Ensham Life of Mine Extension - Project overview

Supporting documentation for application to voluntarily prepare an Environmental Impact Statement

Document details and history

Document details

Project number	60603371
Document title	Ensham Life of Mine Extension - Project overview
Site address	Ensham Mine
File name	60603371-REP-EE-0100 -00- vEIS_dToR.docx
	July 2020

Table of contents

List of tables

List of figures

Executive summary

Ensham Mine is operated by Ensham Resources Pty Ltd (Ensham), a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd ACN 010 236 272 (Idemitsu), on behalf of the Ensham Joint Venture (Ensham JV). The Ensham JV partners, and holders of the Environmental Authority, are Bligh Coal Limited ACN 010 186 393 (47.5 percent), Idemitsu (37.5 per cent) and Bowen Investment (Australia) Pty Ltd ACN 002 806 831 (15 per cent). This report is prepared on behalf of the Ensham JV partners (the Proponents) for the Ensham Life of Mine Extension Project (the Project). Ensham is proposing to extend the life of its existing bord and pillar underground operations by up to nine years by developing a portion of Mineral Development Licence (MDL) 217 as well as targeted areas within the existing mining leases (MLs). Separate to this application any extension of the existing MLs will be sought in future in the renewal period to allow for the extended mining.

The Project is located in the Bowen Basin in Central Queensland. The nearest townships include Emerald, approximately 35 kilometres (km) to the west, and Blackwater, 49 km to the south-east. The Project is wholly located within the Central Highlands Regional Council (CHRC) Local Government Area.

Project description

The proposed Project will allow extension of the current underground bord and pillar operations. Existing underground and surface facilities, systems and equipment infrastructure including road, rail and mine infrastructure equipment that service the existing mine will be utilised..

With inclusion of the proposed Project, Ensham Mine will:

- Continue to produce at current planned production rates of 4.5 million tonnes per annum and would not seek to change the current Environmental Authority (EA) limit (condition A5) which authorises the mining of 12 million tonnes of run of mine coal per annum.
- enable the extension of the Ensham Mine by up to nine years with sufficient coal reserves to approximately 2037.
- extend the Ensham mine underground operation to the west (encompassing a new mining lease area (referred to as Zone 1) by developing a portion of MDL 217)
- continue to utilise approved operational mine infrastructure as no additional surface infrastructure is proposed as part of the Project activities (Zone 1).
- enable Ensham to provide the continuation of long-term employment within the Central Highlands region.

The proposed Project is expected to commence in 2021.

Project benefit

Over the life of the Project, an estimated 38.0 million tonnes of thermal coal will be produced, representing an estimated export value of $3.66 billion over the life of the Project. The economic impact analysis has estimated the impacts of the Project on the regional, state and national economies for both the capital and operational phases. The economic benefits can be summarised as:

- royalties of approximately $256.4 million over the life of the Project
- the capital costs associated with the Project are estimated at $314.9 million
- total operational costs are estimated at $2,726.2 million over the life of the Project

- total output impact of $2,500 million or $138.9 million per annum
- total household income impact of $464.5 million or $25.8 million per annum
- employment impact of up to 654 full time equivalent (FTE) personnel per annum
- value added impact of $971.9 million or $54 million per annum.

The Project will enable Ensham to provide the continuation of employment within the Central Highlands region of approximately 603 FTE operational personnel until the end of the Project in approximately 2037. Approximately 78 per cent of the current workforce are either Emerald based or drive in / drive out based. The workforce will continue to include a mix of local residents and drive in / drive out personnel, while ensuring local employment opportunities and allowing personnel to choose where they live and work. There will be no change in the current accommodation requirements.

The Project will continue to provide flow-on benefits to the surrounding Central Highlands communities, including Emerald and Blackwater by supporting local employment, businesses, suppliers, and housing markets.

Initial environmental values assessment

An environment and social values workshop has been undertaken to identify both impacts and benefits for the Project and assess the critical matters relating to the Project development,. Two environmental values (EVs), employment and supply opportunities, and economics, were assessed as being positively impacted by the Project. Remaining EVs were either not impacted or were assessed not to be significantly impacted. No EVs were determined to be significantly negatively impacted by the Project.

A subsidence assessment was carried out for the Project using a factor of safety (FoS) of 1.6. The study concluded that subsidence will typically be less than 40 millimetres (mm) in the Project Area which is consistent with natural ground swell variation of up to 50mm identified by the Commonwealth Department of Agriculture, Water and the Environment. Groundwater modelling has also been completed for the Project and predicts no impacts to groundwater quality, no drawdown in the alluvium, and, negligible impacts to groundwater dependent ecosystems and private landholder bores.

Given the consistency with current on-site operations, Ensham also considers the Project to be a well-defined, low risk project with predictable impacts and existing proven environmental management system approaches to avoid, minimise and mitigate the impacts.

Project approvals

The Project will require an Environmental Authority (EA) amendment application for EPML00732813 (dated 9 August 2018). Under s.228 of the *Environmental Protection Act 1994* (Qld) (EP Act), the proposed EA amendment would require a major amendment due to the Project footprint adding an additional ML to EPML00732813 (ie. Zone 1: a portion of Mineral Development Licence (MDL) 217).

On 10 June 2020, the Queensland Department of Environment and Science approved an application for the Ensham JV to voluntarily prepare an EIS under the EP Act. Under section 139 of the EP Act, the EIS will form the application documents for the requirements of chapter 3 of the EP Act.

The Project was referred to the Commonwealth Department of Agriculture, Water and the Environment on 6 May 2020 (EPBC 2020/8669). Ensham JV received notification (dated 29 June 2020) from the Commonwealth that the Project will be assessed under the Bilateral agreement and a controlled action relating to:

- Listed threatened species and communities (sections 18 & 18A)
- A water resource, in relation to coal seam gas development and large coal mining development (section 24D & 24E).

This report accompanies the Project's draft Terms of Reference under section 41 of the *Environmental Protection Act 1994* for resource projects undergoing assessment by environmental impact statement under chapter 3, part 1, of the EP Act.

Abbreviations

AHD	Australian Height Datum
AEP	Annual exceedance probability
ALUM	Australian Land Use and Management
BAP	Baseline Assessment Plan
CCA	Conduct and Compensation Agreement
CHMP	Cultural Heritage Management Plan
CHP	Coal Handling Plant
CHRC	Central Highlands Regional Council
CMA	Cumulative Management Area
DAWE	Department of Agriculture, Water and the Environment
DES	Department of Environment and Science
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning
EA	Environmental Authority
EIS	Environmental Impact Statement
Ensham	Ensham Resources Pty Ltd
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPP Noise	Environmental Protection (Noise) Policy 2019
ERA	Environmentally Relevant Activities
ESA	Environmentally Sensitive Area
EV	Environmental Value
FA	Financial Assurance
FoS	Factor of Safety
GDE	Groundwater Dependent Ecosystem
GHG	Greenhouse Gas
ha	Hectares
HVR	High Value Regrowth
IAP2	International Association for Public Participation
IAR	Idemitsu Australia Resources
ISO	International Standards Organisation
JST	Japan, South Korea and Taiwan
km	Kilometres
LOM	Life of Mine
m	Metres
MDL	Mineral Development Licence
MIA	Mine Infrastructure Area
ML (prefix)	Mining Lease
ML (suffix)	Mega Litre
mm	Millimetres
MNES	Matters of National Environmental Significance
MR Act	*Mineral Resources Act 1989* (Qld)

MSES	Matters of State Environmental Significance
Mtpa	Million tonnes per annum
NNTT	National Native Title Tribunal
NT Act	*Native Title Act 1993* (Cth)
OGIA	Office of Groundwater Impact Assessment
PAA	Priority Agricultural Area
PFA	Prefeasibility Assessment
QLUMP	Queensland Land Use Mapping Program
RE	Regional Ecosystem
REMP	Receiving Environmental Monitoring Plan
RIDA	Regional Interests Development Approval
ROM	Run of Mine
SCA	Strategic Cropping Area
SDPWO Act	*State Development and Public Works Organisation Act 1971* (Qld)
SEA	South-East Asian
TEC	Threatened Ecological Community
UWIR	Underground Water Impact Report
Water Act	*Water Act 2000* (Qld)
WoNS	Weeds of National Significance

1.0 Introduction

This documentation has been prepared by the Ensham Joint Venture (Ensham JV) , for the Ensham Life of Mine Extension Project (the Project) to support a Voluntary Environmental Impact Statement (EIS) assessment.

The Project will require an EA amendment application for EPML00732813 (dated 19 March 2020). The Project locality is illustrated in **Figure 1** and **Figure 2.**

The Project footprint is approximately 2,737 hectares (ha) and includes three zones:

- Zone 1: MDL 217 and requires a ML application to be lodged (approximately 2,134 ha)
- Zone 2: partially includes existing leases ML 70326, ML 70365 and ML 7459 (approximately 394 ha)
- Zone 3: partially includes existing leases ML 7459 and ML 70366 (approximately 209 ha).

With inclusion of the proposed Project, Ensham Mine will:

- continue to produce at current production rate and would not seek to change the current Environmental Authority (EA) limit (condition A5) which authorises the mining of 12 million tonnes of Run of Mine (ROM) coal per annum.
- enable the extension of the Ensham Mine by up to nine years with sufficient coal reserves to approximately 2037.
- extend the Ensham Mine underground operation to the west (encompassing a new mining lease area by developing a portion of MDL 217). No additional surface infrastructure or surface disturbance is proposed as part of the new mine lease area (ie. Zone 1).
- continue to utilise approved operational mine infrastructure.
- enable Ensham to provide the continuation of long-term employment within the Central Highlands region.

The Project is proposed to commence in early 2021 and will provide for the continuation of employment within the Central Highlands region. The existing Ensham Mine currently provides direct employment opportunities for Emerald-based and drive in / drive out personnel for approximately 78 per cent of the workforce. The Project is anticipated to support employment of up to 654 full time equivalent (FTE) personnel per annum, providing continued employment for the existing operational workforce of up to 603 FTE at the Ensham mine until approximately 2037.

By using existing infrastructure and maintaining the current level of production, the proposed project aims to remain within the previously assessed levels of impact and current EA conditions

1.1 Proponent

Ensham Mine is operated by Ensham Resources Pty Ltd (Ensham), a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd (ACN 010236272) (IAR), on behalf of the Ensham JV. The Ensham JV partners, and holders of the Environmental Authority (EA), are Bligh Coal Limited (ACN 010186393) (47.5 per cent), Idemitsu (37.5 per cent) and Bowen Investment (Australia) Pty Ltd (ACN 002806831) (15 per cent). The Ensham JV partners are the Proponent for the Project. Ensham currently operates the existing mine under EA EPML00732813, dated 9 August 2018.

IAR is a subsidiary of the Japanese company Idemitsu Kosan Co. Ltd. The company and its associated group members have been operating in Australia for more than 40 years. IAR, previously known as Idemitsu Queensland Pty Limited, was renamed Idemitsu Australia Resources Pty Ltd in December 2006. The combined coal mining operations in Queensland (Ensham Mine) and New South Wales (Boggabri Mine and

Muswellbrook Mine) support more than 1,000 local jobs and produce approximately 14 mtpa of thermal, semi-soft and PCI coals for export.

The impact assessment report for the Project will be delivered with the assistance of a highly capable Project team, including suitably qualified personnel, who have extensive experience in Queensland based mining approvals and environmental management. The Proponent's contact details are provided below.

Ensham JV c/- Idemitsu Australia Resources Pty Ltd
C/- Mr Daniel Yates
GPO Box 301
Brisbane QLD 4001
Ph: (07) 3222 5620
Fax: (07) 3222 5665

1.2 Environment Authority amendment application

The Project will require an EA amendment application for EPML00732813 (dated 19 March 2020). The Project footprint is approximately 2,737 hectares (ha) and includes three zones:

- Zone 1: MDL 217 and requires a ML application to be lodged (approximately 2,134 ha)
- Zone 2: partially includes existing leases ML 70326, ML 70365 and ML 7459 (approximately 394 ha)
- Zone 3: partially includes existing leases ML 7459 and ML 70366 (approximately 209 ha).

The Project will require an Environmental Authority (EA) amendment application for EPML00732813 (dated 9 August 2018). Under s.228 of the *Environmental Protection Act 1994* (Qld) (EP Act), the proposed EA amendment would require a major amendment due to the Project footprint adding an additional ML to EPML00732813 (ie. Zone 1: a portion of Mineral Development Licence (MDL) 217).

On 9 June 2020, the Queensland Department of Environment and Science approved an application for the Ensham JV to voluntarily prepare an EIS under the EP Act. Under section 139 of the EP Act, the EIS will form the application documents for the requirements of chapter 3 of the EP Act.

In consideration of information provided in Guideline ESR/2016/2171 (Version 2.00, 23 April 2019) and as submitted as part of the application to voluntarily prepare and EIS, a review of EIS triggers relating to the Project has been presented in **Table 1**.

Table 1 EIS Trigger assessment (Appendix B, ESR/2016/2167)

EIS triggers	Application to Project
For proposals to amendment/alter an existing mine	
For mines already removing 2–10 mtpa ROM ore or coal, would the application increase the current annual removal rate by more than 100% or 5 mtpa (whichever is the lesser)?	**No.** The Project will continue to produce at current Ensham Mine production rates of up to approximately 4.5 mtpa. The Project would not seek to change the current Environmental Authority limit which authorises the mining of 12 mtpa ROM coal.
For mines already removing over 10 mtpa ROM ore or coal, would the application increase the current annual removal rate by more than 50% or 10 mtpa (whichever is the lesser)?	**Not Applicable.**
For mines already removing more than 20 mtpa ROM ore or coal, would the application increase the current annual removal rate by more than 25%?	**Not Applicable.**
Would the application involve an extension into and significant impact on a Category A or B ESA, which is not already authorised by the State?	**No.** No Category A ESAs are included within or in close proximity to the Project Area. One Category B ESA, an endangered regional ecosystem (RE 11.3.1), is located within the Project Area. This RE occurs as both remnant and high value regrowth (HVR). A total of 60.21 ha of RE 11.3.1 is described and mapped within the Project Area. The Project will allow extension of the current underground bord and pillar operations at Ensham Mine. The Project will utilise existing underground and surface infrastructure including road, rail and mine infrastructure equipment. The Project proposes to utilise the existing Mine Infrastructure Area (MIA) facilities which includes a Coal Handling Plant (CHP).

EIS triggers	Application to Project
	As the Project is seeking approval for continuation of existing mining operations, no construction activity is required. No blasting is proposed as part of the Project.. No significant impacts to ESAs are anticipated for the Project.
Would the application involve a substantial change in mining operations—such as from underground to open cut, or (for underground mining) a change in operations from one causing little subsidence to one likely to cause substantial subsidence?	**No.** The Project will allow extension of the current underground bord and pillar operations at Ensham Mine.
Would the application introduce a novel or unproven resource removal process, technology or activity?	**No.**

1.3 Report structure

This report accompanies the Project's draft Terms of Reference under section 41 of the *Environmental Protection Act 1994* for resource projects undergoing assessment by environmental impact statement under chapter 3, part 1, of the EP Act.

This report is structured in line with requirements to support an application to voluntarily prepare an EIS under Sections 69 to 72 of the EP Act. **Table 2** provides the application checklist referencing where each requirement is addressed.

Table 2 Voluntary EIS checklist of supporting information

	Voluntary EIS form requirement	Relevant section in report
1	A description of the project, including total area impact and taking into consideration all proposed ancillary activities.	**Section 2.0** and **Section 5.0**
2	Locality maps.	**Figures 1, 2, 3** and **4**
3	Site plan.	**Figure 2**
4	A description of the operational land.	**Section 3.1**
5	Tenure details for the operational land.	**Section 3.1**
6	Documentary evidence that the proponent may enter land to which the project relates in order to carry out any necessary studies for the EIS.	Zone 2 and 3 of the Project Area are within approved ML for the Ensham Mine. The Proponent is the landowner of these areas. Zone 1 (portion of MDL 217) is accessible for the Project. Majority of field assessments for the EIS are complete.
7	A list stating the name and address of the affected and interested persons for the project, as defined within sections 38 and 39 of the EP Act.	**Section 3.1**
8	Maps showing lot on plan numbers for all affected persons, tenements on, or adjacent to, the project land.	**Appendix C**
9	A statement of how the proponent propose to consult with the interested and affected persons.	The findings and outcomes of consultation already undertaken for the Project are described in **Section 3.2**.
10	A list of environmentally relevant activities to occur as part of the project for which an aggregate environmental score is stated. Include an illustration of the location of these activities on a site map.	**Section 6.2** Proposals for managing Project impacts in line with these requirements are set out in **Sections 6.0 to 8.0**.
11	The proposed source of water for the project, including approximate volumes.	**Section 5.2.3.6**
12	Proposed post resource activity land use.	**Section 5.3**
13	The proposed source of power.	**Section 5.2.3.4**

2.0 Project overview

Ensham Mine is an existing open-cut and underground bord and pillar coal mine located approximately 35 kilometres (km) east of Emerald in Queensland. The existing bord and pillar operations are located on ML 7459 and ML 70365 which extracts a portion of the various combined Aries/Castor seam plies.

The Proponent proposes to develop the Project to extend the life of the existing underground operations into an area identified as the Project Area commencing from within ML 7459, ML 70326, ML 70365, and ML 70366 to an area west of ML 70365 within part of Mineral Development Lease (MDL) 217.

Ensham has been a significant contributor to the Emerald community since 1993, and for the past 25 years has supported regional employment and local businesses. Ensham is committed to working with our local communities to create sustainable outcomes. The Project provides continued employment of the existing workforce at the Ensham Mine and therefore is of strategic economic and social significance to the Emerald locality and wider Central Highlands region.

The Project would not seek to change the current EA limit (condition A14) which authorises the mining of 12 million tonnes of ROM coal per annum. This will enable the extension of the Ensham Mine by up to nine years with sufficient coal reserves to approximately 2037. The Project is proposed to commence in 2021. The use of conventional underground mining equipment, or similar forms of continuous miners, is currently anticipated. The Project proposes to utilise the existing MIA facilities which includes a CHP.

By using existing infrastructure and maintaining the current level of production, the Project aims to remain within the previously assessed levels of impact and current EA conditions.

2.1 Regional context

The Project is located in the western part of the central Bowen Basin, within the Central Queensland region. It exists within the CHRC Local Government Area. The Project locality is illustrated in **Figure 1** and **Figure 2**.

The Project Area is located within the rural margins between a range of central township nodes. The largest nearby townships include Emerald which is located approximately 35 km west, and, Blackwater which is located 49 km to the south-east. The small township of Comet is located approximately 18 km south-east of the Project Area.

Resource activities are common within the region. There are 13 other active mine sites located within 65 km of the Project site.

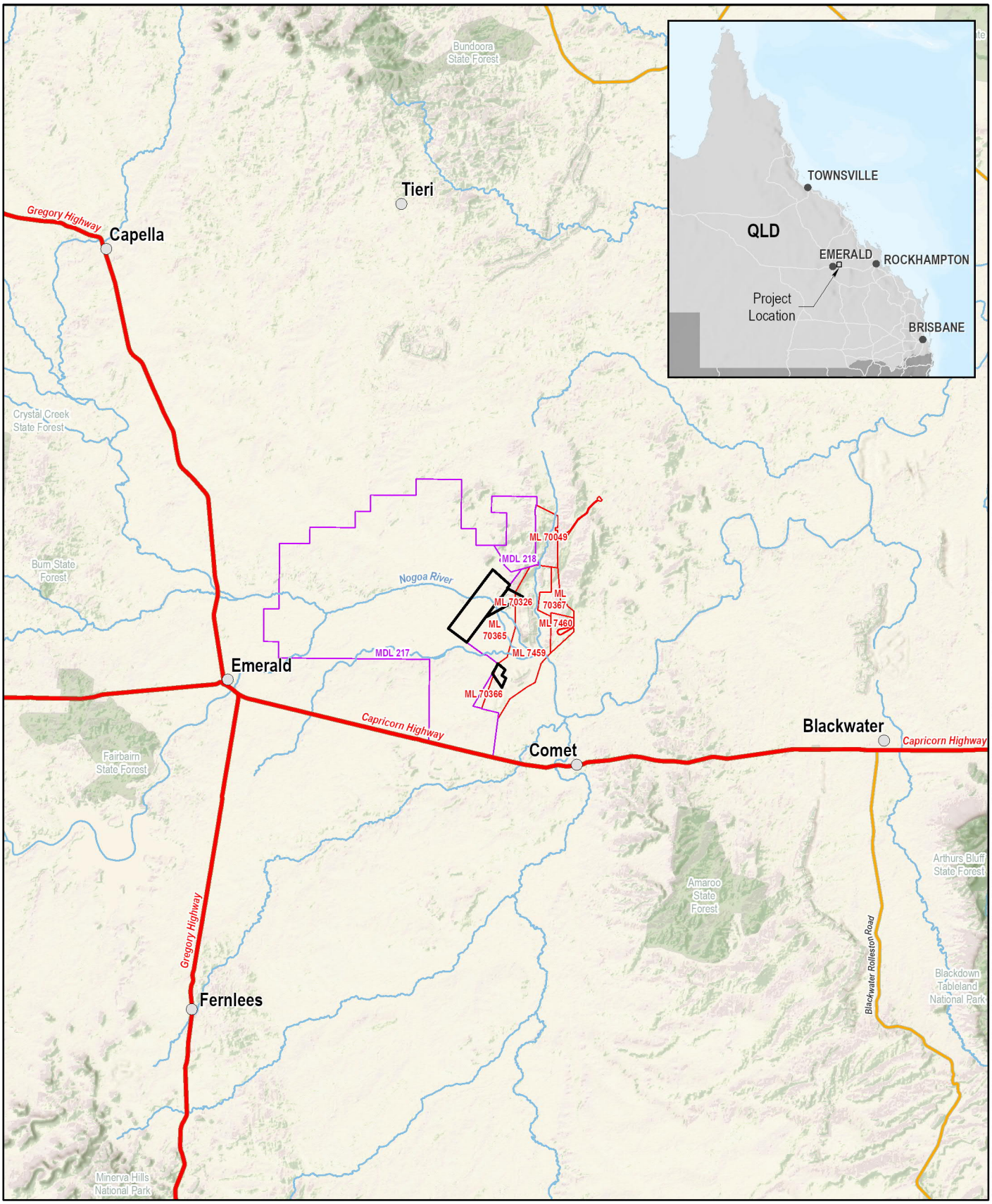

Figure 1
Regional Context

Ensham RESOURCES

N

0 10 20 km

Legend

- Project Area
- Towns
- Main Road
- Public Road
- Mineral development licence
- Mining leases

Ensham Life of Mine Extension Project

Projection: GDA 1994 MGA Zone 55 Scale: 1:600,000
Source: State of Queensland, 2019. Imagery: ESRI Online World Imagery

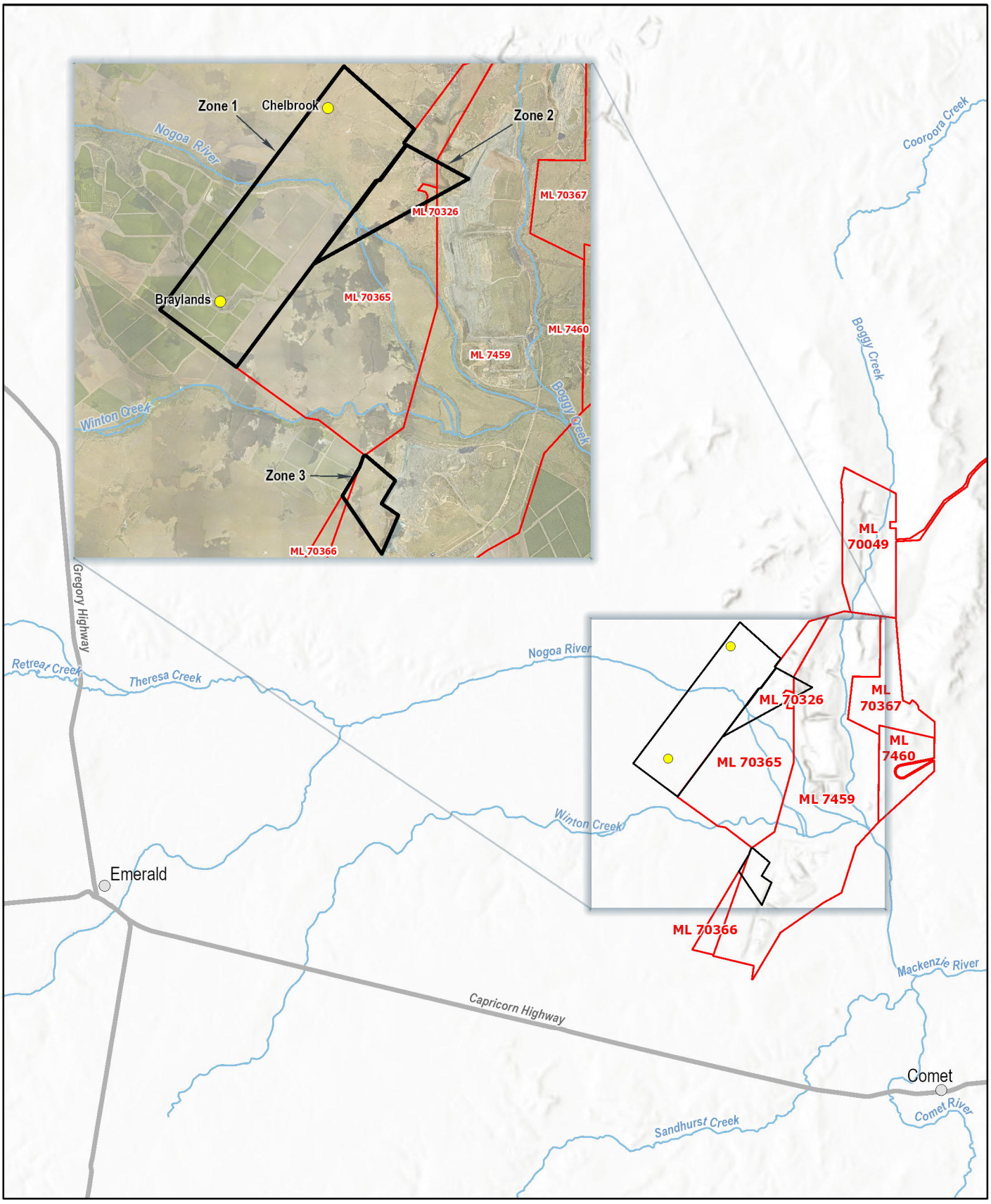

Figure 2
Project Area

Legend

- Project Area
- Mining leases
- Homestead

Ensham RESOURCES

N

0 4 8 km

Ensham Life of Mine Extension Project

Projection: GDA 1994 MGA Zone 55 Scale: 1:250,000
Source: State of Queensland, 2019. Imagery: Indemitsu, 2109.
ESRI Basemap Online, 2019. Indemitsu RFI, 2019

2.2 Project's approval requirements

The Project will be subject to a range of complex approval requirements under both Commonwealth and State legislation. Approval requirements already commenced for the Project include:

- A referral under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) was submitted to the Commonwealth Department of Agriculture, Water and the Environment on 6 May 2020 (EPBC 2020/8669). Ensham JV received notification (dated 29 June 2020) from the Commonwealth that the Project will be assessed under the Bilateral agreement and a controlled action relating to:
  - Listed threatened species and communities (sections 18 & 18A)
  - A water resource, in relation to coal seam gas development and large coal mining development (section 24D & 24E).
- An application to voluntarily prepare and Environmental Impact Statement was submitted 6 May 2020 and approval of the application was signed 9 June 2020.
- Assessment under the *Mineral Resources Act 1989* (Qld) (MR Act) for the grant of a ML within that part of MDL 217 (Zone 1) that is included in the Project Area. A ML application has been submitted to the Department of Natural Resources, Mines and Energy (DNRME) (lodgement date 25/03/2020, reference ML 700061).

It is anticipated that the Project will also require:

- An EA amendment under the *Environment Protection Act 1994* (EP Act).
- A Regional Interest Development Approval (RIDA) under the *Regional Planning Interests Act 2014* (Qld) (RPI Act) with the Project Area being mapped as a strategic cropping area (SCA) and being within the priority agricultural area (PAA).
- Compliance with the right to negotiate process under the *Native Title Act 1993* (Cth) (NT Act) due to a registered claim by the Western Kangoulu People over the Project Area (Tribunal No. QC2013/002).
- A Cultural Heritage Management Plan under the *Aboriginal Cultural Heritage Act 2003* (Qld).

Separate to this application, any necessary extension of the existing MLs will be sought in future in the renewal period.

Assessment of impacts on underground water caused by the exercise of underground water rights would be undertaken through the EA amendment application process. The management of impacts on underground water will be undertaken in accordance with the *Water Act 2000* (Qld).

A high-level assessment of these approvals is provided in **Appendix A**.

2.3 Project's regional significance

Local and regional employment

The Project is of strategic economic and social significance to the Emerald locality and wider Central Highlands region. Ensham has been a significant contributor to the Emerald community since 1993, and for the past 25 years has supported regional employment and local businesses.

In 2016 the most significant industry of employment for residents of Central Highlands Local Government Area was the mining and agriculture industry, accounting for 24.3 per cent of all employment. The Project would provide for the continuation of employment within the Central Highlands region. The existing Ensham Mine currently provides direct employment opportunities for Emerald-based and drive in / drive out personnel for

approximately 78 per cent of the workforce. The Project workforce is assessed to be 654 FTE per annum personnel until approximately 2037 (capital and operational workforce).

Secondary employment opportunities currently supported through the ancillary services to the Ensham Mine include extended requirements for workforce accommodation and a large range of mine support services such as, fabrication, maintenance and rehabilitation related services.

Local and regional economy

The Project will contribute to the local business vitality in the Emerald locality and wider Central Highlands region.

Over the life of the Project, an estimated 38.0 million tonnes of thermal coal will be produced, representing an estimated export value of $3.66 billion over the life of the Project. The economic impact analysis has estimated the impacts of the Project on the regional, state and national economies for both the capital and operational phases, based on cost data provided by the Ensham. The economic benefits can be summarised as:

- royalties of approximately $256.4 million generated over the life of the Project
- the capital costs associated with the Project are estimated at $314.9 million
- total operational costs are estimated at $2,726.2 million over the life of the Project
- total output impact of $2,500 million or $138.9 million per annum
- total household income impact of $464.5 million or $25.8 million per annum
- employment impact of up to 654 FTEs per annum
- value added impact of $971.9 million or $54 million per annum.

The continuation of the Ensham Mine operation, with inclusion of the Project, is paramount to provide both economic and workforce security for the Emerald and surrounding region, up to and beyond the Project's proposed start date of early 2021. With the proposed Project, and subsequently continuation of the mine operation from 2028, Ensham Mine will assist the economics, business supply opportunities and expenditure of the region remain available and stable into the foreseeable future.

Community partnerships and participation

Ensham is a dedicated supporter of regional and community development, through participation in a range of community initiatives. To promote community sustainability, Ensham invests in the region wherever practical, including sourcing supplies locally and supporting community programs.

Since commencing operations in the area, Ensham has strongly supported the local community through sponsorships to a number of community groups including Emerald Amateur Swimming Club, Comet Benefit Rodeo, Emerald State High School, Emerald Rodeo Association and the Rotary Club of Emerald. Ensham would continue to actively engage, support and participate within the Central Queensland regional communities through the operation of the Project.

2.4 Environmental values

A workshop was held in December 2019 to identify environmental values (EVs) relevant to the Project, to document any potential negative or positive impacts to those values, as well as propose mitigating measures to ameliorate any potential negative impacts (the EV Workshop).

As part of the EV Workshop, the impacts and benefits were assessed and scored. The EV Workshop determined that no significant environmental effects are likely to result from the Project. The outcomes of that workshop are presented in **Sections 6.0** to **8.0** and detailed in **Appendix B**.

2.5 Infrastructure requirements

The Project will allow extension of the current underground bord and pillar operations at Ensham Mine. Existing underground and surface infrastructure including road, rail and mine infrastructure equipment will be utilised. The Project proposes to utilise the existing MIA facilities which includes a CHP.

An upgrade of the CHP is currently being investigated which would include dry processing which would be designed to comply with existing EA conditions. The CHP upgrade module would be integrated into the existing footprint of the processing plant and on pre-approved disturbed area. The upgrade would assist with the dry removal of contaminants from the coal. Waste rock would continue to be disposed of in the existing open-cut pits as authorised under the current EA.

By using existing infrastructure and maintaining the current level of production, the Project aims to remain within the previously assessed levels of impact and current EA conditions.

As such, there are no significant infrastructure requirements for the Project and no additional surface disturbance proposed to the Project Area.

A description of the existing infrastructure proposed to be used for the Project is provided in **Section 5.0**.

3.0 Project stakeholders

3.1 Affected and interested persons

As a requirement of the application to voluntarily prepare an EIS (ESR/ 2016/2160. Version 4.00. 26 June 2019), a summary of affected and interested persons is provided in **Table 3** and detailed further in the Sections below.

Table 3 Overview of affected and interested persons

Type	Stakeholders
Underlying tenure	The Project Area comprises nine registered land parcels. Refer to **Section 3.1**.
Overlapping tenure	Refer to **Section 3.3, Table 4**.
Adjoining parties	Refer to **Appendix C** for full list of adjoining properties.
Registered Native Title	The Western Kangoulu People are currently the registered native title claimants of the land which encompasses the Project Area. Refer to **Section 3.2**.
Federal Government	Department of Agriculture, Water and Environment Independent Expert Scientific Committee
State Government	• Queensland Police Service (QPS) • Queensland Ambulance Service (QAS) • Queensland Fire and Emergency service (QFES) • Queensland Health • Department of Communities Disability Services and Seniors (DCDSS) • Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) • Department of Employment, Small Business and Training (DESBT) • Department of Housing and Public Works (DHPW) • Department of State Development Manufacturing Infrastructure and Planning (DSDMIP)
Local Government	CHRC
Other interested parties	Refer to **Section 3.1.6**

3.1.1 Underlying tenure

The Project Area comprises nine registered land parcels, as detailed in **Table 4** and shown on **Figure 3**. The tenure of these properties consists of freehold, reserve, and lands lease. Part of the Project Area is also subject to a secondary interest, being a strata easement.

Table 4 Land tenure and ownership across the Project Area

Lot on plan	Strata / easement	Tenure type	Ownership
Lot A AP7202	'A	Reserve Permit to occupy	• Minister responsible for administering the *Land Act 1994* (Qld) • Trustee – CHRC • Registered Permittee - Private landholder
Lot 2 CP911010	'A	Freehold	• Private landowner
Lot 8 TT345	'A	Freehold	• Cowal Agriculture Holdings Pty Ltd (CAN 164 442 148) as trustee under instrument 715389664
Lot 6 TT309	Lot A SP273867	Reserve and Term Lease	• Minister responsible for administering the *Land Act 1994* (Qld) • Trustee – CHRC • Registered Lessee - Private landowner
Lot 7 TT309	Lot A SP273867	Reserve and Term Lease	• Minister responsible for administering the *Land Act 1994* (Qld) • Trustee – CHRC • Registered Lessee - Saratoga Holdings Pty Ltd (CAN 000 636 859)
Lot 30 CP864574	N/A	Freehold	• Bligh Coal Ltd (47.5%) • Idemitsu Australia Resources Pty Ltd (37.5%) • Bowen Investment (Australia) Pty Ltd (15%)
Lot 33 RP864576	N/A	Freehold	• Bligh Coal Ltd (47.5%) • Idemitsu Australia Resources Pty Ltd (37.5%) • Bowen Investment (Australia) Pty Ltd (15%)
Lot 32 RP908643	N/A	Freehold	• Bligh Coal Ltd (47.5%) • Idemitsu Australia Resources Pty Ltd (37.5%) • Bowen Investment (Australia) Pty Ltd (15%)
Lot 31 CP864573	N/A	Freehold	• Bligh Coal Ltd (47.5%) • Idemitsu Australia Resources Pty Ltd (37.5%) • Bowen Investment (Australia) Pty Ltd (15%)

3.1.2 Native Title

The National Native Title Tribunal (NNTT) online Native Title Vision mapping identified one registered claim over the Project Area as detailed in **Table 5**. The Western Kangoulu People are currently the registered native title claimants of the land which encompasses the Project Area.

The NNTT online Native Title Vision mapping did not identify any existing Indigenous Land Use Agreements over the Project Area.

Table 5 Native Title claims within the Project Area

Name	Tribunal number	Federal Court number	Status
Western Kangoulu People	QC2013/002	QUD17/2019	Active – Accepted for registration.

Any acts or dealings in relation to land and waters that affect native title must comply with the NT Act in order to be validly completed. During the process of obtaining lawful tenure to occupy and undertake the Project, native title will be addressed as required under the NT Act. It is anticipated that a Right To Negotiate will be executed with the native title party.

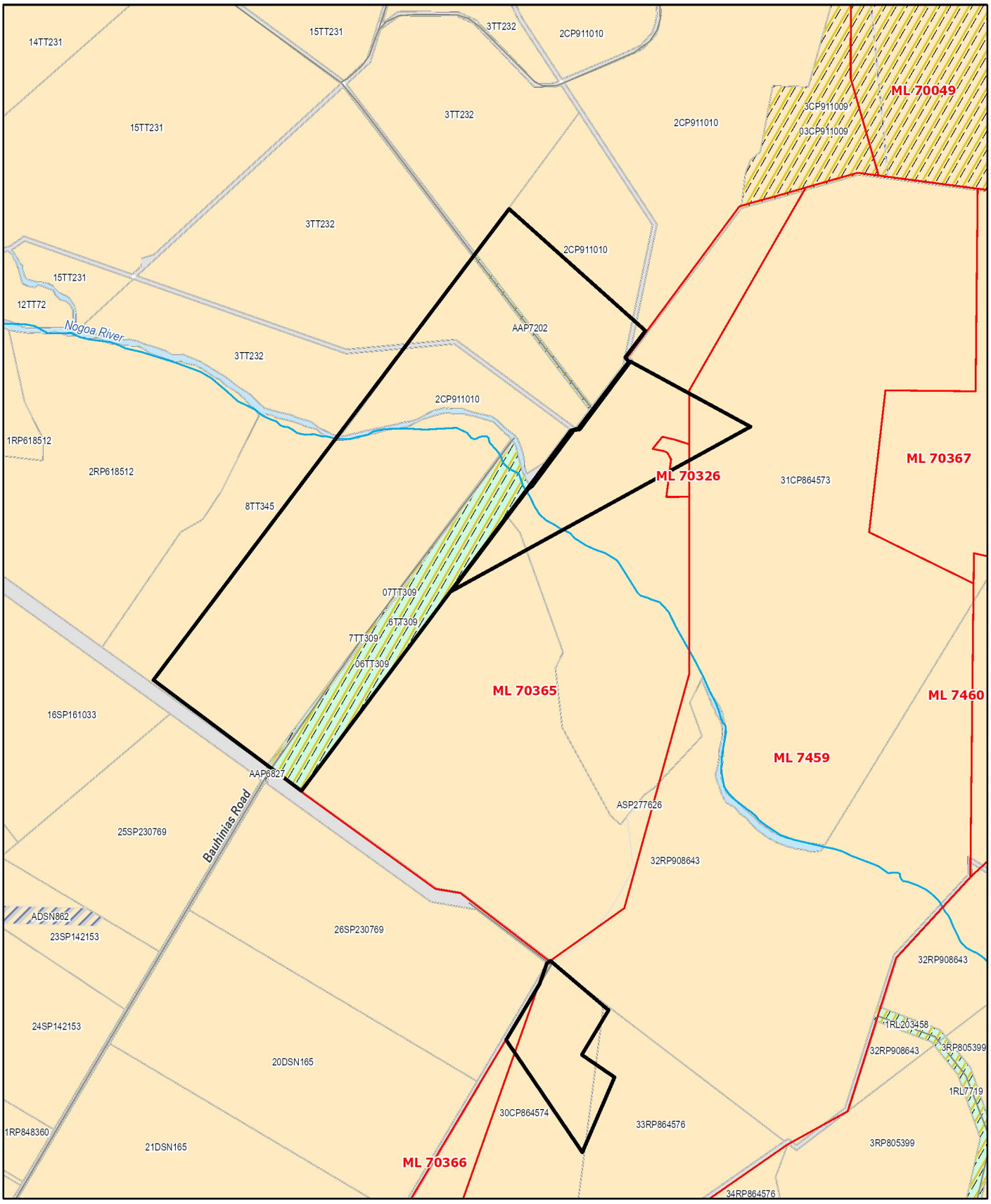

Figure 3
Tenure

Ensham RESOURCES

N

0 1 2 km

Legend

- Project Area
- Mining leases
- Cadastral lot boundaries
- Watercourse
- Other Road

Tenure

- Easement
- Freehold
- Lands Lease
- Reserve
- Strata Parcel
- Road Parcel
- Watercourse Parcel

Ensham Life of Mine Extension Project

Projection: GDA 1994 MGA Zone 55 Scale: 1:75,000
Source: State of Queensland, 2019.

3.1.3 Resource interests

The Ensham JV are the holders of the mining tenements for the Ensham mining operations. These tenements include seven MLs and two MDLs as shown in **Table 6**. It is noted that all current MLs will expire on 31 January 2028. Separate to this application, any necessary extension of the existing MLs will be sought in future in the renewal period. To the extent required, compensation agreements will be obtained or determined to enable the renewals to be granted.

The Project Area comprises three new resource areas: an area on MDL 217 (Zone 1), and two areas across current MLs; Zone 2 partially includes ML 70326, 70365 and ML 7459 and, Zone 3 partially includes ML 7459 and ML 70366 (see **Figure 4).**

The Ensham JV participants are the holders of EA Permit No. EPML00732813 for the existing operations and Ensham Resources Pty Ltd is the current operator of Ensham Mine.

Table 6 Ensham tenements

Tenure no.	Status	Name	Grant date	Expiry date	Area (ha)	Authorised holder
ML 7459	Granted	Ensham 1	21/04/1994	31/01/2028	6,154	IAR
ML 7460	Granted	Ensham 2	21/04/1994	31/01/2028	774	IAR
ML 70049	Granted	Yongala	28/01/1993	31/01/2028	1,648	IAR
ML 70326	Granted	White Hill	15/09/2005	31/01/2028	25.66	IAR
ML 70365	Granted	Maria	4/11/2010	31/01/2028	2,766	IAR
ML 70366	Granted	Dorrigo	4/11/2010	31/01/2028	254.3	IAR
ML 70367	Granted	Volga	4/11/2010	31/01/2028	1,004	IAR
MDL 217	Granted	-	30/09/1996	30/04/2021	47,393	IAR
MDL 218	Granted	-	29/4/1996	30/04/2021	3,201	IAR

A number of exploration permits of varying types have been identified within the Project Area. **Table 7** identifies the allocation type, permit number, and holder of these existing permits. Coordination arrangements will be discussed with the overlapping permit holders as required under the MR Act as part of the proposed ML application.

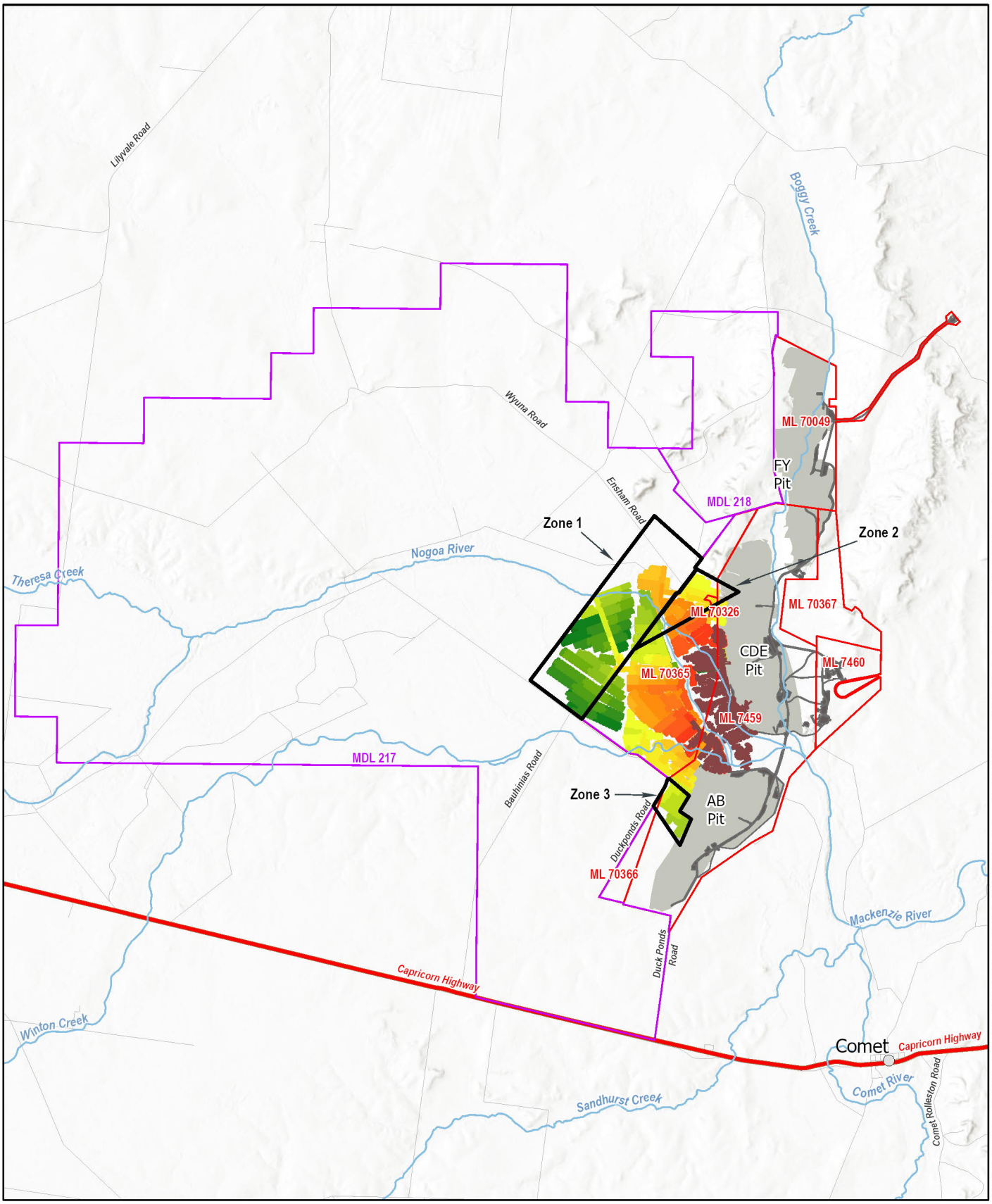

Figure 4
Project Layout

Ensham RESOURCES

N

0 4 7 km

Legend

- Project Area
- Mining leases
- Mineral development licence
- Pit
- Mine infrastructure footprint
- Existing mined areas and roads

MINE PLAN - JAN 2020

Year

- 2019
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
- 2030
- 2031
- 2032
- 2033
- 2034
- 2035
- 2036
- 2037

Ensham Life of Mine Extension Project

Projection: GDA 1994 MGA Zone 55 Scale: 1:215,000
Source: State of Queensland, 2019. ESRI Online data, 2020.
Indemitsu RFI, 2020

Table 7 Exploration permits across the Project Area

Allocation type		Purpose	Expiry date	Holder
Authority to Prospect	ATP 806	Petroleum	16/07/2022	Ome Resources Australia Pty Ltd[1] (75%) and CNOOC Coal Seam Gas Company Pty Ltd (25%)
Potential Commercial Area - Petroleum	PCA 170	Petroleum	16/072022	Ome Resources Australia Pty Ltd (75%) and CNOOC Coal Seam Gas Company Pty Ltd (25%)
Authority to Prospect	ATP 1177	Petroleum	30/11/2021	Denison Gas (Queensland) Pty Ltd
Potential Commercial Area – Petroleum	PCA 154	Petroleum	25/06/2029	Denison Gas (Queensland) Pty Ltd

3.1.4 Joining persons

Zones 2 and 3 of the Project Area partially overlap existing leases ML 70326, ML 70365, ML 7459 and ML 70366 at Ensham Mine. Zone 1 of the Project Area is located immediately west of the existing leases within MDL 217.

A figure and ownership details showing lot on plan numbers for all affected persons and tenements on, and adjacent to, the Project Area is provided in **Appendix C**.

3.1.5 Local government

The Project is located in the western part of the central Bowen Basin, within the Central Queensland region.

It exists within the CHRC Local Government Area. The Project locality is illustrated in **Figure 1** and **Figure 2**.

3.1.6 Other interested parties

The CHRC is a key stakeholder for the SIA and will provide inputs other interested parties to consult with. Community organisations that may be consulted with are:

- Central Highlands Development Corporation
- Central Highlands (Qld) Housing Company Limited (CHQHC)
- Comet State School Parents and Citizens Association
- Centacare CQ Emerald
- Comet Rural Fire Brigade
- Emerald Interagency Network
- Bidgerdii Community Health Service.

Others to be identified in consultation with Community Development Officer, Central Highlands Regional Council.

[1] OME Resources Australia Pty Ltd is a wholly owned subsidiary of QGC Pty Ltd who is the Authorised holder representative for the tenement.

3.1.6.1 Training and employment service providers

Central Queensland University (CQU) has a campus in Emerald which provides access to a wide range of courses , either on campus or with support for online courses, in health, business, the arts and communications, education, childcare, community welfare, engineering, and information technology

CQU includes a TAFE campus (TAFE) which offers a wide range of certificates, trade qualifications and diploma courses.

Private and community training providers include WorkPac Group, Max Employment Emerald and Lennon Training.

3.1.6.2 Community members

Community members and groups in the potentially affected communities of Comet, Blackwater and Emerald are key stakeholders for the Project. The Project's potential for impacts on the environment within these communities is anticipated to be low, however social impacts and benefits relating to changes in access to training, employment, housing or business opportunities may be experienced in potentially affected communities.

3.2 Community and stakeholder consultation

Ensham is committed to observing best practice community and stakeholder consultation throughout the life of the Project.

Since commencing operations in 1993, Ensham has established positive relationships with key stakeholders, local landowners and leaseholders, business owners and local government.

3.2.1 Stakeholder engagement objectives

The key objectives of stakeholder engagement for the Project are to:

- build and maintain stakeholders' understanding and perceptions of the Project, by providing genuine opportunities for stakeholders to provide inputs into the planning
- ensure there is consistently accurate and accessible Project information in the public domain
- identify and proactively respond to key stakeholder and community issues and concerns about the Project in a timely manner
- maintain and strengthen Ensham's existing key stakeholder and community relationships and its social licence to operate.

Community and other key stakeholder engagement and feedback is a critical step in the process and Ensham is committed to actively engaging with local businesses, landowners and government to enhance the benefits and minimise any negative impacts associated with the Project.

These objectives are consistent with the 'inform and consult' levels of engagement in the International Association for Public Participation (IAP2) Spectrum of Public Participation, which is acknowledged as an industry-leading stakeholder engagement framework.

3.2.2 Stakeholder engagement strategy

Ensham's Stakeholder Engagement Strategy will be consistent with maintaining its strong commitment to the environment and the local community throughout the development of the Project. The proposed methods for informing and engaging Project stakeholders are described in the following sections.

3.2.2.1 Affected and interested persons

Engagement with affected and interested persons identified in **Section 3.1** will seek to understand how they are potentially impacted by the Project. This engagement will also identify opportunities which may result from the Project, and any mitigations/enhancements required.

Ensham proposes to engage with affected and interested persons through various forums to discuss their views on the project and how it might affect the use or amenity of their properties or their wellbeing. Feedback will be sought through the following:

- phone interviews
- online meetings
- online and postal surveys, where necessary.

Affected and interested persons will also be informed about the Project through the various public engagement channels described in **Section 3.2.2.2**.

3.2.2.2 Local communities

Ensham proposes to utilise a number of consultation and engagement options to ensure the local community are well informed throughout all stages of the Project lifecycle and opportunities are available for them to provide feedback through the following:

- online meetings
- community and business workshops
- newsletters
- media releases
- advertising
- Project website.

Ensham's communication and engagement team will support targeted consultation activities associated with the Project, including community workshops and stakeholder meetings to ensure effective sharing of information between the Project team, the local community and key stakeholders.

A summary of the engagement activities undertaken to date on the Project is provided in **Table 8**.

Table 8 Activities and timeline of stakeholder engagement

Engagement activity	Date
Meeting with Native Title Claimant to introduce and briefly discuss the Project	October 2019
Meeting with CHRC to discuss the Project	October 2019
Various meetings with private landholders to discuss the Project	October 2019

4.0 Project need and justification

4.1 Project need

4.1.1 Industry drivers

The long-term global demand for thermal coal remains strong and is forecast to increase steadily over the next 20 years. Thermal coal will remain a key energy source for Asia based on the abundance, affordability and availability in the global market. It is forecast that Asia will continue to be the largest importer of thermal coal, with 80 per cent of export thermal coal demand coming from Asia.

The increased focus from countries to achieve their climate goals has resulted in the phasing out of lower quality coal from their energy mix. As a result, the coal industry is developing existing and investigating new technologies to increase their competitiveness against other fossil fuels and renewables. Due to the high quality of coal, Australia is expected to remain in the top five largest suppliers of thermal coal to the global export market over the next 20 years. It is well positioned to supply the south-east Asian (SEA), Japan, South Korea and Taiwan (JST) markets with low-ash, low-sulfur, high-energy coal that is likely to remain in demand.

4.1.2 Local need

The Project will contribute to the local business vitality in the Emerald locality and wider Central Highlands region. Facilitating continuation of the mining operation for up to a further nine years from 2028 to 2037 will assist the economics, business supply opportunities and expenditure of the region remain available and stable into the foreseeable future.

Community partnerships and participation

Ensham is a dedicated supporter of regional and community development, through participation in a range of community initiatives. To promote community sustainability, Ensham invests in the region wherever practical, including sourcing supplies locally and supporting community programs.

Since commencing operations in the area, Ensham has strongly supported the local community through sponsorships to a number of community groups including Emerald Amateur Swimming Club, Comet Benefit Rodeo, Emerald State High School, Emerald Rodeo Association and the Rotary Club of Emerald. Ensham would continue to actively engage, support and participate within the Central Queensland regional communities through the operation of the Project.

4.2 Project alternatives

A Prefeasibility Assessment (PFA) undertaken for the Project has evaluated alternatives and selected a preferred case based on its technical and financial feasibility (Idemitsu, 2020).

Six underground mine development cases were evaluated in the PFA as identified in **Table 9**. All options sought to extend the Ensham LOM to ensure employment for the existing workforce is maintained up to and beyond 2028. MDL Case 1 was considered the preferred option. The selected option has been evaluated and proven to be technically and financially feasible (Idemitsu, 2020). A 'do nothing' scenario was also considered as an option. This option showed that employment for the underground operational workforce of approximately 603 FTEs and the community and economic benefits to the regional, state and national economies summarised in **Section 9.0** reduce over the years leading up to mine closure in 2028 should the Project not be developed. Furthermore, State royalties of approximately $256 million and Commonwealth tax revenue

from the coal resource would be foregone and the contribution to Queensland's growing export industry would not be realised.

The continuation of the Ensham Mine operation, with inclusion of the Project, and subsequently continuation of the mine operation from 2028, Ensham Mine will assist the economics, business supply opportunities and expenditure of the region remain available and stable into the foreseeable future.

Table 9 Project alternatives

Case #	Description
Base Case	Thick and thin seam in ML's only, includes Zone 2 and Zone 3. Maintain current operation (5-production units), excluding CHP.
Long Term Plan	Base Case including thick seam in Zone 1. Maintain current operation (5-production units), excluding CHP.
MDL Case 1	Base Case - including the Zone 1 thick & thin seam, excluding CHP. Maintain current operation (5-production units) with no coal washing.
MDL Case 2	Base Case – including the Zone 1 thick & thin seam and including CHP. Maintain current operation (5-production units) and commence with coal washing when required in 2027.
MDL Case 3	MDL Case 1 – without dilution.

4.3 Strategic benefits of the selected option

The Project will allow Ensham to remain a competitive, high quality, thermal coal producer and deliver a thermal coal product to its customers, while continuing to supply both strong economic and social contributions to the region and the State of Queensland. The benefits of the Project are outlined in **Section 9.0**.

Furthermore, the continuation of the bord and pillar method and the proven FoS applied means no material subsidence is predicted and the use of existing infrastructure means no additional surface impacts, such as vegetation clearing, would occur in Zone 1.

5.0 Project description

5.1 Existing Ensham Mine operations

The existing mining operations at Ensham Mine consist of open-cut and underground operations. The open-cut operation is scheduled to continue to approximately 2024, followed by further rehabilitation of the open-cut mine. Existing underground operations are due to cease in 2028.

The underground operations currently use the bord and pillar mining method. This involves the use of a continuous miner to remove the ROM coal while leaving a series of coal pillars to support the roof.

The existing underground workings are accessed through portals located in Pit C. The portals are used for conveying ROM coal from the workings to the Coal Handling Plant (CHP) and for personnel and materials access.

Extracted coal is transported by a system of underground conveyors to the surface. Coal is then transported by semitrailers to the CHP where it is crushed and sized. Product coal is transported via rail to Gladstone for the Gladstone Power Station and to the port for export.

The underground mine services are largely integrated wherever possible with those of the open-cut mine in aspects such as coal handling, transport, waste and water management.

5.2 Proposed Project operations

The proposed Project is an extension of current underground operations utilising existing underground and surface infrastructure and processes.

No new surface infrastructure is proposed in Zone 1 of the Project Area. The use of conventional underground mining equipment, or similar forms of continuous miners, is currently anticipated.

Design intent

The Project will continue with the bord and pillar mining method for long term stability, with no material subsidence predicted or observed for the Project.

The environmental impacts of the Project are predicted to be very low.

The extension of the underground operation into zones 1, 2 and 3, using existing access infrastructure means that no surface construction or surface disturbance will be required in Zone 1 to facilitate the Project (see **Figure 4**).

Avoid, minimise, manage

The extension of the existing underground operation into the Project Area demonstrates the considered avoidance of potential environmental impacts. The avoidance of surface disturbance through the use of existing site infrastructure allows the Project to avoid impacts associated with EVs of terrestrial ecology, flooding and potential amenity impacts, such as noise, visual and air quality, on sensitive receptors.

The EVs associated with the Project, were identified through the EV Workshop (refer **Appendix B**. Potential impacts and mitigation measures are discussed in more detail in **Section 6.0** and **Section 7.0**.

Industry standards

The operation of underground coal mines is a well understood activity across Queensland. The environmental control of these operations is facilitated through a range of management and monitoring requirements in line with industry standards prescribed under the EP Act and regulated by the DES. Industry standards include model mining conditions (ESR/2016/1936) and the technical guideline for water release to Queensland waters (ESR/2015/1654).

5.2.1 Conceptual mine design, ROM production and schedules

The mining sequence proposed for the Project is based on the extension of the current mine workings. **Figure 4** shows the predicted mine production levels and **Figure 5** shows the existing mined out areas, existing sequences (under EA Permit No. EPML00732813) and the proposed extensions into the Project Area.

As shown in **Figure 4**, Zone 2 would be the first area to be accessed from ML 70365 in approximately 2021, before mining continues into the area north of the Nogoa River in Zone 1. South of the Nogoa River in Zone 1, mining would extend in a south-west direction from approximately 2027. Mining in Zone 3 would continue from ML 70365 beyond approximately 2028.

Mine design has been completed with a FoS of 1.6 all for bord and pillar workings. Underground mining for the proposed Project will occur at a depth of approximately 120 to 210 m (metres) below the surface.

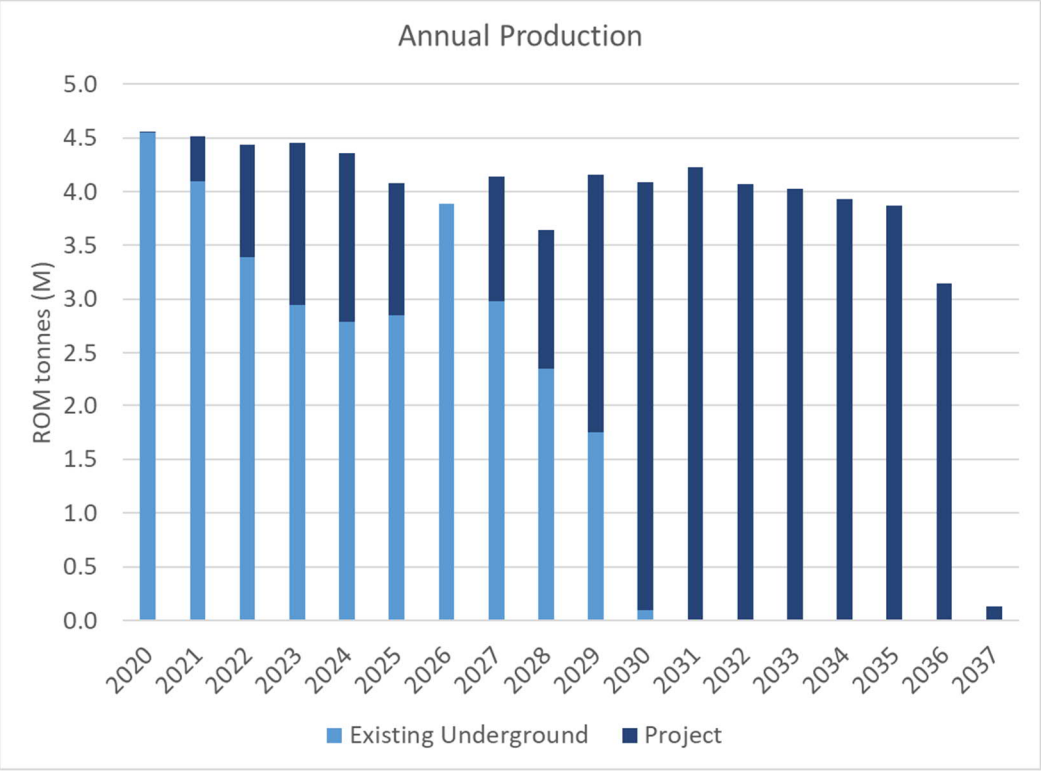

Figure 5 Ensham Mine ROM coal production

5.2.2 Mining and processing equipment and infrastructure

A mining infrastructure study has been conducted as part of the PFA and the findings of that study are discussed as follows. As the proposed Project is an extension of underground mining activities, the Project utilises all existing operational infrastructure, and proposes no surface disturbance to the Project Area. As stated previously, an upgrade of the CHP is currently being investigated for dry processing.

5.2.2.1 Underground equipment

The Project will continue to use continuous underground miners (or similar) which will provide sufficient capability to mine the proposed Project Area. Other existing equipment that will continue to be used includes shuttle cars, mobile bolters and feeder breakers.

5.2.2.2 Coal clearance system

Extracted coal is currently transported from the underground production panels to the surface ROM pad by a system of underground conveyors with a maximum design discharge rate of 600 tonnes per hour. The existing underground coal clearance system has sufficient capacity for the Project and will be extended in the underground workings as the mining operations extend into the Project Area.

5.2.2.3 Run of Mine storage area

The ROM stockpile area is expected to remain essentially the same size during the Project LOM. Existing or similar heavy machinery including loaders and side tippers will continue to be utilised to manage the ROM stockpiles.

5.2.2.4 Coal handling plant

The existing CHP comprises a truck dump station, crushing and screening plant, product conveyors, stackers, reclaim system and loadout system. An upgrade of the CHP is currently being investigated to include waste rock removal from the ROM coal. In line with existing operation, the waste rock will continue to be returned to the mining voids and used as fill.

After crushing, the product coal will continue to be stockpiled and loaded onto trains via the reclaim tunnel and bin.

5.2.3 Associated infrastructure

5.2.3.1 Ventilation

Existing underground ventilation systems will be extended into the Project Area as these areas are developed with current practices and procedures utilised.

5.2.3.2 Gas drainage and management

The current operational procedures and mains ventilation system will be utilised to manage incidental gas for the Project. The current surface infrastructure is deemed to be sufficient for ventilation requirements so no new infrastructure will be required.

5.2.3.3 Compressed air

Surface compressors are currently located within the Red Hill infrastructure complex located in Pit C above the portals. The existing compressed air system will be adequate to support the Project.

5.2.3.4 Electricity supply

66 kV power is provided to the Ensham Mine from the Ergon Lilyvale substation via an existing 27 km overhead transmission line. The underground mine is supplied via an existing 66/11 KV 10MVA transformer located at Red Hill.

Demand modelling conducted for the Project indicates there is sufficient capacity to supply power for the LOM and no new surface electrical infrastructure will be required.

5.2.3.5 Communications

The current underground system is located along conveyors, mining operations and substations, to provide communications between underground and surface personnel.

The existing underground fibre optic communication network is adequately servicing the current mining operations and will be extended as the mine area expands. The communication system is expected to have sufficient capacity for the Project.

5.2.3.6 Raw water supply

The current water supply system including potable water infrastructure will be utilised for the Project. Additional piping and booster pumps will be installed underground to supply the required water pressure for the Project Area. Water supply to the Project is expected to average approximately 52 mega litres per month (ML / month). No changes in water licencing arrangements are expected for the Project.

No change to the existing water supply surface infrastructure would be required.

5.2.3.7 Mine dewatering

Mine effected water is currently removed from the underground production areas using a dedicated 66 litres per second dewatering system. This dewatering system would be extended underground as mining progresses into the Project Area. Overall, no changes to the dewatering infrastructure will be required.

5.2.3.8 Flood protection

Potential underground flooding from open-cut catchments (through portals) will continue to be controlled by existing water diversion structures to provide protection up to a 0.1 per cent annual exceedance probability (AEP) (1 in 1000 year) event. Accordingly, no changes to flood protection infrastructure will be required.

5.2.3.9 Surface buildings

The existing surface buildings have sufficient capacity for the Project. No new surface buildings will be required to be constructed for the Project.

5.2.4 Waste

The Project will generate regulated, recyclable and general wastes, consistent with volumes currently generated.

Waste generated as part of the Project will be managed using the existing waste management systems utilised by the current mine operations.

Waste mine water will continue to be managed using the existing water management system for the Project.

Septic tanks will continue to be used to treat sewage from bathroom facilities in the mining area. Sludge from septic tanks will be removed by a licenced contractor. The current septic system capacity will be adequate to for the Project and no upgrade will be required as there will be no increase in the number of FTE personnel.

Mineral waste material generated by the CHP will continue to be returned to open-cut voids.

Overall, no changes to the current waste management system will be required.

5.3 Rehabilitation and decommissioning

Progressive rehabilitation for the existing Ensham Mine is currently being undertaken and will continue for existing approved operations in accordance with the EA and Rehabilitation Management Plan.

Rehabilitation and closure of the underground workings for the Project would commence on cessation of underground production. Surface infrastructure used for the Project would then be decommissioned and rehabilitated by 2043. Pits C and D which provide access to underground wordings would be rehabilitated after underground production ceases and be rehabilitated by 2043 also. Rehabilitation would be followed by a 10 year monitoring period for the rehabilitated areas followed by a two year certification period which is expected to be complete by 2055. It is expected some roads and dams would be retained for future landowner use.

Zones 2 and 3 of the Project Area partially overlap existing leases ML 70326, ML 70365, ML 7459 and ML 70366 at Ensham Mine. Post-mining, zones 2 and 3 are expected to be returned to pre-mining land use. Land use within zone 1 of the Project Area is expected to remain unchanged as no surface disturbance is proposed and subsidence is predicted to be negligible.

6.0 Natural environment

6.1 Introduction

As part of this application, the natural environment aspects have been considered to include topography, geology and soils, groundwater; surface water, environmentally sensitive areas (ESAs), terrestrial ecology, biosecurity, aquatic ecology and groundwater dependant ecosystems. Where relevant, the outcomes of the EV report (**Appendix B**) are discussed below.

6.2 Environmentally Relevant Activities

The Environmental Protection Regulation 2008 (EP Regulation) defines Environmentally Relevant Activities (ERAs) as activities with the potential to impact negatively on the environment.

The current EA authorises the carrying out of the following ERAs:

- Resource Activity, Schedule 2A, 13: Mining black coal
- Resource Activity, Ancillary 60 - Waste disposal, 1: Operating a facility for disposing of, in a year, the following quantity of waste mentioned in subsection (1) (a), (d) more than 200,000t
- Resource Activity, Ancillary 16 - Extraction and Screening, 2: Extracting, other than by dredging, in a year, the following quantity of material, (a) 5,000t to 100,000t
- Resource Activity, Ancillary 08 - Chemical Storage, 3: Storing more than 500 cubic metres of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c)
- Resource Activity, Ancillary 62 - Waste transfer station operation, Operating, on a commercial basis or in the course of carrying on a commercial enterprise, a waste transfer station that receives a total quantity of at least 30t or 30 cubic metres of waste on any day
- Resource Activity, Ancillary 63 - Sewage Treatment, 1: Operating sewage treatment works, other than no release works, with a total daily peak design capacity of, (b-i) more than 100 but not more than 1500EP if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme

6.3 Land use

The predominant land uses within the wider region include cropping, grazing, and resource activities. The land use for the Project Area is representative of the broader regional land use, and includes cropping, grazing land, and waterways with fringing riparian vegetation. The agricultural nature of the Project Area and surrounds is further indicated through the Central Queensland Regional Plans, the designation of the Priority Agricultural Area and the Strategic Cropping Area (under the RPI Act).

Two homesteads are located within the Project Area (Braylands Homestead and Chelbrook Homestead) on freehold land. An additional 10 homesteads are located within 5 km of the Project Area.

A review of the Queensland Land Use Mapping Program (QLUMP) has been undertaken to further characterise the land use pattern of the Project Area and surrounds (State of Queensland, 2013a). QLUMP assesses and maps land use patterns and changes across the state according to the Australian Land Use and

Management (ALUM) Classification. The land use types are provided in **Table 10** in accordance with the QLUMP classifications, along with approximate percentage cover.

Table 10 QLUMP land use classes

Mapped land use	Land use definition	Approximate cover of Project Area (%)
Irrigated cropping	Land under irrigated cropping. This class may include land in a rotation system that at other times may be under pasture.	43
Grazing irrigated modified pastures	Irrigated pasture production, both annual and perennial, based on a significant degree of modification or replacement of the native vegetation. This class may include land in a rotation system that at other times may be under cropping.	3
Residential and farm infrastructure	Land with houses and or other residential infrastructure with or without associated agricultural activity. This class includes urban and remote communities, farm buildings and other farm infrastructure larger than the minimum mapping scale, and land in transition to residential from other land uses. This class also includes holiday shacks.	1
Grazing native vegetation	Land uses based on grazing by domestic stock on native vegetation where there has been limited or no deliberate attempt at pasture modification.	40
Marsh/wetland	Wetlands are areas of permanent or periodic/intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, excluding estuary and coastal water.	8
Mining	Mining and extractive industries.	5

QLUMP maps approximately 5 percent of the Project Area with a land use defined as mining and extractive industries. Zones 2 and 3 of the Project Area are located within the existing Ensham Mine footprint and together account for approximately 22 percent of the entire Project Area. Therefore, land use mapped by QLUMP in the Project area does not appear to represent the full extent of mining in the area.

6.4 Topography, geology and soils

6.4.1 Existing environment

The Project Area has an elevation of approximately 150 m Australian Height Datum (AHD). To the south of Nogoa River the landscape is flat, consistent with floodplains. A small ridge forms north of the Nogoa River with an elevation of up to approximately 180 m. The ridge continues to rise sharply to the north-west of the boundary with an elevation of up to approximately 250 m AHD.

The geology of the Project Area, from shallowest to deepest, comprises unconsolidated Quaternary sediments in the river alluvium, Tertiary sediment, Triassic Rewan Group sediment, and Permian age Rangal Coal Measures, including sandstone, siltstone, mudstone, tuff and conglomerate within the Burngrove, Fair Hill and Macmillan Formations, Aries Coal Seam, Castor Coal Seam, Pollux Coal Seam and Orion Coal Seam. Within the Project Area, the underground mining will continue to target the Aries and Castor Seams.

The Central Highlands region is defined by extensive cropping, and high productivity grazing land in addition to current and potential horticultural use.

6.4.2 Potential impacts and mitigation measures

Potential impacts to topography, geology and soils from the Project as identified by the EV Workshop are expected to be negligible, as the Project consists of the expansion of the current underground mine, with no additional surface infrastructure required in Zone 1 (see **Figure 5**).

The Project will continue to operate using the bord and pillar mining method which is currently being undertaken at the Ensham Mine. A subsidence assessment has been completed and peer reviewed by Mine Advice (Mine Advice, 2020). The assessment has identified that subsidence, if it were to occur, is predicted to be typically less than 40 mm in the Project Area. The Australian Government Department of the Agriculture, Water and the Environment (DAWE) states that seasonal variation in surface levels can be as high as 50 mm as a result of changes in moisture content meaning that the predicted subsidence is within the range of normal seasonal fluctuation (IESC, 2015).

The subsidence assessment for the Project has also considered observations from the existing bord and pillar mining operations at Ensham mine which have similar mining depth of cover, and mine design. The current underground operations have not observed any surface cracking or ponding, or, any subsidence, which is consistent with operational experience at comparable bord and pillar mining areas in both Queensland and New South Wales.

6.5 Groundwater

6.5.1 Existing environment

The principal groundwater bearing strata in the Project Area are associated with the Permian coal seams and the Quaternary alluvium. A groundwater study has been undertaken for the Project which demonstrates that there is limited hydraulic connectivity between different geological units. Groundwater flow in the alluvium is expected to follow topographical gradients, which is from north-west to south-east in the vicinity of the Project and follows the Nogoa River flow direction.

There are no registered groundwater bores within the Project Area due to the salinity of the groundwater which ranges between 10,000 and 25,000 uS/cm. As noted in **Section 6.6** below, agricultural irrigation water for land within the Project Area is sourced from the upstream Fairbairn Dam. There is a total of nine registered groundwater bores located within one kilometre of the Project Area.

The current EA requires groundwater monitoring of the bores in the area allowing for the compilation of groundwater data from the Quaternary (alluvium), Triassic age sediments, and Permian Coal Measures. Monitoring wells are both located on the MLs and on nearby private properties.

6.5.2 Potential impacts and mitigation measures

The groundwater study has been undertaken for the Project and peer reviewed by the Sustainable Minerals Institute, University of Queensland.

The key conclusions of the groundwater assessment are as follows:

- The Project has a predicted mine inflow between 3 and 20 mega litres per day (ML / day), with an average of 8.9 ML / day. Due to the methodology used, these inflows are considered a conservative over-estimate. An increase of total inflow is predicted due to the extension of the mine life. The inflow rates of the project are similar when compared to existing operations.
- There is no predicted groundwater level drawdown within the alluvium in the Project Area.

- Impacts on identified groundwater dependent ecosystems (GDEs) are negligible (refer **Section 6.8.2**).
- The maximum additional drawdown extent in the coal seam aquifer extends up to 7 km to the west and the south-west of the Project Area.
- No private landholder bores are predicted to have a decline in groundwater levels by more than 2 m
- The additional net indirect loss of groundwater from the Nogoa River alluvium (within the study area) to underlying strata, due to the Project, is expected to be about 0.01 ML / day on average with a peak loss of 0.05 ML / day.
- Predicted groundwater drawdown due to the Project indicates no increased leakage from the Nogoa River to the underlying alluvium.
- There are no additional impacts on groundwater quality predicted as a result of the Project.
- Post mining, the groundwater levels are predicted to recover slowly based on 200 year recovery simulations. Some permanent reduction in water levels is predicted in the target coal seams.

Based on these findings, the EV Workshop determined the Project to have minimal potential impacts.

Agriculture in the area is commonly reliant on surface water allocations for stock watering or irrigation requirements, due to the high salinity of the groundwater, therefore risk to groundwater users in the surrounding agricultural areas is predicted to be low.

Groundwater monitoring will continue during the Project under the conditions of the amended EA and as required for site operations and environmental monitoring.

6.6 Surface water

6.6.1 Existing environment

The dominant hydrological feature across the Project Area is the Nogoa River. The Project is located within the Nogoa River catchment, which is a sub-basin of the Fitzroy Basin. The Nogoa River is naturally ephemeral but generally has constant low flows due to controlled irrigation water supply releases from Fairbairn Dam which is located approximately 60 km upstream of the Project Area.

The main channel of the Nogoa River is relatively deep and well defined, however, overbank flooding can occur after heavy rains in the catchment. Within the Project Area, the river has a secondary anabranch channel that flows intermittently. Smaller ephemeral tributaries such as Winton Creek and Boggy Creek also skirt the Project Area. Approximately 10 km downstream of the mine, the Nogoa and Comet Rivers meet to form the Mackenzie River.

Ensham Mine is currently licensed to extract water from, and discharge water to, the Nogoa River under the current water licencing arrangements. There is expected to be no change in the current water licencing arrangements.

6.6.2 Potential impacts and mitigation measures

A hydrology and flooding assessment currently underway for the Project has shown that impacts on surface water flow across the Project Area are not predicted, as the Project will not alter the surface topography. In addition, no potential changes to flooding including instability and erosion of waterways are predicted based on flood modelling undertaken for the Project.

Monitoring of surface water flow and quality will continue in accordance with the EA.

The existing mine water management system, which comprises water storages, water reticulation, and water release facilities, is considered adequate to meet the ongoing operational requirements of the Project.

The EV Workshop determined that the potential impact to surface water flows and quality is expected to be minor.

6.7 Environmentally sensitive areas

6.7.1 Existing environment

ESAs are defined under the Environmental Protection Regulation 2019. Category A ESAs include a range of protected areas under Commonwealth and State legislation. No Category A ESAs are included within or in close proximity to the Project Area.

Category B ESAs include a range of environment and planning values managed and protected through a range of both Commonwealth and Queensland legislation. One Category B ESA, a previously undisturbed '*endangered regional ecosystem identified in the database known as the 'Regional ecosystem description database' published on the department's website*' is located within zone 1 of the Project Area. Further detail on regional ecosystems (REs) is provided in **Section 6.8**.

6.7.2 Potential impacts and mitigation measures

No additional surface infrastructure is proposed in the Project Area, avoiding the need for any clearing of identified regional ecosystems. Accordingly, no potential impacts to ESAs are anticipated for the Project.

6.8 Terrestrial ecology

6.8.1 Existing environment

In order to characterise the ecological values of the Project Area, a desktop review and field survey has been undertaken. The following sections present the results of the ecology assessment for the Project Area.

Threated ecological communities

The field survey confirmed the presence of one threatened ecological community (TEC) within the Project Area, being Brigalow (*Acacia harpophylla* dominant and co-dominant).

Conservation significant flora

The desktop assessment identified six conservation significant flora species with the potential to occur within the Project Area and 10 km boundary, however no threatened flora species were detected during the flora surveys across the Project Area.

A likelihood of occurrence assessment based on desktop review and field survey results was undertaken for the Project Area. It was determined that the likelihood of occurrence is possible for *Acacia spania* and *Cerbera dumicola* as suitable habitat was identified in remnant areas of RE 11.7.1. The likelihood of occurrence for the other four species was determined as unlikely.

Regulated vegetation and regional ecosystems

A terrestrial ecology (flora) assessment for the Project has identified the majority of the Project Area was validated to comprise non-remnant vegetation, associated with either non-remnant woodland, grasslands mostly dominated by *Cenchrus ciliaris* (buffel grass), agricultural cropping land small patches of Brigalow regrowth vegetation.

One additional RE was observed, RE 11.7.1 *Acacia harpophylla* and / or *Casuarina cristata* and *Eucalyptus thozetiana* or *E. macrocarpa* woodland on lower scarp slopes in the north-east of the Project Area.

A single RE with an endangered biodiversity status was identified within zone 1 of the Project Area, namely RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains). This RE is a Category B ESA and occurs as both remnant and high value regrowth (HVR). A total of 60.21 ha of RE 11.3.1 is described and mapped within the Project Area.

Fauna

A desktop review undertaken in a terrestrial ecology (fauna) assessment currently underway for the Project has identified 27 conservation significant fauna species with the potential to occur within the Project area, including 10 birds, seven mammals and 10 reptiles. Field assessments were completed in May 2019 (autumn survey), October 2019 (targeted bat survey) and November 2019 (spring survey).

The majority of the fauna habitat within the Project Area was generally found to be of low conservation value. Fauna habitat that does persist has been subject to significant agricultural disturbance from cattle grazing, selective clearing, and weeds and pests. This has led to a general lack of native understorey growth in the remnant woodlands, although this has resulted in an accumulation of ground habitats in the form of logs and large branches. Some habitats, such as the riparian zones and woodland remnant, provide movement opportunities for fauna populations and possess greater potential for supporting conservation significant and migratory fauna.

The field surveys recorded 201 fauna species, including 124 bird, 31 reptile, 34 mammal and 12 amphibian species. Two conservation significant fauna species, the Greater glider and short-beaked echidna were recorded in the Project Area, with the golden-tailed gecko recorded less than two km north of the Project Area.

The likelihood of occurrence assessment identified an additional five conservation significant fauna species with the potential to occur within the Project Area based on the habitat encountered during the field surveys.

Migratory species

The desktop assessment identified 16 migratory species with the potential to occur within the Project Area, including four migratory marine birds, five migratory terrestrial species and seven migratory wetland species. The field survey did not record any migratory species within the Project Area, however three migratory species were recorded adjacent to the Project Area. The likelihood of occurrence assessment identified an additional three migratory fauna species with the potential to occur within the Project Area based on the habitat encountered during the field surveys.

Matters of state environmental significance (MSES)

The Project was referred to the Commonwealth Department of Agriculture, Water and the Environment on 6 May 2020 (EPBC 2020/8669). Ensham JV received notification (dated 29 June 2020) from the Commonwealth that the Project will be assessed under the Bilateral agreement and a controlled action relating to:

- Listed threatened species and communities (sections 18 & 18A)
- A water resource, in relation to coal seam gas development and large coal mining development (section 24D & 24E).

6.8.2 Potential impacts and mitigation measures

The planned development of the Project Area is to occur entirely underground with no additional surface mine infrastructure proposed and, accordingly, no above ground clearing is required. Operational aspects of the Project will be serviced by existing infrastructure and services within the existing Ensham Mine footprint. In the absence of vegetation clearing or additional road / track access requirements, or increased indirect impacts (dust, light etc), flora impacts associated with development of the Project Area are unlikely.

No direct or indirect impacts to fauna and fauna habitat are expected to occur as a result of the Project, as no clearing or surface infrastructure is required and predicted subsidence as a result of the Project is less than the Department of Agriculture, Water and Environment estimated seasonal variation in surface levels as a result of changes in moisture content (50 mm).

The terrestrial ecology (flora and fauna) study has identified that existing dust, noise and lighting conditions within the Project Area are typical of land adjacent to a mine. By 2024, surface mining will cease, and dust, noise, and lighting impacts will further reduce. The Project itself is not expected to increase traffic numbers, lighting, dust or noise beyond current Ensham Mine conditions, and therefore the impacts to ecology, including MSES, are expected to be negligible.

A significant impact assessment in accordance with the criteria in the EPBC Act Significant Impact Guideline has been undertaken for the Project. After considering the significant impact assessment, the Project is considered unlikely to significantly impact on terrestrial ecology values and will be further assessed as part of the EIS process.

A state significant residual impact assessment in accordance with the criteria provided in the Significant Residual Impact Guidelines (DES, 2014) has been undertaken for the Project on MSES identified within the Project Area. MSES identified as present were assessed and it was concluded that the Project will not result in a significant residual impact on MSES floristic values.

The EV Workshop concluded that the potential impact of the Project on terrestrial ecology is expected to be negligible.

6.9 Biosecurity

6.9.1 Existing environment

Fauna

The field survey recorded eight introduced fauna species, four of which are listed as restricted matter under the *Biosecurity Act 2014* (Qld), these being feral cat, European fox, European rabbit and dingo/dog. The other introduced species were house mouse, European hare, cane toad and common myna. Additionally, feral pigs have been identified at the Ensham Mine.

Flora

The field surveys undertaken for the Project recorded 30 exotic flora species on the Project Area, including six species which are considered to be 'restricted matters' under the *Biosecurity Act 2014* (Qld). Four of these species are Weeds of National Significance (WoNS). The CHRC Biosecurity Plan 2017-2022 identifies 29 introduced flora species to be targeted for various levels of management or control within the local council area.

The greatest weed diversity and density was commonly associated with the presence of proximity to a water source, with the Nogoa River and tributary drainage lines often heavily weed infested. Cattle grazing areas was often dominated by *Cenchrus ciliaris* (buffel grass), particularly areas with minimal tree or shrub cover.

6.9.2 Potential impacts and mitigation measures

As there is to be no above ground disturbance in the Project Area, the likelihood of the Project resulting in increased or new weed incursions or exotic fauna is considered to be negligible.

Potential risk management and mitigation measures will continue in accordance with Ensham Mine's Pest and Weed Management Plan (EOP.06.00.03).

6.10 Aquatic ecology

6.10.1 Existing environment

The Nogoa River flows almost all year round due to release of irrigation water from the upstream Fairburn Dam, and hence is of high ecological value for fish passage and aquatic habitat. Tributary creeks are highly ephemeral and hence are unlikely to provide fish or aquatic invertebrate habitat for most of the year. Key aspects of the aquatic environment are discussed below:

- Riparian vegetation: The riparian vegetation of the Project Area is mapped as regulated vegetation intersecting a watercourse, with some riparian vegetation also mapped as Category B, Category C and Category R vegetation. None of the recorded aquatic plant species are listed as threatened species under the EPBC Act or *Nature Conservation Act 1992* (Qld) (NC Act).
- Fish and aquatic fauna: There are two EPBC Act Matters of National Environmental Significance (MNES) species known to occur in the Nogoa River, the Fitzroy River turtle and the White-Throated Snapping Turtle, with both species last recorded in 1998. Both species are also listed under the Queensland NC Act. Eighteen native species of fish are known from the region, which are all common species that are tolerant of relatively harsh environmental conditions that are typical of ephemeral watercourses of the region.
- Macroinvertebrates: Aquatic macroinvertebrates of the region are dominated by insects including beetles, flies, midges and dragon flies, but also include other taxa including mussels, crustacea and worms. Results from the existing Ensham Mine Receiving Environmental Monitoring Plan (REMP) which monitors macroinvertebrates (amongst other values) in the receiving environment, indicate that mining activities associated with the Ensham Mine do not appear to have negatively impacted downstream EVs.
- Stygofauna: Stygofauna are subterranean aquatic animals that live in the pores, voids and cavities of aquifers and other groundwater ecosystems. The stygofauna community of the Project Area was assessed as having low environmental value based on the limited occurrence of one stygoxene taxa. This is due to the water quality of groundwater being only potentially suitable for stygofauna due to its high electrical conductivity and depth of the water table.

6.10.2 Potential impacts and mitigation measures

As the Project is a continuation of existing operations, it is not expected to have a significant impact on aquatic ecology. Similar volumes of licenced water extraction and discharge are expected, and therefore, the Project is unlikely to give rise to impacts to aquatic ecology EVs.

The predicted subsidence as a result of the Project is less than the DAWE estimated seasonal variation in surface levels as a result of changes in moisture content (50 mm) and is therefore unlikely to form surface cracks or significant depressions in surface topography where ponding of the surface water may occur. This is consistent with experience for the current Ensham Mine operations where no surface cracking or ponding has been observed above the operating bord and pillar mine areas.

No significant changes to aquatic ecology are expected as no surface disturbance is proposed, and no additional drainage / levee infrastructure is required for the Project. As current underground water management activities will continue for the Project, any changes to surface water flows and water quality as a result of Project activities are unlikely to impact on aquatic ecology EVs.

Monitoring and reporting associated with the current EA would continue for the duration of the Project or as varied by the regulator.

The EV Workshop concluded that the potential impact of the Project on aquatic ecology was negligible.

6.11 Groundwater dependant ecosystems

6.11.1 Existing environment

Riparian vegetation present along the Nogoa River and associated ephemeral creeks are likely dependent on groundwater located within the upper alluvial sediments.

A groundwater impact assessment completed for the Project has identified there are no registered springs in the vicinity of the Project Area. The closest spring identified on Queensland Globe is located more than 70 km south-east of the Project Area.

6.11.2 Potential impacts and mitigation measures

A groundwater impact assessment completed for the Project has identified that impacts on any GDEs are negligible as no additional drawdown larger than 0.5 m was predicted for groundwater in the alluvium in the Project Area.

7.0 Social

7.1 Introduction

As part of this supporting information, the social aspects that have been considered include accommodation and housing, indigenous cultural heritage, non-indigenous cultural heritage, acoustic amenity, air quality, and visual amenity. Where appropriate the outcomes of the EV report (**Appendix B**) are discussed below. Economic considerations are presented in **Section 9.0**.

7.2 Accommodation and housing

7.2.1 Existing environment

The current workforce is a mixture of local Emerald and surrounding community-based persons and drive in / drive out personnel. Approximately 78 per cent of Ensham Mine personnel are either Emerald based or drive in / drive out based. In addition to the local workforce that is accommodated in local community housing, Ensham Mine maintains a 600 person workers camp.

7.2.2 Potential impacts and mitigation measures

The Project will ensure that ongoing employment, both direct and indirect, and job security are maintained for local communities. This has the positive impact of retaining a local workforce who will continue to reside in local accommodation and housing. Accordingly, the Project will continue to provide a strong social and economic contribution to the region and the State of Queensland.

As the Project does not involve any construction activity, there would be no construction workforce required. It is expected that current operational workforce arrangements will continue for the proposed mine extension and no new accommodation facilities would therefore be required.

7.3 Indigenous cultural heritage

7.3.1 Existing environment

The Western Kangoulu people are the registered native title claimants for the area that includes the Project Area.

7.3.2 Potential impacts and mitigation measures

Ensham and the Western Kangoulu people currently have a number of arrangements in place including:

- Cultural Heritage Management Agreement dated 25 October 2018, which relates to exploration activities on MDL 217 and MDL 218
- Cultural Heritage Management Plan dated 17 March 2007 in relation to the existing Ensham Mine area (including ML 70049, ML 70365, ML 7459, ML 70367 ML 70366, ML 70326, and ML 7460), which includes zones 1, 2 and 3 but excludes MDL 217.

Any acts or dealings in relation to land and waters that affect native title must comply with the *Native Title Act 1993* in order to be validly completed. During the process of obtaining lawful tenure to occupy and undertake the Project, native title will be addressed as required under the *Native Title Act 1993*. It is anticipated that a Right To Negotiate will be executed with the native title party.

7.4 Non-indigenous cultural heritage

7.4.1 Existing environment

A desktop review of Commonwealth, State and Local databases for non-Indigenous cultural heritage was undertaken in November 2019. Databases reviewed included the following:

- Australian Heritage Database for world heritage places and national heritage places managed under the EPBC Act
- Queensland Heritage Register for Queensland Heritage Places managed under the *Queensland Heritage Act 1992*
- Local Heritage Register for Local Heritage Places under the CHRC Planning Scheme
- the Register of National Estate, a non-statutory register for context only.

The review did not identify any listed or known places of non-Indigenous heritage significance within the Project Area or immediate surrounds.

7.4.2 Potential impacts and mitigation measures

No places of non-Indigenous heritage significance were identified within the Project Area or immediate surrounds. No surface disturbance is proposed for the Project in Zone 1, therefore the risk of impacting on undiscovered places or items of non-Indigenous cultural heritage is considered low.

The Project will operate under the existing Ensham Mine Environmental Management System Cultural Heritage Management Environmental Procedure, which would be updated to incorporate the Project.

7.5 Acoustic amenity

7.5.1 Existing environment

Typical quasi-continuous[2] mine noise sources associated with the current Ensham Mine include the operation of road trains, haul trucks and other mobile plant, underground ventilation, conveyors, CHP infrastructure and dragline. Noise associated with transport infrastructure includes vehicles driving on local roads and coal trains. Surface blasting is periodically undertaken within the open-cut operation only, producing instances of ground vibration and air blast overpressure.

Sensitive receptors for acoustic amenity are defined in Schedule 1 of the Environmental Protection (Noise) Policy 2019 (EPP Noise). The land surrounding the Project Area is predominantly farming land, with a number of rural residential properties identified as noise sensitive receptors. No other sensitive receptors defined under the EPP Noise are present.

7.5.2 Potential impacts and mitigation measures

Noise modelling is currently being undertaken to assess the potential impact of the Project. The modelling will incorporate the various inputs from open-cut, underground and rehabilitation activities at Ensham Mine.

The underground works and associated infrastructure will have a negligible impact on noise levels.

No additional blasting has been proposed as part of the Project and, as existing blast monitoring for the open-cut mine shows compliance with the EA criteria, there are no predicted additional impacts at sensitive receptors as a result of the Project.

[2] quasi-continuous noise, such as that from mining plant and equipment, is constant but variable in intensity.

7.6 Air quality

7.6.1 Existing environment

Activities at the existing Ensham Mine with the potential to impact air quality include:

- vehicle movements on unsealed roads, coal handling and crushing operations and movement of material (soil and rock) for mine rehabilitation activities
- greenhouse gas (GHG) emissions produced from the operation of machinery, plant, and fugitive methane gas emissions released in mining.

Sensitive receptors with regards to dust are typically defined as residential, commercial, community or heritage land uses under the EP Act. The Project is located in a rural setting, a significant distance away from major population centres. Accordingly, the only sensitive receptor types that apply to the Project are neighbouring rural dwellings.

7.6.2 Potential impacts and mitigation measures

Underground operations associated with the Project are unlikely to have a significant impact on air quality. Air quality impacts are expected to meet the current EA requirements and will reduce over the life of the Project as open-cut operations cease.

GHG emission studies are currently in progress. Management of potential air quality impacts are expected to be in line with the EA for the Project and incorporated into existing dust management procedures for the Ensham Mine. Based on available information, the EV Workshop concluded that the potential impact of the Project was negligible.

7.7 Visual amenity

7.7.1 Existing environment

The Project is located in a landscape that is already considerably influenced by the presence of mining and agricultural activities affecting both the perception of character and quality of views. None of the landscape on or around the Project Area is the subject of any code or zone to protect valued landscape or scenic values. There are no important recreational areas lying within or adjacent to the Project Area.

The Project Area and surrounding area are dominated by irrigated cropping, dryland grazing and dryland cropping, as well as existing mining activities associated with Ensham Mine.

The roads in the local area consist of local roads and private drives to farms. Therefore, there are very few publicly-accessible views towards the Project Area. No scenic viewpoints or viewpoints from facilities used for recreational purposes were identified. Typically, viewer sensitivity of the current Ensham Mine is negligible or low.

7.7.2 Potential impacts and mitigation measures

A visual amenity assessment for the Project has been undertaken. The Project is located underground and relies on existing surface infrastructure associated with the existing Ensham Mine operations which limits potential visual impacts. Consequently, views are not anticipated to change, and views of the Project's above-ground facilities and activities would be congruent with existing mining activities already present adjacent to the Project Area.

Due to the minimal subsidence, and no above ground infrastructure in Zone 1, current farming operations can continue above the mine as per current operations. Therefore, there would be no impact on views. Even very close-range views of the Project Area (experienced only by participating properties) would not be affected.

As lighting will be restricted to that provided for existing above ground mining activities being undertaken adjacent to the Project Area, there would be no additional night lighting impacts from the Project. Current lighting would reduce upon closure of the open cut mine around 2024.

No significant impacts on scenic amenity or lighting values have been identified. The Project occurs in an area with few sensitive visual receptors and generally low landscape sensitivity due to the presence of extensive existing underground and open-cut mine activities and agricultural-intense businesses across the surrounding landscape. The Project has no requirement for additional above-ground lighting infrastructure and will continue to use the existing infrastructure at Ensham Mine. Therefore, there will be no impact to local or more distant views during day or at night.

7.8 Hazard and risk, and health and safety

Ensham Mine is a well-established open-cut and underground mining operation. Hazards and risks are identified and managed in accordance with Ensham's Safety Management system, and, Environmental Management System to reduce potential harm to people and property.

An assessment is currently underway to review hazards and risks associated with the Project, giving consideration to both on-site and off-site risks. This assessment will inform any updates to Ensham's existing safety management system. The risk assessment is being undertaken in accordance with International Standards Organisation (ISO) 31000:2009 *Risk Management – Principles and Guidelines* (ISO 31000:2009) / ISO 31010:2009 *Risk Management – Risk Assessment Techniques*.

8.0 Built environment

8.1 Introduction

The built environment aspects have been considered to include road, rail and port transport. Existing infrastructure in the region consists of health, education and accommodation facilities largely centred in the townships of Emerald and Blackwater (see **Figure 1**).

Major road transport routes servicing the region include the Capricorn Highway and the Gregory Highway. The Capricorn Highway runs in an east-west direction to the south of the Project Area, and the Gregory Highway is the main north-south connection which runs to the west of the Project Area. More locally, there are several public and private local roads surrounding the existing Ensham Mine.

The most recently approved mining projects in the region include:

- Taroborah Coal Project, proposed by Shenhuo International Group Pty Ltd, approximately 22 km west of Emerald (approved 2015)
- Springsure Creek Coal Mine Project, proposed by Springsure Creek Coal Pty Ltd, approximately 47 km south-east of Emerald (approved 2014)
- Minyango Project, proposed by Blackwater Coal Pty Ltd, approximately 170 km west of Rockhampton (approved 2013).

8.2 Road transport

8.2.1 Existing environment

The Project is anticipated to primarily utilise the following main transport routes:

- Capricorn Highway
- Duckponds Road.

The most relevant section of the Capricorn Highway is the 40 km segment between the rural township of Comet to the east of the Project Area to Emerald to the west. Duckponds Road is a rural access road that provides a sealed road link from the Capricorn Highway to the Ensham Mine to the north, as well as servicing a small number of adjacent rural properties along its length. The section of the link relevant to the Project is the 9 km section between the Capricorn Highway intersection and the Ensham Mine access gate located across Duckponds Road.

8.2.2 Potential impacts and mitigation measures

The Project is not anticipated to generate any increase in traffic volumes on the adjacent road network. Therefore, it is expected that the Project will have a negligible impact on the operation of the relevant sections of both the state-controlled (Capricorn Highway) and CHRC controlled (Duckponds Road) networks, and that the existing access facilities for the Ensham Mine via the gated access on Duckponds Road will be suitable for the expected future operations.

Further to this, a detailed assessment of the Capricorn Highway / Duckponds Road intersection identified that the current configuration would be more than adequate to cater for expected future “with Project” traffic volumes up to the identified 2043 design horizon (completion of mine remediation works on Ensham Mine) for the Project. The EV Workshop concluded that the potential impact of the Project was negligible.

8.3 Rail and port transport

8.3.1 Existing environment

The existing Ensham Mine CHP is linked to the Rockhampton to Longreach Queensland Rail network system via an existing spur line for the transportation of coal to the Port of Gladstone and the Gladstone Power Station. The Gladstone Coal Terminal will continue to be utilised for coal export purposes of underground Coal production from the Ensham Mine.

8.3.2 Potential impacts and mitigation measures

The existing rail infrastructure will meet the needs of the Project. The current schedule for the railing of coal would also be expected to be maintained. Continued use of this infrastructure through the extended LOM will continue Ensham Mine's contribution to the wider regional economy through employment and resource export.

9.0 Costs and benefits summary

The long-term strategy for Ensham is to sustain or improve its current level and quality of coal production.

The development of the Project supports the Ensham strategy through the following strategic drivers:

- supports the LOM extension strategy for Ensham
- continues to deliver a quality thermal coal product to customers and sustains the growth pipeline for IAR
- increases the value of the current assets by gaining mining rights to the Project Area.

As an extension of the existing operations, no additional infrastructure is needed for the Project and no additional clearing is proposed for Zone 1. The Project will continue to support regional, state and national economies, generating an additional $256.4 million in State royalties over the life of the mine to support local infrastructure and services, such as schools, hospitals, roads, and bridges. The Project will also ensure that ongoing employment, both direct and indirect, and job security are maintained for local communities.

Ensham Mine will provide continued resource security, extending the life of the mine up to 2037 with coal production sold to offshore markets (via Gladstone Port) and the Gladstone Power Station. Over the life of the Project, an estimated 38.0 million tonnes of thermal coal will be produced, representing an estimated export value of $3.66 billion over the life of the Project. The economic impact analysis has estimated the impacts of the Project on the regional, state and national economies for both the capital and operational phases. The economic benefits of the Project can be summarised as:

- assuming Queensland coal mining royalty rates remain unchanged, this will yield royalties of approximately $256.4 million over the life of the Project
- the capital costs associated with the Project are estimated at $314.9 million
- total operational costs are estimated at $2,726.2 million over the life of the Project
- total output impact of $2,500 million or $138.9 million per annum
- total household income impact of $464.5 million or $25.8 million per annum
- employment impact of up to 654 FTEs per annum
- value added impact of $971.9 million or $54 million per annum.

Consistent with the requirements of the *Strong and Sustainable Resource Communities Act 2017* (Qld) the workforce will continue to include a mix of local residents and drive in / drive out personnel, while ensuring local employment opportunities and allowing personnel to choose where they live and work.

The Project will also continue to provide flow-on benefits to the surrounding Central Highlands communities, including Emerald and Blackwater by supporting local employment, businesses, suppliers, and housing markets.

10.0 References

Department of the Environment and Heritage Protection, 2014. *Significant Residual Impact Guideline*, Queensland Environmental Offsets Policy, December 2014.

DSDMIP, 2020a. Guidance: Environmental impact statement/impact assessment report. Accessed online: http://statedevelopment.qld.gov.au/coordinator-general/assessments-and-approvals/coordinated-projects/the-coordinated-project-process/environmental-impact-statement-impact-assessment-report.html.

DSDMIP, 2020b. Coordinated projects map. Accessed online: http://statedevelopment.qld.gov.au/coordinator-general/assessments-and-approvals/coordinated-projects/coordinated-projects-map.html

ESR/2016/2167. Version 2.00. 15 July 2019. Guideline. Criteria for environmental impact statements for resource projects under the EP Act. DES.

ESR/2016/2171. Version 2.00. 23 April 2019. Guideline. The environmental impact statement process for resource projects under the EP Act. DES.

Hydrobiology, 2017. *Ensham Coal Mine, 2016/2017 Annual REMP Report*. Report prepared for Ensham Resources Pty Ltd by Hydrobiology, November 2017.

Hydrobiology, 2018. *Ensham Coal Mine, 2017/2018 Annual REMP Report*. Report prepared for Ensham Resources Pty Ltd by Hydrobiology, December 2018.

Idemitsu, 2020. MDL 217 Lease A Prefeasibility Study. Report prepared by Ensham Resources Pty Ltd, February 2020.

Independent Expert Steering Committee (IESC), 2015. *Monitoring and Management of Subsidence Induced by Longwall Coal Mining Activity*. Report to the Department of the Environment.

Jacobs, 2018. Water Management Plan. Prepared for Ensham Resources Pty Ltd.

Mine Advice, 2020. *Peer Review Outcomes – GGPL Subsidence Report*. Prepared for Ensham Resources Pty Ltd.

Appendix A

Approvals register

Legislation	Administering authority	Approval trigger	Approval	Relevance to the Project
Commonwealth Legislation				
EPBC Act	Department of Agriculture, Water and Environment (DAWE)	Referral is required where the Project will or is likely to have a significant impact on MNES.	EPBC Act Referral	A number of MNES are present or potentially present within the Project Area (refer **Section 6.8**). The Project does not propose any ground disturbance and subsidence levels are minimal and within the DAWE recommended range. There is low risk of impact to MNES as a result of the Project. Impacts on water resources in relation to large coal mining development are not considered to be significant but a referral is likely to be made under the EPBC Act. If the water trigger is a controlling provision, before deciding whether or not to approve the action, the Minister must obtain advice from the Independent Expert Scientific Committee (IESC) on the potential for impacts on water resources.
NT Act	NNTT; DNRME	Any acts or dealings in relation to land and waters that affect native title must comply with the NT Act in order to be validly done. A registered native title claim gives a native title party certain procedural rights with applicants regarding the grant of mining authorities for the areas covered by the claim.	Right to Negotiate	A search of the NNTT online Native Title Vision mapping identified the Western Kangoulu People identifies one registered claim over the Project Area (Tribunal No. QC2013/002).
State Legislation				
MR Act	DNRME	Approval is required to mine minerals specified in the lease and for all purposes necessary to effectually carry on the mining as well as purposes other mining specified in the ML and associated with, arising from or promoting the activity of mining. Coal mining and production and associated activities including processing and rehabilitation must be conducted within a ML.	ML	Granting of a new ML is required prior commencing mining activities within that part of the Project Area within MDL 217. This will require an ML application to be made under the MR Act

Legislation	Administering authority	Approval trigger	Approval	Relevance to the Project
EP Act	DES	To authorise the proposed mining activities within the lease area. An Environmental Authority is required to conduct Environmentally Relevant Activities (ERAs) identified within the Environmental Protection Regulation2019.	EA	An application under the EP Act will be required to obtain an amended EA for the Project. The application to amend the existing EA will likely be assessed as a 'major amendment', as the application involves the addition of a new ML.
RPI Act	DSDMIP	Required when a resource or regulated activity is proposed in an area of regional interest.	RIDA	The Project Area is mapped within a PAA and partly within the SCA. The RPI Act includes certain exemptions from the requirement to obtain a RIDA. The most relevant exemption is where: • the holder of the tenure is not the owner of the land on which resource activities are to be undertaken • there is a conduct and compensation agreement (CCA) or other voluntary agreement with the land owner • the resource activity is not likely to have a significant impact on the PAA or SCA • the resource activity is not likely to have an impact on land owned by a person other than the land owner: – for land in a PAA - the suitability of the land to be used for a priority agricultural land use for the area – for land in a SCA - the land's soil, climate and landscape features that make that area highly suitable, or likely to be highly suitable, for cropping. If the exemption does not apply to the Project, a RIDA application will be required and the relevant PAA and SCA assessment criteria must be satisfied.
Duty of Care Obligation				
Water Act 2000 (Qld) (Water Act)	DNRME	Management of impacts on underground water caused by the exercise of underground water rights by resource tenure holders.	Duty of care and obligations	Ensham Resources has an obligation to comply with the underground water management framework under the Water Act. The Water Act underground water management framework: • requires resource tenure holders to undertake baseline assessments of water bores

Legislation	Administering authority	Approval trigger	Approval	Relevance to the Project
				• requires resource tenure holders to prepare baseline assessment plans (BAPs) • requires resource tenure holders to prepare underground water impact reports (UWIRs) • provides for the chief executive to declare cumulative management areas (CMAs) • establishes make good obligations for resource tenure holders—including the requirement to undertake bore assessments and enter into make good agreements • establishes the Office of Groundwater Impact Assessment (OGIA) to oversee the groundwater impacts of the resource industry. Provided the underground water management framework under the Water Act is complied with, Section 334ZP of the MR Act gives resource operators the right to take 'associated water' as a necessary activity in the process of extracting the resource. The volume of any 'associated water' taken must be measured and reported, with the Chief Executive of the DNRME notified within three months of the initial taking.
Aboriginal Cultural Heritage Act 2003 (Qld)	Aboriginal Party and Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP)	Any activity undertaken by any person that may harm Aboriginal cultural heritage.	Duty of care and obligations	There is a Cultural Heritage Management Plan (CHMP) currently in place between Ensham Resources and the Western Kangoulu Party for the ML 70049, ML 70365, ML 7459, ML 70367, ML 70366, ML 70326, and ML 7460. The CHMP does not currently include the MDL 217 area.

Appendix B

Environmental Values Report

AECOM Imagine it. Delivered.

Ensham Life of Mine Extension Project

Environmental Values Workshop Report

Revision A – 27-Feb-2020
Prepared for – Ensham Resources Pty Ltd – ABN: 23 011 048 678

Ensham Life of Mine Extension Project

Ensham Life of Mine Extension Project

Environmental Values Workshop Report

Client: Ensham Resources Pty Ltd

ABN: 23 011 048 678

Prepared by

AECOM Australia Pty Ltd
Level 8, 540 Wickham Street, PO Box 1307, Fortitude Valley QLD 4006, Australia
T +61 7 3553 2000 F +61 7 3553 2050 www.aecom.com
ABN 20 093 846 925

27-Feb-2020

Job No.: 60603371

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

Ensham Life of Mine Extension Project

Table of Contents

Executive Summary

Ensham Resources Pty Ltd (Ensham) operates the Ensham Mine, an open cut and underground coal mine located approximately 35 kilometres (km) east of Emerald along the Nogoa River in Central Queensland. Ensham proposes to develop the Life of Mine Extension Project (the Project) which exists within Mineral Development Lease (MDL) 217 and the existing mining leases to extend the underground mine while utilising the existing underground mine access and supporting infrastructure located within the current Mining Leases.

In support of the approvals process, an Environmental Values (EV) Workshop was conducted to:

- identify specific EVs pertaining to the Project
- assess the predicted impacts/benefits to these EVs as a result of the Project.

The assessment of the EVs identified is focussed on those values potentially impacted by the Project both within and external to the Project Area.

Two key areas for consideration for the assessment of potential impacts to the EVs associated with the Project Area were subsidence and groundwater impacts. To assist in providing a meaningful workshop outcome, modelling of both potential subsidence and groundwater impacts was undertaken and available to the workshop attendees.

The EV Workshop determined through consensus potential impacts by scoring each of the criteria used to assess the key environmental aspects. No EVs were determined to be significantly negatively impacted by the Project. Two EVs, social values relating to employment and supply opportunities, and economics, were assessed as being positively impacted by the Project.

Economic and social EVs would be benefited by the Project, specifically as they relate to employment and supply opportunities. The Project will continue to support the local economy through employment, as well as generating royalties to support new infrastructure and services. The Project will also provide flow-on benefits to the region, including Emerald and Blackwater, by supporting local businesses, suppliers and housing markets.

The remaining EVs were assessed as either not impacted by the Project or with a minor/medium negative impact as a result of the Project. Of those negatively impacted by the Project, only one EV was assessed with a medium negative impact – social values, specifically relating to landowner's use or amenity. In the absence of complete information at the time of the EV Workshop, the social values EV was assessed on a precautionary basis with a medium negative impact and will be investigated further as part of the ongoing assessment.

1.0 Introduction

1.1 Project overview

Ensham Resources Pty Ltd (Ensham) operates the Ensham Mine, an open cut and underground coal mine located approximately 35 km east of Emerald along the Nogoa River in Central Queensland. Ensham Mine is located in the western part of the Central Bowen Basin, within the Central Highlands Regional Council Local Government Area and within the rural margins of central township nodes Emerald (35 km west), Blackwater (49 km south-east) and Comet (18 km south-east) (**Figure 1**).

The proposed Project will allow extension of the current underground bord and pillar operations as well as utilisation of existing underground and surface infrastructure including road, rail and mine infrastructure area.

The Project Area comprises three zones: Zone 1 within MDL 217; Zone 2 comprises sections of Mining Lease (ML) 70365, ML 70326 and ML 7459 and Zone 3 comprises portions of ML 7459 and ML 70366. The footprint of the Project Area is illustrated in **Figure 2**. The extension of the underground into the Project Area adjacent to the current approved mine will extend the current approved Life of Mine (LOM) by up to nine years, from 2028 to 2037, maintaining a steady supply of coal to market and ongoing employment at the site.

Over the life of the Project, an estimated 38.0 million tonnes of thermal coal will be produced, representing an estimated export value of $3.66 billion over the life of the Project. The economic impact analysis has estimated the impacts of the Project on the regional, state and national economies for both the capital and operational phases. The economic benefits include:

- Royalties of approximately $256.4 million over the life of the Project.
- The capital costs of approximately $314.9 million.
- Employment impact of up to 654 FTEs per annum

The Project will continue to use the existing Ensham Mine surface infrastructure, including ROM, coal handling plant (CHP), rail loop for coal freight to the Port of Gladstone, buildings, utilities, water management and roads. The existing underground coal conveyor system that transports underground coal to the surface will be extended as the Project develops. The Project is not expected to alter the topography of the overlying agricultural land, impact the natural ecosystems overlying the underground operations or detract from amenity values of the surrounding community. Existing management practices at the site will continue and be adapted as required. There will be no change in the current accommodation requirements as there would be no increase in personnel numbers. The majority of personnel are either Emerald based or drive in / drive out based.

1.2 Purpose of the workshop

To inform the approvals process for the Project, an Environmental Values (EV) Workshop was conducted. The purpose of the EV Workshop was to identify specific EVs pertaining to the Project and assess the predicted impacts/benefits as a result of the Project. The assessment of the EVs identified is focussed on those values potentially impacted by the Project both within and external to the Project Area.

Two key areas for consideration for the assessment of potential impacts to the EVs associated with the Project Area were subsidence and groundwater impacts. To assist in providing a meaningful workshop outcome, modelling of both potential subsidence and groundwater impacts was undertaken and available to the workshop attendees.

The scoring criteria used as part of this assessment assume the baseline to be the current impacts to EVs from existing mining operations; the outcomes of the workshop are based on the change from this baseline. That is the potential impact of the Project.

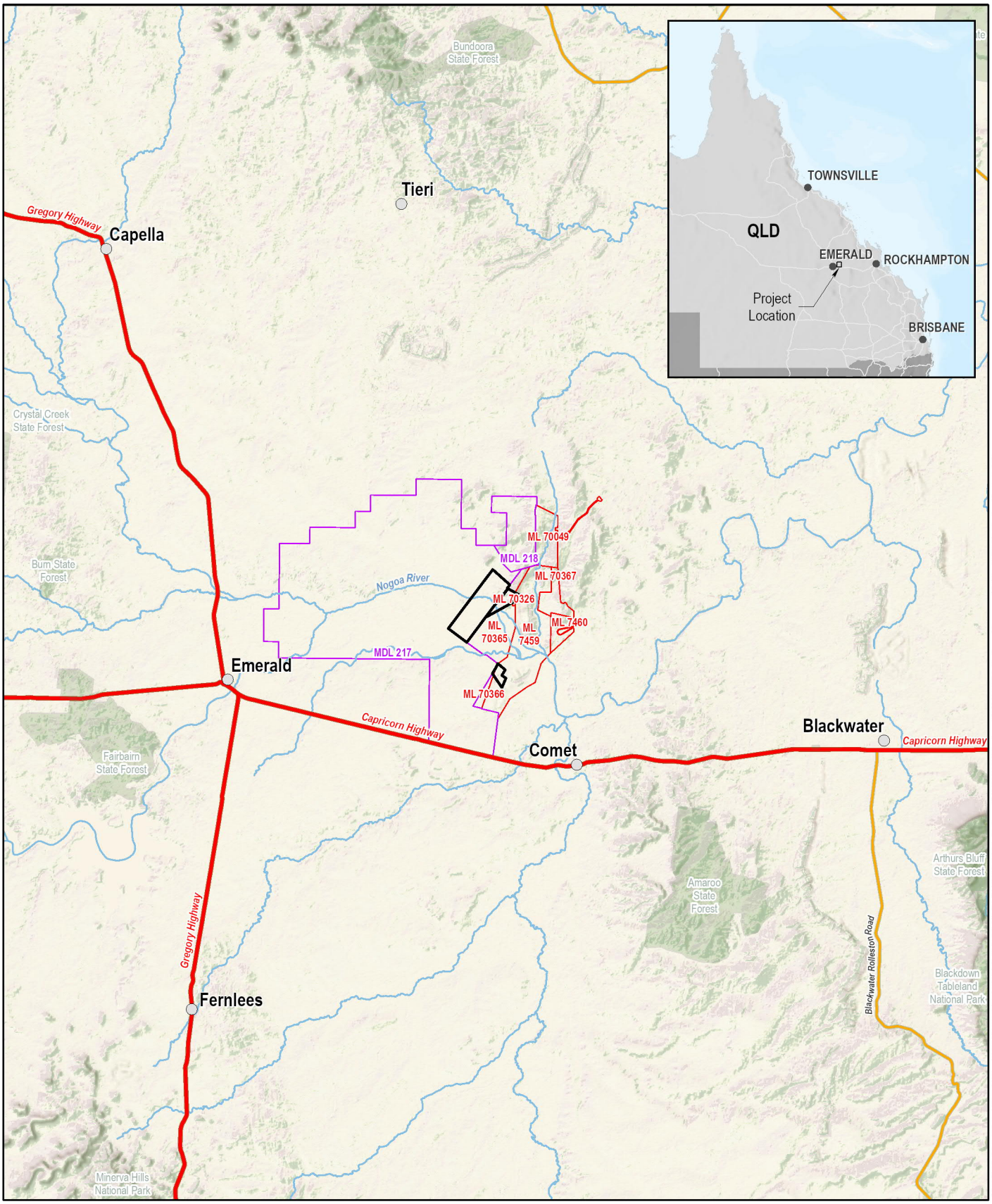

Figure 1
Regional Context

Legend

- Project Area
- Towns
- Main Road
- Public Road
- Mineral development licence
- Mining leases

ENSHAM LIFE OF MINE EXTENSION PROJECT

Projection: GDA 1994 MGA Zone 55 Scale: 1:600,000
Source: State of Queensland, 2019. Imagery: ESRI Online World Imagery

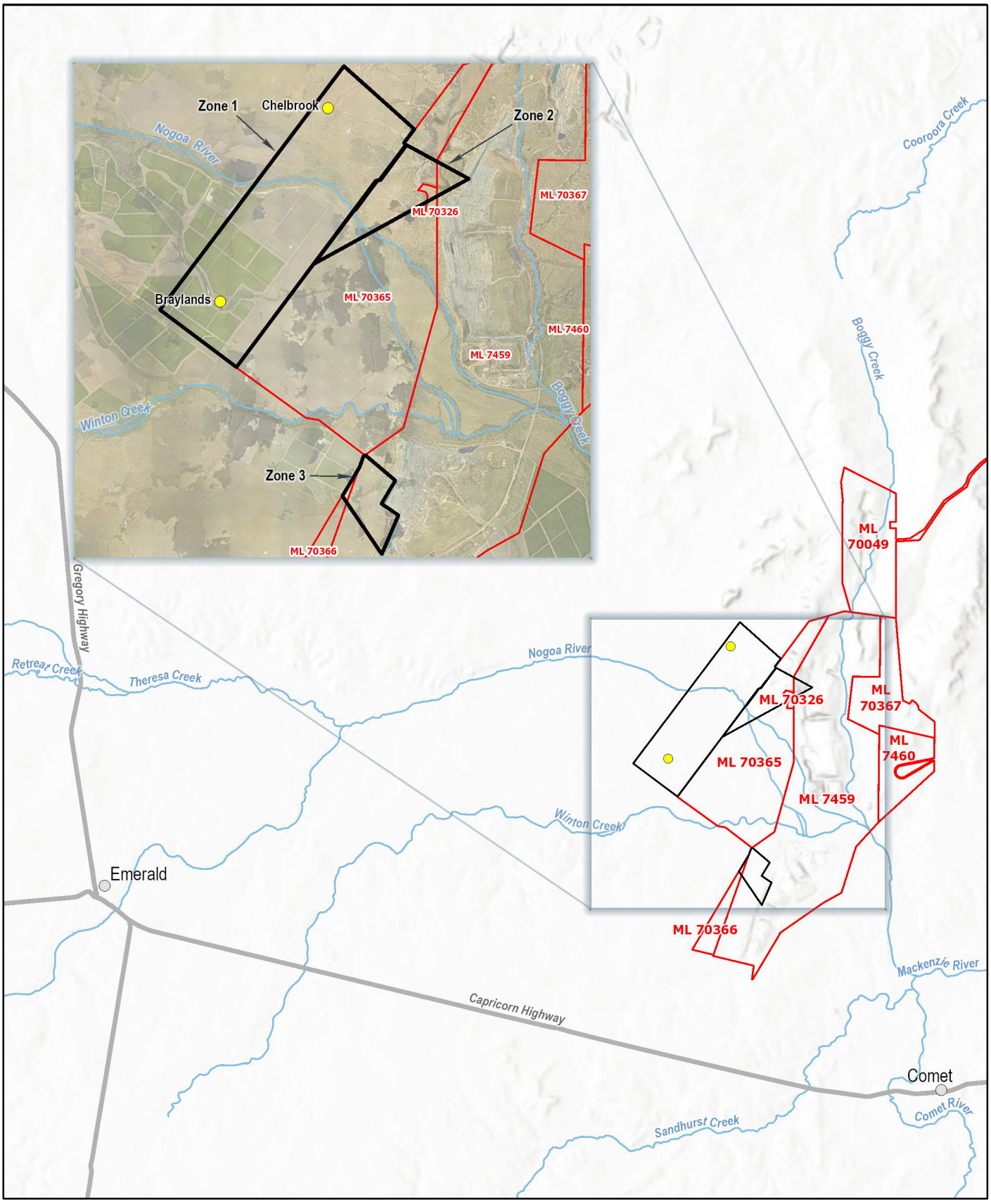

Figure 2
Project Area

Legend

- Project Area
- Mining leases
- Homestead

Ensham RESOURCES

N

0 4 8 km

Ensham Life of Mine Extension Project

Projection: GDA 1994 MGA Zone 55 Scale: 1:250,000
Source: State of Queensland, 2019. Imagery: Indemitsu, 2109.
ESRI Basemap Online, 2019. Indemitsu RFI, 2019

2.0 Methodology

The EV Workshop was conducted at the AECOM Brisbane office on 6 December 2019. The workshop consisted of intermittent (in person and teleconference) discussions with AECOM's technical leads on the Project. The workshop attendees and their credentials are presented in **Appendix A**.

In preparation for the workshop, each technical lead was asked to consider the following three standard questions:

1. what are the Project's EVs pertinent to your discipline?
2. what are the discipline-specific impacts of the Project?
3. what are the proposed mitigation measures?

To ensure consistency when considering the level of impact, workshop participants would use these three questions to score the level of impact/benefit. The matrix and definition for the scoring system are outlined in **Table 1** and **Table 2**.

Table 1 Project impact scoring criteria

Scoring criteria	Ranking
Significant benefit for this criterion	+3
Medium benefit for this criterion	+2
Minor benefit for this criterion	+1
No impact for this criterion	0
Minor negative impact for this criterion	-1
Medium negative impact for this criterion	-2
Significant negative impact for this criterion	-3

Table 2 Adopted definitions of scoring criteria for assessment of EVs

Definitions
Significant impact / benefit - results in a change which is important, notable or of consequence to the EV having regard to its intensity / frequency. For an impact the change will result in not being able to meet published standards (if there are any). For a benefit the change should meet best practice standards (if there are any published).
Medium impact / benefit - results in a change which is potentially important, notable or of consequence to the EV having regard to its intensity / frequency. For an impact, the change will result in occasions where the criterion will not meet published standards (if there are any). For a benefit the change should meet good practice standards (if there are any published).
Minor impact / benefit - results in a change which is identifiable but is not important, notable or of consequence to the EV having regard to its intensity.

Note: The definition of significant impact has been based on the Federal Government's definition of significant impact contained within its "Matters of National Environmental Significance", Significant Impact Guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999 (DoE, 2013).

3.0 Legislation and policy

Legislation and policy at both the Commonwealth and State level will apply to the identification of EVs relevant to the Project. The identification of EVs draws upon the following relevant legislation.

3.1 Commonwealth

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework for the protection and management of nationally and internationally threatened flora and fauna (including migratory species), ecological communities, internationally important wetlands, heritage places, the Great Barrier Reef, and Commonwealth marine areas, which are collectively defined as Matters of National Environmental Significance (MNES). Water resources in relation to coal seam gas and large mining projects, and nuclear actions, are also regulated under the EPBC Act.

The EPBC Act establishes EVs to be protected, including those described above, and the specific measures for ensuring their conservation. Of those EVs referred under the EPBC Act, only ecology and water resources were considered relevant to the Project and therefore assessed as part of the EV Workshop.

3.2 Queensland

Environmentally relevant legislation and policies were reviewed to ensure all necessary EVs were identified.

3.2.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) at Section 9 defines an "environmental value" as:

(a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or

(b) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Under the EP Act, four approved policies were developed that provided the framework for environmental management using the principles of ecologically sustainable development. The four approved policies are water, air, noise and waste (refer Section 4.4, 4.5 and 4.6). Whilst the three policies of water, air and noise are still in force, the waste policy was repealed by the *Waste Reduction and Recycling Act 2011*.

The Environmental Protection Regulation 2019, Schedule 8, Part 3 Division 1 (Operational assessment) and Division 2 (Land use assessment) list broad environmental objectives and performance outcomes for generic EVs. Division 1 lists the generic EVs: air, water, wetlands, groundwater, noise, waste and land. Division 2 lists the criteria which determine how an activity may be considered in relation to an EV: site suitability, location on the site and critical design requirements.

3.2.2 Regional Planning Interest Act 2014

The *Regional Planning Interest Act 2014* (RPI Act) seeks to manage the impact of resource activities on areas regional interest through the protection of:

- living areas in regional communities (Priority Living Areas) (PLA)
- high-quality agricultural areas from dislocation (Priority Agricultural Areas) (PAA)
- strategic cropping land (SCL) (Strategic Cropping Areas) (SCA)
- regionally important environmental areas (Strategic Environmental Areas) (SEA).

These interests were considered to be the soil specific EVs for this assessment.

3.2.3 Water Act 2000

The *Water Act 2000* and subordinate legislation provides protection for EVs related to groundwater resources in Queensland. These have been drawn upon for the determination of water related EVs in this assessment.

3.2.4 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

Water related disciplines include groundwater, hydrology and hydraulics, and surface water quality. Environmental Protection (Water and Wetland Biodiversity) Policy 2019 identifies the EVs to be enhanced or protected and these include the Nogoa River (including all waters of the Nogoa River sub-basin); and otherwise, waters that may be used for the production of aquatic food for human consumption, aquaculture, agriculture, recreational or aesthetic uses, drinking water, industrial purposes or cultural and spiritual use.

3.2.5 Environmental Protection (Air) Policy 2019

Ambient air quality EV qualities are benchmarked by the Environmental Protection (Air) Policy (EPP Air) 2019. EPP Air identifies four EVs including the qualities of the air environment that are conducive to:

- protecting the health and biodiversity of ecosystems;
- human health and wellbeing;
- protecting the aesthetics of the environment; and
- protecting agricultural use of the environment.

EPP Air also provides air quality objectives for specific substances and exposure scenarios.

3.2.6 Environmental Protection (Noise) Policy 2019

The EP Act provides for protection of EVs, including those relating to the maintenance of public amenity. The Environmental Protection (Noise) Policy 2019 (EPP Noise) also applies. Acoustic EV qualities are benchmarked by EPP Noise. EPP Noise identifies three EVs to be enhanced or protected including the qualities of the acoustic environment that are conducive to:

- protecting the health and biodiversity of ecosystems;
- human health and wellbeing (including sleep, study and recreation); and
- protecting the amenity of the community.

4.0 Preliminary identification and assessment of EVs

The purpose of the EV Workshop was to identify the EVs that may be affected either negatively or beneficially by the Project. This allowed the identification and assessment of potential impacts to EVs pertinent to the Project which are described in this section of the report. The EVs are taken from the relevant Commonwealth and Queensland legislation described in **Section 3.0**. A summary of the EVs and their assessment criteria are presented in **Table 3**.

4.1 Climate

The Project is required to publicly report their greenhouse gas (GHG) emissions under *National Greenhouse and Energy Reporting Act 2007*. There is no specific EV linked to GHG identified in Queensland legislation (see **Section 3.2**). Sensitive receptors with regards to GHG emissions are not defined under the EP Act but are generally accepted as the global population.

For the purposes of the workshop, EVs with respect to climate are aligned with the EVs of other disciplines and are quantified based on the Projects' GHG emissions. The GHG study identifies the Project's overarching contribution to climate change through an inventory of current emissions, informing emission projections of the Project.

Due to the unavailability of information on the Projects' GHG emissions at the time of the workshop, this EV was not assessed, and its potential impact not determined at the EV Workshop.

4.2 Land

4.2.1 Rehabilitation and decommissioning

The EP Act sets out the rehabilitation and closure requirements for the Project. There are no legislated rehabilitation-specific EVs. Rehabilitation and decommissioning has potential to impact on the EVs from relevant disciplines including, but not limited to, subsidence, groundwater, surface water quality and land use.

The EV criteria, for the purposes of this exercise, is restoration of final landform. EVs of several disciplines are reliant on the outcome of final landform. The Project predicts minimal subsidence, based on modelling undertaken for the Project and visibly evidenced by current Ensham Mine underground mining operations. Changes to final landform are expected to be negligible and, therefore, impacts to this EV are minor.

The rehabilitation and decommissioning EV was assessed based on the rehabilitation of final landform criterion as a minor negative impact (-1).

4.2.2 Scenic amenity and visual

No specific Commonwealth or Queensland legislation applies to scenic amenity or lighting values of the Project Area. The Project is not assessable against any regional or local planning schemes, however, consideration has been made of any landscape and scenic amenity EVs within the applicable regional and local plans.

Visual EVs relevant to the Project include visual receptors (farm properties and travellers) and public views to the Project Area. A landscape and visual impact assessment undertaken for the Project describes the existing conditions against which the impacts of the Project can be assessed. As the mining activities will be primarily undertaken underground, visual and lighting impacts on nearby receptors are anticipated to be limited and consistent with existing operations.

Additionally, there are no anticipated landscape impacts as subsidence modelling predicts insignificant changes (within the range of moisture related ground swell).

The scenic amenity and visual impact EV was assessed based on the visual receptors and public views criteria as being not impacted (0).

4.3 Soil

The *Regional Planning Interest Act 2014* (RPI Act) seeks to manage the impact of resource activities on areas regional interest through the protection of:

- living areas in regional communities (Priority Living Areas) (PLA)
- high-quality agricultural areas from dislocation (Priority Agricultural Areas) (PAA)
- strategic cropping land (SCL) (Strategic Cropping Areas) (SCA)
- regionally important environmental areas (Strategic Environmental Areas) (SEA).

These interests are considered to be the soil specific EVs for this assessment.

The Project Area encroaches an area of SCA and is identified as an SCL Assessment Area. An assessment is currently underway to assess impacts on soil resources, however, impacts are expected to be negligible as the Project consists of an extension of the current underground mine, with no additional surface disturbance or drawdown on groundwater. In addition, a subsidence study undertaken for the Project predicts negligible subsidence; therefore, impacts to the soil EVs are likely to be minor.

The soil EVs were assessed based on the top soils land use criterion as a minor negative impact (-1).

4.3.1 Contaminated land

The EP Act is the primary legislation relating to contaminated land in Queensland. There are no legislated EVs pertaining to contaminated land, however, the EP Act sets out requirements to identify and protect multiple components of the environment, such as land and water resources. For the purposes of this assessment, potential soil and groundwater contamination are the criteria used to assess potential impacts to EVs.

There are four land parcels are registered on the Environmental Management Register and Contaminated Land Register (EMR / CLR) within the Project Area. As the Project is an extension of existing underground mining operations, there will not be any surface disturbance or interference with the registered contaminated land parcels with no additional infrastructure. Potential to drawdown of any contaminated groundwater from shallow aquifers has not been identified as a Project risk based on the current design.

The contaminated land EV was assessed based on the soil and groundwater contamination criterion as being not impacted (0).

4.4 Water

Water related disciplines include groundwater, hydrology and hydraulics, and surface water quality. Environmental Protection (Water and Wetland Biodiversity) Policy 2019 identifies the EVs to be enhanced or protected and these include the Nogoa River (including all waters of the Nogoa River sub-basin); and otherwise, waters that may be used for the production of aquatic food for human consumption, aquaculture, agriculture, recreational or aesthetic uses, drinking water, industrial purposes or cultural and spiritual use.

4.4.1 Groundwater

The *Water Act 2000* and subordinate legislation provides protection for EVs related to groundwater resources in Queensland. Groundwater EVs of the Project relate to the availability of clean water for aquatic ecosystems, irrigation use, farm supply, stock use and drinking water. These EVs are assessed based on groundwater drawdown and groundwater quality criteria.

Interim groundwater modelling has indicated that minimal impacts are predicted to both groundwater quality and drawdown with the main (alluvium) aquifer unaffected by the Project, and the existing groundwater quality being unsuitable for potable or irrigation uses.

The groundwater drawdown EV was assessed as follows:

- no impact (0) based on the aquatic ecosystem criterion
- no impact (0) based on the irrigation use criterion
- minor impact (-1) based on the farm supply criterion
- minor impact (-1) based on the stock use criterion
- no impact (0) based on the drinking water use criterion.

The groundwater quality EV was assessed as follows:

- no impact (0) based on the aquatic ecosystem criterion
- no impact (0) based on the irrigation use criterion
- no impact (0) based on the farm supply criterion
- no impact (0) based on the stock use criterion.

4.4.2 Geomorphology

Geomorphology EVs for the Project are established in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and relate to the protection of the Nogoa River. The geomorphology EVs are assessed based on predicted impacts to the geological structure of the river bed.

The subsidence study undertaken for the Project predicts negligible subsidence; therefore, no material flooding or geomorphic impacts are predicted. No published or anecdotal evidence was found indicating the existence of sites of geomorphological significance within the study area.

The geomorphology EV was assessed based on the geological structure of the river beds criterion as a minor negative impact (-1).

4.4.3 Hydrology and hydraulics

Hydrology and hydraulic EVs are assessed based on predicted downstream flood levels. The dominant hydrological feature across the Project Area is the Nogoa River. Ensham Mine is currently licensed to extract water from and discharge water to the Nogoa River under the current EA. There is expected to be no change in the current water licencing arrangements.

No potential changes to flooding including instability and erosion of waterways are predicted based on flood modelling undertaken for the project (HEC, 2019). Monitoring of surface water flow and quality will continue in accordance with the existing EA. The existing mine water management system, which comprises water storages, water reticulation, and water release facilities, is considered adequate to meet the ongoing operational requirements of the Project.

The hydrology and hydraulics EV was assessed based on the downstream flood levels criterion as a minor negative impact (-1).

4.4.4 Surface water quality

Nogoa River EVs include aquatic ecosystems, irrigation, farm supply / use, stock water, aquaculture, human consumer, primary recreation, visual recreation, drinking water, industrial use and cultural and spiritual values. As the Project consists of an extension of the current underground mine, with no additional surface disturbance, minimal impact to surface water flows and quality is predicted. Additionally, as the Project proposes to discharge in accordance with existing EA, no change to the current situation is expected.

The surface water quality EV was assessed based on all 11 criteria. Based on the criteria of aquaculture, human consumption, primary recreation, visual recreation, drinking water, industrial use, and cultural and spiritual values, this EV was assessed as not impacted (0). Based on the criteria of aquatic ecosystems, irrigation, farm supply/use and stock water, this EV was assessed with a minor negative impact (-1).

4.4.5 Geochemistry

The EVs of geochemistry were based on those values attributed to surface water quality and groundwater.

Potential project impacts to water quality relate to total sulfur. Total sulfur in coal can include sulfide sulfur that has the potential to oxidise and produce acid mine drainage (AMD) (DTIR, 2007; INAP, 2009). The total sulfur concentrations in the coal seams, coal roof and coal floor have been evaluated to quantify the concentrations and range in distribution within and between seams. The majority of the total sulfur in the 5,200 samples considered is typically low (< 0.3%). Some analysed samples are at the higher range (> 5% total sulfur) suggesting there is the potential for some isolated areas of seams, plies or partings to contain some sulfide minerals. If AMD occurs during mining, the water is collected in the underground workings and pumped to surface where it is managed within the mine water management system.

Water within the underground workings may also produce drainage with concentrations of major ions or metal(loids) that have the potential to impact surface water if not managed appropriately (ACARP, 2008). Water pumped to surface will be contained in the current mine water management system.

At closure the underground workings will flood over time as the groundwater table recovers. The quality of the water in the underground workings will be a function of the chemistry of the exposed coal, the duration it takes to flood the voids and the quality of the water that enters the voids. It is probable that the water remaining in the voids will return to pre-mine conditions.

The geochemistry EV was assessed based on the total sulfur in water and surface water criteria as being not impacted (0). However, this EV was also assessed based on the groundwater criterion as a minor impact (-1).

4.5 Air

The four EVs identified in the EPP Air include the qualities of the air environment that are conducive to: protecting the health and biodiversity of ecosystems; human health and wellbeing; protecting the aesthetics of the environment; and protecting agricultural use of the environment. For the purpose of this assessment, these are considered to be the EVs used to assess potential impacts to air quality.

Assessment of the impacts are underway through detailed dispersion modelling. It is noted that the move from open cut to underground mining will see an overall reduction in impact from site operations and appropriate mitigation will be determined after the assessment process.

The air quality EV was assessed based on the air quality criterion as a minor negative impact (-1).

4.6 Noise and Vibration

The EPP Noise identifies three EVs to be enhanced or protected including the qualities of the acoustic environment that are conducive to: protecting the health and biodiversity of ecosystems; human health and wellbeing (including sleep, study and recreation); and protecting the amenity of the community. For the purpose of this assessment, these are considered to be the EVs used to assess potential impacts relating to noise and vibration.

Interim modelling and assessment of noise impacts has shown that there are not expected to be any exceedances of the EPP Noise benchmarks at any of the sensitive receptors identified.

The noise and vibration EV was assessed based on both the operational noise and ground vibration criteria as a minor negative impact (-1).

4.7 Ecology

The *Vegetation Management Act 1999* (VM Act) clarifies management objectives for vegetation including the retention or maintenance of vegetation to avoid land degradation, maintain or increase biodiversity or maintain ecological processes, the retention of riparian vegetation, and the retention of vegetation clumps or corridors. The *Nature Conservation Act 1992* (NC Act) sets out EVs for conservation, including native wildlife and its habitat, and protected areas and their biological and natural features.

As the Project consists of an extension of the current underground mine, with no additional surface disturbance, minimal impact to ecological EVs is anticipated

4.7.1 Aquatic ecology

MNES species mapped within the Project Area include the Fitzroy River Turtle and the Snapping River Turtle (known to occur in the area (1998 record)). EVs include groundwater dependent ecosystems (GDEs), water quality value and use of water (irrigation and flora and fauna). Owing to insignificant subsidence levels predicted, impacts to fish passage and GDEs are not anticipated.

The EV Workshop concluded that impacts on any GDEs are negligible as no maximum additional drawdown larger than 0.5 m was predicted in the alluvium in the Project Area (SLR, 2019).

The aquatic ecology EV was assessed based on the MNES, groundwater dependent ecosystems, water quality, use of water criteria as being not impacted (0). However, this EV was assessed on the stygofauna criterion as a minor impact (-1).

4.7.2 Terrestrial ecology

Four EVs have been identified for terrestrial ecology as follows.

4.7.2.1 Vegetation

Vegetation on site is restricted to key areas on the Nogoa River, tributaries and drainage lines. Vegetation communities identified are of remnant status. Areas of high value regrowth are along water courses. Vegetation identified hold ‘least concern’ and ‘of concern’ status under VM Act.

As the Project consists of an extension of the current underground mine, with no additional surface disturbance, the Project is not anticipated to impact vegetation.

The terrestrial ecology EV was assessed based on the vegetation criterion as being not impacted (0).

4.7.2.2 Biodiversity

Under the EP Act, the majority of the Project Area contains ‘of concern’ (category B) biodiversity status and ‘endangered’ regional ecosystems (RE). The Project is not deemed to impact on category B environmentally sensitive areas.

Based on nearby records, two flora species are identified as potential occurrences. Inclusion of these species serves as a precautionary approach.

As the Project consists of an extension of the current underground mine, with no additional surface disturbance, the Project is not anticipated to impact biodiversity.

The terrestrial ecology EV was assessed based on the biodiversity criterion as being not impacted (0).

4.7.2.3 Matters of State Environmental Significance

Regulated vegetation containing of concern and endangered REs are classified as a Matter of State Environmental Significance (MSES) and mapped remnant vegetation in proximity of a mapped watercourse.

MSES findings are limited to threatened ecological communities and threatened fauna:

- Brigalow Threatened Ecological Community identified and ground truthed
- koala mapped along Nogoa River (not ground truthed)
- ornamental snake (gilgai area provides critical habitat and support important population)
- the Project Area provides important habitat to four potential migratory bird species.

As the Project consists of an extension of the current underground mine, with no additional surface disturbance, the Project is not anticipated to impact MSES.

4.7.2.4 Fauna

Fauna habitat types reflect mapped vegetation values. During ground truthing ecological surveys, the non-remnant area in the northern part of Project Area (gilgai) was found to hold a greater amount of ecological value and function than State mapping suggests. The gilgai area acts as a retention basin benefitting a range of fauna including birds and amphibians with findings from field survey including 201 fauna species.

As the Project consists of an extension of the current underground mine, with no additional surface disturbance, the Project is not anticipated to impact protected fauna.

The terrestrial ecology EV was assessed based on the fauna criterion as being not impacted (0).

4.8 Social

The social values associated with the Project Area and surrounds are assessed using three criteria: underlying landowner's use of land or amenity, continuation of employment and supply opportunities and stakeholder engagement.

4.8.1 Social values and employment

The workforce at the existing Ensham mine is made up of a mixture of locals and drive in / drive out (DIDO) personnel. The Project will extend employment at the Ensham Mine for up to nine years. It is expected that existing workforce arrangements will continue for the proposed mine extension. It will also continue the supply opportunities that benefit local businesses.

As the Project proposes to extend the life of the existing underground mining operations, changes to population, housing or social infrastructure demand are not anticipated. There will be no material subsidence which could affect underlying or adjacent landowners. A social impact assessment (SIA) is currently underway to understand and assess the potential for impacts on landowners' interests.

On a precautionary basis, the social values EV was assessed based on the underlying landowner's use of land or amenity criterion as a medium negative impact (-2). This EV was assessed based on the continuation of employment and supply opportunities criterion as a minor positive impact (+1).

4.8.2 Stakeholder engagement

There are no specific EVs associated with stakeholder engagement, however, the Project has a number of key objectives for engaging with stakeholders. These objectives aim to build stakeholders' understanding and perceptions of the Project, ensuring timely and accurate information is accessible to the public, and responding to issues and concerns to ultimately strengthening Ensham's relationship with key stakeholders.

Ensham's Stakeholder Engagement Plan for the Project will ensure that regular engagement with stakeholders is undertaken to provide pertinent information updates about the Project and its potential impacts and benefits. Stakeholder feedback will be sought for consideration as part of the approvals process.

The social values EV was not assessed against the stakeholder engagement criterion in the EV Workshop.

4.9 Hazard and risk

Hazards with acute effects have the potential to impact the Project and environment, though this is unlikely. There are no proposed changes that would result in new risks or increase the consequence or probability of the existing risks as a result of the Project. Mitigation measures will continue to comprise monitoring and mitigation as per site management procedures set out under Ensham's Integrated Management System.

A hazard and risk study currently underway for the Project will consider in further detail the impact to EVs which may result from potential hazards and risks associated with the Project. As the Project proposes to extend the life of the existing mine, this study will draw upon existing project risks and mitigation measures already established as part of ongoing underground mining operations.

The hazard, health and risk EV was assessed based on the hazards with acute effects criterion as being not impacted (0).

4.10 Heritage

Historic EVs pertain to land and interests of the registered native title claimants for the area, the Western Kangalou people. These interests are primarily in relation to the Nogoa River system and previously relocated scarred trees. For the purposes of the EV Workshop, these interests are considered to be the historic EVs.

Impacts to historic EVs are expected to be negligible as the Project consists of an extension of the current underground mine, with no additional surface disturbance. As there is no material subsidence predicted, there is unlikely be any significant impacts from the underground mining operations. Whilst there is potential for scarred trees to experience negative impacts owing to modification of water table, this is unlikely as the groundwater study predicts no drawdown of the alluvial aquifers.

The cultural heritage EV was assessed based on the Indigenous and non-Indigenous heritage criterion as being not impacted (0).

4.11 Transport

The EV associated with transport is connectivity with the local road network and is assessed based on changes to traffic volumes which result from the Project. Key transport routes to be utilised from the Project include the Capricorn Highway and Duckponds Road. As there is no construction phase and no increase in workforce numbers, the Project is not anticipated to generate any increased traffic volumes on the local road network.

As the Project is an extension of current operations utilising existing infrastructure with no increase in workforce numbers, there is no expected impact on transport EVs as no increase in workforce and no construction phase.

The transport EV was assessed based on the transport criterion as being not impacted (0).

4.12 Waste

4.12.1 Waste Management

For the purposes of the workshop, EVs with respect to waste management are aligned with the EVs of other disciplines and are quantified based on the volume of waste attributed to the Project. The specific assessment criteria associated with the EV of waste management comprises construction waste, operational waste, overall waste volumes, waste stream diversity and cumulative waste production.

There will be no construction waste generated from the Project as no changes to Ensham Mine infrastructure facilities will be required. Operational wastes will be consistent with the current operations and managed using the existing waste management infrastructure, services and systems utilised by the current mine operations. The operation of the Project is not expected to increase the overall waste volumes or diversity of the waste streams compared to the existing operation; however, waste generation will extend up to an additional nine years.

Cumulative impacts associated with waste production over the life of the Project are considered to be minor due to implementation of a responsible, proven waste management approach, minimising potential impacts on environment and community values.

The waste management EV was assessed based on the construction waste, operation waste, overall waste volumes and waste stream diversity criteria as being not impacted (0). However, this EV was assessed based on the cumulative waste production criterion as a minor negative impact (-1).

4.12.2 Geochemistry

The EVs of geochemistry are based on those values attributed to surface water quality and groundwater (already discussed in **Section 4.4**), and mine waste.

Mineral wastes produced by the Project will be limited to coal waste generated during mining and rejects generated from the coal handling plant. In line with existing processes at the current Ensham Mine, the Project will continue the approved activity of in-pit placement of coal rejects and waste rock into mined voids.

A geochemical characterisation study for the Project is currently underway, however, it is expected that the potential for the development of acidic drainage at the site is very low to negligible.

The geochemistry EV was assessed based on the coal rejects criterion as a minor negative impact (-1).

4.13 Economics

Economic values of the Project are informed by detailed assessment and input from other technical studies with economic considerations. There are potential positive and negative economic impacts resulting from the Project.

As the Project proposed to extend the life of the existing Ensham Mine, with no additional infrastructure requirements, the Project will continue to support the local economy through employment (over 600 FTEs), as well as generating royalties to support new infrastructure and services and total capital spending. The Project will also provide flow-on benefits to the region, including Emerald and Blackwater, by supporting local businesses, suppliers and housing markets.

The economics EV was assessed based on all criteria (economic stimulation, export revenue, employment in region, loss of habitat, tightening of labour market, inflation in property market, and infrastructure network) as a significant positive impact (+3).

4.14 Summary

Table 3 documents the EVs and assessment criteria and associated impacts / benefits associated with each of the impact area discussed above. The table also includes the scores assigned to each of the EVs through consensus at the workshop.

Table 3 Summary of impacts on Project environmental values

Environmental aspect	Environmental value	Criteria	Impacts / benefits
Climate	Greenhouse gas	CO_2 (equivalent) emissions	Not determined
Land	Rehabilitation and decommissioning	Restoration of final landform	-1
	Scenic amenity and visual	Visual receptors (farm properties and travellers)	0
		Public views to the Project Area	0
Soil	Soil	Top soil land use	-1
	Contaminated land	Soil and groundwater contamination	0
Water	Groundwater – drawdown	Aquatic ecosystem	0
		Irrigation use	0
		Farm supply	-1
		Stock use	-1
		Drinking water	0
	Groundwater – quality criteria	Aquatic ecosystem	0
		Irrigation use	0
		Farm supply	0
		Stock use	0
	Geomorphology	Geological structure of river beds	-1
	Hydrology and hydraulics	Downstream flood levels	-1
	Surface water quality	Aquatic ecosystems	-1
		Irrigation	
		Farm supply / use	
		Stock water	

Environmental aspect	Environmental value	Criteria	Impacts / benefits
		Aquaculture	0
		Human consumer	
		Primary recreation	
		Visual recreation	
		Drinking water	
		Industrial use	
		Cultural and spiritual values	
	Geochemistry	Total sulfur in water	0
		Surface water	0
		Groundwater	-1
Air	Air quality	Air quality	-1
Acoustics	Noise and vibration	Operational noise	-1
		Ground vibration	-1
Ecology	Aquatic ecology	MNES	0
		Groundwater dependent ecosystems	0
		Water quality	0
		Use of water (irrigation and flora and fauna)	0
		Stygofauna	-1
	Terrestrial ecology	Vegetation	0
		Biodiversity	0
		MSES	0
		Fauna	0
Social	Social values	Underlying landowner’s use of land or amenity	-2

Environmental aspect	Environmental value	Criteria	Impacts / benefits
		Continuation of employment and supply opportunities	+1
		Stakeholder engagement	Not determined
Hazard and risk	Hazard, health and risk	Hazards with acute effects	0
Heritage	Cultural heritage	Indigenous and non-Indigenous heritage	0
Transport	Transport	Local connectivity via road network	0
Waste	Waste management	Construction waste	0
		Operation waste	0
		Overall waste volumes	0
		Waste stream diversity	0
		Cumulative waste production	-1
	Geochemistry	Coal rejects	-1
Economic	Economics	Economic stimulation	+3
		Export revenue	
		Employment in region	
		Loss of habitat	
		Tightening of labour market	
		Inflation in property market	
		Infrastructure network	

5.0 Workshop conclusions

A summary of the EV Workshop conclusions are provided below.

The EVs assessed with a medium negative impact (-2):

- Social values, specifically as they relate to landowner's use or amenity.

The EVs assessed with a minor negative impact (-1):

- Rehabilitation and decommissioning
- Soil, including top soil land use and land contamination
- Groundwater drawdown, specifically as they relate to farm supply and stock use
- Geomorphology
- Hydrology and hydraulics, due to potential impacts to downstream flood levels
- Surface water quality
- Air quality
- Noise and vibration
- Stygofauna
- Cumulative waste production
- Mineral wastes, due to the generation of coal rejects.

The EVs assessed with a positive impact (+1 or +3):

- Social values, specifically as they relate to employment and supply opportunities (+1)
- Economics (+3)

The EVs assessed as not impacted (0):

- Scenic amenity and visual impacts
- Soil
- Contaminated land
- Groundwater drawdown, specifically as they relate to on the EVs for aquatic ecosystem, irrigation use and drinking water
- Groundwater quality
- Hazard and risk
- Cultural heritage
- Geochemistry, specifically as it relates to total sulfur in water and surface water
- Transport
- Waste management, specifically as it relates to construction waste, operation waste, overall waste volumes and waste stream diversity.

No EVs were assessed as being significantly negatively impacted (-3).

6.0 References

ACARP (2008). Development of ARD Assessment for Coal Process Wastes. ACARP Project C15034. Report prepared by Environmental Geochemistry International and Levay and Co. Environmental Services, ACeSSS University of South Australia, July.

Department of Environment and Heritage Protection, 2011, *Nogoa River Sub-basin Environmental Values and Water Quality Objectives,* <https://environment.des.qld.gov.au/__data/assets/pdf_file/0026/88802/fitzroy_nogoa_river_wqo_290911.pdf> (downloaded 13/12/2019).

Department of Environment and Heritage Protection, 2019, *Healthy waters for Queensland: Environmental values, management goals and water quality objectives,* <https://environment.des.qld.gov.au/__data/assets/pdf_file/0025/86128/factsheet-evs-wqos-faq.pdf> (downloaded 13/12/2019).

Department of Environment and Science, 2013, *Fitzroy Basin Groundwater Zones,* <https://environment.des.qld.gov.au/__data/assets/pdf_file/0030/88815/fitzroy_groundwater_plan_300811.pdf> (downloaded 13/12/2019).

Department of the Environment (DoE), 2013, Matters of National Environmental Significance: Significant impact guidelines 1.1, < https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf> (accessed 16/12/2019).

DITR (2007). Department of Industry, Tourism and Resources. Leading Practice Sustainable Development Program for the Mining Industry. Managing Acid and Metalliferous Drainage. February 2007, Canberra ACT.

INAP (2009). Global Acid Rock Drainage Guide (GARD Guide). Document prepared by Golder Associates on behalf of the International Network on Acid Prevention (INAP). June 2009 (http://www.inap.com.au/).

Appendix A

Workshop Attendees

Appendix A Workshop Attendees

Name	Discipline	Position and company
Daniel Yates	-	Ensham Principal's Representative
Garry Gough	-	Ensham Project Manager
Neil Dale	-	Environmental Superintendent – Ensham Mine
David Curwen	-	Project Manager, AECOM
Sophia Saint-Forrester	-	Deputy Project Manager, AECOM
Noel Merrick	Groundwater	Technical Director, SLR Consulting
Greg Roads	Geomorphology	Director/Principal Engineer WRM Water & Environment
Dayjil Buhle	Hydrology and hydraulics	Senior Water Resources Engineer, HEC
	Water balance	
	Surface water quality	
Kate Haddan	Stakeholder engagement	Senior Consultant, Communication & Engagement, AECOM
Liz Fisher	Terrestrial ecology	Ecology Team Lead, AECOM
Andrew Bentley	Aquatic ecology	Principal Ecologist, frc environmental
Shelley McCormack	Economics	Senior Economist, CDM Smith
Sam Putland	Air quality	Environmental Engineer, AECOM
Max Thomson	Noise and vibration	Acoustics Engineer, AECOM
Andrew Barrie	Transport	Director-Principal Traffic Engineer, Access Traffic
Luke Kirkwood, Perri Braithwaite	Cultural heritage	Heritage Specialists, AECOM
Martine Goldner	Rehabilitation and decommissioning	Director, Sageheart
Greg Tuck	Soil	Director, GTE Environmental
Ona Kanas	Contaminated land	Senior Contaminated Land Consultant, AECOM
Dee Elliott	Social impact assessment	Director, ElliottWhiteing
Wendy Davies	Scenic amenity and visual	Practice Director, Lat27
Elisha Bawden	Waste management	Principal Environmental Engineer, AECOM
David Lockley	Hazard, health and risk	Associate Director - Process Safety, AECOM
Greg Maddocks	Geochemistry	Principal Hydrogeochemist, RGS Environmental

Appendix C

Adjoining landholders

Personal information has been removed to protect privacy