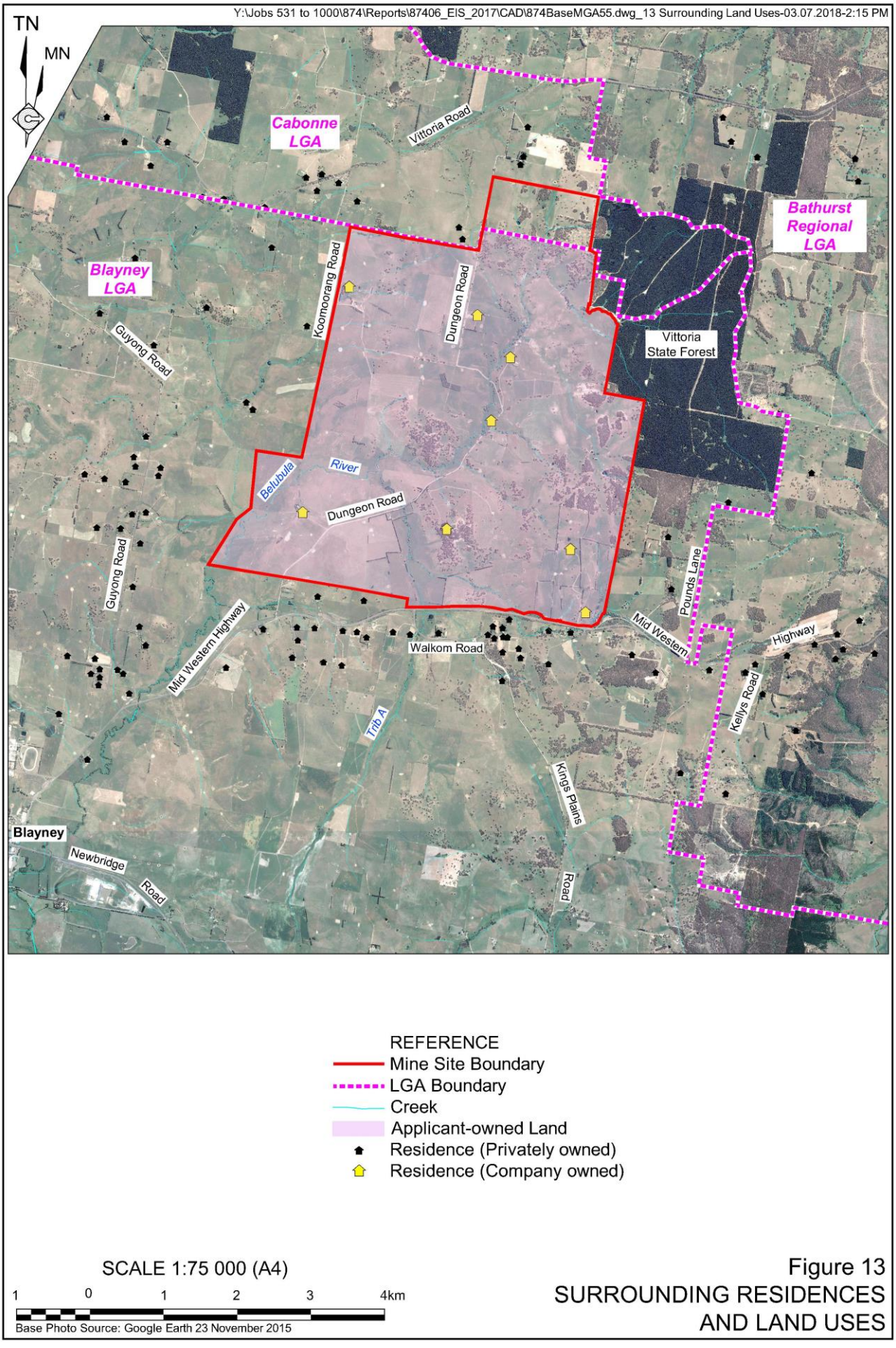


Figure 13
SURROUNDING RESIDENCES AND LAND USES

5.2.4.2 Surrounding Land Uses

Figure 13 presents the local setting which is predominantly rural. Land uses surrounding the Mine Site include the following.

- Agriculture – primarily grazing of cattle, sheep and more recently goats, with limited dry cropping, including residences.
- Forestry – to the northeast of the Mine Site.
- Rural residential – including within Kings Plains to the south of the Mine Site and along Guyong Road to the west of the Mine Site.
- Residential and industrial – associated with the town of Blayney, approximately 8km to the southwest of the Mine Site.
- Transport – associated with the Mid Western Highway, a State Road, immediately to the south of the Mine Site and local roads including Dungeon, Vittoria and Guyong Roads and Pounds Lane.

5.3 SURFACE WATER

5.3.1 Introduction

The Applicant has engaged EMM and HEC to complete the surface water assessment for the Mine Development. The following subsections have been prepared based on information provided by EMM and HEC for inclusion in this document.

5.3.2 Existing Environment

The Mine Site is located in the headwaters of the unregulated Belubula River which flows from northeast to southwest through the Mine Site (**Figures 9** to **11**). The Belubula River is a tributary of the Lachlan River which terminates in the Great Cumbung Swamp near the banks of the Murrumbidgee River to the North East of Balranald – it rarely flows into the Murrumbidgee River which in turn flows to the Murray River.

A substantial number of unnamed tributaries flow into the Belubula River. For the purpose of this application, these are referred to as Trib A to Trib K (**Figure 11**), with Trib A and Trib B combined being the most substantial of these with a catchment area of approximately 2,440ha. By comparison, the Belubula River at the confluence with Trib A has a catchment area of approximately 1,750ha.

Carcoar Dam is located on the Belubula River approximately 26km downstream or to the southwest of the Mine Site (**Figure 9**). The Dam has a catchment area of approximately 23,000ha and a storage capacity of approximately 35.8GL. The Dam is used primarily for regulated releases for environmental, irrigation, stock and domestic purposes. Some regulated river licences are available downstream of Carcoar Dam on the Belubula River.

The Applicant has established a detailed groundwater and surface water monitoring network, in accordance with relevant guidelines and policies, and has undertaken a substantial water quality and level monitoring program within and surrounding the Mine Site. The monitoring network has

been reviewed by the NSW Government in the Groundwater Monitoring and Modelling Plan (GMMP), prepared for the site. The results of the program are currently being modelled and assessed by EMM and HEC and will be summarised within the EIS. In addition, the Applicant notes that there are two stream gauging stations on the Belubula River downstream of the Mine Site.

The Mine Site is located within the area covered by the following Water Sharing Plans.

- *Water Sharing Plan for the Belubula Regulated River Water Source 2012*.
  - Belubula Regulated River Water Source.
- *Water Sharing Plan for the Lachlan Unregulated Rivers and Alluvial Groundwater Sources 2012.*
  - Belubula River Upstream Carcoar Unregulated River Water Source.

5.3.3 Potential Impacts

Potential Mine Development related impacts on the surface water environment include the following.

- Potential for reduced water quality associated with an unplanned discharge or leakage of process, mine or untreated dirty (sediment-laden) water.
- Marginally reduced water flows as a result of a reduction in the water run off in the catchment area reporting to local watercourses.
- Changed hydrological processes.

5.3.4 Management Commitments

The Applicant would construct and operate the surface water management structures described in Section 2.8.2. In addition, the Applicant would also implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development related impacts on surface water. The EIS will provide a comprehensive range of surface water related management commitments.

- Ensure that best-practice erosion and sediment control measures are implemented at all stages throughout the life of the Mine Development.
- Ensure that appropriate measures are implemented during construction operations to limit the potential for discharge of dirty water. These would include the following.
  - Construction of structures to permit clean water to flow through disturbed areas without becoming contaminated with sediment.
  - Implementation of protocols that would ensure that work areas are stabilised in a timely manner to account for rain events.
- Ensure that water accumulated within sediment basins is either pumped to the raw water dam or treated and tested prior to discharge in accordance with the relevant guidelines.

- Implement a self-auditing program and retain a record of inspections identifying the performance of surface water design features, general erosion and drainage conditions throughout the life of the Mine Development.
- Implement a comprehensive surface water monitoring program as part of an overarching *Water Management Plan* and ensure that monitoring data is made publicly available once reviewed and verified.
- Ensure that appropriate surface water allocation licences and approvals are obtained.
- Ensure that adaptive environmental management practices are implemented in the event that monitoring or site inspections identify potential or actual impacts to the surrounding surface water environment.

5.3.5 Proposed Assessment

EMM and HEC propose to complete the following surface water assessments. The resulting reports will be presented in full in the Specialist Consultant Studies Compendium (SCSC) that will accompany the EIS.

- A Site Water Balance, including:
  - an operational site water balance, comprising forecast water management system performance including site water inventory, in-pit water volumes, water supply security, dam sizing, pump sizing and discharge risk; and
  - a post closure water balance, comprising forecast void water level and expected water quality.

  The site water balance modelling will assume a range of climatic conditions, including dry, wet and average rainfall.
- A Surface Water Quality Assessment, including:
  - an overview of the existing surface water quality;
  - an assessment of potential impacts; and
  - recommendations for additional mitigation methods and water quality monitoring/investigations.
- A Surface Water Flow and Geomorphology Assessment, including the following.
  - A description of
    - the climate, including seasonal and historic annual variations;
    - surrounding land use; and
    - flow and fluvial characteristics and their importance to catchment yield and significance to water supply for watercourses within the Mine Site.
  - An assessment of impacts to downstream water users (including Lake Carcoar).
- A Flooding Assessment, including a description of flood conditions and identification of potentially flood prone land.

5.4 GROUNDWATER

5.4.1 Introduction

The Applicant has engaged EMM to complete the groundwater assessment for the Mine Development. The following subsections have been prepared by RWC and EMM for inclusion in this document.

5.4.2 Existing Environment

The regional and deposit-scale geological setting is described in Sections 3.1.1 and 3.1.2. The following describes the hydrogeological setting of the Mine Site.

The hydrogeology surrounding the Mine Site is dominated by the Palaeozoic metamorphic rocks of the eastern Lachlan Fold Belt. The dominant structure influencing groundwater flow is the Godolphin-Copperhania Fault Zone (**Figure 5**). Regional groundwater flow is from northeast to southwest, generally coincident with surface drainage. Local variations in groundwater flow are driven by topography, faulting and discharge zones.

The groundwater system is recharged locally by the percolation of rainfall and leakage from surface watercourses. Groundwater discharge occurs via evapotranspiration, spring flow, and contributions to surface watercourses (baseflow). Alluvial deposits along the creek banks and drainage lines provide temporary groundwater storage following rainfall and a delayed source of baseflow.

Within the Mine Site, there are three primary groundwater systems:

- shallow alluvial deposits along the Belubula River and some of the unnamed tributaries;
- fracture networks within the Silurian Anson Formation; and
- permeable parts of the weathered zone (saprock).

A narrow corridor of Quaternary alluvium is present along the narrow banks of the Belubula River and in some sections along the unnamed tributaries. Exploratory drilling has identified shallow (maximum depth of 3m) and disconnected alluvial deposits within the Mine Site. The extent of this alluvium is not sufficient to support useful aquifers.

The Silurian Anson Formation comprises a basal conglomerate overlain by calcareous sediments and carbonates. The volcanics, volcaniclastics and siltstones that unconformably overlie these sediments have a low primary porosity. Groundwater storage is predominantly within the secondary porosity associated with fractures and faulting. However exploratory drilling and testing has only identified marginal groundwater yields decreasing with depth of cover.

The weathered zone is poorly developed within and surrounding the Mine Site. The base of weathering occurs between 20m and 50m below surface. Parts of the weathered zone are saturated and form marginal aquifers.

The Mine Site is located within the area covered by the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011* - Lachlan Fold Belt MDB Groundwater Source.

5.4.3 Potential Impacts

Potential Mine Development-related impacts on the groundwater environment include the following.

- Changed groundwater quantity, including changes to groundwater levels/pressures, flow and storage in the immediate vicinity of the mine.
- Changed groundwater quality, including changes in salinity (i.e. salt balance), and concentrations of other important water quality parameters (such as pH, major cations and anions and dissolved metals) or contamination.
- Adverse impacts on the following sensitive receivers as a result of the above.
  - Neighbouring landholders and water users.
  - Belubula River and associated tributaries and aquatic ecosystems.
  - Terrestrial riparian vegetation.
  - Groundwater springs and associated ecosystems.

5.4.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development-related impacts on groundwater. The EIS will provide a comprehensive range of groundwater-related management commitments.

- Construct and use suitable hydrocarbon, reagent and chemical storage, transfer and use facilities and ensure that the risk of spills of such materials is minimised to the greatest extent practicable.
- Construct all tailings and process and mine water storages in a manner that would minimise the potential for discharge of contaminated water to underlying aquifers.
- Meter the volume of water removed from the proposed open cut and any surrounding production bores and ensure that appropriate groundwater allocation licences and approvals are obtained.
- Monitor groundwater levels/pressure and quality within a range of on and off-site bores, including at surrounding private bores and dedicated monitoring bores.
- Implement procedures to ensure continued water supply to water users whose access may be compromised by the proposed Mine Development (make good strategies as required by the NSW Aquifer Interference Policy (AIP) 2012).

5.4.5 Proposed Assessment

EMM propose to complete the following groundwater assessment. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Develop a conceptual groundwater model based on a review of the local and regional geology and hydrogeology, baseline groundwater monitoring in 23 bores, a survey of groundwater springs within and surrounding the Mine Site and a bore census. The conceptual groundwater model will provide the framework for the subsequent groundwater assessment.
- Develop a numerical groundwater model calibrated to observed aquifer properties. The model will simulate groundwater impacts based on steady state (existing), construction, operation and closure phases of the Mine Development. The Model will take into account a number of statistical scenarios to predict the level of impact at each of the identified phased of the Mine Development. Model predictions will inform project-related commitments to risk mitigation and management.

In addition, the Applicant would ensure that the following is implemented at key points during the groundwater assessment.

- Regulator and community stakeholder engagement at relevant stages throughout the assessment.
- Ensure that risk mitigation and management commitments are discussed and agreed in principal with the relevant agencies prior to EIS submission.

5.5 BIODIVERSITY

5.5.1 Introduction

The Applicant has engaged EnviroKey Pty Ltd (EnviroKey) to complete the biodiversity assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by EnviroKey.

5.5.2 Existing Environment

5.5.2.1 Introduction

EnviroKey have undertaken field surveys on seven occasions since 2013. Field data was collected in accordance with the methods outlined within the BioBanking Assessment Methodology of the Framework for Biodiversity Assessment (FBA). At each survey site, a 50m x 20m plot combined with a 50m step point transect was surveyed in accordance with the relevant methodology. A study area which coincides with the Mine Site (Biodiversity Study Area) was also traversed on foot using the random meander method and by vehicle to maximise the opportunity of detecting significant or sparsely distributed flora species and vegetation communities. EnviroKey state that this enabled almost all patches of vegetation to be inspected.

The following presents a necessarily brief overview of the outcomes of the field assessments within the Mine Site undertaken by EnviroKey.

5.5.2.2 Flora

A total of 104 flora species have been recorded within the Biodiversity Study Area, comprising 62 native species and 42 exotic species. EnviroKey state that despite extensive searches within the Ecology Study Area at appropriate times of year for detectability, no threatened flora species have been identified.

Vegetation Communities

Four vegetation communities or Plant Community Types (PCTs) have been identified within the Biodiversity Study Area.

- PCT 951 Mountain Gum – Manna Gum Open Forest of the South Eastern Highlands.
- PCT 727 Broad-leaved Peppermint – Brittle Gum – Red Stringybark Dry Open Forest on the South Eastern Highlands.
- PCT 654 Apple Box - Yellow Box Dry Grassy Woodland of the South Eastern Highlands.
- PCT 1375 Wet tussock grasslands of cold air drainage areas of the tablelands.

Where appropriate, PCTs have been split into sub-types based on presence or absence of the over-storey canopy and the condition of the groundcover layer. These subtypes include medium – good and low condition in accordance with the Biodiversity Assessment Methodology criteria.

Two further vegetation communities with no equivalent PCT classification have also been identified, namely Radiata Pine Plantation and Cleared Land. **Figure 14** presents the distribution of each vegetation community within the Ecology Study Area.

Of the identified vegetation communities, two may be classified as Endangered Ecological Communities under the NSW *Biodiversity Conservation Act 2016*, with one also classified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (**Table 10**).

Table 10
Endangered Ecological Communities

PCT	Vegetation type name	TSC Act	EPBC Act
PCT 654	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands	White Box Yellow Box Blakely's Red Gum Woodland. Endangered	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Critically Endangered
PCT 951	Mountain Gum - Manna Gum open forest of the South Eastern Highlands	Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions. Endangered	
Source: EnviroKey.			

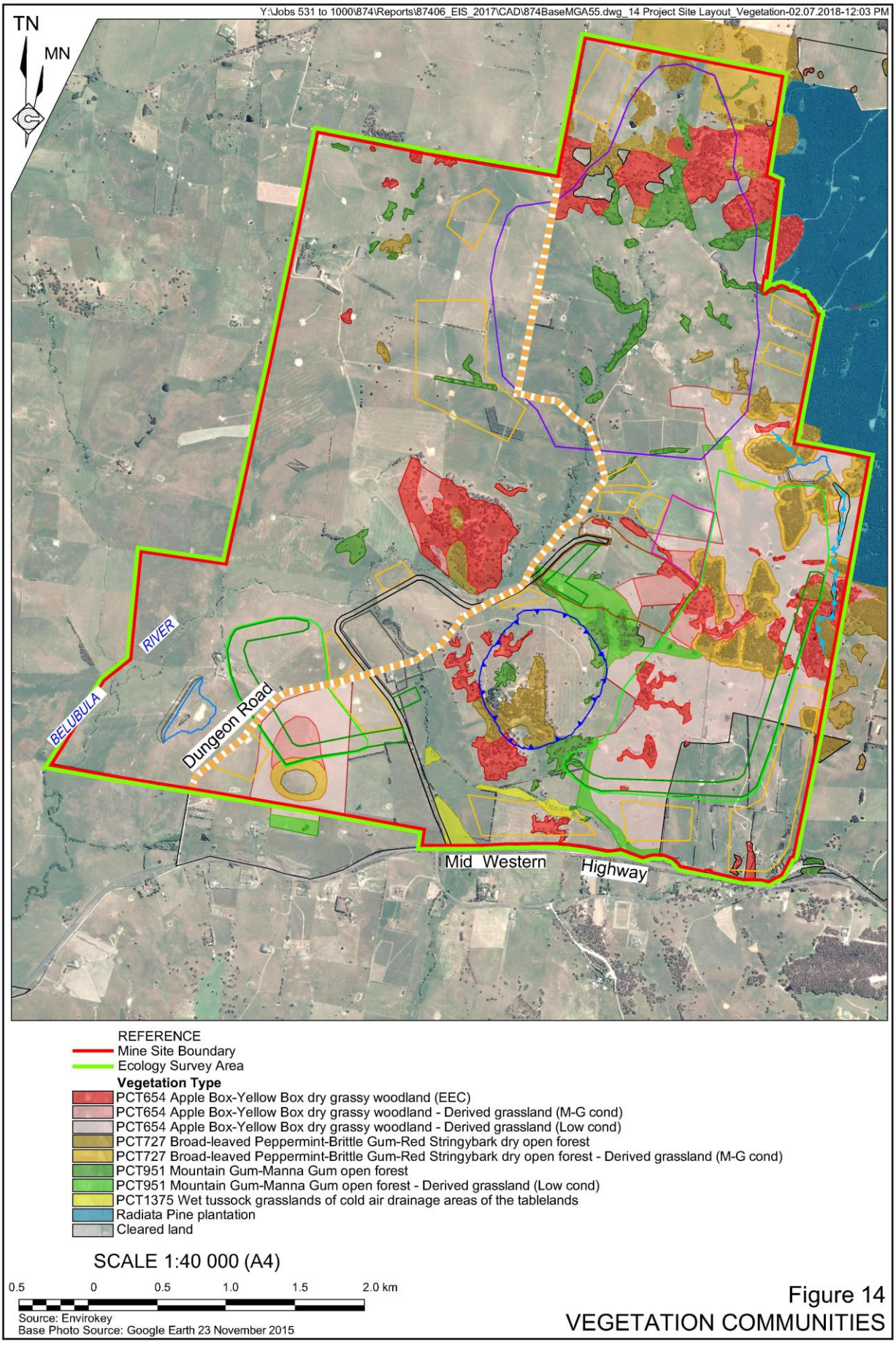


Figure 14
VEGETATION COMMUNITIES

5.5.2.3 Fauna

EnviroKey state that extensive field surveys across the Biodiversity Study Area and surrounds detected 159 species of fauna, including the following.

- 113 species of bird (including five introduced species)
- 11 species of frog
- 10 species of reptile
- 25 species of mammal (including five introduced species)

The following 12 species listed under the BC Act and EPBC Act were identified within the Ecology Study Area.

- Flame Robin (*Petroica phoenicea*), Vulnerable TSC Act
- Scarlet Robin (*Petroica boodang*), Vulnerable TSC Act
- Superb Parrot (*Polytelis swainsonii*), Vulnerable TSC Act and EPBC Act
- Diamond Firetail (*Stagonopleura guttata*), Vulnerable TSC Act
- Little Eagle (*Hieraaetus morphnoides*), Vulnerable TSC Act
- Black-chinned Honeyeater (*Melithreptus gularis*), Vulnerable TSC Act
- Varied Sittella (*Daphoenositta chrysoptera*), Vulnerable TSC Act
- Squirrel Glider (*Petaurus norfolcensis*), Vulnerable TSC Act
- Eastern Bentwing-bat (*Miniopterus orianae oceanensis*), Vulnerable TSC Act
- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), Vulnerable TSC Act
- Latham's Snipe (*Gallinago hardwickii*), Migratory EPBC Act
- Rainbow Bee-eater (*Merops ornatu*s), Migratory EPBC Act

5.5.2.4 Habitat

EnviroKey identified the following general habitats with the Biodiversity Study Area.

- Exotic Grassland/Cleared Land – approximately 2,757ha.
- Woodland/Forest – approximately 429ha.
- Native Grassland – approximately 278ha.

In addition, a 530 hollow-bearing trees containing 861 hollows were identified within the Biodiversity Study Area.

5.5.2.5 Riparian Condition

EnviroKey undertook an assessment of the riparian habitat associated with the Belubula River using the Rapid Assessment of Riparian Condition methodology which returned a score of less than 25 for all sites assessed, indicating very poor condition.

5.5.3 Potential Impacts

Potential Mine Development-related impacts on biodiversity within and surrounding the Mine Site include the following.

- Potential loss of vegetation and habitat that would result in an impact on a species or vegetation community listed under NSW or Commonwealth legislation.
- Potential fragmentation or isolation of habitat that is important to the long-term survival of the species or ecological community in the locality.
- Potential to increase the impact of a key threatening process.

5.5.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development-related impacts on biodiversity.

- Identify the limit of approved disturbance areas on the ground through the use of permanent markers and ensure that all ground disturbing activities are only undertaken within approved areas.
- Ensure that vegetation is removed in such a way to avoid damage to surrounding vegetation.
- Undertake a pre-clearing inspection to identify and, where practicable, remove nesting or roosting fauna.
- Stockpile vegetation onsite where practicable for use during rehabilitation operations. Larger vegetation may be retained whole for use in rehabilitation operations on site or for regional biodiversity enhancement programs such as re-snagging of rivers.
- Undertake weed management and pest control programs in consultation with surrounding landholders.
- Undertake progressive rehabilitation.

In addition, the Applicant would implement a Biodiversity Offset Strategy in the form of a Biodiversity Stewardship Site(s), or through contribution to the Biodiversity Conservation Fund to retire equivalent biodiversity credits to those generated by the proposed disturbance

5.5.5 Proposed Assessment

EnviroKey propose to complete the following biodiversity assessment. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Review the impact minimisation and mitigation measures nominated by Regis, review the impact of any residual impacts and identify any additional impact mitigation or management measures which could be applied.
- Determine the areas of each vegetation community and habitat area to be disturbed and undertake tests of significance in accordance with Section 7.3 of the BC Act.

- Calculate the number of biodiversity credits generated by the proposed disturbance footprint which require retirement in accordance with the BC Act.

  With the implementation of the Biodiversity Assessment Methodology following enactment of the BC Act, the Applicant submitted an application to apply the transitionary arrangements under the Act for the biodiversity assessment. Approval to apply the transitionary arrangements was subsequently received and calculation of biodiversity credits will continue to follow the FBA. An application for reasonably equivalent biodiversity credits under the Biodiversity Assessment Methodology required by the BC Act will be made following confirmation of the offset obligation, i.e. following determination of the Proposal.[8]

- Should a referral to the Commonwealth Minister for the Environment determine the Proposal to represent a Controlled Action, EnviroKey will also complete assessment necessary to assess the impact against the requirements of the EPBC Act, including the calculation of an appropriate offset.

  The requirement to retire any offset liability separately to offsetting obligations under NSW legislation will be reviewed in consultation with the DPE, OEH and Commonwealth DEE.

5.6 HERITAGE

5.6.1 Introduction

The Applicant has engaged Navin Officer Heritage Consultants Pty Ltd (Navin Officer) to undertake the initial heritage assessment for the Mine Development. Peer reviews of the work of Navin Officer have been undertaken by Dr Matt Cupper of Landskape Natural and Cultural and Heritage Management and Dr Tim Stone. The following subsections have been prepared by RWC based on information provided by each of the above.

5.6.2 Existing Environment

5.6.2.1 Consultation with the Aboriginal Community

Navin Officer on behalf of the Applicant have undertaken consultation with the Aboriginal community in accordance with the requirements of *Aboriginal cultural heritage consultation requirements for proponents 2010.* In summary, the consultation undertaken to date may be summarised as follows.

- Stage 1 – notification of project proposal and registration of interest.

  An advertisement was placed on 17 November 2016 in the Central West Daily (Orange) and the Blayney Chronicle and letters were sent to the relevant organisations on the same day. The Orange Local Aboriginal Land Council were the only party to respond.

[8] It is noted that the biodiversity aspects of the Pipeline Development will be assessed in accordance with the Biodiversity Assessment Methodology, including both the impact and offsetting components, The Applicant anticipates that a single biodiversity offset arrangement will be implemented for both the Mine and Pipeline Developments.

- Stage 2 – presentation of information about the proposed project.

  Methodology and cultural information request was sent to registered groups on 7 March 2017. No responses were received.

- Stage 3 – gathering information about cultural significance.

  Orange Local Aboriginal Land Council participated in the field survey between 18 April 2017 and 11 May 2017.

- Stage 4 – review of draft cultural heritage assessment report (to commence once the final draft of the heritage assessment report is available).

5.6.2.2 Aboriginal Historical Context

Navin Officer report that the area surrounding the Mine Site was Wiradjuri country roughly defined by the Macquarie (Wambool), Lachlan (Kalari) and Murrumbidgee (retaining its original name) Rivers and occupied by Wiradjuri people.

Navin Officer undertook an assessment of previous heritage studies and identified archaeological attributes and site location parameters for the Heritage Study Area.

5.6.2.3 Aboriginal Heritage Survey Results

Navin Officer undertook an assessment of the Heritage Survey Area between 18 April 2017 and 11 May 2017, with the assistance of the Orange Local Aboriginal Land Council. The field survey identified the following sites of Aboriginal heritage significance within the Heritage Study Area. **Figure 15** presents the location of the identified sites.

- Eighteen isolated finds, with one site including a potential archaeological deposit (PAD).
- Nineteen artefact scatters, with one site including a potential archaeological deposit (PAD).
- Nine potential scarred trees.

The cultural and archaeological significance of each of the identified sites will be assessed in more detail and the impact of the Mine Development on each site will be addressed in the EIS.

The Applicant has consulted with both Office of Environment and Heritage and the Orange Local Aboriginal Land Council in relation to the extent of appropriate subsurface testing of PADs. As a result, the EIS will include a description of the locations of the PADs, as well as the proposed subsurface testing regime in those sections of PADs that would be disturbed by the Proposal.

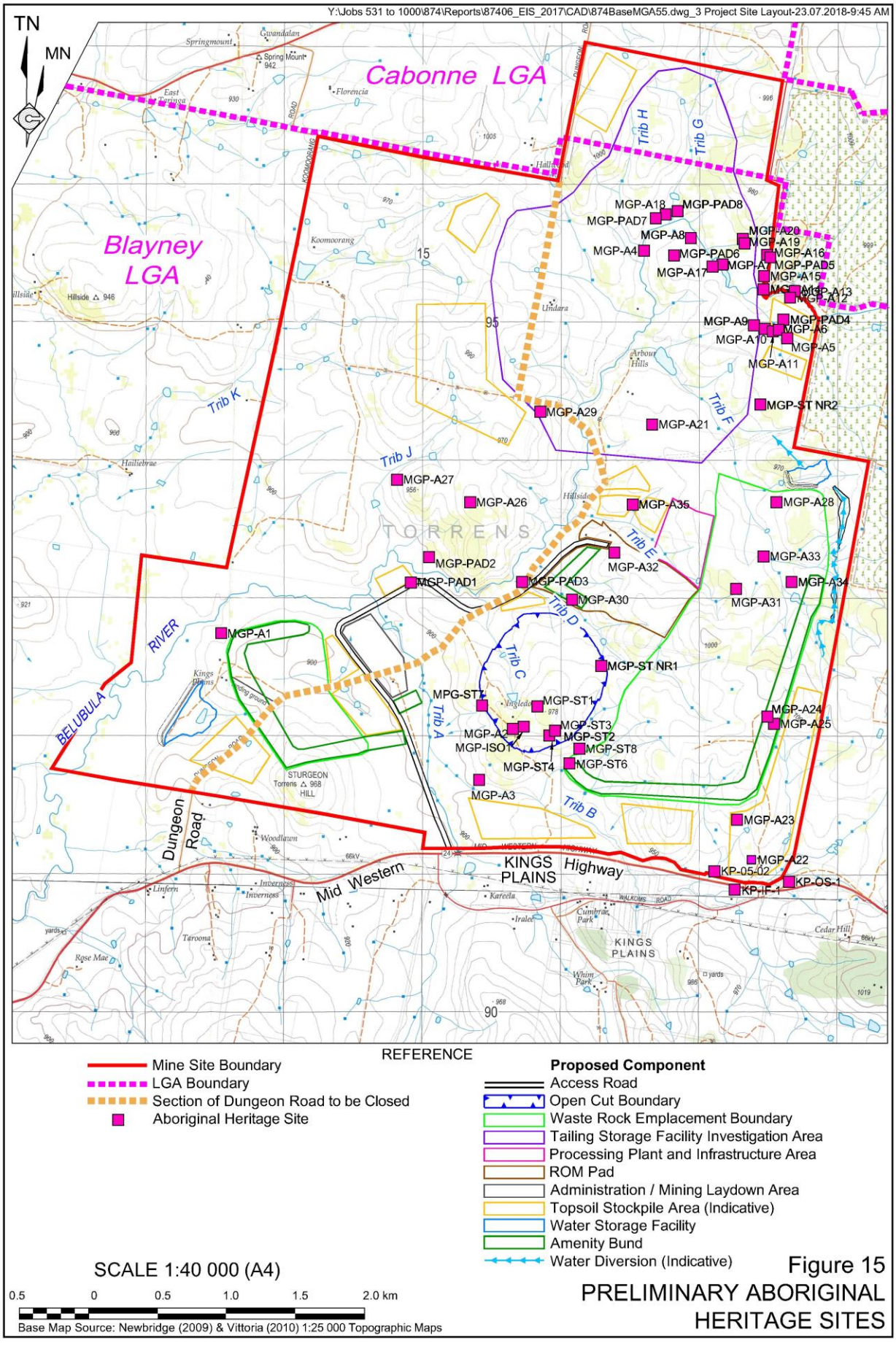


Figure 15
PRELIMINARY ABORIGINAL HERITAGE SITES

5.6.2.4 Historic Heritage Survey Results

Navin Officer undertook an assessment of historic European heritage in parallel with the Aboriginal heritage assessment. The field survey identified the following sites of historic heritage significance within the Mine Site. **Figure 16** presents the location of the identified sites.

- Seven sites comprising evidence of past mining-related activities.
- Fifteen sites comprising evidence of buildings or structures.
- One tree with historic survey marks.

5.6.3 Potential Impacts

Potential Mine Development-related impacts on heritage within and surrounding the Mine Site include the following.

- Disturbance of known sites of Aboriginal heritage significance, including PADs.
- Inadvertent disturbance of unknown/unidentified sites of Aboriginal heritage significance.
- Disturbance of sites with historic heritage value.

5.6.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development-related impacts on heritage.

- Undertake, in consultation with the Aboriginal community, a test program for PADs that would be the subject of surface disturbing works and recover and appropriately catalogue objects of Aboriginal heritage significance within areas to be disturbed.
- Appropriately store and secure all recovered objects in accordance with the wishes of the Aboriginal community.
- Record and/or salvage objects of historic heritage significance.
- Identify the limit of approved disturbance areas on the ground through the use of permanent markers and ensure that all ground disturbing activities are only undertaken within approved areas.
- Develop and implement an *Unanticipated Finds Protocol* to protect and manage any potential objects of Aboriginal heritage significance.
- Ensure that all remaining in situ objects of Aboriginal or historic heritage significance are either marked on site plans or suitably fenced to prevent inadvertent damage.

5.6.5 Proposed Assessment

A qualified archaeologist will complete a cultural heritage assessment for the Mine Development with a copy of the draft report to be provided to the Aboriginal community for comment prior to submission of the EIS. After addressing comments from the Aboriginal community, if any, the resulting report will be presented in full in the SCSC that will accompany the EIS.

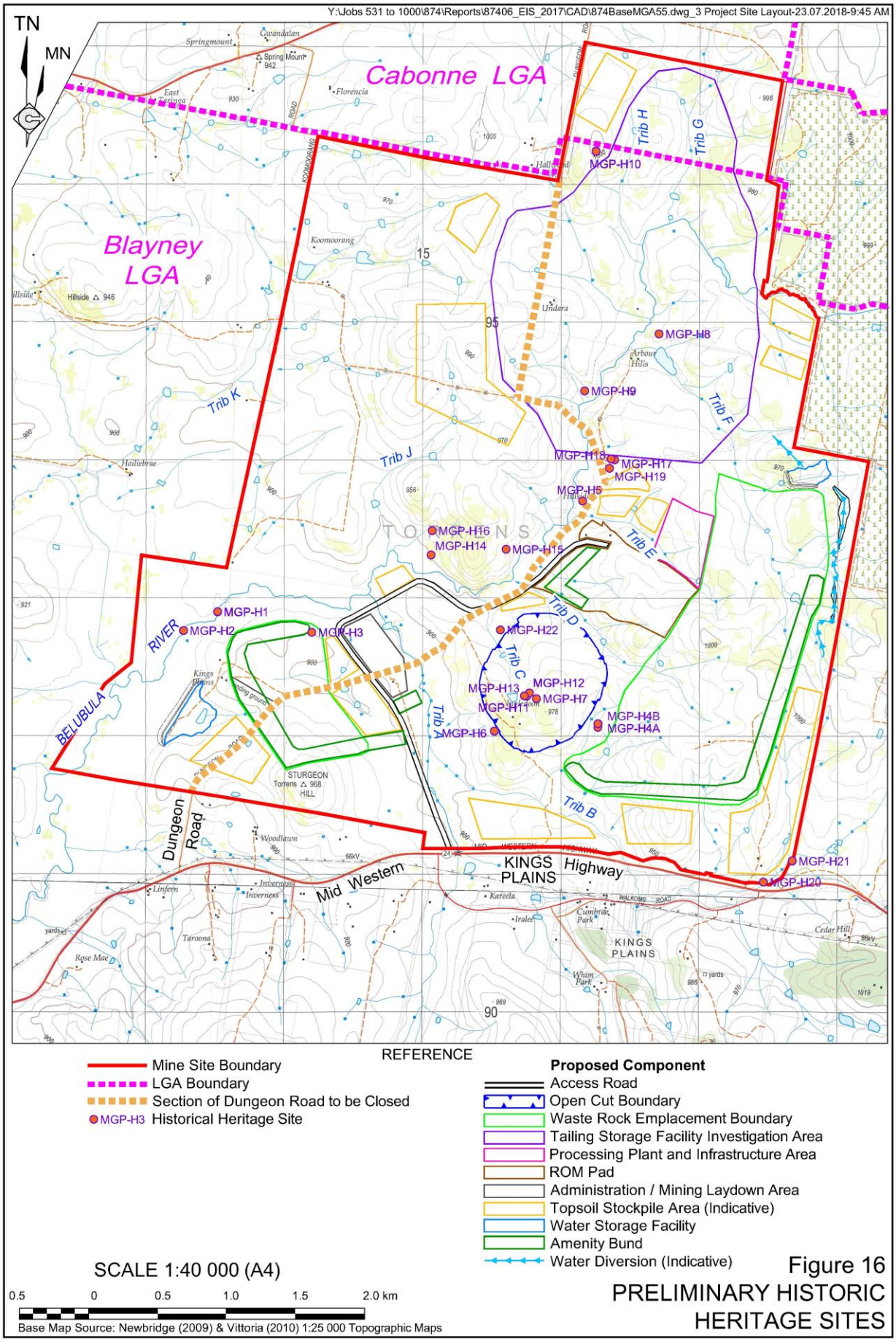


Figure 16
PRELIMINARY HISTORIC HERITAGE SITES

5.7 NOISE AND VIBRATION

5.7.1 Introduction

The Applicant has engaged Muller Acoustic Consulting Pty Ltd (MAC) to complete the noise and vibration assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by MAC.

5.7.2 Existing Environment

Figure 13 presents the location of residences surrounding the Mine Site. In summary, approximately 100 residences are shown on **Figure 13**, including:

- to the south of the Mine Site within Kings Plains;
- to the west of the Mine Site along Guyong Road;
- to the north of the Mine Site along Vittoria Road; and
- elsewhere as more isolated rural residences.

A background noise assessment was undertaken at seven locations surrounding the Mine Site by EMGA Mitchell in 2013. The noise assessment locations were selected based on the conceptual infrastructure layout at that time and involved both attended and unattended noise monitoring and was undertaken in accordance with the *NSW Industrial Noise Policy*. Additional monitoring was also undertaken in late 2017. A detailed description of the results of both programs will be presented in the EIS. In summary, however, noise environment surrounding the Mine Site may be described as follows.

- Noise at locations at a distance from the Mid Western Highway is typical of a rural setting, with background noise levels typically equal to or less than 35dBA during the day (7:00am to 6:00pm) and 30dBA during evening (6:00pm to 10:00pm) and night (10:00pm to 7:00am). MAC anticipates that residences located at a distance from the Highway would have the default Project Specific Noise Levels of 40 dBA during the day and 35dBA during the evening and night.
- Noise at locations closer to the Mid Western Highway is dominated by road traffic noise during the day and to a lesser extent during the evening, with low levels of noise during the night. As a result, MAC anticipates that residences located closer to the Highway would have Project Specific Noise Levels of between 40dBA and 45dBA during the day, 35dBA to 38dBA during the evening and 35dBA during the night.

The EIS will present a detailed description of the noise monitoring locations and justification of the proposed assessment criteria in accordance with the relevant guidelines.

Finally, the MAC states that F Class temperature inversions are likely to form a component of the environment surrounding the Mine Site and will be taken into account in the noise modelling. However, winds with the potential to enhance noise propagation in accordance with the criteria identified in the *Noise Policy for Industry* do not occur.

5.7.3 Potential Impacts

Potential Mine Development-related impacts on the noise environment surrounding the Mine Site include the following.

- Amenity or intrusive noise-related impacts on surrounding residents as a result of construction or operational activities within the Mine Site.
- Amenity noise-related impacts on residents as a result of activities road traffic noise outside the Mine Site.
- Amenity ground vibration or blast overpressure-related impacts on residents as a result of blasting activities within the Mine Site.
- Property damage as a result of vibration or blast overpressure from blasting activities within the Mine Site.

5.7.4 Management Commitments

It is noted that noise impacts in particular are highly subjective and that noise that one person may find acceptable may be unacceptable to another. Similarly, noise that a person finds acceptable on a particular day or time of day (i.e. during the day on a workday) may be unacceptable on other days or at other times (i.e. in the evening/night or on weekends/public holidays). As a result, the Applicant will ensure that its consultation program will canvas the attitude of surrounding residents to noise to determine the preferred approach to managing this issue.

Notwithstanding the above, the Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development-related impacts associated with noise.

- Construct and rehabilitate amenity bunds and undertake construction works in a manner that minimise the overall impact on surrounding residents.
- Preferentially operate noisy equipment during the day.
- Strictly comply with the approved hours of operation.
- Regularly service all on-site equipment.
- Install frequency modulated reversing alarms to all mobile equipment.
- Maintain an open dialogue with the surrounding community and neighbours to ensure any concerns over noise or vibration are addressed.

In addition to the above, Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable Mine Development-related impacts associated with blasting.

- Ensure that blasting only take place within the mine when it is necessary, that is, when material is not classified as free dig.
- Ensure that when blasting is required, that near neighbours are notified by a suitable means of communication.

- Ensure that all blasts are designed by a suitably qualified and experienced blasting engineer to comply with all relevant criteria at surrounding residences.
- Undertake blasting only during the hours of 7:00am to 7:00pm.

5.7.5 Proposed Assessment

MAC propose to complete the following noise and blasting assessment. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Undertake an assessment of predicted noise and vibration levels for a number of construction and operational scenarios under varying meteorological conditions initially using a three-dimensional environmental noise model. It is anticipated that the noise modelling will be an iterative process, with proposed controls progressively applied to ensure that compliance with the relevant criteria can be achieved in the most efficient manner possible.
- Undertake a road traffic noise assessment based on the proposed maximum peak-hour traffic levels.
- Undertake a blasting assessment based on standard blast formulae.

5.8 AIR QUALITY

5.8.1 Introduction

The Applicant has engaged Ramboll Environ Australia Pty Ltd (Environ) to complete the air quality assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by Environ.

5.8.2 Existing Environment

Existing sources of dust within and surrounding the Mine Site include the following.

- Wind generated dust from exposed areas.
- Dust emissions from agricultural activities.
- Dust entrainment due to vehicle movements along unsealed and sealed roads with high silt loadings.
- Seasonal emissions from household wood burning.
- Episodic emissions from vegetation fires.

The Applicant has installed the following air quality monitoring infrastructure within the Mine Site.

- One high volume air sampler (HVAS) for the recording of PM10 concentrations on a one-in-six day cycle.

- Four dust deposition gauges for recording monthly dust deposition rates; and
- One meteorological station for the recording weather conditions, including wind speed direction, temperature, solar radiation, rainfall and atmospheric pressure.

The results of monitoring may be summarised as follows.

- Average monthly dust deposition rates since December 2014 ranged from 0.8g/m^2/month to 2.3g/m^2/month, with an average deposition rate of 1.4g/m^2/month across all sites.
- Average 24-hour PM_{10} concentration recorded on site between 2013 and 2016 was 10.4µg/m$^{3.}$ By contrast a PM_{10} monitor operated by EPA in Bathurst recorded an average 24-hour PM_{10} concentration 14.1µg/m^3, with an approximately linear relationship between the onsite monitor and the EPA-operated Bathurst monitor, with the onsite monitor consistently returning lower results than the Bathurst monitor. Both stations concurrently recorded elevated PM_{10} concentrations during periods of bushfires and dust storms.

5.8.3 Potential Impacts

Potential Mine Development-related impacts on the air quality environment surrounding the Mine Site include the following.

- Deposited dust, total suspended particulates, PM_{10}, or $PM_{2.5}$ related concentrations in excess of the relevant annual or 24-hour average criterion.

No odour or other air quality-related impacts associated with the Mine Development would occur.

5.8.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable air quality-related impacts associated with the Mine Development.

- Disturb only the minimum area necessary for the proposed activities.
- Shape, topsoil and rehabilitate disturbed areas as soon as practicable.
- Use water carts so as to manage traffic-generated and wind-blown dust.
- Use dust suppression measures to disturbed sections of the Mine Site that would not be subject of regular vehicular traffic or other activities.
- Ensure that all appropriate dust management measures are used during drilling operations, including dust aprons, dust extraction and water injection.
- Ensure that adequate stemming is used during blasting operations.
- Ensure that all sections of the crushing and screening circuit with the potential to emit dust are equipped with dust suppression measures.

- Ensure that the surface of the Tailing Storage Facility is, to the extent practicable, maintained in a damp state to limit the potential for dust emissions.
- Undertake regular monitoring of dust emissions, including through the use of visual assessments and real-time monitoring to actively manage dust emitting operations and implement additional dust controls as required.

5.8.5 Proposed Assessment

Environ propose to complete the following air quality assessment. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Calculate air pollution emissions based on proposed activities within the Mine Site and wind erosion from disturbed areas for a number of representative scenarios throughout the life of the Mine Development.
- Undertake atmospheric dispersion modelling and determine model predictions of ground level concentrations of all pollutants.
- Determine cumulative impacts accounting for background air quality against applicable assessment criteria.

5.9 VISUAL AMENITY

5.9.1 Introduction

The Applicant has engaged Urbis Pty Ltd (Urbis) to complete the visual amenity assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by Urbis.

5.9.2 Existing Environment

The visual environment surrounding the Mine Site is typical of rural areas in the Central West of NSW. In particular, views from residences and local vantage points include the following.

- Rolling agricultural land comprising a mixture of pasture, paddock trees, native vegetation, wind breaks composed of non-native pine trees and occasional houses of farm buildings.
- Local (sealed and unsealed) roads, regional road and State roads with variable levels of traffic. The Mid Western Highway is a major transportation route and carries numerous semi-trailer and B-Double trucks.
- Small settlements such as Kings Plains with a higher density of residences and other buildings than other areas surrounding the Mine Site.

The Mine Site is visible to motorists using the Mid Western Highway, as well as from public vantage points to the south (within and surrounding Kings Plains) and west (along sections of Guyong Road).

5.9.3 Potential Impacts

It is noted that visual amenity impacts in particular are highly subjective and that changes to the visual landscape that one person may find acceptable may be unacceptable to another. As a result, the Applicant will ensure that its consultation program will canvas the attitude of surrounding residents to potential changes to the visual landscape to determine the preferred approach to managing this issue.

Potential Mine Development-related impacts on visual amenity surrounding the Mine Site include the following.

- Changes to the daytime visual landscape from residences surrounding the Mine Site as a result of ground disturbing activities, movement of machinery and changed landforms.
- Changes to the night-time visual landscape as a result of lighting-related impacts, both direct and indirect.

5.9.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable visual amenity-related impacts associated with Mine Development.

- Construct and progressively rehabilitate amenity bunds in a manner that is consistent with minimising impacts to surrounding residents.
- Establish visual screens at key locations within the Mine Site as early as practicable during the life of the Mine Development.
- Assist, where practicable, surrounding residents to establish vegetation screens on their own properties to minimise adverse visual amenity impacts.
- Construct buildings and other structures with non-reflective cladding of a colour consistent with the surrounding landscape.
- Install suitable lighting that would minimise the potential for light spillage and only operate those lights that are required for the safe operation of the Mine Development.

5.9.5 Proposed Assessment

Urbis propose to complete the following visual impact assessment tasks. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Identify the visual catchments surrounding the Mine Site, namely those areas with similar views and visual characteristics.
- Identify landscape character types and cultural landscape significance;
- Outline the sensitivity of the landscape to change based on physiographic characteristics, pattern of viewing, and the nature of the proposed activities, including the relative significance of landscapes, views and landscape features and the degree of existing modification / man made elements.

- Prepare a range of photomontages of existing and proposed views at various stages throughout the life of the Mine Development, including during and after mining operations are complete. The photomontages would utilise digital terrain models and 3D designs of the relevant infrastructure to assess visual and landscape impacts.
- Review the proposed lighting components and estimate the extent of the 'visible glow' likely to be experienced by surrounding residents.

5.10 TRAFFIC AND TRANSPORTATION

5.10.1 Introduction

The Applicant has engaged Constructive Solutions Pty Ltd (Constructive Solutions) to complete the traffic and transportation assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by Constructive Solutions.

5.10.2 Existing Environment

The Mine Site is surrounded by a range of State and local roads as follows (**Figures 10** and **11**).

- Mid Western Highway - a classified road (State Highway [SH] 6) linking Bathurst in the east with Cowra and the Newell Highway in the west. In the vicinity of the Mine Site, the Mid Western Highway is a two-lane / two-way sealed road with two marked travel lanes approximately 3.5m wide and 1.5m sealed shoulders. The road is generally in good condition with a posted speed limit of 100km/h. The Highway is approved for B-double trucks.
- Dungeon Road – is a local road 9.3km long that provides access to numerous rural properties and links the Mid Western Highway in the south to Vittoria Road to the north. Dungeon Road is unsealed with a formation width that varies from 4m to 6m. The gravel pavement is generally in good condition with some potholes and corrugations. There is no posted speed limit, however the alignment is windy, undulating, and steep in places. There are no curve warning signs and multiple substandard curves, including three 90-degree bends.

Other roads include Guyong and Vittoria Roads, both sealed, two lane rural roads.

Background traffic counts were undertaken from 2 to 15 February 2017. **Table 11** presents the current traffic volumes as annual average daily traffic (AADT) and percentage of heavy vehicles (HV %).

Table 11
Background Traffic Volumes

Road	Site	AADT	HV%
Mid Western Highway	Proposed Mine Entrance	2900	19%
Dungeon Road	South west of existing entrance	68	19%
Dungeon Road	North east of existing entrance	32	22%
Guyong Road	2.5km north of Mid Western Highway	258	15%

Source: Constructive Solutions

5.10.3 Potential Impacts

Potential Mine Development-related impacts on traffic and transportation surrounding the Mine Site include the following.

- Construction of an intersection between the site access road and the Mid Western Highway, resulting in changed traffic conditions.
- Closure or realignment of a section of Dungeon Road, potentially limiting (or enhancing) access for residences and rural property owners located along Dungeon Road.
- Additional traffic on the Mid Western Highway and other local roads, including Guyong Road, as a result of Mine Development related traffic.
- Associated additional road maintenance requirements as a result of the proposed additional extra traffic.

5.10.4 Management Commitments

The Applicant would implement the following management and mitigation measures to minimise the potential for unacceptable traffic and transportation-related impacts associated with Mine Development.

- Construct the intersection of the site access road and the Mid Western Highway in a manner that is consistent with the Austroads *Guide to Road Design*, taking in account the existing road conditions and proposed traffic levels and types.
- Implement procedures to ensure safe operation of the proposed intersection of the site access road and the Mid Western Highway.
- Close and realign Dungeon Road in consultation with Blayney Shire Council and surrounding residents and landholders.
- Implement a Driver's Code of Conduct with disciplinary action for non-compliance.
- Implement emergency, accident, incident, complaint or non-compliance response and reporting procedures.

5.10.5 Proposed Assessment

Constructive Solutions propose to complete the following traffic and transportation impact assessment tasks. The resulting report will be presented in full in the SCSC that will accompany the EIS.

- Assessment of transport impacts of the Mine Development on the local road network and transport routes for the life of the Mine Development that includes:
  - existing and proposed traffic volumes;

  - levels of service and road network performance, as determined using an intersection software package (e.g. SIDRA); and
  - safety of all road users; and
- Identification of appropriate design criteria for any works required for the surrounding traffic network.

5.11 SOILS AND LAND CAPABILITY

5.11.1 Introduction

The Applicant has engaged Sustainable Soils Management (SSM) to complete the soils assessment for the Mine Development. The following subsections have been prepared by RWC based on information provided by SSM.

5.11.2 Existing Environment

5.11.2.1 Soils

The Mine Site has been mapped by Kovac *et al*., (1989) as occurring over two soil landscapes as follows (see **Figure 17**).

- Vittoria-Blayney Soil Landscape

  This is the main soil landscape mapped over the Mine Site and occurs on the elevated and undulating landforms above the Belubula River and its tributaries. Soil profiles in the Vittoria-Blayney Soil Landscape have a consistent pattern of loamy topsoil over clayey subsoil that is red in elevated parts of the landscape and tends to mottled yellowish brown in lower parts of the landscape. Kovac *et al*., (1989) note that most soils of this soil landscape suggest moderate to lower land capability classes III, IV and VI.

- Macquarie Soil Landscape

  Areas in the floodplain of the Belubula River have been mapped as this soil landscape. The four soil types of the Macquarie Soil Landscape are variable; however, all have been allocated higher Land Capability Classes I, II and III (Kovac *et al*., 1990).

  The Macquarie Soil Landscape has been mapped at a regional scale as Biophysical Strategic Agricultural Land (BSAL) (See **Figure 17**).

To further define the soil types of the Mine Site, and assess whether the Mine Site contains BSAL, 96 soil pits and five core sites were established and sampled by SSM in accordance with the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (Interim Protocol). Based on in-field observations and laboratory analyses of 97 of the 101 sampled sites, SSM mapped seven Soil Associations across the Mine Site. A soil association is a mapping unit that has two or more soil types in a regularly repeating pattern that is generally associated with landscape features (Powell, 2008).

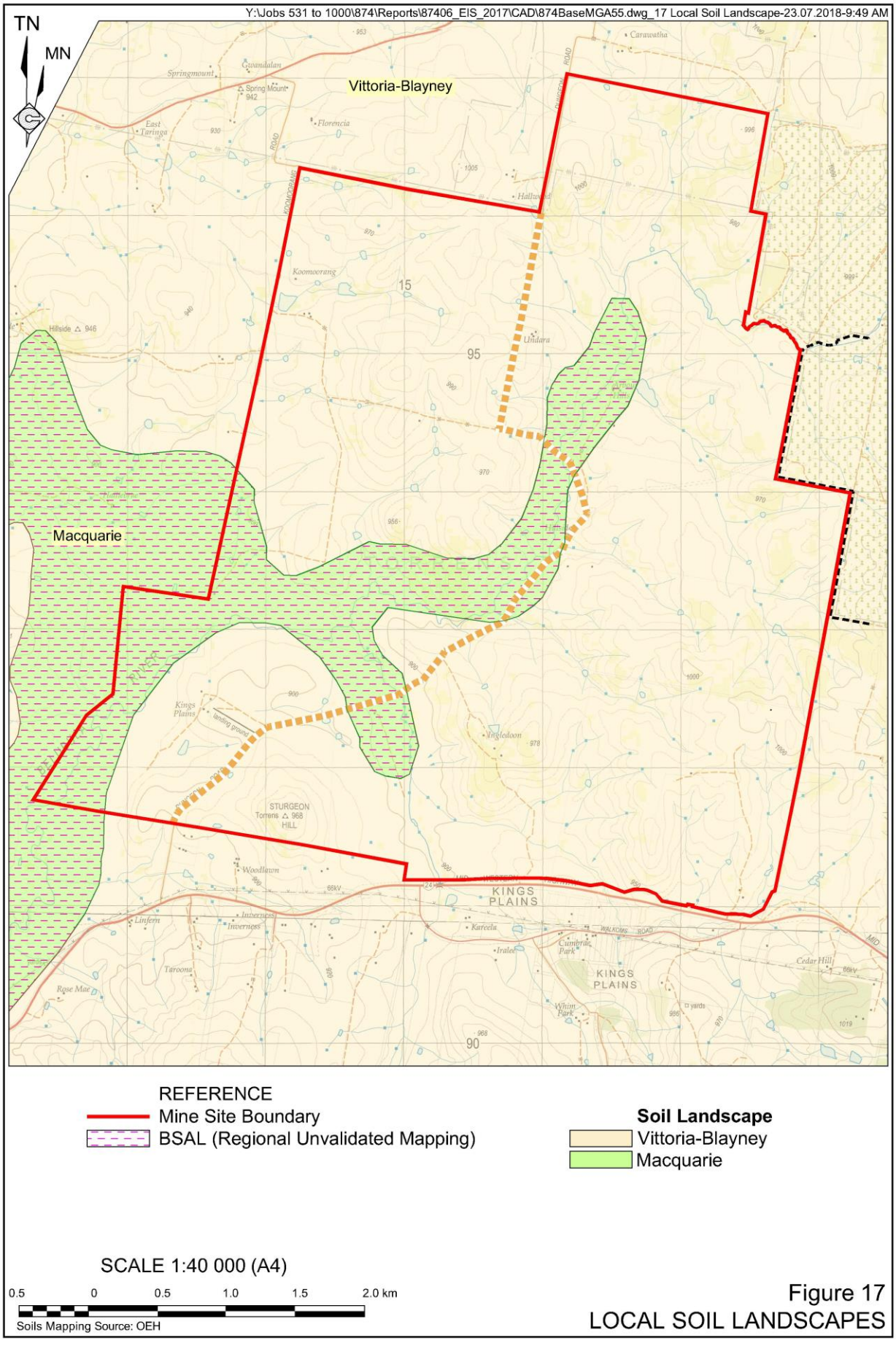


Figure 17
LOCAL SOIL LANDSCAPES

Soil associations were used as the Soil Mapping Unit rather than soil type because the identified soil types (based on the Australian Soil Classification) were interspersed across the Mine Site rather than being clustered together. As a result, the ASC soil types contained within each soil association shared a common defining trait or traits with the other soil types within this association, not shared with the corresponding soil type in another soil association. The seven Soil Associations and corresponding soil properties mapped across the Mine Site are as follows (see **Figure 18**).

- Alluvial Chromosols, Sodosols and Dermosols. Situated on valley floors beside watercourses over the Anson Formation and Byng Volcanics. Subsoil colour was generally grey, soil texture was generally more clayey than other soil associations in Mine Site and 100m buffer zone.
- Alluvial Dermosols, Vertosols, Sodosols and Kandosols. Situated on valley floors downstream of a pinch point in the Belubula River near the southwestern corner of the Mine Site. These soils area located over the Quaternary alluvium and receive runoff from the Byng Volcanics.
- Manganic Dermosols and Chromosols on Byng Volcanics. Situated on the mid and lower slopes and developed on the Ordovician Byng Volcanics. The majority of soil test pits in this Soil Association had either ferromanganiferous or manganiferous nodules in the subsoil.
- Manganic Chromosols and Dermosols on Anson Formation. Similar soil and landscape properties to the Manganic Dermosols and Chromosols on Byng Volcanics Soil Association, however, developed on the Silurian Anson Formation.
- Red Chromosols and Dermosols. Situated in elevated parts of the landscape, often on the eastern side of a hill crest. Stable subsoil structure. Characterised by red subsoil.
- Mesotrophic Brown Chromosols and Dermosols. Situated on the mid and upper slopes of a north-south trending ridge in the centre of the Mine Site and underlain by the Anson Formation. This Soil Association was more acidic than either of the Manganic Soil Associations.
- Poorly Drained Brown Chromosols, Dermosols, Sodosols and Kurosols. Predominant Soil Association along the eastern edge of the Mine Site and 100m buffer zone (where applied). Profiles of this Soil Association were strongly acidic with some profiles also returning elevated Exchangeable Aluminium Percentages through the full depths sampled.
- Strongly Sodic Sodosol. This Soil Association was classified site as the soil was so much more alkaline, sodic and saline than all other sites assessed that it was classified separately.

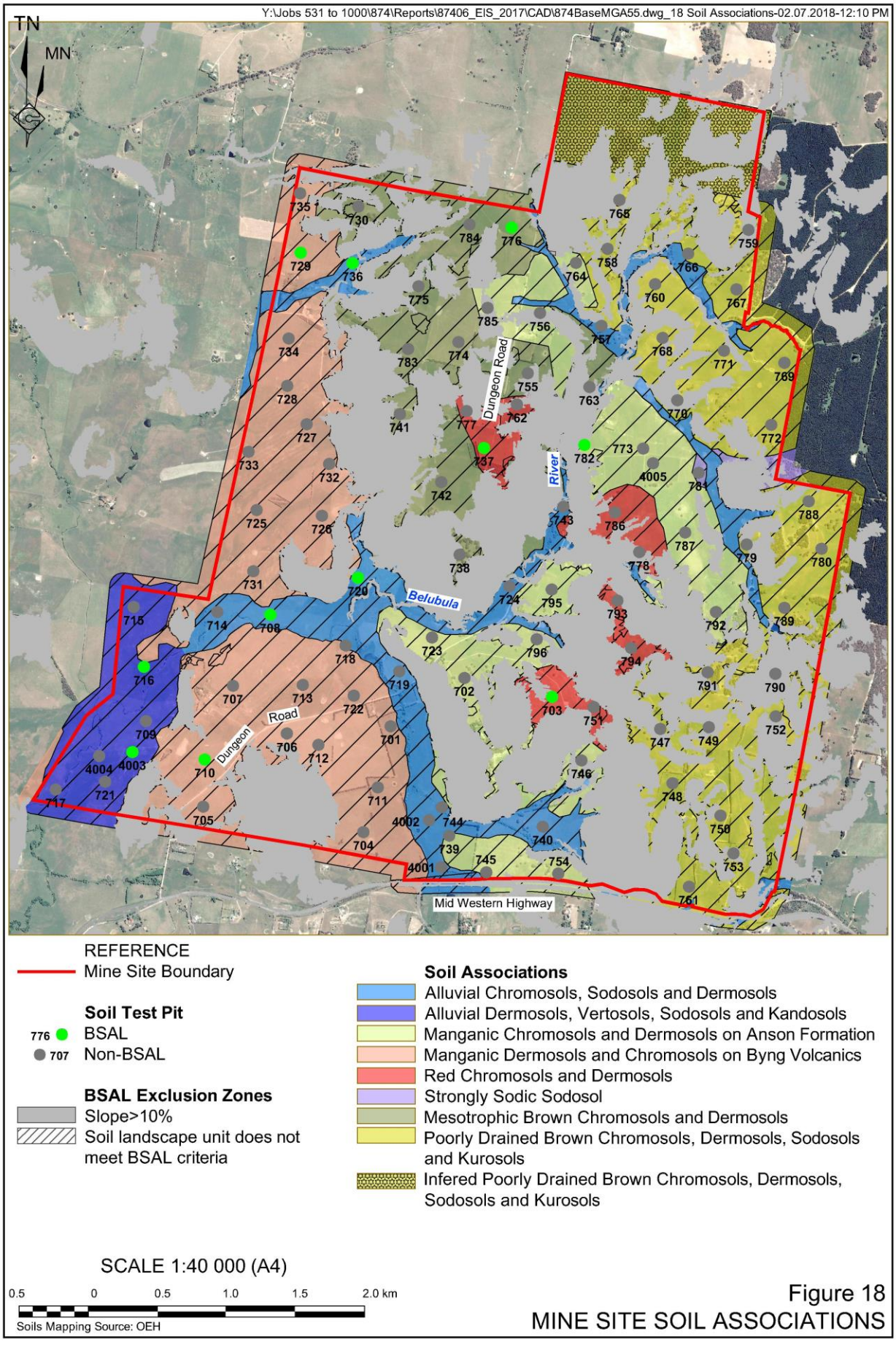


Figure 18
MINE SITE SOIL ASSOCIATIONS

Of the 97 non-excluded soil sample sites investigated, eleven were identified as displaying BSAL characteristics. However, none of the seven soil associations identified during the assessment met the minimum threshold for declarable BSAL (of the Interim Protocol). As a consequence, an application for Site Verification Certificate has been made which acknowledges that no BSAL is present within the Mine Site.

5.11.2.2 Agriculture

The land capability of the land on and surrounding the Mine Site varies with the highest capability land (Classes I and II) occurring in the valleys of the Belubula River and major tributaries. Moderate land capability (Classes II and IV) extends onto the lower and mid-slopes of the local landforms reducing to VI or greater as the landform increases in slope (>10%).

There are no intensive plant or livestock activities within or adjacent to the Mine Site with the dominant land use being grazing (primarily cattle with some properties running sheep and more recently goats) on improved pasture. Some rotational cropping is also undertaken.

There are no sensitive agricultural activities undertaken on or in the immediate vicinity of the Mine Site and the soil and water resources found in the area are considered to be the key agricultural resources with the potential to be impacted by the Mine Development.

Potential Mine Development-related impacts to local soils and agricultural resources include the following.

- Loss of soil resources, both in terms of quantity and quality, as a result of stripping and stockpiling.
- Reduced soil function and future agricultural productivity as a result of stripping, stockpiling and respreading over final landforms.
- Reduced land capability within the final landform decreasing the post-mining potential of the Mine Site.
- Reduced agricultural production as a result of mine-related disturbance which cannot be returned to the same land capability.
- Contamination of landforms and soils resources on and surrounding the Mine Site as a consequence of discharges and other emissions.

5.11.3 Management Commitments

The Applicant would implement a range of soil management and mitigation measures aimed at minimising land and soil degradation through the implementation of appropriate soil management measures. The EIS will document these measures which will, in summary, aim to achieve the following.

- Define and identify the various soil associations and types of the Mine Site prior to disturbance and nominate the stripping depths and storage requirements of each.
- Ensure that disturbance is restricted only to those areas immediately required for mining-related activities (to minimise the volume of soil stockpiled and time soil is retained in stockpile).

- Strip soil in such a way so as to minimise degradation prior to stockpiling.
- Preferentially transfer soils being stripped to areas of the final landform requiring rehabilitation.
- Locate, construct and manage stockpiles in such a way as to minimise the potential for soil degradation.
- Regularly test soil in stockpile and respread over final landforms in such a way as to replicate the soil profile of the pre-disturbance environment.
- Implement a rehabilitation management plan that establishes timing and final land use objectives of the progressive rehabilitation activities during the operational life of the Project and post closure.
- Ensure where practicable, the continuation of agricultural activities on lands not directly impacted by the Mine Development.

5.11.4 Proposed Assessment

Building upon the assessment completed in accordance with the Interim Protocol, SSM have been engaged to undertake and complete a Soils, Land Capability and Agricultural Productivity Assessment (SLCAPA) of the Mine Site. This assessment will further assess the soil associations and soil types located on the Mine Site and provide specific recommendations as to the management of these, individually or as grouped mapping units. The recommendations of the SLCAPA will be aimed at maximising the recreation of a soil profile that provides a topsoil layer for the entry and storage of water, air and nutrients for plant support and a subsoil layer for retention of water and deep root penetration.

Noting the competing requirements for maximising biodiversity conservation and minimising reduction in agricultural productivity, the SLCAPA will also consider the effect of any reduction in agricultural land in the final landform and ways to maximise the productivity of agricultural lands which remain, either undisturbed or rehabilitated.

The SLCAPA resulting report will be presented in full in the SCSC that will accompany the EIS.

5.12 HAZARDS

5.12.1 Existing Environment

The environment within and surrounding the Mine Site has low exposure to hazardous materials. The only materials would include agricultural chemicals.

A Bush Fire Prone Land Map for the Blayney LGA and Cabonne LGA has not been identified, however, use of the NSW Rural Fire Service (RFS) land mapping tool identifies the land of the Mine Site to be variably bushfire prone. Land parcels adjoining Vittoria State Forest are identified as bushfire prone, however, those closer to Dungeon Road and the Mid Western Highway are classified as not bushfire prone.

5.12.2 Potential Impacts

The Mine Development would require the use of several chemicals, e.g. cyanide, capable of impacting on human health and safety, as well as the local environment.

Considering bushfire hazard, the Mine Development would:

- increase the number and type of ignition sources in the local area;
- result in the creation of stockpiles of natural fuels in the form of cleared vegetation; and
- store flammable materials.

5.12.3 Management Commitments

Emphasis will be placed upon avoiding any impacts of hazardous materials on the workforce and persons living/travelling in the vicinity of the indicative Mine Site. All chemicals would be transported, stored and used in accordance with manufacturers' specifications.

All activities would be undertaken in a manner which minimises the potential for initiation of fire. Plans for management of bushfire, either initiated on the Mine Site or elsewhere, would be prepared with assistance to be provided as required to local emergency services in the event of a bushfire event.

5.12.4 Proposed Assessment

A comprehensive list of all potential hazardous materials that would be used on site throughout the life of the Mine would be assembled for consideration in the EIS. A detailed Preliminary Hazard Assessment (PHA) would be undertaken for inclusion with the EIS to outline the risks and management measures required through the transportation, storage, use and management of waste products, where appropriate.

5.13 SOCIAL AND ECONOMIC IMPACTS

5.13.1 Introduction

The Applicant has engaged Hansen Bailey Environmental Consultants (Hansen Bailey) to complete the social impact assessment (SIA) for the Mine Development. In accordance with the DPE Social Impact Assessment Guidelines (DPE, 2017), this section provides an overview of the Mine Development's social setting, a summary of potential social impacts and a description of the proposed actions to be undertaken to complete the SIA for inclusion with the EIS.

5.13.2 Existing Environment

5.13.2.1 Regional Setting

The Mine Site is located in the Blayney and Cabonne LGAs. The Blayney LGA has an area of 1,525km^2 and an estimated resident population at the 2016 Census of 7,257 persons.

The town of Blayney is the administrative centre of the Blayney LGA with an estimated resident population of 2,810 people (ABS 2013a). Blayney is located approximately 30 minutes from the larger regional centres of Orange to the northwest and Bathurst to the east. Consequently, Blayney LGA Shire suffers from the 'sponge city effect' experiencing a steady movement of residents and businesses from its rural communities to nearby regional centres. The town of Blayney, whilst the centre for the Blayney Shire, supports a small commercial centre due to its proximity to Orange and Bathurst.

The small rural settlement of Kings Plains and the small rural villages of Millthorpe, Carcoar, Mandurama, Lyndhurst, Neville, Newbridge, Hobby's Yard and Barry are scattered across the Blayney LGA. With the exception of Millthorpe, these villages support fewer than 150 residents.

The Cabonne LGA has an area of 6,026km^2 and an estimated resident population at the 2016 Census of 13,386 persons. A small northern portion of the Mine Site is located within the easternmost section of the Cabonne LGA. Molong, the administrative centre of the Cabonne LGA is located approximately 73km (1 hour driving time) to the northwest of the northern section of the Mine Site.

Blayney LGA and Cabonne LGAs are essentially rural shires. They contain a range of primary industries including dairying, beef cattle, lamb, wool, viticulture and grains. The LGA's have a strong mining heritage and mining remains a key industry in theses LGA's. Cadia Valley Operations (CVO) underground copper gold mine is located in the northwestern section of the Blayney LGA and the southeastern section of the Cabonne LGA. Manufacturing, transportation and food processing are also key industries. Purina Pet Food manufacturing plant, SeaLink Cold Storage facility and the CVO Dewatering facility are significant enterprises located in the town of Blayney.

5.13.2.2 Local Setting

The Mine Site, is currently used for grazing (cattle, sheep and goats) with a scattering of residential dwellings and includes the Belubula River and its tributaries. Dungeon Road, an existing unsealed road traverses the Mine Site, with Vittoria State Forest forming the north eastern boundary. The Mid Western Highway, from which access to the Mine Site is proposed, forms a significant portion of the southern Mine Site boundary.

Kings Plains, a small rural settlement, is located on Walkom Road, to the south of the Mid Western Highway immediately south of the Mine Site and approximately 10km east of Blayney. The settlement of Kings Plains has an estimated population of 60 people[9] and consists of a combination of rural lifestyle blocks and larger agricultural landholdings. The population is a mix of retired couples, families with school age children and young couples. The small community has no civic buildings. The Kings Plains Rural Bushfire Brigade is located on Kellys Road, approximately 2.5km from the Mine Site. Drayshed Nursery, a commercial nursery is located on Kings Plains Road to the south of the township.

A number of rural and rural residential landholdings are located to the north, east and west of the Mine Site.

[9] Australian Bureau of Statistics (ABS) Census Data is not available for small areas such as Kings Plains. The population estimate provided is based on a combination of consultation conducted to date with residents and house counts from aerial photography interpretation.

5.13.2.3 Local Mining History

Gold and copper exploration and mining activity has occurred in the local and broader area since the mid 1800's. McPhillamys and the surrounding Blayney-Kings Plains area was worked in the 1850s as an alluvial gold field, with some small scale open pit and underground workings in the district. Hard rock mining at McPhillamys Hill began in 1888, with mining continuing sporadically over the next 50 years.

5.13.3 Social Impact Assessment Scoping Consultation

5.13.3.1 Company Consultation

The Applicant has consulted widely with the community surrounding the Mine Site since it acquired the McPhillamys Gold Project in 2012. That consultation has involved:

- Numerous one-on-one meetings, both formal and informal and face-to-face and via telephone.
- Small group meetings; and
- An open invitation for community members to contact the Applicant to discuss particular matters of concern or to ask questions.

Initially, that consultation was largely related to the Applicant's exploration activities, however more recently, the Applicant has met with community members to discuss the proposed mining operations.

5.13.3.2 SIA Consultation Process

Hansen Bailey has also consulted with the community with 23 structured, face-to-face interviews with near neighbours to the Mine Site.

In summary, 22 individual meetings with 36 participants were undertaken, as well as one small group meeting with 10 attendees. The majority of interview participants were residents of Kings Plains.

The purpose of the interviews was to:

- provide a Proposal update;
- collect qualitative data on the social setting;
- verify existing social baseline data;
- explore existing stakeholder perceptions of the Proposal; and
- identify initial stakeholder issues and concerns in relation to the Proposal.

A structured interview proforma was utilised and participant responses were recorded on the interview proforma.

Participants identified a suite of valued attributes of the local area. The valued attributes identified included:

- Privacy, peace and tranquillity – Many of the interviewees reported that they liked the quiet lifestyle and relative isolation.
- Views – The majority of participants valued the quality of views from their properties.
- Dark skies – Interview participants valued their outdoor lifestyle, particularly in the evening. The dark sky and the view of the stars was identified as important.
- Proximity and accessibility to nearby centres for employment and services - Many participants indicated that they rely on Blayney for their day-to-day services, but valued the ready access to surrounding regional centres, including Orange and Bathurst, for employment or for goods or services that may not be available in Blayney.
- Air quality – Participants identified the "clean air" as a valued attribute of the local area.
- Sense of community - While many participants noted that privacy and space was important to them, they also value the presence of community in Kings Plains. Kings Plains residents identified the Kings Plains Rural Fire Service as an important social hub; and
- Access to groundwater - With no reticulated water supply in Kings Plains, many participants valued potential access to groundwater as an important backup for domestic rainwater supply.

5.13.4 Potential Impacts

Preliminary identification and assessment of potential social impacts and their significance has been undertaken for the Mine Development in accordance with the requirements of the NSW SIA Guideline (DPE 2017). The preliminary assessment considered potential social impacts and opportunities for near neighbours and the wider community. The potential socio-economic impacts of the Proposal for near neighbours, include:

- adverse changes to rural amenity from Mine Development related noise, vibration, dust and visual impacts;
- disruption to use and enjoyment of private property due to adverse changes in rural amenity;
- loss of long-term landholders from the locality and associated social connections;
- changes in property accessibility and local road network accessibility impacting travel times and property management regimes;
- disruption to local road use patterns as a result of road closures;
- stress and anxiety resulting from uncertainty around the location, timing and potential impacts of the Mine Development on private land;
- impacts to economic viability of existing landholdings due to adverse changes in groundwater and surface water conditions; and
- stress and anxiety from the significant physical changes to the natural environment, degradation of local environmental values.

The potential negative social impacts of the Proposal for the Blayney LGA and Cabonne LGA include:

- difficulties attracting and retaining staff for Blayney Shire Council and Cabonne Council and local businesses;
- impacts to downstream water users from changes in surface water quality;
- increased competition for local labour with potential shift of labour from service industry to mining;
- changes in road usage and associated impacts on regional road safety; and
- loss of local environmental values through change in land use from rural to industrial.

The potential positive impacts of the Proposal for the Blayney LGA and Cabonne LGA include:

- direct and indirect population growth during all phases of the Proposal;
- direct and indirect employment generation during all phases of the Proposal;
- growth in resident population during the mining operations phase and resulting benefits for community capital and infrastructure sustainability;
- improved local capital, skills and capabilities through training and development undertaken for the Proposal;
- improved local infrastructure (e.g. roads) and services through a Voluntary Planning Agreement (VPA);
- significant economic benefits during construction and operations through local investment and rate payments to Blayney LGA and Cabonne LGA; and
- improved local business opportunities associated with Proposal related procurement and the potential for increased business viability, profitability and capability.

5.13.5 Management Commitments

The SIA will include a wide range of strategies developed to specifically manage the potential social impacts of the Proposal. These will include strategies to manage impacts for near neighbours and for the wider community.

In relation to those residents or near neighbours to the Mine Site, the Applicant will continue to consult both directly and indirectly through the SIA process with affected residents. Potential management mechanisms may include, but not be limited to, the following.

- Early construction and rehabilitation of amenity bunds.
- Amendments to the proposed hours of operations for particular activities with the potential to result in perceived or actual adverse impacts.
- Enhancement of community infrastructure.

- Individual consultation and identification of specific measures to manage perceived or actual impacts for particular individuals.

A VPA with the affected local Council's will be the primary mechanism for managing the wider socio-economic impacts and enhancing positive benefits and opportunities. Additional mechanisms may include, but will not be limited to:

- a Corporate Sponsorship and Donations Fund (SD Fund);
- a Social Impact Management Plan (SIMP);
- commitments to local hire arrangements for all Mine Development phases where local commercial arrangements are on par with non-local suppliers;
- Local Content Policy for all Mine Development phases;
- provision of financial or in-kind support to the Kings Plains Rural Bushfire Service (RFS);
- management strategies described in relevant EIS technical reports e.g. visual, noise and blasting; and
- ongoing community engagement program for Proposal construction and operations phases.

5.13.6 Proposed Social and Economic Impact Assessment

The SIA will be conducted in accordance with the NSW Department of Planning and Environment (DPE) *Social Impact Assessment – Guidelines for State Significant Mining, Petroleum Production and Extractive Industry Development* (DPE, 2017). **Table 12** presents a summary of the Proposed Social Impact Assessment Methodology.

An *Economic Impact Assessment* has been commissioned and will be completed by Gillespie Economics in accordance with *Guidelines for the Economic Assessment of Mining and Coal Seam Gas Proposals, December 2015*. The *Economic Impact Assessment* will be included in the EIS.

Table 12
Proposed Social Impact Assessment Methodology

Page 1 of 2

Key Tasks	Description
Baseline Social Profiling	Baseline profiling of the SIA Study Area will be completed and will build on the profile presented in the SIA Scoping Study. The purpose of this task and the associated consultation tasks is to develop a profile of the social and economic context in which the Project is located in order to highlight the strengths and vulnerabilities of the communities of interest and the social issues of relevant to the Proposal. Baseline profiling will include the following key tasks: • Desktop literature of relevant local and regional studies and statistical data collation and analysis; • Stakeholder interviews to validate social baseline data; and • Consultation with service providers, industry groups and organisations to identify challenges and opportunities for the Blayney and Cabonne LGAs.

Table 12 (Cont'd)
Proposed Social Impact Assessment Methodology

Key Tasks	Description
Identification of Impacts and Opportunities (Cont'd)	A comprehensive set of impacts and opportunities (including cumulative) would be identified using the following processes: • Analysis of past consultation and exploration complaints database; • Case study analysis of: – CVO to understand expected and experienced impacts in the Blayney and Cabonne LGAs; and – Tomingley Gold Mine between Parkes and Dubbo. • Findings of stakeholder consultation (including personal consultation with nearby neighbours) and baseline profiling; • Analysis of Mine Development details; and • Review of findings of related EIS technical studies e.g. Economic Assessment.
	Perceived issues and opportunities will be ranked by frequency based on outcomes of consultation. A table of potential project impacts and opportunities (including cumulative) will be prepared. Impact analysis methods will include: • Trend extrapolation. • The use of population multipliers. • Scenario analysis for labour recruitment and workforce accommodation arrangements. • Sensitivity analysis may also be necessary for components of the project e.g. labour recruitment arrangements and workforce accommodation.
Significance Assessment	The impacts and opportunities identified will be subjected to risk assessment to confirm potential significant risks. The significance of impact and opportunities will be predicted using the risk based approach described in the NSW SIA Guidelines.
Development of Management Strategies	Management strategies, procedures and actions will be developed to address the identified socio-economic impacts. Management strategies will be discussed with key stakeholders and near neighbours.
SIA Consultation	The following consultation will be undertaken to inform the various stages of the SIA: • Face-to-face interviews with residents of near neighbours to understand the impacts of the Mine Development to date, explore potential social impacts and opportunities, validate baseline data and identify/discuss mitigation and management strategies; • Focus Groups with a selection of residents/business owners/service providers in Blayney (and where relevant Cabonne) to validate social baseline data, discuss the Mine Development, potential social impacts and opportunities, and management strategies; • Interviews and discussions with service and facility providers (child care, health, education, housing, emergency services) across the Blayney and Cabonne LGAs to understand the provision of services/facilities and potential demand and supply issues; • Interviews with representatives from neighbouring LGAs; • Consultation with real estate agents in Blayney (and where relevant Cabonne), to understand current housing market conditions in the wider community; and • Survey of accommodation providers in the Blayney LGA to understand supply of short-term accommodation for the construction phase of the Mine Development.

Source: Hansen Bailey

6. REFERENCES

Australian Bureau of Statistics (ABS) 2013a. *Crime Victimisation, Australia, 2011-12, cat. no. 4530.0,* ABS, Canberra.

Department of Environment and Climate Change (DECC) 2008a. *Managing Urban Stormwater: Soils and Construction, Vol. 2C,* DECC, NSW, Sydney.

Department of Environment and Climate Change (DECC) 2008b. *Managing Urban Stormwater: Soils and Construction, Vol. 2E,* DECC, NSW, Sydney.

Kovac, M., Murphy, B.W. and Lawrie, J.W., 1989. *Soil Landscape Series Map, Bathurst 1:250000 Sheet*. Soil Conservation Service of New South Wales, Scale 1:250000.

Kovac, M., Murphy, B.W. and Lawrie, J.W., 1990. *Soil Landscapes of the Bathurst 1:250000 Sheet*. Soil Conservation Service of New South Wales, Sydney 324 pp.

Landcom (2004). *Managing Urban Stormwater: Soils and Construction, Vol. 1 Second eds,* Landcom, NSW, Sydney.

Office of Agricultural Sustainability and Food Security (OASFS) 2013. *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land 2013.*

Powell, B. (2008). *Classifying Soil and Land. Chapter 19 in: Guidelines for Surveying Soil and Land Resources*, eds. N.J. McKenzie, M.J. Grundy, R. Webster and A.J. Ringrose-Voase, CSIRO, pp. 307-315.

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Appendix 1

McPhillamys Pipeline Development – Preliminary Environmental Assessment

Prepared by Blakelys Environmental

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APPENDIX 1

LFB Resources NL

(a 100% wholly owned subsidiary of Regis Resources Ltd)

McPhillamys

"The Pipeline Development"

Preliminary Environmental Assessment

July 2018

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Contents

1. INTRODUCTION 5

1.1 SCOPE 5
1.2 BACKGROUND 5
1.3 OBJECTIVES AND OVERVIEW OF THE PIPELINE DEVELOPMENT 6
1.4 PURPOSE OF THIS PRELIMINARY ENVIRONMENTALASSESSMENT 6

2. STRATEGIC NEED AND OPTIONS ASSESSED 8

2.1 THE NEED TO ESTABLISH A RELIABLE WATER SUPPLY TO THE MINE SITE 8
2.2 OPTIONS ASSESSED 8
2.3 PIPELINE CORRIDOR 9
2.4 WATER SUPPLY AGREEMENTS 9

3. PROPOSAL DESCRIPTION 10

3.1 REGIONAL CONTEXT AND SITELOCATION 10
3.2 PIPELINE DEVELOPMENT PROPOSAL 10
3.3 LAND ACCESSAGREEMENTS 11
3.4 CONSTRUCTION 12
3.5 OPERATION PHASE 14

4. PLANNING FRAMEWORK 15

4.1 APPROVAL PROCESS 15
4.2 COMMONWEALTH LEGISLATIVE CONSIDERATIONS 19
4.3 RELEVANT NSW LEGISLATION 20

5. CONSULTATION AND STAKEHOLDER ENGAGEMENT 25

6. PRELIMINARY ENVIRONMENTAL ASSESSMENT METHODOLOGY 27

6.1 SCOPE 27
6.2 GENERAL ENVIRONMENTAL ISSUES 27
6.3 DESKTOP STUDY 27
6.4 PRE-FEASIBILITY STUDY REPORT 28

7. PRELIMINARY ENVIRONMENTALASSESSMENT 29

7.1 INTRODUCTION 29
7.2 FLORA AND FAUNA 29
7.3 ABORIGINAL AND NON-ABORIGINALHERITAGE 36
7.4 SURFACE AND GROUNDWATER 38
7.5 SOILS AND GEOLOGY 39
7.6 LAND USE 40
7.7 AIR QUALITY 41
7.8 NOISE AND VIBRATION 42
7.9 TRAFFIC AND ACCESS 43
7.10 RESOURCE USE AND WASTE MANAGEMENT 44
7.11 SOCIO-ECONOMIC CONSIDERATIONS 46
7.12 LANDSCAPE CHARACTER AND VISUAL AMENITY 47

8. PROPOSED ENVIRONMENTAL ASSESSMENTSCOPE 48

9. REFERENCES 49

Tables

Table 1: Stakeholders and communities and their key interests in the proposals. 25
Table 2: Plant community types impacted as a result of the Pipeline Development. 31
Table 3: NSW BioNet results for threatened flora and fauna recorded in the general locality of the proposed Pipeline Development. 32
Table 4: Heritage Listed Items within the Pipeline Development 37
Table 5: Potential waste generated during the construction phase 45

Figures

Figure 1: Preferred Pipeline Corridor 7
Figure 2: Overview of plant community types traversed by Pipeline Development. 30
Figure 3: Selected search area for a NSW BioNet threatened species across the area of the proposed pipeline development. 32

1. Introduction

1.1 Scope

This Preliminary Environmental Assessment for the McPhillamys Gold Project Pipeline Development (Pipeline PEA) has been completed by Blakelys Environmental on behalf of Regis Resources Ltd (Regis) for the Applicant, LFB Resources NL (a 100% wholly owned subsidiary of Regis).

The proposed Pipeline Development consists of a pipeline and ancillary infrastructure to transfer water from Centennial's Angus Place Colliery (Angus Place) & Springvale Coal Services Operations (SCSO) and Energy Australia's (EA) Mt Piper Power Station (MPPS) operations near Lithgow to the proposed Mine Site near Blayney. The water quality specification would vary according to the contribution from each of these water sources. This water would be used for mining-related purposes, including processing and dust suppression and would not be permitted to be discharged.

The Applicant

The Applicant, LFB Resources NL is a 100% owned subsidiary of Regis Resources Ltd. Regis is a publicly listed mining company trading on the Australian Stock Exchange (ASX:RRL). The Applicant has a proven record of developing gold resources into producing operations which include the 100% owned and operated Moolart Well, Rosemont and Garden Well Gold Mines located within the Duketon Gold Project area, approximately 130km north of Laverton in Western Australia. Production at the Duketon Gold Project is currently 300,000 to 360,000 ounces per annum.

The Applicant is controlled by a board of directors with a comprehensive range of skills and experience in mine development and operations, exploration, finance and administration. Further information in relation to the Applicant is available on its website at *www.regisresources.com*.

1.2 Background

The Mine Development is located approximately 8 kilometres north east of Blayney in the Central Tablelands of NSW. The McPhillamys Gold Project (McPhillamys or Mine Site) is a large tonnage, low grade gold deposit that would produce approximately 150,000 to 200,000 ounces per annum.

Approximately 13 megalitres per day ("ML/day") would be transferred from the pump station storage tank at MPPS for the mining and processing requirements during the operational phase of the indicative 15 year lifespan of the Mine Development.

An options assessment study undertaken in 2016 examined various water supply options including; treated wastewater discharged from the Bathurst Regional Council Waste Water Treatment Works, groundwater from the Upper Lachlan Alluvium Zone 2, surface water from the Belubula River (EMM, 2017) and surplus water from Centennial and EA. The study indicated that a pipeline connection from Centennial's and EA's operations could be a suitable option from a reliability, cost and environmental/social impact perspective.

The Applicant proposes to construct a pipeline along an approximate 80 km corridor to transfer water from three sources; Angus Place, SCSO and MPPS to the Mine Site near Blayney (Figure 1). The corridor will include the Pipeline Development and all pipeline easements which will vary between 5 and 20 metres wide (Pipeline Corridor).

1.3 Objectives and Overview of the Pipeline Development

The Pipeline Development is a water transfer scheme to take water from Angus Place, SCSO and MPPS following private land, existing power transmission line and gas pipeline easements, State forest tracks, and road and railway corridors to the Mine Site near Blayney.

The primary objectives of the proposal are to:

- Provide a pipeline from water storage tanks located at Angus Place, SCSO and MPPS to the water dam on the Mine Site; and
- Deliver an operating pipeline and ancillary infrastructure by 2019/2020.

The Pipeline Development will be approximately 80 km in length and will be located within the Local Government Areas (LGAs) of Lithgow, Bathurst and Blayney. Subject to detailed design, the necessary ancillary infrastructure will likely include:

- A 80km water transfer pipeline;
- Four (4) to six (6) pumping stations;
- Three (3) to five (5) water storage tanks;
- Isolation valves located approximately every 2-3km;
- Pressure reducing valves and scour valves;
- Power supply and controls; and
- A communications system.

Investigations are continuing to determine the specific pipeline route and location of pumping stations. Where possible, the Pipeline Corridor will be guided by an avoidance policy for sensitive land uses and environmental impacts.

The pipeline will be designed to accommodate a nominal flow of approximately 13 ML/day up to a maximum of 15 ML/day. The mode of operation of the system will provide continuous pumping and will take into account the potential for long term water supply disruption. The Pipeline Development would operate in conjunction with the Mine Development.

1.4 Purpose of this Preliminary Environmental Assessment

This PEA provides a preliminary assessment of the key issues associated with the Pipeline Development and outlines broad methodologies for subsequent detailed environmental assessment. Key environmental features are discussed further in Section 7.

The purpose of this PEA is to describe the key elements of the Pipeline Development, with the view to seek formal Secretary's Environmental Assessment Requirements (SEARs) from the Department of Planning and Environment NSW (DPE), including requirements from other government agencies, as the basis for the detailed Environmental Impact Statement (EIS) and further design development.

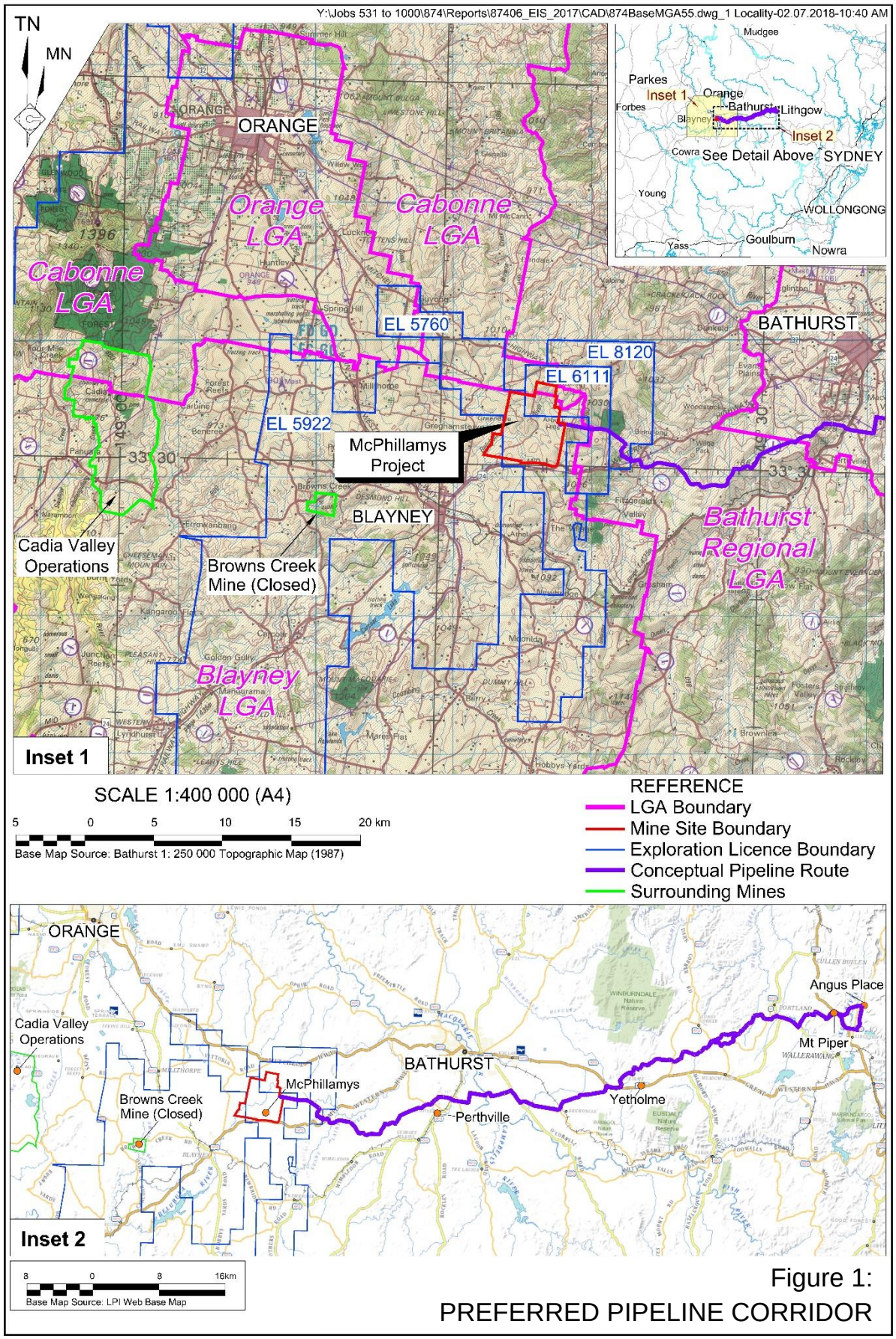

Figure 1:
PREFERRED PIPELINE CORRIDOR

2. Strategic need and options assessed

2.1 The need to establish a reliable water supply to the Mine Site

The operational water supply for the Mine Development is a key infrastructure requirement for the Applicant. The Mine Site occurs at the top of the Belubula River catchment, part of the Lachlan River Catchment. There is insufficient surface water or groundwater available close to the Mine Site to meet the Proposal requirements.

As a result, the Applicant has resolved that the primary source of water for the Mine Development would be water imported from off-site.

2.2 Options assessed

In assessing potential water supply options, *Water Supply Assessment* (EMM, 2017), several options for sources of water were identified that potentially could satisfy the requirement for the Mine Development.

These include:

1. The treated wastewater output of the Bathurst Regional Council ("BRC") Waste Water Treatment Works ("WWTW").

   A report on the environmental impact of diverting treated wastewater from the Bathurst WWTW to the Mine Development, undertaken by BRC, funded by Regis Resources Ltd in 2013, determined that the diversion of treated wastewater would have no significant impacts on the environment of the Macquarie River or on downstream users (including irrigators) with the proviso that 'Cease to Transfer' ("CTT") rules were applied during periods of low flow in the Macquarie River (GHD, 2013). However, notwithstanding this report BRC were unwilling to make a decision on the sale of the wastewater for use by the Project.

2. Surface water from the Belubula River

   There was insufficient reliable water available in the Belubula River to meet the Proposal requirements.

3. Surplus water from Springvale and MPPS

   Regis approached Centennial with a request as to whether surplus water from Centennial's dewatering operations could provide a reliable and sustainable source of water for the Proposal. Regis, Centennial and EA have entered into a Heads of Agreement (HOA), and are finalising a Water Offtake Agreement which would facilitate the use of surplus water from Springvale and MPPS to be used for the Proposal.

4. Upper Lachlan Groundwater Alluvium Zone 2

   In parallel with the assessment of the Springvale/MPPS water supply option, an investigation was undertaken to assess the potential of the Upper Lachlan Groundwater Alluvium Zone 2 to provide a reliable and sustainable water supply for the project. The Upper Lachlan Groundwater Alluvium Zone 2 has approximately 33GL /annum of groundwater licences available, of which an average of 12GL/annum is utilised. At the height of the millennium drought, this usage peaked at 19GL/annum leaving 14GL/annum unused. Based on the result of this investigation, Regis then secured 4.5GL/annum of licences as a contingent water supply source should the Springvale/MPPS option not proceed.

2.3 Pipeline Corridor

Based on the preference for the Springvale/MPPS option, a pipeline route assessment was undertaken. A number of alternative pipeline route options were considered in light of a range of economic, social and environmental factors (both positive and negative) to consider the trade-offs for each of the Pipeline Corridor options. The following criteria were used to determine the most appropriate option:

- Minimising the number of landholdings traversed;
- The use of public lands such as State Forests and road reserves to minimise disruption to land holders and environmental impacts;
- Potential pipe construction and operating costs as dictated by pipe length, number of creek and road crossings;
- Difficulty of construction (due to factors such as ground conditions and gradient);
- Selecting the route that would likely result in minimal disturbance of local vegetation and potential to impact on noteworthy environmental aspects; and
- Capital and operating costs.

The Pipeline Corridor shown in Figure 1 incorporates water from three sources - Angus Place, SCSO and MPPS.

The preferred Pipeline Corridor would, where possible, be primarily located within land owned or controlled by the Forestry Corporation of NSW and road reserves that have previously been cleared, with easements into private properties utilised where it minimises clearing impacts and / or represents a significant cost benefit.

2.4 Water Supply Agreements

Regis announced on 4 July 2017 that it had negotiated a non-binding heads of agreement with Centennial and EA to utilise surplus water sourced from Angus Place, SCSO and MPPS near Lithgow.

Regis also announced on 4 July 2017 that it had contractually secured approximately 4.5 GL/annum of groundwater allocation licences within Zone 2 of the Upper Lachlan Groundwater Alluvium Management Area. At the time of securing the licences, approximately 14GLpa of the total of 33GLpa of groundwater licences in Zone 2 remain unused on an annual basis, even when taking into account peak usage during the millennium drought.

The Applicant will retain this water supply option as a contingency in the event that its preferred water supply option does not proceed.

3. Proposal description

3.1 Regional context and site location

3.1.1 Region

The Lithgow LGA is located in Central West NSW approximately 150 km west of Sydney. The majority of the LGA is elevated more than 950 metres (mRL) above sea level. The Lithgow LGA is to the east of the Bathurst Regional LGA, which is to the east of the Blayney LGA.

The Pipeline Corridor lies within the northern section of the South Eastern Highlands Bioregion and traverses the Bathurst Regional, Capertee Uplands, Hill End, Orange sub-regions. These subregions are characterised by a variety of different landforms from the rounded and stepped hills of plateau around Lithgow to terrace alluvium around the Macquarie River.

3.1.2 Environmental context

The Pipeline Corridor lies within the Central Tablelands area of NSW. Reference levels in accordance with the Australian Height Datum (AHD) at the Angus Place storage tank site is approximately 975mRL. The Pipeline Corridor runs west bounded by Newnes to the north and the Blue Mountains National Park to the east. The area through which the Pipeline Corridor would traverse generally drains towards Yetholme. Agricultural land around Brewongle drains naturally to the Macquarie River approximately 6 km south of Bathurst. The pipeline Corridor will traverse a small area of biophysical strategic agricultural land (BSAL) to the south and south east of Bathurst.

The area from the Macquarie River to Fitzgeralds Mount is dominated by flat agricultural land, with an elevated area of forest around Fitzgeralds Mount. The average annual rainfall for the Bathurst region is 640 mm, with rainfall at its highest between October and March and at its lowest between April to September (BOM, 2017). The entire Pipeline Corridor is within the area managed by the Central Tablelands Local Land Service(CTLLS).

Two major rivers, the Macquarie River to the west, the Coxs River in the east and numerous creeks and unnamed tributaries are found within the Pipeline Development.

The natural ecosystems within the region have been extensively modified since European settlement and the extent of the component vegetation communities within the proposed Pipeline Development have been dramatically reduced, restricted to reserves, state forest, roadside and riverine vegetation corridors.

Major power transmission lines and gas pipeline infrastructure can be found within easements running east to west along the proposed Pipeline Development. During the course of refining the Pipeline Corridor, the use of these easements has been investigated, however the companies with the benefit of those easements were unable to permit the Pipeline Development within those easements. Following those easements would have resulted in the widening of clearing adjacent to those easements. The proposed Pipeline Corridor has been chosen instead of using those easements because the impact on the existing natural environment is significantly less, and the number of landholders impacted is significantly reduced.

3.2 Pipeline Development proposal

The Pipeline Development proposal is to construct and operate a water supply scheme that would transfer water from the three sources (Angus Place, Springvale Coal Services and Mt Piper power station) near Lithgow to the McPhillamys Mine Site near Blayney. The scheme includes:

- A 80km water transfer pipeline;
- Four (4) to six (6) pumping stations;

- Three (3) to five (5) water storage tanks;
- Isolation valves located approximately every 2-3km;
- Pressure reducing valves and scour valves;
- Power supply and controls; and
- A communications system.

The Pipeline Development, if approved is scheduled to be operational by 2019/2020.

Key construction activities include:

- Installation of off take valves and pump stations;
- Below ground installation of pipeline;
- Excavating rock with minimum impact on the environment in an economically sustainable manner;
- Construction of road, railway and river crossings; and
- Installation of power supply to pump stations.

Key operational activities would include:

- Maintenance of the pumping stations;
- Maintenance of the air valves and scour valves; and
- Other infrequent maintenance of the pipeline (e.g. pigging to remove scaling, or repairing of leaks if required).

3.3 Land access agreements

Ongoing consultation is being undertaken by the Applicant with landowners and utilities directly affected by or neighbouring the Pipeline Corridor:

- From Angus Place to Mt Piper power station, the pipeline runs along land owned mainly by Centennial Coal, Energy Australia and a haul road owned by Coal-Link Pty Ltd with minor intersections with land owned by the Forestry Corporation of NSW and private landowners. The Pipeline Corridor crosses Coxs River and the Castlereagh Highway at Blackmans Flat.
- From the Wallerawang Road/Pipers Flat Road south of Mt Piper power station, the Pipeline Corridor runs:
    - west along Wallerawang Road/Pipers Flat Road;
    - west along John Mackey Drive and across Sunny Corner Road to Reservoir Road;
    - Across Forest Corporation forests and then south and south-west along Bourkes Road until the junction with Sugarloaf Road;
    - South-west along Sugarloaf Road to the junction with Sunny Corner Road, then south over Forestry tracks turning briefly west along Kelly Boundary Road and then south west along Forestry tracks to Egan Road;
    - West along Egan Road, then south along Ridge Road until crossing farmland to Sunny Corner Road near the junction with Kirk Connell Forest Road;
    - West along Kirk Connell Forest Road, turning south along Macabees Road then immediately west along Phillips Boundary Road and south along Stoney Trig Road;

- West along Gulf Boundary Road, a short crossing over native forest and then south along Sibleys Road until turning west along Yetholme Drive and then briefly west along the Great Western Highway;
- Turning south from the Great Western highway across farmland, across Brewongle Lane, across the railway line just north of the town of Brewongle and then west along Tarana Road to the junction with O'Connell Road;
- North -west along O'Connell Road then west across farmland tracks to Thompsons Hill retreat, north along White Rock Road to the Macquarie River;
- Under the Macquarie River and remerging on Montavella Road, south on Gormans Hill Road and then west along a fenceline, crossing Lagoon Road to Vale Road at Orton Park (south of Bathurst);
- Across Vale Road then across Council land to the south of the Bathurst rubbish tip and bike velodrome and south west over farmland near an unmade road, crossing Hen and Chicken Lane and south-west and west over farmland until crossing the Mid Western Highway at Bathampton; and
- Across scattered treed landscape until Forestry lands to the north-west and along forest roads, crossing Gardiners Road and them to the Mine Site.

The Applicant would need to reach a negotiated agreement with property owners to acquire access and easement rights. There are estimated to be approximately 19 property owners along the Pipeline Corridor. The Pipeline Corridor provides suitable flexibility to adjust the final pipe position should access, easement rights, environment, heritage or other issues cause a need to do so.

Ongoing access to the Pipeline Corridor would be required to allow for regular inspections and maintenance.

3.4 Construction

3.4.1 Site establishment (site compounds)

Primary and secondary site compounds would be required for the construction phase of the Pipeline Development. Primary compounds would predominantly be used for site offices, amenities, storage of major plant, equipment and materials. Primary compounds would be located in close proximity to major construction areas.

Secondary site compounds would be predominantly used for storage of minor plant, equipment and materials. Nominal amenities may also be provided in these locations. Secondary site compounds would also be located in areas close to major construction works. However, the area of secondary site compounds would generally be smaller than primary site compounds.

3.4.2 Pipeline construction

The pre-feasibility design for the Pipeline Development primarily uses pipe technology with a 400mm to 500mm diameter nominal pipe size, buried underground with a nominal 800mm cover to the top of the pipe.

The construction Pipeline Corridor would have where necessary, a 5-20m wide licenced area for construction in addition to the 10m wide easement for the pipe infrastructure. If required, intermittent pipe storage areas would be established along the Pipeline Corridor. Tree clearing or trimming may be required at intermittent points along the Pipeline Corridor to provide clearance for the construction and ongoing inspection and maintenance of the pipeline. Following construction, the easement will be maintained as a cleared landscape to allow access for maintenance activities.

The following construction activities would occur for the installation of the pipeline:

- Access road provision;
- Delivery and stringing of pipes along proposed route;
- Excavation and installation of pipeline support structures, with trench spoil mounded to one side;
- Installation of the pipe;
- Crossing of major roads, railways and rivers; and
- Rehabilitation, commissioning and operation.

A range of heavy plant including excavators and trenchers would be required to access the Pipeline Corridor during construction.

3.4.3 Pumping station construction

The terrain profile of the pipeline will require installation of four to six pumping stations along the Pipeline Corridor.

Pumping stations would be located at Angus Place, SCSO and Mt Piper power station on land owned by Centennial or Energy Australia. Additional pumping stations would be located at other points along the route pending the outcomes of detailed design phase.

Each pumping station facility would be located within a security-fenced compound. The compound would include a covered water storage tank, power supply and a protective structure (container, shed or cover), which would house up to four pumps (duty and standby) to maximise efficiency and allow for greater flexibility in servicing and maintenance.

3.4.4 Transmission line construction

A minimal amount of tree clearing may be required to enable connection of the power supply (11kV) to the Angus Place, SCSO and Mt Piper power station pumping station facilities, which would be located on land owned by Centennial Coal or Energy Australia.

The power supply for the additional pumping stations would be via the connection to existing transmission lines near to the Pipeline Corridor or alternatively using diesel / solar generated power.

3.4.5 Access and Easement Acquisition

The Pipeline Development would require access agreements along the Pipeline Corridor to enable the necessary environmental surveys to be undertaken, and easement rights along the Pipeline Corridor prior to the commencement of any construction activities. The Pipeline Development would also require permission to occupy any existing easements across public and private utilities (e.g. roads and other services).

3.4.6 Crossings

The Pipeline Development would cross railway lines, major and minor roads (including the Castlereagh, Great Western and Mid-Western Highways), major and minor creeks, and the Macquarie River. Where required, under-boring installation techniques would be used to cross major roads, railway lines and waterways.

The appropriate installation techniques would be determined following consideration of technical and geological constraints during the detailed design phase.

3.4.7 Private property access during construction

Private vehicle access to surrounding private properties would be maintained throughout the construction program. If existing vehicle access routes are temporarily or permanently severed, alternate routes would be provided.

3.4.8 Construction hours

Construction hours would be determined as part of the detailed design and be included in the EIS, however it is anticipated that construction activities would normally be restricted to daylight hours (indicatively 6.00am to 6.00pm). These hours might be adjusted if there was to be potential impacts to property owners or critical services (e.g. road access) in specific areas. Any requirement for extended working hours would be assessed in accordance with the *Interim Construction Noise Guideline.*

3.5 Operation phase

3.5.1 Water transfer

Water would be sourced from storage tanks located at Angus Place, SCSO, and MPPS. The size of these storage tanks would be determined as part of the detailed design. This water is surplus to the operational requirements of Centennial and EA and originates from the following sources:

- Surplus ground water at Angus Place which is currently discharged by Centennial at their licenced discharge point LDP001;
- Water at SCSO which is currently discharged by Centennial at their licenced discharge point LDP006; and
- By-product water (brine) at MPPS which would originate from the proposed new water treatment plant.

The Pipeline Development would be designed to accommodate an average flow of 13 ML/day with a maximum flow of 15 ML/day. The transfer of water to the Mine Site would be preferentially sourced from SCSO then MPPS and finally Angus Place.

The water quality specification would vary according to the contribution from each of the water sources above and is estimated to have an average total dissolved solids of approximately 2,500mg/l, or an average nominal electrical conductivity (at 25 degrees Celsius) of approximately 4,000 µS/cm. Further details of water quality will be included in the EIS.

The water transfer system would be designed so that any single source or any combination of all three sources is capable of meeting the required 13 ML/day average flow. Alternative water source locations would be made available if these specific locations were unable to supply the required volume of water. Pumping would occur on a continuous basis 24 hours a day, with standby pumps starting in the event that a duty pump stopped. Planned maintenance would take place on an as required basis. Water would not be transferred into the pipeline during any periods of planned or unplanned maintenance or shutdowns and would be managed at source. Further details of the operation of the system will be determined during detailed design.

The water from the Pipeline Development would be transferred into a water dam/s located at the Mine Site, which would have an overall capacity of approximately 300ML to 600ML.

3.5.2 Maintenance

During the operational phase, the Applicant would periodically inspect the Pipeline Development and undertake routine and planned maintenance to ensure that the pipeline is functioning adequately. Fault detection systems will be incorporated within the pipeline design. In the unlikely event of a pipe leak, the fault detection systems would shut down the water transfer and notify the operator that an inspection of the system is required. The maintenance team would then undertake any necessary repairs and would remain in the cleared pipeline easement so as to avoid disturbance to the natural environment.

4. Planning framework

This section provides a discussion of the relevant Acts, environmental planning instruments and approvals applicable to the Pipeline Development.

4.1 Approval process

4.1.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act and the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) establish the statutory planning context for assessment and approval of the proposed works.

Section 4.36 of the EP&A Act allows a State Environmental Planning Policy (SEPP) to declare any development to be State Significant Development. The Minister is the consent authority for State Significant Development. State Environmental Planning Policy (State and Regional Development) 2011 declares mining related works ancillary to a mine with a capital investment value of $30 million or more as State Significant Development (refer to clause 5(3) of Schedule 1).

Section 4.38(2) of the EP&A Act prohibits approval of State Significant Development if the development is wholly prohibited by an environmental planning instrument. The Pipeline Corridor is likely to traverse land zoned RU3 Forestry under Bathurst Regional Local Environment Plan 2014, which prohibits water supply systems (refer to section 4.1.3 below). However, the Minister may grant consent if only part of the Pipeline Development is prohibited by an instrument (Section 4.38(3)).

In accordance with section 4.41 of the EP&A Act the following authorisations are not required for State Significant Development that has received development consent:

- a permit under section 201, 205 or 219 of the Fisheries Management Act 1994;
- an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977;
- an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974;
- a bush fire safety authority under section 100B of the Rural Fires Act 1997; and
- a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the Water Management Act 2000.

An order under the Heritage Act 1997 (Division 8 of Part 6) that restricts harm to a building, work, relic or place that is not the subject of an Interim Heritage Order or a State heritage order cannot prevent the approval and carrying out State Significant Development.

A State agency cannot refuse the following authorisations for State Significant Development that has received development consent and the authorisation is to be substantially consistent with the consent:

- an aquaculture permit under section 144 of the Fisheries Management Act 1994;
- an approval under section 15 of the Mine Subsidence Compensation Act 1961;
- a mining lease under the Mining Act 1992;
- a production lease under the Petroleum (Onshore) Act 1991;

- an environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act);
- a consent under section 138 of the Roads Act 1993; and
- a licence under the Pipelines Act 1967.

The above does not apply to the renewal of an authorisation.

Clause 1(g1) in Schedule 1 of the EP & A Regulation 2000 requires a list of any authorisations that must be provided under section 4.42 of the EP & A Act. The authorisations relevant to this Pipeline Development are discussed in further details in the relevant sections of this section.

4.1.2 State Environmental Planning Policies

State Environmental Planning Policy (State and Regional Development) 2011

Under State Environmental Planning Policy (State and Regional Development) 2011 (SEPP State & Regional Development) various activities are set out in Schedule 1 as being State Significant Development (SSD). These relevantly include Clause 5 Mining:

- development for mining where there is a capital investment value of $30 million or more, or
- mining related works (including primary processing plants or facilities for storage, loading or transporting any mineral, ore or waste material) that is:
    - ancillary to or an extension of another State Significant Development project, or
    - has a capital investment value of $30 million or more.

The Proposal, which include the Mine Development and the Pipeline Development requires a capital investment value greater than $30 million and is therefore considered a State Significant Development.

Clause 11 of SEPP (State and Regional Development) 2011 stipulates that development control plans (whether made before or after the commencement of the SEPP) do not apply to State Significant Development.

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

Under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007, Biophysical Strategic Agricultural Land (BSAL) with high quality soil and water resources capable of sustaining high levels of productivity are to be safeguarded.

BSAL has been mapped at a regional scale across NSW and the Pipeline Corridor crosses a small portion of BSAL south of Bathurst.

Under clause 17A of the Mining SEPP, BSAL must be considered for new mining leases issued under the Mining Act 1992. However, cl17A(2) indicates that the definition of “mining or petroleum development” does not include development carried out on land that is outside the mining area of a proposed mining lease or outside the area of a proposed production lease. Further assessment as set out under the gateway process under Part 4AA specifically excludes any associated development, such as linear infrastructure, outside the area of a proposed mining or production lease. Consequently, further assessment of BSAL is not required under the Mining SEPP.

Amendments to the SEPP were exhibited until 16 February 2018. Those amendments aim to update the SEPP to the amended noise and air quality criteria of the Environment Protection Authority and the Voluntary Land Acquisition and Mitigation Policy. The amendments, if gazetted, will affect the non-discretionary development standards for air and noise in clause 12AB of the SEPP.

State Environmental Planning Policy No 44 Koala Habitat Protection

The State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

The Blayney, Lithgow and Bathurst LGAs are listed under SEPP 44 as having potential koala habitat. A preliminary Flora and Fauna Assessment identifying potential impacts of the Pipeline Development (provided in Section 7.2 - Flora and Fauna Assessment). The assessment concludes the proposed Pipeline Corridor passes through land where threatened species and ecological communities have been recorded or potentially occur. The impact of the proposal on potential koala habitat should be assessed as part of the EIS.

Amendments to the SEPP 44 have been exhibited between 18 November 2016 and 3 March 2017. Amongst other matters, it increases the number of feed trees listed in Schedule 2. The draft amendments will be considered as part of the EIS.

State Environmental Planning Policy 55 (Remediation of Land)

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) specifies certain considerations for development on land with respect to the potential for contamination, particularly for sensitive land uses such as development for residential, educational or recreational purposes. SEPP 55 and Managing Land Contamination: Planning Guidelines – SEPP 55 Remediation of Land (NSW EPA 1998) are currently under review. Potentially contaminated lands are addressed in Section 7.5 of this preliminary assessment.

4.1.3 Local Environmental Plans

Lithgow Local Environment Plan 2014

The pump stations, transmission line, river crossing and the eastern section of the pipeline would be located within the Lithgow Local Government Area which is subject to the Lithgow Local Environmental Plan 2014 (Lithgow LEP). The land within this section of the Pipeline Corridor has a number of zonings including:

- RU1 Primary Production where water supply systems are permissible;
- R5 Large Lot residential where water supply systems are permissible;
- SP2 Electricity Generating Works; where development ordinarily incidental or ancillary to that purpose is permissible;
- SP2 Roads and Traffic;
- SP2 Parks and Public Reserves (possibly, being the cemetery at the corner of Portland Sunny Corner Road and Reservoir Road); and
- RU3 Forestry.

Water supply systems are not a permissible use in RU3, or in SP2 Roads and Traffic or SP2 Parks and Public Reserves. However, the Minister may grant consent if only part of the project is prohibited by an instrument (Refer to Section 4.1.1 above).

The Pipeline Corridor largely avoids the area mapped as Biodiversity, but does cross land mapped as groundwater vulnerable and sensitive land areas.

Bathurst Regional Local Environment Plan 2014

The pump stations, transmission line and the middle section of the pipeline would be located within the Bathurst Regional Local Government Area which is subject to the Bathurst Regional Local Environmental Plan 2014 (Bathurst LEP). The land within this section of the Pipeline Corridor has a number of zonings including:

- RU1 Primary Production where water supply systems are permissible;
- RU4 Primary Production Small Lots where water supply systems are permissible;
- RU3 Forestry;
- SP2 Classified Road; and
- SP2 Railway.

Water supply systems are not a permissible use in RU3, or in SP2 Classified Roads or SP2 Railway. However, the Minister may grant consent if only part of the project is prohibited by an instrument (Refer to Section 4.1.1).

Part of the land is in the area mapped as drinking water catchment and the land immediately adjacent to the Macquarie River is mapped as flood prone land. There is a heritage item I97 - Leeholme Homestead and Outbuildings on O'Connell Road near the junction with Tarana Road, which will be adjacent to the Pipeline Corridor.

Blayney Local Environment Plan 2012

The pump stations, transmission line and the western section of the pipeline would be located within the Blayney Local Government Area which is subject to the Blayney Local Environmental Plan 2012 (Blayney LEP). The land within this section of the Pipeline Corridor has two zonings including:

- RU1 Primary Production where water supply systems are permissible; and
- RU3 Forestry.

Water supply systems are not a permissible use in RU3, However, the Minister may grant consent if only part of the project is prohibited by an instrument (Refer to Section 4.1.1). A small part of the proposed Pipeline Corridor may be mapped as biodiversity.

4.2 Commonwealth legislative considerations

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) regulates actions that may have a significant impact on matters of National Environmental Significance, which include:

- World Heritage properties;
- National Heritage places;
- Wetlands of international importance;
- Listed threatened species and ecological communities
- Migratory species protected under international agreements;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mines).

Under Part 6 of the EPBC Act, actions likely to impact on matters of National Environmental Significance require approval from the Commonwealth Minister for the Environment.

A Protected Matters search under the EPBC Act returned no records of World Heritage properties, National Heritage places, Commonwealth marine areas, Commonwealth heritage places or nuclear actions. However, the following matters of National Environmental Significance were identified as likely to occur within the Local Government areas associated with the Pipeline Development:

- One (1) endangered ecological community;
- Sixteen (16) threatened species; and
- Eight (8) migratory species.

An assessment of matters of national environmental significance as listed under the EPBC Act in accordance with the EPBC Act Administrative Guidelines would be undertaken as part of the EIS for the Pipeline Development.

4.2.2 Native Title Act 1993

The Native Title Act 1993 administers processes relating to the recognition, protection and determination of native title and dealings with native title land.

Native title is concerned with the rights and interests of Aboriginal and Torres Strait Islander peoples in relation to land and water in Australia and its territories. The Act is administered by the National Native Title Tribunal.

A search of the Native Title Register found there is currently one Native Title Claim application registered that intersects with the Pipeline study area. The claimants are Warrabinga-Wiradjuri #7 and the claim area covers the area from near Mt Piper Power Station to around Sunny Corner. Though the application has not yet been determined, the impact of the Pipeline Development on the application would be assessed as part of the EIS. Any Crown land that the pipeline passes through within the registered claim area has potential to trigger the need for native title negotiations.

Warrabinga Wiradjuri #9 has registered a claim over small parcels of land near The Lagoon –south of the proposed route where it crosses the Macquarie River near Bathurst. The Bathurst and O'Connell Plains Wiradyuri Native Title Claim Group have lodged a claim over small parcels of land to the south of the Pipeline Corridor near The Lagoon, however this claim has not been accepted for registration (as at 19 April 2018 determination) as it does not satisfy all of the conditions in s190C of the Native Title Act.

4.3 Relevant NSW legislation

The following NSW legislation may have relevance to the Pipeline Development, and, will be considered in the EIS:

4.3.1 Biodiversity Conservation Act 2016

The Biodiversity Conservation Act 2016 (BC Act) has repealed the Threatened Species Conservation Act 1995, the Nature Conservation Trust Act 2001 and the animal and plant provisions of the National Parks and Wildlife Act 1974. The BC Act protects species of threatened flora and fauna, endangered populations and endangered ecological communities and their habitats in NSW.

A Flora and Fauna Assessment has been prepared to assess the potential impacts of the Pipeline Development (provided in Section 7.2 - Flora and Fauna Assessment). The assessment identified threatened species and endangered ecological communities as likely to occur within the Local Government areas associated with the Pipeline Development.

The assessment concludes the proposed Pipeline Corridor passes through land where threatened species and ecological communities have been recorded or potentially occur. The BC Act establishes the need for a Biodiversity Development Assessment Report (BDAR) using the Biodiversity Assessment Method (BAM). Biodiversity credits via an offsets scheme are required for development impacts on threatened species, individuals or area of habitat. Details are also provided in the Biodiversity Conservation Regulation 2017. The impact of the Pipeline Development on threatened species and endangered ecological communities would be assessed by an accredited assessor as part of the EIS.

4.3.2 Biosecurity Act 2015

The Biosecurity Act 2015 (Biosecurity Act) repeals the Noxious Weeds Act 1993, which previously provided regulatory controls and powers to manage noxious weeds in NSW. The Biosecurity Act guides the management of weeds at the regional level throughout NSW. Under the Biosecurity Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant who knows or ought to know of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Individual land holders and managers are required under the Biosecurity Act to control priority weeds for their area according to the relevant biosecurity toolset. Priority weeds were identified at the site and will discussed further in the EIS. These weeds would be managed in accordance with the Biosecurity Act 2015.

4.3.3 Contaminated Land Management Act 1997

The Contaminated Lands Management Act 1997 provides the management framework for contaminated sites in NSW and is administered by the EPA. No registered contaminated sites were identified in vicinity of the Pipeline Corridor.

4.3.4 Crown Lands Act 1989

The Crown Lands Act 1989 (Crown Lands Act) sets out how Crown land is to be managed in NSW. The Crown Lands Act is administered by Crown Lands Division within the Department of Industry.

Under s155 of the Crown Lands Act it is an offence to erect a structure, clear or dig up public land without a lawful authority. Elements of the Pipeline Corridor within Crown Land could require authorisation by a lease, licence or other permit to allow the use of Public Land (section 45 of the Crown Lands Act). The Department of Industry would be consulted with regards to the Pipeline Development and the EIS would identify relevant requirements for Crown Land access.

4.3.5 Crowns Land Management Act 2016

The Crown Lands Management Act 2016 was passed in November 2016 and the majority of the provisions commenced on 1 July 2018. Upon coming into force, this Act will consolidate eight pieces of legislation into one, including repealing the Crown Lands Act 1989. The Crown Land Management Regulations 2018 will also largely commence on 1 July 2018, although some provisions have already commenced. The aim of the new legislation is to reduce complexity and duplication with regard to management of Crown Lands. The impact of the Proposal on Crown Lands would be assessed as part of the EIS.

4.3.6 Fisheries Management Act 1994

The Fisheries Management Act 1994 (FM Act) aims to conserve fish stocks and key fish habitats, and protect threatened species, populations and ecological communities of fish and marine vegetation, including providing viable commercial and recreational fishing. Part 7A of the FM Act establishes a scheme for identifying endangered and vulnerable species, populations and ecological communities, including those which are nationally threatened. Offences are included for damage to habitat, although licences can be issued by the Secretary to undertake activity that will harm or damage species, populations or ecological communities or their habitats.

The Pipeline Corridor crosses the Macquarie River, Coxs River and a number of small creeks. The impact on communities protected under the FM Act will be assessed as part of the EIS.

4.3.7 Forestry Act 2012

The Forestry Act 2012 (Forestry Act) establishes the Forestry Commission of New South Wales which manages the forestry operations from State forests or land owned by the Forestry Corporation. The Forestry Corporation owns the trees in any plantation that is or is part of a State forest (section 12(1) of the Forestry Act). The Forestry Act allows for the dedication of Crown Land as State forest. Section 34(1) of the Forestry Act allows the Minister to grant easements through or over land within a State forest or flora reserve. Part 5 allows for the use of forestry areas for non-forestry purposes. The Department of Primary Industries and the Forestry Corporation of NSW will be consulted when writing the EIS and the Forestry Act provisions relevant requirements identified.

4.3.8 Heritage Act 1977

The Heritage Act 1977 (Heritage Act) is a statutory tool designed to conserve environmental heritage in NSW. It is used to regulate development impacts on the state's historical heritage assets. The Heritage Act defines a heritage item as "a place, building, work, relic, moveable object or precinct". To assist with the management of the State's heritage assets, the Heritage Act distinguishes between items of local and State heritage significance. Items that are assessed as having State heritage significance are be listed on the NSW State Heritage Register. Proposals to alter, damage, move or destroy heritage items listed on the State Heritage Register or protected by an Interim Heritage Order, require an approval under section 60 of the Heritage Act unless they involve works that are exempt from the need to obtain approval from the Heritage Council.

There are 7 heritage listed items within 500 metres of the Pipeline Corridor. Of these two are directly adjacent to the proposed Pipeline Corridor. The impact of the Pipeline Development on heritage listed items would be assessed as part of the EIS.

4.3.9 Local Land Services Act 2013

The Local Land Services Act 2013 (Local Land Services Act) regulates the clearing of native vegetation on rural land in NSW. However, the Local Land Services Act does not apply to any clearing that is authorised under other legislation, including an activity carried out by a determining authority within the meaning of Part 5 of that Act after compliance with that Part (s60O(b)).

As the Pipeline Development would require development consent under the EP&A Act, the Local Land Services Act 2013 does not apply.

4.3.10 Native Title (New South Wales) Act 1994

Section 165 of the Native Title (New South Wales) Act sets out the functions of the Office of the Registrar Aboriginal Land Rights Act 1983 (NSW). These functions include registering land claims and maintaining the Register of Aboriginal Land Claims, maintaining the Register of Aboriginal Owners, approving the rules of Aboriginal Land Councils, issuing compliance directions, investigating complaints and mediating disputes. The Office would be consulted and the outcomes described in the EIS.

4.3.11 Pipelines Act 1967

The Pipeline Act 1967 requires licensing of certain pipelines. However, a license is not required for a pipeline that is to be constructed for the purpose of supply of water (including for irrigation), the drainage of land or the conveyance of waste water, mine water, aqueous slurries of minerals, mineral concentrates or mineral tailings unless required by the Minister.

4.3.12 Protection of the Environment Operations Act 1997

The NSW Environment Protection Authority (EPA) is responsible for the administration of the Protection of the Environment Operations Act 1997 (POEO Act). The POEO Act regulates air, noise, land and water pollution. Activities listed under Schedule 1 of the POEO Act are scheduled activities that require an Environment Protection Licence (EPL). The most relevant is under clause 29 – Mining for Minerals, which includes:

- mining, processing or handling minerals if it disturbs more than 1 hectare of a gold mine, by clearing or excavating; or
- by constructing dams, ponds, drains, roads, railways or conveyors; or
- storing overburden or tailings.

An EPL is granted by the Environment Protection Authority of NSW and generally requires renewal annually with annual licence fees. It also contains conditions which are additional to those set out in any development approval. Although the Pipeline Development would not appear to require an EPL, the EPA would be consulted, and their requirements described in the EIS.

4.3.13 Protection of the Environment Operations (Waste) Regulation 2014

The Protection of the Environment Operations (Waste) Regulation 2014 sets out the provisions with regards to non-licensed waste activities and non-licensed waste transporting, in relation to the way in which waste must be stored, transported, and the reporting and record-keeping requirements. The disposal of construction waste including spoil and operational water by-products would be required to comply with this regulation.

4.3.14 Roads Act 1993

Under Section 138 of the Roads Act 1993 a person must not erect a structure or carry out a work in, on or over a public road, other than with the consent of the appropriate roads authority.

Lithgow City Council, Blayney Shire Council and Bathurst Regional Council are the relevant roads authorities for local roads. The Great Western Highway and Mid Western Highway are Classified State Roads. All works within the road corridors will require approval from the relevant roads authority and any works within the Great Western Highway or Mid Western Highway corridors will require the concurrence of Roads and Maritime Services under Section 138(2) of the Roads Act 1993.

4.3.15 Waste Avoidance and Resource Recovery Act 2001 (WARR Act)

The WARR Act seeking to encourage the most efficient use of resources and aims to reduce environmental harm in accordance with the principles of ecological sustainable development. The resource management hierarchy principles embodied in the WARR Act are:

- Avoid unnecessary resource consumption;
- Recover resources (including reuse, reprocessing, recycling and energy recovery); and
- Dispose (as a last resort).

Waste management would be discussed further in the EIS and a construction waste management plan would be prepared prior to the commencement of construction.

4.3.16 Water Act 1912

In those water sources (rivers, lakes and groundwater aquifers) in NSW where water sharing plans have not commenced, the Water Act 1912 still governs the issue of new water licences and the trade of water licences and allocations. The EIS would provide details of the water source, whether it is subject to a water sharing plan and Centennial Coal's existing Water Access Licence arrangements.

4.3.17 Water Industry Competition Act (WIC Act) 2006

The WIC Act establishes a regime for private water utilities to access, operate and operate water infrastructure and is regulated by the Independent Pricing and Regulatory Tribunal (IPART). The Applicant is likely to apply for a Network Operator Licence, on the basis that that it will be constructing, maintaining and operating water industry infrastructure. A WIC License will facilitate the use of the extracted water to convey water from outside the water sources specified in water access licenses, water use and water supply works approvals to convey water to the Mine Site.

4.3.18 Water Management Act 2000

The object of the Water Management Act 2000 (WM Act) is the sustainable and integrated management of the State's water for the benefit of both present and future generations. The WM Act is the main piece of water legislation for NSW ensuring secure access of water for users and that water is provided for the environment.

In accordance with section 4.41 (1)(g) of the EP&A Act a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the WM Act 2000 are not required for State Significant Development that has received development consent (refer to section 4.1.1).

An aquifer interference approval under Section 91 of the WM Act is required if more than 3 ML of groundwater is extracted per annum. Based on the consideration of soils, geology and climate it is considered unlikely that groundwater would be intercepted during the construction works and therefore an aquifer interference approval is not likely to be required. However, this would be confirmed by the geotechnical assessment prepared for the EIS.

Water Access Licence

The WM Act provides for a local water utility to gain water access for town supply through a special purpose access licence. The WM Act also provides the legislative framework for water transactions in NSW. A Water Access Licence (section 56) is required to extract water. The EIS would provide details of Centennial Coal's existing Water Access Licence for water supply arrangements.

4.3.19 Wilderness Act 1987

The Wilderness Act 1987 provides the legislative framework for the nomination, assessment, identification and declaration of wilderness and its subsequent management in NSW. The Wilderness Act 1987 is administered by the Office of Environment and Heritage (OEH) and the National Parks and Wildlife Service is responsible for the investigation, protection and management of wilderness areas in NSW.

There are no declared wilderness areas located within, or in close proximity to the Pipeline Corridor.

5. Consultation and stakeholder engagement

To date, initial consultation is being carried out with over 19 landowners who adjoin the Pipeline Corridor. A communications and stakeholder engagement strategy continues to be developed to provide the local community, statutory and industry stakeholders with information about the Proposal and provide them with clearly defined opportunities to provide informed feedback.

The Applicant proposes to undertake an appropriate level of consultation with relevant communities and stakeholders listed in Table 1.

Table 1: Stakeholders and communities and their key interests in the proposals. Note additional groups may be identified during subsequent stages.

Stakeholder	Interest
Neighbouring Local Governments – Lithgow, Bathurst, Blayney	Approval requirements including local road crossings, environmental planning and assessment land use planning approvals and management plans.
Government Members	Federal and State Ministers and Senators.
NSW Department of Industry (formally NSW Office of Water)	Water licensing and other water management approvals, including impact on Crown Lands.
NSW Department of Planning and Environment	Environmental assessment and approval. Environmental protection and approvals related to flora and fauna, vegetation clearing, waterway crossings, heritage, threatened species, ecological communities and habitats.
NSW Roads and Maritime Services	Road and traffic management planning and road crossings and works, structures and activities affecting roads.
NSW Department of Primary Industries	Forestry, agriculture, fishing and aquaculture management
Forestry Corporation of NSW	State Forests including removal of some trees.
NSW Rural Bushfire Service	Bushfire management.
Utilities (APA, Transgrid, telecom, cable etc)	Construction of the pipeline within close proximity or within or along existing easements.
Commonwealth Department of Environment and Energy	Environmental assessment and approval.
Private landowners	Access, easements, noise, visual, air quality, rehabilitation and other impacts associated with the construction and operational of pipeline within property.

Stakeholder	Interest
Local Aboriginal Land Councils and Aboriginal stakeholder groups;	Indigenous culture protection.
Business community groups	Impacts to business operations and further economic development opportunities.
Transport and emergency services;	Access to properties and potential to use water for emergency services.
Road users (local and regional road network users)	Impacts to traffic and access due to road works and changes to the network during both construction and operation.
The wider community	Progress of the proposal and any changes.

Consultation would continue to be carried out during the preparation of the EIS for the Proposal, and would include appropriately timed publications, information sessions and landholder negotiations. Results of all consultation would be summarised, and outcomes of issues addressed through consultation would be included in the EIS for the Proposal.

6. Preliminary environmental assessment methodology

This section provides an overview of the methods used to conduct the Preliminary Environmental Assessment (PEA). The PEA itself is provided in Section 7.

6.1 Scope

This PEA documents a preliminary assessment of the key issues associated with the Proposal and outlines broad methodologies for undertaking a more detailed EIS.

The scope of this PEA for the Pipeline Development Appendix and the Mine Development was to undertake a preliminary study aimed at describing the possible environmental impacts associated with the Proposal.

6.2 General environmental issues

The general environmental issues associated with the Proposal have been identified based on existing data and knowledge held by the Applicant, preliminary investigations undertaken and an understanding of the statutory framework and general approvals requirements. The broad environmental areas identified that may be impacted by the Proposal that would require assessment and management include (in no particular order):

- Flora and fauna;
- Surface water and groundwater;
- Soils and geology;
- Land use;
- Traffic and transport;
- Social and economic considerations;
- Noise and vibration;
- Air quality;
- Landscape and visual amenity;
- Aboriginal and non-indigenous heritage;
- Greenhouse gases; and
- Resource use and waste management.

6.3 Desktop study

A desktop level study was undertaken to describe the existing environment and the broad potential impacts from the proposal in each of the areas listed above. The results from this desktop assessment are provided in Sections 7.2-7.12. The outcomes would be used to inform the development of future work and investigations that should be undertaken as part of the subsequent EIS.

6.4 Pre-feasibility study report

A pre-feasibility study was prepared for the Applicant by DP8 Engineering in March 2017. This report investigated the following factors to determine which Pipeline Corridor was most suitable:

- Minimising the number of landholdings traversed;
- Potential pipe construction and operating costs as dictated by pipe length, number of creek and road crossings;
- Difficulty of construction (due to factors such as ground conditions and gradient);
- Selecting the route that would likely result in minimal disturbance of local vegetation and potential to impact on noteworthy environmental aspects; and
- Capital and operating costs.

Detailed investigations into this Pipeline Corridor are ongoing. The preferred Pipeline Corridor has changed over time, taking into consideration negotiations with landholders, infrastructure providers and the existing vegetation. One of the principal determining factors was the desire to minimise clearing impacts.

7. Preliminary Environmental Assessment

7.1 Introduction

This section provides a preliminary assessment of the environmental impacts that may be associated with the Pipeline Development. Key features of the existing environment, potential environmental issues resulting from the Pipeline Development, and proposed assessment methodologies have been reviewed.

7.2 Flora and fauna

7.2.1 Existing environment

The Pipeline Development crosses the northern section of the South Eastern Highlands Bioregion. Within this bioregion there are 138 species listed as vulnerable, 90 species listed as endangered and 25 critically endangered species. Two endangered populations and 11 endangered ecological communities are also listed (OEH, 2017). This bioregion is bound by the South Western Slopes bioregions to the west and Sydney Basin to the east (OEH, 2017).

The majority of the Pipeline Corridor passes through highly modified land that has generally been cleared for agriculture, is State Forest under the management of the Forestry Corporation of NSW, or is within road corridors. Some minor sections pass through land where threatened species and ecological communities have been recorded or have the potential to occur.

Vegetation and endangered ecological communities

Existing regional scale vegetation mapping identifies that the proposed Pipeline Development traverses 15 plant community types (PCTs) (Figure 2). A list of these communities and the length of the Pipeline Development within each of the 15 communities is detailed in Table 2.

It is likely that the Pipeline Development may pass through limited areas mapped as endangered ecological communities. These are the Box-gum Woodland (Biodiversity Conservation Act, 2016 and under specific criteria), White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (under the EPBC Act) and Tablelands Snow Gum, Ribbon Gum, Candlebark grassy woodland (Biodiversity Conservation Act, 2016).

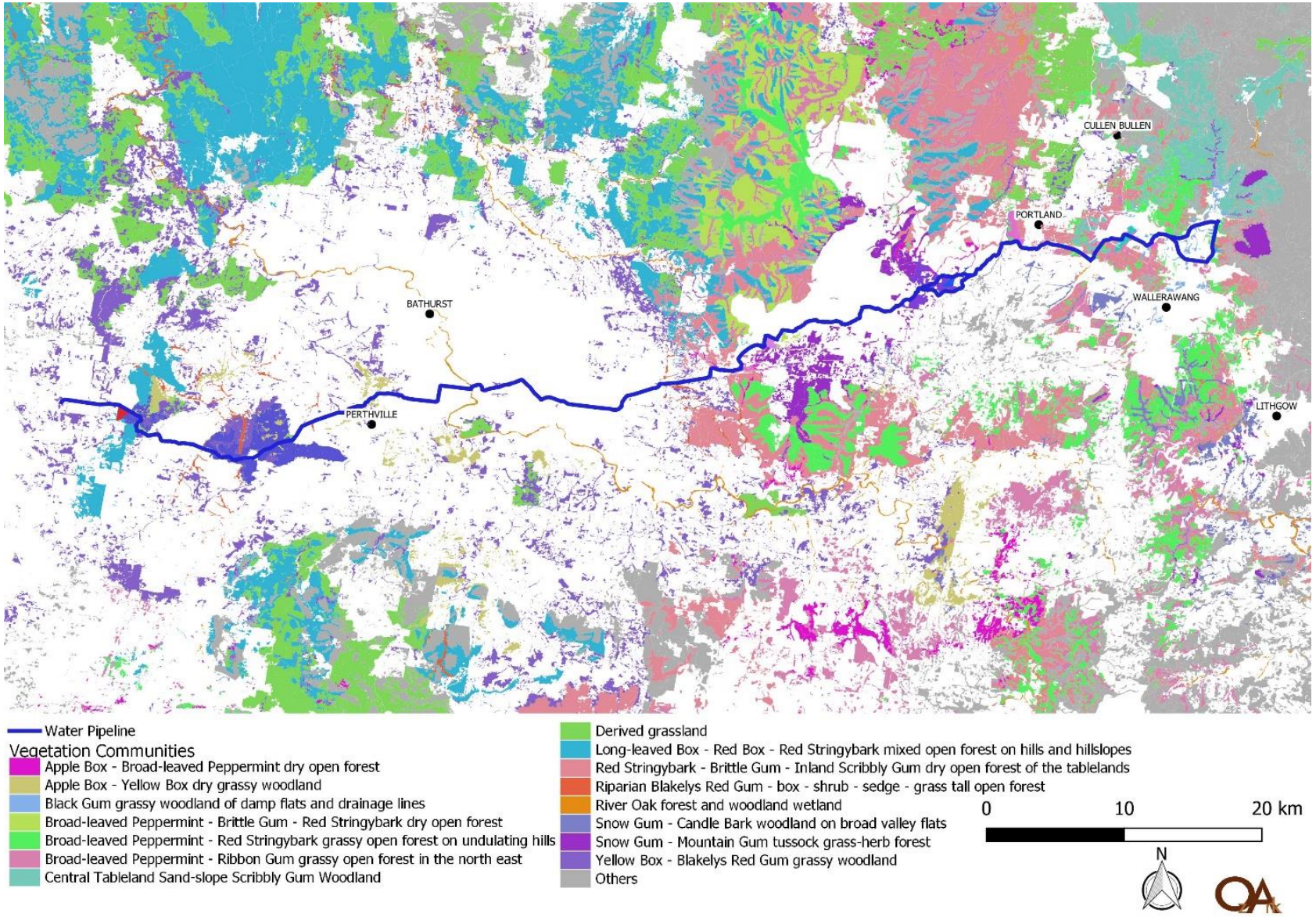

Figure 2: Overview of plant community types traversed by Pipeline Development.

Table 2: Plant community types impacted as a result of the Pipeline Development.

Plant Community Types
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands; South Eastern Highlands Bioregion
Broad-leaved Peppermint - Red Stringybark grassy open forest on undulating hills; South Eastern Highlands Bioregion
Broad-leaved Peppermint - Ribbon Gum grassy open forest in the north east of the South Eastern Highlands Bioregion
Derived grassland of the South Eastern Highlands Bioregion and South East Corner Bioregion
Black Gum grassy woodland of damp flats and drainage lines of the eastern Southern Tablelands; South Eastern Highlands Bioregion
Snow Gum - Mountain Gum tussock grass-herb forest of the South Eastern Highlands Bioregion
Broad-leaved Peppermint - Brittle Gum - Red Stringybark dry open forest on the South Eastern Highlands Bioregion
Riparian Blakelys Red Gum - box - shrub - sedge - grass tall open forest of the central NSW South Western Slopes Bioregion
Apple Box - Broad-leaved Peppermint dry open forest of the South Eastern Highlands Bioregion
Yellow Box - Blakelys Red Gum grassy woodland on the tablelands; South Eastern Highlands Bioregion
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes; South Eastern Highlands Bioregion
Long-leaved Box - Red Box - Red Stringybark mixed open forest on hills and hillslopes in the NSW South Western Slopes Bioregion
Central Tableland Sand-slope Scribbly Gum Woodland
River Oak forest and woodland wetland of the NSW South Western Slopes and South Eastern Highlands Bioregion

Threatened species

The NSW BioNet, “define your own area” map, was used to search for threatened species and populations that have been recorded in the district (Figure 4). Forty two (42) threatened fauna species and ten (10) threatened flora species have been recorded in the general vicinity of the Pipeline Corridor. The results of the NSW BioNet search are detailed in Table 3.

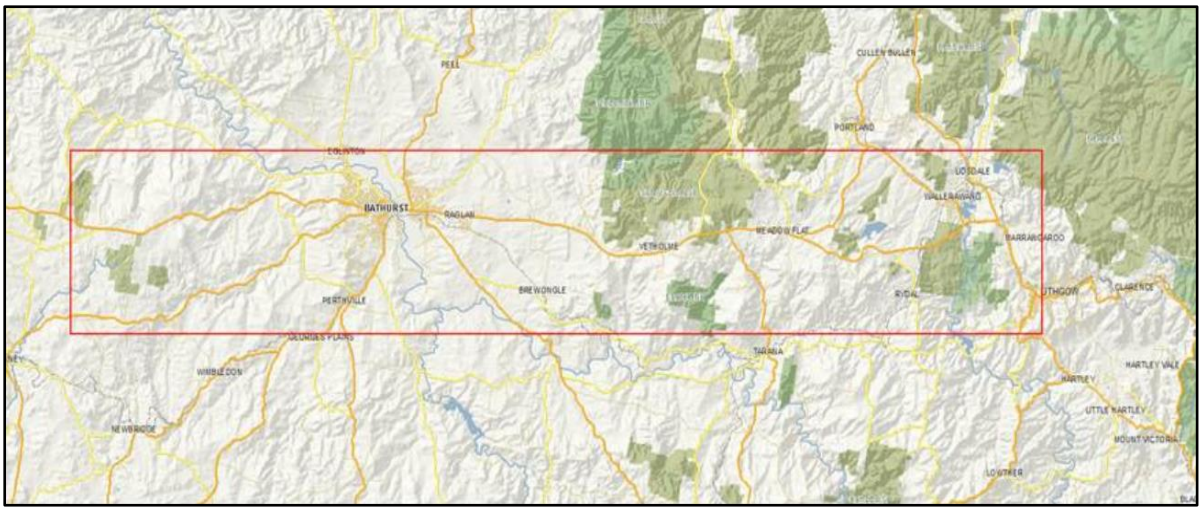

Figure 3: Selected search area for a NSW BioNet threatened species across the area of the proposed pipeline development.

Table 3: NSW BioNet results for threatened flora and fauna recorded in the general locality of the proposed Pipeline Development.

	Scientific Name	Common Name	BC Status	EPBC Status
Fauna	*Litoria aurea*	Green and Golden Bell Frog	E	V
	Litoria booroolongensis	Booroolong Frog	E	E
	Litoria castanea	Yellow-spotted Tree Frog	CE	E
	Anseranas semipalmata	Magpie Goose	V	
	Phaethon rubricauda	Red-tailed Tropicbird	V	M
	Apus pacificus	Fork-tailed Swift		M
	Hirundapus caudacutus	White-throated Needletail		M
	Plegadis falcinellus	Glossy Ibis		M
	Circus assimilis	Spotted Harrier	V	
	Haliaeetus leucogaster	White-bellied Sea-Eagle	V	M
	Hieraaetus morphnoides	Little Eagle	V	
	Falco subniger	Black Falcon	V	
	Calidris acuminate	Sharp-tailed Sandpiper		M
	Gallinago hardwickii	Latham's Snipe		M
	Callocephalon fimbriatum	Gang-gang Cockatoo	V	
	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	
	Glossopsitta pusilla	Little Lorikeet	V	
	Ninox connivens	Barking Owl	V	
	Ninox strenua	Powerful Owl	V	
	Merops ornatus	Rainbow Bee-eater		M
	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	
	Chthonicola sagittata	Speckled Warbler	V	
	Anthochaera phrygia	Regent Honeyeater	CE	CE
	Grantiella picta	Painted Honeyeater	V	V

	Scientific Name	Common Name	BC Status	EPBC Status
Fauna (Cont'd)	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V	
	Daphoenositta chrysoptera	Varied Sittella	V	
	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	
	Petroica boodang	Scarlet Robin	V	
	Petroica phoenicea	Flame Robin	V	
	Stagonopleura guttata	Diamond Firetail	V	
	Dasyurus maculatus	Spotted-tailed Quoll	V	E
	Phascolarctos cinereus	Koala	V	V
	Cercartetus nanus	Eastern Pygmy-possum	V	
	Petaurus norfolcensis	Squirrel Glider	V	
	Petauroides volans	Greater Glider		V
	Pteropus poliocephalus	Grey-headed Flying-fox	V	V
	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	
	Chalinolobus dwyeri	Large-eared Pied Bat	V	V
	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	
	Scoteanax rueppellii	Greater Broad-nosed Bat	V	
	Paralucia spinifera	Purple Copper Butterfly, Bathurst Copper Butterfly	E	V
Flora	*Lepidium hyssopifolium*	Aromatic Peppercress	E	E
	Leucopogon fletcheri subsp. fletcheri		E	
	Swainsona sericea	Silky Swainson-pea	V	
	Eucalyptus aggregata	Black Gum	V	V
	Eucalyptus cannonii	Capertee Stringybark	V	
	Eucalyptus pulverulenta	Silver-leafed Gum	V	V
	Eucalyptus robertsonii subsp. hemisphaerica	Robertson's Peppermint	V	V
	Veronica blakelyi		V	
	Zieria obcordata		E	E
	Euphrasia scabra	Rough Eyebright	E	

BC= *Biodiversity Conservation Act 2016*

EPBC= *Environment Protection and Biodiversity Conservation Act 1999*

M= Migratory V= Vulnerable

E= Endangered CE= Critically Endangered

Regional corridors

The Pipeline Development traverses a combination of cleared land, forestry tracks and roads, and road reserves. Vegetation corridors exist in various sized patches throughout the length of the proposed Pipeline Development, with the larger corridors existing at the eastern and western areas, including Sunny Corner State Forest. Where possible existing cleared corridors, easements and tracks would be utilised to traverse these patches where complete avoidance is not possible. Small scale riparian corridors would also be intersected along the length of the pipeline.

Aquatic ecology

The Macquarie River would be intersected by the Pipeline Corridor south of Bathurst as well as creeks and tributaries in the area. Details of Pipeline Development crossings are yet to be finalised. No significant wetlands have been identified in the vicinity of the Pipeline Corridor based on a desktop review. Macquarie Marshes Nature Reserve, a RAMSAR listed wetland, is located approximately 500 kilometres downstream from the Pipeline Corridor and is unlikely to be impacted by the Pipeline Development.

While no actual database occurs to search for aquatic fauna listed under the *Fisheries Management Act 1994*, the following species are likely to occur in aquatic habitats in the vicinity of the Pipeline Development:

- Flathead Galaxias, *Galaxias rostratus*
- Macquarie Perch, *Macquaria australasica*

7.2.2 Potential Impacts

Potential impacts as a result of the Pipeline Development would arise predominantly during the construction phase associated with vegetation clearing and construction activities such as traffic and earthmoving as well as entrapment within any open trenches. Where the Pipeline Development is to be constructed in existing cleared areas, or in cleared road reserves or forestry tracks, this would likely have a minimal impact on the surrounding environment.

The significance of the following indirect and direct impacts that could potentially occur as a result of the proposed Pipeline Development, would require further investigation as part of the EIS:

- Clearing resulting in vegetation and habitat loss, reduction in foraging and breeding resources, isolation, fragmentation and increased edge effect;
- Decline of threatened plant species or Threatened Ecological Communities and disruption to ecological processes;
- Pest plant and animal invasion from construction / maintenance activities may lead to a loss of biodiversity or outcompeting of other species present;
- Direct injury to fauna species present through construction activities such as traffic movement, excavation or clearing;
- Entrapment within the open trenches during the pipeline construction phase; and
- Impacts on aquatic habitat as a result of infrastructure necessary to pass under the Macquarie River and over smaller creeks and tributaries.

7.2.3 Considerations for Environmental Assessment

The Pipeline Development has the potential to directly and indirectly impact on the habitat of threatened species populations and ecological communities. Utilising existing cleared land and highly modified environments such as state forests to construct the majority of the Pipeline Development would reduce the potential impacts.

The biodiversity assessment will be undertaken in accordance with the Biodiversity Assessment Method (BAM) in accordance with the *Biodiversity Conservation Act 2016* and any other guidelines identified by the Secretary's Environmental Assessment Requirements. Targeted field surveys conducted during the preparation of the EIS will allow for development of mitigation measures and biodiversity offset requirements for cleared vegetation including threatened ecological communities. Targeted field surveys would be required to:

- Validate existing vegetation mapping along the Pipeline Corridor;
- Validate the extent of impact to ecological communities in areas where clearing is required;
- Identify the location and condition and validate the extent of impact to threatened ecological communities listed under the BC Act and EPBC Act;
- Identify known and potential habitat areas for threatened flora species and where appropriate conduct targeted species-specific field surveys to identify individual threatened flora populations that are likely to occur in the subject site;
- Identify habitat types within the subject site and study area in order to conduct targeted investigations in suitable habitat types including:
    - Woodland habitats – surveys for avifauna, nocturnal birds, mammals (including koalas and bats) and reptiles;
    - Ephemeral and permanent watercourses and depressions – surveys for amphibians, waterbirds and some reptiles;
    - Rocky outcrops and caves – surveys for bats and reptiles; and
    - Hollow bearing trees – surveys for hollow dependent fauna such as owls, some birds, mammals and bats.
- Identify the flora and fauna species occurring within the study area at the time of survey and determine the habitat potential within the study area for any additional flora and fauna species including threatened species listed under the BC Act and EPBC Act;
- Identify the potential direct and indirect impacts of the proposed activity on fauna and biodiversity values of the area;
- Identify potential habitat areas for aquatic fauna including riffles, pools etc;
- Identify any aquatic ecology constraints associated with the chosen off-take point;
- Identify any issues associated with the Pipeline Development with regards to:
    - General waterway morphology (e.g. permanent or ephemeral; gully / stream / river / wetland; presence of pools; width of waterway; etc);
    - Flow regime (intermittent / permanent / freshwater; slow / rapid);

- Water quality (such as turbidity and presence of aquatic macroinvertebrates) and surrounding and upstream land use;
- In stream and riparian vegetation; and
- Fish habitat (refuge areas - snags / undercut banks / reedbeds; potential breeding areas – gravel beds and fallen trees); and

- Develop mitigation measures to reduce the potential direct and indirect impacts of the Pipeline Development.

The Pipeline Development will require assessment using the Biodiversity Assessment Method (BAM). An Accredited Assessor under the Biodiversity Conservation Act 2016 would apply the BAM during field surveys to prepare the Biodiversity Assessment Reports (BAR). These will be in the form of a Biodiversity Development Assessment Report (BDAR).

7.3 Aboriginal and non-Aboriginal heritage

7.3.1 Existing environment

Previous archaeological surveys around and across the broader region suggest the presence of artefacts of Aboriginal origin could be expected in the study area given the archaeological attributes and site location parameters. The highest likelihood of unrecorded Aboriginal sites exist in areas such as well drained ground around the Macquarie River and major drainage lines and crest topographies. Wetland/swampy meadow margins which also occur along the Pipeline Corridor are also a focus for Aboriginal occupation in the area (NOHC, 2017).

The Pipeline Corridor is within Wiradjuri country which extends from Dubbo and Bylong in the north to Tallangatta in the south and west from Lithgow to the Hay Plain and Ivanhoe. Wiradjuri country is bounded by the three rivers: Macquarie (Wambool), Lachlan (Kalari), and Murrumbidgee (retaining its original name). Occupation of the land by the Wiradjuri can be seen by campsite remainders, which indicate regular seasonal occupation by small groups, and have previously been found on river flats, open land and by rivers.

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken to identify recorded sites. A total of 64 Aboriginal sites are recorded within 1km of the Pipeline Corridor. It is possible that there are recorded and unrecorded Aboriginal sites located within the Pipeline Corridor (NOHC, 2017).

There is one registered Native Title claim applicable to the Pipeline Corridor (NC2013/001) that is currently being assessed by the Native Title Tribunal for the Warrabinga Wiradjuri and one unregistered claim (NC2017/001).

Aboriginal consultation has been undertaken, in accordance with the *NSW OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (NSW DECCW 2010) by Navin Officer Heritage Consultants (NOHC, 2017) and Ozark Environmental & Heritage Management Pty Ltd (Ozark, 2018) to seek interest from registered Aboriginal parties (RAPs). The Bathurst and Orange Local Aboriginal Land Councils as well as ten (10) RAPs have registered an interest in the Pipeline Development.

There are approximately 7 historic heritage listed items within 500 metres of the Pipeline Corridor. Of these, two are directly adjacent to the Pipeline Corridor which are listed in the Table 4 below. All items are recorded as locally significant on council heritage lists on Local Environmental Plans.

There are no state or national heritage listed items within the Pipeline Development.

Table 4: Heritage Listed Items within the Pipeline Development

ID	Town	Site Name	Address	Lot/DP	Listing
I97	Brewongle	Leeholme Homestead and outbuildings	3664 O'Connell Road and 47 Tarana Road	Part Lots 601 and 602, DP 1186424	Local (Bathurst LEP)
A107	Portland	Portland General Cemetery	Sunny Corner Road	Lot 7300, DP 1144082	Local (Lithgow LEP)

7.3.2 Potential impacts

Where possible, items of heritage significance would be avoided. However, it is possible that pipeline and transmission line construction could result in some impact on these items. Potential impacts that may result from the Pipeline Development include:

- Direct or indirect disturbance to items of heritage significance; and
- Effect on the amenity of heritage artefacts within close proximity of the pipeline during construction and (for example near pump stations or air valves) during operation.

During operation, impacts to heritage items are expected to be negligible.

7.3.3 Considerations for Environmental Assessment

The assessment of Aboriginal heritage impacts would be undertaken in accordance with the *DECC Interim Community Consultation Requirements for Applicants* and *Guidelines for Aboriginal Heritage Cultural Heritage Assessment and Community Consultation*.

The following key tasks would be undertaken to further assess the heritage impacts associated with the proposal:

- Review of existing data to identify the location of the listed heritage items and assess the likelihood of the Pipeline Development to impact on them;
- Further consultation with the local aboriginal community;
- Investigations into the impact of the Pipeline Development on the registered native title claim;
- Targeted field investigations of the investigation corridor by archaeologists with input from representatives of the local aboriginal community;
- Provide input to the design on the significance of the heritage items and any issues identified as having the potential to impact on the items; and
- Prepare a report / reports assessing the significance of any identified and affected items, the significance of any impacts and recommending mitigation measures.

7.4 Surface and groundwater

7.4.1 Existing environment

Surface water along the pipeline corridor

The topography of the study area ranges from slightly undulating to rough and very steep country. The Pipeline Corridor crosses both the Macquarie River to the west and the Coxs River in the east. The Pipeline Corridor crosses approximately eleven named creeks and numerous unnamed tributaries.

More than 50% of the Macquarie River catchment is assigned a high priority status in terms of hydrological and environmental stress.

Groundwater

The Pipeline Development would likely traverse through Macquarie Bogan-Catchment Groundwater Management Area 13: Lachlan Fold Belt, which has groundwater quality / suitability of marginal (1500 -3000 TDS mg/L) and an indicative depth to the water table of approximately 20-80 m. There are a number of groundwater bores within the vicinity of the Pipeline Corridor.

7.4.2 Potential impacts

Surface water along the Pipeline Corridor

During construction, potential impacts on surface hydrology and water quality may include:

- Erosion from exposed soils and sediments and material stockpiles caused by inadequate management measures, resulting in an increase in sediments in watercourses;
- Spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures;
- Blockage of flow paths affecting low flows through construction within creek lines and through erosion and sedimentation control structures; and
- Alteration of flows during periods of high flow as a result of larger obstructions within and adjacent to creek and drainage lines.

These would require sediment and flooding control measures to be in place during the construction phase.

During maintenance activities, the pipeline sections can be isolated and drained to avoid impacts to hydrology and neighbouring waterways.

Groundwater

Groundwater aquifers and management units may be disturbed by the trenching and excavation activities during construction, however the depth to the water tables in the region indicates that this would be unlikely. Nevertheless, the potential for groundwater interference to occur during excavation and the mitigation measures required would require more detailed assessment.

7.4.3 Considerations for Environmental Impact Statement

As part of the EIS, surface and groundwater issues would be assessed as part of determining the significance of the impact of the Pipeline Development and relevant mitigation measures to avoid negative impacts developed. The following specific considerations apply:

- Assessment of the hydrologic impact of the Pipeline Development on the water quality and quantity of watercourses; and
- Assessment of the impacts of the Pipeline Development on flow dynamics and potential for contamination of surface and groundwater resources.

Any risks and mitigation measures associated with construction would be included in the Construction Soil and Water Management Plan. The operational impacts on surface and groundwater would be insignificant.

7.5 Soils and Geology

7.5.1 Existing environment

The topography along the Pipeline Corridor includes a series of crests, upper slopes, mid-slopes, lower slopes, flats and drainage lines. Elevation ranges from between 662mRL at the crossing of the Macquarie River, to 1,260mRL along the Pipeline Corridor north west of Yetholme.

The geology of the study area is comprised mainly of the geological units of granite, shale, sandstone, siltstone, turfs, limestone, sandstone and ashstone.

The Pipeline Corridor traverses a number of soil landscapes including Lithgow, Cullen Bullen, Capertee, Sunny Corner, Yetholme, Mookerawa, Vittoria-Blayney, Raglan and Bathurst. The soil dominant landscape is the Bathurst landscape.

Distinguishable modes of geomorphological activity within the study area include both aggrading and eroding processes, however, erosion of landform units such as knolls, ridges and upper slopes has been the dominant geomorphological activity. The soil erosion hazard is high in the Bathurst soil landscape and moderate in the Sunny Corner, Mookerawa, Cullen Bullen, Lithgow, Vittoria-Blayney, Raglan, Capertee and Yetholme soil landscapes. Erosion is common in the area in disturbed areas, table drains, areas of concentrated flow and the exposed contact between basalt and siltstone.

The soil salinity risk is considered moderate to high in drainage depressions and drainage lines in the Bathurst, Mookerawa, Yetholme soil landscapes on yellow soloths and yellow solodic soils.

No sites within 1km of the Pipeline Corridor are listed on the NSW OEH Contaminated Land: Record of Notices or on the NSW OEH contaminated sites notified to the EPA. The closest recorded contaminated site is the Blue Circle Southern Cement Site in Williwa Street Portland – about 1.8 km from the Pipeline Corridor.

There are numerous mine shafts in the within 1km of the Pipeline Corridor. Many of the shafts that are considered to be dangerous have been filled in and/or fenced to protect the public. However, not all of the old mine shafts have been located or recorded.

Potential contaminants in the soil may be present from agricultural or urban activities; however, these would generally be confined to specific locations and activities including those used for storage and use of pesticides and/or hydrocarbons, machinery storage and vehicle maintenance areas.

7.5.2 Potential impacts

Activities associated with the Pipeline Development would comprise ground excavations for pipeline support structures and road/creek crossings, and lowered groundcover in high machinery impact areas. This exposure of soil and the associated spoil stockpiling may have the potential to increase the risk of an erosion and runoff hazard. The potential for general soil impacts to occur is increased in areas where the soil landscape has higher susceptibility to erosion. The majority of areas that would encounter soil disturbance are likely to have received some level of disturbance in the past due to current land use. In summary:

- Soils exposed during excavation and vegetation removal may result in erosion;
- Watercourses within the Pipeline Corridor may be impacted through an increase in sediment loads during rainfall events during construction that could lower existing water quality. Other pollutants could potentially be introduced to waterways during construction, through chemical spills or vehicle leaks, if inadequately managed;
- Erosive soils that exist in the area may create stability issues during construction;
- Compaction of soils during construction could lead to decreased permeability;
- Wind erosion may occur from unsecured stockpiles or soil mounds created during the earthworks or mobilisation of fill material;
- Potential for disturbance on saline areas in the drainage depressions and drainage lines; and

If contamination is present it may pose a health risk to workers and onsite personnel constructing the pipeline. However, given the nature of the surrounding landscape and land use, this is considered to be a low risk.

Maintenance activities and operation of the pipeline is unlikely to result in any contamination of soils. No oils, fuels and chemicals would be stored on-site for the operation of the pump stations.

7.5.3 Considerations for Environmental Assessment

Further investigation into the susceptibility of soils present along the Pipeline Corridor to erosion, salinity, contamination and the presence of mine shafts should be carried out and mitigation measures implemented to minimise the risk to construction workers and the surrounding environment.

Erosion potential can be identified and limited by application of appropriate controls and by development of a Soil and Water Management Plan in consultation with guidelines for soils and construction (*e.g.* Landcom, 2004). Key features of such a plan would include: appropriate timing to minimise areas with exposed soils; appropriate location of stockpiled soils; engineering measures to prevent and retain sediment migration; and prompt rehabilitation of disturbed areas.

7.6 Land use

7.6.1 Existing environment

The land use in the study area is primarily agricultural for cropping and grazing. Nature reserves (Winburndale Nature Reserve, Sunny Corner State Forest) are adjacent to the Pipeline Corridor in the east and a large reserve area to the west - Fitzgeralds Mount. The Macquarie River is a popular local recreational fishing location. Other land uses include infrastructure (roads, powerlines), urban (villages of Kirkconnell, Yetholme, Orton Park, Bathampton, and outskirt suburbs of Bathurst) and mining around Lithgow.

7.6.2 Potential impacts

Where practicable the Pipeline Development would be located within cleared areas, along road reserves and through State forests. The alignment of the Pipeline Corridor and locations of the pumping stations would be confirmed during detailed design.

Where the Pipeline Corridor traverses agricultural land there is the potential for short-term disruption to the property owner. There is also potential for traffic disruption when works occur in the road reserves.

The impact of the proposal on existing land uses in the study area and the ability to continue these is expected to be minimal.

7.6.3 Considerations for Environmental Impact Statement

The EIS would address the following with regard to the land uses and properties potentially affected by the Pipeline Development:

- Identification of the properties and land uses directly affected by and adjacent to the Pipeline Corridor, including identification of any areas identified as regional and State significant farmland;
- The potential impacts on the viability of these land uses caused by the Pipeline Development;
- Impacts on connectivity and access resulting from the Pipeline Development; and
- Rehabilitation measures to address potential impacts on land use and properties.

7.7 Air quality

7.7.1 Existing environment

Ambient air quality along the proposed Pipeline Corridor is expected to be of good quality due to the area being predominately rural. Air quality may decline slightly where the proposed Pipeline Corridor is in proximity to urban areas.

7.7.2 Potential impacts

Impacts to air quality are expected to be limited to the construction phase with no impacts anticipated to air quality from the constructed Pipeline Development. Minor impacts on air quality may arise from construction activities including dust and emissions from vehicles or plant. These may include:

- Plant, equipment and vehicles utilised during construction and operation would increase localised traffic levels and are likely to generate greenhouse gas emissions and impact on local air quality;
- Energy usage required for construction activities would result in the release of greenhouse gas emissions; and
- Dust emissions may be generated from earthmoving equipment activities, vegetation loss and wind erosion of stockpiled excavated material during construction.

The greenhouse gas emissions of the construction phase of the Pipeline Development are primarily associated with clearance of vegetation, energy consumption and construction materials.

The greenhouse gases that would be emitted during the construction of the Pipeline Development include:

- Carbon dioxide (CO2);
- Carbon monoxide (CO);

- Oxides of nitrogen (NOx); and
- Non-methane volatile organic compounds (NMVOC).

The pumping of water through the pipeline will require the use of power sourced from the electricity grid. The level of emissions generated per year would depend upon the source, level and extent of power generation.

7.7.3 Considerations for Environmental Assessment

The significance of these impacts is considered to be minor, although further assessment in accordance with *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (EPA, 2017) would quantify the scale of these impacts.

A qualitative desktop air quality assessment would be undertaken as follows:

- Existing local air quality would be determined, emissions predicted (for construction and operation), and potential impacts assessed; and
- Standard soil and water mitigation measures for pipeline projects would be adopted.

The EIS would consider various elements of design for efficient energy use, including:

- Ecological Sustainable Development (ESD): The EIS would give consideration to how the Pipeline Development and its elements address the principles of ESD; and
- Sustainability in Design: Advice would be provided in the design phase as to how sustainability considerations can be incorporated into the Pipeline Development.

7.8 Noise and vibration

7.8.1 Existing environment

Aside from the portions of the Pipeline Corridor that take in parts of the villages of Orton Park, Bathampton, and the Bathurst suburban fringe, the majority of the Pipeline Corridor is proposed to be constructed in rural or forestry areas. There are a number of homesteads (i.e. sensitive noise receptors) in the vicinity of the Pipeline Corridor to the south of Bathurst, south of Portland and north of Kirkconnell.

7.8.2 Potential impacts

The construction of the pipeline would increase noise and vibration levels at receivers closest to the Pipeline Corridor. Construction noise would result from actual works and traffic noise. There may also be noise associated with the removal of trees within the State Forests.

During operation (pumping and discharge of flows) any associated noise levels are likely to be minimal, limited to air release events from air valves, pumping stations and maintenance activities. The activities which are likely to create regular noise as part of operation would be located away from sensitive receivers.

7.8.3 Considerations for Environmental Assessment

The impacts associated with noise and vibration from the proposal would not be considered significant. Assessment and management of the construction noise would be undertaken in accordance with relevant guidelines (*e.g. Interim Construction Noise Guideline,* DECC, 2009). This would involve:

- A construction noise and vibration assessment would be undertaken for the Pipeline Development. Occupants of noise sensitive properties would be consulted as part of this assessment. This would involve:
    - Identification of noise sensitive receivers;
    - Noise monitoring for baseline noise levels (if required); and
    - Modelling and predictions of noise levels.
- Planning to ensure that activities would be organised so that noise and vibration impacts are minimised during construction.

7.9 Traffic and Access

7.9.1 Existing transport infrastructure

The Pipeline Development would include several road crossings with the majority across unsealed local roads including, but not limited to:

- Castlereagh Highway;
- Great Western Highway (twice);
- Wolgan Road;
- Wallerawang Road;
- Range Road (at the junction with Wallerawang Road);
- Sunny Corner Road (twice);
- The small forest roads of Burkes Road, Kirkconnell Forest Road, Phillips Boundary Road, Stoney Trig Road and Gulf Forest Road;
- Macabees Road;
- Sibleys Road;
- Yetholme Drive;
- Brewongle Lane;
- Tarana Road;
- O'Connell Road;
- White Rock Road;
- Monavella Road;
- Gormans Hill Road;
- Lagoon Road;
- Vale Road;
- Hen and Chicken Road; and
- Mid Western Highway.

The Pipeline Development includes three railway crossings:

- Near Pipers Flat Road/Wallerawang Road between Portland and Wallerawang;
- At Vale Road near Orton Park for the Great Western Railway Line; and
- Approximately 750 metres north-west of Brewongle for the Great Western Railway Line.

7.9.2 Potential impacts

During construction the Pipeline Development has the potential to increase levels of traffic on local access roads. The condition of the road will be significant in determining the number and types of vehicles that will be employed to enable pipeline construction.

Some roads would also require temporary closure to enable construction of the pipeline. RMS-controlled roads including but not limited to the Castlereagh Highway, Mid Western Highway and the Great Western Highway would be crossed by under-boring if required. Traffic management measures would need to be implemented during construction.

In order to minimize any impact to rail infrastructure and services the three railway crossings would be underbored.

Operational traffic impacts, as a result of maintenance vehicles accessing the pumping stations, would be minimal.

7.9.3 Considerations for Environmental Impact Statement

Traffic management and works scheduling plans would be required prior to construction to ensure minimal disturbance to traffic on local and regional roads throughout the construction phase. Safety would be a significant factor to take into account if there is to be a mix of local traffic and construction traffic, particularly through the presence of large vehicles where there have not previously been. The following should be addressed in the EIS:

- Condition of roads to handle traffic types and volumes during construction;
- Consultation with residents and road authorities regarding traffic and access alternatives and issues;
- Controls and management measures for the use of oversized vehicles; and
- Requirement for the development of a traffic management plan.

7.10 Resource use and waste management

7.10.1 Existing environment

The existing land use pattern is predominantly rural residential, forestry, and some urban areas near Bathurst. Existing waste in the vicinity of the Pipeline Corridor is largely from scattered litter blown by wind around the Pipeline Corridor and waste generated from livestock.

7.10.2 Potential impacts

Possible waste streams generated during the construction phase are presented in Table 5.

Table 5: Potential waste generated during the construction phase

Waste source	Composition	Classification[2]
Site clearing and ground preparation Site excavation and bulk earthworks	Foliage, excess fill materials, excavated material (spoil) such as soil or rock.	General Solid Waste (Non Putrescible)
Construction of pipeline and associated facilities Erection of security fencing along the working width and the installation of safety measures	Scrap wood, metals and concrete spills. Packaging from materials received at facility, such as foam, strapping and lumber. Concrete, metal rods/pipes and timber.	General Solid Waste (Non Putrescible)
Construction phase liquid waste from plant and machinery maintenance	Fuels, oils, paints and chemicals.	Hazardous and/or non- hazardous
Wastewater from various construction activities	Water from concrete mixing and curing, site clean-up, etc.	Non-hazardous
Site office	Used paper, boxes, cartridges, toners.	General Solid Waste (Non Putrescible)
Kitchen waste from site canteen or food preparation area	Food waste.	General Solid Waste (Putrescible)

[2] DECC *Waste Classification Guidelines*

7.10.3 Considerations for Environmental Impact Statement

Potential spoil quantities and disposal options would be refined during the drafting of the EIS including the investigation of spoil disposal options. These would include defining opportunities for reuse in consultation with individual landowners, as part of the development of individual property access agreements. Where possible, spoil material generated by excavation during construction of the pipeline and pumping stations would be reused as backfill.

Any trees removed from the lands managed by the Forestry Corporation of NSW will be disposed of in consultation with the Forestry Corporation.

The *Waste Avoidance and Resource Recovery Act 2001*, the *POEO Act 1997* and relevant regulations and applicable industry guidelines would be used to classify any wastes and where possible, determine measures to handle, store and appropriately dispose of the waste. Proper waste handling and management minimises the risk of causing harm or loss of vegetation, animal, aquatic or human life or contamination of the environment.

Mitigation measures should include a recommendation to prepare a detailed Waste Management Plan (WMP) as part of the Construction Environmental Management Plan (CEMP). The WMP would classify and quantify all the wastes likely to be produced and recommend appropriate handling, storage, recycling and disposal methods.

7.11 Socio-economic considerations

7.11.1 Existing environment

The Pipeline Development is located in the local government areas of Lithgow, Bathurst and Blayney. The Pipeline Corridor is predominantly located on rural land used for agriculture or grazing, on land owned and used by Centennial Coal for mining and Energy Australia for power generation, in lands managed by the Forestry Corporation of NSW, and on some public land which is predominately road reserve.

7.11.2 Potential impacts

The potential impacts that may result from construction and operation of linear infrastructure within the Pipeline Development include:

- Economic resource development – the Pipeline Development would provide a reliable water supply to enable the McPhillamys Mine Development to operate to the benefit of the economy and community through local employment, economic activity and the payment of taxes and royalties.
- Impact on properties and use of land – development of the pipeline and associated infrastructure can result in direct impacts on individual properties, and can affect how members of the community use their land, such as damage to stock or property, spread of weeds, or temporary disruption to access.
- Amenity – construction and operation of an infrastructure project can result in impacts to local amenity, including air quality, noise and visual impacts without appropriate design and mitigation measures.
- Economic benefits and costs – positive benefits to the community, including direct benefits such as the generation of local employment, and indirect benefits to the wider community.
- Public safety during construction ensuring the site has adequate site security, including appropriate fencing in accordance with the requirements of the WorkCover Authority of NSW and the Work Health and Safety Act 2011 and the Work Health and Safety Regulation 2011.

7.11.3 Considerations for Environmental Impact Statement

A construction environmental management plan would be prepared with sub-plans to address the management of individual environmental issues.

A comprehensive community engagement and stakeholder management program will be implemented.

Individual property management and rehabilitation plans would be developed in consultation with individual landowners with respect to the management of construction on private properties and rehabilitation of the Pipeline Corridor.

A review of socio-economic issues for the area would be undertaken to more fully assess the impacts of the Pipeline Development. Stakeholder views and community responses would be considered in the EIS.

7.12 Landscape character and visual amenity

7.12.1 Existing environment

The visual envelope of the Pipeline Corridor is characterised by steeply sloped forested areas, and undulating open rural land. The dominant visual features are Sunny Corner State Forest, rural land centred on the river plains around the Macquarie River with Mt Panoroma (RL 875m) and Fitzgeralds Mount (RL 950m) to the north and south respectively of the Pipeline Corridor. Farming activities, predominantly grazing, water storage dams and rural homesteads are scattered throughout the landscape. Much of the eastern section of the Pipeline Corridor is within State Forests.

Much of the study area has undulating topography which limits sight lines, however, there is limited vegetation for natural screening of Pipeline Development elements.

7.12.2 Potential impacts

It is proposed that the pipeline will be constructed as a below ground structure and would not be visible during operation. It is likely that some impact on the landscape would remain as a result of the presence of the easement, removal of vegetation and the scale and character of the structures such as pumping stations. However, as most of the alignment is proposed to be located alongside existing linear infrastructure which is largely cleared, such as roads, such visual impacts are expected to be limited.

Pumping stations are likely to be housed in containerised or covered structures. However, pumping stations 1, 2 and 3 are located within Centennial or Energy Australia land and not visible, and pumping stations 4-6 would have limited visibility from the road or residences and would not be inconsistent with the character of the surrounding built environment. Power supply for the pumping stations may require new overhead power lines and poles, which would be installed within the same corridor where practicable.

Overall, construction impacts would likely be short-term, and relate to the temporary disturbance of the land surface, security fencing, stockpiles and the presence of construction plant and machinery along the Pipeline Corridor during the construction period.

7.12.3 Considerations for Environmental Impact Statement

Issues relating to visual amenity are being considered as part of the design process and there will be early consultation to communicate the proposed design solution. The following would be considered as part of the EIS:

- Issues raised as part of the stakeholder engagement and community consultation program. Responses would be incorporated in a database and considered in site design and location;
- Site analysis and identification of landscape character zones;
- A qualitative assessment of landscape character and visual impacts, with consideration given to land use, heritage, recreational and precinct character, and open space networks; and
- A determination of the significance of potential impacts by assessing the magnitude of change to the landscape (views) and in combination with the sensitivity of the receptor.

8. Proposed Environmental Assessment Scope

During the detailed design of the Pipeline Corridor and structural features, the issues listed below would be considered and potential impacts would be avoided wherever possible. Where impacts as a result of the Pipeline Development are unable to be avoided, mitigation measures would be identified to reduce the potential impacts. These measures would be identified in the EIS for the Proposal.

Additionally, the EIS which will cover both the Mine Development and the Pipeline Development would include:

- Further consideration of the planning and statutory requirements of the Proposal;
- Strategic justification for the Proposal;
- A detailed description of the Proposal;
- Discussion of the Proposal options;
- The scope, methods and results from detailed investigations into:
    - Flora and fauna;
    - Aquatic ecology;
    - Noise and vibration;
    - Aboriginal and non-Aboriginal heritage;
    - Landscape and visual impacts;
    - Soils and geology;
    - Land use;
    - Air quality;
    - Surface and groundwater;
    - Traffic;
    - Resource use and waste; and
    - Social and economic considerations.
- An interpretation of the results from these investigations to develop:
    - Mitigation measures to manage negative impacts; and
- A Statement of Commitments.
    - Consideration of the principles of sustainability in the context of the Proposal.

9. References

DEC, 2005. 'Approved Methods for the Modelling and Assessment for Air Pollutants in New South Wales', NSW Department of Environment and Conservation. Retrieved 20 February 2011 from http://www.environment.nsw.gov.au/resources/legislation/ammodelling05361.pdf

DECC, 2009. 'Interim Construction Noise Guidelines', Department of Environment and Climate Change.

Retrieved 2017 from www.environment.nsw.gov.au/resources/noise/09265cng.pdf

DECCW, 2010. 'Threatened species listing, Central West Catchment, Orange and Hill End subregions', Department of Environment, Climate Change and Water. Retrieved 2017 from http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/

DECCW, 2010a. 'Aboriginal cultural heritage consultation requirements for proponents', Department of Environment, Climate Change and Water. Retrieved September 2017 from http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf

DIPNR, 1998. 'Soil Classification, 1:250000', Department of Infrastructure, Planning and Natural Resources.

DP8 Engineering, April 2017, Centennial Transfer Pipeline Feasibility Study

EMM Water Supply Assessment – July 2017

EPA Contaminated Land Record (http://www.environment.nsw.gov.au/clmapp/searchregister.aspx)

EPBC Act Database: Protected Matters Search Tool (http://www.environment.gov.au/erin/ert/epbc/index.html)

Landcom, 2004. 'Managing Urban Stormwater: Soils and Construction. Revised 4th edn', National Library of Australia.

NSW Natural Resource Atlas (NRA) database, cited July 2010, http://www.nratlas.nsw.gov.au/

OEH eSPADE, accessed 10 October 2017 http://www.environment.nsw.gov.au/eSpadeWebapp/

OEH – Threatened Species, Populations and Communities of NSW http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species

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