

# Executive summary

## ES.1 Project overview and proponents

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 Mining Lease (ML) 7459 and ML 70365 which extracts a portion of the various combined Aries/Castor seam plies.

Ensham Resources Joint Venture (Ensham JV) partners propose to develop the Ensham Life of Mine Extension Project (the proposed project, hereafter referred to as 'the Project') to extend the life of the existing underground operations into an area identified as the Project Site commencing from within ML 7459, ML 70326, ML 70365, and ML 70366 to an area west of ML 70365 within part of Mineral Development Licence (MDL) 217.

The location of the Project Site is illustrated on **Figure ES-1**.

The existing Ensham Mine is operated by Ensham Resources Pty Ltd (Ensham), a wholly owned subsidiary of Idemitsu Australia Resources Pty Ltd (ACN 010236272) (Idemitsu), on behalf of the Ensham JV partners. 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 Proponents for the Project. Ensham currently operates the existing mine under EA EPML00732813, dated 3 September 2020.

Idemitsu 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. Idemitsu, 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 million tonnes per annum of thermal, semi-soft and pulverised coal injection coals for export.

## ES.2 Purpose of the environmental impact statement

The purpose of an environmental impact statement (EIS) is to identify potential impacts and benefits of the Project on people and the environment. To identify potential impacts, an environmental impact assessment establishes the existing (baseline) conditions and anticipates how these may change in the future, by predicting the potential impacts of a project across a range of topics. An EIS proposes project-specific mitigation measures for any potential impacts identified in the assessment based on established best practices in the industry. Priority is given to avoiding impacts, and if this is not possible, then to reducing or abating impacts through control measures or compensation.

An environmental impact assessment has been conducted for the Project in collaboration with the mine planning process. This has ensured that environmental impacts were considered in the assessment of the Project and its alternatives, and allows for appropriate environmental impact mitigation measures to be incorporated into the proposed mine plan and operating procedures.

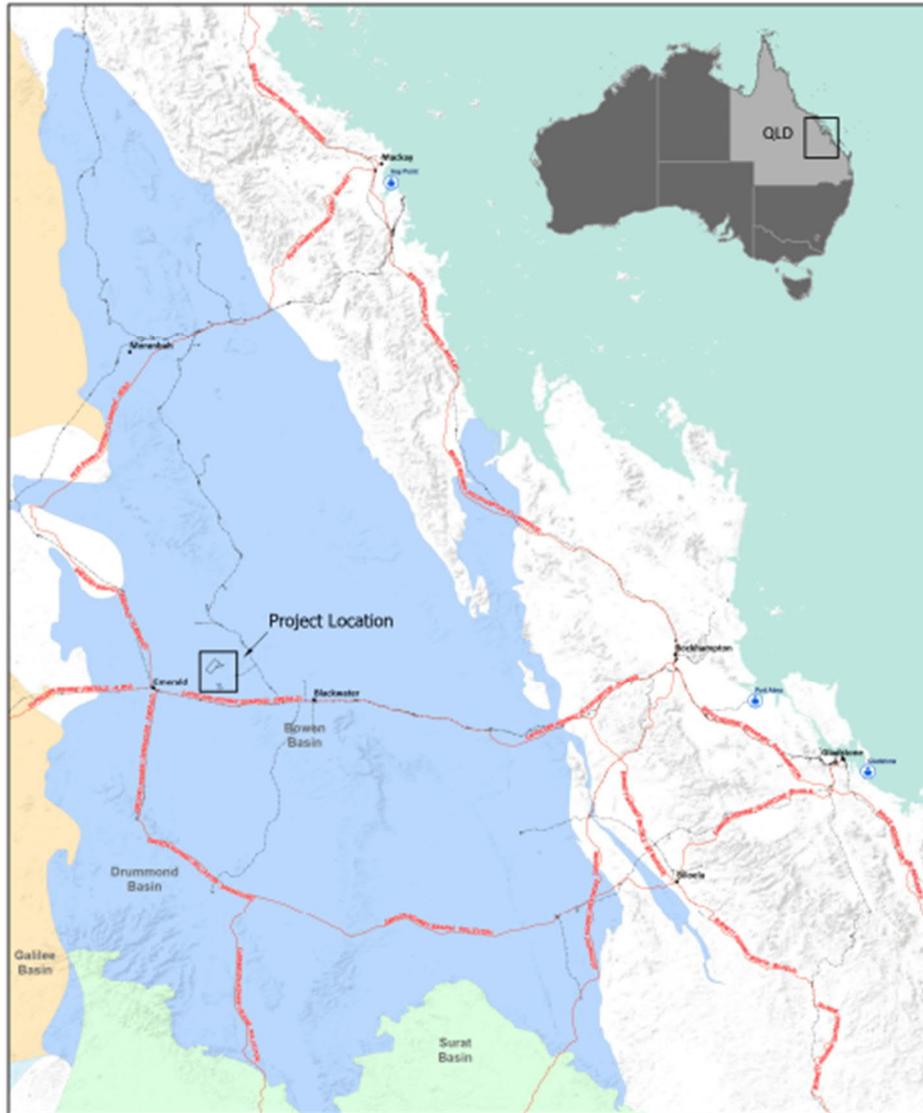


Figure ES-1  
Project Location



Figure ES-1 Project location

A multi-disciplinary approach has been adopted in the development of the Project, involving contributions from:

- a program of stakeholder consultation, which was undertaken to identify and address issues of concern to the community and government agencies
- involvement of environmental specialists in mine planning to ensure that environmental constraints were identified and environmental impacts minimised
- an engineering assessment of the Project and its various options to ensure maximum economic benefit and efficient resource recovery.

The key stakeholder issues and concerns were identified early in the Project planning phase and addressed in all stages of the mine planning and environmental impact assessment processes. Community and environmental concerns were key considerations in the assessment of Project alternatives and development of Project design and operating plans. This process has enabled reasonable and feasible environmental impact mitigation measures to be incorporated into the proposed Project design and operating procedures.

Project design, management and mitigation is a continually evolving process, with the outcomes of the EIS approval process, including regulator and community feedback, expected to influence future changes to the Project and its environmental and social management.

The Project EIS has been prepared by a highly capable Project team, including suitably qualified personnel, who have extensive experience in Queensland based mining approvals and environmental management.

## ES.3 Economic and social benefits

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 Ensham.

Capital expenditures relevant to the Project include one-off sustaining costs (i.e. infrastructure costs associated with the expansion of the Ensham Mine directly attributable to the Project) and ongoing sustaining costs such as the rebuild and replacement of major mining equipment and other capital expenditures.

The capital costs associated with the Project (in 2020 dollars) are estimated at \$314.9 million, and comprise:

- \$72.4 million incurred within Central Queensland
- \$107.1 million incurred within the rest of Queensland
- \$66.1 million incurred within the rest of Australia
- \$69.3 million incurred overseas.

Of the \$314.9 million, \$10.9 million are one-off sustaining costs, and \$304 million are ongoing sustaining costs.

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 the local communities to create sustainable outcomes. The Project will provide 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:

- provide \$256.4 million in royalty payments during the operational phase of the Project
- support employment for up to 603 full-time equivalent (FTE) personnel within the local economy, who would otherwise lose their jobs should the Project not proceed
- support continued economic activity within CHRC, which is likely to be significantly impacted should the Ensham Mine ultimately close
- provide continued opportunities for suppliers in Central Queensland to support capital investment and operation of the Project
- retain private sector investment in Central Highlands Local Government Area (LGA) and the region more generally due to the continued operation of the Ensham mine.

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 around the middle of 2021. With the proposed Project, and subsequently continuation of the underground 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.

## ES.4 Project description

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 authorised to continue until 2028 within Mining Lease (ML) 7459 and ML 70365, extracting a portion of the various combined Aries/Castor seam plies.

The proponents for the Project propose to increase the life of the existing underground operations by extending the underground bord and pillar mine into an area identified as the Project Site which includes zones 1, 2 and 3.

The Project has an equivalent surface area of approximately 2,737 hectares (ha) being:

- Zone 1: a new mining lease (MLA 700061 lodged 25 March 2020) contained within the existing MDL 217 (approximately 2,134 ha)
- Zone 2: an area within the approved mining leases ML 70326, ML 70365 and ML 7459 (approximately 394 ha)
- Zone 3: an area within the approved mining leases ML 7459 and ML 70366 (approximately 209 ha).

Note: zones 1, 2 and 3 comprise the Project Site. The Project Site and the underground mine plan are illustrated on **Figure ES-2**.



The extension of the underground mine into the Project Site adjacent to the current approved mine plan will maintain a steady supply of coal to market and ongoing employment at Ensham Mine. Approval of the Project will allow Ensham Mine to:

- continue to produce at current planned coal production rate of approximately 4.5 million tonnes per annum while retaining the current Environmental Authority (EA) limit (condition A5) which authorises the mining of 12 million tonnes of run of mine (ROM) coal per annum.
- extend the LOM by up to nine years with sufficient coal reserves to approximately 2037.
- progress the underground operation to the west of the existing approved underground operations with no additional surface infrastructure proposed as part of the new mine lease (Zone 1). The Project would continue to utilise existing operational mine equipment and infrastructure located on the existing and approved mining leases.
- continue to provide long-term employment within the Central Highlands region.

By using existing infrastructure and maintaining the current level of production, the proposed Project aims to remain with similar assessed levels of impact.

## ES.5 Project location

The Project is located at the existing Ensham Mine, in the western part of the central Bowen Basin, approximately 200 km west of Rockhampton, and 35 km east of Emerald along the Nogoia River in Central Queensland. The Nogoia River is fed by the ephemeral Teresa Creek and releases from the upstream Fairbairn Dam provide a year-round water supply to downstream users.

Being located in the central Bowen Basin, the Project is situated in an existing mining precinct with a number of other coal mining projects operating in the area. The Project is located within the Central Highlands Regional Council (CHRC) local government area.

Zone 1 of the Project is a portion of MDL 217. Land use includes dry land cropping, cattle grazing and irrigated cropping. The Nogoia River and some minor tributaries traverse Zone 1. The Project is not expected to disturb existing agricultural land use on Zone 1.

Zones 2 and 3 of the Project Site are located in areas within the existing Ensham Mine mining leases as shown in **Figure ES-2**. The southern portion of Zone 2 includes an area mapped as Strategic Cropping Area (SCA) and Priority Agricultural Area (PAA) while the northern portion is largely disturbed with large areas of cleared land and includes seismic lines and tracks. It contains areas of rehabilitated spoil as well as unrehabilitated spoil and pre-strip areas from open-cut mining. Zone 3 is disturbed land with borrow pits, dragline spoil, levees, topsoil stockpiles, pre-strip areas, tracks, and seismic lines associated with the existing open-cut operations at Ensham Mine. Zone 3 is largely cleared with sparse stands of vegetation across the area. The majority of Zone 3 is mapped as SCA and PAA. Both Zone 2 and Zone 3 are currently used for grazing.

## ES.6 Approvals process

The Project requires assessment under the *Mineral Resources Act 1989* (Qld) (MR Act) for the grant of a mining lease (ML) within part of Mineral Development Licence (MDL) 217 (Zone 1) that is included in the Project Site. A ML application was submitted on 25 March 2020 to the Department of Natural Resources, Mines and Energy, reference ML 700061.

An amendment to Ensham Mine's existing EA is required under the *Environmental Protection Act 1994* (Qld) (EP Act) as a pre-requisite to the granting of a new ML.

The Ensham JV partners applied for a voluntary EIS on 6 May 2020. The Department of Environment and Science approved a voluntary EIS process for the Project on 9 June 2020.

The Project was also referred under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) on 6 May 2020 to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) (EPBC 2020/8669). On 29 June 2020, the Minister for the Environment determined the Project to be a controlled action under the EPBC Act. The controlling provisions are sections 18 and 18A (listed threatened species and communities) and sections 24D and 24E (a water resource, in relation to coal seam gas development and large coal mining development).

The Project will be assessed under the bilateral agreement between the Commonwealth and the State of Queensland using the EIS prepared under the EP Act.

The Western Kangoulu People have one registered claim over the Project Site (Tribunal No. QC2013/002). 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* (Cth) (NT Act). It is anticipated that a section 31 deed and ancillary agreement will be executed with the native title party as part of the 'right to negotiate' process under the NT Act.

In addition to the key approvals, there a number of approvals and permit requirements that relate to the Project, including:

- a Regional Interest Development Approval under the *Regional Planning Interests Act 2014* (Qld) (RPI Act) with the Project Site being mapped as a SCA and being within the PAA
- compliance with the underground water management framework under the *Water Act 2000* (Qld) (Water Act). An Underground Water Impact Report (UWIR) has been prepared for the Project (**Appendix F-2**).

## ES.7 Public consultation

The Ensham JV partners have actively engaged with a range of local and regional stakeholders and government agencies to inform the EIS studies and the social impact assessment (SIA) for the Project. Consultation was undertaken with key stakeholders identified through the EIS process, including:

- Local communities – people who live and work in Emerald, Comet and nearby townships/localities
- Landowners/impacted neighbours – those overlying or neighbouring the Project's proposed mining lease area
- Non-government organisations – social services providers and community organisations, including local allied health and aged care providers

- Indigenous groups – the Western Kangoulu People and the Garingbal and Kara Kara People
- State government departments and agencies – those with the decision-making power and services in the Project's nearby communities
- CHRC – the Mayor, Councillors and Council executives
- Ensham JV partner employees – those working at the existing mine
- Industry bodies – Central Highlands Development Corporation.

On the 29 January 2020, the Queensland Government declared a public health emergency in Queensland in response to the COVID-19 pandemic. As part of their response to the pandemic, the Government implemented a range of measures aimed at reducing the spread of COVID-19 during the declared emergency period. As the emergency period was in force during the initial months of the EIS and SIA process, engagement activities were tailored to reach stakeholders primarily through online methods of communication in early-mid 2020, then followed up with face-to-face meetings and community workshops in October 2020.

Consultation aimed to provide information on the Project, identifying any issues or concerns, seeking feedback and providing responses. Consultation has played a key role in informing the EIS studies and SIA, and in developing environmental and social management measures for the Project, contained within a Social Impact Management Plan, including a Community and Stakeholder Engagement Plan and other sub-plans.

Statutory consultation processes will occur as part of the EIS and approvals process for the Project. Under the EIS process, interested and affected persons and the general public are notified of opportunities to make submissions on the draft ToR and draft EIS for the Project. The draft ToR together with the Initial Advice Statement (IAS) for the Project were lodged on 13 July 2020, and publicly notified between 3 August 2020 and 15 September 2020. A public notice was published in The Australian on 1 August 2020 and posted to all affected persons prior to the public notice period. Seventeen submissions were received on the draft ToR and addressed in the final ToR issued on 12 November 2020.

This draft EIS will be made available for public comment, with feedback from project stakeholders to assist in and preparing the Project EA conditions.

The proponents will continue stakeholder engagement activities as documented in the Community and Stakeholder Engagement Plan to inform Project development and management, build on established relationships throughout the community, and build on an existing reputation as an operator that is genuinely committed to the well-being and sustainability of the community.

## ES.8 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 planning in relation to underground activities will adhere to the same rehabilitation hierarchy and objectives as currently approved.

There is a statutory requirement for Ensham to prepare and submit a Progressive Rehabilitation and Closure Plan (PRCP) for the existing operation. A PRCP Transition Notice was issued for the existing Ensham Mine EA requiring the EA holder to submit a PRC plan by 30 April 2021. A PRCP was prepared and issued to Department of Environment and Science and an information request was issued on 17 July 2021. A PRCP schedule consistent with ESR/2019/4957 will be prepared for the Project (if varied from the existing Ensham Mine Rehabilitation schedule) and submitted to the administering authority prior to the Project EA amendment application being lodged.

Subsidence will be monitored and managed in accordance with the Subsidence Management Plan and serve as a basis for informing future rehabilitation.

Specific consultation including the mining method (bord and pillar), and rehabilitation of the underground mine, was undertaken during Project consultation sessions in Emerald and Comet as well as ongoing discussions with landowners and holders (lessees) and the Central Highland Regional Council and Central Highland Development Cooperation. Community workshops held on 13 and 14 October 2020, in Comet and Emerald respectively and discussions included final land use. Continued cattle grazing and agricultural land uses were discussed as the final land uses.

Decommissioning and closure of the underground workings for the Project would commence on cessation of underground production in approximately 2037. Decommissioning of the underground mine, which primarily involves the flooding of the underground and removal of underground infrastructure and sealing of the portals, is scheduled to occur between approximately 2037 and around 2039. This milestone is indicative and may vary due to operational requirements.

## ES.9 Climate

The Project Site is located within Central Queensland, which is characterised by a humid sub-tropical climate. Annual mean rainfall (at Emerald Airport) is 543.4mm with the highest rainfall events between December and February. Mean maximum temperatures are 29.9°C, mean minimum of 16.3°C. Winds at the Emerald Post Office are predominantly from the south-east, east and north-east.

Droughts are an increasingly common occurrence in Australia with prolonged periods of water shortage having negative effects on vegetation growth, erosion and overall land quality. Historical data shows that Queensland experiences some of the highest rainfall variability in the world (DES, 2019a), and as such droughts at some stage have affected most of the state. A review of Queensland Drought Situation maps generated by DES indicates that, as of 1 May 2020, the Project Site is within a fully drought declared area.

A risk assessment undertaken for the Project considered the vulnerability of the Project operations to natural hazards, including floods, bushfires and severe storms. As the Project is an extension of existing operations, it is not expected to increase the current risk profile associated with these extreme weather events. No additional measures are proposed to manage risks associated with climate. Measures currently in place at the existing Ensham Mine, including greenhouse gas (GHG) abatement measures, are proposed to be extended for the Project to protect environmental values in and around the Project Site.

## ES.10 Land use and tenure

Being in the central Bowen Basin, the Project site is situated in an existing mining precinct with a number of other coal mining projects operating in the area. The nearest operating coal mines are Kestrel and Gregory-Crinum located to the north-west.

The Project Site comprises nine registered land parcels which are a mix of freehold, reserve and lands lease properties. Part of the Project Site is also subject to a secondary interest, being a strata easement for the purposes of a stock route.

Land use on Zone 1 of the Project Site includes cotton farming, cropping and cattle grazing. Ownership comprises two private landholding properties.

The Ensham JV partners own Zones 2 and 3. The southern portion of Zone 2 includes an area mapped as SCA and PAA while the northern portion is largely disturbed with large areas of cleared land and includes seismic lines and tracks. Zone 3 is mapped as SCA and PAA. Zone 3 is also disturbed land and largely cleared with sparse stands of vegetation across the area.

The Nogoia River and some minor tributaries traverse through the Project Site, with the Nogoia River fed by the releases from the upstream Fairbairn Dam, providing a year-round water supply to downstream users.

The Ensham JV partners hold various resource tenements within Ensham Mine. The tenements include seven MLs and two MDLs. The existing bord and pillar operation is currently located on ML 7459 and ML 70365. Zones 2 and 3 are situated within existing MLs.

During the process of obtaining lawful tenure to occupy and undertake the Project, native title was addressed as required under the NT Act.

For Zone 1, President Dowsett of the National Native Title Tribunal on 21 May 2021 made a future act determination that the MLA may be granted. President Dowsett also decided that, by virtue of the future act determination being a determination of the arbitral body under section 38 of the NT Act, the determination constituted a 'native title agreement' within the meaning of that term under the ACHA and therefore a Part 7 CHMP is not required for the Project. Zone 2 and 3 are subject to existing CHMPs approved under Part 7 of the ACHA, being:

- a) relevant to zones 2 and 3, a CHMP with the Garingbal and Kara Kara People (QUD6233/1998) dated 22 February 2006. Despite that the Western Kangoulu People registered their native title claim on 9 May 2013 (making them the Aboriginal party for the area for the purposes of the ACHA) this CHMP remains valid and its existence is consistent with the operation of the ACHA; and
- b) relevant to zone 2, a CHMP with the Western Kangoulu (as part of the Kangoulu People (QUD6195/1998)) dated 17 March 2007.

Accordingly, Zones 1, 2 and 3 comply with the ACHA.

The Ensham JV will manage Aboriginal cultural heritage in accordance with its obligations under the ACHA for zone 1, and in accordance with its obligations under the existing CHMPs for zones 2 and 3.

The development of the Project is not anticipated to materially impact the existing land use pattern in the immediate area. During the operation of the mine, the existing land use on and adjoining the site will continue to operate. At the end of mining operations, rehabilitation of existing disturbed areas will be undertaken in line with the existing Ensham Mine Rehabilitation Management Plan.

## ES.11 Land resources

The Project Site is located in the central part of the Bowen Basin which is a sedimentary basin comprising Permian and Triassic age geology. The Bowen Basin is the largest productive coal basin in Australia. In the Project Site, the coal deposits are the Aries and Castor Seams, which are part of the Permian Rangal Coal Measures. The surface geology of the Project Site is dominated by the Nogoia River alluvium to the south and the Tertiary sediment to the south and north.

The Project Site includes areas of gently undulating plains with clay loam to gravel clays, brown-yellow clays, reddish brown to dark brown clays on undulating plains, hill slopes with sandy loams to sandy and light clay soils to shallow rocky soils on escarpment slopes. The area is dominated by Vertosols and Dermosols often associated with gently undulating plains typical of the region. The majority of the Project Site south of the Nogoia River is mapped as Endohypersodic, Epipedal Black, Grey or Brown Vertosols. Rudosols and Kandosols are present north of the Nogoia River where the terrain is more undulating.

The Project Site is located in areas of regional interest mapped as a SCA and PAA. The Project is considered a 'resource activity' under the RPI Act. Where a resource activity is proposed within an area of regional interests (i.e. a PAA or SCA), a regional interests development approval is required unless an exemption applies. It is indicated that the expected low levels of subsidence are unlikely to result in the formation of significant depressions in the surface topography and LiDAR survey data will be checked annually to confirm this. Therefore, it is unlikely that areas mapped as SCA and PAA will be impacted by the Project.

Geochemical assessment has indicated waste rock from the Aries /Castor coal seams is non-acid forming (NAF) and will generally produce non-acidic, alkaline, low salinity drainage. Metals and metalloid concentrations in waste rock are not anticipated to generate dissolved metals and metalloids in water runoff or final mine pits that will exceed EA conditions. Groundwater modelling indicates final voids associated with the open-cut mine and final closure landforms will continue to act as a groundwater 'sink', in compliance with the existing EA Condition C56.

Waste rock generation from the coal handling plant will be approximately 225,000 m<sup>3</sup> and represents 0.6 per cent of total waste rock volumes contained in Pit C and Pit D under the approved final landform conditions of Appendix 3 in the existing EA. Any waste rock produced at the coal handling plant will be stored within the existing open-cut voids of Pit C and Pit D in accordance with Appendix 3 of the EA.

The detailed mine subsidence assessment undertaken for the Project reviewed the bord and pillar design to understand the potential maximum subsidence expected across the Project Site. This assessment, using a design factor of safety of 1.6 for mining under the floodplain, has confirmed the long-term stability of the proposed mine layout. The design factor of safety has been increased to 2.11 for pillars located beneath the Nogoia River. Once flooded, the buoyancy effect of the water will also increase the factor of safety of the pillars and further enhance the stability of the underground workings. This long-term stability assessment of the pillars is also consistent with empirical studies on pillar life expectancy.

Due to the nature of the bord and pillar mining method, the mine design, and depth of cover, subsidence is predicted to be typically less than 40 millimetres (mm) in the Project Site. This is a result of elastic compression of the pillars, based on the additional load on the pillars after the coal is extracted. As the assessment predicts low levels of subsidence and associated strains and tilts, no surface cracking is anticipated within the Project Site (nor has it been detected at the current underground workings which employs the same mining method). Similarly, significant depressions in the surface topography, where ponding of the surface drainage may occur, are unlikely to occur due to the low levels of subsidence predicted. This is consistent with experience at the existing Ensham Mine operations where no surface cracking or ponding has been observed above the mined-out areas.

The risk of sinkhole subsidence occurring in the Project Site has been assessed and is considered to be negligible.

Geotechnical assessment of potential subsidence and stability under extreme flood events is discussed in Chapter 11 (Flooding). No impacts were identified under the Nogoia River floodplain for a 0.1 per cent AEP (1 in 1,000 year) event with existing 1.6 factor of safety. To maintain the proposed 2.11 factor of safety, under the Nogoia River channel during extreme flood conditions, the pillar size can be increased and the mining height reduced as is standard practice in other areas of the Ensham bord and pillar mine.

Ensham Mine is currently monitoring surface movements with LiDAR and fixed GPS survey stations to an accuracy of +/- 5 mm to confirm the low levels of subsidence. It is intended to implement this latter type of monitoring for the Project site. The details of the monitoring are documented in the Subsidence Management Plan in addition to the review and auditing process.

There is the potential for land contamination to be present within the Project Site. Contamination may be associated with known contaminating activities such as waste storage, potential pesticide storage or potential contamination associated with activities listed in the Waste Management Plan. Contamination controls will continue to be managed under the Project operational procedures and processes and in accordance with the EA and conditions pertinent to contamination as outlined in the EP Act.

## ES.12 Surface water resources

In the vicinity of Ensham Mine, the Nogoia River forms part of the Nogoia Mackenzie Water Supply Scheme which supplies agriculture, industry and towns in Central Queensland. Fairbairn Dam is the major water storage in the scheme, the operation of which involves controlled release of water from the dam, via the Nogoia River, to downstream water users and weirs (e.g. Bedford Weir) on the Mackenzie River.

The Nogoia River Sub-basin Environmental Values and Water Quality Objectives document (DEHP, 2011) provides environmental values for waters within the basin. The existing mine is located in both the Lower Nogoia main channel waters and the Lower Nogoia and Theresa Creek tributaries waters. The Project zones are located wholly within the Lower Nogoia main channel waters.

The Lower Nogoia main channel waters are identified as having the following environmental values: aquatic ecosystems, irrigation, farm supply/use, stock water, aquaculture, human consumer, primary recreation, secondary recreation, visual recreation, drinking water, industrial use, and cultural and spiritual values.

Ensham Mine currently operate a mine water management system encompassing the existing open-cut and underground operations. As the Project is an extension of the existing underground operations, the Project will integrate with the existing mine water management system as underground mining transitions from the existing approved areas to the Project Site.

There are no additional annual water requirements, above the demands of the existing Ensham Mine, for the Project. Water requirements will be sourced primarily from water collected and stored on site, including rainfall runoff and groundwater inflows which are stored on site for reuse. Groundwater inflow is predicted to contribute to the majority of the mine water management system requirements.

Extractions of raw water from the Nogoia River are expected to be 546.7 ML/year on average, compared to 546 ML/year for the existing mine operations. In both cases, these flows are notably lower than the 1,500 ML/year high priority allocation held by Ensham Resources Pty Ltd on the Nogoia McKenzie Water Supply Scheme (reference: Water Account 103347). The Project will operate under the same high priority water allocation conditions, and as such it will not extract water from natural flows in the Nogoia River under other circumstances.

The mine water balance uses 131 years of climatic data hence the full range of historical climatic events are simulated including the low, median and high rainfall periods as well as historical extremes (i.e. "worst case"). Climate change factors have not been applied to rainfall and evaporation data because the project mine life ends in 2037 and climate change predictions only start in 2040, hence the effects of climate change predictions on water balance model results would be negligible. Results show that, consistent with existing operations, the Ensham Mine water management system has sufficient capacity to manage all mine affected water generated

by the Project during wet (95th percentile) and dry (5th percentile) climatic conditions. There will continue to be a requirement for controlled releases from Ensham Mine. No changes to EA release conditions are proposed for the Project.

The mine salt water balance shows that, consistent with existing operations, the Ensham Mine water management system has sufficient capacity to manage all mine affected water generated by the Project, including extended periods of drought. Available storage capacity will increase with the Project because completed underground mine areas will become available for water storage and can be progressively filled with water. Groundwater inflow in the Project Site is predicted to have similar quality as groundwater inflows in the existing underground operations at Ensham Mine.

During flood conditions, Ensham Mine can release mine-affected water stored within pit voids to the Nogoia River in accordance with the EA EPML00732813 conditions. The total volumes released by Ensham Mine during current operations are limited by the EA conditions as well as maximum pumping capacities. As such, the maximum possible amount of flow (based on physical infrastructure limitations) is released in each flow event, providing all the trigger limits in the EA are met. The Project will maintain this managed release methodology for the Project, with releases only undertaken for a small number of days each year and only when natural flows in the river are sufficient following heavy rainfall events. Upon commencement of the Project, the average annual release to the Nogoia River for the Project is estimated at 2,766 ML/y which is a decrease of 130 ML/y from the existing operation.

Large rainfall events may increase inventory levels within the onsite water storages, however, rainfall will contribute to a reduction of salinity in these storages, due to dilution. Additionally, such storm events will also result in increased flows in the Nogoia River, promoting background dilution should a release be required.

Annual Receiving Environment Monitoring Program (REMP) reporting is undertaken to meet EA conditions, using multiple lines of evidence to monitor the aquatic health of the Nogoia River upstream and downstream of the waste-water release points. REMP reporting will continue for the life of the Project. In addition to the existing surface water monitoring programme reported in the REMP, a new water quality monitoring site will be established as soon as possible upstream of the proposed extent of underground mining in order to provide a reference site and baseline data from upstream of the operation.

The REMP reports (Hydrobiology Pty Ltd, 2018, 2019, 2020) for the last three years indicate that a comparison of assessed parameters downstream of the mine to upstream results indicate the suitability of current release contaminant limits to protect downstream EVs. The monitored variables (habitat, stream flow, water quality, sediment and macroinvertebrates) have typically remained similar or improved since 2017, highlighting the correct operation of managed releases. The EA conditions for which releases were made between 2017 and 2020 allowed the downstream electrical conductivity trigger level to be up to 1,440 microSiemens per centimetre ( $\mu\text{S}/\text{cm}$ ) (1,200  $\mu\text{S}/\text{cm}$  80<sup>th</sup> percentile) and a minimum flow of 10 m<sup>3</sup>/sec. Considering that the Project will result in no changes to managed releases, and more stringent conditions were applied in the EA issued 3 September 2020, it is concluded that no negative impacts to EVs are to be expected.

Climate projections indicate no significant change to the frequency and intensity of storms and cyclones within the region for the duration of the Project. Ensham Mine's existing measures with respect to extreme weather events, such as severe storms and flooding, are considered to adequately address any further risk of climate change.

As very limited surface disturbance is expected as a result of the Project, changes to hydrology and surface water quality as a result of the extended mining operations are expected to be minimal. Overall, it is concluded that no environmentally significant impacts to surface water quality should occur as a result of the Project activities.

## ES.13 Flooding

Ensham Mine is located within the floodplain of the Nogoia River. The Nogoia River has a catchment area of approximately 27,000 square kilometres (km<sup>2</sup>) upstream of the mine. There are several significant upper tributaries of the Nogoia River with the two of relevance to the Project being Theresa Creek and Crinum Creek, which drain into the Nogoia River about 29 km and 21 km upstream of Ensham Mine respectively. The Comet River drains into the Nogoia River about 8 km downstream of Ensham Mine. The Nogoia River and the Comet River combine to form the Mackenzie River, which then becomes the Fitzroy River.

Fairbairn Dam was constructed on the Nogoia River 40 km upstream of the Theresa Creek confluence. Releases are made from the dam to deliver supplies to downstream riparian water users and to maintain supplies from Bedford and Bingegang weirs to various towns, mines and irrigators. Since the construction of Fairbairn Dam, regulated releases are made to supply downstream users on most days. The dam has significantly changed the flow regime in the downstream reaches of the Nogoia and Mackenzie Rivers. A flood event in December 2010/January 2011 was the largest event to have been recorded since the Fairbairn Dam was commissioned.

The assessment of flooding and geomorphology for the Project demonstrates that, as the Project is an extension of existing operations at Ensham Mine and no changes to the surface topography are predicted, the existing flooding conditions are expected to remain unchanged.

Ensham Mine's existing water management system, which comprises water storages, water reticulation and water release facilities, would be adequate to meet the operational requirements of the Project without augmentation. Potential changes to surface water flow and flooding, including the stability and erosion of waterways, as a result of subsidence is not predicted. Groundwater and subsidence assessments concluded that the Project will not increase the risk of streambed cracking and associated losses of baseflow to groundwater. The subsidence assessment also considered the potential impacts of flooding on the bord and pillar operation.

The existing Ensham Mine has developed open-cut pits on the northern and southern sides of the Nogoia River channel. The pits extend into the floodplain and are protected by earth levees which provide flood protection for the open-cut pits (and underground mine portals) up to the 0.1 per cent (1 in 1,000 year) annual exceedance probability event plus 0.5 m, in compliance with existing Ensham Mine EA conditions. The portals to the underground are located within these open cut pits and accordingly are protected by the existing levees.

The Project is not expected to have any additional impact on the flows or flow regime of the Nogoia River compared to existing approved operations.

## ES.14 Groundwater

The Project is located in the western part of the geological Bowen Basin. In the southern parts, the extent of the Bowen Basin and the hydrogeological Great Artesian Basin (GAB) overlap. The Rewan Group is recognised as the basal aquitard of the GAB (Habermehl, 1980). The closest intake area for the GAB is located 50 km south-east of the Project Site, which means Ensham Mine will have no impact on the recharge to the GAB units.

The Rangal Coal Measures comprise economic coal seams interbedded with low permeability siltstone, sandstone, and shale. The coal seams are the most permeable lithological units within the Rangal Coal Measures. Groundwater storage and movement largely occurs within the coal seams, along the natural cleats. The Rangal Coal Measures overburden and interburden are considered to form aquitards.

Alluvial deposits are associated with the Nogoia River and its anabranch. The Quaternary aged alluvium comprises shallow sequences of clay, silty sand and sand, underlain by discontinuous basal sands and gravel. The groundwater in the alluvium shows high salinity with a median EC of 13,100  $\mu\text{S}/\text{cm}$ , which makes it unsuitable for groundwater uses such as stock watering and irrigation. Several groundwater monitoring bores installed in the alluvium are sporadically dry, indicating that there is no continuous recharge from the Nogoia River, which artificially flows year round due to discharges from the upstream Fairbairn Dam.

Several private bores extract groundwater adjacent to the mine lease boundary for irrigation, farm supply or stock water. Overall, groundwater usage is limited in the region, given access to better quality water from the perennial Nogoia River. There were 19 identified groundwater bores, seven of them currently not in use.

The groundwater impact assessment for the Project was undertaken in accordance with the requirements set out under the Water Act and the EPBC Act. Extensive site-specific monitoring data, including subsidence LiDAR datasets, were available to conceptualise the groundwater regimes, assess mine operations, and evaluate potential impacts using predictive groundwater modelling. A numerical groundwater model, adopting a conservative modelling approach, allowed for the evaluation of potential groundwater impacts related to the Project.

The groundwater data evaluation and conservative modelling allowed for the evaluation of potential surface water – groundwater interaction, artificial groundwater recharge as a result of irrigation, a review of groundwater resources (including groundwater dependent ecosystems (GDEs), groundwater users, and springs), groundwater inflow rates, and predicted drawdown of groundwater levels.

The Project will result in the generation and management of groundwater, at inflow rates similar to the existing Ensham Mine operations but over a longer duration due to the proposed extended life of mine of up to approximately nine years. The combined modelled inflow for both the existing approved operations and the Project ranges from 5 to 16 ML/day following initial inflows. As inflows from the existing operations cease and Project progresses, inflow ranges between 3 and 12 ML/day.

Water balance modelling, including the groundwater inflow rates, indicated that even during periods of prolonged drought, the existing available storage within the mine has sufficient capacity to manage predicted groundwater inflows without the need to rely on additional releases onto the Nogoia River.

Model predictions indicate that no groundwater level drawdown within the alluvium is likely above the existing and proposed underground workings. Limited drawdown is predicted within the assumed fully saturated unconsolidated sediments within the wider groundwater study area. The modelled maximum incremental groundwater level drawdown in the target A2C seam can extend up to 10 km down dip. The predicted drawdown in the A2C seam compared to predicted drawdown in the overlying (assumed saturated) unconsolidated sediments indicates little or no vertical hydraulic connection through the Rewan Group.

No marked drawdown impacts on landholder bores, GDEs, water quality, and baseflow are predicted by modelling. No groundwater impacts by subsidence (no goaf, collapse, or secondary alteration (fracturing)) is predicted to occur when adopting the proven stable bord and pillar mining technique.

Post-mining groundwater level rebound modelling indicates that the shallow groundwater system will fully recover to pre-mining conditions and the water levels in the Rangal Coal Measures will recover to 10 m lower than in the surrounds. The coal seam water level rebound is related to the influence of the Ensham Mine final voids, which will continue to act as a localised groundwater sink in compliance with existing environmental approval conditions.

An assessment of potential impacts to the groundwater resources indicate no additional mitigation measures are required as the existing water management system is sufficient to manage the Project's mine affected water make, modelled drawdowns within neighbouring bores are below adopted water level thresholds (less

than 5 m) so no make good measures are required, and there is a low likelihood of limited drawdown impacting on GDEs.

The groundwater assessment allowed for the compilation of recommendations regarding the augmentation of the existing groundwater monitoring programme. These monitoring recommendations allow for Project specific monitoring, model validation, and the development of bore based water quality trigger and water level thresholds.

## ES.15 Terrestrial ecology

The terrestrial ecology values of the Project Site were assessed through both a desktop assessment and field surveys undertaken in May 2019, October 2019, November 2019 and January 2020.

Approximately 2,263 ha of the land area above the Project Site (2,737 ha, equivalent to 82.6 per cent) was validated to comprise non-remnant vegetation. This is associated with either non-remnant woodland, grasslands mostly dominated by *Cenchrus ciliaris* (buffel grass), agricultural cropping land and mine rehabilitation areas. Remnant, high value regrowth and regrowth vegetation was also confirmed within the Project Site. This vegetation was categorised into eight communities and found to be analogous to five different regional ecosystems. This includes one RE with an endangered biodiversity status.

The habitat landscape within the Project Site has been significantly altered from its original state. Fauna habitat that persists has been subject to disturbance from cattle grazing, selective clearing, weeds and pests. This has led to a general lack of native understorey growth in the remnant woodlands. However, thinning has resulted in an accumulation of ground habitats in the form of logs and large branches. Despite signs of habitat degradation, several fauna habitat values exist.

Two conservation significant flora species, nine conservation significant fauna species and six migratory species have either been confirmed or are considered to potentially occur within the Project Site. One Threatened Ecological Community was also confirmed within the Project Site.

Project impacts were assessed as negligible to ecological values due to:

- minor surface disturbance (exploration) and minor surface construction (not in Zone 1 or on SCA's)
- no clearing of vegetation communities is required
- very low likelihood of subsidence, with the predicted subsidence level of 40 mm, and no predicted surface cracking
- no increases of dust, noise and light will occur above the current levels
- no alteration to flows in the Nogoa River due to the Project, with the river being a highly modified system with irrigation releases from the upstream Fairbairn Dam controlled by SunWater.

Impacts to matters of state environmental significance values as a result of the Project are expected to be negligible. Therefore, offsets under the EP Act are not proposed for the Project.

## ES.16 Aquatic ecology

The aquatic ecological value of the Nogoa River and its tributaries was assessed as high as two aquatic matters of national environmental significance (MNES) species (white-throated snapping turtle and Fitzroy River turtle) are known to occur within the Nogoa River and the main channel provides favourable habitat for foraging and potential habitat for breeding.

The aquatic ecological value of Winton Creek was assessed as moderate, as Winton Creek provides favourable habitat for common species of fish and invertebrates, noting that in-stream aquatic habitat is often restricted to temporary, isolated pools. The aquatic ecological value of Boggy Creek, Corkscrew Creek and Mosquito Creek was assessed as low - moderate, as these were dry at the time of the survey and are unlikely to provide habitat for fish or aquatic invertebrates most of the year based on their high degree of ephemerality.

Regulated vegetation types occur in the riparian zone and watercourses of the study area and watercourses provide important corridors for fish passage during times of flow.

All potential sources of impact to the aquatic ecological values as a result of the Project was assessed as low as:

- the Project will operate using the same bord and pillar mining method associated with existing operations, with the maximum predicted subsidence (40 mm) less than the DAWE estimated seasonal variation in surface levels as a result of changes in soil moisture content (50 mm)
- real-time and annual monitoring for subsidence will be completed as per the SMP, with trigger levels and alert to actions identified where potential for significant subsidence is identified
- there will be no new surface infrastructure within or adjacent to a watercourse, no increase in mine traffic on the surface and no increase in surface construction or surface disturbance within the Project study area as a result of the Project
- proposed mine-affected water releases and ongoing water quality, sediment quality and aquatic ecology monitoring will be managed under the EA conditions of existing operations.

As noted in **Section ES.12**, the REMP annual reports (Hydrobiology Pty Ltd, 2018, 2019, 2020) for the last three years indicate that a comparison of assessed parameters downstream of the mine to upstream results indicate the suitability of current release contaminant limits to protect downstream EVs. The monitored variables (habitat, stream flow, water quality, sediment and macroinvertebrates) have typically remained similar or improved since 2017, highlighting the correct operation of managed releases.

The EA conditions for which releases were made between 2017 and 2020 allowed the downstream trigger level to be up to 1,440  $\mu\text{S}/\text{cm}$  (1,200  $\mu\text{S}/\text{cm}$  80<sup>th</sup> percentile) and a minimum flow of 10m<sup>3</sup>/sec. Considering that the Project will result in no changes to managed releases, and more stringent conditions were applied in the EA issued 19 March 2020, it is concluded that no negative impacts to EVs are to be expected.

The Project is highly unlikely to have a significant impact on the southern snapping turtle (also commonly known as the white-throated snapping turtle) and Fitzroy River turtle populations as:

- no new surface infrastructure or clearing of riparian vegetation or aquatic habitat
- no change in the release process for mine affected water from existing operations
- very low likelihood of subsidence, and
- no impact on water level or flow in the Nogoia River.

As all potential sources of impact to the aquatic ecological values as a result of the Project was assessed as low and the two MNES species known to occur in the Project study area are sufficiently isolated from the Project, monitoring and management plans associated with existing operations (such as current EA and REMP conditions) are therefore adequate for the ongoing monitoring of impacts to aquatic ecological values.

Stygofauna were assessed using a desktop review and field surveys. Overall, the stygofauna community of the Project study area was assessed as having low environmental value based. The stygofauna community of the alluvium was assessed as having moderate environmental value based on the one stygobitic taxon and 3 stygoxene taxa and generally suitable hydrological characteristics, and the stygofauna community of the Rewan Group and Rangal Coal Measures was assessed as having low environmental value due to the absence of stygofauna and unsuitable hydrological characteristics. A risk-based assessment determined that the mitigated risk of impact to stygofauna is low for identified potential sources of impact. Monitoring and management plans associated with existing operations were identified as being adequate for the ongoing monitoring of impacts to the stygofauna community, with the moderate stygofauna values of the alluvial aquifer in the Project study area to be managed via a groundwater level monitoring program.

## ES.17 Air quality and greenhouse gas emissions

The Project is located in a rural setting, a significant distance away from major population centres. As a result, the only sensitive receptor types that apply to the Project are neighbouring rural dwellings. A total of 33 sensitive receptors are identified within 20 km of the Project Site. Terrain features and land use can influence meteorological conditions on both a local and regional scale. The terrain in the area is generally flat, with the area to the west of Ensham Mine a flood plain for the Nogoia River.

Three mining operations are identified as significant emissions sources in the vicinity of the Project Site:

- Kestrel Mine, Emerald (24 km north-east of the Project)
- Blackwater Mine, Blackwater (35 km south-east of the Project)
- Curragh Mine, Blackwater (40 km east of the Project).

Although each of the identified existing emissions sources are likely to be significant emissions sources for the region, the separation distances between them and Ensham Mine is such that their emissions are not expected to directly affect the Project Site. Emissions sources from mines (Wilton Coal Project and Fairhill Coal Project) that may commence during the life of the Project have been considered and were determined to have a low likelihood of cumulative impact at shared sensitive receptors.

An air quality assessment was conducted to assess the potential for offsite impacts due to dust emissions from mining activities associated with the Project. The assessment methodology followed industry standard dispersion modelling and assessment techniques to predict air pollutants in the study area. The methodology used to complete the dispersion modelling assessment included identification of sensitive receptors,

characterisation of the background air quality, identification and quantification of dust emission sources, configuration of the CALPUFF dispersion model based on local topography and land use, and modelling using a 3-dimensional, site-representative, one year meteorological dataset.

Three operational scenarios were modelled, representing various stages of the Project, with the scenario specific dust emission rates quantified for relevant dust generating activities. Relevant mitigation commitments were identified and applied to the emission rates based on published emission factors. The assessment predicts that the Project will not exceed any of the air quality objectives at any of the identified sensitive receptors.

Overall, the outcomes of the three modelled scenarios showed that the Project is not predicted to exceed air quality objectives with the predicted concentrations of all the pollutants of interest being below the criteria in all of the modelled scenarios. The assimilative capacity of the receiving environment is generally sufficient

such that Project emissions would not result in an unacceptable degradation of air quality at neighbouring sensitive receptors.

Current air quality management at Ensham Mine is proving to be effective in maintaining compliance with current EA conditions as evidenced by no air quality related complaints being recorded in the last six years. The current management and EA conditions shall apply to the Project and it is anticipated that ongoing air quality compliance shall be achieved for the Project.

Under the *National Greenhouse and Energy Reporting Act 2007 (Cth)* (NGER Act), Ensham meets the threshold levels for greenhouse gas (GHG) emissions, energy consumption, or energy production and is required to report their GHG emissions annually. A GHG assessment has been undertaken to provide annual estimates of GHG emissions from the Project. The Project will provide mitigation of GHG emissions in the form of pre-drainage remediation, drainage capturing and flaring of the underground ventilation air.

For the base case scenario (unmitigated), the estimated emissions intensity is 0.23 tonnes of CO<sub>2</sub>-e per tonne of ROM coal produced. The Project is estimated to result in 8.6 Mt of CO<sub>2</sub>-e of GHG emissions over the life of the Project, with an average annual GHG emission rate of 0.47 Mt CO<sub>2</sub>-e. The average annual GHG emissions from the Project for the base scenario represent 0.09 per cent of Australia's 2017/18 emissions and 0.29 per cent of Queensland's 2017/18 emissions.

For the mitigated scenario which utilises flaring as the preferred method, the estimated emissions intensity is 0.16 tonnes of CO<sub>2</sub>-e per tonne of ROM coal produced. The Project is estimated to result in 6.6 Mt of CO<sub>2</sub>-e of GHG emissions over the life of the Project, with an average annual GHG emission rate of 0.36 Mt CO<sub>2</sub>-e. The average annual GHG emissions from the Project for the mitigation scenario represent 0.07 per cent of Australia's 2017/18 emissions and 0.22 per cent of Queensland's 2017/18 emissions.

Based on the potential reduction of 2.0 Mt of CO<sub>2</sub>-e of GHG emissions over the life of the Project, the mitigated scenario is assessed to be the preferred method using best practice environmental management to avoid and/or minimise greenhouse gas emissions directly resulting from activities of the Project. The base case (unmitigated) scenario is assessed to be the less preferred alternative method.

## ES.18 Noise and vibration

An assessment of the noise and vibration impacts from the Project has been conducted to determine potential impacts at the 33 sensitive receptors located within 20 km of the Project Site. The existing noise environment of the Project Site is primarily influenced by local sources including local traffic, fauna, local mechanical plant and foliage noise in high winds. In assessing the Project, the cumulative impacts of the Project activities together with the existing Ensham Mine operations were considered.

The noise and vibration assessment was undertaken to address the requirements of the Noise and Vibration - EIS information guideline (DES, 2020). Noise criteria for the Project were determined based on Ensham Mine's existing EA conditions, which were supplemented by appropriate criteria from the appropriate policies and guidelines to assess long-term compliance. Background noise levels were measured at six locations in the vicinity of the Project Site.

Modelling of three operational scenarios was undertaken to assess noise and vibration impacts throughout the life of the Project. The assessment modelled the Project noise sources both in isolation and in combination with the existing Ensham Mine. Based on the noise modelling and existing management measures, compliance with the nominated criteria was predicted at all nearby sensitive receptors.

As blasting is not proposed for the Project, no assessment of blasting impacts is made in the EIS. Blasting is undertaken as part of existing open-cut operations, and monitoring shows compliance with the EA criteria. Therefore, no predicted additional impacts at sensitive receptors are anticipated.

Emissions sources from mines (Wilton Coal Project and Fairhill Coal Project) that may commence during the life of the Project have been considered and were determined to have a low likelihood of cumulative impact at shared sensitive receptors. The cumulative impact of noise from Ensham Mine and the future Wilton Coal project has been reviewed. The combined noise levels from both mines are predicted to comply with the Project criteria at sensitive receptors most affected by contributions from both mines. The future Fairhill Coal project has also been addressed, and there is a very low likelihood of cumulative impacts based on predicted noise levels and the large separation distance. Other operational mines are a significant distance from sensitive receptors affected by Ensham Mine, and there is a very low likelihood of cumulative impacts during the day and night on sensitive receptors as a result of the Project due to the large separation distance.

As the Project is an extension of the existing underground operations, current noise mitigation measures employed at Ensham Mine are considered appropriate for managing noise levels for the Project.

## ES.19 Waste

The Project will continue to generate waste streams at annual rates similar to the current operation. Waste generation will extend for up to nine years due to the extended life of mine.

The existing Waste Minimisation and Management Plan will be used to manage and minimise Project waste. The plan details waste management control strategies for segregation, storage, transport, monitoring and emergency response planning. Waste will continue to be disposed of at an authorised waste disposal site or recycling facility by an appropriately licensed contractor.

The estimated volume of waste rock from the proposed Project over the life of the mine is estimated to be around 225,000 m<sup>3</sup> in total which is approximately 0.6 per cent of total waste rock volumes (36 million m<sup>3</sup>) currently approved for the rehabilitation of Pit C and Pit D. At less than 1 per cent of total approved rock volume for Pit C and Pit D, it is not expected that additional waste rock will impact the approved final landform outcomes in Appendix 3 of the current Environmental Authority including final void water heights. Cumulative impacts associated with waste production are considered to be minor due to implementation of a responsible, proven waste management approach.

## ES.20 Hazards and safety

The Project is an extension of existing operations at Ensham Mine, using the bord and pillar methodology, which involves the use of a continuous miner to remove the coal while leaving a series of pillars in situ to support the roof. The continued use of continuous miners, shuttle cars, mobile bolters and feeder breakers will provide sufficient mining capability for the Project. Blasting will not be required for the Project. Mined coal from the Project will be removed by the existing underground conveyor system to the ROM stockpile just beyond the access portal for handling within the surface infrastructure i.e. truck transfer from ROM stockpile to the coal handling plant, product stockpiling and rail loadout.

In accordance with existing practice, dangerous goods and hazardous substances used in operations will be transported to Ensham Mine by road. Product coal will continue to be dispatched from Ensham Mine to Gladstone by rail.

The risk of hazards to people and property associated with activities required for the Project were identified and evaluated. The risk associated with each identified hazard were determined based on the likelihood of the potential consequence occurring and the consequence severity of the hazard and risk, taking into account standard risk treatment measures as well as specific risk treatment measures.

The risk assessment resulted in the following:

- the majority of hazards associated with the activities have a *low to medium* risk level assuming risk treatment measures are implemented and working effectively
- those risks that remain as *high* when risk treatment measures are implemented were due to the potential for a severe injury or fatality, even though the likelihood of an event was assessed as rare or unlikely
- no mitigated *critical* risks were identified.

The extended underground mining activities associated with the Project do not introduce any new hazards to the existing operations or alter the existing operational hazards (other than their locations). Therefore, the Project is not expected to alter the Ensham Mine health and safety risk profile.

## ES.21 Cultural heritage

A review of historical, archaeological and register information indicates that there are least 208 Aboriginal heritage sites within the Project Site. The vast majority are stone artefact concentrations located within 100 m of drainage lines that would not be subject to impacts from underground mining. There are no historical heritage sites within the Project Site. There is limited potential that the Project Site retains evidence of early pastoral activities.

There is however potential for additional unidentified Aboriginal heritage places to be present within the Project Site. Any such unidentified places are most likely to be located on watercourse margins, or near previously identified places, and to consist of artefact scatters associated with small camps. All these sites would be surface finds that again would not be subject to impacts from underground mining.

The identification of any additional sites, or any impacts on known surface sites, will be managed under the existing CHMPs for the Ensham Mine (CLH000419) for Zone 2 and Zone 3, and in accordance with the Ensham JV's obligations under the ACHA for Zone 1. Any potential impacts to unidentified heritage places will be managed under a chance finds procedure and inductions for staff and contractors.

With the implementation of these measures outlined, it is anticipated that any residual impacts to cultural heritage will be minimal.

## ES.22 Social

A Social Impact Assessment (SIA) has been undertaken for the Project in accordance with the *Strong and Sustainable Resource Communities Act 2018* (Qld) and SIA Guideline. In general, stakeholder and community engagement findings were supportive of the Project, with the retention of employment at the mine for a further nine years, and the associated economic and social benefits in general to the surrounding communities, including jobs, training, continuation of local and regional supply opportunities and avoidance of housing impacts. Some concerns were raised around potential impacts on environmental values, including subsidence, water resources and flooding, which are presented and evaluated within this EIS, along with proposed mitigation and management measures.

The Project will support continuation of employment and income security for existing personnel, and the provision of opportunities for others to obtain employment as personnel retire or move to other jobs. An estimated 207 Project personnel would live locally, primarily based in Emerald. Drive in, drive out personnel would reside at the existing Ensham accommodation village on site.

In supporting maintenance of the Central Highlands LGA's population, the Project will support the maintenance of social networks within local communities, and the Project workplace provides a key avenue for workers to engage and support each other, so a positive effect on the maintenance of community cohesion and resilience is likely. The Project will continue Ensham Mine's Community Donations and Sponsorship program, which has supported a wide range of community groups and services.

The SIA did not identify any potential for negative impacts on the health and well-being impacts of local communities, nor on the level of service provided to the local community by existing social services, facilities and infrastructure.

The Project seeks to protect social values in the Project Site and extend the economic benefits that the existing Ensham Mine operations deliver to the surrounding communities. There are not anticipated to be any adverse social impacts. A Social Impact Management Plan has been developed for the Project and includes a Community and Stakeholder Engagement Plan and management subplans.

## ES.23 Economics

The population of the Central Highlands LGA is projected to increase from 28,783 in 2016 to 30,133 in 2041 at a rate of 0.2 per cent per annum. The working age population (15 years and over) is expected to increase at an even faster rate between 2016 and 2041. In recent years, the labour force in the Central Highlands LGA has decreased as a result of the mining downturn since 2014. The mining and agriculture, forestry and fishing industries are the primary employers within the region, accounting for approximately 35 per cent of total employment.

An assessment has been undertaken to assess the Project's impact to the local, regional, state and national economies. The assessment involved establishing the existing economic environment at a local, regional and state level, and assessing the direct and indirect impacts of the Project to these economies. The assessment is made in terms of output, household income, employment and value added as a result of the Project. A cost benefit analysis was also undertaken to determine the economic robustness of the Project.

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
- positive employment impact of up to 654 FTEs per annum

- value added impact of \$971.9 million or \$54 million per annum.

Overall, the Project is expected to maintain the level of economic activity locally, which otherwise would be lost should the Ensham mine ultimately be closed. This in turn is expected to lead to continued prosperity as incomes, employment and demand for goods and services is retained within the local economy.

## ES.24 Transport

The extension of the underground operation is proposed to be undertaken as part of normal operation and development of the mine, using existing infrastructure. No construction phase will be required for the Project.

The Project will not generate any increase in traffic volumes on the adjacent road network during future operations, and in general, traffic volumes associated with the Ensham Mine will only reduce from the current traffic volumes as the number of operational staff at Ensham Mine decrease during the transition from open cut mining activities to rehabilitation works.

As the Project will not increase traffic volumes, it will have no impact on the operation of the relevant sections of both the state-controlled (Capricorn Highway) and CHRC controlled (Duckponds Road) road networks. Therefore, the existing access facilities for Ensham Mine, via the gated access on Duckponds Road, will be suitable to cater 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).

There is no foreseeable change to production rates so there should be no impacts on either the Aurizon managed Central Queensland Coal Network (the Blackwater System) or the Port of Gladstone operation. All bulk carrier vessels are contractually required to meet all performance and vetting requirements published by Gladstone Ports Corporation in alignment with MSQ, AMSA and IMO prescribed code and legislation.

Therefore, the Project will have no impact on the traffic operation of the surrounding road network and is unlikely to result in any further traffic related impacts beyond current operations at Ensham Mine.

## ES.25 Scenic amenity and lighting

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

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

The small settlement of Comet lies nearly 18 km away and the study area is sparsely settled comprising isolated clusters of rural farmsteads. The main road in the vicinity of the Project Site is the Capricorn Highway, located approximately 8 km from the nearest proposed underground mine expansion area. Other smaller roads include Duckponds Road, Wyuna Road, Ensham Road and Bauhinias Road. These roads service the mine and the small number of rural farmsteads located around the Project Site. There are few other roads in the local area, most of these being local and private drives to farms. There are very few publicly accessible views

towards the Project Site. No scenic viewpoints or viewpoints from facilities used for recreational purposes were identified. Typically, viewer sensitivity is negligible or low. Nine viewpoints were identified for the purposes of the scenic amenity assessment, all of which were assessed as not being impacted by the Project.

The Project is located underground and will continue to use existing surface infrastructure and lighting with the addition of flaring infrastructure to be located in Zone 2 and Zone 3. Therefore, it is concluded there will be no significant impact to local or more distant views during day or at night. Due to the distance of permanent receptors (such as dwellings) from the flares, no light nuisance impacts are anticipated.

## ES.26 Matters of national environmental significance

The Commonwealth Minister for the Environment determined the Project to be a controlled action under the EPBC Act. The controlling provisions are sections 18 and 18A (listed threatened species and communities) and sections 24D and 24E (a water resource, in relation to coal seam gas development and large coal mining development). The MNES assessment undertaken for the EIS evaluated the potential impacts associated with the Project on water resources and threatened species and communities.

The Project does not require significant alteration to water resources. Assessments undertaken for the Project indicate that impacts are unlikely to significantly change from those associated with current operations. Accordingly, there are no predicted significant impacts to water resources, including MNES threatened species and GDEs, in the Project Site and surrounds.

The Project will result in a groundwater drawdown in the target coal seam. This impact cannot be mitigated. Modelling for the groundwater level recovery showed that there is a residual permanent reduction in the groundwater pressure in the confined coal seam aquifer. This residual impact is not expected to have a significant residual impact on MNES and the residual voids of the open cut operation will continue to act as a sink in perpetuity in accordance with the existing EA.

The significant impact assessments undertaken in accordance with the EPBC Act Significant Impact Guidelines Policy Statement 1.1 identified that the Project is unlikely to have a significant impact on the threatened species and ecological communities and offsets under the EPBC Act are not proposed.

## ES.27 References

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