

SARAJI EAST MINING LEASE PROJECT

Environmental Impact Statement

Chapter 22 Cumulative Impacts

BHP

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Saraji East Mining Lease Project

22 Cumulative impacts

22.1 Introduction

This section describes the potential impacts of the Project that are cumulative, both in combination with relevant aspects of the Project and in combination with other Projects and operations. Details of the assessments undertaken for the Environmental Impact Statement (EIS) are discussed in each of the relevant chapters.

22.2 Methodology

The objective of the cumulative impact assessment was to assess the potential for impacts from the Project to have compounding or synergistic interactions with similar impacts from other projects, including projects proposed, under development or already in operation within an envisaged sphere of influence of the Project. The sphere of influence varies based on each biophysical and social aspect considered in this EIS.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system.

There are three separate levels at which cumulative impacts may be relevant: Project Site localised cumulative impacts; regional cumulative impacts; and global cumulative impacts.

- **Project Site localised cumulative impacts** - these are the cumulative impacts that result from mining operations in the immediate vicinity of the Project Site. Project Site localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receptors. These include dust deposition, noise and vibration, groundwater drawdown, groundwater and surface water quality, and transport.
- **Regional cumulative impacts** - regional cumulative impacts include the Project's contribution to impacts that are caused by mining operations throughout the Bowen Basin region. Each coal mining operation in itself may not represent a substantial impact, however the cumulative effect on habitat value, water quality, and the socio-economics of a region may warrant further consideration.
- **Global cumulative impacts** - the only impact from the Project that is potentially global is greenhouse gas (GHG) emissions. However, the level of emissions from the Project represents a very minor contribution at this scale.

The cumulative impact assessment (outlined in Section 22.4) focused on the localised cumulative impacts (Project Site) and the regional cumulative impacts (regional context), taking into consideration other developments (ie nearby mines), where relevant.

To establish the potential for the Project to contribute to cumulative impacts, publicly available information on proposed developments in the area has been reviewed. Where appropriate, baseline assessments undertaken as part of the EIS have also informed the contribution of existing developments and operations within the region. Together this information provides a basis for understanding the cumulative impact of all projects and developments to assess the significance of the Project's contribution on the receiving biophysical and social environment.

As the mechanisms for cumulative impact vary between each of the biophysical and social aspects considered, the methodology for assessing cumulative impacts necessarily varies. The specific methodology for each assessment is described further in the relevant sub sections of Section 22.4.

22.3 Relevant projects

To establish the potential cumulative impacts associated with the Project, consideration is made to other nearby projects and operations. Relevant projects that have been considered include:

- Projects within the anticipated sphere of influence of the Project, listed on the Department of State Development, Tourism and Innovation (DSDTI) that are undergoing assessment under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an EIS is required.
- Projects within the envisaged sphere of influence of the Project, listed on the website of the Department of Environment and Science (DES) that are undergoing assessment under the *Environmental Protection Act 1994* (EP Act) for which an EIS is required.
- Existing resource operations located within the Bowen Basin.

The consideration of projects relevant to the cumulative impact assessment has generally been limited to resource projects within the vicinity of the Project. Given the scale of the Project, development applications in accordance with the *Planning Act 2016*, such as those for residential housing development are not considered to be likely to contribute to cumulative impacts with the Project.

The development projects which have been considered in this assessment are provided in Table 22.1 and Figure 22-1. There are a number of existing resource projects nearby the Project, as shown in Figure 22-2. A discussion on potential cumulative impacts with existing projects is provided, where relevant, in Section 22.4.1 to 22.4.11.

In most cases, impacts of existing developments such as operational mining activities have already been accounted for in terms of baseline data collection. For example, the conservation status of flora, fauna and vegetation communities is based on known extents of habitats or populations and hence, takes into account clearing that has occurred to date. For social and economic issues, assessment of impacts is based on potential changes when compared to current baseline conditions, which have already been influenced by existing developments and operations.

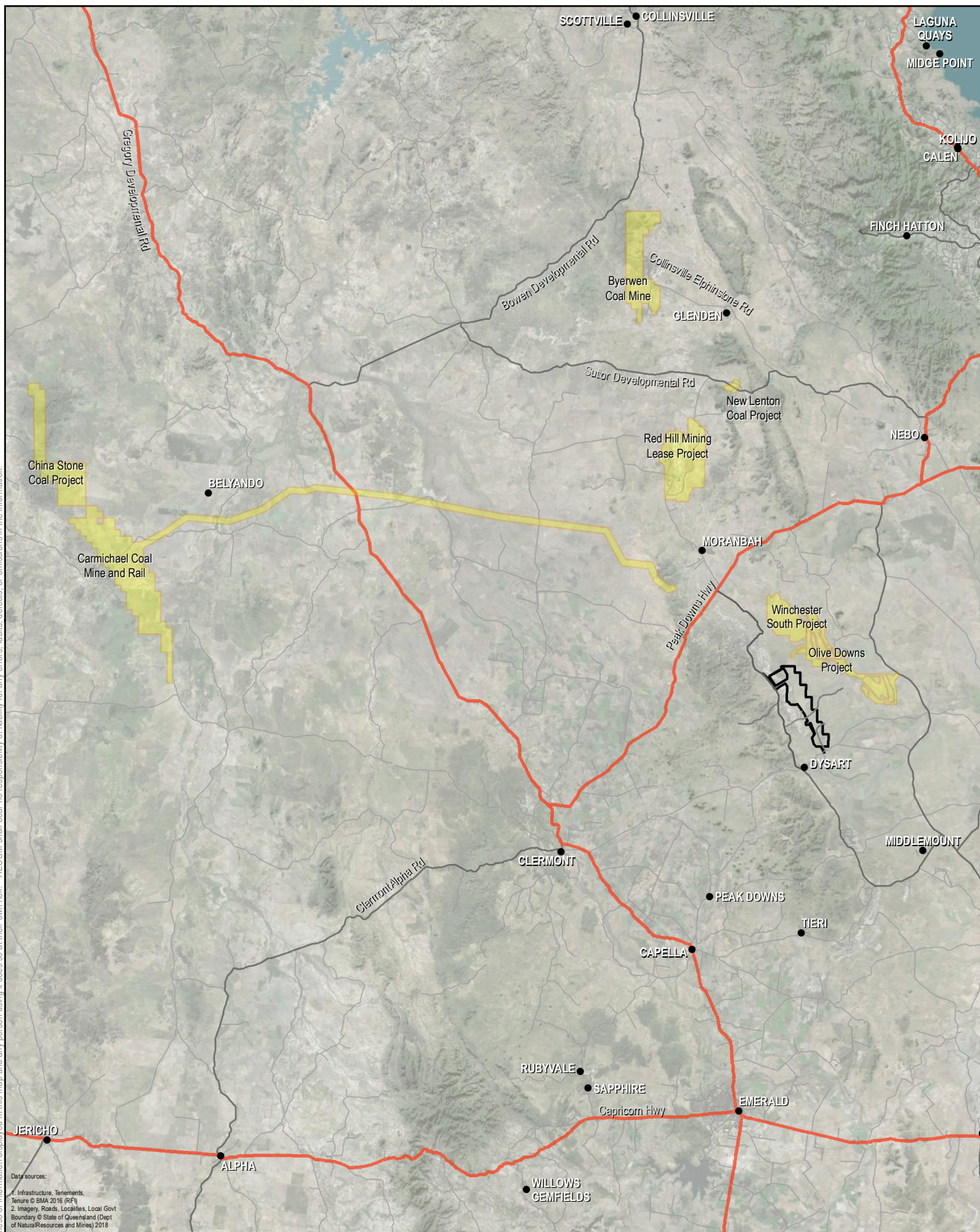
Contribution of existing activities to impacts is, therefore, already accounted for in the impact assessment and is only summarised in this chapter.

Table 22.1 Projects in development which are relevant to the cumulative impact assessment

Project	Description	Status	Location
Red Hill Mining Lease Project	A new underground coking coal mine (Red Hill Mine) with a yield of 14 million tonnes per annum (Mtpa); and expansion of two existing coking coal mines (Broadmeadow and Goonyella Riverside).	EIS approved with conditions June 2015 (SDPWO Act). EIS assumed development from 2020.	20 kilometres (km) from Moranbah.
China Stone Coal Project	Large scale, greenfield coal mine with a yield of up to 38 Mtpa of thermal coal.	EIS approved with conditions November 2018 (SDPWO Act). Execution status unknown.	Approximately 300 km west of Mackay.
Olive Downs Project	Greenfield metallurgical coal mine with a yield of	EIS approved with conditions May 2019	Approximately 40 km south-east of Moranbah

Project	Description	Status	Location
	up to 15 Mtpa of product coal for steel production.	(SDPWO Act). Construction 2019-2021, operation from 2020.	and 40 km north of Dysart.
New Lenton Coal Project	Open cut mine with a yield of up to 8 Mtpa.	EIS process was suspended under section 67 of the EP Act.	Approximately 65 km north-west of Nebo, 65 km north of Moranbah, and 20 km south of Glenden.
Carmichael Coal Mine and Rail Project	Open-cut and underground coal mine with a yield of 60 Mtpa and a 189-kilometre railway line.	EIS approved with conditions May 2014 (SDPWO Act). Early works commenced October 2017.	Approximately 160 km north-west of Clermont.
Byerwen Coal Project	Open-cut coal mine with a yield of up to 10 Mtpa.	EIS approved with conditions July 2014 (SDPWO Act). Early works commenced 2017.	20 km west of Glenden.
Winchester South Project	Greenfield metallurgical coal mine with a yield of up to 8 Mtpa product coal for approximately 30 years, for steel production.	Draft EIS being prepared. Construction from 2021, operation from 2022-2023.	30 km south-east of Moranbah.

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LEGEND

- Project Site
- Locality
- Development Projects
- Highway
- Major Road
- Other Road



Figure 22-1
Development Projects

Environmental Impact Statement
Saraji East Mining Lease Project

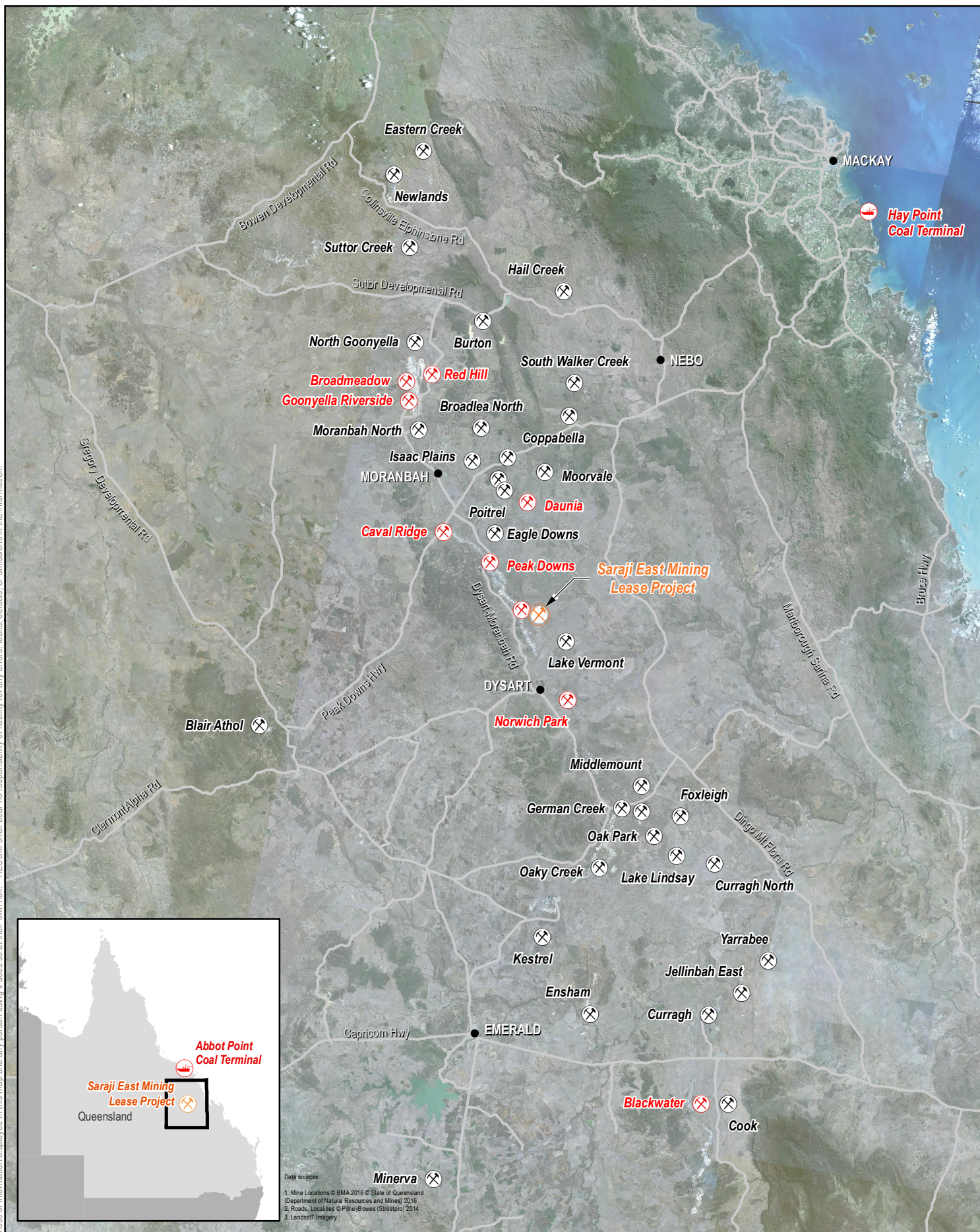
0 5 10 20
Kilometres

Scale: 1:1,500,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

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- LEGEND**
- Saraji East Mining Lease Project
 - Locality
 - Major Road
 - BMA Coal Terminal
 - BMA Mine
 - Other Mine

Figure 22-2
Nearby Resource Projects

Environmental Impact Statement
Saraji East Mining Lease Project

0 5 10 20
Kilometres

Scale: 1:1,500,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

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22.4 Cumulative assessment

22.4.1 Terrestrial ecology

The assessment of terrestrial ecology impacts is detailed in **Chapter 6 Terrestrial Ecology**. The assessment took into consideration the ecological values within and surrounding the Project site to identify the scale of the impacts and the cumulative impacts of mining within the region.

The majority of the fauna habitat within the Project Site is generally of low conservation value, however some habitats, such as the riparian zones and alluvial woodland (which act as a wildlife corridor), the oxbow wetland and the *Acacia harpophylla* (brigalow) woodland with gilgai, possess greater potential for supporting conservation significant fauna.

The Project Site supports some remnant vegetation protected under State and Commonwealth legislation.

Two threatened ecological communities (TECs) were identified as occurring within the Project Site:

- Brigalow (*Acacia harpophylla* dominant and codominant) – endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin – endangered under the EPBC Act.

The vast majority of the habitat proposed to be disturbed is non-remnant vegetation and is currently grazed.

Approximately 1,261 hectares (ha) of remnant vegetation communities and 1 ha of high value regrowth (HVR) vegetation may be impacted by the Project. This includes the indirect disturbance of remnant vegetation associated with subsidence from underground mining operations. Approximately 252 ha of the brigalow TEC will be impacted by the Project. The natural grassland TEC, which is also of concern regional ecosystem (RE), will not require direct clearing, however a powerline easement will run directly adjacent to the TEC and powerlines may span above this vegetation community. These are considered the worst-case scenario due to the variable nature of subsidence.

Where possible, infrastructure has been rearranged during the Project's planning stage to mitigate disturbance to vegetation. Rehabilitation of the Project Site will seek to incorporate native tree, shrub and grass species where appropriate.

Disturbance to key biodiversity values including TECs, and endangered and of concern REs will be avoided and managed, wherever possible. Where impacts to this significant remnant vegetation cannot be avoided, offsets are proposed in accordance with the *Queensland Environmental Offsets Framework*.

The key mechanism in place for addressing cumulative impacts on native vegetation and habitat is the requirement for provision of offsets. As part of the Project, offset areas will be established and managed to compensate for ecosystems and habitat impacted by the Project. These areas will be managed to control pest species and fire, ensuring that significant ecosystems and habitat values for significant species are retained and enhanced within the local area.

Given the mitigation measures proposed for the Project (**Chapter 6 Terrestrial Ecology**), including the establishment of offsets where required, there is no potential for significant regional cumulative impacts on ecology.

22.4.2 Aquatic ecology

The watercourses within and surrounding the Project Site are Plumtree, Boomerang, Hughes, One Mile and Phillips Creeks. These watercourses are highly ephemeral, and aquatic habitat is dominated by small isolated pools within the channel, interspersed with large areas of dry stream bed, with larger pools typically found in artificial waterbodies. Larger pools are likely to be perennial or near-perennial and are considered important refugial habitat for aquatic fauna. Smaller shallower pools provide aquatic habitat for briefer periods after rainfall.

Riparian vegetation within the Project Site was identified as being disturbed to highly disturbed at all survey sites, with sparse to low cover of native Eucalyptus trees comprising the canopy at natural watercourse sites. Pasture grasses dominated the ground stratum.

All aquatic species recorded from watercourses in and surrounding the Project Site are tolerant of ephemeral flow and variable water quality, and all are common and widespread in the region. No aquatic fauna species of special conservation significance were recorded during current or previous surveys of the Project Site and immediate surrounds.

Cumulatively, the most significant potential for degradation of aquatic ecosystems would likely arise from multiple crossings of streams by linear infrastructure. The design and construction watercourse crossings by linear infrastructure (e.g. pipes for water supply), will ensure that fish passage is maintained throughout these watercourses. Where practical, crossings of watercourses will be constructed in the dry season and crossing locations will preferentially be selected in areas where the bank gradient is low.

Numerous mining operations are operating in similar ecological areas (ephemeral creeks and drainage paths) within the Isaac River catchment. The Isaac River catchment is mostly covered by either mining leases, mining claims or exploration permits (coal, petroleum and mineral).

The Project is unlikely to cause any significant cumulative impacts to aquatic ecology values as the existing riparian vegetation is highly disturbed, and no conservation significant aquatic species were recorded.

Chapter 7 Aquatic Ecology further discusses the aquatic values surrounding the Project Site.

22.4.3 Surface water resources

Land uses surrounding the Project Site have the potential to contribute to sediment loads and turbidity.

These land uses, and contributing factors, include:

- Existing Saraji Mine operation – open cut mine, exposed soils
- Nearby mine developments:
 - Winchester South Project – open cut metallurgical coal mine, exposed soils
 - Olive Downs Project – open cut metallurgical coal mine, exposed soils
- Agricultural land use – soil disturbance due to livestock and /or tilling
- Construction/development – soil disturbance due to construction and earthworks.

Potential impacts (increased sediment load and salinity) on the water quality of the Isaac River and tributaries occurring on the Project Site will be mitigated through the use of a mine water management system, sediment basins, structures, restrictions to site water discharges, progressive rehabilitation, spill controls, and water quality monitoring. Given the mitigation measures proposed for the Project (**Chapter 8 Surface Water Resources**), and the mining industry standards and regulations for water quality protection, there are not expected to be significant regional cumulative impact on surface water.

The creeks within the Project Site are part of the Isaac River catchment which flows into the Fitzroy River. The total catchment area for all creeks and tributaries upstream and within the Project Site is approximately

590 km². Therefore, the total catchment area represents less than three per cent of the Isaac River catchment and approximately 0.4 per cent of the Fitzroy River catchment (142,665 km²).

The Lower Fitzroy River and Fitzroy Barrage Water Supply Schemes have 28,621 megalitres (ML) and 62,335 ML of allocated water, respectively. The Lower Fitzroy and Fitzroy Barrage Water Supply Schemes are approximately 250 km downstream of the confluence with Isaac River. The total catchment area upstream and within the Project Site is less than 0.0004 per cent of the total catchment area for these water supply schemes. Therefore, the Project is not expected to impact these water supply schemes.

The site water management system for the Project has been designed such that the risk of off-site uncontrolled release of mine affected water during operations is very low and sediment inputs can be controlled through drainage, and erosion and sediment control measures. On this basis, the Project is not expected to make any significant contribution to sediment loads in the Fitzroy River Basin.

22.4.4 Groundwater

A cumulative impact assessment was undertaken to assess the existing approved open-cut mining operations of the Saraji Mine together with the proposed underground mine. The assessment also took into account the approved Grevillea Pit extension of the Saraji Mine (located adjacent to the Project Site).

Predictive groundwater modelling was conducted for the Project to analyse potential cumulative impacts. **Chapter 9 Groundwater** considered the modelled predictions of underground mining impacts which also included simulation of the approved Saraji Mine open-cut operations (including the Grevillea Pit extension).

Predictive simulations (including an evaluation of groundwater level drawdown), the prediction of groundwater ingress and an evaluation of groundwater level recovery was conducted with and without the Project.

Groundwater in the area is limited in both quality and quantity and aquifers are compartmentalised by regional faults. This limits potential for regional-scale drawdown effects and also limits the extent to which existing users may be impacted by cumulative impacts.

Groundwater level drawdown in the Tertiary and Quaternary cover, as well as the target coal seam indicated that the Project would result in extension of drawdown into the underground mining footprint and up to 3 km further towards the east and north when compared to previously approved open-cut mining drawdown predictions.

Groundwater ingress estimates show that the total amount of ingress because of underground mining for the life of open-cut is predicted to be 1,527,725 m³, which is on average 152.77 megalitres per annum (ML/a). Total groundwater ingress resulting from the cumulative open-cut and underground mining over 25 years is estimated to be 3.57 gegalitres (GL). This impact is not considered to be significant due to the absence of privately owned bores in the drawdown areas.

Impacts of the mine dewatering associated with the proposed underground workings, considered in connection with the approved Saraji Mine open-cut operations, are considered low for the following reasons:

- surface water creeks in the area are ephemeral and groundwater levels (more than 17 m below surface) are below the level that would provide baseflow to existing alluvium or to the root zone of plants
- groundwater level drawdown will occur predominantly within the permian coal seams, which are separated from surficial groundwater regimes by aquitards and are not expected to impact surface ecosystems.

Given the limited quality of groundwater, the regional cumulative impact on groundwater is not considered significant. The assessment is supported by a conservative groundwater modelling approach with actual impacts expected to be equal to or lower than predictions.

22.4.5 Land resources

This section of the cumulative impact assessment considers potential impacts on land resources from the Project. The Project's potential impact on land resources is discussed in **Chapter 5 Land Resources**. Land resource cumulative impacts have been measured using the following indicators:

- The dominant current land use and land suitability within the Project site
- The presence of potential strategic cropping land (SCL) associated with the Project
- The agricultural values within and surrounding the Project site
- The contamination status of the Project site.

Prior to mining, the land surrounding the Project Site has been utilised for cattle grazing. During the operation of the mine, existing land uses such as grazing may be able to continue within the proposed mining lease, in areas not directly impacted by the mine and supporting infrastructure.

It has been identified that the proposed post-mining land use of cattle grazing will be suitable to the area and post-subsidence landform. The implementation of the **Subsidence Management Plan (Appendix K-2)** will manage potential impacts arising from subsidence.

The successful rehabilitation objectives of the Project are outlined within **Appendix K-1 Rehabilitation Management Plan**. It is considered unlikely that the Project would have a significant impact on land and soil resources based upon the review of potential impacts, suggested mitigation measures and continual review and management of the Project Site.

22.4.6 Air quality and greenhouse gas

While the Project is not considered likely to generate a significant impact on air quality, cumulative impacts are considered in relation to adjacent mining activities operated by BMA and others. In order to assess the potential for cumulative impacts, publicly available information was used to estimate the mass of air quality particulates released into the local airshed from nearby mines.

The cumulative impact assessment included the following:

- Saraji Mine (existing)
- Lake Vermont Mine
- Peak Downs Mine
- The Project.

Dust emissions are predicted to be minimal relative to existing open-cut mining activities at the adjacent Saraji Mine and, therefore, the Project is not anticipated to have significant impacts on air quality. The Project involves underground mining activities and the potential for dust generation is substantially lower than surrounding open-cut operations.

An Air Quality Assessment was prepared for the Project (refer to **Appendix H-1 Air Quality Technical Report**). The Air Quality Assessment indicated that the Project will be located in an airshed which also includes the BMA owned Saraji Mine, Peak Downs Mine and Norwich Park Mine, in addition to the Lake Vermont Mine which is owned by the Jellinbah Group. The Project's potential impact on air quality is discussed in **Chapter 11 Air Quality and Greenhouse Gas**.

For fugitive PM₁₀ (particulate matter 10 micrometres or less in diameter) emissions, the Air Quality Assessment found that the Project was likely to contribute to less than 0.3 per cent of the total airshed loading, from all four mining operations combined.

Consequently, the Project is considered unlikely to generate a significant cumulative impact on air quality. Opportunities to minimise the release of pollutants during all phases of the Project will be incorporated into an Air Management Plan.

Adoption of a combination of engineering controls, dust suppression measures, rehabilitation of exposed surfaces, operational procedures, and measurement of ambient air quality is expected to result in adequate management of dust emissions from the Project and any potential cumulative impact from these emissions.

The operational phase of the Project is estimated to result in approximately 16.3 million tonnes of carbon dioxide equivalent (Mt CO₂-e) of GHG (Scope 1 and Scope 2) over the 20-year production schedule. This equates to 0.81 Mt CO₂-e on an annual basis. The annual GHG emissions for the Project represent 0.15 per cent of Australia's 2016 GHG emissions.

22.4.7 Noise and vibration

Cumulative noise impacts are assessed by considering the current or permissible noise levels from existing and future approved industry, and the predicted increase with the inclusion of the Project. In this instance, the subjective change in noise level associated with the cumulative increase in noise levels was used as the assessment metric.

The subjective effects outlined in **Chapter 12 Noise and Vibration**, based on the magnitude of change in noise levels, were used to assess the cumulative impacts of noise associated with:

- An increase in road traffic noise on nearby public roads
- An increase in rail traffic noise on the local rail network
- An increase in noise impacts to nearby receptors with regard to existing and future approved noise from other industrial noise sources.

Noise emissions during neutral and worst-case meteorological conditions were modelled for a range of construction and operational scenarios. Based on the results of the noise assessment, noise emissions from the Project during construction and operational phases were forecast to exceed the nominated noise criteria at five receptors.

The overall increase in operational mine noise levels as a result of the Project (when considering noise from the existing Saraji Mine) is predicted to be “clearly perceptible” to “twice as loud” at Saraji Homesteads 2 and 3, “just perceptible” at the Meadowbrook Homestead, and not perceptible to most people at the other receptors.

The increase in noise levels associated with increased road traffic on public roads and rail movement on the local rail network is not predicted to be perceptible to most people, with the exception of Dysart Moranbah Road during the Financial Year (FY) 2023 when the increase is “just perceptible”.

The following co-existence agreements are currently in place, or being actively sought, at the following sensitive receptors:

- Lake Vermont Homestead – BMA owned, when required for mining or subject to mining impacts the homestead will be vacated
- Saraji Homestead 1 – discussions between BMA and the landholder concerning a co-existence agreement have commenced
- Saraji Homestead 2 – co-existence agreement currently in place between BMA and the landholder. When required for mining or subject to mining impacts the homestead will be vacated
- Saraji Homestead 3 – co-existence agreement currently in place between BMA and the landholder. When required for mining or subject to mining impacts the homestead will be vacated

- Meadowbrook Homestead – BMA owned, when required for mining or subject to mining impacts the homestead will be vacated.

Notwithstanding these current or pending agreements with affected landowners, noise management strategies and treatments will be implemented for the Project. These are discussed in **Chapter 12 Noise and Vibration**. With the implementation of these management measures and landowner agreements, it is unlikely that the Project will cause any cumulative noise impacts.

22.4.8 Scenic amenity and lighting

An assessment of the potential impact of the Project on scenic amenity is presented in **Chapter 13 Scenic Amenity and Lighting**. At the regional scale, the infrastructure and landforms proposed for the project are typical of current and previous underground mining in the area. The Project does not involve any additional overburden landforms (consistent with open-cut mining) which are the most significant non-natural visual elements in the overall regional landscape. Where possible, the Project utilises existing services (power, road, rail, water) and thus potential cumulative impacts at a regional scale will be negligible.

The Project occurs in an area with few sensitive visual receptors and generally low landscape sensitivity due to the presence of extensive mining activities in the wider landscape. Much of the Project is underground but associated above-ground mine infrastructure will likely result in localised changes to views during both operation and construction and during both day and night. Affected views will primarily be experienced by travellers on Dysart-Moranbah Road and a small number of rural homesteads. No significant impacts on landscape character, scenic amenity or lighting were identified.

The above ground infrastructure elements associated with the Project will be similar in visual character and scale to the existing infrastructure associated with current mining at the existing Saraji Mine. Consequently, the contribution of the above ground infrastructure to the cumulative impacts of existing mining operations in the vicinity of the site will be very low.

22.4.9 Transport

The assessment of traffic impacts is presented in **Chapter 14 Transport**. The adopted methodology for the traffic assessment, which also addresses cumulative impacts, was centred on establishing a background 'without development' traffic scenario and comparing this with a scenario including the Project generated traffic, i.e. the 'with development' scenario. This process allows for the assessment of the traffic impacts of the Project in terms of access, intersections, link capacity, pavement and road safety.

The assessment shows the Project traffic is anticipated to exceed five per cent of the background traffic volumes. This level of traffic is considered material. However, the assessment concluded that all highway links and intersections are anticipated to operate within capacities and without significant congestion, delay and queuing. Therefore, it is concluded that impact to efficiency and operation of the road network is minimal. Mitigation measures based on operation efficiency are not warranted.

However, based on road safety, the following mitigation measures are proposed to address the issues identified in this assessment:

- upgrade Lake Vermont Road for approximately 11km from Dysart-Moranbah Road
- provide intersection lighting at Intersection 1 (Lake Vermont Road / Dysart-Moranbah Road)
- construct proposed Intersection A on Dysart-Moranbah Road
- provide intersection lighting at Intersection 3 (Peak Downs Mine Access / Peak Downs Mine Road / Dysart-Moranbah Road).

Figure 22-3 illustrates the key intersections expected to be utilised by Project traffic and the proposed upgrades to mitigate potential traffic impacts. These mitigation measures are further described in **Chapter 14 Transport**.

The investments committed by the Department of Transport and Main Roads (DTMR) and listed in the Queensland Transport and Roads Investment Program (QTRIP) 2017-18 to 2020-21 (The State of Queensland (Department of Transport and Main Roads), 2017c) were taken into account in developing the mitigation measures proposed.

The upgrades are considered necessary and implementation would contribute to maintaining the long-term safety of road users.

The adjacent road network, particularly the Peak Downs Highway and Moranbah Access Road, are expected to experience significant traffic growth due to other industrial activities planned for the vicinity.

22.4.10 Social

The assessment of social impacts is presented in **Chapter 17 Social**. Cumulative social impacts are the incremental and combined impacts – positive, negative or both – of multiple projects. Cumulative impacts may occur at the local level and/or at the regional level.

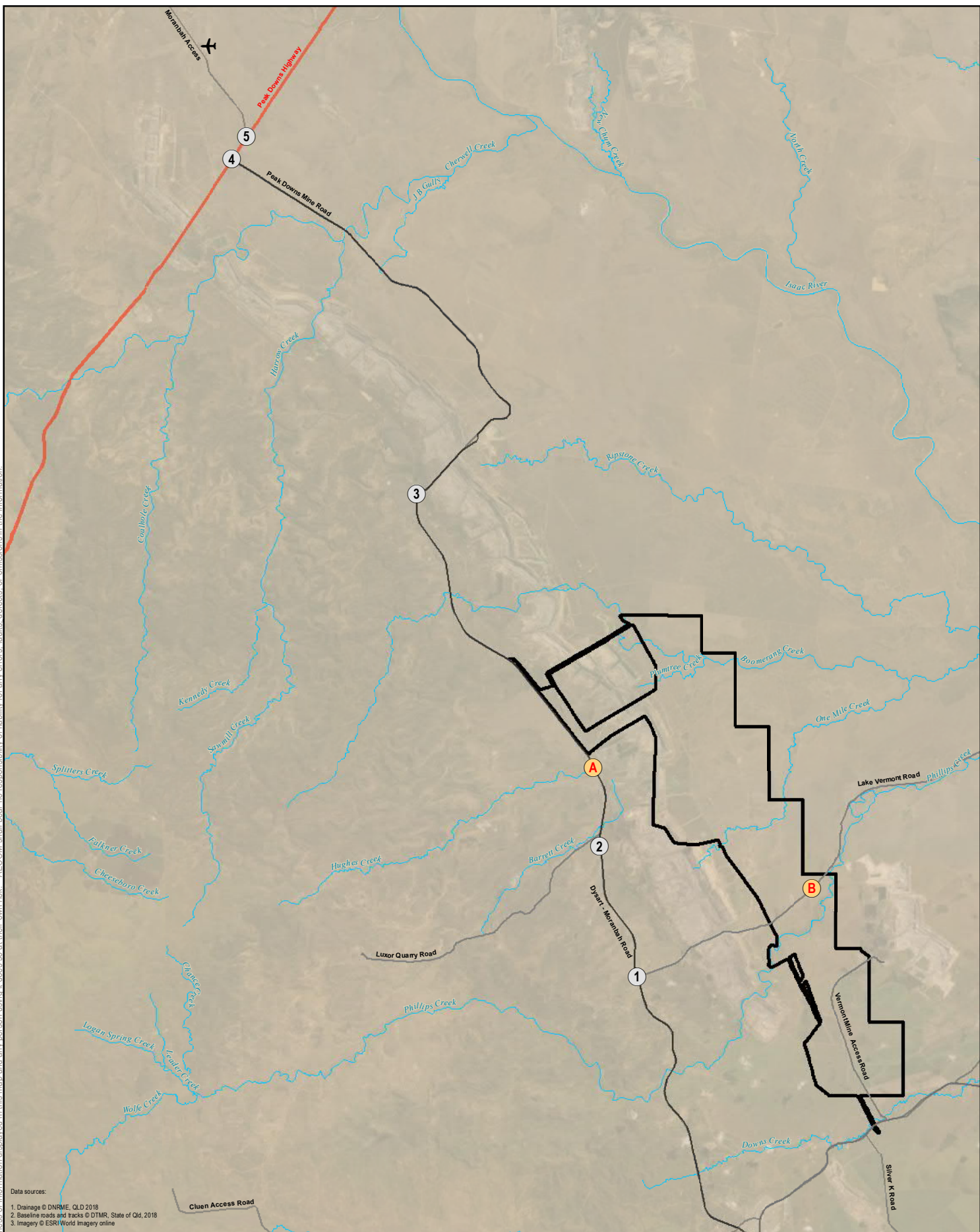
While the Project will bring with it a number of direct impacts (both positive and negative) in isolation it is unlikely to have significant impact on the local or regional communities. However, when combined with other growth projects and the expansion of mining operations by other proponents and the general increase in focus on the mining industry in general, the impacts become more significant.

Currently proposed developments in the Isaac Local Government Area (LGA) are outlined in Table 22.1.

The potential for cumulative social impacts (both positive and negative) during the Project's construction phase includes:

- changes to perceptions of safety or access to services resulting from an increase in non-resident workers
- safety issues associated with increased traffic volumes
- increased temporary demand on health and emergency services
- creation of additional direct and indirect local and regional employment
- contribution to regional skills shortages and labour market drain into the mining industry
- sustained and enhanced opportunities for service industries and businesses in the Local Government Area (LGA).

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LEGEND

- Moranbah Airport
- Highway
- Watercourse
- Major Road
- Project Site
- Other Road
- Existing Intersection
- Proposed intersection



Figure 22-3
Road Network Study Area

Environmental Impact Statement
Saraji East Mining Lease Project

0 1 2 4
Kilometres

Scale: 1:250,000 (when printed at A4)

Projection: Map Grid of Australia - Zone 55 (GDA94)

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The potential for social impacts to occur during the Project's operational phase include:

- contributions to an increased population growth rate in Isaac LGA
- health and safety issues associated with increased traffic volumes
- increased workforce accommodation requirements affecting local housing affordability in Dysart, Moranbah, Middledmount and other communities
- increased permanent demand on social infrastructure, including mental health, general health and emergency services
- continued provision of educational and training opportunities
- sustained opportunities for service industries and businesses in the LGA
- enhanced economic development opportunities across the Bowen Basin.

All cumulative impacts are likely to be significant, but their likelihood is unknown.

Prior to the Project's construction, BMA will reassess the potential for cumulative impacts and its local and regional implications, to inform further engagement with the DSDMIP, Isaac Regional Council (IRC) and other proponents.

The magnitude and timing of cumulative impacts of the Project are uncertain at this stage, however, it is anticipated that more than one major project will be constructed within a similar time frame. As the Project is likely to strain social infrastructure (particularly health and emergency services), it may affect perceptions of community safety, traffic safety or access to services. If there is insufficient capacity to accommodate non-local personnel, housing impacts are likely.

Cumulative demands on Council infrastructure, community services, health and emergency services, schools, childcare and recreational infrastructure are likely as a result of multiple new coal mining projects commencing operation in the Isaac LGA. Significant demands on local housing stocks are possible, with potential for rent inflation and displacement of local residents and key workers.

Chapter 17 Social identifies that the Social Impact Assessment (SIA) includes a Social Impact Management Plan (SIMP) which details how BHP will work with local and regional stakeholders to mitigate social impacts and maximise opportunities identified in relation to the Project. This SIMP includes five Management Plans for:

- Community and Stakeholder Engagement
- Workforce Management
- Housing and Accommodation
- Health and Community Wellbeing
- Local Business and Industry Content.

Each Management Plan articulates:

- the overall purpose of the management plan, including social impacts and opportunities to be addressed
- the desired outcomes of the management plan, to help monitor effectiveness
- the measures designed to mitigate social impacts and enhance opportunities identified during SIA
- an action plan, providing a practical basis for implementing each measure.

A monitoring program is also provided, including outcomes sought, how management of the impacts will be monitored and reported, and the timing and frequency of monitoring. Revisions of the SIMP will account for nearby development projects and their potential impact on stakeholders.

22.4.11 Economics

The economic assessment is presented in **Chapter 18 Economics** and undertook two separate types of assessments:

- regional impact analysis, which is used to describe the size and nature of the effects on local, regional and state economies
- cost benefit analysis, which is used to identify the costs and benefits of the Project.

Additionally, assessment review of the economic baseline of the local and regional economy was undertaken.

In terms of cumulative economic impacts, the Project contributes to Queensland's most important export commodity. In the financial year ending 2017, coal contributed \$3.4 billion in royalties to the Queensland Government.

Assuming Queensland coal mining royalty rates remain unchanged, the Project is expected to yield royalties of approximately \$1.2 - \$1.3 billion over the 20-year production schedule.

An initial capital investment of approximately \$1.3 billion will be required to bring the Project to full production. Operational expenditure is estimated at \$5.98 billion over the 20-year production schedule. The contribution to State royalties coupled with the direct and indirect employment opportunities and associated spending, highlights the value of the Project to Queensland.

The coal industry in the Isaac LGA employs 37.7 per cent of the total workforce. At full production, the Project will directly employ approximately 1,000 people, with many more employed indirectly as a result of flow-on opportunities.

The Project's high quality hard coking coal is attractive to overseas buyers. The Project forms part of a growth strategy designed to strategically service the expanding demands of India, China and other international metallurgical coal markets.

The cumulative economic impacts of the Project include increased export income, royalties and employment, generating wealth within Queensland and Australia that significantly benefits the wider community. An assessment of economic impacts of the Project is presented in **Chapter 18 Economics**.