Winchester South project

Coordinator-General's evaluation report on the environmental impact statement

November 2023

COORDINATOR-GENERAL

Queensland Government

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Acknowledgement of Country

The department acknowledges the First Nations peoples in Queensland: Aboriginal and Torres Strait Islander peoples and their connections to the lands, winds and waters we now all share. We pay our respect to Elders, past, present and emerging. We also acknowledge the continuous living culture of First Nations Queenslanders – their diverse languages, customs and traditions, knowledges and systems. We acknowledge the deep relationship, connection and responsibility to land, sea, sky and Country as an integral element of First Nations identity and culture.

The Country is sacred. Everything on the land has meaning and all people are one with it. We acknowledge First Nations peoples' sacred connection as central to culture and being. We acknowledge the stories, traditions and living cultures of First Nations peoples and commit to shaping our state's future together. The department recognises the contribution of First Nations peoples and communities to the State of Queensland and how this continues to enrich our society more broadly.

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Synopsis

This report provides my evaluation of the environmental impact statement (EIS) for the Winchester South project (the project). This evaluation has been prepared pursuant to section 34D of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act).

This report includes an evaluation of matters of national environmental significance (MNES) and recommended conditions to the Australian Minister for the Environment and Water (the Australian Minister for the Environment) to inform a subsequent decision under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The evaluation of matters under the EPBC Act in this report is consistent with the Queensland Assessment Bilateral Agreement between the State of Queensland and the Australian Government (Bilateral Agreement).

In undertaking the evaluation, I have considered the draft EIS, the revised draft EIS, submissions made during public consultation on the draft and revised draft EIS's, and advice I have received from relevant Australian, state and local government agencies.

It is not intended to record in this report all the matters that were identified and subsequently addressed during the evaluation. Rather, it concentrates on the substantive issues identified during the EIS process and the measures and conditions required to address the impacts. The report:

- summarises the key issues associated with the potential impacts of the project on the natural, physical, social and economic environments at the local, regional, state and national levels
- presents an evaluation of the project, based on information contained in the EIS (including the draft and revised draft EIS), submissions made on the EIS during public and advisory agency consultation periods, and information and advice from advisory agencies and the proponent
- states and recommends conditions under which the project may proceed
- makes general recommendations
- documents the proponent's commitments.

Project description and rationale

Whitehaven WS Pty Ltd, a wholly owned subsidiary of Whitehaven Coal Limited, proposes to develop an open cut metallurgical and thermal coal mine and associated infrastructure in the Bowen Basin. The Bowen Basin has Australia's largest coal deposits and is one of the nation's largest coal producing area. The project is proposed within the Isaac Regional Council local government area (LGA), approximately 30 kilometres (km) south-east of Moranbah, Queensland.

The project would include the:

- development of an open cut coal mine which would produce up to 17 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal and 11 Mtpa of product coal for up to 28 years
- construction of an access road from the Eagle Downs Mines Access Road, off the Peak Downs Mine Road to the mine infrastructure area (MIA)
- construction of an 8 km rail spur and loop connecting to the Norwich Park Branch Railway
- train load-out facility, including product coal stockpiles for rail transport

- construction of a 132 kilovolts (kV) electricity transmission line (ETL) from Powerlink's existing Eagle Downs substation to the project and an onsite 132 kV/22 kV electricity switching/substation
- installation of approximately 13 km raw water supply pipeline connecting the project to the existing Eungella pipeline network
- connection to the existing high speed telecommunications network
- construction of a MIA including offices, onsite coal handling and preparation plant (CHPP) and workshops
- construction of ancillary infrastructure including explosives storage facilities, consumable storage areas, potable water supply, sewage treatment facilities, site communications, remote crib huts and security.

The proposed production mining lease applications (MLA) for the project include mining lease areas 700049, 700050 and 700051. The infrastructure MLA 700065 is proposed to contain the ETL, raw water supply pipeline and access road, and would transect the neighbouring Eagle Downs Mine (ML 70389 held by South32 Eagle Downs Pty Ltd). The project proposes to connect to established water, electricity, rail and road networks and co-locate infrastructure to minimise potential environment impacts.

The project is adjacent to the approved and partially constructed Eagle Downs Mine (project currently on hold) and the Olive Downs Mine (project recently commenced operations). Other mines operating in proximity to the project include the Peak Downs Mine, Daunia Mine, Poitrel Mine, Saraji Mine, Millennium Mine, Moranbah South Mine, Isaac Downs Mine, Isaac Plains East Mine, Caval Ridge Mine, Carborough Downs Mine, Moorvale Mine and Lake Vermont Mine. In June 2022, there were 46 coal mines, 2 metalliferous mines and coal seam gas and conventional gas operations within the Bowen Basin.

The project's MLAs are approximately 11,239 hectares (ha), with approximately 6,950 ha proposed to be disturbed by mining activities. Approximately 90% of the project area has historically been cleared or disturbed for cattle grazing and agriculture.

The mine would produce up to approximately 11 Mtpa of product coal for up to 28 years. Two types of coal would be produced by the project: metallurgical coal (approximately 58%) and thermal coal (approximately 42%). The coal resource would be mined by conventional truck and shovel mining methods, with product coal intended to be transported by rail to the ports of Hay Point or Gladstone for export to Japan, South Korea, India, Vietnam, Taiwan and China.

The *Queensland Resources Industry Development Plan* (QRIDP)[1] sets out a 30 year vision for Queensland's resources industry to be a resilient, responsible and a sustainable resources industry that grows as it transforms. The global market for metallurgical coal is predicted to be stronger for longer than thermal coal. The global demand for thermal coal is expected to decline as countries choose alternative energy generation solutions to reduce emissions. However, the QRIDP outlines that reduced demand in developed economies for thermal coal is predicted to be offset by increased demand from the fast-developing Indo-Pacific region, which could create pockets of future growth for Queensland. The high quality of Queensland thermal coal, which generates fewer greenhouse gas emissions per megawatt hour of electricity compared to lower calorific value coal, means Queensland is well placed to respond to these opportunities.

The proponent anticipates there would be a contraction in the number of operating coal mines in the world, as less efficient, higher-cost and higher-emission coal mines begin to close as global demand for

[1] Queensland Government, Department of Resources, *Queensland Resources Industry Development Plan*, June 2022.

coal falls. The proponent anticipates the project would supply high quality metallurgical and thermal coal under International Energy Agency's (IEA) Sustainable Development Scenario.

The proponent estimates capital expenditure for the project would be $1 billion with up to 500 full time equivalent (FTE) jobs created during the 2 year construction period and up to 500 FTE jobs during operation.

Construction activities would commence as soon as relevant approvals including the environmental authority (EA) and mining lease tenement are granted.

The following provides an overview of the main issues arising from my evaluation.

Land use and rehabilitation

Current land use

The proposed project is within the Bowen Basin, one of the nation's largest coal producing areas. Land within the project area is predominately currently used for cattle grazing, with approximately 90% of the project area historically cleared or disturbed for cattle grazing and agriculture. The Winchester Quarry is operating in the northern part of the project area and remnant vegetation exists near the Isaac River.

I have considered the potential impacts of the project on surrounding land uses, potential sterilisation of coal resources and impacts on current agricultural, quarrying, coal and petroleum activities. The proponent has consulted with the owners of the affected quarry, coal and petroleum exploration and production tenure holders to resolve overlapping tenure issues. The proponent has consulted with Eagle Downs Coal Management Pty Ltd, manager of the Eagle Downs Mine, regarding the location of the project's infrastructure corridor to minimise disturbance and sterilisation of a coal resource. I am satisfied that these impacts would be appropriately managed.

Progressive rehabilitation and final land use

Mining activities would progressively disturb approximately 6,950 ha of land over the project's 31 year life. Mining would progress in 4 broad operational stages across 28 years. In accordance with the progressive rehabilitation and closure plan (PRCP) requirements under the *Environmental Protection Act 1994* (EP Act), the proponent must progressively rehabilitate mined land so it is safe, stable, does not cause environmental harm (non-polluting), and is able to sustain a post-mining land use approved in the project's PRCP.

The *Mineral and Energy Resources (Financial Provisioning) Act 2018* amended the EP Act to introduce requirements for a PRCP, which commenced on 1 November 2019. The transitional provisions in the *Mineral and Energy Resources (Financial Provisioning) Act 2018* apply to the project as the proponent lodged a site-specific application for an EA under the EP Act in June 2019. The transitional provisions mean the project must be assessed against the pre-amended EP Act. The proponent must submit a PRCP to the Department of Environment and Science (DES) for approval after the project's final EA is issued.

The project would create 6 mining pits over the course of mining. The proponent proposed to completely backfill 3 pits by the end of mining and leave 3 residual voids, covering 11% of the project site with a proposed final land use of water storage for agricultural use (stock drinking). The proponent proposed the remainder of the project site would be returned to cattle grazing (approximately 89% of the project site) and 0.02% would be waterways to provide for fish passage. These uses are consistent with the existing land use and approved land use outcomes for mines and coal projects surrounding the project.

In proposing a final land use, the proponent considered alternative mine plan, sequence and backfilling options to minimise residual voids and to ensure a safe, stable and non-polluting final land use. The proponent analysed the feasibility of completely backfilling the 3 residual voids to ground level and determined that the financial cost of backfilling (approximate cost of $178 million in net present value (NPV) terms or $1.7 billion in undiscounted terms) would make the project economically unviable, and potentially cause off-site groundwater impacts.

In balancing the environmental, economic and social effects of the proposed 3 residual voids, I consider the proposed final land use of water storage for agricultural use (stock drinking) for the Main Void to be acceptable. The EIS identified the Main Void is capable of providing a sustainable and reliable supply of water for cattle within the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Primary Industries* (stock water guideline)[2] over the long term. I have stated conditions for the EA requiring the Main Void area to have the final land uses of water storage for agricultural use (stock drinking) for the void water, native ecosystem for the highwalls/end walls, and low intensity grazing for the low walls and ramps.

I also consider the proposed final land use of water storage for agricultural use (stock drinking) of the West Void to be acceptable. The residual void water model outlined in the EIS predicted salinity concentrations of the West Void water would meet the preferred salinity limit for cattle consumption in the stock water guideline for the majority of the time over the modelled 500 year period. I have stated conditions for the EA requiring the West Void area to have the final land uses of water storage for agricultural use (stock drinking) for the void water, native ecosystem for the highwalls/end walls, and low intensity grazing for the low walls and ramps.

I consider the North-West Void is unable to support the proposed final land use. The residual void water model outlined in the EIS predicted salinity concentrations of the North-West Void water would more frequently exceed the preferred salinity limit for cattle consumption in the stock water guideline when the void has low volume, and could have spikes of up to up to 18,000 microsiemens per centimetre (µS/cm) during drier climatic conditions, well above the upper limit of 7,500 µS/cm. The proposal to pump the water within the North-West Void to another location to manage the water quality does not demonstrate the North-West Void can sustain the proposed final land use without abstraction over the long term. I have stated a condition for the EA to require complete backfill of the North-West Pit to support a final land use of low intensity grazing.

I consider the reinstatement of the excised portion of the northern unnamed waterway to provide for fish passage to be an acceptable final land use outcome. I have also required the central unnamed waterway to be reinstated post-mining due to the significance of the waterway to the Wynette offset area and for the Winchester Quarry area to be rehabilitated to a low intensity grazing final land use.

Matters of state environmental significance

Matters of state environmental significance (MSES) are environmental values that are protected under Queensland legislation. MSES potentially impacted by the project include regulated vegetation, connectivity areas, wetlands and watercourses, protected wildlife habitat for flora and fauna species, and waterways providing for fish passage.

The terms of reference (TOR) required the proponent to complete comprehensive desktop analyses and field surveys to confirm the occurrence of MSES, including groundwater dependant ecosystems (GDEs).

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[2] Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3 Primary Industries*, October 2000.

I note that agencies with an interest in biodiversity, including DES and the Department of Agriculture and Fisheries (DAF), generally agreed that the survey effort undertaken by the proponent, along with the provision of on-site inspections for departmental staff, was adequate.

The project design has avoided impacts on MSES values where possible during the initial project planning phase, and further reduced impacts through an optimised project mine plan submitted during the EIS process. This has been achieved by co-locating the mine access road, ETL and water pipeline within a single infrastructure corridor and reducing the surface disturbance extent. Where the avoidance or mitigation of impacts to MSES is not possible, the significant residual impacts (SRI) would require offsets to compensate for the loss, as per the Queensland Environmental Offsets Framework.

There is considerable overlap between MSES and matters of national environmental significance (MNES) relevant to this project. The DES and the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) were consulted during the EIS process in consideration of overlaps between MSES and MNES. Rather than duplicating aspects of this evaluation, overlapping MSES matters are assessed in the MNES section of this report only. This approach is consistent with the Bilateral Agreement and the *Environmental Offsets Act 2014*. A detailed evaluation of MNES, including overlapping MSES, can be found in section 6 of this report.

Regulated vegetation

The EIS determined that the project would result in the direct and unavoidable disturbance of up to 2,002.7 ha of regulated vegetation comprised of the following areas:

- 107.7 ha of ‘endangered’ regional ecosystems (REs)
- 56.3 ha of ‘of concern’ REs (9.6 ha overlap with MNES)
- 4.5 ha of remnant vegetation which occurs within the defined distance of a watercourse (watercourse vegetation) (0.1 ha overlap with MNES)
- 1834.2 ha of essential habitat for the ornamental snake (*Denisonia maculata*) (overlap with MNES).

Overlap between regulated vegetation MSES and MNES exists for areas described under the EPBC Act as habitat for threatened species and REs that are representative of threatened ecological communities (TECs). As such, essential habitat for the ornamental snake (threatened species habitat), the ‘of Concern’ RE 11.3.2 (Poplar Box TEC), and the watercourse vegetation RE 11.4.4 (natural grasslands TEC) are assessed in the MNES section of this report.

After excluding the areas that are assessed under MNES, the EIS concludes that an SRI would be incurred for up to 158.8 ha of regulated vegetation assessed as MSES. Therefore, environmental offsets are required to compensate for these impacts. The EIS demonstrates that native vegetation communities and fauna habitats that will be disturbed by the project all occur extensively in the surrounding landscapes and subregions. Each of the MSES listed above that are predicted to be impacted by the project represents less than 1% of the remnant vegetation for each category within the Northern Bowen Basin and Isaac-Comet Downs biodiversity sub-regions. As such, I consider the impacts to regulated vegetation to be acceptable.

Connectivity areas

A connectivity area is defined as a prescribed regional ecosystem that contains an area of land required for ecosystem functioning. Therefore, all remnant vegetation within the project area is considered to potentially contain connectivity values. Despite there being no well-defined movement corridors across a highly fragmented landscape from historical agricultural clearing, the EIS determined that the project would result in an SRI to 569.3 ha of connectivity areas requiring environmental offsets.

It is acknowledged that the proponent has avoided impacts to 150.6 ha of connectivity areas by reducing the surface disturbance extent in the optimised mine layout and will minimise impacts by undertaking progressive land clearing over the life of the project to allow mobile fauna species the opportunity to disperse away from areas being cleared.

Wetlands and watercourses

The EIS determined that the project would not have any material impacts on wetlands, groundwater dependent ecosystems (GDE), or watercourses in high ecological value waters classified as MSES. The mine layout was designed to avoid direct disturbance to adjacent wetlands, and the project water management system was designed to reduce impacts to the receiving environment. Modelling presented in the EIS predicted that groundwater drawdown would be unlikely to impact potential GDEs, however some uncertainty remains regarding the significance of potential impacts.

I am satisfied that the proposed clean water diversions will facilitate the delivery of surface water flows around the project activities and back into the original alignment of the waterways when exiting the site. This will mitigate downstream impacts on receiving wetland ecosystems by reducing the potential loss of surface flows from the excised waterways.

Nevertheless, a conservative approach to managing impacts will be adopted. I have stated a condition that requires the proponent to undertake a receiving environment monitoring program (REMP) which includes the monitoring of aquatic and riparian ecosystem health for potential impacts to environmental values caused by project activities. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a groundwater dependent ecosystem and wetland management plan (GDEWMP) to detect and manage any potential impacts on GDEs and wetlands associated with the project.

Protected wildlife habitat – protected plants and fauna

A number of flora and fauna species were investigated through extensive desktop analyses and field surveys. Species listed under both the *Nature Conservation Act 1992* (NC Act) and the EPBC Act are assessed at the Australian level and are examined in the MNES section of this report.

A single flora species, *Solanum adenophorum*, was determined to have a SRI due to the project. Surveys identified a 0.2 ha patch containing 3 individual specimens which would require an offset. This species of plant is listed as 'endangered' under the NC Act but is not listed under the EPBC Act and is assessed in the MSES section of this report.

Two species of fauna that are listed under the NC Act and not the EPBC Act were also examined: the 'vulnerable' common death adder (*Acanthophis antarcticus*) and 'special least concern' short-beaked echidna (*Tachyglossus aculeatus*). Suitable habitat for these species occurs across the project area and will be disturbed. The EIS appropriately considered potential impacts to these species, noting that they both have very broad habitat ranges that occur extensively across the local area. I accept the conclusion that there would not be a SRI on either of these species.

Additionally, 16 migratory birds listed under the NC Act as 'special least concern' were also examined as part of the EIS process. Of these, 4 were considered known or likely to occur in the project area. The EIS appropriately considered potential impacts to these 4 species and concluded that SRIs were unlikely to occur.

Waterways providing for fish passage

Three unnamed mapped waterways were identified as potentially providing for fish passage and being impacted by the project. Ground-truthing of the waterways facilitated by the proponent and with the data custodians, DAF, confirmed that portions of 2 of the mapped waterways along with a previously unidentified waterway provide for fish passage. These waterways will be excised for the project and will require environmental offsets.

I have stated conditions for the EA to ensure that clean water diversions direct surface water flows around the disturbance areas and into the lower reaches of the existing waterways exiting the project area. Constructing the clean water diversions in this manner will mitigate impacts to the downstream sections of the waterways that provide for fish passage and reduce potential impacts to receiving ecosystems by minimising the potential loss of surface flows from the excised waterways.

Regardless, a SRI will still occur as a result of the excision of the waterways that provide for fish passage. I acknowledge that the proponent has proposed financial offsets for this SRI and, additionally, has committed to the reinstatement of a portion of the northern unnamed waterway. I have stated a condition for the EA for the proponent to reinstate the excised portion of the northern unnamed waterway to provide for fish passage and to reinstate the central unnamed waterway. As such, I consider that the impacts to waterways that provide for fish passage are acceptable.

Surface water

Surface water resources

The project would impact surface water resources as a result of catchment excision and implementation of the project water management system; however, impacts would be primarily localised, and impacts to regional surface water resources would be limited. The EIS determined that the project's use of raw and potable water from external sources would be managed through an external water supplier, therefore would be unlikely to impact regional water availability.

Localised impacts would include significant (60%) excision of catchments for ephemeral waterways within the MLA which would result in changes to the hydrological regime of the waterways and potential impacts to associated downstream ecosystems, including the Wynette offset area.

The proponent has committed to clean water diversions as part of the project water management system that would direct surface water flows around the disturbance areas and into the lower reaches of the existing waterways exiting the lease area. Constructing the clean water diversions in this manner would reduce, but not prevent impacts to receiving ecosystems by reducing the potential loss of surface flows from the excised waterways.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands that may be impacted by changes to hydrological flows as a result of the project. In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which would require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Based on the project water management system described in the EIS and the implementation of the recommended management plans, I am satisfied that the proponent would adequately manage any significant impacts of the project on environmental values supported by surface water resources.

Surface water quality

The project would impact surface water quality as a result of land disturbance, releases of mine-affected water and other project activities. Potential impacts to environmental values would be mitigated through implementation of the project water management system and any residual impacts are likely to be localised; therefore, impacts to regional surface water quality would be limited.

The project water management system has been designed to contain and separate mine affected water from other water streams and to prevent uncontrolled discharges of mine affected water to the receiving environment. Controlled releases would only occur in accordance with the proposed controlled release strategy and would need to meet the release limits stipulated in the EA.

I have stated a range of conditions for the EA to ensure that acceptable water quality outcomes for the receiving environment are achieved. The conditions include specific water quality objectives, release limits, and trigger levels which would require further investigation and management action if exceeded, as well as requirements for the proponent to prepare a water management plan, an erosion and sediment control plan (ESCP) and a receiving environment monitoring program. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands that may be impacted by changes to surface water quality as a result of the project. As such, I am satisfied that the proponent would adequately manage any significant impacts of the project on environmental values supported by surface water quality.

Groundwater

Groundwater resources

The project would impact groundwater resources as a result of dewatering groundwater inflows to the open cut operations required to access the target coal seams; however, impacts have been predicted to be localised, and would not extend more than 2 km from the mine lease area.

Groundwater modelling in the EIS predicted there would be direct take from groundwater in the sub-artesian regolith and Rangal and Fort Cooper coal measures with an average of 0.42 ML/day (155 ML/year) and a maximum of 0.77 ML/day (280 ML/year) during mining. This would result in groundwater drawdown extending 1.8 km north-west and 1.5 km south-east of the lease boundary, however the EIS didn’t identify any privately owned bores that would be impacted by project-related drawdown.

Groundwater modelling in the EIS predicted there would be no direct take from groundwater in the Isaac River alluvium, and indirect take would be less than 0.01 ML/year, resulting in groundwater drawdown of less than 0.3 m, which was stated to be negligible. The EIS predicted that groundwater drawdown in the Isaac River alluvium would be unlikely to impact potential GDEs, including GDEs in the Wynette offset area, however some uncertainty remains regarding the significance of potential impacts.

Due to the nature of groundwater drawdown being an inherent aspect of mining for the project, there are no mitigation measures proposed to avoid or minimise impacts. Management of drawdown impacts would be primarily through the monitoring of groundwater levels and quality.

I have stated conditions for the EA which require the proponent to develop and implement a groundwater monitoring program prior to the commencement of activities, and to monitor groundwater levels at a frequency which would detect potential drawdown impacts. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which would require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands. As such, I am satisfied that the proponent would adequately manage any significant impacts of the project on environmental values supported by groundwater resources.

Groundwater quality

The project would have the potential to increase the risk of contaminants entering groundwater as a result of seepage from waste rock emplacements or fuel/chemical storage areas, and migration of saline water from residual voids; however, no impacts to groundwater quality were predicted following the implementation of proposed mitigation measures.

The EIS stated that risks to groundwater from waste rock and coal rejects were low due to low potential for acidity and salinity to be generated. In addition, the presence of open cut pits during mining and residual voids after mining would create a hydraulic flow gradient that would draw groundwater toward the pits, and ensure any seepage would not leave the site. The EIS also stated that underlying clay layers would prevent seepage from waste rock emplacements entering the Isaac River alluvium and regolith.

The EIS predicted that there would be no impacts to groundwater from the final landform as the hydraulic gradient for the surrounding groundwater would be toward the residual voids, and this would prevent migration of groundwater off-site and limit impacts to groundwater quality.

I have stated conditions for the EA which require the proponent to develop and implement a groundwater monitoring program prior to the commencement of activities, and to monitor a range of parameters that would detect potential impacts to groundwater quality. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which would require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands. As such, I am satisfied that the proponent would adequately manage any significant impacts of the project on environmental values supported by groundwater quality.

Air quality

Air quality

Four homesteads were identified as sensitive receptors for the project. The EIS found that air quality objectives for particulate matter with a diameter less than 10 micrometres (PM_{10}) specified in the Environmental Protection (Air) Policy 2019 would be exceeded at the Olive Downs Homestead, located 1.4 km north-east of the project. The EIS found the remaining homesteads, located greater than 6.5 km from the project, would be within the objectives with implementation of the proposed mitigation measures.

To mitigate potential air quality impacts at the Olive Downs Homestead, the proponent has executed a non-residency agreement with the owner for the homestead to remain vacant during the life of the project. To ensure limits for air quality objectives are complied with at the remaining 3 homesteads, I have stated conditions for the EA regarding limits, monitoring and management. I require the proponent to undertake continuous monitoring of meteorological conditions and PM_{10}, and monthly dust deposition monitoring at 4 locations to determine air emissions from the project. The monitoring will guide the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with air quality objectives. I also require the monitoring data to be published on the proponent's website in real time.

The EIS modelled air quality impacts at the Eagle Downs Mine and Eagle Downs Exploration Shed, which found air quality objectives for particulate matter with a diameter less than 2.5 micrometres ($PM_{2.5}$) and PM_{10} would be exceeded. As these assets are workplaces, impacts would be regulated by the *Mining and Quarrying Safety and Health Act 1999* and *Coal Mining Safety and Health Act 1999* and subordinate legislation. The proponent has committed to ongoing engagement with Eagle Downs Coal Management Pty Ltd, owner of the Eagle Downs Mine, regarding operational blasting procedures to reduce the potential risk of blast fume impacts (e.g., consideration of prevailing and forecast wind direction prior to blasting in proximity to the Eagle Downs Mine ventilation intakes).

Measures to minimise coal dust emissions associated with the railway operations include profiling the coal in wagons to a "garden bed" shape and spraying a biodegradable sealant on top of the coal to prevent dust generation during transit to port. These mitigation measures would be consistent with Aurizon's *Coal Dust Management Plan*.

The EIS also assessed the potential cumulative air quality impacts from the project and surrounding mines and found that with the implementation of the proposed mitigation measures, the cumulative emissions would not exceed the air quality objectives at sensitive receptors.

Greenhouse gases

The construction, operation and rehabilitation of the project, and combustion of project coal in export countries has the potential to release greenhouse gas emissions (mostly carbon dioxide (CO_2)) into the atmosphere, which would contribute to climate change.

The EIS estimates the project's Scope 1 greenhouse gas emissions would be 15.94 megaton (Mt) of carbon dioxide equivalent (CO_2-e), Scope 2 emissions would be 1.4 Mt of CO_2-e and Scope 3 emissions (emissions caused during the transport and combustion of the project coal) would be 567 Mt of CO_2-e. I have stated a condition for the EA for the proponent to prepare and implement a greenhouse gas abatement plan to avoid and minimise Scope 1 and 2 emissions. The proponent has committed to purchase carbon neutral electricity to abate all estimated Scope 2 emissions associated with the project. Regarding Scope 3 emissions, the proponent proposes to export coal to countries which are signatories to the Paris Agreement and have Nationally Determined Contributions (except for Taiwan which has domestic energy policies consistent with the objectives of the Paris Agreement).

The project's contribution to climate change could result in harm to the Queensland environment, including its people, and has the capacity to limit human rights protected by the *Human Rights Act 2019*. The Coordinator-General must consider whether the decision to prepare a report evaluating the project's EIS, including any conditions and recommendations set by the Coordinator-General to manage the project's potential environmental effects is compatible with human rights.

It was determined that the decision would limit the right to enjoy a person's human rights without discrimination, the right to life, the right to freedom of movement, the right to property, the right to privacy and reputation, the right to protection of children, and the cultural rights of Aboriginal peoples and Torres Strait Islander peoples. The limitation on each right is linked to climate change consequences that may arise from the project. When balancing each human right with the purpose of extracting primarily a metallurgical coal product (approximately 58%) for the production of steel and a secondary thermal coal product (approximately 42%) for electricity generation for export to Japan, South Korea, India, Vietnam, Taiwan and China, the limit is considered reasonable and demonstrably justified.

Transport

An increase in traffic is expected to be generated on state-controlled roads and local roads from vehicles delivering materials to the project site, primarily during the construction phase, and from daily workforce movements between accommodation and the mine site during the construction and operational phases.

Access to the project site during the construction phase would be via the Winchester Access Road while the project's Mine Access Road is being constructed. To accommodate the Mine Access Road, a new intersection with the existing Eagle Downs Mine Access Road is required. The new intersection will be designed and constructed in consultation with Eagle Downs Coal Management Pty Ltd, manager of the Eagle Downs Mine, and Isaac Regional Council, and in accordance with relevant Department of Transport and Main Roads (DTMR) and Austroads guidelines. The intersection will be funded by the proponent.

The EIS determined that additional capacity is not required on the transport network to accommodate the project traffic. However, the additional project traffic, including the use of heavy vehicles, is expected to generate pavement impacts and increase the likelihood of motorists experiencing crashes along the main access route from Moranbah and Coppabella to the project. To minimise project traffic and associated pavement impacts and safety risks, the proponent proposes to use shuttle buses to transport construction and operational workers to site and to implement a fatigue management policy for workers travelling via light vehicle.

To manage safety risks on local roads, the proponent has committed to enter into an Infrastructure Agreement with Isaac Regional Council at least 3 months prior to the commencement of construction. The Infrastructure Agreement will detail appropriate financial contributions to Isaac Regional Council to improve road safety as outlined in the road transport assessment, or otherwise agreed with council, for the maintenance of Moranbah Access Road and Peak Downs Mine Road.

To manage impacts on state-controlled roads, I have recommended conditions to the Minister for Transport and Main Roads that the proponent prepare a detailed traffic impact assessment and road use management plan prior to the commencement of construction to be approved by the DTMR. This is to ensure impacts identified during the detailed design phase are adequately managed during construction and operation of the project.

The project traffic during peak hours in the construction phase would result in minor delays and queues at the active level crossing between Peak Downs Mine Road and the Norwich Park Branch Railway. To minimise impacts, the proponent has committed to consult with Aurizon, the railway manager, and the DTMR regarding impacts on the level crossing in accordance with the Australian Level Crossing Assessment Model.

The Norwich Park Branch Railway transects the project area and the proposed Railway, North-West, West and Main North Pits abut the railway corridor. To manage potential impacts on the Norwich Park Branch Railway from mining activities, I have recommended a condition to the Minister for Transport and Main Roads in Appendix 3, that project activities must not disrupt the safety and operational integrity of the railway corridor, including all transport infrastructure, from ground movement and vibration. The proponent has also committed that the project rail spur will be designed and constructed in consultation with Aurizon and in accordance with Aurizon's requirements to access its Central Queensland Coal Network.

Social

The project is likely to have impacts and provide opportunities for the nearby regional communities of Moranbah, Dysart, and Coppabella. These communities are within the Isaac Regional Council LGA, which provides key services and personnel to construct and operate mines in the Bowen Basin. Nearby regional communities within a 125 km radius of the project such as Middlemount and Nebo may also be impacted and be provided opportunities from the development and operation of the project.

In considering the scale and duration of the project's construction phase and the capacity of the local communities to provide the project's construction workforce, I have determined that the project presents an opportunity for local employment during construction. The social impact assessment (SIA) identified that there would be workers living locally with relevant skills who could be employed during construction. Therefore, I have decided that the 100% fly-in, fly-out (FIFO) prohibition and anti-discrimination provisions of the *Strong and Sustainable Resource Communities Act 2017* (SSRC Act) shall apply to the project's construction workforce.

I consider that the project presents opportunities for social benefits for local communities in the Isaac Regional Council LGA through local employment and training, procurement from local suppliers and increased workforce participation of people from traditionally underrepresented groups in the mining industry, such as people with a disability, Aboriginal and Torres Strait Islander peoples, and women.

I note that potential impacts on local healthcare services, housing affordability and availability could occur while the project is still under construction and when operation commences. The project would require both a substantial construction and operational workforce and has the potential to impact the local housing market and the provision of community facilities, social services, and infrastructure.

To ensure that impacts are avoided, minimised, or mitigated to acceptable levels, I have stated a condition requiring the proponent to prepare an updated social impact management plan (SIMP) for the construction and operational phases of the project to be submitted to the Coordinator-General for approval prior to the commencement of construction. I have also set conditions in this report that seek to maximise social benefits by ensuring that:

- all relevant stakeholders are engaged and are informed about the project, and that identified potential social impact issues are effectively managed and monitored
- recruitment of workers from local and regional communities are prioritised, and measures are undertaken to enhance potential employment opportunities for local communities including Aboriginal and Torres Strait Islander peoples
- negative impacts on housing and accommodation affordability and availability are limited or mitigated, and housing and support services are provided to project workers and their families who relocate to local communities
- opportunities for local businesses to provide goods and services for the project during the construction and operational phases are maximised
- opportunities to improve the health and well-being of local and regional communities are capitalised upon, and the level of service provided to the local communities by existing social services, facilities, and infrastructure is maintained or improves.

I require the proponent to review and revise the SIMP every 2 years for the first 4 years of the project and then every 3 years up to Project Year 10 to ensure the effectiveness and relevancy of the proposed social management measures. The updated SIMP at year 2, 4, 7 and 10 must be submitted to the Coordinator-General for approval and must be made publicly available on the proponent's website. I also require that a SIMP be prepared and provided to the Coordinator-General to manage the social aspects of mine closure 24 months prior to the scheduled closure.

Economics

Mining is a major industry within the Isaac and Mackay LGAs, employing approximately 60% of the employed population (as at 2016 Australian Bureau of Statistics, Census of Population and Housing). Mining was the highest paying industry in the Isaac and Mackay areas. The second largest employer in the Isaac and Mackay region is agricultural operations, with 538 beef cattle farms within the Mackay/Isaac/Whitsunday region.

The proponent estimates that the project would require capital expenditure of $1 billion and would employ up to 500 FTE jobs during construction and up to 500 FTE jobs during operation. In addition to the direct jobs generated, the project could provide flow-on procurement and employment opportunities for local business and residents. The EIS estimates the project would increase gross regional product by $7.8 billion and increase gross state product by $11 billion, both in NPV. The EIS estimates royalties for the production and sale of product coal to be $696 million in present value. The cost-benefit analysis estimated the project would provide the Queensland community a total net economic benefit of $882 million in NPV terms.

The project would produce up to 17 Mtpa of ROM coal and 11 Mtpa of product coal for up to 28 years. Two types of coal would be produced by the project: metallurgical coal (approximately 58%) and thermal coal (approximately 42%). The product coal is proposed to be exported to Japan, South Korea, India, Vietnam, Taiwan and China.

The EIS referenced the IEA’s Sustainable Development Scenario where global metallurgical coal demand is forecast to be approximately 850 million tonnes coal equivalent (Mtce) in 2030 and 410 Mtce in 2050; and global thermal coal demand is forecast to be 2,840 Mtce in 2030 and 770 Mtce in 2050. The project is proposing to export to the Asia region, which is expected to account for 85% of the total global demand in 2030 and 2050. The proponent anticipates there would be a contraction in the number of operating coal mines in the world, as less efficient, higher-cost and higher-emission coal mines begin to close as global demand for coal falls. The proponent anticipates the project would supply high quality metallurgical and thermal coal under the IEA’s Sustainable Development Scenario.

The EIS demonstrated that the project would provide net economic benefits and employment opportunities to the local region and Queensland.

Cultural heritage

The project traverses the country of the Barada Barna People and is recognised as the relevant Aboriginal Party by the *Aboriginal Cultural Heritage Act 2003* (ACH Act). Native Title has been extinguished over land within the MLAs and does not form part of the Barada Barna People’s Native Title Determination. No Aboriginal cultural heritage sites within the project area are recorded on the Aboriginal and Torres Strait Islander Cultural Heritage Register maintained by the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts.

To protect Aboriginal cultural heritage values, the proponent has an approved cultural heritage management plan (CHMP) with the Barada Barna Aboriginal Corporation (BBAC) (the prescribed body corporate for the Barada Barna People) in accordance with the ACH Act. The CHMP describes the process for undertaking detailed Aboriginal cultural heritage field surveys prior to any ground disturbance and details how any identified Aboriginal cultural heritage would be recorded and managed.

The EIS identified 28 potential non-indigenous cultural heritage listed places within the study area (being the area traversed by the project). In 2021, site surveys were undertaken to determine that the listed sites or items did not have heritage significance to be protected under the *Queensland Heritage Act 1992*. The EIS concluded there is low potential for new sites or artefacts to be discovered during construction and operational activities.

I am satisfied the EIS appropriately considered potential impacts to Aboriginal cultural heritage and non-indigenous cultural heritage values. The implementation of a CHMP would ensure adequate management of cultural heritage values by the proponent and the traditional owners as custodians of their cultural heritage.

Noise and vibration

Four homesteads were identified as sensitive receptors for the project. The EIS found that acoustic quality objectives specified in the Environmental Protection (Noise) Policy 2019 would be exceeded by up to 5 A-weighted decibels (dBA) during neutral weather conditions and up to 11 dBA during adverse weather conditions at the Olive Downs Homestead during evening and night time periods, located 1.4 km north-east of the project. To mitigate potential noise impacts, the proponent has executed a non-residency agreement with the owner of the homestead for the duration of the project.

To ensure acoustic quality objectives are met at the remaining 3 homesteads, the proponent has committed to prepare a noise management plan and blast management plan to identify appropriate mitigation and management strategies. The EIS found that with the implementation of the proposed mitigation measures, acoustic quality objectives at the 3 remaining homesteads, located greater than 6.5 km from the project, would be within the objectives. To ensure acoustic quality objectives are complied with, I have stated conditions for the EA which must be complied with regarding limits, monitoring and management.

The EIS also assessed the potential cumulative noise impacts from the project and surrounding mines and found that with the implementation of the proposed mitigation measures, the cumulative noise impacts would be negligible at sensitive receptors other than Olive Downs Homestead (managed via the non-residency agreement).

Visual amenity

The project has the potential to create visual amenity impacts from the development of mine infrastructure and elevated landforms during mining, which may impact direct regional and local views. The project is proposed in the Bowen Basin, where open cut mining is a key land use and land within the project area is predominately used for cattle grazing.

The EIS found the project is consistent with existing land uses within the project area and is unlikely to have a material impact on visual amenity at the nearest sensitive receptors, 4 homesteads, due to the separation distances from the mine. In addition, the proponent has executed a non-residency agreement with the owner for the Olive Downs Homestead, to remain vacant during the life of the project.

I am satisfied the project would not have a material impact on visual amenity of nearby homesteads and that the project is consistent with the existing land uses in the project area.

Hazard and risk

The EIS includes a risk assessment which considers potential risks to the use of, and storage of hazardous substances, bushfires, flooding, wind and other potential environmental and safety issues associated with the project.

To ensure hazards and risks on the project site are adequately managed, I have stated a condition for the EA requiring the proponent to prepare and implement a risk management system for mining activities which comply with the *Risk Management – Principles and guidelines*[3].

The project's infrastructure corridor transects the neighbouring Eagle Downs Mine which may pose a health and safety risk to workers. The proponent has committed to have ongoing engagement with Eagle Downs Coal Management Pty Ltd, manager of the Eagle Downs Mine regarding overlapping tenure and health and safety responsibilities.

To address the increased risk of climate change impacts at the project site, the proponent has committed to implement an adaptive management approach including monitoring and reviewing information from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Bureau of Meteorology.

I am satisfied that the stated conditions and the proponent's commitment to develop management plans, engage with emergency services and implement an adaptive management approach will ensure that any potential hazards would be appropriately managed.

Waste management

The proponent has identified the expected volumes of each potential waste stream for the project, developed management strategies and identified expected disposal locations in a draft waste management plan. The proponent has committed to manage the waste produced by the project in accordance with the waste and resource management hierarchy stipulated in the *Waste Reduction and Recycling Act 2011* and to dispose of waste in a way that prevents or minimises adverse effects on the environment.

The EIS identified excavated waste rock, coarse rejects and fine rejects are significant waste streams generated during project operations. To ensure waste is appropriately managed and does not impact on environmental values, I have stated a condition for the EA requiring the proponent to prepare a non-mineral waste management plan to detail how waste generated by the project during construction and operation would be managed in accordance with the waste and resource management hierarchy of avoid, reduce, re-use, recycle, recover, treat and dispose.

The geochemistry assessment concluded that most of the mined waste rock is likely to be non-acid forming (NAF) in the long term and salinity is expected to be generally low to moderate. I have stated conditions for the EA to ensure that the proponent's commitments to design and operate mine affected water dams and, to minimise uncontrolled releases to the receiving environment, are implemented and that mine wastes do not have adverse impacts on surface and groundwater quality.

[3] Standards Australia, *Risk management – Principles and guidelines,* AN/NZS ISO 31000:2009.

Matters of national environmental significance

The project would impact MNES protected under the EPBC Act. In accordance with the Bilateral Agreement, the EIS meets the impact assessment requirements of both Australian and Queensland legislation. Under the Bilateral Agreement, this report includes an evaluation of MNES protected under the EPBC Act applicable to the project. This evaluation has been informed by consultation with DCCEEW.

The project is comprised of 3 separate controlled actions: the ETL (EPBC 2019/8458); the water pipeline (EPBC 2019/8459); and the mine site and access road (EPBC 2019/8460). The relevant controlling provisions for the project under the EPBC Act are listed threatened species and communities (sections 18 and 18A) and a water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E).

The TOR required the proponent to complete comprehensive field surveys to confirm the occurrence of MNES, including listed threatened species and communities. I note that agencies with an interest in biodiversity (including DCCEEW) generally agreed that the survey effort undertaken by the proponent was adequate.

Listed threatened species and communities

The impacts from the project to a total of 22 threatened fauna species, 5 threatened flora species, and 4 TECs were considered in the EIS. A likelihood of occurrence assessment was undertaken, along with extensive field surveys to determine if the project would incur a residual significant impact on these MNES. I note that in response to concerns raised during submissions on the EIS, the proponent has undertaken further targeted field surveys incorporating the use of harp trapping and baited hair tubes. I am therefore satisfied that the proponent's survey methodology was adequate.

A primary consideration of the mine design has been the minimisation of the project disturbance area to avoid impacts to riparian vegetation associated with the Isaac River (2 palustrine wetlands, a Brigalow TEC, and ornamental snake habitat). I note that these efforts, along with the co-location of the ETL action and water pipeline within the access road component of the mine site and access road, have demonstrated the proponent's commitment to avoiding impacts to MNES where possible.

The EIS determined that no threatened flora species would be impacted by the project disturbance areas and I agree with that finding.

The EIS concluded that the project may result in the disturbance of suitable habitat for the ornamental snake (1,834.2 ha) and greater glider (southern and central) (132.8 ha), along with disturbance to the Natural Grasslands of the Queensland Central Highlands and Northern Fitzroy Basin TEC (80.9 ha) and Poplar Box Grassy Woodland on Alluvial Plains TEC (9.6 ha). These figures represent a maximum impact scenario which I have recommended the Australian Minister for the Environment set as the maximum disturbance limit for the impacts to these threatened species and communities. I consider the permanent loss of suitable habitats for these threatened species and communities a residual significant impact which requires offsets to compensate for the loss.

I note that the EIS concluded that there would be no residual significant impact to the Australian painted snipe for the loss of intermittent foraging habitat (1,859.3 ha); that a residual significant impact to the squatter pigeon (southern) would occur to potential breeding and foraging habitat (115.5 ha) but not to the loss of dispersal habitat (612.8 ha); and that the residual significant impact to the koala (168.9 ha) excluded areas deemed of low value due to habitat fragmentation.

I do not agree with these findings and have recommended to the Australian Minister for the Environment that the proponent submit updated areas of impact for the Australian painted snipe, squatter pigeon (southern), and the koala. I have recommended to the Australian Minister for the Environment that the updated areas are set as maximum disturbance limits for impacts to these threatened species. I consider the permanent loss of suitable habitats for these threatened species a residual significant impact which requires offsets to compensate for the loss.

The proponent is proposing a staged approach to the delivery of offsets and has prepared an updated offset management strategy that details the offsets for Stage 1 of the project. The Stage 1 offsets would be delivered across 3 parcels of land within the local subregions. The biodiversity offset management strategy also identifies 8 properties as potential biodiversity offset sites for future stages of the project. The offset requirements for future offset stages would be confirmed prior to clearing commencing for each relevant offset stage and I have recommended conditions for the Australian Minister for the Environment to ensure that this occurs. My recommended conditions to the Australian Minister for the Environment also require reporting of the offset areas against agreed performance criteria at 5 yearly intervals, and to undertake corrective actions immediately if performance criteria have not been met.

I am not satisfied that the offsets proposed by the proponent for Stage 1 of the project would compensate for residual significant impacts of the proposed actions, however, properties identified within the EIS as potential locations of offsets for future stages of the project may provide the required offsets within the local subregions. I have recommended a condition to the Australian Minister for the Environment that the proponent submit an updated offset management strategy that incorporates the additional areas of impact to the Australian painted snipe, squatter pigeon (southern), and the koala in order to ensure that suitable offsets are available for Stage 1 of the project and for each proceeding offset stage.

I have also recommended a condition to the Australian Minister for the Environment that would require the proponent to submit a MNES management plan prior to the commencement of works which would include species and ecological community-specific management measures. These measures include (but are not limited to): pest plant and animal control; pre-clearance fauna surveys; the use of fauna spotters/catchers during vegetation clearance; managing risks from construction works and excavations; and management for vehicular strikes including designated speed limits on mine site roads. I note that many of these activities are effective strategies for mitigating unintended mortalities to threatened species and communities during the construction and operational phases of the project.

I am satisfied that the concerns raised during submissions on the EIS regarding potential impacts from the project to MNES have been addressed, and that the proponent's commitments, the stated conditions for the EA, and the recommended conditions to the Australian Minister for the Environment will ensure that acceptable outcomes are achieved for impacts on threatened species and communities MNES.

Coordinator-General's conclusion

I have considered the EIS documentation, submissions received and agency advice in evaluating the EIS for the project. I consider that the EIS requirements of the SDPWO Act for the project have been met and that sufficient information has been provided to enable my thorough evaluation of the potential impacts of the project.

I conclude that any adverse environmental impacts can be adequately avoided, minimised, mitigated and/or offset as required through conditions I have stated and recommended in this report, and proponent commitments outlined in the EIS.

Accordingly, I recommend that the project proceed, subject to conditions and recommendations included in this report. I expect that the commitments made by the proponent in the EIS will be fully implemented.

In accordance with section 35A(1)(b) of the SDPWO Act, this report will lapse 3 years following the publication date of this report, unless the Coordinator-General sets another date at a future time that extends the report.

A copy of this report will be provided to the proponent, relevant local and state government agencies and the Australian Minister for the Environment, and will be made publicly available at **www.statedevelopment.qld.gov.au/winchestersouth**.

……………………………………..

Kerry Smeltzer
Assistant Coordinator-General
Project Evaluation and Facilitation
(as delegate of the Coordinator-General)

23 November 2023

1. Introduction

This report has been prepared pursuant to section 34D of the SDPWO Act (Qld) and provides an evaluation of the EIS for the Winchester South project (the project).

It is not intended to record in this report all the matters that were identified and subsequently addressed during the assessment. Rather, it concentrates on the substantive issues identified during the EIS process and the measures and conditions required to address the impacts. The report:

- summarises the key issues associated with the potential impacts of the project on the natural, physical, social and economic environments at the local, regional, state and national levels
- presents an evaluation of the project, based on information contained in the EIS (including the draft and revised draft EIS), submissions made on the EIS during public and advisory agency consultation periods, and information and advice from advisory agencies and the proponent
- states and recommends conditions under which the project may proceed
- makes general recommendations
- documents the proponent's commitments.

2. About the project

2.1 The proponent

On 14 May 2019, the proponent notified under section 27AE of the SDPWO Act that the proponent for the project changed from Winchester South Coal Operations Pty Ltd to Whitehaven WS Pty Ltd.

Whitehaven WS Pty Ltd (ABN 87 625 165 004/ACN 625 165 004) was formed in 2018 in New South Wales (NSW) as an Australian based private company to develop and operate the Winchester South project.

Whitehaven WS Pty Ltd is a wholly owned subsidiary of Whitehaven Coal Limited, an Australian based public company. Whitehaven Coal started mining in 1999 and currently operate 4 thermal and metallurgical coal mines in north-west NSW.

2.2 Project location

The project is proposed approximately 30 km south-east of Moranbah, within the Isaac Regional Council LGA in the Bowen Basin (Figure 2.1).

The project is adjacent to the approved and partially constructed Eagle Downs Mine (project currently on hold) and recently commenced operating Olive Downs Mine. Other mines operating in close proximity to the Winchester South project include the Peak Downs Mine, Daunia Mine, Poitrel Mine, Saraji Mine, Millennium Mine, Moranbah South Mine, Isaac Downs Mine, Isaac Plains East Mine, Caval Ridge Mine, Carborough Downs Mine, Moorvale Mine and Lake Vermont Mine. In June 2022, there were 46 coal mines and 2 metalliferous mines in production located in the Bowen Basin, along with coal seam gas and conventional gas operations.

2.3 Project description

The project involves the development and operation of an open cut coal mine and associated infrastructure in the Bowen Basin.

The project would include the:

- development of an open cut coal mine which would produce up to 17 Mtpa of ROM coal and 11 Mtpa of product coal for up to 28 years
- construction of an access road from the Eagle Downs Mines Access Road, off the Peak Downs Mine Road, to a MIA
- construction of an approximately 8 km rail spur and loop, connecting to the Norwich Park Branch Railway
- train load-out facility, including product coal stockpiles for rail transport
- construction of a 132 kV ETL from Powerlink's existing Eagle Downs substation to the project and an onsite 132 kV/22 kV electricity switching/substation
- installation of an approximately 13 km raw water supply pipeline connecting the project to the existing Eungella pipeline network
- connection to the existing high-speed telecommunications network

- construction of a MIA including offices, onsite CHPP, and workshops
- construction of ancillary infrastructure including explosives storage facilities, consumable storage areas, potable water supply, sewage treatment facilities, site communications, remote crib huts and security.

The proposed production MLA for the project include mining lease areas MLA 700049, MLA 700050 and MLA 700051. The proposed mining lease infrastructure application 700065 is proposed to contain the ETL, raw water supply pipeline and access road, and would transect the neighbouring Eagle Downs Mine (ML 70389 held by South32 Eagle Downs Pty Ltd). The project's lease applications total an area of approximately 11,239 ha.

The project proposes to connect to established water, electricity, rail and road networks and co-locates infrastructure to minimise potential environmental impacts. Approximately 90% of the project area has historically been cleared or disturbed for cattle grazing and agriculture. The approximate extent of the open cut mining area and associated waste rock emplacements and infrastructure areas would be 6,950 ha.

The proponent estimates capital expenditure for the project would be $1 billion with up to 500 FTE jobs created during the 3 year construction phase and up to 500 FTE jobs during the 28 year operational phase.

2.3.1 Project components

2.3.1.1 Open cut coal mine

The project includes open cut mining within the Rangal and Fort Cooper Coal Measures. Three main coal seams would be mined, including the Leichhardt Seams, Upper Vermont Seam and Vermont Middle Lower Seam.

The mine would have 6 operating pits over the life of the project: Railway Pit, North-West Pit, West Pit, Main Pit North, Main Pit South, and South Pit (Figure 2.2). The Main North Pit and Main South Pit are part of a single extraction area, proposed to be mined simultaneously from both ends The EIS stated mining would occur in 4 broad stages, which is discussed further in section 2.3.2.2.

Mining operations would generally occur 24 hours per day, 7 days per week, with open cut mining activities and general sequence entailing:

- progressive clearing of vegetation occurring on areas required for the mining operation
- stripping and stockpiling of soil from disturbed areas for storage and reuse in future rehabilitation of the mined areas
- pre-stripping of weathered tertiary sediments using scrapers, excavators and trucks
- drilling and blasting of competent overburden and inter-burden as waste rock
- removal of waste rock to expose the underlying coal seams, and placement in out-of-pit waste rock emplacements, or as infill in the pit behind advancing mining operations
- mining of coal and haulage to the ROM coal handling facilities
- re-shaping of the waste rock emplacements, re-application of topsoil (or topsoil/subsoil) and revegetation of the final landform surfaces.

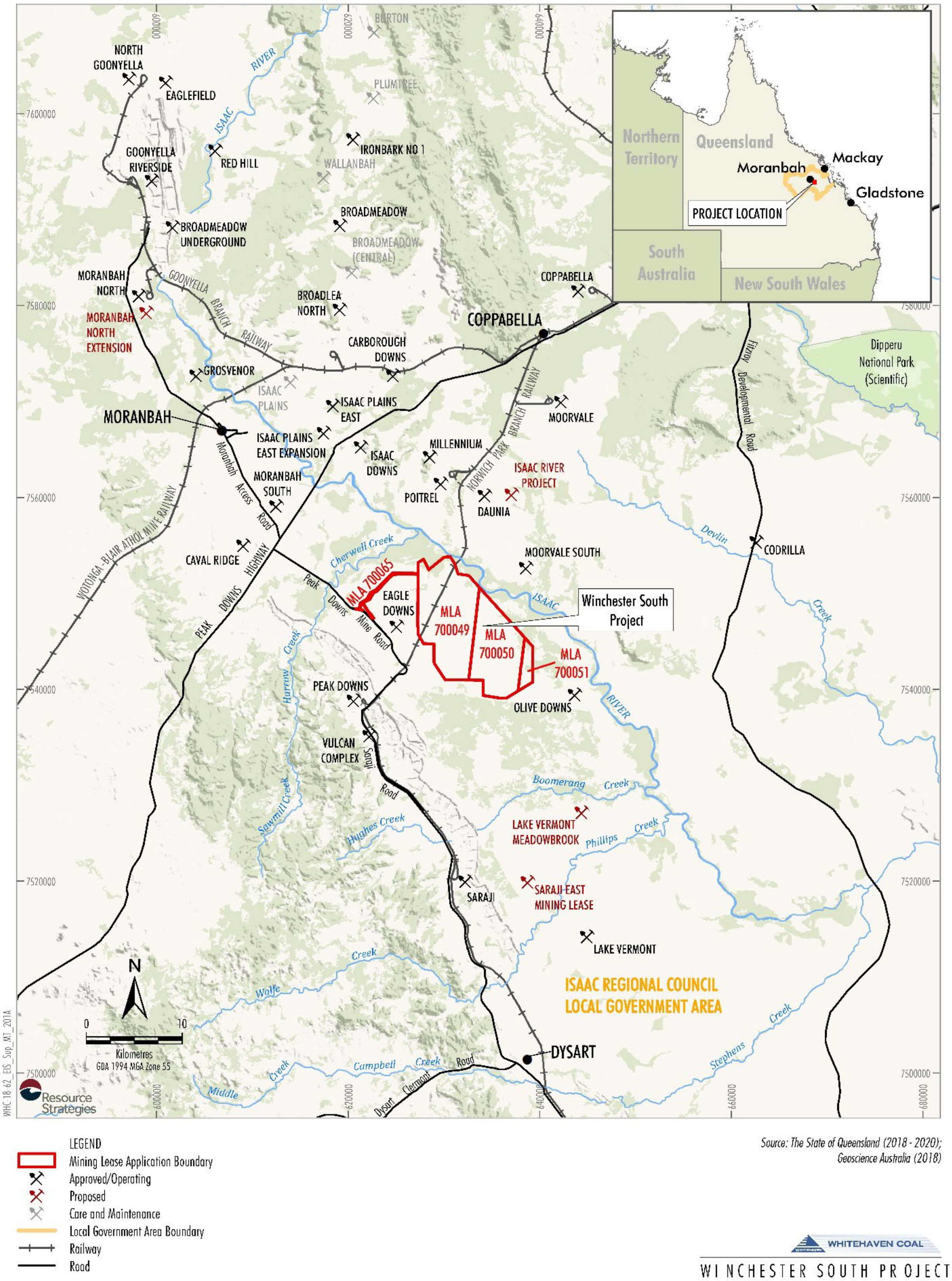
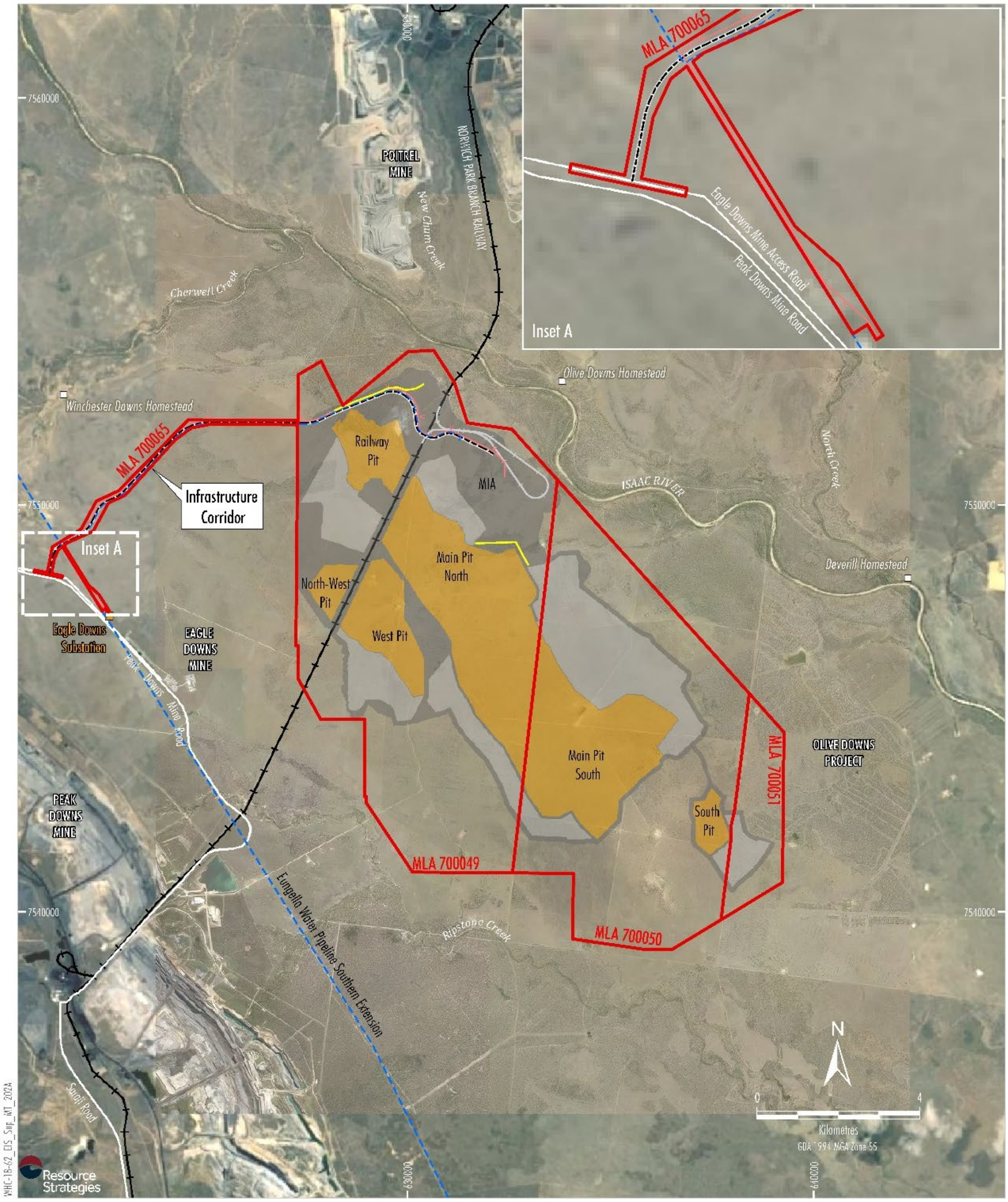


Figure 2.1 Project location



LEGEND
- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Substation

Project Component*
- Indicative Infrastructure Area
- Indicative Out-of-pit Waste Rock Emplacement
- Indicative Open Cut Pit Including In-pit Waste Rock Emplacement
- Indicative Mine Access Road
- Indicative Rail Spur and Loop
- Indicative Electricity Transmission Line
- Indicative Raw Water Supply Pipeline
- Indicative Flood Levee

Source: The State of Queensland (2018 - 2020); Whitehaven (2022)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL
WINCHESTER SOUTH PROJECT

Note: * Excludes some project components such as water management infrastructure, access tracks, topsoil stockpiles, explosives magazines, power reticulation, temporary offices, other ancillary works and construction disturbance.

Figure 2.2 Project arrangement

2.3.1.2 Access road

The EIS stated access to the project site during the construction phase would be provided by the Winchester Access Road, an existing private access track, for approximately 6 months while the project's Mine Access Road is being constructed. The Mine Access Road would be 12 metres wide, connect to the Eagle Downs Mine Access Road and traverse the Eagle Downs Mine (ML 70389) to the project's MIA (Figure 2.2). The access road would be co-located with the ETL and raw water supply pipeline within the infrastructure corridor to minimise the disturbance area. The access road construction would require vegetation clearing.

2.3.1.3 Rail spur and loop

The rail spur and loop would be approximately 8 km and connect to the Norwich Park Branch Railway (Figure 2.2). The rail spur and loop would be located within the project's MIA.

2.3.1.4 Electricity transmission line

The 132 kV ETL would connect from Powerlink's existing Eagle Downs substation to an onsite 132 kV/22 kV electricity switching/substation (Figure 2.2). The ETL would be co-located within the infrastructure corridor.

2.3.1.5 Raw water supply pipeline

The approximately 13 km raw water supply pipeline is proposed to be installed to connect the project to the existing Eungella pipeline network (Figure 2.2). The raw water supply pipeline would be partly buried within the infrastructure corridor and would terminate at the mine water dam (MWD), in the MIA.

2.3.1.6 Telecommunication data

A fibre optic cable would connect the existing fibre optic network to the project and would be co-located within the infrastructure corridor.

2.3.1.7 Mine infrastructure area

The MIA is proposed to include site offices, CHPP and workshops, product coal stockpiles for rail transport, rail loop and spur, train load-out facility, and wastewater and sewage treatment plant (Figure 2.2). Site wastewater would be treated in a sewage treatment plant located within the MIA. The sewage treatment plant would be designed to meet a Class A effluent quality for irrigation.

2.3.2 Project development stages

The proposed timeframes identified in the EIS for each stage of the project are summarised in Table 2.1.

Table 2.1 Project phases and approximate timeframes

Approximate project timeframe	Description
Year 1	Construction commences at the project (including overburden removal) and external ancillary infrastructure requirements (e.g. raw water supply pipeline, mine access road, ETL, rail spur and overpass).
Year 2	Construction of the MIA, including workshops and offices, and an on-site CHPP to process ROM coal from the project. Overburden removal continues and ROM coal extraction commences.
Year 3	Construction of final stage of the CHPP.

Approximate project timeframe	Description
	ROM coal extraction ramps up.
Year 4–26	ROM coal extraction reaches maximum extraction rate of 17 Mtpa.
Year 27–29	Mining operations ramp down.
Year 30 onwards	Mine closure (e.g. decommissioning of infrastructure) and rehabilitation.

2.3.2.1 Construction

Pre-construction and construction would occur progressively with the major construction forecast to take place in the first 36 months of the project. Construction works are proposed to commence as soon as practicable after all relevant planning and environmental approvals, EA, and mining leases are granted.

The EIS stated construction activities would be based on the development of the following key project infrastructure:

- MIA (including the CHPP) and mine access road (including an overpass of the Norwich Park Branch Railway)
- rail spur and loop
- water management infrastructure (including flood protection levees)
- water supply and electricity transmission infrastructure
- progressive development and augmentation of water management infrastructure: dams, sumps, pipelines, up-catchment diversions, storages and other water management equipment and structures
- progressive development of haul roads, light vehicle access roads and services
- construction and installation of ancillary infrastructure (e.g. electricity distribution infrastructure, explosives storage facilities, consumable storage areas, potable water supply, sewage treatment facilities, site communications, remote crib huts and security)
- replacement and/or upgrades to open cut mining and coal handling and processing machinery
- installation of environmental monitoring equipment.

The proponent proposes to use quarry material from the existing Winchester Quarry, located within the MIA, for use in the construction phase.

The estimated development footprint during the construction phase is provided in Table 2.2.

Table 2.2 Approximate disturbance areas during construction

Project component	Disturbance (ha)
Infrastructure corridor	135
MIA (and other infrastructure areas)	1,075
Water management infrastructure	50
Total	**1,260**

2.3.2.2 Operations

Project mining and rail operations would be conducted up to 24 hours per day, 7 days per week. The EIS stated mining would occur in 4 broad stages:

- Stage 1 (years 2–5):

- extraction of 15 Mtpa of ROM coal from the Railway Pit, Main Pit North and Main Pit South
  - the out-of-pit waste rock emplacements to the west of the Railway Pit and east of Main Pit North would be constructed and partially rehabilitated
  - backfilling of the Railway Pit, Main Pit North and Main Pit South would also commence.
- Stage 2 (years 5–9):
  - extraction of approximately 15 Mtpa (with a peak of 17 Mtpa) of ROM coal
  - mining within the Railway Pit is completed
  - the out-of-pit waste rock emplacement to the west of the Railway Pit would be rehabilitated and the Railway Pit would be partially backfilled, with a portion retained for project water management
  - backfilling of the Main Pit South and Main Pit North would continue with the progression of the open cut.
- Stage 3 (years 9–19):
  - extraction of approximately 15 Mtpa (with a peak of 17 Mtpa) of ROM coal
  - the east out-of-pit waste rock emplacement for Main Pit South would be established and partially rehabilitated
  - progressive rehabilitation of the Main Pit North and Main Pit South would occur.
- Stage 4 (years 19–27):
  - extraction of ROM coal from the North-West Pit, West Pit and South Pit with total ROM volumes steadily declining as mining in the Main Pit North and Main Pit South is completed
  - backfilling of the Railway Pit, South Pit, North-West Pit and West Pit would progressively occur
  - residual voids are proposed in the North-West Pit, West Pit and Main Pit.

2.3.2.3 Decommissioning

The EIS stated decommissioning activities would be undertaken as required in accordance with the project's approved PRCP which must be applied for within 6 months of receiving the EA. The project's main decommissioning phase of the project would occur once mining has stopped, in Years 30 and 31.

2.3.2.4 Progressive rehabilitation and final land use

The project would progressively disturb approximately 6,950 ha of land over the project's 31 year life. In accordance with the PRCP requirements under the EP Act, the proponent must progressively rehabilitate mined land so it is safe, stable, does not cause environmental harm (non-polluting), and is able to sustain a post-mining land use approved in the project's PRCP.

The project's final landform shaping is expected to take 2 years. The proponent proposed to rehabilitate most of the project area (approximately 89%) to a low intensity grazing final land use and the remaining project areas would be restored to water storage for agricultural use (stock drinking) (approximately 11%) and waterways to provide for fish passage (approximately 0.02%).

The proponent proposed to completely backfill 3 pits and leave 3 residual voids with a final land use of water storage for agricultural use (stock drinking). At the cessation of mining, the proponent has committed to assess all infrastructure to determine whether it would be decommissioned and removed or retained for future use as part of the proposed final land use. All proposed residual voids are located outside of the Isaac River floodplain.

The project's proposed rehabilitation strategy and final land use are discussed in section 5.1.7.

2.4 Project rationale

Whitehaven WS Pty Ltd proposes to develop an open cut coal mine and associated infrastructure in the Bowen Basin. The Bowen Basin has Australia's largest coal deposits and is one of the nation's largest coal producer. Coal mining is a major industry in the region and the largest employer.

The mine would produce up to approximately 11 Mtpa of product coal for up to 28 years. Two types of coal would be produced by the project: metallurgical coal (approximately 58%) and thermal coal (approximately 42%). The coal resource would be mined by conventional truck and shovel mining methods, with product coal intended to be transported by rail to the ports of Hay Point or Gladstone for export. Proposed export countries would predominately include Japan, South Korea, India, Vietnam, Taiwan and China.

The majority of the product coal would be metallurgical coal, which is necessary for the production of steel. Currently there is no viable alternative to metallurgical coal for the commercial production of steel. The EIS stated that global demand for metallurgical coal correlates to industrialisation and urbanisation, and steel will enable the development of renewable energy equipment, such as wind turbines and solar panels. The remaining portion of product coal is thermal coal, which is used to produce energy.

The *Queensland Resources Industry Development Plan* (QRIDP)[4] sets out a 30 year vision for Queensland's resources industry to be a resilient, responsible and a sustainable resources industry that grows as it transforms. The global market for thermal coal is likely to decline as countries choose alternative energy generation solutions to reduce emissions. However, the QRIDP outlines that reduced demand in developed economies for thermal coal is predicted to be offset by increased demand from the fast developing Indo-Pacific region, which could create pockets of future growth for Queensland. The high quality of Queensland thermal coal, which generates fewer greenhouse gas emissions per megawatt hour of electricity compared to lower calorific value coal, means Queensland is well placed to respond to these opportunities. The QRIDP identifies the demand for metallurgical coal is predicted to be stronger for longer than thermal coal.

The QRIDP acknowledges that future opportunities for both thermal and metallurgical coal will be supported further by mines decarbonising their operations to remain competitive globally. The Queensland Government has committed to work with the resources industry to investigate ways to reduce fugitive emissions from resource activities, particularly in the Bowen Basin.

The IEA provides alternative coal demand scenarios. The proponent referenced the IEA's Sustainable Development Scenario within the EIS.[5] Under the Sustainable Development Scenario, global metallurgical coal demand is forecast to be approximately 850 Mtce in 2030 and 410 Mtce in 2050; and global thermal coal demand is forecast to be 2,840 Mtce in 2030 and 770 Mtce in 2050. The project is proposing to export to the Asia region, which is expected to account for 85% of the total global demand in 2030 and 2050. The proponent anticipates there would be a contraction in the number of operating coal mines in the world, as less efficient, higher-cost and higher-emission coal mines begin to close as global demand for coal falls. The proponent anticipates the project would supply high quality metallurgical and thermal coal under IEA's Sustainable Development Scenario.

The proponent's metallurgical and thermal coal demand forecast was supported by the IEA forecast under the Sustainable Development Scenario and the QRIDP.

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[4] Queensland Government, Department of Resources, *Queensland Resources Industry Development Plan,* June 2022.
[5] Queensland Government, Queensland Treasury, *Queensland's coal industry and long-term global coal demand,* November 2022.

In November 2022, Queensland Treasury published *Queensland's coal industry and long-term global coal demand*.[6] This paper provides an overview of Queensland's coal industry and discusses the potential implications of the IEA's latest *World Energy Outlook*[7] in the context of Queensland's coal production and major export markets over the long-term. The IEA note that metallurgical coal demand is expected to decline much less than thermal coal. This paper demonstrates that Queensland's coal industry remains relatively well-placed over the long term, given Queensland's proximity to the fast growing Asia region and the quality of Queensland's metallurgical coal.

It was noted in the *Queensland's coal industry and long-term global coal demand* that uncertainty remains regarding the global demand for coal considering global greenhouse gas reduction efforts and the long-term nature of the projections.

The EIS presented a forecast of coal production and coal prices from financial year 2024 to 2051 for both types of coal. The coal prices used in the economic analysis were developed by the proponent and compared to coal prices forecast by Consensus Economics, an international organisation that publishes economic forecasts. When compared, the EIS found the proponent's forecasted coal prices were considered conservative. The EIS also undertook a sensitivity analysis of coal price which considered a sustained 50% decrease and increase in coal price relative to the base case over the 28-year operational phase.

The proponent estimates project benefits would include capital expenditure of $1 billion, with up to 500 FTE jobs created during the 3 year construction phase, and up to 500 FTE jobs during operation (when considering the use of automation). The EIS estimated the project would increase gross regional product by $7.8 billion and increase gross state product by $11 billion, both in NPV. The EIS estimated royalties for the production and sale of product coal to be $696 million in present value terms. The EIS found that in all modelled scenarios, the project would have a substantial net benefit for Queensland.

Royalties for Queensland's natural endowments, such as coal are important sources of revenue for the State to deliver essential services and infrastructure to meet the needs of a growing and ageing population. The Queensland Government has committed to investing coal royalties to deliver better infrastructure for regional Queensland.

Section 5.6 of this report evaluates the economic benefits and impacts predicted for the project as stated in the EIS.

[6] Queensland Government, Queensland Treasury, *Queensland's coal industry and long-term global coal demand,* November 2022.
[7] International Energy Agency, *World Energy Outlook 2022.*

3. Environmental impact assessment

In undertaking this evaluation, the following matters have been considered:

- the initial advice statement
- the EIS documentation and technical reports
- issues raised in submissions on the EIS
- advice from the following state government agencies:
  - Department of Agriculture and Fisheries
  - Department of Environment and Science
  - Department of Housing
  - Department of Regional Development, Manufacturing and Water
  - Department of Resources
  - Department of State Development, Infrastructure, Local Government and Planning
  - Department of Transport and Main Roads
  - Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts
  - Department of Youth Justice, Employment, Small Business and Training
  - Queensland Ambulance Service
  - Queensland Fire and Emergency Services
  - Queensland Police Service
  - Queensland Treasury
- advice from Isaac Regional Council
- advice from the Australian DCCEEW, formerly the Department of Agriculture, Water and the Environment
- advice from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development
- additional information and advice from the proponent as requested during the evaluation of the project's EIS.

The stages of the project's EIS are documented on the project's webpage at **www.statedevelopment.qld.gov.au/winchestersouth**.

3.1 Coordinated project declaration

On 17 April 2019, the Coordinator-General declared the project to be a 'coordinated project' under section 26(1)(a) of the SDPWO Act. This declaration initiated the statutory environmental impact evaluation procedure of Part 4 of the SDPWO Act, which required the proponent to prepare an EIS for the project.

3.2 Australian Government assessment

On 17 and 18 July 2019, the then Australian Minister for the Environment determined the project, proposed as 3 referrals, is a 'controlled action' requiring an environmental assessment for approval under the EPBC Act (EPBC referral numbers: 2019/8458, 2019/8459, 2019/8460). The relevant controlling provisions for the project under the EPBC Act are:

- EPBC 2019/8458 – ETL
  - listed threatened species and communities (sections 18 and 18A)
- EPBC 2019/8459 – water pipeline
  - listed threatened species and communities (sections 18 and 18A)
- EPBC 2019/8460 – mine site and access road
  - listed threatened species and communities (sections 18 and 18A)
  - a water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E).

The then Australian Minister for the Environment also determined that the project should be assessed under the Bilateral Agreement. Under the Bilateral Agreement (made under section 45 of the EPBC Act), if a controlled action is a 'coordinated project for which an EIS is required' under the SDPWO Act, certain types of projects do not require assessment under Part 8 of the EPBC Act. The Bilateral Agreement enables the EIS to meet the impact assessment requirements of both Australian and Queensland legislation.

In July 2022, the Environment Council of Central Queensland submitted a request to the Australian Minister for the Environment to reconsider EPBC Act decisions for 19 coal and gas projects, including the Winchester South project. The request seeks the Australian Minister for the Environment to reconsider the controlled action decisions for the project on the basis there is substantial new information about the impacts the project will have, or is likely to have, including the broader effects of climate change and how project emissions could damage the environment.

The Australian Minister for the Environment invited public comment on each request from 3 November to 24 November 2022. The Australian Minister for the Environment, or a delegate of the Minister, is considering all relevant information to decide whether to confirm the original decisions for the project or revoke the original decisions and substitute a new decision.

The reconsideration request does not affect the Coordinator-General's decision on the evaluation report. To inform the Australian Minister for the Environment's decision under the EPBC Act, the Minister may consider additional controlling provisions and request further information on MNES from the proponent after the Coordinator-General's evaluation report is complete.

Section 6 of this report provides an assessment of MNES, lists each controlling provision under the EPBC Act and explains the extent to which the EIS process addresses the actual or likely impacts of the project on the matters covered by each controlling provision. Appendix 2 of this report recommends conditions for the Australian Minister for the Environment, or the delegate, to consider in making a decision on the project under the EPBC Act.

After a copy of this report is provided to the Australian Government, a decision on the controlled action under section 133 of the EPBC Act will be made by the Australian Minister for the Environment or the delegate. The decision maker will use the information in section 6 of this report to decide whether the project should proceed, and if so, whether any additional conditions, beyond those recommended in this report, will be applied to manage impacts on MNES.

The assessment and recommended conditions are consistent with the Bilateral Agreement.

3.3 Terms of reference

The draft TOR for the EIS for the project were released for public and advisory agency comments from 24 June 2019 to 19 July 2019. Comments were received from 32 submitters, including advisory agencies, local governments, interest groups, resource companies and private individuals.

The final TOR were prepared, having regard to comments received, and issued to the proponent on 4 September 2019.

3.4 Referral to the Independent Expert Scientific Committee

Under the National Partnership Agreement on Coal Seam Gas and Large Coal Mining Development, of which Queensland is a signatory, large coal mining development proposals undergoing environmental impact assessment and are likely to have a significant impact on water resources, are to be referred to the Independent Expert Scientific Committee (IESC).

In accordance with section 131AB of the EPBC Act, the Office of the Coordinator-General submitted a joint request with the former Australian Department of Agriculture, Water and the Environment on water matters for the project. The IESC provided its advice on 5 September 2021.

The IESC advice has informed the evaluation of the project and is discussed in section 6.6.2 of this report.

3.5 Review of the draft EIS

Since the preparation of the project's initial advice statement, the proponent undertook additional drilling at the project site in 2019 and 2020 to determine coal quality. As a result, the proposed mining rate increased from 15 Mtpa to 17 Mtpa of ROM coal and from 8 Mtpa to 11 Mtpa of product coal.

The proponent also proposed the co-location of the mine access road, ETL and raw water supply pipeline to avoid or minimise potential impacts. The proponent also applied for a mining lease for the infrastructure corridor (MLA 700065).

A draft EIS, prepared by the proponent, was released for public and advisory agency comment from 4 August 2021 to 15 September 2021.

A total of 507 submissions were received for the draft EIS comprising one from Isaac Regional Council, 12 from state government advisory agencies, 2 from Australian Government advisory agencies, 5 from interest groups, 57 from the mine equipment and technology sector (METS) sector companies and 430 from private individuals (313 of which related to a Do Gooder Campaign proforma submission).

The key issues raised by advisory agency submissions on the draft EIS included:

- limited analysis to support the 4 residual voids proposed as the final landform
- potential impacts on water quality, water resources, including GDEs and waterways providing fish passage

- lack of detailed offset plans for listed species
- limited specific measures to avoid, mitigate or manage greenhouse gas emissions (Scope 1, 2 and 3)
- greater clarity to identify assumptions and inputs used in the economic analysis, including the continued demand for thermal coal beyond 2025, the price of thermal coal and cost of carbon
- potential social impacts, including housing affordability
- potential air, noise and safety impacts at the adjacent Eagle Downs Mine.

In addition to the matters listed above, additional key issues raised by interest groups and private submitters included:

- support for the project due to potential employment opportunities and economic benefits to local and regional communities
- concern regarding Whitehaven Coal group of companies' history of environmental breaches at their existing New South Wales mining operations
- potential impacts on surface and groundwater quality and resources
- clearing of koala, greater glider and ornamental snake habitat
- potential impacts from Scope 3 emissions.

3.6 Review of the revised draft EIS

On 2 December 2021, the Coordinator-General requested additional information about the environmental effects of the project and a response to submissions received for the draft EIS. The Coordinator-General also decided that public notification of the additional information was required.

To address submissions received on the draft EIS, the additional information included key changes to the project, including:

- optimising the final landform and land use was optimised to remove all non-use management areas (NUMAs) and propose a final land use of water storage for agricultural use (stock drinking)
- backfill of an additional pit, the South Pit
- reduction in impacts to koala, greater glider and squatter pigeon habitat by 46%, 20%, and 56% respectively
- measures to reduce Scope 1 and 2 emissions.

The additional information, prepared by the proponent, was released for public and agency comment from 21 November 2022 to 19 December 2022.

A total of 614 submissions were received on the additional information comprising one from Isaac Regional Council, 10 from state government advisory agencies, 7 from interest groups, 69 from METS companies and 528 from private individuals (178 of which related to a Do Gooder Campaign proforma submission).

Many of the same key issues listed above were raised again in submissions. New matters included a request to confirm the disturbance footprint and the sustainability of the proposed final land use of water storage for agricultural use (stock drinking) for the West and North-West Voids.

On 31 March and 30 June 2023, the proponent provided additional information to respond to submissions received.

On 7 July 2023, the Coordinator-General accepted the draft EIS, together with the additional information as the final EIS. The Coordinator-General did this after considering the draft EIS, the additional information, submissions and further information provided by the proponent responding to the submissions.

Submissions from the EA application were also reviewed, with issues raised consistent with the issues raised in the submissions on the draft EIS and additional information.

3.7 Large resource project under the *Strong and Sustainable Resource Communities Act 2017*

The object of the SSRC Act is to ensure that residents of communities in the vicinity of large resource projects benefit from their construction and operation. The Winchester South project is a large resource project under the SSRC Act as it is a resource project that requires an EIS under the SDPWO Act.

The project is subject to the SIA provisions of the SSRC Act which require a SIA to be undertaken in accordance with the *SIA Guideline* (March 2018).

Large resource projects which are published on the list of large resource projects on the Department of State Development, Infrastructure, Local Government and Planning's (DSDILGP) website are prohibited from hiring a 100% FIFO workforce and from discriminating against locals when recruiting workers for the operational phase.

During my evaluation of the EIS for the project, I have decided that the construction workforce is also subject to the SSRC Act. I have also decided to include Coppabella as a nearby regional community for the project, which is discussed further in section 5.5.

I have published the project and its nearby regional communities on the DSDILGP's website.

4. Project approvals

Following the release of this report, the proponent will need to obtain statutory development approvals from Australian, state and local government agencies before the project can proceed. Table 4.1 provides a list of key approvals required for the project, some of which includes stated and recommended conditions in this report.

Subsequent approvals required for the project, which are subject to separate applications and assessment processes are not considered in this report.

Table 4.1 Key approvals required for the project to proceed

Project components	Permit/approvals	Legislation	Assessment Manager/lead agency
Australian Government			
Winchester South Project ETL	Decision on taking the action for the purposes of the following controlling provisions (EPBC reference 2019/8458) • listed threatened species and communities (sections 18 and 18A)	EPBC Act	DCCEEW
Winchester South Project Water Pipeline	Decision on taking the action for the purposes of the following controlling provisions (EPBC reference, 2019/8459) • listed threatened species and communities (sections 18 and 18A)	EPBC Act	DCCEEW
Winchester South Project Mine Site and Access Road	Decision on taking the action for the purposes of the following controlling provisions (EPBC reference 2019/8460) • listed threatened species and communities (sections 18 and 18A) • a water resource in relation to coal seam gas development and large coal mining development (sections 24D and 24E)	EPBC Act	DCCEEW
State Government			
Whole of project	EA	EP Act	DES
Whole of project	Mining leases (MLA 700049, MLA 700050, MLA 700051 and MLA 700065)	*Mineral Resources Act 1989*	Department of Resources
Whole of project	CHMP (an agreement between a land user and Traditional Owners)	ACH Act	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships and the Arts

Project components	Permit/approvals	Legislation	Assessment Manager/lead agency
Clearing protected plants for the project	Protected plant clearing permit or exemption clearing notification	NC Act	DES
Species management program for disturbing animal breeding places	Species management program	NC Act	DES
Construction of an overpass over the Norwich Park Branch Railway and construction of a rail loop and spur to the railway	Approval for works interfering with a railway	*Transport Infrastructure Act 1994*	DTMR
Use of explosives	Authorities to possess, store and use explosives	*Explosives Act 1999*	Resources Safety and Health Queensland
Local Government			
Plumbing and drainage works associated with MIA	Plumbing and drainage approvals	*Plumbing and Drainage Act 2018*	Building certifier
Building works	Development permit for building works	*Building Act 1975*, Building Regulation 2021	Building certifier

4.1 Australian Government approvals

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The project comprises 3 separate controlled actions, each requiring approval under the EPBC Act.

- EPBC 2019/8458 for the ETL
- EPBC 2019/8459 for the water pipeline
- EPBC 2019/8460 for the mine site and access road.

The proposed actions have been evaluated under the Bilateral Agreement, which enables the EIS to meet the impact assessment requirements of both Australian and Queensland legislation. Further detail on the Australian Government assessment is in section 3.2.

Section 6 in this report provides an assessment of MNES, consistent with the Bilateral Agreement.

After a copy of this report is provided to the Australian Minister for the Environment, a decision on the controlled action under section 133 of the EPBC Act will be made by the Minister or the delegate. The Australian Minister for the Environment or the delegate will use the information in section 6 to decide whether the project should proceed, and if so, whether amendments to the conditions recommended in the report and/or any additional conditions beyond those recommended in this report would be applied to manage the impacts on MNES.

4.2 State Government approvals

4.2.1 *Environmental Protection Act 1994*

The proponent lodged an application for a site-specific EA for a resource activity and ancillary activities on 19 June 2019. The proponent applied to amend the EA application to incorporate the infrastructure corridor (MLA 700065) on 2 September 2020.

The transitional provisions in the *Mineral and Energy Resources (Financial Provisioning) Act 2018* apply to the project which means the project must be assessed against the EP Act that applied at the time of the application.

The environmentally relevant activities (ERA) applied for are:

- ERA 8 – chemical storage
- ERA 13 – mining black coal
- ERA 16 – extractive and screening activities
- ERA 31 – mineral processing
- ERA 60 – waste disposal
- ERA 63 – sewage treatment.

The project's joint mining lease/EA application was publicly notified from 16 August to 24 September 2021. Five submissions were received and have been considered in the evaluation of the project.

The proponent is registered as a suitable operator under section Part 4, Division 1 of Chapter 5A of the EP Act. DES will decide whether to issue the EA for the project upon receipt of a copy of this report. The EA must include any stated conditions included in this report. The proponent must then submit a PRCP after the project's EA is issued, following the EIS process.

4.2.2 *Mineral Resources Act 1989*

The proponent holds mineral development licence 183, the pre-requisite resource authority for the coal MLAs. On 14 June 2019, the proponent applied for MLA 700049, MLA 700050 and MLA 700051. On 3 September 2020, the proponent applied for MLA 700065 for the infrastructure corridor.

In accordance with section 4A of the *Mineral Resources Act 1989*, development authorised under the *Mineral Resources Act 1989* is not subject to the provisions of the *Planning Act 2016*, except for building work which is not accepted development under the *Building Act 1975* and development on heritage land under the *Queensland Heritage Act 1992*.

4.2.3 *Water Act 2000*

The project site is located within the Water Plan (Fitzroy Basin) 2011 (Water Plan) area. The Department of Regional Development, Manufacturing and Water (DRDMW) has commenced a process to replace the Water Plan to address current and emerging issues within the water plan area to continue the sustainable management of water in the basin.

Section 110 of the Water Plan limits the take of overland flow of not more than the volume necessary to satisfy the requirements of an EA. Section 97(3) of the *Water Act 2000* allows for the take of overland flow where the impacts or interference were assessed as part of the grant of an EA and the EA was granted with a condition about the take or interference with water.

Under section 110(2) of the Water Plan, the proponent would be authorised to capture overland flows draining internally from disturbed areas classed as sediment water or mine-affected water, and not clean water.

In relation to groundwater resources, Section 334ZP of the *Mineral Resources Act 1989* gives holders of a mining lease the right to take 'associated water' as a necessary activity in the process of extracting the resource. The volume of any 'associated water' taken must be measured and reported, with the Chief Executive of DES notified immediately after the initial water take.

4.2.4 Nature Conservation Act 1992

Prior to the clearing of native plants for the project and interfering with a species breeding habitat, the proponent must obtain a protected plan clearing permit and prepare a species management plan in accordance with section 335 of the Nature Conservation (Animals) Regulation 2020.

4.2.5 Aboriginal Cultural Heritage Act 1993

Part 7 of the ACH Act requires a CHMP to be developed and approved when an EIS is required for a project.

The proponent has developed a CHMP with the BBAC, which was approved by the former Department of Aboriginal and Torres Strait Islander Partnerships on 31 March 2020, under section 107 of the ACH Act.

5. Evaluation of environmental impacts

This section discusses the major environmental effects of the project identified in the EIS. Some potential impacts of the project have been adequately addressed in the EIS. For these matters, the proponent's mitigation measures are appropriate. For the matters evaluated below, this report includes conditions or recommendations to build on proponent commitment to mitigate and/or manage potential adverse impacts.

5.1 Land use and rehabilitation

Sections 4.10 and 6 and Appendix J of the draft EIS and Enclosure 1 and Attachment 17 of the revised draft EIS provides the proponent's assessment of project impacts on land use and tenure associated with the construction and operation of the project, as well as the proposal to progressively rehabilitate the project site and establish final land uses. This section evaluates these potential impacts and the proponent's proposed mitigations and management strategies.

5.1.1 Existing environment

5.1.1.1 Land use

The proposed project is located approximately 30 km south-east of Moranbah, Queensland, within the Isaac Regional Council LGA. The project is proposed within the Bowen Basin, an established coal field which includes the towns of Moranbah and Dysart. In June, there were 46 coal mines and 2 metalliferous mines in production located in the Bowen Basin, along with coal seam gas and conventional gas operations.[8] Agriculture is another key industry for the region is predominately low intensity cattle crazing and some cropping.

The EIS identified land within the project area is predominately currently used for cattle grazing, with approximately 90% of the project area historically cleared or disturbed for cattle grazing and agriculture. The Winchester Quarry, operated by Quarrico Products Pty Ltd under an EA, is operating in the northern part of the project area and the Norwich Park Branch Railway transects the project. There are also several coal and petroleum exploration and production tenures overlapping the project's MLAs, including the neighbouring Eagle Downs Mine. Most vegetation in the project area is non-remnant, however remnant vegetation exists near the Isaac River.

5.1.1.2 Native title

The Barada Barna People are the native title holders for the general project region. The EIS identified that native title has been extinguished over land within the MLA and does not form part of the Barada Barna People's Native Title Determination.

5.1.1.3 Landholders

Land within the project area and to the east and south are freehold land parcels. The Winchester Downs property, privately owned, underlies the project's MLA 700065 and 700049. The Wynette property, owned by the proponent, underlies MLA 700050. The Iffley property, owned by the neighbouring proponent Pembroke Olive Downs Pty Ltd, underlies MLA 700051.

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[8] Queensland Government, Queensland Government Statistician's Office, *Bowen Basin population report, 2022*

The project is in the vicinity of the Olive Downs Homestead, located 1.4 km north-east of the project, and the Winchester Downs Homestead, located 6.5 km north-west of the project.

5.1.1.4 Topography and soils

The project area is generally flat to gently undulating with elevations of between approximately 185 metres Australian height datum (AHD) to 235 metres AHD. There are areas of natural and artificial elevation surrounding the project which reach elevations between approximately 310 metres AHD and 471 metres AHD.

The EIS stated the project area and surrounds are dominated by soils with uniform and gradational clays with microrelief, uniform and gradational clays, texture contrast soils on gently undulating plains, texture contrast soils on wide crests, uniform sands on plains and shallow sandy earths. Acid sulfate soils were not observed during the site surveys, and actual or potential acid sulfate soils are highly unlikely to occur within the project area.

5.1.1.5 Contaminated land and unexploded ordnances

The EIS found there are no properties within the project area listed on the contaminated land register or the environmental management register.

5.1.2 Submissions

The key issues regarding land use, tenure and soils raised in submissions on the EIS include:

- the project is proposed within an established coal field
- potential impacts to State land, including from proposed offset locations
- proposed future land tenure of all lands impacted by the project
- potential impacts to a strategic cropping area and Agricultural Land Class A, including from proposed offset locations
- photos of soil sampling sites and description of soil mapping units consistent with the Australian Soil Classification[9]
- risks of erosion and scouring from release of water from the mine site
- preparation of an ESCP in accordance with the *Best Practice Erosion and Sediment Control*[10] by a certified professional in erosion and sediment control
- management measures for sodic soils
- amenity impacts at the Olive Downs Homestead
- potential impacts on the Norwich Park Branch Railway
- potential impacts to the Eagle Downs Mine from overlapping coal tenure.

The key issues regarding progressive rehabilitation and final landform and use raised in submissions on the EIS include:

- location of the proposed residual voids within the Isaac River floodplain

[9] R F Isbell, and the National Committee on Soil and Terrain, *The Australian Soil Classification*, CSIRO Publishing, 3rd edition, June 2023.
[10] International Erosion Control Association, *Best Practice Erosion and Sediment Control*, International Erosion Control Association (Australasian Chapter), November 2008.

- the project proposed residual void without a final land use
- project alternatives considered for the final landform and use to minimise the extent of disturbance and maximise the area of a final land use
- detailed cost-benefit analysis of project alternatives considered for the final landform and use
- detailed rehabilitation completion criteria for disturbed land consistent with the new PRCP framework to achieve land which is safe, stable, does not cause environmental harm and can sustain a post-mining land use
- environment risks associated with proposing residual voids, including risks to cattle, birds and people
- proposed final landform and use do not accord with best practice in mine rehabilitation and is contrary to the Queensland Government's Mined Land Rehabilitation Policy[11]
- groundwater would flow into the proposed residual voids and water quality would become hypersaline over time, creating a legacy problem for future generations
- complete backfill of an additional pit, the South Pit
- justification that the proposed final land use of water storage for agricultural use (stock drinking) can provide suitable drinking water for cattle in the short and long-term
- ongoing maintenance of water within the residual voids to maintain water quality post-mining and after the EA is surrendered
- re-establishment of waterways for fish passage which were diverted by the project and include 'natural like' meanders and features
- rehabilitation of parts of the project area to a wildlife corridor to support and improve the biodiversity and viability of areas of remanent vegetation.

This report has considered each submission received and the responses provided by the proponent in the evaluation of the project. Assessment of key matters is provided below.

5.1.3 Methodology

5.1.3.1 Land use

The EIS was informed by a desktop assessment to define the existing environment associated with the project including a review of:

- Queensland Globe and GeoResGlobe mapping layers
- State Planning Policy[12]
- Regional planning interests (strategic cropping area)
- Queensland Agricultural Land Audit
- Mackay, Isaac and Whitsunday Regional Plan[13] and the Isaac Regional Planning Scheme 2021
- Native title rights and interests

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[11] Queensland Government, Department of Environment and Heritage Protection, Department of Natural Resources and Mines and Queensland Treasury, *Mined Land Rehabilitation Policy*, August 2017.
[12] Queensland Government, Department of Infrastructure, Local Government and Planning, *State Planning Policy*, July 2017.
[13] Queensland Government, Department of Local Government and Planning, *Mackay, Isaac and Whitsunday Regional Plan*, February 2012.

- Contaminated land register and environmental management register.

5.1.3.2 Soils

GT Environmental Pty Ltd (GTE) conducted soil and land suitability surveys in accordance with the *Guidelines for Surveying Soil and Land Resources*.[14] GTE also surveyed 3 potential infrastructure corridors in accordance with guidance provided in *Draft for discussion: soil survey methodology along linear features*.[15] GTE also consulted former Department of Natural Resources and Mines regarding requirements for soil surveys of linear features.

Collection of soil samples for laboratory analysis was undertaken in line with the Land Suitability Assessment Techniques outlined in the *Technical Guidelines for Environmental Management of Exploration and Mining in Queensland*.[16]

Soil characteristics and soil profiles were described in accordance with the Australian Soil and Land Survey: Field Handbook[17] and *Australian Soil and Land Survey: Guidelines for Conducting Surveys*.[18]

5.1.4 Legislation and policy

5.1.4.1 *Mineral Resources Act 1989*

The *Mineral Resources Act 1989* regulates resource exploration and extraction in Queensland. The proponent holds mineral development licence 183, the pre-requisite resource authority for the coal MLA. On 14 June 2019, the proponent applied for MLA 700049, MLA 700050 and MLA 700051. On 3 September 2020, the proponent applied for transportation MLA 700065 for the infrastructure corridor.

The project's joint mining lease/EA application was publicly notified from 16 August to 24 September 2021. Five submissions were received and have been considered in the evaluation of the project.

5.1.4.2 *Regional Planning Interests Act 2014*

The *Regional Planning Interests Act 2014* identifies and protects areas of regional interest and manages the impact of resource activities on areas of regional interest. A strategic cropping area, an area of regional interest, intersects MLA 700049 within the Norwich Park Branch Railway corridor, however this area will not be disturbed by project activities.

5.1.4.3 *Mineral and Energy Resources (Financial Provisioning) Act 2018*

The *Mineral and Energy Resources (Financial Provisioning) Act 2018* amended the EP Act to introduce requirements for a PRCP, which commenced on 1 November 2019. The amendments also prohibited residual voids on flood plains.

The transitional provisions in the *Mineral and Energy Resources (Financial Provisioning) Act 2018* apply to the project as the proponent lodged a site-specific application for an EA on 19 June 2019. The proponent later applied to change the EA application to incorporate MLA 700065, which did not affect the transitional provisions. The transitional provisions mean the project must be assessed against the pre-

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[14] NJ McKenzie, MJ Grundy, R Webster, AJ Ringrose-Voase, *Guidelines for surveying soil and land resources*, CSIRO Publishing, 2nd edition, April 2008.
[15] Soil Science Australia, *Draft for discussions: soil survey methodology along linear features*, 2015.
[16] Department of Minerals and Energy, *Technical Guidelines for Environmental Management of Exploration and Mining in Queensland*, 1995.
[17] The National Committee on Soil and Terrain, *Australian Soil and Land Survey: Field Handbook*, 3rd edition, 2009).
[18] Gunn, R.H, Beatie J.A, Reid R.E, Van De Graaff R.H.M, Australian Soil and Land Survey Handbook: Guidelines for Conducting Surveys, Inkata Press, 1998.

amended EP Act. The proponent must submit a PRCP after the project's EA is issued, following the EIS process.

The *Mineral and Energy Resources (Financial Provisioning) Act 2018* also introduced the Financial Provisioning Scheme, which replaced previous financial assurance arrangements for resource activities under the EP Act. The purpose of the Financial Provisioning Scheme is to improve the State's management of its financial risk in the event holders of a resource activity EA fail to comply with their environmental management and rehabilitation obligations. The annual risk category allocation assessment process will determine whether the proponent, the holder, will be required to provide a contribution to the Scheme's Financial Provisioning Fund and/or provide surety to Queensland Treasury.

5.1.4.4 Mined Land Rehabilitation Policy

The Mined Land Rehabilitation Policy[19] was published in August 2017 and was the precursor to the *Mineral and Energy Resources (Financial Provisioning) Act 2018*. The policy requires land disturbed by mining activities is rehabilitated to a safe and stable landform that does not cause environmental harm and is able to sustain a post-mining land use. The policy sets out the Queensland Government's expectations that mine operators will propose suitable land uses following consideration of the surrounding landscape, community views and the objectives of any local and regional planning strategies.

5.1.5 Land use and tenure impacts and mitigation

5.1.5.1 Landholder

The project construction and operations would directly impact existing cattle grazing operations within the Winchester Downs property (privately owned), the Wynette property (owned by the proponent) and the Iffley property (owned by Pembroke Olive Downs Pty Ltd). The EIS found the project would disturb approximately 14% (approximately 4,780 ha) of Winchester Downs, 37% (approximately 2,180 ha) of Wynette and less than 1% (approximately 175 ha) of Iffley properties.

The EIS stated the project area is mapped and ground-truthed as Class A1 agricultural land (approximately 1,077 ha) and Class B (approximately 21 ha), however, it was noted this land is currently used for cattle grazing, not cropping.

The EIS stated that there has been extensive and ongoing engagement between the proponent and landholders directly affected by the project regarding operational issues such as land access and compensatory negotiations. Section 279 of the *Mineral Resources Act 1989* requires compensation for the landholders to be settled before a mining lease can be granted over a landholder's land, whether by agreement between the parties or by determination of the Land Court. The proponent advised that negotiation with the Winchester Downs landholder is progressing and compensation with the Iffley landholder was agreed in August 2019.

The proponent has committed to provide notice to directly affected landholders and residents of nearby homesteads of project activities that may potentially impact the amenity and activities of the properties. The proponent has also committed to continue engagement with local and surrounding landholders to monitor overall project impacts.

The EIS predicted that air and noise quality objectives would be exceeded at the nearest sensitive receptor, the Olive Downs Homestead. To manage impacts at the Olive Downs Homestead, the

[19] Queensland Government, Department of Environment and Heritage Protection, Department of Natural Resources and Mines and Queensland Treasury, *Mined Land Rehabilitation Policy*, August 2017.

proponent has entered into a non-residency agreement with the landholder. This is discussed further in section 5.3.5.1.1 and section 5.8.1.1.

Section 5.1.6 discusses the proposed progressive rehabilitation and final land use of the project site.

5.1.5.1.1 Flooding impacts on surrounding properties

Submitters on the EIS raised concerns that the proposed flood levees to prevent inundation of mining pits would impact surface water flows north of the project area, which would consequently impact agricultural production in this area. The proponent determined that impacts from 1% and 0.1% annual exceedance probability (AEP) and probably maximum flood (PMF) events would be generally localised (i.e., restricted to the MLA) and relatively minor in magnitude. A small area west of the MLA boundary previously unaffected by flooding was predicted to be inundated during a PMF flood event, however, impacts on agricultural land were determined not to be significant. Potential impacts on surface water are discussed in section 6.6.2.

5.1.5.1.2 State land

The Department of Resources submitted on the EIS raising potential impacts to State land, including from proposed offset locations, and the proposed future land tenure of all lands impacted by the project. The EIS stated all land within the MLA would remain freehold land parcels once mining and rehabilitation activities have finalised.

The proponent has committed to develop a tenure management plan in consultation with the Department of Resources prior to construction. The tenure management plan for components related to the project would include:

- all land impacted by the project
- current land tenure of all lands impacted by the project
- proposed future land tenure of all lands impacted by the project
- proposed future management and ownership arrangements for the lands associated with the project
- final proposed land tenure, landform and rehabilitation outcomes that will be achieved at the decommissioning of the project and how these tenures will interact with the surrounding lands following decommissioning.

5.1.5.2 Winchester Quarry

The Winchester Quarry operates in the northern part of the project area, adjacent to the existing Norwich Park Branch Railway and proposed Railway Pit. The Railway Pit partially overlaps the Winchester Quarry and would impact the operation of the quarry (Figure 5.1).

To manage the impacts of the project on access to and operation of the Winchester Quarry, the proponent has committed to enter into an agreement with Quarrico Products Pty Ltd, operator of the Winchester Quarry, and the landholder of Lot 5 CNS90, holder of the quarry's EA (EPPR0090713).

The EIS stated that for the first year of the construction phase, the Winchester Quarry would continue to operate in accordance with the quarry's EA and any access interactions would be in accordance with the agreement between the parties. During this time, the quarry area would not form part of the operational area of the project and would be excluded from the proponent's workplace health and safety responsibility.

The proponent has committed to developing an agreement with the holder of EPPR0090713 requiring the quarry operator to cease operations on the giving of advanced notice by the proponent. Through the proposed agreement, quarry operations will cease before the project's mining operations commence on the western side of the existing rail line.

The EIS stated the project would extract material from the Winchester Quarry, or purchase material from other quarries in the region, for use in the construction of the project.

I am satisfied that a commercial agreement between the parties would address potential project impacts on the operation of the Winchester Quarry.

The proponent proposed the quarry area to be retained as a quarry following the cessation of mining. I have stated a condition for the EA to require the quarry area to be rehabilitated to support a final land use of cattle grazing, which is discussed further at section 5.1.6.3.1.

5.1.5.3 Norwich Park Branch Railway

The project construction and operation have the potential to impact the Norwich Park Branch Railway which transects the project area. The project proposes to construct a new rail spur and loop within the MIA (MLA 700049), with an approximate total rail length of 8 km; an overpass over the railway for the infrastructure corridor to connect to the MIA; and the proposed Railway, North-West, West and Main North Pits abut the railway corridor.

The EIS stated the overpass would be designed to deliver coal from the Railway Pit and North-West Pit to the CHPP within the MIA and would include services such as the raw water pipeline, ETL and fibre optic cable.

To allow for the safe operation of the Norwich Park Branch Railway, the overpass would be designed in accordance with relevant DTMR and Queensland Rail/Aurizon standards to allow passage for both light and heavy vehicles, with suitable safety barrier separation and safety barriers and berms on either side, and access track for rail maintenance.

The rail spur would connect to the existing Norwich Park Branch Railway and would transport project coal to ports for export. The proponent has committed that the project rail spur will be designed and constructed in consultation with Aurizon and in accordance with Aurizon's requirements to access its Central Queensland Coal Network to minimise potential impacts on the existing environment in accordance with relevant guidelines, including the Guide to Development in a *Transport Environment: Rail*.[20]

To manage potential impacts on the Norwich Park Branch Railway, I have recommended a condition to the Minister for Transport and Main Roads that the project must not disrupt the safety and operational integrity of the Norwich Park Branch Railway corridor, including all transport infrastructure or the land supporting this infrastructure from ground movement and vibration.

The project's potential impacts on the operation of the Norwich Park Branch Railway are discussed further in section 5.4.4.2.

I am satisfied that proponent commitments to design project infrastructure in accordance with relevant guidelines and recommended conditions in Appendix 3 of this report would minimise and mitigate impacts on the Norwich Park Branch Railway.

[20] Queensland Government, Department of Transport and Main Roads, *Guide to development in transport environment: Rail*, 2015.

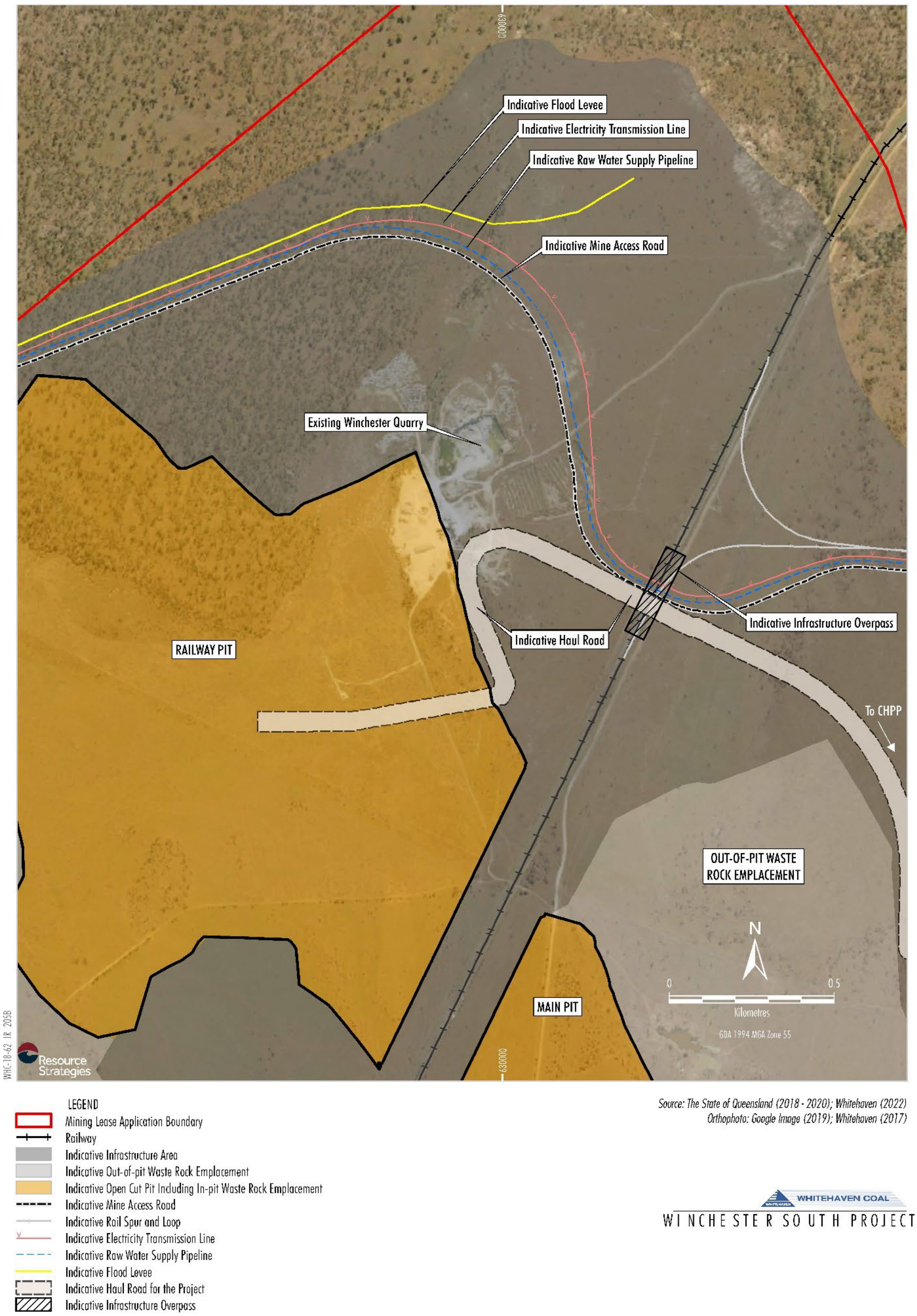

Figure 5.1 Winchester Quarry and the project

5.1.5.4 Resource tenures

5.1.5.4.1 Coal tenures

The proposed infrastructure MLA 700065 would contain the ETL, raw water supply pipeline and access road, and would transect the neighbouring Eagle Downs Mine (ML 70389). The Eagle Downs Mine is partially constructed and currently on hold. The Eagle Downs Mine is managed by Eagle Downs Coal Management Pty Ltd on behalf of joint venture parties Aquila Resources Pty Ltd and South32 Limited.

A submitter on the EIS raised concerns about the overlapping tenure including sterilisation of a coal resource, operational delays at the Eagle Downs Mine due to vegetation clearing and development within the corridor, potential chemical spill and floodings risks from the construction of project infrastructure, overlapping health and safety responsibilities, and health and safety risks to employees of the Eagle Downs Mine during construction and operational phases.

The EIS stated the infrastructure corridor would result in minimal surface disturbance. The project's infrastructure MLA 700065 would have surface rights while the Eagle Downs Mine (ML 70389) would have underground rights over land within the infrastructure corridor. The proponent consulted with Eagle Downs Coal Management Pty Ltd regarding the preferred alignment of the infrastructure corridor to avoid any potential sterilisation of a coal resource by aligning along a faulted zone and to minimise potential impacts at the Eagle Downs Mine by avoiding a ventilation shaft. To manage interactions between the 2 mines and to mitigate impacts at the Eagle Downs Mine, the proponent has committed to ongoing engagement with Eagle Downs Coal Management Pty Ltd.

The project's potential impacts on the Eagle Downs Mine regarding health and safety risks are discussed in section 5.8.3.1.1, air quality impacts are discussed in section 5.3.5.1.1 and noise impacts are discussed in section 5.8.1.1.

Under section 271AB(2) of the *Mineral Resources Act 1989*, the Minister for Resources may grant the project's MLA 700065 if satisfied the project's activities are carried out in a way that is compatible with activities at the Eagle Downs Mine (authorised under ML 70389) and co-existence will optimise the development of the State's resources. If the Minister for Resources decides to grant MLA 700065, sections 271AB(6) and (8) of the *Mineral Resources Act 1989* require the proponent to enter into a co-existence agreement with Eagle Downs Coal Management Pty Ltd and for both parties to negotiate in good faith.

At the cessation of mining, the proponent has committed to assess the remaining infrastructure to determine whether it would be decommissioned and removed or retained for future use as part of the proposed final land use, which is discussed below at section 5.1.6.3.

I am satisfied that ongoing consultation and implementation of the co-existence agreement would manage impacts associated with overlapping tenure.

The EIS also found the project would overlap with the exploration permit for coal (EPC) 1951 (held by Stanmore SMC Pty Ltd) and EPC 1949 (held by Pembroke Olive Downs Pty Ltd). In accordance with section 248 of the *Mineral Resources Act 1989*, the EPC holders provided consent for the MLA.

The proponent has committed to consult with owners of neighbouring Eagle Downs, Olive Downs, Daunia and Poitrel mines and Moorvale South Project regarding interactions between the mines and potential opportunities to cooperate regarding mine water sharing, data sharing and management of cumulative impacts in the region.

5.1.5.4.2 Petroleum tenures

The EIS stated petroleum lease (PL) 485, held by South32 Eagle Downs Pty Ltd, overlaps with the infrastructure corridor (MLA 700065) and a small section of land within MLA 700049. The proponent has consulted South32 Limited, parent company of South32 Eagle Downs Pty Ltd, regarding the interactions between the overlapping mining leases. In accordance with section 130 of the *Mineral and Energy Resources (Common Provisions) Act 2014*, the proponent must enter a joint development plan with the PL holder. This plan would be finalised post the EIS process. The EIS determined the small overlap of MLA 700049 is a spatial error which will be corrected once the MLA is finalised.

The EIS stated authority to prospect 1103, held by Ch4 Pty Ltd (now Arrow Energy Limited), overlaps with the entire project area. The proponent has consulted with Arrow Energy Limited in accordance with sections 121 and 122 of the *Mineral and Energy Resources (Common Provisions) Act 2014*. The EIS stated Arrow Energy Limited confirmed the project has right of way and will decommission pilot wells located within land covered by the MLAs.

5.1.5.5 Soils

The EIS identified that potential impacts to soil would occur during construction and operational phases from vegetation clearing and earthworks associated with the construction of access tracks, infrastructure corridor, project infrastructure and the mine infrastructure area, including stockpiling of soils. The proponent would progressively clear vegetation and strip soil ahead of open cut mining operations. Soil stockpile volumes and locations would vary over the life of the project and additional temporary soil stockpiles may be constructed within the approved disturbance area and/or unused areas of the waste rock emplacements. Stockpiling procedures would aim to minimise soil degradation prior to its use for progressive rehabilitation. The proponent has committed to maintain a soil inventory for the life of the project which will account for the volumes and locations of soil to be progressively stripped, stockpiled and reapplied.

I have stated a condition in Appendix 1 of this report for the proponent to prepare and implement an ESCP prior to any ground disturbance. The ESCP must:

(a) be consistent with the latest version of the *Best Practice Erosion and Sediment Control*[21]; and

(b) demonstrate how erosion and sediment control measures adequately minimise the release of sediment to receiving waters and must include at least the following:

  (i) assessment of all catchment areas

  (ii) assessment of soil types, including sodic dispersive soils

  (iii) specify design criteria for erosion and sediment control structures.

(b) detail the locations and descriptions of all erosion and sediment control measures

(c) provide an audit schedule to ensure erosion and sediment controls are being maintained.

I also require the proponent to review the ESCP annually to ensure actual and potential environmental impacts are effectively managed.

Land degradation in the form of soil erosion reduces the productive capacity of the land and can impact water quality through sediment and nutrient loads, which is discussed at section 6.6.2, and can impact air quality which is discussed in section 5.3.5.1.1.

I am satisfied the proponent commitments and stated conditions would adequately manage impacts on soil and disturbed land which would be progressively rehabilitated to support proposed final land uses approved in the project's PRCP.

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[21] International Erosion Control Association, *Best Practice Erosion and Sediment Control*, International Erosion Control Association (Australasian Chapter), November 2008.

5.1.5.6 Contaminated land

The unsuitable storage, handling and management of chemicals, explosives and wastes during project construction and operation have the potential to contaminate land.

To prevent or reduce the potential for land contamination from the project, the proponent has committed to implement appropriate mitigation and management measures. Where unexpected contamination is identified, work will cease in that area and action taken to appropriately delineate the contaminated soil or fill material, which will be managed and/or remediated and validated under the supervision of a suitably qualified person. This commitment is reinforced by conditions in Appendix 1 of this report that require the proponent to rehabilitate and submit a site investigation report for an area that has been used for notifiable activities, or the proponent is aware is likely to be contaminated, to ensure the land is suitable for the proposed final land use.

5.1.6 Progressive rehabilitation and final land use

The project would progressively disturb approximately 6,950 ha of land over the project's 31 year life. In accordance with the *Mined Land Rehabilitation Policy*,[22] the proponent must progressively rehabilitate mined land as it becomes available to minimise the risk of environmental impacts and reduce cumulative impacts of disturbed land. Land disturbed by mining activities is considered to be rehabilitated when it can be demonstrated it is safe, stable, does not cause environmental harm (non-polluting), and is able to sustain a final land use approved in the project's PRCP.

In evaluating the EIS, I have considered the transitional provisions of the *Mineral and Energy Resources (Financial Provisioning) Act 2018* and the requirement for the proponent to submit a detailed PRCP to DES for approval after the project's EA is issued, following the EIS process.

Mining would progress in 4 broad operational stages across 28 years and would extract up to 17 Mtpa of ROM coal and 11 Mtpa of product coal from 6 mining pits: Railway Pit, North-West Pit, West Pit, Main Pit North, Main Pit South and South Pit (Figure 5.2). The proponent would progressively rehabilitate disturbed areas as they became available using mineral waste (waste rock and coal rejects) and stockpiled soil and vegetation stripped ahead of open cut mining operations.

5.1.6.1 Options analysis for proposed final landform and land use

In proposing a final land use, the proponent consulted with the community and potentially affected landholders during preparation of the EIS to discuss aspirations for the land post-mining. The draft EIS proposed that following the cessation of mining, the Railway Pit would be completely backfilled, and the other pits would remain as residual voids without a land use, referred to as NUMAs. Submitters on the EIS raised concerns that the EIS did not provide adequate details of alternative final land uses considered for the residual void areas, including a comparison of the proposed NUMAs against the alternative options. Submitters also raised concerns whether the final landform minimised the extent of disturbance and whether the residual voids were proposed within the Isaac River floodplain.

5.1.6.1.1 Consideration of alternative final landforms

In response to submissions on the draft EIS, the proponent considered alternative mine plans and backfilling options to minimise residual voids and ensure disturbed land is safe, stable, non-polluting and can support a final land use. The revised draft EIS provided an analysis of environmental and economic effects for the following alternatives:

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[22] Queensland Government, Department of Environment and Heritage Protection, Department of Natural Resources and Mines and Queensland Treasury, *Mined Land Rehabilitation Policy*, August 2017.

- Scenario 1: each residual void completely backfilled, with no residual void water body
- Scenario 2: each residual void backfilled to a level 5 metres above the pre-mining groundwater level
- Scenario 3: exposed coal seams within each residual void covered with waste rock.

These scenarios were applied to all residual voids, without an individual assessment for each void. Enclosure 1 of the revised draft EIS provides details of the environmental and economic effects of each scenario.

5.1.6.1.2 Optimised final landform

In addition to the above scenarios, the proponent reviewed the project's mine plan and sequence with the aim of reducing the number of residual voids in the final landform, reducing impacts on threatened species habitat and investigating alternative final land uses for the residual void areas.

The revised draft EIS proposed an optimised final landform which resulted in the proposal to:

- backfill an additional pit, the South Pit, to support a low intensity grazing final land use
- change all NUMAs to a final land use of water storage for agricultural use (stock drinking) for the 3 remaining residual voids
- smooth low-walls to minimise slopes to approximately 10 degrees (°) or lower to ensure the slope down to the residual void is practical for stock access
- re-establish the northern waterway to provide for fish passage which includes 'natural like' meanders and features
- residual voids would behave as groundwater sinks, preventing off-site migration of groundwater in perpetuity
- all residual voids would be located outside the Isaac River floodplain (up to and including a probable maximum flood).

The proponent proposed to rehabilitate most of the project area (approximately 89%) to a final land use of low intensity grazing, and the remaining area would be water storage for agricultural use (stock drinking) (approximately 11%) and waterways to provide for fish passage (approximately 0.02%) (Figure 5.3). The water in the Main Void, West Void and North-West Void is proposed to be used for stock watering.

The proponent estimated the rehabilitation costs to achieve the optimised final landform (Figure 5.3) would be $103 million in NPV terms ($389 million in undiscounted terms) and the project life would be extended by another year, which would also result in additional greenhouse gas, dust and noise emissions, and amenity impacts.

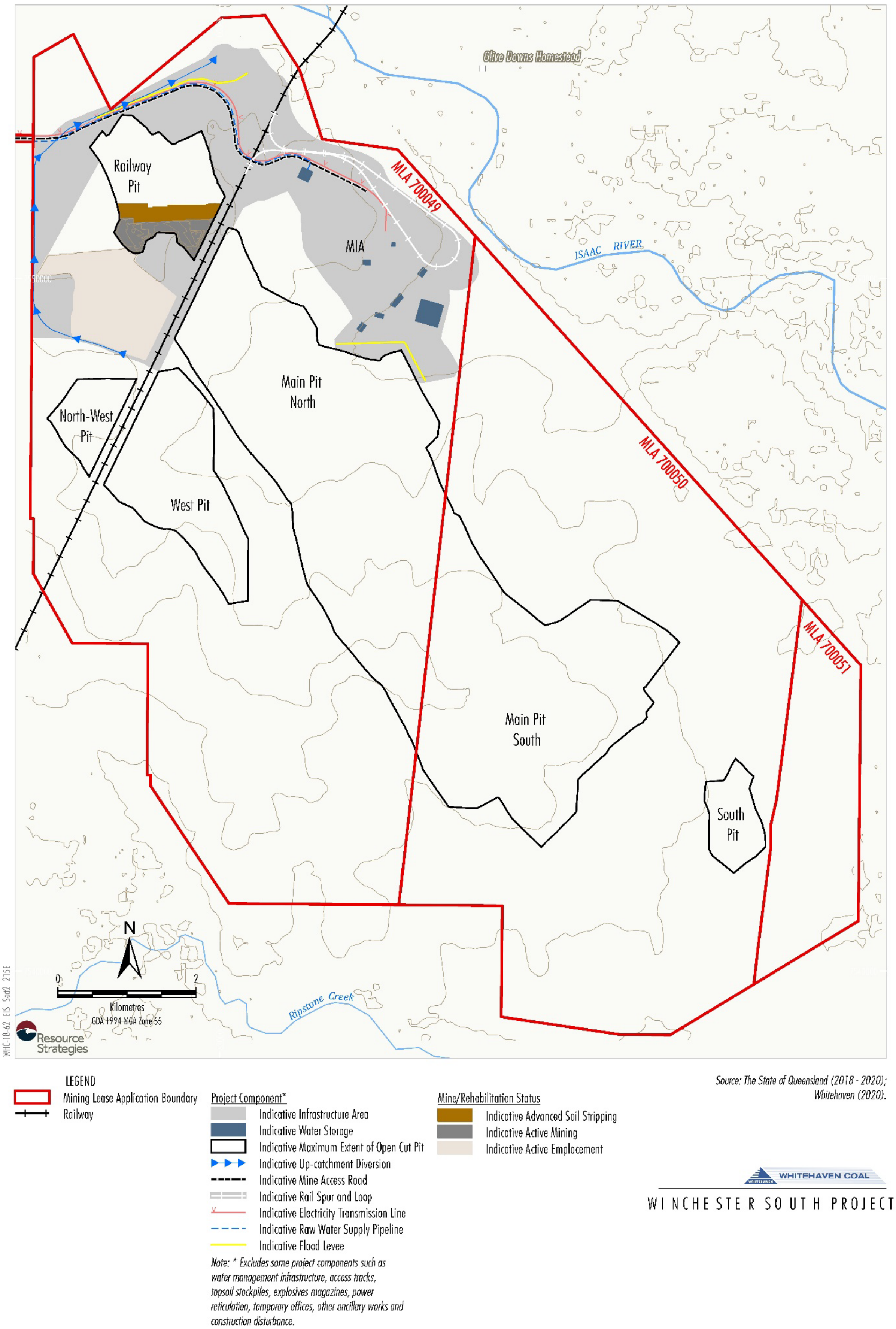

Figure 5.2 General project arrangement at the start of operations – project year 2

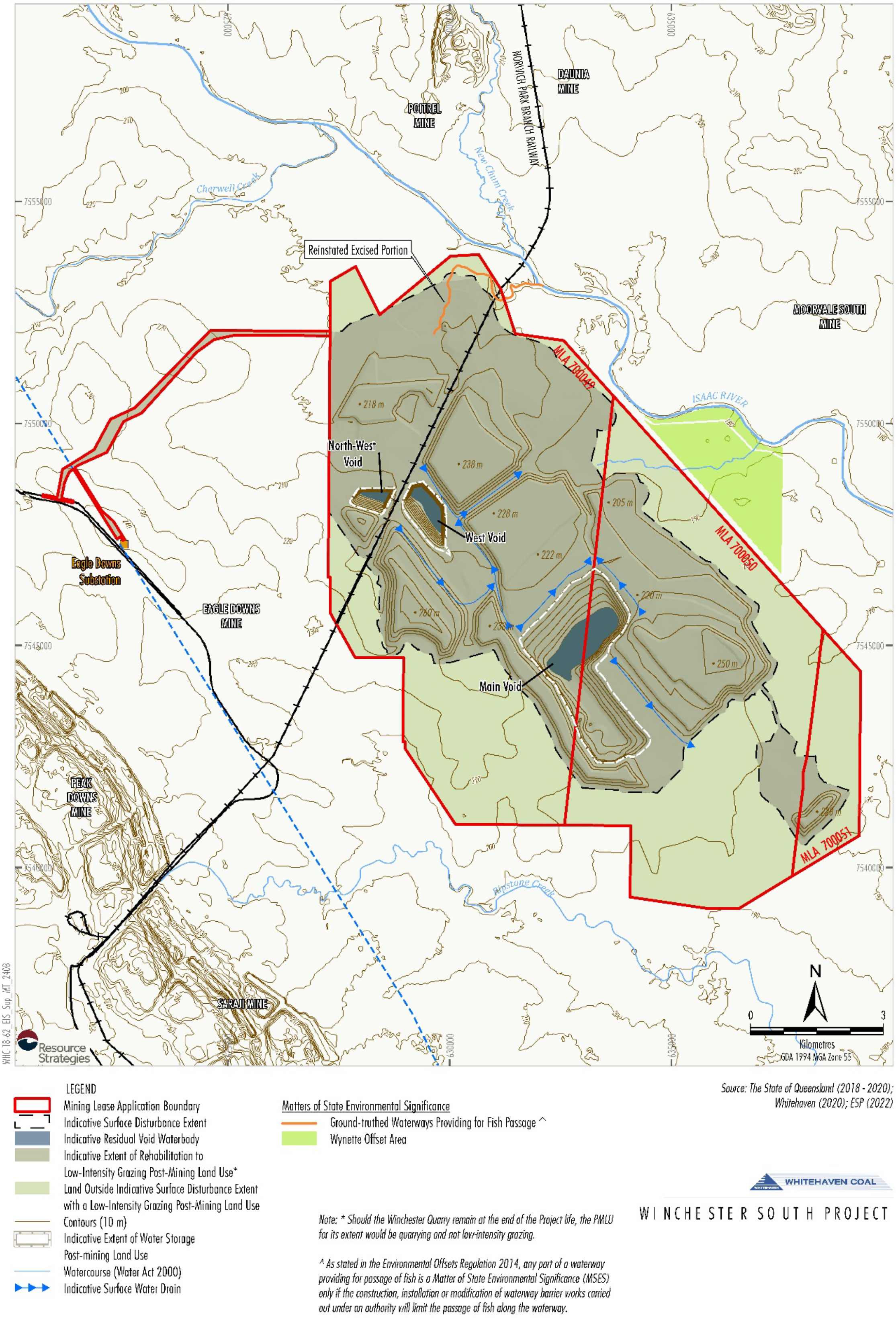

Figure 5.3 Project's proposed final landform and uses

5.1.6.2 Residual voids with a final land use of water storage for agricultural use (stock drinking)

As discussed in section 5.1.6.1.2, the proponent proposed in the revised draft EIS to partially backfill the Main Void, West Void and North-West Void to support a final land use of water storage for agricultural use (stock drinking). A summary of considerations for the final land use and conclusion for each void is presented below.

5.1.6.2.1 Water storage for agricultural use (stock drinking)

The EIS stated that salts and minerals introduced into the residual voids through groundwater inflows, surface water catchment run-off and rainfall would accumulate and concentrate over time due to evaporation.

The proponent used a residual void water model (void model) to predict the long-term water level and salinity in each void. *Applying leading practice modelling of residual mine voids for mine rehabilitation planning*[23] published by Office the Queensland Mine Rehabilitation Commissioner provides that predictions from void water balance models need to be obtained over an extended timeframe (typically hundreds of years) to reflect the full range of historical and potential future hydrologic conditions and establish when an equilibrium condition for water levels and/or water quality is reached. Given the extended timeframe of water balance predictions, the impact of future climate change should also be considered in water balance model predictions. The result for each void is detailed below, with the residual void water model discussed further in section 6.6.2.1.2.

The void modelling adopted a water abstraction rate of 70 megalitres (ML)/year, with 45% (31.5 ML/year) proposed to be extracted from the Main Void, 40% from the West Void (28 ML/year) and 15% (10.5 ML/year) from the North-West Void. The abstraction rate of 70ML/year was based on a stocking rate of 2.4 ha per head of cattle within the MLA area and an average annual water consumption rate of 15,000 litres (L) per year per head of cattle.

The EIS stated that each void could provide a sustainable and reliable supply of water for cattle as the predicted salinity was less than 6,000 µS/cm (up to 4,000 mg/L total dissolved solids (TDS)) for the majority of the time. The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Primary Industries* (stock water guideline)[24] identifies that the preferred salinity limit for cattle consumption is less than 6,000 µS/cm, with an upper limit of 7,500 µS/cm. The stock water guideline states that there is no loss of production up to the upper limit, with salinity concentrations greater than 7,500 µS/cm expected to adversely affect cattle health. To meet the salinity limits within the stock water guideline the proponent proposed to abstract water for consumption by cattle (removes salt from the water), as well as pump water from the West and North-West Voids to the Main Void, or to mix with water from the Main Void at the point of use (e.g., troughs, tanks, dams).

Submitters on the revised draft EIS raised concerns regarding the adequacy of the void modelling and assumptions used, as well as the suitability of the optimised final landform. To address submitter concerns, the proponent modelled the salinity of void water without abstraction for agricultural use (stock drinking). The void model demonstrated water in the West and North-West Voids would exceed the preferred salinity limit for cattle consumption after approximately 150 and 30 years respectively with no abstraction, and the Main Void water would remain suitable for use for approximately 500 years.

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[23] Queensland Government, Office of the Queensland Mine Rehabilitation Commissioner, *Applying leading practice modelling of residual mine voids for mine rehabilitation planning: Technical paper 3*, March 2023.
[24] Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3 Primary Industries*, October 2000.

Advice from DES during the evaluation of the EIS determined that the stocking rate of 2.4 ha per head of cattle within the MLA area is overly optimistic for rehabilitated landforms in the Bowen Basin and is likely to cause erosion and a reduction in groundcover. A review of relevant literature indicated that a stocking rate of 4.6 ha per head of cattle was more appropriate.

5.1.6.2.2 Main Void

The void model predicted groundwater inflows to the Main Void would range between 0 ML/day to 1.8 ML/day, with most of the water being indirect percolation of rainwater through backfilled spoil. The maximum modelled water level is around 59 metres below the full supply level (FSL) (the level at which the Main Void would spill to the surrounding environment). The Main Void is not predicted to spill under any climate scenario.

The void model predicted that salinity in the first 500 years would range from 1,000 μS/cm up to 4,000 μS/cm during wetter climatic conditions, with spikes of up to 6,300 μS/cm during drier climatic conditions when the stored volume within the void is lower because of low rainfall and high evaporation rates. The predicted salinity concentrations in the Main Void would rarely exceed (2% of the time) the preferred salinity limit for cattle consumption (6,000 μS/cm or 4,000 mg/L TDS) and would not exceed the upper limit for cattle consumption (7,500 μS/cm or 5,000 mg/L TDS).

After 500 years, the void model predicted salinity would continue trending upwards to 8,500 μS/cm, with spikes of up to 13,600 μS/cm. The void model predicted the Main Void salinity would reach equilibrium within 2,500 years.

The proponent also proposed pumping the higher salinity water from the West and North-West Voids into the Main Void to maintain salinity levels within the smaller voids. This would increase the salinity in the Main Void by around 100 μS/cm (on average), which would remain within the preferred limit for cattle consumption (6,000 μS/cm or 4,000 mg/L TDS).

Submitters on the EIS raised concerns that the void modelling solely considered salinity and didn’t consider potential impacts because of the accumulation or enrichment of metals and metalloids, major ions, nutrients, acidity and hydrocarbons within the residual voids. The proponent advised that the abstraction of water for agricultural use (stock drinking) would limit the accumulation or enrichment of metals and metalloids and proposed to monitor water quality parameters to ensure the water is suitable for cattle consumption. The proponent proposed to manage the risk of excess nutrients and algal blooms by restricting cattle access to the water storages and reticulating water to tanks, dams and troughs for consumption.

DES provided advice during the evaluation of the EIS that the Main Void should be partially backfilled to cover the coal seams. DES took a precautionary approach to recommend the partial backfill to the level of exposed coal seams due to the insufficient information and rationale for the Main Void sustaining the proposed final land use over the long term. The covering of the coal seams or backfill to the level of the coal seams was proposed as a method to minimise groundwater inflow into the Main Void and reduce the rate of salt accumulation. The EIS determined that direct groundwater inflows from the coal seams make up 3% of total inflows to the Main Void, therefore it would be unlikely to have a material impact on the salinity of void water over time.

The partial backfill to the level of the exposed coal seams in the Main Void was not evaluated in the EIS. This alternative landform option is a scenario between Scenario 2 and Scenario 3, discussed above at section 5.1.6.1.1. The void model of Scenario 3 (exposed coal seams within each residual void covered with waste rock) predicted in higher salinity within the Main Void when compared to the optimised final landform. It was not clear if this was due to the change to groundwater inflows to the Main Void, or because of changed void geometry.

Conclusion: Main Void

In balancing the environmental, economic and social effects of the Main Void, I consider the proposed final land use of water storage for agricultural use (stock drinking) to be acceptable. I have considered the risks and benefits of the proponent's proposal, as well as other landform and land use alternatives for the Main Void area.

I am satisfied the proponent has demonstrated that the Main Pit could be progressively rehabilitated to a final landform that will be safe, stable, non-polluting and able to support a final land use of water storage for agricultural use (stock drinking). I am satisfied the proponent has demonstrated the proposed footprint of the Main Void is as small as practicable, when considering the environmental risks and associated costs and benefits of a complete backfill, and that the water in the Main Void would broadly comply with the stock water guideline for approximately 500 years even without any abstraction.

The requirement to rehabilitate the Main Pit as per the optimised final landform to support a final land use of water storage for agricultural use (stock drinking) is in the public interest as it provides certainty on rehabilitation outcomes, reduces the cost of backfilling to the proponent, which in turn supports the feasibility of the mine going ahead, allowing benefits to the State of Queensland to be realised.

To ensure the final landform for the Main Void meets the mined land rehabilitation criteria and to address submitter concerns, I have stated conditions in Appendix 1 of this report that the final land uses to be water storage for agricultural use (stock drinking) for the void water body, native ecosystem for highwalls/end walls and low intensity grazing for low walls and ramps. Given that direct groundwater inflows from the coal seams make up 3% of total inflows to the Main Void, and environmental outcomes do not justify the additional costs associated with covering or backfilling the Main Void to the level of the coal seams, I have not stated a requirement to cover or backfill to the level of the coal seams.

I have also stated requirements that the void water quality must comply with the preferred salinity limit of (6,000 µS/cm or 4,000 mg/L TDS). I also require the proponent to monitor water quality within the Main Void (including but not limited to pH, electrical conductivity, sulfate and a broad suite of soluble metals/metalloids) to demonstrate that the water quality meets the relevant criteria and is suitable for cattle consumption.

I require the low wall slopes to be shaped to 15% or less to allow for stock access to the void water to remove the pumping requirement, and for the low walls and ramps to have at least 4 perennial species suitable for pasture established with greater than 70% groundcover and weed presence controlled.

I require the highwalls/end walls to be shaped to 25% or less and for the highwalls/end walls to establish trees, shrub and groundcover species and for bunding, security fencing and signage to be erected to prevent public access. I also require a registered professional engineer of Queensland (RPEQ) to certify that the Main Void is safe and stable.

These conditions must be included in the project's PRCP, to be submitted following the EIS process. During the rehabilitation planning part of the PRCP, the proponent must also provide details on the mechanisms and infrastructure required to ensure ongoing suitability and use of void water for stock drinking. These will need to demonstrate that the accumulation of salt is limited, the likelihood of excess nutrients and algal blooms is minimised, and that management of void water will not cause environmental harm.

5.1.6.2.3 West Void

The void model predicted groundwater inflows to the West Void would range between 0.1 ML/day to 0.9 ML/day, with most of the water being indirect percolation of rainwater through backfilled spoil. The maximum modelled water level was approximately 87 metres below the FSL. The West Void was not predicted to spill under any climate scenario.

The void model predicted that the West Void was more susceptible to climate change scenarios than the Main Void, which accelerated salinity concentrations. The void model predicted that salinity would range from 2,000 μS/cm up to 3,800 μS/cm during wetter climatic conditions, with spikes of up to 8,500 μS/cm during drier climatic conditions when the stored volume within the void is lower because of low rainfall and high evaporation rates. The void model predicted the West Void would reach equilibrium within 100 years.

As discussed in section 5.1.6.2.1, submitters on the EIS raised issues regarding the suitability of the proposed final land use given the requirement to actively and consistently abstract water to meet salinity limits within the stock water guidelines and the ongoing maintenance of the void water after the EA is surrendered. The proponent stated the void model predicted salinity concentrations in the West Void would occasionally exceed (20% of the time) the preferred salinity limit for cattle consumption (6,000 μS/cm or 4,000 mg/L TDS) and would rarely exceed (5% of the time) the upper limit for cattle consumption (7,500 μS/cm or 5,000 mg/L TDS). To meet the stock water guidelines, the proponent proposed to mix the water in the West Void with water from the Main Void.

The responsibility to actively manage the water quality within the West Void would transfer to the landholder after the EA is surrendered. The proponent has consulted with the landholder of the Winchester Downs property regarding the proposed final land use and ongoing maintenance of the West Void.

During the evaluation of the EIS, additional issues with the final landform for the West Void were identified including drainage patterns in the final landform, the cattle stocking rate and the steepness of the low-wall slope. The final landform for the West Void will directly capture 2% of the catchment for the central unnamed waterway and divert a further 23% from the central unnamed waterway to Ripstone Creek, resulting in a total 25% catchment excision. This will reduce natural flows in the central unnamed waterway and could have potential long-term impacts on the success of the Wynette offset area. I have stated a condition for the EA requiring the central unnamed waterway to be reinstated post-mining. The Wynette offset area is discussed further in section 6.6.1.3.1.

A reduced stocking rate of 4.6 ha per head of cattle would reduce the water demand from the West Void from 28 ML/year to 13.8 ML/year, which could result in acceleration of salinity over time. The low-wall slope for the West Void would have slopes up to 17° (29%), which is greater than the maximum recommended grazing slope of 15% in guidelines published by the Office of the Queensland Mine Rehabilitation Commissioner[25]. This may create difficulties for cattle to access the water in the void and cause increased erosion and failure of revegetation after rehabilitation.

Complete backfill of the West Void

The proponent analysed the feasibility of completely backfilling the West Void to ground level (in isolation of the other 2 residual voids). The rehabilitation costs would be an additional $38 million in NPV terms (or $322 million in undiscounted terms); a reduction in net economic benefits to Queensland by $6 million in NPV terms; an additional 94 ha of land available for low-intensity grazing; removal of approximately 28 ML/year of reliable water storage supply; additional greenhouse gas emissions, dust and noise emissions and amenity impacts.

The EIS stated the additional 94 ha of grazing land would have an estimated annual benefit of $140,000 in undiscounted terms, while the water supply for agricultural use (stock drinking) has an estimated annual benefit of $390,000 in undiscounted terms. Meaning there would be a net annual disbenefit of backfilling the West Void of $250,000 in undiscounted terms.

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[25] Queensland Government, Office of the Queensland Mine Rehabilitation Commissioner, *Rehabilitated mined land suitability for beef cattle grazing in the Bowen Basin*, October 2023.

The proponent stated when considering the above factors, backfilling the West Void would result in less benefit to the Queensland community in comparison to the proposed final landform and use and is not considered to be in the public interest.

DES provided advice during the evaluation of the EIS that the West Void should be completely backfilled to support a final land use of low intensity cattle grazing. DES took a precautionary approach to recommend the complete backfill due to the insufficient information and rationale for the West Void sustaining the final land use over the long term. The backfill would minimise key environmental risks associated with a residual void which would become hypersaline over the long-term. DES advised that the proponent could submit further detailed information during the PRCP process, after the final EA is issued, to demonstrate that the West Void can support the proposed final land use.

Conclusion: West Void

In balancing the environmental, economic and social effects of the West Void, I consider the proposed final land use of water storage for agricultural use (stock drinking) to be acceptable. I have considered the risks and benefits of the proponent's proposal, as well as other landform and land use alternatives for the West Void area. I have considered deferring the selection of final land use to the PRCP process or requiring the complete backfill of the West Pit to support a final land use of low-intensity grazing.

I am satisfied the proponent has demonstrated that the West Pit could be progressively rehabilitated to a final landform that will be safe, stable, non-polluting and able to support a final land use of water storage for agricultural use (stock drinking). I am satisfied the proponent has demonstrated that proposed footprint of the West Void is as small as practicable, when considering the environmental risks and associated costs and benefits of a complete backfill, and that the water in the West Void would broadly comply with the stock water guideline for approximately 150 years even without any abstraction.

The requirement to rehabilitate the West Pit as per the optimised final landform to support a final land use of water storage for agricultural use (stock drinking) is in the public interest as it provides certainty on rehabilitation outcomes, reduces the cost of backfilling to the proponent, which in turn supports the feasibility of the mine going ahead, allowing benefits to the State of Queensland to be realised.

To ensure the final landform for the West Void meets the mined land rehabilitation criteria and to address submitter concerns, I have stated conditions in Appendix 1 of this report for the final land uses to be water storage for agricultural use (stock drinking) for the void water body, native ecosystem for highwalls/end walls and low intensity grazing for low walls and ramps. I have stated requirements that the void water quality must comply with the preferred salinity limit of (6,000 µS/cm or 4,000 mg/L TDS). I also require the proponent to monitor water quality within the West Void (including but not limited to pH, electrical conductivity, sulfate and a broad suite of soluble metals/metalloids) to demonstrate that the water quality meets the relevant criteria and is suitable for cattle consumption. I require the low wall slopes to be shaped to 15% or less to allow for stock access to the void water to remove the pumping requirement, and for the low walls and ramps to have at established at least 4 perennial species suitable for pasture, which have greater than 70% groundcover and weed presence controlled. I require the highwalls/end walls to be shaped to 25% or less and for the highwalls/end walls to establish trees, shrub and groundcover species and for bunding, security fencing and signage to be erected to prevent public access. I also require a geotechnical assessment to conclude that the West Void is safe and stable.

These conditions must be included in the project's PRCP, to be submitted following the EIS process. During the rehabilitation planning part of the PRCP, the proponent must also provide details on the mechanisms and infrastructure required to ensure ongoing suitability and use of void water for stock drinking. These will need to demonstrate that the accumulation of salt is limited, the likelihood of excess nutrients and algal blooms in minimised, and that management of void water will not cause environmental harm.

5.1.6.2.4 North-West Void

The void model predicted groundwater inflows to the North-West Void would range between 0.1 ML/day to 0.55 ML/day, with most of the water being indirect percolation of rainwater through backfilled spoil. The maximum modelled water level is around 78m below FSL. The North-West Void is not predicted to spill under any climate scenario.

The void model predicted that salinity would range from 2,000 µS/cm to 9,000 µS/cm during wetter climatic conditions, with spikes of up to 18,000 µS/cm during drier climatic conditions when the stored volume within the void is lower because of low rainfall and high evaporation rates. The void model predicted the North-West Void would reach equilibrium within the first 100 years.

As discussed in section 5.1.6.2.1, submitters on the EIS raised issues regarding the suitability of the proposed final land use given the requirement to actively and consistently abstract water to meet salinity limits within the stock water guidelines, and the ongoing maintenance of the void after the EA is surrendered. The proponent stated the void model predicted salinity concentrations in the North-West Void would frequently exceed (32% of the time) the preferred salinity limit for cattle consumption (6,000 µS/cm or 4,000 mg/L TDS) and would often exceed (25% of the time) the upper limit for cattle consumption (7,500 µS/cm or 5,000 mg/L TDS). To meet the stock water guidelines, the proponent proposed to mix the water in the North-West Void with water from the Main Void. Without consistent abstraction of water, the North-West Void would become hypersaline within 50 years.

Complete backfill of the North-West Void

The proponent analysed the feasibility of completely backfilling the North-West Void to ground level (in isolation of the other 2 residual voids). The rehabilitation costs would be an additional $11 million in NPV terms (or $92 million in undiscounted terms); a reduction in net economic benefits to Queensland by $1 million in NPV terms; additional 38 ha of land available for low-intensity grazing; removal of approximately 10.5 ML/year of reliable water storage supply; additional greenhouse gas emissions, dust and noise emissions and amenity impacts.

The EIS stated the additional 38 ha of grazing land would have an estimated annual benefit of $60,000 in undiscounted terms, while the water supply for agricultural use (stock drinking) has an estimated annual benefit of $150,000 in undiscounted terms. Meaning there would be a net annual disbenefit of backfilling the North-West Void of $90,000 in undiscounted terms.

The proponent stated when considering the above factors, backfilling the North-West Void would result in less benefit to the Queensland community in comparison to the proposed final landform and use and is not considered to be in the public interest.

DES provided advice during the evaluation of the EIS that the North-West Void should be completely backfilled to support a final land use of low intensity cattle grazing. DES took a precautionary approach to recommend the complete backfill due to the insufficient information and rationale for the North-West Void sustaining the final land use over the long term. The backfill would minimise key environmental risks associated with a residual void which would become hypersaline over the long-term. DES advised that the proponent could submit further detailed information during the PRCP process, after the final EA is issued, to demonstrate that the North-West Void can support the proposed final land use.

Conclusion: North-West Void

In balancing the environmental, economic and social effects of the North-West Void, I consider the North-West Void is unable to support the proposed final land use over the medium to long term. I have considered the risks and benefits of the proponent’s proposal, as well as other landform and land use alternatives for the North-West Void area.

I am not satisfied the proponent has demonstrated that the North-West Pit could be progressively rehabilitated to a final landform that will be safe, stable, non-polluting and able to support a final land use of water storage for agricultural use (stock drinking). The water quality is not suitable for cattle consumption in the medium and long term, and would quickly become hypersaline without consistent abstraction, and would therefore be considered a NUMA. Leaving the North-West Pit as a residual void to become hypersaline over the long term is not in the public interest.

To ensure the final landform for the North-West Pit area meets the mined land rehabilitation criteria and to address submitter concerns, I have stated conditions in Appendix 1 of this report for the final land use to be low intensity grazing, consistent with the surrounded proposed final land uses of the site.

Proposing an alternative landform and use for the North-West Pit area

I acknowledge that as the project is subject to the transitional provisions of the *Mineral and Energy Resources (Financial Provisioning) Act 2018*, the EIS provides a high-level rehabilitation strategy and that the proponent will be required to submit a detailed PRCP after the EA is issued.

The proponent may submit further detailed information during the PRCP process consistent with DES *Guideline – Progressive rehabilitation and closure plans*,[26] including detailed cost-benefit analysis of options considered for the North-West Pit, to demonstrate that the North-West Void can support the proposed final land use.

5.1.6.3 Infrastructure areas

At the cessation of mining, the proponent has committed to assess all infrastructure to determine whether it would be decommissioned and removed or retained for future use as part of the proposed final land use. The EIS stated any retained infrastructure would be commensurate with the final land use and may include access roads and fences. Infrastructure (such as buildings, roads, dams and ETL) may be accepted as part of final land use where the relevant landholder has agreed through a signed landholder statement declaring that they will accept responsibility for the infrastructure once mining has ceased. As the proponent is also the landholder of the Wynette property, the proponent must justify how the infrastructure will provide a benefit or improvement to the use of the land and/or community once mining has ceased. Where infrastructure is decommissioned and removed, the area would be shaped, topsoiled, ripped and revegetated to achieve a final land use of low intensity grazing.

I have a stated condition in Appendix 1 of this report requiring all infrastructure to be decommissioned and removed and the land to be rehabilitated to support low intensity grazing or native ecosystem. This requirement does not apply where a signed agreement provides that the infrastructure is to be retained as part of the final land use.

5.1.6.3.1 Winchester Quarry area

The proponent proposed to consult with the landholder of Lot 5 CNS90 to determine whether the quarry would be retained post-mining. Where the landholder decided the quarry would not be retained, the proponent proposed to rehabilitate the quarry area to support a final land use of low intensity grazing. The operation of the Winchester Quarry requires an EA and planning approval, not held by the proponent. I have stated a condition for the EA to require the quarry area to be rehabilitated to support a final land use of low intensity grazing.

[26] Queensland Government, Department of Environment and Science, Guideline – *Progressive rehabilitation and closure plans, ESR/2019/4964, Version 3.00*, 2023.

5.1.6.3.2 Northern and central unnamed waterway

As a result of the determination in the EIS that the northern unnamed waterway provides for fish passage, the proponent committed to re-establish excised portions of the northern waterway in the final landform and re-establish a post-mining surface water drainage that was sympathetic with the natural drainage lines. During the EIS process, DAF determined the central unnamed waterway also provides for fish passage, which was supported by a site investigation. As a result of this determination, as well as the significance of the central unnamed waterway to the Wynette offset area, I also require the proponent to reinstate the central unnamed waterway post-mining. As the proponent has committed to financial offsets for impacts to fish passage, I have not included the requirement that the central unnamed waterway must provide for fish passage, but my stated conditions will ensure the waterway will function in a similar manner to its pre-development configuration and will support downstream ecosystems after rehabilitation.

To ensure the reinstated northern and central unnamed waterways are safe, stable and non-polluting, and to ensure the northern unnamed waterway is able to provide for fish passage, I have stated conditions in Appendix 1 of this report that the waterways must have:

- similar pre-mining hydraulic characteristics
- a gradient of no more than 5%
- depth and velocity of water within the waterway is suitable to provide adequate fish passage during 1, 2 and 5 year average recurrence intervals (northern unnamed waterway only)
- woody debris to create habitat diversity within the water
- natural features such as pools and meanders, bed and bank profiles.

I also require no active erosion be present and the establishment of vegetation on slopes.

I am satisfied that rehabilitation of the northern and central unnamed waterways in accordance with rehabilitation completion criteria would be suitable for a final land use of either low-intensity grazing or native ecosystem.

5.1.6.4 Waste rock emplacements

The EIS stated waste rock and coal reject would be used to progressively backfill and rehabilitate the open cut pits. Waste rock and coal rejects would be placed in out-of-pit waste rock emplacements and within the open cut pits as mining operations advance. The waste rock emplacements would be progressively shaped and prepared for rehabilitation activities (e.g., final contouring, soil placement and revegetation) as soon as practicable after the area becomes available.

The EIS stated that risks to surface water and groundwater from waste rock and coal rejects were low due to low potential for acidity and salinity to be generated. In addition, the presence of open cut pits during and after mining would create a hydraulic flow gradient that would draw groundwater toward the pits and ensure any seepage would not leave the site.

Submitters on the EIS raised concerns about the reactiveness of waste rock and coal reject material, and potential impacts on the receiving environment. The proponent advised that surface water runoff would be monitored for a range of water quality parameters, waste rock and coal rejects from the CHPP would undergo geochemical validation prior to disposal, and coal rejects would be buried by at least 10 metres of waste rock.

A submitter on the EIS raised concerns regarding the interaction of floodwaters with final landform structures, and possible retention of the flood levees after mine closure to protect final landforms. The proponent clarified that there would only interaction between the final landform and flood waters for the

0.1% AEP and PMF events and that there would be no interaction between flood waters and residual voids. The proponent stated that flood levees were not proposed to be retained post-mining, however, this could be considered if relevant stakeholders identify the benefits of levee retention during PRCP consultation.

Potential impacts on surface and groundwater quality from waste rock emplacement is discussed further at section 5.8.4.1.2.

To ensure the waste rock emplacements are safe, stable, non-polluting and can support a final land use of low-intensity cattle grazing or native ecosystem, I have stated conditions in Appendix 1 of this report that the rehabilitation completion criteria for this area would include:

- landform slope angles of 17.6% or lower (10°) for native ecosystems and 15% or less for grazing pasture slopes
- minimal presence of erosion
- runoff and seepage from rehabilitated waste rock emplacements comply with EA water quality criteria
- no contaminated land exists
- at least 2 tree species, 3 shrubs species and 5 groundcover species established with greater than 50% ground cover for native ecosystems
- at least 4 perennial species suitable for pasture established with greater than 70% groundcover and weed presence controlled for grazing pasture slopes
- establishment of land suitability class 3 for grazing or native ecosystems.

I am satisfied that the waste rock emplacements would be progressively rehabilitated, and the rehabilitation completion criteria would support a final land use of low-intensity grazing or native ecosystem.

5.1.6.5 Conclusion on final landform and use

I am satisfied the proponent has adequately demonstrated that land disturbed by mining including the Main Void, West Void, waste rock emplacements and infrastructure areas would be safe, stable, non-polluting and support a final land use of low intensity grazing, native ecosystems, water storage for agricultural use (stock drinking) or waterways providing for fish passage. I have stated a condition in Appendix 1 of this report that land disturbed by mining must be rehabilitated in accordance with Table H1 and Table H2, and that rehabilitation must commence progressively in accordance with the project's approved PRCP.

The proponent has committed that the rehabilitation monitoring program will detail plant species to be used or the target regional ecosystem/broad vegetation groups to provide an understanding of species composition in the rehabilitated landform.

I consider the proposed final land use of low-intensity grazing, water storage for agricultural use (stock drinking), native ecosystems and waterways providing for fish passage to be an acceptable final land use outcome. I have stated conditions for the EA in Appendix 1 of this report which ensure the proposed final land use would meet the mined land rehabilitation criteria and the Main and West Voids would be located outside the Isaac River floodplain.

I am not satisfied the EIS has demonstrated the North-West Void can sustain the proposed final land use given the frequent exceedances of the preferred salinity limits in the stock water guidelines.

DES will assess the project's detailed PRPC after the EIS process. I note that as the PRCP is based on the rehabilitation and closure of land for surrender, residual risk is not included in the PRCP process and the residual risk framework will be applied to an EA as part of the surrender application for the EA.

5.1.7 Coordinator-General's conclusion: land use and rehabilitation

The EIS identified the potential impacts on land use and tenure impacts associated with the project. The EIS proposed progressive rehabilitation of disturbed areas to support final land uses of low-intensity grazing, water storage for agricultural use (stock drinking), native ecosystems or waterways providing for fish passage.

The proponent has committed to providing notice to directly affected landholders and residents of nearby homesteads of activities that may potentially impact the amenity and activities of the properties; to continue engaging with local and surrounding landholders to monitor overall project impacts and to design and construct the rail spur in consultation with Aurizon to minimise potential impacts on the Norwich Park Branch Railway.

I am satisfied that ongoing consultation and implementation of the co-existence agreement with Eagle Downs Coal Management Pty Ltd would manage impacts associated with overlapping tenure at the Eagle Downs Mine and an agreement with Quarrico Products Pty Ltd, operator of the Winchester Quarry, and the landholder of would manage impacts on the Winchester Quarry.

I consider the proposed final land use of grazing, water storage, native ecosystems and waterways providing for fish passage to be acceptable final land use outcomes. I am not satisfied the EIS has demonstrated the North-West Void would be safe, stable, non-polluting and support the proposed final land use of agricultural use (stock drinking).

The implementation of the proponent's commitments; stated conditions in Appendix 1 of this report and the subsequent approval of the project's PRCP would adequately manage impacts on land use and address issues raised by submitters.

5.2 Matters of state environmental significance

This section addresses the potential impacts of the project on MSES during the construction and operation of the project and evaluates the proponent's proposed mitigation and management strategies.

The MSES relevant to the project, as defined by the Environmental Offsets Regulation 2014 (EO Regulation), include:

- regulated vegetation
  - 'endangered' and 'of concern' REs
  - an area of essential habitat on the essential habitat map for an animal or plant that is critically endangered, endangered, or vulnerable wildlife (essential habitat)
  - REs that are located within a defined distance from the defining banks of a relevant watercourse or drainage feature (watercourse vegetation)
- connectivity areas
- wetlands and watercourses
  - a wetland in a wetland protection area or a wetland of high ecological significance shown on the map of referable wetlands

- a wetland or watercourse in high ecological value waters

- protected wildlife habitat
  - an area that is not shown as a high risk area on the flora survey trigger map, to the extent the area contains plants that are critically endangered, endangered, or vulnerable wildlife (protected plant habitat)
  - a habitat for an animal that is critically endangered, endangered, or vulnerable wildlife, or a special least concern animal (protected fauna habitat)
- waterways providing for fish passage.

There is considerable overlap between MSES and MNES relevant to the project, as outlined in Table 5.1. In accordance with the *Environmental Offsets Act 2014*, the State can only impose an offset condition on an authority if the same or substantially the same impact and the same or substantially the same matter has not been subject to an assessment under a relevant Commonwealth Act. This avoids the duplication of offset conditions between jurisdictions. A relevant Commonwealth Act in this instance refers to:

- the EPBC Act
- the *Great Barrier Reef Marine Park Act 1975*
- any other Commonwealth Act prescribed by legislation.

Table 5.1 Overlap between MSES and MNES prescribed environmental matters

MSES value	Overlapping MNES value
Regulated vegetation	
'Of concern' Regional Ecosystems (RE 11.3.2)	Poplar Box Grassy Woodland on Alluvial Plains TEC
Essential habitat (Ornamental snake)	Refer to Ornamental snake below
Remnant vegetation which occurs within the defined distance of a watercourse (RE 11.4.4)	Natural Grasslands of the Queensland Central Highlands and Northern Fitzroy Basin TEC
Protected wildlife habitat – protected fauna	
Habitat for the ornamental snake, squatter pigeon (southern subspecies), koala (combined populations of Qld, New South Wales (NSW) and the Australian Capital Territory (ACT)), greater glider, and Australian painted snipe	Threatened species habitat for the ornamental snake, squatter pigeon (southern subspecies), koala (combined populations of Qld, NSW and the ACT), greater glider, and Australian painted snipe

The project is comprised of 3 components (the ETL; water pipeline; and the mine site and access road) which have all been determined to be controlled actions under the EPBC Act. Accordingly, offsets will be required for residual impacts on MNES, which negates the need for the Queensland Government to impose offset conditions on MSES that overlap with MNES. Rather than duplicating key aspects of the evaluation which relate to the impacts on overlapping matters, a more detailed assessment of the project's MSES which are also MNES is provided in section 6 of this report.

The TOR required the proponent to complete comprehensive desktop analyses and field surveys for the EIS to confirm the occurrence of MSES, including GDEs. I note that agencies with an interest in biodiversity, including DES and DAF, generally agreed that the survey effort undertaken by the proponent, along with the provision of on-site inspections for departmental staff, was adequate.

5.2.1 Existing environment

The project is located approximately 30 km south-east of the township of Moranbah within the Brigalow Belt Bioregion (Figure 5.4). The bioregion's name is derived from the *Acacia harpophylla* (brigalow) forests and woodlands that dominated the landscape prior to widespread clearing for agricultural purposes. The Brigalow Belt Bioregion consists of a range of vegetation communities in addition to the remnant brigalow, including eucalypt forests and woodlands; grasslands; dry rainforest; cypress pine woodland; and riparian habitats.

Of the thirteen provinces within the Brigalow Belt Bioregion, 2 occur across the project site: Northern Bowen Basin and Isaac-Comet Downs. Both of these are characterised by undulating landscapes containing brigalow and eucalypt woodlands with native grasslands. The project is located within a drainage subbasin of the Isaac River, which is within close proximity to the site (less than one kilometre, at its closest). Three unnamed waterways are mapped as present on the project site, however there is limited riparian vegetation present due to the impacts of historical land clearing associated with cattle grazing. Gilgai that become inundated during the typically seasonal, wet summers also occur across much of the clay plains, providing habitat for threatened species and their prey.

Within a broader context, the project site is surrounded by a highly modified landscape that has been predominately cleared for cattle grazing and contains many active coal mines. The region is host to the majority of Queensland's active coal mines and is also a significant producer and exporter of natural gas. The cumulative impacts of these activities lead DCCEEW to highlight that remnant vegetation on the project site may be disproportionally important habitat for threatened species. Furthermore, pockets of remnant vegetation in proximity to waterways may provide important climate change refugia during increasingly extreme weather events.

Figure 5.4 Project location within the Brigalow Belt Bioregion

5.2.2 Submissions

The key issues raised in submissions on the EIS regarding impacts to MSES include (but are not limited to):

- a low value was placed on the remnant REs that will be cleared, especially in relation to the impacts on habitat connectivity
- assessment of the cumulative impacts on surface water and groundwater was inadequate, particularly with reference to GDEs
- a lack of a suitable monitoring plan for GDEs and wetlands
- impacts of waterway excisions on disproportionally important fauna habitat downstream have not been discussed
- impacted regrowth areas provide important habitat for threatened species, as demonstrated by the identification of *Solanum adenophorum* during field surveys
- sampling techniques for surveys were inadequate, including a lack of recommended methods (harp trapping and hair tube sampling)
- impacts of noise and artificial lighting on threatened species have been downplayed
- details surrounding the arrangements for acquiring ownership of 2 of the offset areas are absent
- failure to correctly identify waterways that provide for fish passage due to poor timing of surveys and the incorrect application of both the definition of fish and the definition of a waterway under the *Fisheries Act 1994*
- design of clean water diversions and if they would mitigate the impacts of the waterway excisions was not discussed
- details for how the reinstated waterway will incorporate natural-like features are absent
- lack of a monitoring program for the reinstated waterway to ensure it is providing for fish passage.

I have considered each submission received and the responses provided by the proponent in the evaluation of the project. Assessment of the key matters for each relevant MSES is provided below. After consideration of the avoid / mitigate / offset hierarchy and when no other options were available, a conditioning approach has been taken to ensure acceptable ecological outcomes are achieved in line with the precautionary principle, as per the EP Act.

5.2.3 Regulated vegetation

5.2.3.1 Background

The EO Regulation defines the types of remnant vegetation that are classified as prescribed REs and the requirements of a prescribed RE to be classified as regulated vegetation. Prescribed REs that occur on the project site and are classified as regulated vegetation fall within the following categories:

- ‘endangered’ or ‘of concern’ REs, as defined under the *Vegetation Management Act 1999* (VM Act)
- essential habitat, as defined under the VM Act, for an animal that is vulnerable wildlife, as defined under the NC Act

- remnant vegetation located within a defined distance from the defining banks of a relevant watercourse or relevant drainage feature, as defined under the VM Act for watercourses and the *Water Act 2000* for drainage features.

5.2.3.2 Survey methodology

The EIS indicates that an extensive desktop analysis was undertaken to consolidate information from relevant databases, available mapping, aerial photography, and published literature to produce an initial characterisation of the ecological values of the project site and the surrounding landscape. A likelihood of occurrence assessment (LOA) was then conducted to evaluate the qualitative probability that a flora or fauna species can physically occupy any area within the project site during all or part (e.g. breeding season, migration) of its life cycle. The outcome of the LOA is then used to guide the design of field survey work.

Field surveys were undertaken to ground-truth the extent of REs across the site and evaluate mapped essential habitat, with flora and fauna surveys conducted over 2 wet season periods and 2 dry season periods to account for the seasonal variation in species presence, abundance and habitat utilisation (e.g. breeding, foraging). Survey sites were short-listed using aerial imagery, regional ecosystem mapping, and geological information to stratify the project site. Sites that best represent the existing environment were then selected and surveyed in accordance with the relevant State and Australian survey guidelines.

Given that the proponent has undertaken an extensive desktop assessment, completed field surveys during both wet and dry season periods, and the surveys were conducted in accordance with the relevant State and Australian survey guidelines, I consider that the survey methodology employed by the proponent to identify regulated vegetation was adequate.

5.2.3.3 Project impacts

5.2.3.3.1 Land clearing

The EIS determined that the project would permanently impact up to 2,002.7 ha of regulated vegetation, as outlined in Table 5.2. The majority of the impacts will be from land clearing associated with the mine site itself, however a section of endangered RE, essential habitat for the ornamental snake, and watercourse vegetation will also be cleared for the infrastructure corridor (described in sections 5.2.3.4, 6.4 and 6.5). The mine site activities that are forecast to impact regulated vegetation are as follows:

- infrastructure corridor
- mining infrastructure area
- out-of-pit waste rock emplacement
- open cut pits (excluding North-West Pit).

Table 5.2 Regulated vegetation within the project's indicative disturbance extend

Regulated vegetation	Description	Total area (ha)
Endangered regional ecosystems		
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	64.5
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	2.4
11.4.9	*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	23.1

Regulated vegetation	Description	Total area (ha)
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	17.7
Of concern regional ecosystems		
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	9.6
11.3.3c	*Eucalyptus coolabah* woodland to open woodland (to scattered trees) with a sedge or grass understorey in back swamps and old channels	6.9
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains	39.8
Essential habitat		
Ornamental snake	Area of essential habitat on the essential habitat map for the ornamental snake (*Denisonia maculata*)	1834.2
Watercourse vegetation		
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	1.3
11.4.4	*Dichanthium spp*., *Astrebla spp*. grassland on Cainozoic clay plains	0.1
11.9.3	*Dichanthium spp*., *Astrebla spp*. grassland on fine-grained sedimentary rocks	3.1

5.2.3.3.2 Significance of land clearing

The significance of land clearing for regulated vegetation was determined by comparing the project's direct impact on the areas of habitat present within the 2 subregions that occur across the project site: Northern Bowen Basin and Isaac-Comet Downs. Within this subregional context, the impacted ecosystems represent very small (<1%) proportions of the total remnant REs in each category. As such, the EIS determined that vegetation clearing for the project will have a minimal impact on the extent of regulated vegetation within the local subregions and I agree with that finding.

5.2.3.3.3 Animal breeding places

The clearing of remnant vegetation for the project will likely have an impact on animal breeding places which may occur generally across the project site. As such, the proponent has committed to preparing a Species Management Program in accordance with the Nature Conservation (Animals) Regulation 2020 for approval by DES prior to undertaking any activities that would disturb animal breeding places.

5.2.3.3.4 Edge effects

Due to the highly fragmented landscape from historical land clearing practices for agriculture, edge effects are likely to have already manifested in the remaining vegetated areas. The EIS therefore determined the project to be unlikely to increase the potential of edge effects in these areas.

5.2.3.3.5 Fauna mortality and injury

Unintended mortality or injury may occur to fauna as a result of the construction and operational activities associated with the project. These impacts could potentially occur as a result of the use of heavy machinery and vehicles on site (vehicle strikes); the dispersal of fauna during vegetation clearing; or from animals being caught or trapped within excavations, trenches, or other mine site infrastructure.

5.2.3.3.6 Invasive weeds and feral animals

Eight pest fauna species and 5 weed species that are listed as Weeds of National Significance (WoNS) and/or restricted matters under the *Biosecurity Act 2014* were recorded within the project area. The presence and abundance of pest weed and animal species disrupt ecosystems by outcompeting and replacing native species through increased competition for resources, predation, and habitat degradation, resulting in altered ecosystem diversity and function.

The risk of increasing the extent of WoNS due to project activities without management and mitigation strategies is considerable. The spread of weed species is facilitated by disturbance, resulting in construction activities having a large potential for disturbing or introducing weeds and resulting in the establishment of invasive plants within and outside the project site. Seeds from weed species can be transported in contaminated fill, the mud on machinery, or in the machinery itself. Mine site activities may also increase populations of feral animals by introducing new food sources (e.g. rubbish) or by creating greater opportunities for hunting and foraging (e.g. from artificial light).

5.2.3.3.7 Bushfire risk

There is the potential for project activities to create accidental ignitions that may result in bushfires that pose a risk to the project and ecosystems within and adjacent to the project site. This can be the result of the use of machinery, an accident or collision, scheduled burns getting out of control, hot works, spontaneous combustion of coal, or from the incorrect disposal of flammable items. The EIS concluded that it is unlikely that the project would increase the bushfire potential within the surrounding landscape as mitigation and management measures (section 5.2.3.4) would be implemented for the project and I accept that conclusion.

5.2.3.3.8 Artificial lighting, noise, and vibration

The project is anticipated to operate throughout the day and night, which will result in artificial light, noise, and vibration that can disrupt local fauna roosting, breeding, and foraging activities. The increased light from an artificial source poses risks to fauna as it allows predators to locate prey more easily, while the noise and vibrations from mining activities can also make it harder for prey species to detect approaching predators. The EIS determined that the fauna which inhabit the areas affected by construction and operational activities are predominantly common species that are more tolerant to some disturbance, and that these animals may either adapt to the disturbance levels or dissipate into similar adjacent habitats in the local landscape.

5.2.3.3.9 Dust

While excessive dust deposition can cause impacts on vegetation (e.g. reducing photosynthetic processes, respiration, transpiration, health and growth rates), the EIS noted that the landscape surrounding the project site is heavily cleared, resulting in the vegetation within the vicinity of the project to already be subjected to dust from exposed soils. It was determined that dust from the project, which would be concentrated near dust sources such as haul roads and areas with active mine landforms, would therefore be unlikely to cause a significant impact on surrounding vegetation as there are no observable impacts from the current levels of dust deposition.

5.2.3.4 Avoidance and mitigation measures

While the project location is determined by the presence of coal seams, the proponent has designed the project to avoid or minimise impacts to regulated vegetation through the following measures:

- minimising the overall mine footprint by optimising backfilling of the open cut
- avoiding clearance of riparian vegetation associated with the Isaac River

- design of the project to avoid the Brigalow TEC located adjacent to the Main Pit South out-of-pit waste rock emplacement
- design of the western Main Pit South out-of-pit waste rock emplacement to avoid disturbance of ornamental snake habitat
- co-locating the mine access road, ETL and water pipeline within a single infrastructure corridor
- avoiding creek crossings/waterways for the infrastructure corridor
- avoiding palustrine wetlands on the boundary of the mining lease area and establishing a 50 metre buffer from the 2 wetlands
- optimisation of the project mine plan by reducing the overall surface disturbance extent of the project by approximately 179 ha when compared to the initial project design.

The proponent has also committed to the development and implementation of an environmental management plan, which includes a weed management plan, feral animal management plan, and details of the range of mitigation activities proposed to limit the impacts of project activities. Of relevance to regulated vegetation are the following mitigation activities:

- boundaries of areas to be cleared and those not to be cleared would be defined during construction and operation
- land clearing would be carried out progressively over the life of the project to allow mobile fauna species the opportunity to disperse away from clearing areas
- directional clearing towards retained vegetation would be undertaken where practical to encourage the movement of fauna into retained vegetation
- select habitat features (e.g. hollow-bearing trees, woody debris, logs and rocks) would be salvaged for re-use in rehabilitation of the project
- a suitably experienced and qualified fauna spotter/catcher would be present during the clearing of habitat areas
- pre-clearance fauna surveys would be undertaken by suitably experienced and qualified persons to identify individual fauna at direct risk from clearing activities
- management of fauna identified during clearing would include relocating individuals to adjacent habitat or treating injuries
- during construction works, work areas and excavations (trenches) would be checked for fauna that may have become trapped
- if trenches remain open after daily site works have been completed, fauna ramps would be put in place
- vehicle strike management will be undertaken to: reduce the occurrence of road fatalities by designating speed limits; develop a process for the removal of roadkill to prevent injuries to carrion feeders; and develop a process for injured wildlife
- targeted control efforts for restricted matter weed species
- vehicle washdown procedures to prevent weed spread
- maintain a clean, rubbish-free work site to avoid attracting feral animals
- undertake feral animal control measures
- maintain safe fuel loads in vegetation and manage fire access tracks

- focus artificial lighting on disturbance/work areas to minimise the lighting of remnant vegetation.

Defining the boundaries of the areas to be cleared and the areas not to be cleared will be an important mitigation strategy to avoid unintentional impacts to regulated vegetation adjacent to the indicative soil disturbance extent. The proponent has optimised the project mine plan to avoid regulated vegetation in several areas. Consequently, regulated vegetation occurs in close proximity to the indicative soil disturbance extent in several locations, and there is a risk that there may be unintended impacts during the construction and operation phases of the proposed development. I consider that defining the boundaries of these areas is an appropriate and adequate mitigation strategy to reduce the risk posed to the regulated vegetation in those locations.

The progressive clearing of vegetation is a suitable mitigation strategy to reduce the impacts of vegetation clearing in areas identified as essential habitat for the ornamental snake, as it will provide more opportunity for the threatened species to relocate away from the project area. Additionally, directional clearing towards retained vegetation should encourage the species away from construction areas and towards remnant vegetation. The impacts of land clearing on the ornamental snake will further be mitigated by the effective and appropriate use of qualified fauna spotters/catchers who can identify fauna at risk and, where appropriate, relocate individuals to a safe location.

5.2.3.5 Significant residual impacts and offsets

I acknowledge that overlap occurs for 3 regulated vegetation MSES with MNES values, as per Table 5.1. Where overlap occurs between MSES and MNES, impacted regulated vegetation will be assessed under the EPBC Act. This precludes the Coordinator-General from stating conditions on the overlapping values, as the same (or substantially the same) matter and the same (or substantially the same) impact has been assessed by the Australian Government. A detailed review of MNES is provided in section 6, where the overlapping regulated vegetation is examined under the relevant TECs and threatened species habitat.

I find that while the proponent's strategies will be beneficial in mitigating the impacts on regulated vegetation, SRIs that will require environmental offsets may still occur. After deducting the regulated vegetation MSES that overlap with MNES values, the EIS concludes that offsets are required for the values displayed in Table 5.3.

Table 5.3 SRI for regulated vegetation MSES

MSES	Description	SRI (ha)
Endangered REs		
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	64.5
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	2.4
11.4.9	*Acacia harpophylla* shrubby woodland *with Terminalia oblongata* on Cainozoic clay plains	23.1
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	17.7
Of concern RE		
11.3.3c	*Eucalyptus coolabah* woodland to open woodland (to scattered trees) with a sedge or grass understorey in back swamps and old channels	6.9
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains	39.8
Watercourse vegetation		

MSES	Description	SRI (ha)
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	1.3
11.9.3	*Dichanthium spp*., *Astrebla spp*. grassland on fine-grained sedimentary rocks	3.1

For regulated vegetation, offset areas must be:

- of the same broad vegetation group as the impacted RE
- of the same regional ecosystem status ('endangered' or 'of concern' REs only)
- within the same bioregion
- associated with a watercourse or drainage feature (watercourse vegetation only)
- set at a maximum multiplier of 4 (i.e. a maximum of 4 times the area of the SRI).

The EIS provides details of the offsets proposed for Stage 1 of the project, which includes the impacts associated with the construction of the infrastructure corridor; MIA; CHPP; train load-out facility; and rail spur and loop. These offsets are to be delivered across 3 offset areas identified within the EIS. At least 3 months prior to the commencement of each stage of the project, the proponent must submit a Notice of Election to DES, whereby an agreed delivery arrangement would be entered into by the proponent and DES to offset impacts to MSES. A condition has been stated in the EA to ensure this occurs. I am satisfied that the offset requirements for impacts to regulated vegetation will be met by the approach described.

5.2.3.6 Coordinator-General's conclusion: regulated vegetation

The project would require the clearing of up to 2,002.7 ha of remnant vegetation considered to be regulated vegetation. However, the area assessed at the State level is substantially less as 1,834.2 ha of the regulated vegetation is also defined as MNES under the EPBC Act. As such, the total SRI for regulated vegetation would potentially be 158.8 ha.

The majority of vegetation within the project area has been historically cleared for cattle grazing and exists in a non-remnant state. While much of the site has been the subject of agricultural pressures and weed encroachment, it should be noted that the remnant vegetation present may be disproportionally significant due to the highly fragmented nature of the landscape.

The proponent has committed to a mine layout that avoids disturbance of remnant ecosystems where feasible and will define the boundaries of areas that are to be cleared and areas that are not to be cleared during construction and operation phases to prevent unintended disturbance. In the instances where impacts to regulated vegetation are unavoidable, the proponent has committed to an offset management strategy in-line with the *Queensland Environmental Offsets Framework*. Conditions have been stated for the EA that requires the proponent to provide reports for each stage of the offset strategy, including an analysis of the actual impacts on prescribed environmental matters and a commitment to address any outstanding offset debits for the authorised impacts.

The extent of ecosystems classified as regulated vegetation that are expected to be impacted by the project represent a very small fraction of the regulated vegetation found within the local subregions (<1%) and, given the proponent's commitment to avoid, mitigate, and offset the impacts, I consider the SRIs to regulated vegetation to be acceptable. I am satisfied that the stated conditions for the EA, the implementation of the proponent's commitments, and the recommended conditions for the Australian Minister for the Environment would ensure that acceptable outcomes are achieved for impacts on regulated vegetation due to the project.

5.2.4 Connectivity areas

5.2.4.1 Background

The EO Regulation defines a connectivity area as a prescribed RE that contains an area of land that is required for ecosystem functioning. The EIS has therefore identified that all remnant vegetation containing prescribed REs across the project site potentially contains connectivity area values.

5.2.4.2 Survey methodology

In addition to the survey methodologies for remnant prescribed REs outlined in section 5.2.3.2, the proponent used the Landscape Fragmentation and Connectivity (LFC) tool to determine that the project would result in an SRI on connectivity areas. The Queensland Environmental Offsets Policy: Significant Residual Impact Guidelines 2014 details the LFC tool as the method for identifying and quantifying SRIs on connectivity areas.

Given that the proponent has used the LFC tool, undertaken an extensive desktop assessment, completed field surveys during both wet and dry season periods, and the surveys were conducted in accordance with the relevant Australian and State survey guidelines, I consider that the survey methodology employed by the proponent to identify connectivity areas was adequate.

5.2.4.3 Project impacts

5.2.4.3.1 Land clearing

The EIS determined that the project would permanently impact up to 569.3 ha of remnant prescribed REs providing value as connectivity areas. The majority of the impacts will be from land clearing associated with the mine site itself, however several areas of prescribed REs will also be cleared for the infrastructure corridor. The mine site activities that are forecast to impact upon connectivity areas are as follows:

- infrastructure corridor
- mining infrastructure area
- out-of-pit waste rock emplacement
- open cut pits (excluding North-West Pit, Main Pit South, and South Pit).

5.2.4.3.2 Significance of land clearing

The EIS states that habitat connectivity is generally low across the project site, with a highly fragmented landscape and disturbance present throughout from historical clearing of native vegetation for cattle grazing. There are no well-defined fauna movement corridors being impacted that need to be retained, however I note that submissions were made that questioned the impacts of the project on habitat connectivity. The potential impact of reduced connectivity on 2 of the threatened fauna species present, the koala and greater glider, has been used in the EIS as an example of the connectivity on the project site. On a scale of completely fragmented (0) to highly connected (5), the connectivity to remnant vegetation for the koala and greater glider was rated 1 and 0.5 respectively.

5.2.4.3.3 Edge effects, invasive weeds and feral animals, bushfire risk, and dust

Connectivity areas would be susceptible to additional indirect impacts from edge effects, invasive weeds and feral animals, bushfire risk, and dust. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on regulated vegetation.

5.2.4.4 Avoidance and mitigation measures

Avoidance and mitigation measures relevant to connectivity areas are listed in section 5.2.3.4. I note that the optimisation of the project mine plan would result in a 150.6 ha reduction of impacts to remnant vegetation with connectivity area values when compared to the initial project design.

5.2.4.5 Significant residual impacts and offsets

I find that while the proponent's strategies will be beneficial in mitigating the impacts to connectivity areas, an SRI that will require environmental offsets may be required. The EIS concludes that offsets are required for the entire 569.3 ha of connectivity areas that will be cleared.

For connectivity areas, offset areas must be:

- a non-remnant ecosystem
- in the same subregion; however, if the subregion is intact, the offset should be in the nearest fragmented subregion
- set at a multiplier of one (i.e. one times the area of the SRI).

Further details on the delivery of offsets are provided in section 5.2.3.5. I am satisfied that the offset requirements for impacts to connectivity areas will be met by the approach described in the EIS.

5.2.4.6 Coordinator-General's conclusion: connectivity areas

Habitat connectivity for the project site is low, with disturbance present throughout from historical clearing of native vegetation for cattle grazing. There are no well-defined fauna movement corridors being impacted by the project that need to be retained, and while the project area contains low Brigalow regrowth in several patches, connectivity of these patches to remnant vegetation is considered low as they are surrounded by cleared and grazed areas.

The proponent has committed to a project that requires the clearance of up to 569.3 ha of remnant vegetation classified as connectivity areas. The project avoids disturbance of remnant ecosystems where feasible, and the proponent will define the boundaries of areas that are to be cleared and areas which are not to be cleared during construction and operation phases to mitigate unintended disturbance.

In the instances where impacts to connectivity areas are unavoidable, the proponent has committed to an offset management strategy in-line with the Queensland Environmental Offsets Framework, and to provide reports for each stage of the offset strategy, including an analysis of the actual impacts on prescribed environmental matters and a commitment to address any outstanding offset debits for the authorised impacts.

Given the proponent's commitment to avoid, mitigate, and offset the impacts, I consider the SRIs to connectivity areas to be acceptable. I am satisfied that the stated conditions for the EA, the implementation of the proponent's commitments, and the recommended conditions for the Australian Minister for the Environment in this report would ensure that acceptable outcomes are achieved for impacts on connectivity areas due to the project.

5.2.5 Wetlands and watercourses

5.2.5.1 Background

The EO Regulation defines wetlands and watercourses as MSES if they fall within one of the following categories:

- a wetland in a wetland protection area, as shown on the map of the Great Barrier Reef wetland protection areas
- a wetland of high ecological significance, as shown on the map of Queensland wetland environmental values
- a wetland or watercourse in high ecological value waters, as defined under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.

5.2.5.2 Survey methodology

The survey methodologies outlined in section 5.2.3.2 were used to identify wetlands and watercourses classified as MSES. Additionally, the proponent has established a groundwater monitoring network of 14 on-site monitoring bores. A further 3 off-site bores were added to the network – one of which is owned by the proponent and located in the nearby offset area. Groundwater and surface water survey methodology is explored further in section 6.6.2.1 of this report.

I note that the proponent has undertaken an extensive desktop assessment, completed field surveys during both wet and dry season periods including monitoring a network of groundwater bores, and the surveys were conducted in accordance with the relevant Australian and State survey guidelines.

5.2.5.3 Project impacts

5.2.5.3.1 Hydrological changes

The proponent has identified potential pathways for project impacts, including a reduction in the availability of groundwater and adverse changes to groundwater quality. Impacts may also be experienced due to changes in surface water flows, in particular, from the significant catchment excision of the unnamed waterways that traverse the project site. A detailed assessment of project impacts to surface water and groundwater is provided in section 6.6.2 of this report.

Changes to groundwater availability and surface water flows are of particular concern for the project, due in large part to the location of a proposed offset area downstream of the project site. The offset area has been identified as potentially being disproportionally important, particularly for threatened species listed as MNES, due to the clearing and fragmentation of the surrounding landscape. Reductions in surface water flows could lead to reduced recharge of alluvial groundwater. Impacts to the offset area may also result in the failure of the offset, which would in turn require the proponent to offset the original impact area plus the lost gains from the offset site.

5.2.5.4 Avoidance and mitigation measures

Avoidance and mitigation measures relevant to wetlands and watercourses are listed in section 5.2.3.4. I note the proponent’s commitment to avoiding the 2 palustrine wetlands on the boundary of the mining lease area and establishing a 50 metre buffer is particularly relevant to wetlands and watercourses. While these wetlands are not mapped as wetlands of high ecological significance and are therefore not MSES, this avoidance method does demonstrate the proponent’s commitment to preventing impacts to wetlands and watercourses where possible.

In addition to the mitigation measures listed in section 5.2.3.4, the project water management system has been designed to reduce downstream impacts to receiving wetland ecosystems. I have stated a condition for the EA to ensure that the diversions meet this objective.

I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a GDEWMP to detect and manage any potential impacts on GDEs, waterways and wetlands associated with the project. As part of implementing this plan, the proponent would undertake further investigations and monitoring of waterways and wetlands to allow the early detection and management of any potential adverse impacts to the ecological values of the waterways and wetlands attributable the project.

I note that the proponent has committed to a groundwater quality monitoring plan and water management plan which will document management measures and adaptive management measures to avoid or reduce impacts to wetlands and watercourses. The information from these plans would be used in a conservative approach to managing impacts in parallel with the GDEWMP.

5.2.5.5 Significant residual impacts and offsets

I am satisfied that, based on the information provided in the EIS and advisory agencies, it is unlikely that the project will impact wetlands and watercourses or GDEs classified as MSES. Therefore, there will be no SRIs to wetlands and watercourses or GDEs and offsets will not be required.

5.2.5.6 Coordinator-General's conclusion: wetlands and watercourses

While I agree with the findings of the EIS that there would likely be no impacts to wetlands and watercourses classified as MSES as a result of the project, I consider it essential that monitoring is undertaken to ensure that unintended impacts are observed and addressed accordingly. Importantly for adjacent wetlands, the proponent has proposed to undertake groundwater quality monitoring and a water management plan. The information provided by the monitoring program and management plan will be instrumental in ensuring that offsite impacts to wetlands are managed appropriately. In particular, data from the groundwater quality monitoring will be incorporated into the GDEWMP.

I am satisfied that the stated conditions for the EA, the implementation of the proponent's commitments, and the recommended conditions for the Australian Minister for the Environment in this report would ensure that acceptable outcomes are achieved for potential impacts on wetlands and watercourses due to the project.

5.2.6 Protected wildlife habitat – protected plants

5.2.6.1 Background

The EO Regulation defines protected wildlife habitat for protected plants (protected plant habitat) as either:

- an area that is shown as a high risk area on the flora survey trigger map and that contains plants that are critically endangered wildlife, endangered wildlife or vulnerable wildlife, as defined by the Nature Conservation (Plants) Regulation 2020, or
- an area that is not shown as a high risk area on the flora survey trigger map, to the extent the area contains plants that are critically endangered wildlife, endangered wildlife or vulnerable wildlife, as defined by the NC Plants Regulation.

5.2.6.2 Survey methodology

The survey methodology is discussed in section 5.2.3.2. Given that the proponent has undertaken an extensive desktop assessment, field surveys during both wet and dry season periods to account for seasonal variations, and the surveys were conducted in accordance with the relevant Australian and State survey guidelines, I consider that the methodology employed by the proponent to identify protected plant habitat was adequate.

5.2.6.3 Project impacts

5.2.6.3.1 Land clearing

The EIS determined that the only protected plant species that would be impacted by the project is the *Solanum adenophorum*, which is listed as 'endangered' under the NC Act. A small population of 3 individual plants were identified at a single 0.2 ha location within the project area during wet season surveys in 2019 and 2020. The habitat would be permanently disturbed by out-of-pit rock emplacement associated with the mining activities.

5.2.6.3.2 Significance of land clearing

The significance of clearing the *Solanum adenophorum* habitat was determined by comparing the project's direct impact to the areas of habitat present within the 2 subregions that occur across the project site: Northern Bowen Basin and Isaac-Comet Downs. Within this subregional context, the impacted area represents a very small (<0.01%) proportion of the total extent of the species. As such, the EIS determined that vegetation clearing for the project will have a minimal impact on the extent of *Solanum adenophorum* habitat within the local subregions.

5.2.6.3.3 Edge effects, invasive weeds and feral animals, bushfire risk, and dust

Protected plant habitat would be susceptible to additional indirect impacts from edge effects, invasive weeds and feral animals, bushfire risk, and dust. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on regulated vegetation.

5.2.6.4 Avoidance and mitigation measures

Impacts to protected plant habitat are unavoidable. While the proponent has reduced the surface disturbance area extent to deliver an optimised mine plan and avoid or reduce the impacts to several MSES, the optimised project mine plan would result in no change to the clearance of *Solanum adenophorum* habitat.

I note that mitigation measures for the impacts on protected plant habitat have not been explored by the proponent. Under the requirements for the protected plant clearing permit application that is necessary for removing the *Solanum adenophorum*, the impact management should consider the following options:

- translocation of the species
- opportunities for propagation of the species
- opportunities for rehabilitation of the species in a particular area
- site rehabilitation programs, such as erosion control and weed management to promote natural regeneration of protected plant species.

The impacted species is described as a prostrate or sprawling herb that grows to 0.3 metres in height. I therefore consider that, given the growth form of the plant and in light of only 3 individuals being identified on the project site, translocation of the endangered species should be explored by the proponent in order to mitigate the damage of vegetation clearing and reduce or eliminate the SRI to protected plant habitat.

5.2.6.5 Significant residual impacts and offsets

I find that no mitigation measures have been proposed by the proponent and as such, an SRI that will require environmental offsets may occur. The EIS concludes that offsets are required for the 0.2 ha of protected plant habitat that will be cleared.

For protected plant habitat, offset areas must:

- contain, or be capable of containing, a self-sustaining population of that same impacted species
- be set at a maximum multiplier of 4 (i.e. a maximum of 4 times the area of the SRI).

Further details on the delivery of offsets are provided in section 5.2.3.5. I am satisfied that the offset requirements for impacts to protected plant habitat will be met by the approach described.

5.2.6.6 Coordinator-General's conclusion: protected wildlife habitat – protected plants

Within a subregional context, the impacted 0.2 ha of *Solanum adenophorum* habitat represents an extremely small (<0.01%) proportion of the total extent of the species. As the proponent has committed to offset this impact in-line with the Queensland Environmental Offsets Framework, I consider the SRI to protected plant habitat to be acceptable.

However, the proponent should explore mitigation activities to reduce or eliminate the SRI to protected plant habitat. The proponent will require a protected plant clearing permit to undertake the proposed vegetation clearing and will need to supply an impact management plan where the potential for translocating the 3 identified specimens should be investigated.

Given the proponent's commitment to offset the impacts and the need to explore mitigation options during the protected plant clearing permit application, I am satisfied that the stated conditions for the EA and the implementation of the proponent's commitments would ensure that acceptable outcomes are achieved for impacts on protected plant habitat due to the project.

5.2.7 Protected wildlife habitat – protected fauna

5.2.7.1 Background

The EO Regulation defines protected wildlife habitat for protected fauna (protected fauna habitat) as either:

- a koala habitat area, as defined by the *Nature Conservation (Koala) Conservation Plan 2017* or
- a habitat for an animal that is critically endangered wildlife, endangered wildlife or vulnerable wildlife or a special least concern animal, as defined by the NC Act.

The Nature Conservation (Animals) Regulation 2020 lists the special least concern animals as the short-beaked echidna (*Tachyglossus aculeatus*), platypus (*Ornithorhynchus anatinus*), and least concern birds which are listed under international agreements for migratory birds. An assessment of least concern birds has been provided within this chapter.

5.2.7.2 Survey methodology

Further to the survey methodology outlined in section 5.2.3.2, a suite of techniques was used during field surveys to identify protected fauna habitat, including:

- establishing systematic trap sites for catch and release of fauna
- nocturnal spotlighting and call playback surveys
- auditory and visual bird surveys conducted early morning and evening
- Anabat detectors to detect and record the echolocation calls emitted by bats
- diurnal active searches

- fauna habitat surveys
- baited hair tubes
- harp trapping.

I note that additional surveying was conducted by the proponent in response to submissions regarding the absence of the recommended techniques for the northern quoll (*Dasyurus hallucatus*) and Corben's long-eared bat (*Nyctophilus corbeni*) of baited hair tubes and harp trapping respectively.

The EIS describes that fauna surveys aimed to meet the prescribed survey effort guidelines for each species listed in the TOR, however in some cases, survey hours were reduced based on the limited potential habitat available for the target species. The proponent considers that the survey effort is sufficient as it was supplemented by habitat assessments and in some instances, the target species was confirmed to be present.

Given that the proponent has undertaken an extensive desktop assessment, field surveys during both wet and dry season periods to account for seasonal variations, and the surveys were generally conducted in accordance with the relevant Australian and State survey guidelines, I consider that the methodology employed by the proponent to identify protected fauna areas was adequate.

5.2.7.3 Project impacts

5.2.7.3.1 Land clearing

The EIS determined that the project would potentially impact protected fauna habitat for 8 species, as outlined in Table 5.4. The majority of the impacts will be from land clearing associated on the mine site itself. The mine site activities that are forecast to impact upon protected fauna habitat are as follows:

- infrastructure corridor
- railway spur and loop
- mining infrastructure area
- out-of-pit waste rock emplacement
- open cut pits.

Table 5.4 Protected fauna habitat within the project's indicative soil disturbance extent

Protected fauna habitat	NC Act status	EPBC Act status	Total area (ha)
Ornamental snake (*Denisonia maculata*)	Vulnerable	Vulnerable	1,834.2
Squatter pigeon (southern subspecies) (*Geophaps scripta scripta*)	Vulnerable	Vulnerable	115.5 breeding and foraging TBC dispersal
Koala (combined populations of QLD, NSW and the ACT) (*Phascolarctos cinereus*)	Vulnerable	Vulnerable*	TBC
Greater glider (*Petauroides volans*)	Vulnerable*	Vulnerable*	132.8
Australian painted snipe (*Rostratula australis*)	Endangered	Endangered	TBC
White-throated needletail	Vulnerable	Migratory / Least Concern*	N/A

Protected fauna habitat	NC Act status	EPBC Act status	Total area (ha)
(*Hirundapus caudacutus*)			
Common death adder (*Acanthophis antarcticus*)	Vulnerable	N/A	230.3^
Short-beaked echidna (*Tachyglossus aculeatus*)	Special Least Concern	N/A	2,049.3

* Species has been uplisted since the time of evaluation.

^ Initial area calculated prior to the optimised mine layout.

5.2.7.3.2 Significance of land clearing

The significance of land clearing for protected fauna habitat was determined by comparing the project's direct impact to the areas of habitat present within the 2 subregions that occur across the project site: Northern Bowen Basin and Isaac-Comet Downs. Within this subregional context, the impacted ecosystems represent very small (<0.2%) proportions of the total remnant habitat for each species. As such, the EIS determined that vegetation clearing for the project will have a minimal impact on the extent of protected fauna habitat within the local subregions and I agree with that finding.

5.2.7.3.3 Animal breeding places, edge effects, fauna mortality and injury, invasive weeds and feral animals, bushfire risk, artificial lighting, noise, and vibration, and dust

Protected fauna habitat would be susceptible to additional indirect impacts from animal breeding places, edge effects, fauna mortality and injury, invasive weeds and feral animals, bushfire risk, artificial lighting, noise, and vibration, and dust. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on regulated vegetation.

5.2.7.3.4 Hydrological changes

Protected fauna habitat would also be susceptible to additional indirect impacts from hydrological changes. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on wetlands and watercourses.

5.2.7.4 Avoidance and mitigation measures

Avoidance and mitigation measures relevant to protected fauna habitat are listed in section 5.2.3.4. I note that the optimised project mine plan would result in a reduction of impacts to breeding and foraging habitat for the squatter pigeon (145.7 ha), koala (145.7 ha), and the greater glider (34.3 ha) when compared to the initial project design. I also note that if a koala is found on site, the proponent proposes to let it move away from clearance areas on its own accord if safe to do so.

5.2.7.5 Significant residual impacts and offsets

I acknowledge that overlap occurs between MSES and MNES values for 6 of the 8 species identified as having protected fauna habitat that may be impacted by the project, as per Table 5.1 and Table 5.4. Where overlap occurs between MSES and MNES, impacted protected fauna habitat will be assessed under the EPBC Act. This precludes the Coordinator-General from stating conditions on the overlapping values, as the same (or substantially the same) matter and the same (or substantially the same) impact has been assessed by the Australian Government. A detailed review of MNES is provided in section 6, where the overlapping protected fauna habitat is examined under the relevant threatened species habitat.

The EIS considered the potential impacts of the project on 2 species that are likely to occur within the project area and are listed under the NC Act: the 'vulnerable' common death adder, and the 'special least concern' short-beaked echidna. Both species are noted to have a broad habitat range with similar potential habitat abundant in the surrounding locality. The EIS concluded that it was unlikely that the removal of potential habitat for either species would result in an SRI.

Furthermore, the EIS considered the potential impacts of the project on 16 bird species that are listed as "special least concern" under the NC Act. Of these, 4 species were considered to be likely or known to occur within the project area: fork-tailed swift (*Apus pacificus*); satin flycatcher (*Myiagra cyanoleuca*); Latham's snipe (*Gallinago hardwickii*); and glossy ibis (*Plegadis falcinellus*). The EIS concludes that it is unlikely an SRI would occur to these species, as the project area does not include:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat that is of critical importance to the species at life-cycle stages
- habitat utilised by a migratory species which is at the limit of the species range
- habitat within an area where the species is declining.

5.2.7.6 Coordinator-General's conclusion: protected wildlife habitat – protected fauna

The project would require the clearing of protected wildlife habitat for 8 species listed under the NC Act. Two of these species, the common death adder and the short-beaked echidna, occur in a broad range of habitats that is located in abundance within the locality. Both were determined to incur no SRI from lost habitat as a result of the project and I agree with that conclusion. Conversely, there would be SRIs for the remaining 6 species, however these are all defined as MNES under the EPBC Act and are therefore assessed at the Australian level (see section 6).

The proponent has committed to a project that avoids disturbance of protected fauna habitat where feasible and has committed to undertaking several key strategies in order to mitigate the impacts to protected fauna species, such as pre-clearance fauna surveys; the use of fauna spotters/catchers during vegetation clearance; managing risks from construction works and excavations; feral animal management; and management for vehicular strikes. While these activities will not mitigate the impacts on the protected fauna areas, I note that they are effective strategies for mitigating unintended mortalities to the target species.

The extent of ecosystems classified as protected fauna habitat that are expected to be impacted by the project represent a very small fraction of the totals found within the local subregions (<0.2%). Given the proponent's commitment to avoid, mitigate, and offset the impacts, I consider the SRIs to protected fauna habitat as assessed at the Australian level to be acceptable. I am satisfied that the stated conditions for the EA, the implementation of the proponent's commitments, and the recommended conditions for the Australian Minister for the Environment in this report would ensure that acceptable outcomes are achieved for impacts on protected fauna habitat due to the project.

5.2.8 Waterways providing for fish passage

5.2.8.1 Background

The EO Regulation states that any part of a waterway providing for passage of fish is an MSES only if the construction, installation, or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway.

The *Queensland Waterways for Waterway Barrier Works* mapping indicates the level of 'risk' associated with undertaking waterway barrier works within Queensland waterways with regards to fish passage. The mapping identifies the unnamed tributaries of the Isaac River that are to be excised for the project as being at low to moderate risk of adverse impacts to fish passage. The EIS determined that the project would not create a barrier to fish passage to any high or major risk waterways and this report agrees with that finding.

5.2.8.2 Survey methodology

Further to the survey methodology outlined in section 5.2.3.4, the proponent facilitated a site inspection with the Office of the Coordinator-General and DAF on 14 February 2023. The DAF collected ground-truthing data in order to assess the 3 unnamed waterways that will potentially be impacted by the project. The report provided by DAF concluded that 2 of the unnamed waterways provide for fish passage, along with a third previously unidentified waterway. While DAF's assessment is inconsistent with the findings of the proponent's ecologists, the proponent has accepted the determination of waterways that provide fish passage by DAF.

5.2.8.3 Project impacts

5.2.8.3.1 Land clearing

The DAF determined that the project would remove a combined 6.8 ha of waterways that provide for fish passage. The impacts will be from land clearing associated with the mine site itself, with no waterways that provide for fish passage expected to be impacted by the infrastructure corridor. The mine site activities that are forecast to impact upon waterways that provide for fish passage are as follows:

- infrastructure corridor
- mining infrastructure area
- out-of-pit waste rock emplacement
- open cut pits (excluding North-West Pit, Main Pit South, and South Pit).

5.2.8.3.2 Significance of land clearing

The ephemeral waterways within the project area that provide for fish passage are classified as low and moderate risk of adverse impacts to fish movements. Based on the results of the field survey, these waterways provide poor aquatic ecological value and are largely disturbed by surrounding land use, in particular, soil disturbance associated with cattle grazing. They are low Strahler stream-order waterways that do not connect to important fish habitat upstream. As such, the EIS determined that the excision of these unnamed tributaries for the project will have a minimal impact to the extent of waterways that provide for fish passage within the local subregions.

5.2.8.3.3 Animal breeding places, edge effects, and invasive weeds and feral animals

Waterways that provide for fish passage would be susceptible to additional indirect impacts from animal breeding places, edge effects, and invasive weeds and feral animals. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on regulated vegetation.

5.2.8.3.4 Hydrological changes

Waterways that provide for fish passage would also be susceptible to additional indirect impacts from hydrological changes. As the potential impacts would be similar for both MSES, further discussion is provided in the assessment of impacts on wetlands and watercourses.

5.2.8.4 Avoidance and mitigation measures

The EIS indicates that impacts to waterways that provide for fish passage are unavoidable due to the nature of the project and location of the coal seams.

In addition to the mitigation measures listed in section 5.2.3.4, the proponent has proposed to maintain surface water flows to waterways providing for fish passage downstream of the disturbance area through the construction of clean water diversions that will direct surface flows around the disturbance area and back into the original alignment of the waterways when exiting the site. I have stated a condition for the EA to ensure that the diversions meet this objective.

Furthermore, the proponent has proposed post-mining reinstatement of the portion of the northern waterway that provides for fish passage up to the existing quarry. The reinstated excised portion of the northern unnamed waterway would incorporate natural-like features including pools and meanders with a gradient of no more than 5%. Conditions have been stated in the EA to ensure these requirements are met, along with conditions that require the proponent to demonstrate that the reinstated waterway has similar ecological values to a comparable waterway within the vicinity.

5.2.8.5 Significant residual impacts and offsets

The proponent determined that an SRI of 6.8 ha would be incurred for waterways that provide for fish passage. The proponent has proposed financial offsets for the total SRI for an amount that will be calculated at the time of payment. Additionally, the proponent has committed to the reinstatement of a portion of the northern unnamed waterway, as detailed in section 5.2.8.4. I am satisfied that the offset requirements for impacts to waterways providing for fish passage will be met with this approach.

5.2.8.6 Coordinator-General's conclusion: waterways providing for fish passage

The impacted waterways that provide for fish passage are highly ephemeral in nature, providing potential habitat qualities during periods of high rainfall only. The waterways have limited in-stream and bankside vegetation and exist in a highly disturbed landscape that has been historically impacted through cattle grazing and land clearing practices. Nonetheless, DAF determined during a site inspection that the central unnamed waterway, a portion of the northern unnamed waterway, and a previously unmapped waterway to the west of the northern unnamed waterway all provide for fish passage and as such, are an MSES.

The proponent has committed to providing both financial offsets for the entire SRI along with reinstating the section of the northern unnamed waterway that provides for fish passage. Furthermore, the proponent has committed to constructing clean water diversions which would divert surface water flows around the mine site and re-enter the original alignment of the waterways downstream of the indicative soil disturbance extent. This will ensure that downstream environments continue to receive surface flows during rainfall events and that fish passage may still occur up to the extent of the project site.

Given the limited habitat value of the waterways that provide for fish passage that are expected to be impacted by the project, and the proponent's commitment to mitigate the impacts through diverting surface flows into waterways that provide fish passage downstream of the site, reinstate the section of the northern unnamed waterway that provides for fish passage, and provide a financial offset for the entirety of the impacts, I consider the significant residual impacts to this MSES to be acceptable. I am satisfied that the stated conditions for the EA and the implementation of the proponent's commitments would ensure that acceptable outcomes are achieved for impacts on waterways that provide for fish passage MSES due to the project.

5.2.9 Coordinator-General conclusion: MSES

I am satisfied that the proponent has identified the potential impact of the project on all relevant MSES, including regulated vegetation; connectivity areas; wetlands and watercourses (including GDEs); protected wildlife habitat (plants and fauna); and waterways providing for fish passage. The proponent has calculated the maximum impact to each MSES, identified overlapping MNES, and determined if an SRI would occur which would require an environmental offset, as per Table 5.5. I agree with the findings of the EIS for potential impacts on MSES.

Where overlap occurs between MSES and MNES, the prescribed environmental matters will be assessed under the EPBC Act. This precludes the Coordinator-General from stating conditions on the overlapping values, as the same (or substantially the same) matter and the same (or substantially the same) impact has been assessed by the Australian Government. A detailed review of MNES is provided in section 6.

Table 5.5 Significant residual impacts to prescribed environmental matters (MSES)

Prescribed environmental matter (MSES)	Maximum extent of disturbance (ha)	State environmental offset required
Regulated vegetation		
Endangered Regional Ecosystem – RE 11.3.1	64.5	Yes
Endangered Regional Ecosystem – RE 11.4.8	2.4	Yes
Endangered Regional Ecosystem – RE 11.4.9	23.1	Yes
Endangered Regional Ecosystem – RE 11.9.5	17.7	Yes
Of Concern Regional Ecosystem – RE 11.3.2	9.6	No*
Of Concern Regional Ecosystem – RE 11.3.3c	6.9	Yes
Of Concern Regional Ecosystem – RE 11.3.4	39.8	Yes
Essential habitat for an animal that is vulnerable wildlife – Ornamental snake (*Densonia maculata*)	1,834.2	Yes
RE within the defined distance of a vegetation management watercourse – RE 11.3.1	1.3	Yes
RE within the defined distance of a vegetation management watercourse – RE 11.4.4	0.1	No*
RE within the defined distance of a vegetation management watercourse – RE 11.9.3	3.1	Yes
Connectivity areas		
Prescribed REs that contain an area of land that is required for ecosystem functioning	569.3	Yes
Protected wildlife habitat		
Habitat for a plant that is endangered wildlife – *Solanum adenophorum*	0.2	Yes
Habitat for an animal that is endangered wildlife – Australian painted snipe (*Rostratula australis*)	TBC	No*
Habitat for an animal that is vulnerable wildlife – Ornamental snake (*Densonia maculata*)	1,834.2	No*
Habitat for an animal that is vulnerable wildlife – Squatter pigeon (*southern subspecies*) (*Geophaps scripta scripta*)	TBC	No*

Prescribed environmental matter (MSES)	Maximum extent of disturbance (ha)	State environmental offset required
Habitat for an animal that is vulnerable wildlife – Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*)	TBC	No*
Habitat for an animal that is vulnerable wildlife – Greater glider (*Petauroides volans*)	132.8	No*
Habitat for an animal that is vulnerable wildlife – Common death adder (*Acanthophis antarcticus*)	230.3^	No#
Habitat for an animal that is special least concern wildlife – Short-beaked echidna (*Tachyglossus aculeatus*)	2,049.3	No#
Waterways that provide for fish passage		
Waterways where waterway barrier works carried out under an authority will limit the passage of fish along the waterway	6.8	Yes

* This matter will be assessed under the EPBC Act as an MNES.

This matter will not incur a significant residual impact.

^ Initial area calculated prior to the optimised mine layout.

I have stated conditions for the EA in relation to several MSES, including:

- maximum disturbance limits for MSES
- at least 3 months prior to the commencement of each stage of the project, the proponent must submit a Notice of Election to DES, whereby an agreed delivery arrangement would be entered into by the proponent and DES to offset impacts to MSES
- clean water diversions that will facilitate the delivery of surface water flows back into the original alignment of the waterways when exiting the site in order to protect downstream ecological values
- incorporation of natural-like features in the reinstated excised portion of the northern unnamed waterway, including pools and meanders with a gradient of no more than 5%.

I have also recommended conditions for consideration by the Australian Minister for the Environment to address the offset obligations for MSES that are assessed under the EPBC Act as MNES, including:

- maximum disturbance limits for MNES
- prior to the commencement of each stage of the project, the proponent must submit an Offset Management Plan to DCCEEW, whereby an agreed delivery arrangement would be entered into by the proponent and DCCEEW to offset impacts to MNES
- an MNES Management Plan detailing monitoring programs and how impacts and threats to EPBC Act listed threatened species will be avoided, mitigated, and managed
- a GDEWMP, including ground-truthing of potential GDEs prior to the commencement of mining activities.

I am satisfied that the stated conditions for the EA, the implementation of the proponent's commitments, and the recommended conditions for the Australian Minister for the Environment in this report would ensure that acceptable outcomes are achieved for impacts on MSES due to the project.

5.3 Air

Appendix H of the draft EIS and Attachment 13 of the revised draft EIS provides the proponent's assessment of the project's air quality and greenhouse gas impacts associated with the construction, operation and rehabilitation of the project, and combustion of project coal in export countries. This section evaluates these potential impacts and the proponent's proposed mitigations and management strategies.

5.3.1 Existing environment

The EIS identified a number of dust sources in the vicinity of the project which contribute to ambient air quality, including natural sources (e.g. wind erosion and bushfires) and anthropogenic sources (e.g. existing mines in the region, agricultural activities and operation of the Winchester Quarry within the project site).

There are 4 homesteads (residences) identified as sensitive receptors. The EIS also identified air quality impacts at the Eagle Downs Mine and Eagle Downs Exploration Shed. Table 5.6 summarises the location of the sensitive receptors and workplaces.

Table 5.6 Sensitive receptors and workplaces in the vicinity of the project site

Description	Distance and director from the project
Eagle Downs Exploration Shed – workplace	1.3 km south-west
Olive Downs Homestead – residence	1.4 km north-east
Eagle Downs Mine – workplace	3.2 km west
Winchester Downs Homestead – residence	6.5 km north-west
Coolibah Homestead – residence	9.2 km north-west
Vermont Park – residence	10 km south-east

Greenhouse gas emissions are emitted from different land uses within the vicinity of the project including resource extraction and agriculture. Queensland's agriculture sector emissions are largely from farming livestock, particularly the associated methane emissions, and from growing crops. The main sources of fugitive emissions in the vicinity are from underground coal mining, surface coal mining and natural gas extraction, which is a key land use within the Bowen Basin.

5.3.2 Submissions

The key issues regarding air quality and greenhouse gas emissions raised in submissions on the EIS include:

- exceedance of predicted cumulative 24-hour and annual average particulate matter with a diameter less than 10 PM_{10} at the Olive Downs Homestead
- potential air quality impacts from blasting at the Eagle Downs Mine
- potential Scope 1, 2 and 3 greenhouse gas emissions and mitigation measures
- combustion of coal that the proponent proposes to extract and sell is not consistent with the goal of the Paris Agreement to limit the increase in global temperature above pre-industrial levels to well below 2 degrees Celsius (°C) while pursuing efforts to limit it to 1.5°C

- the project and its potential emissions are inconsistent with the standard criteria to be considered under the EP Act for an EA application
- the project and its contribution to climate change is not compatible with human rights protected by the *Human Rights Act 2019* (HR Act)
- request to put the EIS assessment on hold until the Australian Minister for the Environment has reconsidered the controlled action decisions made under the EPBC Act for the project (the Environmental Justice Australia request related to 19 coal and gas projects).

This report has considered each submission received and the responses provided by the proponent in evaluation of the project. Assessment of key matters is provided below.

5.3.3 Methodology

5.3.3.1 Air quality

The EIS adopted baseline air quality values for pollutants based on a review of baseline monitoring undertaken at Moranbah (approximately 30 km north-west of the project) and at the Olive Downs Mine (adjacent to the project). Data obtained from air quality monitoring stations located at Moranbah and dust deposition monitoring at Utah Drive, Moranbah was used.

In order to simulate the air quality impacts from construction, operation and rehabilitation activities, dispersion modelling software California Puff Model (CALPUFF) was used in the EIS to predict pollutant concentrations and dust deposition at the nearest sensitive receptors. The Air Pollution Model (TAPM) was used to generate twelve months of modelled meteorological data inputs to inform CALPUFF modelling. TAPM used wind speed and direction monitored at the now decommissioned weather monitoring station at the Moranbah Water Treatment Plant.

The air quality emission rates entered into the CALPUFF dispersion model are based on the source and activities anticipated in each year, including drilling and blasting, waste rock removal, ROM coal extraction, plant equipment movement, train loading, road grading, wind erosion from exposed areas, and onsite CHPP operations. The methodology used to undertake the project's air quality assessment is considered appropriate.

The EIS adopted greenhouse gas emissions rates for the construction and operation of the project based on activity data representative of the proposed activities and methods described in *The National Greenhouse Accounts*,[27] National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Cth), and the *Greenhouse Gas Protocol*.[28]

The greenhouse gas emission rates are based on the source and activities anticipated in each year, including diesel combustion, fugitive emissions, explosive use, vegetation clearing, electricity usage, transportation of coal and combustion of coal.

DES noted in its submission on the EIS that there remains uncertainty associated with the estimation of emissions from surface coal mines due to the unrepresented emission intensity, the natural variability of in-situ methane content as mining gets deeper and the exclusion of any gas from pore and fracture space.

Notwithstanding DES submission, the methodology used to undertake the project's greenhouse gas assessment is considered adequate and addresses the project's TOR to describe the release rates of pollutants and to provide an emissions inventory. I acknowledge that there are limitations of the

[27] Australian Government, Department of Industry, Science, Energy and Resources, *National Greenhouse Accounts 2019*, August 2019.
[28] World Resources Institute, *Greenhouse Gas Protocol*.

methodology and assumptions presented in the EIS for predicting emissions, however, the EIS has provided sufficient information to estimate the project's annual and total emissions.

5.3.4 Legislation and policy

5.3.4.1 Air quality

In Queensland, air quality is managed under the EP Act, EP Regulation and the EPP Air. The project must meet air quality objectives set out in the EPP Air for particulate matter with a diameter less than 2.5 micrometres ($PM_{2.5}$) and PM_{10} and total suspended particles, which are the 3 main pollutants covered by the EPP Air that are expected to be generated by the project.

The air quality objectives in the EPP Air do not apply to workplaces. Instead, the air quality impacts are regulated by the *Mining and Quarrying Safety and Health Act 1999* and *Coal Mining Safety and Health Act 1999* and subordinate legislation.

The EIS adopted the dust deposition limits in DES Application requirements for activities with impacts to air[29] and DES Guideline – Model mining conditions,[30] which is a commonly used benchmark for avoiding dust impacts.

5.3.4.2 Greenhouse gas emissions

5.3.4.2.1 Australian Government

Australia is a party to the Paris Agreement, which is a legally binding international treaty on climate change. The Paris Agreement aims to strengthen the global response to the threat of climate change by limiting the increase in global temperature above pre-industrial levels to well below 2°C while pursuing efforts to limit it to 1.5°C.

Under the Paris Agreement, Australia must submit emissions reduction commitments known as Nationally Determined Contributions (NDCs). On 16 June 2022, the Australian Government lodged a new NDC, setting an ambitious 2030 target to reduce greenhouse gas emissions by 43% below 2005 levels, putting Australia on track to achieve the net zero emissions by 2050 target. The emission reduction targets are legislated in the *Climate Change Act 2022* (Cth).

Australia is also a signatory to the Global Methane Pledge, which is a non-binding commitment to take a range of actions to collectively reduce global methane emissions across all sectors by at least 30% below 2020 levels by 2030.

Safeguard Mechanism

The Safeguard Mechanism is the Australian Government's policy for reducing emissions at Australia's largest industrial facilities. The Safeguard Mechanism is enacted through the *National Greenhouse and Energy Reporting Act 2007* (Cth). The Clean Energy Regulator administers the National Greenhouse and Energy Reporting scheme and the Safeguard Mechanism.

The Safeguard Mechanism sets greenhouse gas emission baselines for facilities which emit more than 100,000 tonnes of carbon dioxide equivalent (CO_2-e) per year (Scope 1 emissions). Coal mines which emit above the emission threshold must comply with emission reporting requirements and the industry baselines. The industry baselines will decline over time to be consistent with achieving Australia's

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[29] Queensland Government, Department of Environment and Science, *Application requirements for activities with impacts to air*, ESR/2015/1840, Version 4.04, September 2021.
[30] Queensland Government, Department of Environment and Science, *Guideline – Model mining conditions*, ESR/2016/1936, Version 6.02, March 2017.

emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050. To meet the industry baseline, coal mines must implement measures to reduce emissions over time or surrender Australian Carbon Credit Units to the Clean Energy Regulator meet compliance obligations.

5.3.4.2.2 Queensland Government

The Queensland Government has committed to reducing Queensland's emissions by 30% below 2005 levels by 2030 and to achieve net zero emissions by 2050. Queensland's emissions have reduced by 29% since 2005 based on 2021 reporting data.

Queensland Resources Industry Development Plan

The *Queensland Resources Industry Development Plan* (QRIDP)[31] sets out a 30 year vision for Queensland's resources industry to be a resilient, responsible and a sustainable resources industry that grows as it transforms. The QRIDP outlines that while the global market for thermal coal is likely to decline as countries choose alternative energy generation solutions to reduce emissions, demand in developed economies will be offset by increased demand from the fast-developing Indo-Pacific region, which could create pockets of future growth for Queensland. This is because Queensland's high quality thermal coal generates fewer greenhouse gas emissions per megawatt hour of electricity compared to lower calorific value coal. Further, the QRIDP identifies the demand for metallurgical coal is predicted to be stronger for longer than thermal coal.

The QRIDP acknowledges that future opportunities for both thermal and metallurgical coal will be supported further by mines decarbonising their operations to remain competitive globally. The Queensland Government expects the resources industry to contribute to Queensland's emission reduction targets, including a pathway to net zero emission operations.

The Queensland Government has committed to develop and consult on a draft resources industry decarbonisation plan policy which would result in substantial and consistent reductions in Scope 1 and 2 emissions. The Queensland Government has also committed to work with the resources industry to investigate ways to reduce fugitive emissions from resource activities, particularly in the Bowen Basin.

5.3.5 Impacts and mitigation

5.3.5.1 Air quality

5.3.5.1.1 Impacts

Mine construction, operation and rehabilitation

The EIS stated the project is expected to generate air quality impacts during construction, operation and rehabilitation activities including drilling and blasting, waste rock removal, ROM coal extraction, plant equipment movement, train loading, road grading, wind erosion from exposed areas, onsite CHPP operations and backfilling of open cut pits.

As discussed in section 5.3.3.1, the proponent undertook site-specific modelling to predict the impacts of dust emissions generated from the project. The potential air quality impacts were assessed for a range of scenarios, with year 19 representing peak ROM coal extraction and dust generation from the project.

The EIS predicted that air quality objectives for PM_{10} specified in the EPP Air would be exceeded at the nearest sensitive receptor, the Olive Downs Homestead (Table 5.6), in all modelled scenarios. The EIS

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[31] Queensland Government, Department of Resources, *Queensland Resources Industry Development Plan*, June 2022

predicted that air quality objectives specified in the EPP Air and dust deposition rates would be met at the 3 remaining sensitive receptors (Table 5.6) when all proposed mitigation measures are implemented.

The EIS also modelled air quality impacts at the Eagle Downs Mine and Eagle Downs Exploration Shed (Table 5.6), which predicted that air quality objectives for $PM_{2.5}$ would be met at the Eagle Downs Mine in all modelled project scenarios, except year 27 of the project, and air quality objectives for PM_{10} would be exceeded at the Eagle Downs Mine and Eagle Downs Exploration Shed in all modelled project scenarios. As these assets are a workplace, the air quality objectives in the EPP Air do not apply and instead, impacts would be regulated by the *Mining and Quarrying Safety and Health Act 1999* and *Coal Mining Safety and Health Act 1999* and subordinate legislation.

The EIS found that emissions from diesel-powered equipment and blasting such as carbon monoxide, oxides of nitrogen, and sulphur dioxide are likely to have negligible impact outside of roads and open cut pits and were therefore not assessed further in the air quality assessment.

Railway operations

The EIS stated the project has the potential to generate localised dust impacts along the rail corridor during the transport of project coal to a port for export. Potential sources of dust include from wind erosion of exposed coal in loaded wagons and coal spilled in the rail corridor; and leakage of coal during loading and unloading activities. The EIS referred to several studies of ambient air quality monitoring and modelling of emissions from coal trains conducted by Katestone Environmental and air quality monitoring conducted by the Queensland Government. The air quality monitoring found that rail transport dust emissions were a minor contributor to overall particle levels at the monitoring sites and that increases in dust along the railway corridor from passing trains was short-lived and dependent on the type of train and meteorological conditions.

Cumulative impacts

The proponent undertook site-specific modelling to predict the cumulative impacts of dust emissions generated from the project and nearby mining operations. The EIS predicted a low probability that the Olive Downs Homestead (Table 5.6) would experience cumulative dust impacts from mines in proximity (the project, Poitrel Mine, Daunia Mine, Olive Downs Mine and the Moorvale South Project) as these mines are located in different directions relative to the homestead.

The EIS also predicted a low probability that the Winchester Downs Homestead (Table 5.6) would experience cumulative dust impacts from the project and the Caval Ridge Horse Pit Extension Project as these projects are located in different directions relative to the homestead.

5.3.5.1.2 Mitigation

The proponent proposes a range of measures to minimise dust emissions from project activities. Table 5.7 outlines the proposed routine dust control measures to be implemented during the construction, operation and rehabilitation phases.

Table 5.7 Routine dust control measures

Project activity	Mitigation measure	Reduction (%)
ROM coal haulage	Watering	85
Waste Rock haulage	Watering	85
Drilling	Drill dust suppression sprays	70
ROM coal unloading at CHPP	Water sprays	50
Crushing	Enclosure	100

Project activity	Mitigation measure	Reduction (%)
Product stockpiles	Water sprays, reshaping	85
Train loading	Telescopic chute with water spray	85

To ensure air quality objectives are complied with at sensitive receptors (Table 5.6) and the broader environment, I have stated conditions for the EA in Appendix 1 of this report regarding limits, monitoring and management. I require the proponent to undertake continuous monitoring for meteorological conditions and PM_{10}, and monthly monitoring of dust deposition at 4 monitoring locations. The monitoring will guide the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with the air quality objectives in the EA.

I also require the air quality and meteorological condition data to be published on the proponent's website in real time. This requirement promotes transparency for nearby potentially affected landholders and community members to determine air emissions from the project; addresses the risk that the proponent did not undertake site specific baseline air quality monitoring to inform the EIS; and provides an opportunity to validate predicted air emissions.

To minimise impacts to air quality, I require the proponent to prepare and implement an air quality management plan prior to construction. The plan must:

- detail the mitigation and control measures to prevent environmental nuisance and air limits being exceeded at sensitive receptors
- include a trigger action response program that uses a combination of predictive meteorological forecasting and real time air monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with the EA
- be reviewed annually.

The EIS stated the proponent would modify project operations in accordance with the air quality management plan where air quality monitoring and meteorological forecasting indicate the potential for exceedances of air quality objectives within the EPP Air at sensitive receptors. The monitoring of air quality will also assist the proponent to understand the project's contribution to the regional airshed and adjust operations to minimise cumulative air quality impacts.

To mitigate air quality impacts at the Olive Downs Homestead, the proponent has executed a non-residency agreement with the owner for the homestead to remain vacant during the life of the project. I have stated a condition for the EA in Appendix 1 of this report which allows for the proponent to enter into agreements with the owner of a sensitive receptor to manage impacts experienced at the receptor.

To minimise air quality impacts at the Eagle Downs Mine, the proponent has committed to ongoing engagement with Eagle Downs Coal Management Pty Ltd, owner of the Eagle Downs Mine, regarding operational blasting procedures to reduce the potential risk of blast fume impacts (e.g., consideration of prevailing and forecast wind direction prior to blasting in proximity to the Eagle Downs Mine ventilation intakes). As discussed above, I have stated a condition to require continuous monitoring of PM_{10} and monthly monitoring of dust, and implementation of proactive and reactive measures to manage impacts on the Eagle Downs Mine.

To minimise coal dust emission on the project's rail infrastructure, the proponent has committed to profile the coal in wagons to a "garden bed" shape and spray a biodegradable sealant on top of the coal to prevent dust generation during transit to port. These dust measures are consistent with Aurizon's *Coal Dust Management Plan*[32] and are highly effective in reducing coal dust during transit.

5.3.5.2 Greenhouse gases

5.3.5.2.1 Impacts

Scope 1 and 2 emissions

The EIS stated the project is expected to generate Scope 1 and 2 greenhouse gas emissions during construction, operation, and rehabilitation activities, predominately from diesel use, fugitive methane emissions, vegetation clearing and electricity usage.

The EIS estimated the project's total Scope 1 emissions[33] would be 14.96 megaton (Mt) of CO_2-e (15.94 Mt of CO_2-e including land clearing emissions) and Scope 2 emissions[34] would be 1.4 Mt of CO_2-e. The average annual Scope 1 emissions would be 0.49 Mt of CO_2-e (0.53 Mt of CO_2-e including land clearing emissions). The EIS concluded that the project's maximum annual Scope 1 emissions would account for approximately 0.12% and 0.43% of Australian and Queensland emissions in 2019 respectively.[35]

Scope 3 emissions

The transport of project coal to a port for export and combustion of project coal in export countries would release emissions (mostly CO_2) into the atmosphere, which would contribute to climate change. The impact of Scope 3 emissions is a relevant factor when evaluating the EIS and considering human rights.

The EIS estimated the project's total Scope 3 emissions[36] would be 567 Mt of CO_2-e. The average annual Scope 3 emissions would be 18.9 Mt of CO_2-e. The EIS concluded the project's annual Scope 3 emissions would account for approximately 0.04% of global anthropogenic emissions in 2019.[37] The Australian and Queensland emissions targets are not affected by combustion emissions in another country.

Submitters on the EIS raised concerns that the combustion of the coal that the proponent proposes to extract and sell is inconsistent with the goal of the Paris Agreement; the standard criteria to be considered under the EP Act for an EA application; and various principles of international environmental law. The climate change experts agreed in the recent Galilee Coal Project Land Court objections hearing[38] that a project can be consistent and 'meet' the requirements of Australia's NDCs and the obligations of the Paris Agreement while being contrary to the intent of both. From the perspective of climate change and reduction of global impacts, it is the intent of the Paris Agreement that matters.[39] President FY Kingham in that case determined that the Paris Agreement does not prohibit new coal mines being approved[40] and that current Australian and Queensland Government policy contemplates an ongoing role for Australia as an exporter of metallurgical and thermal coal, albeit in the context of declining demand.[41]

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[32] Aurizon, *Coal Dust Management Plan*, March 2020.
[33] Scope 1 emissions are direct emissions from sources owned or controlled by the proponent.
[34] Scope 2 emissions are indirect or upstream emissions which arise from the generation of purchased electricity consumed by the proponent.
[35] Australian and Queensland Government 2019 emission inventory excludes emissions associated with land use and land use change.
[36] Scope 3 emissions are all other indirect emissions which occur in sources not owned or controlled by the proponent.
[37] Global 2019 emission inventory excludes emissions associated with land use changes.
[38] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21.
[39] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21, [573].
[40] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21, [1846].
[41] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21, [687].

Submitters on the EIS also requested that the Coordinator-General not progress the EIS assessment until the Australian Minister for the Environment has decided the request to reconsider the controlled action decisions for the project submitted by Environmental Justice Australia. The reconsideration request is discussed at section 3.2.

5.3.5.2.2 Mitigation

Scope 1 and 2 emissions

The Queensland Government expects the resources industry to contribute to Queensland's emission reduction targets, including a pathway to net zero emission operations. To avoid and minimise Scope 1 and 2 emissions, I have stated a condition for the EA (Appendix 1) of this report that the proponent must prepare and implement a greenhouse gas abatement plan prior to construction.

The plan must include:

- an inventory of projected unmitigated annual Scope 1 and 2 emissions for each greenhouse gas over the life of the project
- the intended objectives, measures and performance standards to avoid and mitigate emissions consistent with Queensland's Climate Action Plan and relevant targets
- a process for regularly reviewing, assessing and implementing new technologies to identify opportunities to further reduce emission and energy use and progressively improve energy efficiency
- a program for annual monitoring, auditing and reporting on emissions from all relevant activities and the success of measures to avoid and mitigate emission and achieve relevant targets
- a biennial review and update of the effectiveness of the plan.

The proponent has committed to implement the following measures to minimise Scope 1 and 2 emissions:

- conducting regular maintenance of plant and equipment to minimise fuel consumption and associated emissions, including training staff on continuous improvement strategies regarding efficient use of plant and equipment
- procurement of policies that require the selection of energy efficient equipment and vehicles
- optimising diesel consumption through logistics analysis and planning (e.g. review of the mine plan to optimise haul lengths, dump locations, and road gradients)
- using high-efficiency motors
- limiting vegetation clearance, as far as practical, within the project area
- monitoring and waste reduction in accordance with the project waste management plan, including implementation of a waste recycling program for the project to promote and encourage recycling of materials such as paper, cardboard and scrap metal
- purchasing carbon neutral electricity to abates all Scope 2 emissions (1.4 Mt of CO_2-e) of the project
- funding research targeted at reducing greenhouse gas emissions associated with the project
- implementing measures where determined to be feasible (e.g. carbon capture and storage, pre-drainage of methane, zero emission trucks, automatic haulage system)
- preparing and implementing a research program to allocate funds to minimise fugitive emissions post-mining; capture of CO_2 for beneficial reuse or sequestration; understand opportunities for electrification; and other potential abatement options

- preparing an annual energy audit of diesel and electricity usage
- reviewing the greenhouse gas management and abatement plan annually and revising based on outcomes of the annual energy audit to improve energy efficiency.

In addition to the monitoring and reporting of Scope 1 and 2 emissions required by the greenhouse gas abatement plan, the project must record and report emissions data against the industry baseline to the Australian Clean Energy Regulator each year the project emits more than 100,000 t of CO_2-e. The Clean Energy Regulator must publish information about all facilities covered by the Safeguard Mechanism. The EIS stated the project is anticipated to emit more than 100,000 t of CO_2-e for all project years, except the first year of operation and decommissioning/final rehabilitation of the project.

The industry baseline set under the Safeguard Mechanism will decline at 4.9% each year to 2030, and in 5 year periods after 2030 to meet Australia's NDCs under the Paris Agreement. To meet the industry baseline, the project must implement additional measures to reduce emissions over time or surrender Australian Carbon Credit Units to the Clean Energy Regulator meet compliance obligations.

Pre-drainage of coal seams

Submitters on the EIS recommended the proponent implement pre-drainage of coal seams to minimise fugitive emissions (approximately 46% of total emissions for the project). The abatement of fugitive emissions from the project would contribute to the Global Methane Pledge, to collectively reduce global methane emissions across all sectors by at least 30% below 2020 levels by 2030. DES acknowledged that while direct abatement of fugitive emissions from surface mines remains challenging, pre-drainage can capture gas from coal seams and thus achieve deep emissions reduction at surface mines.

In preparation of the revised draft EIS, the proponent investigated pre-drainage of coal seams and concluded that pre-drainage is not currently feasible due to the capital investment associated with drilling, fracking and development of gas extraction wells. The EIS stated that due to the low levels of in-situ gas content (ranging between 0.4 cubic metres per tonne (m^3/t) to 2.1 m^3/t, with an average gas content of 1.5 m^3/t), significant depressurisation would be required to mobilise the gas, as well as a substantial level of well stimulation (e.g., fracking) in advance of mining. In addition, the EIS stated that approximately 20% of in-situ gas would remain bound to coal following pre-drainage, which is emitted during mining.

Other measures to mitigate emissions

A submitter on the EIS suggested the proponent implement measures to reduce uncertainty of the scale of Scope 1 and 2 emissions from the project to assist the Queensland Government to better understand the local coal mining industry's contribution to the overall methane and other emissions of the country, and to assist the coal mining industry to identify the most promising mitigation opportunities. The requirement for the greenhouse gas abatement plan to detail a program for annual monitoring, auditing and reporting on emissions from all relevant activities and the success of measures to avoid and mitigate emissions addresses the issues raised.

A submitter on the EIS also recommended that the proponent investigate use of zero-emission trucks (e.g. hydrogen trucks and electric trucks) and automatic haulage systems to reduce diesel use at project, and to implement mobile carbon capture technologies to remove carbon dioxide from diesel trucks. In preparation of the revised draft EIS, the proponent investigated mobile carbon and capture technologies and the use of low/zero emission haul trucks. The proponent determined that mobile carbon capture technologies are not yet technically/commercially viable at this stage and that haul trucks technologies are unlikely to be commercially available before 2030.

To contribute to decarbonising the mining industry, the proponent has committed to preparing and implementing a research program to allocate funds to minimise fugitive emissions post-mining; capture of CO_2 for beneficial reuse or sequestration; understand opportunities for electrification; and other potential abatement options which are identified.

Scope 3 emissions

The proponent proposes to export project coal to Japan, South Korea, India, Vietnam, Taiwan and China who are signatories to the Paris Agreement and have NDCs (except for Taiwan which has domestic energy policies consistent with the objectives of the Paris Agreement). The reporting and management of Scope 3 emissions are the responsibility of the end users of coal, in accordance with domestic legislation and policies.

The proponent has also committed to work with commercial partners to analyse and evaluate opportunities to reduce operational emissions and investigate measures at each point of its value chain to reduce emissions, consistent with actions outlined in the Minerals Council of Australia Climate Action Plan.[42]

5.3.6 Human Rights consideration

Submitters on the EIS raised concerns that the project and its contribution to climate change is not compatible with human rights protected by the HR Act and referred to analysis and recommendations made by President FY Kingham to refuse the EA and mining lease for the Galilee Coal Project,[43] having regard to the project's potential climate change impacts and limitation of human rights (amongst other matters).

President FY Kingham was clear that case was not about determining whether any new coal mines should be approved, it was about whether the Galilee Coal Project should be approved on its merits. Nonetheless, the decision provides useful guidance for considering human right implications for government decision makers.

The combustion of the project's coal in the proposed export countries has the potential to generate indirect impacts on people, property and the environment in Queensland and has the capacity to limit the following human rights: the right to enjoy a person's human rights without discrimination, the right to life, the right to freedom of movement, the right to property, the right to privacy and reputation, the right to protection of children, and the cultural rights of Aboriginal peoples and Torres Strait Islander peoples.

The Coordinator-General must consider whether the decision to prepare a report evaluating the project's EIS, including any conditions and recommendations set by the Coordinator-General to manage the project's potential environmental effects is compatible with human rights.

The combustion of the project's coal would emit emissions (mostly CO_2) into the atmosphere, which would contribute to climate change. Climate change is currently resulting in physical impacts which will intensify as average global surface temperature rises. The project's contribution to increasing emissions would exacerbate potential climate change impacts such as heat waves, rainfall events, drought events, tropical cyclones and sea level rise.

Parties to the Galilee Coal Project objections hearing agreed the potential health impacts from climate change would disproportionately affect children who are living now and are born in the future; and older people, people living in poverty, other disadvantaged people, and First Nations Aboriginal and Torres Strait Islander peoples.[44] Parties to the Galilee Coal Project objections hearing also agreed that climate change impacts would affect Aboriginal and Torres Strait Islander peoples in specific ways, including by

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[42] Minerals Council of Australia, *Climate Action Plan*, 2020.
[43] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21.
[44] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21, [1589].

causing: disruption of traditional cultural practices, including those which depend on connection to place and ecological systems; displacement from traditional land; impediments to the continuation, preservation and development of culture into the future and for future generations; and irreversible harm to their traditional lands and waters.[45]

I determined that the decision to prepare a report evaluating the EIS would limit the right to enjoy a person's human rights without discrimination, the right to life, the right to freedom of movement, the right to property, the right to privacy and reputation, the right to protection of children, and the cultural rights of Aboriginal peoples and Torres Strait Islander peoples. The limitation on each right is linked to climate change consequences that may arise from the project.

To minimise emissions from the project and to mitigate any potential limits on human rights associated with the project's emissions, I have stated a condition for the EA to require the proponent to prepare a greenhouse gas abatement plan to minimise Scope 1 and 2 emissions over time to meet Australian and Queensland emission reduction targets. In addition, the proponent proposes to export the project coal to countries which are signatories to the Paris Agreement. The implementation of measures to avoid, minimise and mitigate emissions is considered to have mitigated limits on human rights, with the residual limit considered necessary to achieve the purpose of the limit.

When balancing each human right with the purpose of extracting primarily a metallurgical coal product (approximately 58%) for the production of steel and a secondary thermal coal product (approximately 42% for electricity generation for export to Japan, South Korea, India, Vietnam, Taiwan and China, the limit on human rights in sections 15(2), 16, 19, 24, 25, 26(2) and 28 of the HR Act is considered reasonable and demonstrably justified. The economic and social benefits, as well as steel production and energy security in export countries is considered to outweigh any harm that may be caused to human rights. I consider that the balance weighs in favour of recommending the project proceed to the next stage in the approvals process, subject to stated conditions and recommendations in Appendix 1 and Appendix 3 of this report.

Following my decision, the Ministers for Environment and Resources must consider whether granting the project's EA under the EP Act and mining leases under the *Mineral Resources Act 1989* are compatible with human rights.

5.3.7 Coordinator-General's conclusion: air quality and greenhouse gases

The EIS adequately assessed the impacts of the project on air quality and greenhouse gas emissions. To ensure potential impacts to air quality experienced at sensitive receptors and in the environment are adequately managed, I have stated conditions in Appendix 1 of this report regarding limits, monitoring and management. I have required the proponent to undertake continuous monitoring of meteorological conditions and PM_{10}, and monthly dust deposition monitoring at 4 locations to determine air emissions from the project; guide the day-to-day planning of mining operations; and implement both proactive and reactive mitigation measures to ensure compliance with air quality objectives. I also require the monitoring data to be published on the proponent's website in real time.

To mitigate potential air quality impacts at the Olive Downs Homestead, the proponent has executed a non-residency agreement with the owner for the homestead to remain vacant during the life of the project. I am satisfied that the ongoing consultation with Eagle Downs Coal Management Pty Ltd and implementation of proactive and reactive measures would manage impacts on the Eagle Downs Mine.

[45] Waratah Coal Pty Ltd v Youth Verdict Ltd & Ors (No 6) [2022] QLC 21, [631].

To ensure the project’s Scope 1 and 2 emissions are managed in accordance with Australian and Queensland emission reduction targets, I have stated a condition in Appendix 1 of this report requiring preparation and implementation of a greenhouse gas abatement plan. The proponent has also committed to fund research initiatives to minimise Scope 1 emissions and to export the project coal to countries which are signatories to the Paris Agreement (or have similar domestic policies).

I am satisfied that the implementation of the stated conditions in Appendix 1 of this report, compliance with the industry baseline under the Safeguard Mechanism and proponent commitments would adequately manage impacts on air quality and address issues raised by submitters.

5.4 Transport

Section 4.9, Appendix I and Attachment 15 of the EIS provides the proponent’s assessment of project impacts on traffic and transport associated with the construction and operation of the project. This section evaluates these potential impacts and the proponent’s proposed mitigations and management strategies.

5.4.1 Existing environment

An overview of the existing road and rail network near the project is provided in Figure 5.5.

5.4.1.1 Road transport network

The major roads servicing the project area are the Peak Downs Highway (state-controlled road) and the Peak Downs Mine Road/Saraji Road (local government road). The EIS stated the Peak Downs Highway provides the primary link between the Whitsunday Coast and Central West region, connecting the towns of Mackay and Clermont. Peak Downs Mine Road/Saraji Road provides the vehicular link between the towns of Dysart and Moranbah.

Key local roads that would be impacted by traffic generated by the project include the Moranbah Access Road (local government road), Eagle Downs Mine Access Road (private road) and Winchester Access Road (private road). The main access route to the project is via Moranbah Access Road, Peak Downs Highway, Peak Downs Mine Road, Winchester Access Road and Mine Access Road.

The EIS stated that the intersections of Goonyella Road and Mills Avenue, and Goonyella Road and Curtin Street, which are the main accesses for Moranbah from the Moranbah Access Road, are near capacity and require upgrades to accommodate evening peak hour traffic (between 5-6 pm). The delay at these intersections are expected to be unacceptable by 2029 and require a seagull arrangement to accommodate traffic movements (without project traffic) prior to 2029. A seagull arrangement provides a separate lane for vehicles turning right from the side road to enter and accelerate to through traffic speed before merging with through traffic. These upgrades are the responsibility of Isaac Regional Council.

There is no public transport access or walking/cycling infrastructure in the region which provides travel to and from the project site. Private bus services currently operate for workforces in surrounding existing mines, reducing the overall demand for vehicle travel on the road network.

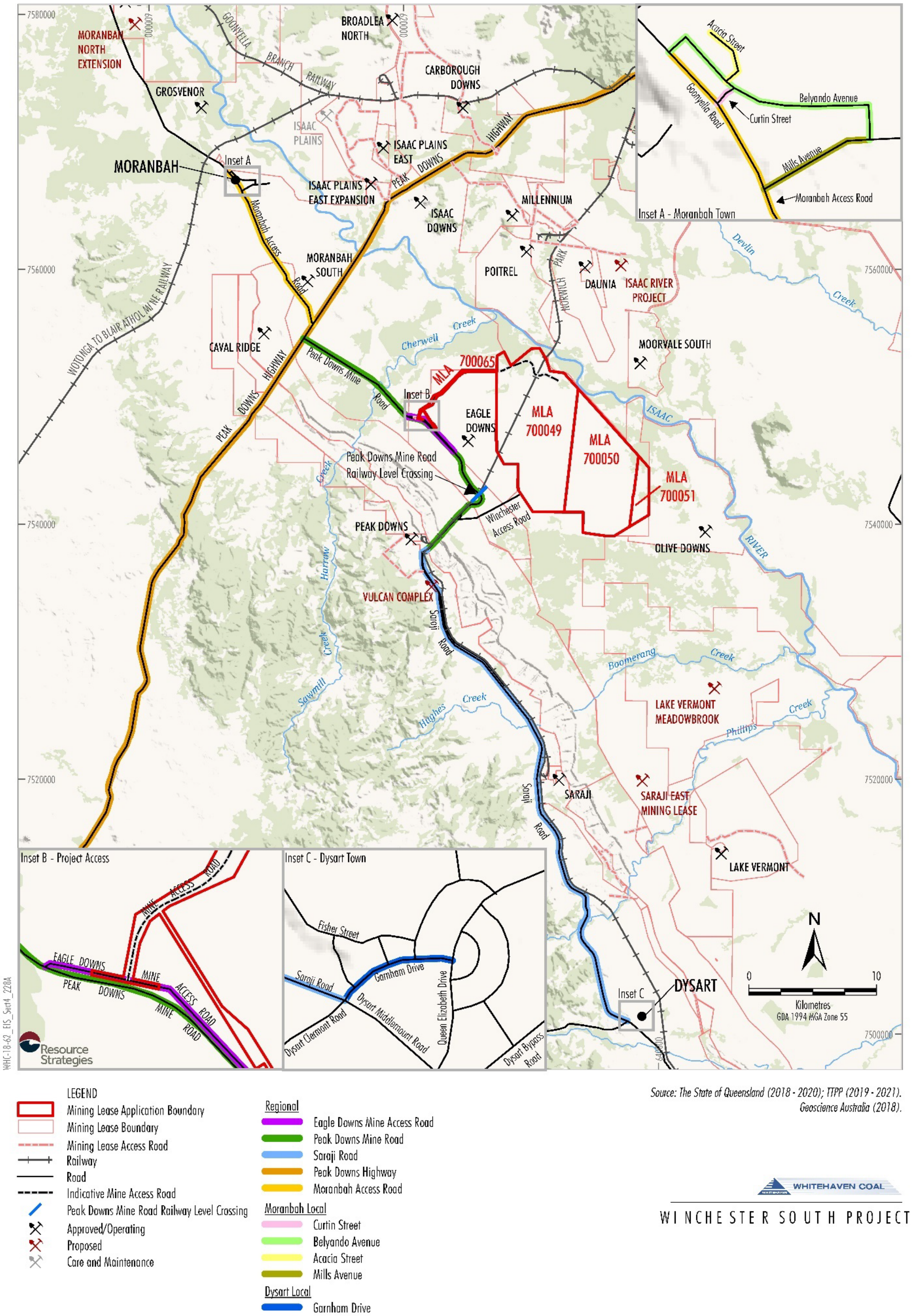

Figure 5.5 Existing road and rail network near the project

5.4.1.2 Road transport network

The major roads servicing the project area are the Peak Downs Highway (state-controlled road) and the Peak Downs Mine Road/Saraji Road (local government road). The EIS stated the Peak Downs Highway provides the primary link between the Whitsunday Coast and Central West region, connecting the towns of Mackay and Clermont. Peak Downs Mine Road/Saraji Road provides the vehicular link between the towns of Dysart and Moranbah.

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There is no public transport access or walking/cycling infrastructure in the region which provides travel to and from the project site. Private bus services currently operate for workforces in surrounding existing mines, reducing the overall demand for vehicle travel on the road network.

5.4.1.3 Rail transport network

The Norwich Park Branch Railway, managed by Aurizon, transects the project area (through MLA 70049). The railway forms part of the Goonyella Rail System, servicing and connecting Bowen Basin mines, including Peak Downs, Saraji, Lake Vermont, Middlemount, Oaky Creek, Millennium and Moorvale mines to the Port of Hay Point or the Port of Abbot Point. The Goonyella Rail System also provides a connection to the Port of Gladstone via the Blackwater Rail System. The EIS stated that in financial year 2019, 124.5 million tonnes of coal were transported via the Goonyella Rail System. The Peak Downs Mine Road crosses the Norwich Park Branch Railway at an active level crossing approximately 19 km from the Peak Downs Highway.

5.4.1.4 Air transport

The EIS stated the Mackay Airport is the nearest major regional airport servicing the project region and currently accommodates more than 800,000 passengers per year. Moranbah Airport located approximately 5 km south-east of Moranbah, and Middlemount Airport, located approximately 1 km north of Middlemount are smaller airports located near the project.

Brisbane Airport is the nearest major city airport. FIFO employees for the project are proposed to travel to the project site via each of the nearby airports.

5.4.2 Submissions

The key issues regarding transport impacts raised in submissions on the EIS include:

- potential impacts on the transport network during the construction, operation, closure and decommissioning of the project
- transport of dangerous goods and mitigation measures for potential impacts to the railway corridor

- potential stormwater or flooding impacts on the existing rail network
- preparation of a road use management plan and infrastructure agreement.

This report has considered each submission received and the responses provided by the proponent in the evaluation of the project.

5.4.3 Methodology

The EIS adopted baseline traffic data based on surveys conducted at key project locations during October and November 2019 and annual average daily traffic data for the Peak Downs Highway between Clermont and Mackay (2018 data) collected by the DTMR.

The proponent conducted a road transport assessment consistent with the principles of the *Guide to Traffic Impact Assessment*[46] (GTIA) to determine potential impacts on access and frontage, intersection delay, road link capacity, road safety, pavement condition and level crossings. Three future scenarios were developed for the road transport assessment, representing the busiest conditions expected throughout the life of the project: initial project construction (year 1), peak construction and initial coal production (year 2), and during peak operation (i.e. peak operational workforce) (year 8). The EIS also undertook a cumulative traffic assessment based on traffic sources in the vicinity of the project, notably the Eagle Downs Mine and the Olive Downs Mine. The cumulative assessment applied a background growth rate of 2% per annum to all roads.

The road transport assessment assumed a maximum workforce of 700 FTE employees (without the use of automation at the mine) and undertook a sensitivity analysis to account for automation at the mine (500 FTE). The existing performance of access routes, intersections, traffic volume, and any other relevant factors were assessed to determine the current level of service.[47]

5.4.4 Impacts and mitigation

5.4.4.1 Road network

An increase in traffic is expected to be generated on major roads from vehicles delivering materials to the project site and daily workforce movements between accommodation and the mine site during the construction and operational phases. The EIS stated that the majority of the vehicular activity generated by the project during operations would be from workforce movement, via light vehicles and shuttle buses.

Most deliveries to site are expected during the construction phase (at peak approximately 100 deliveries per day), with less expected during the operational phase (at peak approximately 30 deliveries per day). The EIS stated that materials would be transported from Mackay via a mix of rigid trucks, semitrailers and B-doubles.

The proponent would operate shuttle buses to transport the majority of the construction and operational workforce (approximately 75%) between the project and proposed accommodation facilities located in and surrounding Moranbah, Dysart or Coppabella. Subject to capacity and availability within accommodation facilities, approximately 95% of the construction and operational workforce is expected to reside in Moranbah, 2% expected to reside in Dysart and 3% expected to reside in Coppabella. The remaining portion of the workforce is proposed to use light vehicles to get to site, primarily driving from Moranbah.

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[46] Queensland Government, Department of Transport and Main Roads, *Guide to Traffic Impact Assessment*, December 2018.
[47] 'Level of service' describes operational conditions such as speed and travel time, freedom to manoeuvre, convenience and safety for road users.

5.4.4.1.1 Road access and frontage

The EIS stated access to the project site during the construction phase would be provided by the Winchester Access Road, an existing private access track, for approximately 6 months while the project's Mine Access Road is being constructed. An intersection with the existing Eagle Downs Mine Access Road will be required to accommodate the project's Mine Access Road. The proponent has committed to designing and constructing the new intersection of the Mine Access Road with Eagle Downs Mine Access Road in accordance with the relevant DTMR and Austroads guidelines. The intersection design will be in prepared in consultation with Eagle Downs Coal Management Pty Ltd, manager of the Eagle Downs Mine, and Isaac Regional Council, and in accordance with relevant DTMR and Austroads guidelines. The intersection will be funded by the proponent.

The EIS determined the construction of the Mine Access Road would minimise potential impacts on the Peak Downs Mine Road during the later construction phase and operational phase by consolidating interaction with the public road network to a single existing intersection, rather than introducing a new intersection. As a result, the EIS found access interactions are expected to operate at good levels of service with forecast peak demands, and site distances meet or exceed requirements.

5.4.4.1.2 Intersection delay

As described in section 5.4.4.1.1, following the upgrades of the road intersections at Moranbah Access Road/Goonyella Road with Mills Avenue and Goonyella Road with Curtin Street to a seagull arrangement, the project's traffic contribution on these and other identified intersections in the EIS are acceptable.

5.4.4.1.3 Road link capacity

The level of service of road links was assessed in accordance with the *Guide to traffic management Part 3: Transport studies and analysis*. Levels of service are graded from A to F, with A providing the best traffic conditions with no restriction on desired travel speed or overtaking and E not providing the driver with freedom to select desired speeds or to manoeuvre in the traffic stream as the road is at or near capacity. The EIS determined that the project traffic would impact the levels of service on Moranbah Access Road in the morning peak hour (between 6-7 am) during the construction and operational phases and afternoon peak hour (between 5-6 pm) during the construction phase. The EIS also determined that project traffic would impact the levels of service on Peak Downs Mine Road in the afternoon peak during the peak operational stage. The EIS concluded that the traffic volume generated by the project construction and operation during peak hours are acceptable and that additional capacity is not required on the existing transport network to accommodate the project traffic.

5.4.4.1.4 Road safety

A preliminary risk assessment of the likelihood and consequence of safety risks from project-generated traffic was undertaken as part of the EIS investigations in accordance with the *Guide to traffic impact assessment.* The EIS determined the additional traffic generated by the project is expected to potentially increase the exposure of motorists to crashes along the project access route (Moranbah Access Road, Peak Downs Highway, Peak Downs Mine Road).

As described above in section 5.4.4.1, in order to mitigate the potential safety risks from project generated traffic, the proponent proposes to implement a range of measures. These include the use of shuttle buses to transport construction and operational workers to site and promote car-pooling. This in turn would minimise the volume of project traffic on roads. To manage worker's fatigue, the proponent would implement a fatigue management policy including a swipe card to monitor hours of work. Additional measures include consultation with the Isaac Regional Council and emergency providers regarding safety measures, appropriate vehicle use training, as well as an upgrade to the Eagle Downs Mine Access Road intersection.

The EIS also identified that improvements such as line marking, delineation and pavement conditions of local roads would improve road safety. These would be implemented by Isaac Regional Council's regular maintenance programs.

The proponent has confirmed that direct impacts to local roads arising from project generated traffic is being negotiated via an Infrastructure Agreement with Isaac Regional Council. The proponent has committed to enter into the Infrastructure Agreement with Isaac Regional Council at least 3 months prior to the commencement of construction. The Infrastructure Agreement will detail appropriate financial contributions to Isaac Regional Council to improve road safety as outlined in the road transport assessment, or otherwise agreed with Isaac Regional Council, for the maintenance of Moranbah Access Road and Peak Downs Mine Road.

As discussed in section 5.4.4.1.1, the design and construction of the new intersection of the Mine Access Road with Eagle Downs Mine Access Road will be in accordance with the relevant DTMR and Austroads guidelines.

The EIS found with implementation of the proposed mitigation measures, there is no significant worsening of road safety at any location on the state controlled network, nor local road that would be used by the project.

I have recommended a condition to the Minister for Transport and Main Roads in Appendix 4of this report that the proponent prepare a traffic impact assessment in accordance with the GTIA and a road use management plan prior to the commencement of construction for approval by DTMR. The traffic impact assessment must be prepared by a RPEQ to consider the following:

- a pavement impact assessment that considers cumulative impacts of project traffic on the state controlled road network and identifies mitigation measures
- a road safety risk assessment that includes:
  - an audit of the current conditions on the state controlled road network and identifies mitigation measures
  - confirms the total project task (including volume, weight, origin/destination of materials, hazardous goods, waste)
  - confirm the existing pavement conditions and defects which may lead to safety issues
  - existing intersection performance from a safety perspective
  - existing state controlled road infrastructure and impacts of project traffic.

5.4.4.1.5 Pavement condition

The EIS demonstrated the project would have pavement impacts to the Peak Downs Highway during the construction phase. The proponent has committed to continue consulting with DTMR to determine appropriate financial contributions to support pavement reconstruction and rehabilitation works. As detailed above, I have recommended a condition that the proponent prepare a pavement impact assessment prior to the construction phase and pay pavement maintenance contributions prior to commencement of significant project traffic unless otherwise agree to in writing by DTMR.

5.4.4.1.6 Level crossings

The EIS found the project traffic during the construction phase would result in minor delays and queues at the active level crossing between Peak Downs Mine Road and the Norwich Park Branch Railway, located to the south of the project during peak hours. To minimise project impacts on this active level, the proponent has committed to consult with Aurizon, the railway manager and DTMR regarding the Australian Level Crossing Assessment Model (ALCAM) assessment. The proponent will also abide by the key actions and performance indicators set out by the *Queensland Level Crossing Safety Strategy 2012-2021*[48], which has a long-term vision of zero harm at Queensland level crossings.

The EIS found the project traffic during the operational phase would have a negligible impact on the active level crossing between Peak Downs Mine Road and the Norwich Park Branch Railway.

5.4.4.2 Rail network

The project construction and operation has the potential to impact the Norwich Park Branch Railway. The project proposes to construct a new rail spur and loop within the mine infrastructure area (MIA) (MLA 700049). The rail spur would be approximately 8 km in length and connect to the Norwich Park Branch Railway. It is proposed to transport product coal to the ports of Hay Point and Gladstone for export. The project also proposes to construct an overpass over the railway for the project's infrastructure corridor to connect to the MIA and the proposed Railway, North-West, West and Main North Pits abut the railway corridor. Potential impacts on the railway associated with the construction and operation of the project is discussed further in section 5.1.5.3 (land use and rehab chapter).

To manage potential impacts on the Norwich Park Branch Railway, I have recommended a condition to the Minister for Transport and Main Roads that the project must not disrupt the safety and operational integrity of the Norwich Park Branch Railway corridor, including all transport infrastructure or the land supporting this infrastructure from ground movement and vibration.

I have recommended a condition to the Minister for Transport and Main Roads that certification from a RPEQ be provided to DTMR confirming that the rail interface and infrastructure crossing has been designed to not encroach upon, destabilise or cause damage to the Norwich Park Branch Railway corridor. The proponent has committed that the project rail spur will be designed and constructed in consultation with Aurizon and in accordance with Aurizon's requirements to access its Central Queensland Coal Network to minimise potential impacts on the existing environment in accordance with relevant guidelines, including the *Guide to Development in a Transport Environment: Rail*.[49] This will address submitter concerns.

I have also recommended a condition that the proponent prepare and implement an earthworks and blasting management plan prior to the commencement of mining activities. Where monitoring identifies any damage to the Norwich Park Branch Railway, I have recommended a condition that the proponent must undertake all necessary rectification works.

Submitters on the EIS raised concerns that the project could cause stormwater or flooding impacts to the railway network. The flood model determined that a flood depth of between -0.1 metre to 0.1 metre would occur as a result of the project during a 1% AEP event. A change in flood depth would occur as a result of the project during a 5% AEP event. The proponent has committed to consult with DTMR over the life of the project regarding flood management and earthworks adjacent to the Norwich Park Branch Railway. I have also recommended a condition to the Minister for Transport and Main Roads in Appendix 3 of this report that stormwater and flooding management of the project must not cause actionable nuisance to the Norwich Park Branch Railway.

The EIS stated that approximately 11 Mtpa of product coal (at peak) would be transported via rail for export via Dalrymple Bay Coal Terminal or the Abbot Point Coal Terminal (via the Newlands rail system) and/or the Blackwater rail system to the Gladstone coal port. This would require an average of 6 train

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[48] Queensland Government, Department of Transport and Main Roads, *Queensland Level Crossing Safety Strategy 2012-2021*, 2012.
[49] Queensland Government, Department of Transport and Main Roads, *Guide to development in transport environment: Rail*, 2015.

movements per day, with a maximum of 16 train movements per day, with arrivals and departures occurring 24 hours per day. The EIS concluded the Norwich Park Branch Railway has sufficient capacity to accommodate project coal traffic, which would represent approximately 9% of the existing capacity. The additional train movements are not anticipated to significantly impact the wait times at level crossings located along the Norwich Park Branch Railway between the project and ports.

I am satisfied the proponent commitments and conditions would adequately minimise and mitigate impacts on the Norwich Park Branch Railway.

5.4.4.3 Decommissioning and closure impacts

The EIS stated that the road traffic scenarios described in section 5.4.3 represent the busiest conditions throughout the life of the project, and that traffic associated with the mine closure phase is expected to be lower than the operational phase. As such, the road impact assessment considered the worst-case scenario and did not assess traffic impacts associated with the mine closure.

5.4.5 Coordinator-General’s conclusion: transport

I am satisfied that the proponent has adequately assessed the impacts to transport networks impacted by the project. In line with the proponent’s commitments and advisory agency advice, this report includes recommendations and the development of management plans, supported by detailed assessment, to mitigate and manage the project’s impact on road and rail networks through the construction, operation, and decommissioning phases of the project.

The proponent has committed to design and construct the rail spur in consultation with Aurizon and in accordance with Aurizon's requirements to access its Central Queensland Coal Network to minimise potential impacts on the Norwich Park Branch Railway and to consult with Aurizon and DTMR regarding the ALCAM assessment for impacts on the active level crossing.

I am satisfied that through the implementation of the proponent’s commitments and the recommendations in this report, as well as execution of an Infrastructure Agreement with Isaac Regional Council, potential impacts on the transport network will be appropriately identified and managed.

5.5 Social

This section provides an evaluation of the project’s SIA, which was undertaken as part of the EIS. The SIA that was completed for the project is generally in accordance with the *Coordinator-General’s SIA Guideline* (March 2018) (SIA Guideline).

The SSRC Act requires large resource projects undergoing an EIS process under the SDPWO Act to complete an SIA consistent with the SIA Guideline.

The SIA is required to address the details provided in the SIA Guideline for the following 5 key matters:

- community and stakeholder engagement
- workforce management
- housing and accommodation
- local business and industry procurement
- health and community wellbeing.

The SIA is also required to demonstrate that the project's workforce recruitment hierarchy prioritises workers from local and regional communities, followed by workers who would live in regional communities.

The SSRC Act ensures that residents of communities near large resource projects benefit from the operation of the project by requiring owners of large resource projects to employ people from nearby regional communities. The SSRC Act prohibits operational large resource projects from having a 100% FIFO workforce and from discriminating against locals when employing for the workforce.

As part of evaluating the EIS, the Coordinator-General is required under the SSRC Act to decide whether the 100% FIFO prohibition and anti-discrimination provisions should also apply to the project's construction workforce. In making this decision, the Coordinator-General would consider the scale and duration of the construction phase and the capacity of local communities to support local employment. These matters are addressed in my evaluation below.

5.5.1 Submissions

The key issues raised in submissions on the EIS regarding impacts to social matters include:

- increased traffic on the Peak Downs Highway and associated roads around Moranbah which has the potential to impact community safety or emergency services provision
- the proponent should, in consultation with the Queensland Ambulance Service, develop and provide an emergency planning and response plan (including emergency and evacuations planning and response procedures)
- hard targets should be set in relation to the employment of Aboriginal and Torres Strait Islander peoples, and procurement from Aboriginal and Torres Strait Islander owned businesses through both the construction and operations stages
- Isaac Regional Council are looking for the proponent to enhance the 'live local initiatives'
- provision of bus transport between local communities and the mine for local workers
- flexible work rosters that support local workers
- financial commitments for the life of the project to be made for community services (e.g. childcare, medical)
- location of the non-resident workforce that would support positive interaction with the community
- data currency and the need for further engagement prior to commencing operations
- no literature review on the social impacts of the resource industry
- lack of consultation with the wider community.

5.5.2 SIA process

The SIA identified, analysed, and assessed both positive and negative potential social impacts of the project. The scoping of the SIA included determining the regulatory context, the project activities and potentially affected communities. The SIA study area includes the affected communities which are described in section 5.5.2.1.

The social baseline assessment was informed by Australian Bureau of Statistics (ABS) census data and other secondary sources of information supported by feedback from stakeholder consultation. The social baseline described the community setting and values, population composition and growth, housing and accommodation, labour force and employment, business and industry, social infrastructure provision and community health and safety indicators.

Potential impacts were categorised as either positive or negative changes to indicators of the social environment (e.g. the cost of housing). A significance-based approach was used for impact evaluation, which considered the magnitude of the impact against the vulnerability of the affected person, both pre- and post-application of mitigation measures. Additional analysis was undertaken of proposed workforces associated with new projects and the capacity of nearby regional communities to provide for cumulative demand on accommodation and other services.

Management measures, stakeholder engagement commitments, and monitoring approaches were collated into social impact management strategies for each of the 5 key SIA components and presented in the SIA. The management measures and monitoring approach proposed by the proponent were included in a draft SIMP within the SIA. The draft SIMP measures provide for the management of social impacts throughout the construction and operation of the project.

I consider the SIA methodology standard practice in accordance with the terms of reference and the SIA Guideline. The broader literature on the social impacts of the resource industry has been considered in the Queensland Government 'FIFO Reviews' and consultation that informed the SSRC Act. A submission on the SIA also referred to the social impacts of climate change on the region and the project proceeding in this context. Climate change and the coal industry are considerations in the EIS more broadly, including economics chapter. The directly impacted local communities consulted for the SIA are resource communities with strong association with the coal industry.

5.5.2.1 SIA study area

The SIA study area is broken down into the 3 categories shown in Figure 5.6:

- Primary study area – Moranbah
- Secondary study area – Dysart and Coppabella
- Regional study area – Isaac LGA and Mackay LGA.

Moranbah is the nearest town, located approximately 29 km from the project's main access. Moranbah is expected to experience the most direct impacts (including benefits) from the project and is the primary focus of the SIA. Moranbah is a key population and service centre in the Bowen Basin. It has a strong identity as a mining town and acts as the main service centre for the Isaac sub-region, providing a hub for employment, housing, urban services and infrastructure.

Dysart and Coppabella are located within a safe daily commute distance (maximum 1 hour drive) from the project site and are likely to experience a broad range of social impacts and benefits from the project.

Moranbah, Dysart and Coppabella are all within the Isaac LGA. The Isaac LGA provides key services and personnel to construct and operate mines in the Bowen Basin. The Mackay LGA also provides key services and personnel to the mining industry. The SIA anticipates that both Isaac LGA and Mackay LGA will be integral to the project's supply chain during the construction and operation of the project.

5.5.2.2 Nomination of the project's construction workforce and nearby regional communities

During evaluation of an EIS for a resource project, the Coordinator-General is required to decide whether to nominate the project as a large resource project for which the 100% FIFO prohibition (section 6 of the SSRC Act) and the anti-discrimination provisions (section 8 of the SSRC Act) also apply to the project's construction workforce.

A large resource project must have a least one nearby regional community for the SSRC Act provisions to apply to the project. A nearby regional community is defined by the SSRC Act as a town within a 125 km radius of the main access to the project, with a population of more than 200 people. The Coordinator-General may, however, decide to include a town within a greater radius or with a population of less than 200 people.

Eight towns, Capella, Clermont, Dysart, Glenden, Middlemount, Moranbah, Nebo and Tieri, are located within a 125 km radius of the project and meet the definition of a nearby regional community for the project under Schedule 1 of the SSRC Act. The town of Finch Hatton (Figure 5.6 below) is not within the 125 km as taken from the main access to the project. Therefore, Finch Hatton has not been included as a nearby regional community.

Coppabella is located approximately 30 km from the mine. Coppabella is classified as a state suburb by the ABS, and therefore does not meet the population density requirements to be classified as an urban centre locality, as defined under the SSRC Act.

However, the inclusion of Coppabella as a nearby regional community for the project is consistent with the object of the SSRC Act, as it is located in the vicinity of the project and identified in the SIA as a potentially impacted town source of relevant skilled labour. Civeo Coppabella is also identified as a potential workforce accommodation village (WAV) to accommodate the workforce. Therefore, I have included the 8 towns and Coppabella as nearby regional communities for the purposes of the SSRC Act.

I have also decided to nominate the project as a large resource project for which the 100% FIFO prohibition and anti-discrimination provisions of the SSRC Act apply to the project's construction workforce. In making this decision, I considered the capacity of local communities to provide workers for the project's construction phase and determined that:

- the scale and duration of construction is significant with 500 workers being required over a 2 year construction period
- the 9 nearby regional communities identified are potential sources of labour for the project's construction phase, with the capacity to provide workers with relevant skills and experience for the construction and operation of the project
- inclusion of the 9 towns as nearby regional communities would support these local communities by providing local employment and supply of goods and services by local businesses in the construction period
- opportunities from the mine could offset the potential negative impacts associated with the project, particularly in Moranbah, Dysart and Coppabella, which were identified in the SIA as the communities most likely to be impacted by the project.

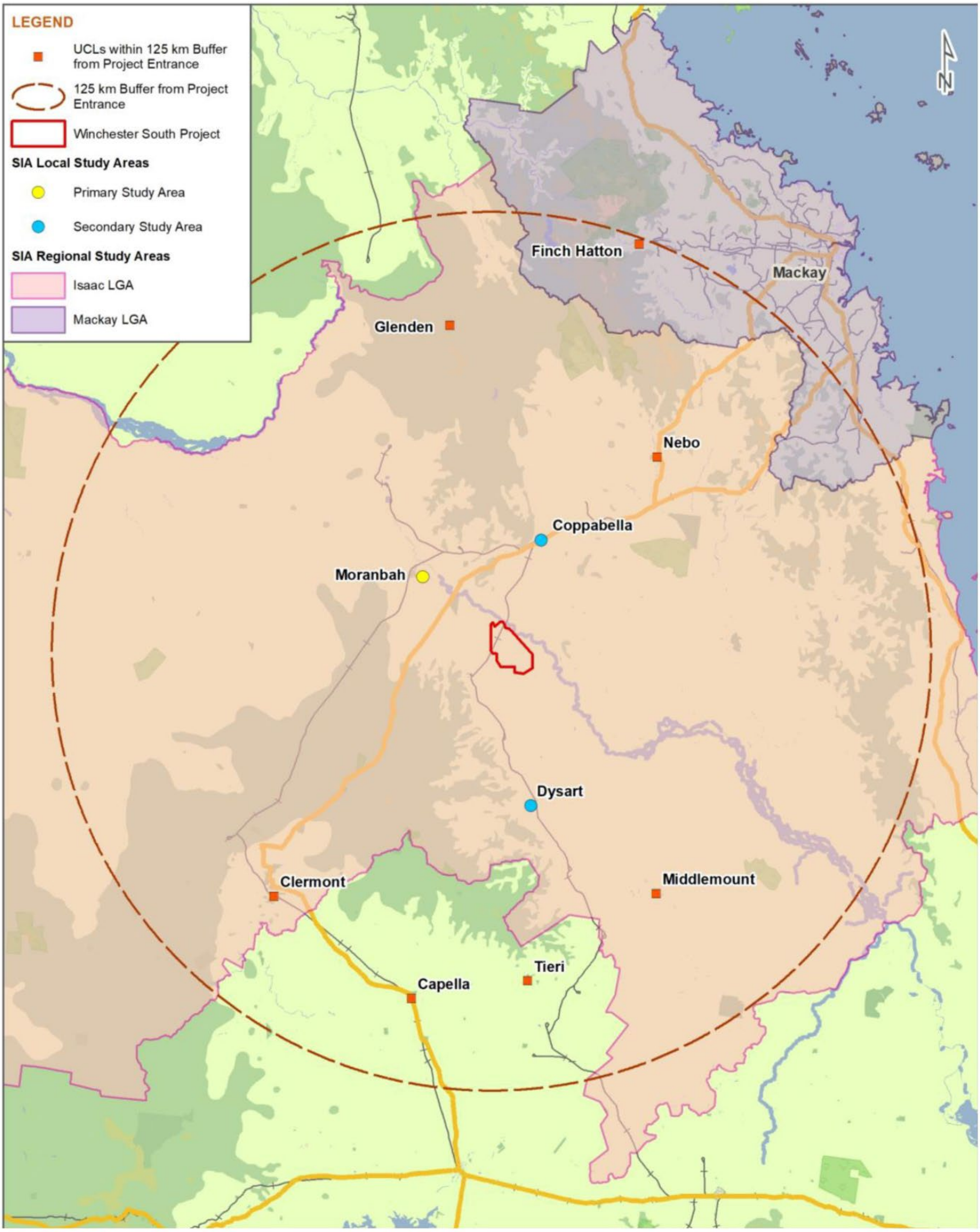

Figure 5.6 Map of the SIA study area

5.5.3 Community and stakeholder engagement

The SIA includes an analysis of key stakeholders and a description of the engagement undertaken for the SIA. Stakeholder input into the baseline analysis, impact assessment and development of management measures is described throughout the SIA. The engagement process was guided by the proponent's community and stakeholder engagement management strategy (CSEMS). The CSEMS sets out the approach to implementing an effective engagement program with stakeholders throughout the SIA process and beyond.

5.5.3.1 Engagement undertaken for the SIA and EIS

The primary means of SIA engagement was via semi-structured interviews and meetings with targeted key stakeholders. The consultation program for the SIA and SIMP involved the engagement of the Isaac Regional Council, Barada Barna Traditional Owners, state government agencies and infrastructure providers, local businesses and supply chains, and community stakeholders (Table 5.8). Engagement with directly impacted landholders was undertaken separately to the SIA between Whitehaven and the landholders due to the sensitive commercial nature of the negotiations. Whitehaven has met individually with Winchester Downs Property and Winchester Homestead on managing the impacts of the project and have a non-residency agreement with the owner of the Olive Downs Homestead.

Table 5.8 Project stakeholders

Category	Stakeholders
Local government – Isaac Regional Council	• Councillors and key council staff
Local government – Mackay Regional Council	• Councillors and key council staff
State agencies	• Office of the Coordinator-General • Department of State Development, Local Government, Infrastructure and Planning • Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Culture and the Arts • Department of Youth Justice, Employment, Small Business and Training
State provided service	• Ambulance and police services
Services - health	• Moranbah and Dysart Hospital • General Practitioner Clinics
State provided service - schools	• Moranbah State High School • Moranbah State School • Moranbah East State School • Dysart and Coppabella State Schools
Social service providers	• Moranbah and District Support Services • Moranbah Men's Shed • Whitsunday, Isaac and Mackay Suicide Prevention Network
Social service providers - childcare	• Simply Sunshine Childcare Centre • Moranbah Early Learning Centre
Employment and training providers	• Coalfields Training Excellence Centre • Regional Industry network (RIN) Resources Training Excellence Centre • Local training providers (MREAL etc.)

Category	Stakeholders
Housing and accommodation providers	• Queensland Department of Housing • Isaac Affordable Housing Trust • Emergency and Long-Term Accommodation Moranbah • Real estate agencies in Moranbah
Industry groups and businesses	• Moranbah Traders Association • CFMEU Mining and Energy Union • various local business owners
Indigenous groups	• BBAC

Key issues raised by stakeholders during the SIA consultation program include:

- housing availability, fluctuating values, and rising rental costs
- commitment to housing availability and affordability in Moranbah
- the lack of availability of childcare services
- Moranbah continues to be under-resourced with regard to health services
- the ongoing challenges of mental health related issues in the community
- health and welfare of the workforce
- roster flexibility options
- need to attract more skills back into the region / difficulty finding and retaining skilled staff
- youth unemployment
- importance of STEM (Science, Technology, Engineering and Mathematics) programs for schools
- sustainable employment pathways for Traditional Owners, focusing on youths
- maximise local content in procurement (including by contractors)
- the need for a coordinated, collective response with multiple mine projects.

Overall, the community and stakeholder engagement undertaken by the proponent to inform the SIA and EIS is considered acceptable. The proponent engaged with a wide and relevant range of stakeholders and provided them with timely and relevant information on the project. I consider that the stakeholders engaged are representative of the community interests without the need for wider engagement. The engagement processes implemented also provided affected stakeholders opportunity to provide feedback on the project, and EIS documentation has been publicly notified.

5.5.3.2 Engagement with Traditional Owners

The Barada Barna People are the native title holders for the general project region. While preliminary investigations conducted as a part of the EIS process indicated that native title had been extinguished over the project area, the proponent has been actively engaging with the BBAC on a CHMP and a Reconciliation Action Plan (RAP).

In line with the CHMP, the proponent undertakes annual briefings and updates on the project with the Board of the BBAC. A part of the engagement strategy has involved facilitating site inspections of the proponent's operations in NSW for the Board of the BBAC to view the numerous partnerships and initiatives that the proponent is delivering with Traditional Owners in NSW. Additionally, the proponent has engaged with the BBAC regarding on-site cultural heritage surveys which informed the preparation of the CHMP. The proponent is progressing a RAP with the BBAC that is looking to maximise training and employment opportunities.

5.5.3.3 Ongoing community and stakeholder engagement

The proponent prepared a community and stakeholder engagement plan as part of the SIA. The plan describes the key issues raised and the key actions and commitments for ongoing engagement with stakeholders. The CSEMS identified additional engagement actions the proponent intends to undertake during the construction and operational phases of the project, including:

- employment of a dedicated Project Officer as project contact
- undertake community information sessions
- develop a project website
- establish a complaints management process
- publish project update newsletters
- presentations to local business.

In addition, the proponent will consult with stakeholders about housing and accommodation for workers, additional demands for healthcare, childcare, police and emergency services, developing emergency response procedures, opportunities for training and education, employment and businesses.

I have stated conditions in this report to ensure that ongoing community and stakeholder engagement is effective, informs management, and monitoring of potential impacts occurs during construction and operation. These conditions require annual SIMP reporting to inform the Coordinator-General of the actions undertaken as part of engagement following the EIS process and throughout the construction and operational phases.

5.5.3.4 Coordinator-General's conclusion: community and stakeholder engagement

I am satisfied that the CSEMS, prepared as part of the SIA, provides a strategic approach for the proponent's ongoing engagement. To ensure that ongoing community and stakeholder engagement is undertaken and informs the proactive management and monitoring of potential social impacts during the construction and operations phases of the project, I have stated conditions requiring the proponent to prepare a community and stakeholder engagement plan as part of the SIMP to be submitted to the Coordinator-General for approval at least 3 months before construction commences.

5.5.4 Workforce management

The proponent's approach, as described in the SIA's Workforce Management Plan, is to prioritise the recruitment of workers in the following order:

(1) the 'local' towns of Moranbah, Dysart and Coppabella

(2) residents of other nearby regional communities within 125 km radius from the project site

(3) workers from the Isaac region

(4) workers from Mackay Whitsunday region

(5) workers from the rest of Queensland.

Scheduling of recruitment would be staggered in accordance with the approach identified above to maximise local employment opportunities. This is consistent with the recruitment hierarchy requirements for large resource projects detailed in the SSRC Act. While employing the best qualified person for a position is a paramount consideration, the workforce recruitment strategy will also ensure that potentially marginalised groups, such as women and Aboriginal and Torres Strait Islander peoples, are provided equitable access to employment opportunities.

The SIA considered that a safe commute distance is within one hour drive time from the project site, which includes the towns of Moranbah, Dysart, and Coppabella. The SIA therefore defines non-resident workers as workers who live further than one hour driving distance from the mine. For the purpose of my evaluation, FIFO workers include those who would FIFO, bus-in, bus-out or drive-in, drive-out to work from outside the local communities of Moranbah, Dysart and Coppabella.

5.5.4.1 Construction

Project construction will be undertaken over a 2 year period and have maximum of 500 construction workers. The SIA indicates that the majority of construction workforce will be sourced from contractors. Construction workers are anticipated to work shifts up to 12 hours long, with rosters likely to be 21 days on and 7 days off.

Construction activities require workers with skills in:

- operating earthmoving plant operators
- structural steel and welding
- geology, engineering, environmental science, management and safety
- painting, plumbing and electrical trades
- concreting.

The SIA identified the Isaac Regional Council and Mackay Regional Council LGAs have significant strengths in construction for the mining industry and could be a key source for the project's construction workforce. Analysis of nearby regional communities suggests that the total labour force with skills applicable for construction (industries including construction, transport and warehousing, and professional scientific and technical services) comprises some 800 workers. There are also an estimated 340 businesses listed in nearby regional communities that offer services potentially relevant to the construction phase of the project.

The proponent has committed in the SIA to maximising the proportion of the construction workforce sourced from nearby regional communities, particularly Moranbah, Dysart and Coppabella.

The SIA assumes that a maximum of 20% (100 workers) of the construction workforce will be sourced from nearby regional communities and 95% (475 workers) from Mackay and Isaac LGAs. Moranbah, Dysart and Coppabella are assumed to provide 7% (35 workers) of the peak construction workforce.

5.5.4.2 Operations

Project operations would occur over 28 years and require a workforce of 500 workers to be based on site and at an automation control centre. Mining operations are proposed to be on 12.5 hours shift cycle roster, working 7 days on, 7 days off. Senior management would work a roster of 5 days on (Monday to Friday) and 2 days off.

An alternative operational workforce estimate of 700 workers is provided, which assumes less automation of equipment (manned scenario). The social impacts and benefits in the SIA are extrapolated for the manned scenario (i.e. corresponding increase in local workers due to overall increase in workforce numbers).

Mining operations require workers with skills in:

- operating machinery
- driving trucks
- trades including diesel fitter, boilermaker, electrician, plumber, gasfitter and painter
- engineering, surveying and geology
- health safety, human resources and mine management
- administration.

The project would provide significant local job opportunities, potentially increasing the number of local residents through encouraging existing residents to stay in Isaac LGA and attracting new residents who move to the LGA to work at the mine.

The SIA estimates that 10% (50 workers) of the total operational workforce would be sourced from Moranbah, Dysart and Coppabella with an assumed maximum of 100 workers (20% of the workforce) able to be recruited from nearby regional communities. Overall, it is estimated that 80% (400 workers) will be recruited from the Mackay and Isaac LGA (this includes the workers from the above local and nearby regional communities). Those workers from nearby regional communities that reside outside the safe one hour driving distance to the mine will be required to stay at the worker accommodation village (WAV) while on shift.

In addition, actions identified in the workforce management plan aim to maximise local employment through the application of the recruitment hierarchy, which indicates that 25% of employees would reside locally. This would include the 10% sourced from local communities and a further 15% of the workforce would relocate to the local area and reside locally. The proponent has committed to the provision of a 'live local' program (direct financial subsidies to live in the local community) and to develop and maintain a project housing register which is to be made available for workers and their families who wish to reside locally. I expect the annual social impact management reports to monitor these performance indicators and to enhance the 'live local' strategies should these outcomes not be achieved.

I note that the proponent has committed to consideration of job share/ flexible shift arrangements for specific positions. These roles may include positions such as management and administration, along with professional staff including engineering, environmental and other support staff. The Isaac Regional Council's submission requested further information about whether job share or flexible shift arrangements were going to be extended to the operational workforce (i.e. mining workforce). Whitehaven have indicated that this may not initially be offered to the operational mining workforce on roster but a future consideration as the project workforce develops.

As noted above, during operations, workers who reside greater than one hour commute from the mine would be required to reside at the WAV when on shift. These workers would return home at the end of their roster. In addition to being bused from the WAV to the project site, the proponent has committed to fatigue management initiatives, including implementation of a swipe on, swipe off system to monitor hours worked and coordinated car-pooling arrangements. Bus transport would also be provided for resident workforces from Moranbah and potentially Dysart and Coppabella to the project site.

5.5.4.3 Potential impacts and management measures

Potential benefits associated with workforce management are:

- increased employment opportunities for residents of local and regional communities. This includes opportunities for traditionally underrepresented groups such as women, and Aboriginal and Torres Strait Islander persons

- enhanced skills and capacity in local communities due to the movement of a skilled workforce into the local area, further supported by targeted training and skills development initiatives
- economic benefits to local businesses due to incidental expenditure by members of the project workforce (e.g. clothing, food, entertainment).

Potential impacts associated with workforce management are:

- increasing the number of people in the Isaac LGA would increase demand on local services and social infrastructure, which is discussed further in section 5.5.7
- labour / skills shortages for other local employers due to high levels of demand as further contributed to by the project
- health and wellbeing effects associated with maintaining a large project workforce
- loss of employment opportunities, and associated redundancies following the conclusion of operations.

5.5.4.3.1 Training and recruitment

The project would provide significant local job opportunities, potentially increasing the number of local residents through encouraging existing residents to stay in the Isaac LGA and attracting new residents who move to the LGA to work at the mine.

Workforce training opportunities would be provided through training and skills development initiatives during the construction and operation of the project. Training programs will help manage the potential impacts of increased competition for workers with relevant skills and possible labour draw from other mining projects and local industry.

The proponent also has skills development initiatives that target schools in the local community. This includes providing additional training opportunities for young people from local communities through funding an education-based traineeship for each year of operation. In addition, providing a direct contribution to STEM skills in the local community though funding positions dedicated to the integration of STEM into the curriculum of Years 3-6 at Moranbah State School and Moranbah East State School (commitment of $35,000 per annum for each school, for the life of the project). The proponent's commitment to STEM development in local schools is a significant commitment as it will assist building the skills for future work in the region, including automative and emerging industries.

5.5.4.3.2 Workforce participation

The project presents an opportunity to increase workforce participation of people from traditionally underrepresented groups in the mining industry, including Aboriginal and Torres Strait Islander people, people with a disability, the elderly and women.

The proponent has committed to collaborate with the BBAC, Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts (DTATSIPCA), Department of Youth Justice, Employment, Small Business and Training (DYJESBT) and other government agencies to design and implement programs (such as skilling Queenslanders for Work) which target groups such as youth to access employment opportunities. The revised SIMP is expected to provide further consideration of people with a disability and elderly including community services and employment opportunities.

The proponent will maximise employment opportunities for Aboriginal people through supporting aboriginal groups such as the BBAC. The proponent is developing a reconciliation action plan (RAP) with the BBAC that will include a financial contribution specifically for training and skills development initiatives for Aboriginal people.

The SIMP includes a key performance indicator of 5% of employees who identify as Aboriginal and Torres Strait Islander. I acknowledge the proponent's proposed actions to advance Aboriginal and Torres Strait Islander training and employment. However, I consider the establishment of a target commitment an important contributor to this goal. I have conditioned that a target for Aboriginal and Torres Strait Islander employment be included in the workforce management plan as part of the updated SIMP.

5.5.4.3.3 Worker safety and wellbeing

The proponent has committed to providing a safe and healthy environment for workers during the construction and operation of the project through the implementation of the Whitehaven Coal Health and Safety Management Systems. Mitigation measures include the implementation of the Whitehaven Fatigue Management Standard (refer above) and Whitehaven Coal Induction and Training Standard (this establishes minimum training standards for employees and contractors who perform work for Whitehaven).

Stakeholders consulted during the development of the SIA raised concerns about the mental health impacts associated with FIFO working arrangements. Stakeholders asserted that there is a clear indication that there are significant mental health and family welfare challenges associated with people operating on shifts and residing in camps. Whitehaven's mitigation measures include alcohol and drug standards (including employee assistance) and regularly engaging with WAV operators to encourage and support workforce health programs targeting mental health, obesity, drug and alcohol programs. Whitehaven is also committed to an annual financial contribution ($30,000 per year for the life of the project) to support employees and families through mental health and suicide prevention programs.

5.5.4.3.4 Workforce behaviour

Potential impacts of recruiting FIFO workforce include a change to the social character of the community. Stakeholder feedback to the SIA suggested that instances of anti-social behaviour are more commonly associated with non-resident workforce (rather than resident) workers. There are also positive opportunities where non-resident workers spend in local communities and participate in community events.

To minimise potential impacts on social character, the proponent would develop a Code of Conduct prior to commencing construction, which would outline positive behavioural outcomes and prohibit negative behaviours. The proponent is committed to hosting specific events for FIFO workers within Moranbah to facilitate positive interactions with the community. I would expect the revised SIMP to set-out the specific opportunities for non-resident workers interactions with local communities. The potential for positive (and negative) interactions will be enhanced by the location of the WAV camp to accommodate the non-resident workforce, which is discussed further in section 5.5.5.1.

5.5.4.3.5 Mine Closure

The life of the mine operations is expected to be 28 years. The conclusion of operations of the mine would result in loss of employment opportunities and redundancies. The SIA considered likely that the coal industry will undergo substantial change over the next 30 years. Therefore, it would be difficult to predict the future conditions and employment opportunities for those skilled employees living locally.

The proponent has committed to strategies that minimise the economic loss to workers and their families associated with the conclusion of operations. I would expect this to be expanded to consider the range of social impacts normally associated with closure and the impacts on local communities. Therefore, I have conditioned that the SIMP be revised 2 years prior to the conclusion of operations to manage the social impacts of mine closure.

5.5.4.4 Coordinator-General's conclusion: workforce management

I am satisfied that the proponent's recruitment strategy and workforce management practices would minimise the proportion of workers engaged in FIFO arrangements. However, this will need to be monitored to ensure that the local workforce is maximised and to adjust the 'live local' strategies in SIMP revisions where further action may be required. The SIMP revisions (every 2 years for the first 4 years of the project) will be informed by the annual SIMR provided to the Coordinator-General.

To ensure that the proponent commitments described in the workforce management plan are undertaken and inform proactive management and monitoring of the workforce's potential social impacts, I have stated conditions in Appendix 1 of this report requiring the proponent to update the workforce management plan as part of the updated SIMP, to be submitted to the Coordinator-General for approval at least 3 months before construction commences. I require a target for Aboriginal and Torres Strait Islander employment be included in the updated workforce management plan. The workforce management plan would also need to be updated in the revised SIMPs for Coordinator-General approval up to Year 10 of the project and the SIMP prepared for the conclusion of operations.

5.5.5 Housing and accommodation

In line with the SIA Guideline, the SIA includes an assessment of the potential social impacts from project housing and accommodation arrangements during the construction and operational phases.

The SIA detailed:

- the proposed workforce accommodation arrangements during construction and operation
- projected population changes attributable to the project, including an estimate of workers and their households who may move to the local communities
- an analysis of the local and regional housing and accommodation market, and an assessment of potential social impacts on housing affordability and availability.

5.5.5.1 Accommodation for FIFO workers

The EIS confirms construction and operational workers residing more than one hour drive from the project site would be required to stay at an existing local WAV during their shift. The proponent has proposed to utilise existing WAV accommodation for the construction and operational workforce as opposed to building new WAV accommodation. The SIA has identified existing WAV accommodation in the region. However, with a number of projects progressing in the future (and lack of public data on their accommodation arrangements) it was not possible at the time of the SIA preparation to determine which WAV accommodation provider would be utilised.

The SIA describes that at the time of the EIS, the Isaac LGA had approximately 19,000 existing WAV beds with a total approved capacity of approximately 32,200 beds. Moranbah town hosts 18 WAVs and contributed a total of 6,400 existing beds and a potential total capacity of 15,000 beds to the Issac Regional Council LGA totals.

As there are multiple projects currently progressing near Moranbah, there may be limited supply of WAV beds, therefore necessitating consideration of WAVs located in Dysart and Coppabella. However, a range of factors will need to be considered including the preference for WAV accommodation in Moranbah which facilitates positive interaction between the workforce and local community. The Isaac Regional Council advocates for non-resident workers to be accommodated in facilities located within nearby communities.

I have stated conditions in Appendix 1 of this report requiring the proponent to update the housing and accommodation plan to include the workforce accommodation arrangements for FIFO workers (i.e. the location of the WAV to be utilised).

5.5.5.2 Potential impacts and management measures

Construction and operational workers who move to the Isaac LGA would increase demand for rental properties and housing for sale. Local property and rental prices could become inflated, excluding lower income residents from the market and potentially increasing pressure on social housing.

The social baseline in the SIA highlights that Moranbah currently has a tight rental market with very low reported rental vacancy rates (less than 2%). Historically, housing availability and affordability in Moranbah has fluctuated in line with the level of surrounding resource sector activities.

5.5.5.2.1 Housing and affordability and availability

The social baseline highlights a considerable proportion of unoccupied housing stock within Moranbah and Dysart. A high percentage of the unoccupied dwellings are owned by mining companies and are therefore not publicly available for occupancy.

In a housing market that is experiencing upward pressure on pricing and availability, the impact of bulk rental and or purchasing of current housing stock will further exacerbate the ability of local communities to provide staff in essential service roles across all industries, e.g. retail, hospitality, accommodation, health, police and emergency services. The proponent's housing and accommodation plan includes funding commitments to increase the permanent housing stock and availability of affordable housing in Moranbah.

5.5.5.2.2 Construction

The SIA considers that due to the relatively short construction phase, construction workers are not expected to move into local communities and seek permanent accommodation. It is predicted that only up to 35 workers would be sourced from local towns, which represents 7% of the peak construction workforce.

I have decided that the local workforce provisions of the SSRC Act should also apply to the construction workforce. I consider that the number of workers and the extent of the construction phase will support local workers and likely attract some new workers to the local area. As multiple contractors are proposed it is likely there may be workers that require short term accommodation in local communities.

The SIA also assumed that workers who are existing residents of the local study area are assumed to have their own housing, and therefore would not require the provision of workforce accommodation. The Isaac Regional Council submitted that many resource workers in Moranbah are provided with company housing as part of their employment and therefore may impact the local housing market where local workers may shift to new employment with Whitehaven. Therefore, the proponent will also need to account for potential demand from employees already residing locally in accommodation. I agree that this is likely to occur and will need to be considered while monitoring of housing impacts.

I have stated a condition in Appendix 1 of this report requiring the proponent to prepare a SIMP that includes a workforce housing and accommodation plan for the construction and operational phases of the project to be submitted to the Coordinator-General for approval at least 3 months before construction commences. The plan should demonstrate that the project would not contribute to significant affordability and availability impacts on housing and accommodation in local communities in the construction as well as operations phase.

5.5.5.2.3 Operations

Workers are more likely to be based locally for the long-term operational phase, with workers having access to the project's 'Live Local' initiative which provides direct financial housing subsidies (up to $13,000 per worker annually) to support workers that choose to live in the local community.

In addition to the incentives encouraging workers to live locally, the proponent further commits to providing support to workers seeking to move into the local communities through the provisions of a housing register, connections advice and support networks.

The SIA estimates that 50 operational workers may be sourced from the local areas (Moranbah, Dysart and Coppabella) and a further 68 would move to the local area with employment. Therefore, the housing demand would equate to 68 houses for the project. As considered above there may be greater impact on local housing with existing resident workers (50 workers) requiring new accommodation where they may change employers. The SIA also predicts that not all the influx to the local area would occur upon the commencement of operations and would occur over time. As a result, housing pressures and other social impacts will likely increase throughout the operations phase as greater numbers of local workers are attracted with the implementation of 'live local' strategies.

The SIA states that to minimise impacts associated with workforce housing and accommodation, the proponent will construct new housing in Moranbah dedicated for project employees with a maximum of 20-34 houses. The proponent has since updated their commitment to construct a minimum of 34 dwellings in Moranbah as detailed in Appendix 4 of this report, I have conditioned the proponent to construct a minimum of 34 dwellings in Moranbah in the following sequence:

- Year 2 – 18 dwellings
- Year 6 – 8 dwellings
- Year 11 – 8 dwellings.

This should not preclude the number of dwellings being delivered earlier than identified or responding to greater demands for housing. The first tranche of project housing (18 dwellings) is to be made available prior to the end of year 2 to support local workers. It is expected that the types of dwellings required (i.e. houses, units, number of bedrooms) and the availability of existing housing in Moranbah will inform the updated housing and accommodation plan and revised SIMPs.

To minimise the project's impact on housing affordability, the proponent has committed to a financial contribution ($500,000) to the Isaac Affordable Housing Trust (IAHT). The IAHT is a social housing provider in the Isaac LGA. It is understood that the proponent is consulting with the IAHT and that the funding may be directed to providing housing for childcare workers within Moranbah. The revised SIMP is required to incorporate the outcomes of ongoing consultation between the proponent and relevant stakeholders on the agreed approach to affordable housing.

5.5.5.3 Coordinator-General's conclusion: housing and accommodation

I am satisfied that the proponent's workforce housing strategy described in the housing and accommodation management plan would minimise the project's impact on housing and accommodation in local communities.

To ensure that the project's housing and accommodation arrangements for new locals do not contribute to significant affordability and availability impacts on housing and accommodation in local communities, I have stated a condition in Appendix 1 of this report requiring the proponent to prepare a workforce housing and accommodation plan as part of the SIMP for the construction and operational phases of the project to be submitted to me for approval at least 3 months before construction commences. Construction of the project cannot commence until I have approved the workforce housing and accommodation plan as a component of the SIMP. The workforce housing and accommodation plan must include:

- an updated assessment of housing availability in the local towns including consideration of the likelihood of unoccupied housing becoming available for workers to rent or purchase
- details of housing and accommodation that the proponent can provide to construction workers who wish to move to the Isaac LGA
- detailed strategies developed in consultation with Isaac Regional Council to ensure that enough housing is available for construction and operation workers
- the accommodation arrangements (WAV location) for the FIFO workforce.

I have also conditioned the proponent to construct a minimum of 34 dwellings in Moranbah to ensure impacts on availability and affordability of housing are minimised.

5.5.6 Local business and industry procurement

The SIA included a profile of the skills and services needed for the project, an analysis of local and regional supplier capability and capacity relevant to the project, and an assessment of potential social impacts on local and regional suppliers. Skills needed for the project are listed in section 5.5.4.

In line with this requirement, the SIA identified the following opportunities and challenges to local business and industry procurement:

- opportunities for local and regional businesses to provide goods and services to the project, including targeted opportunities for Aboriginal and Torres Strait Islander businesses
- potential to drive up the cost of local goods and services through increased project demand.

5.5.6.1 Potential impacts and management measures

Construction and operation of the project would require the procurement of civil construction and mining contracting services, including civil engineering, transport and logistics, trades and accommodation and hospitality.

5.5.6.1.1 Service and supply opportunities

The SIA indicates there is a capacity within the local and regional study areas to provide many of the goods and services for the project. Moranbah and Mackay are key service centres for the mining industry. The SIA found that in the regional study area, there were 128 businesses registered in the mining industry and 1,699 in the construction industry. Around 182 construction businesses and 24 mining businesses were registered in the Isaac LGA.

Stakeholder consultation undertaken as part of the SIA stressed the importance of local business and engagement with local industry forums. It was also considered important that specific consideration be given to small-to-medium enterprises with contractors having the same commitment to local content as the proponent. The proponent has committed to collaborate with the Greater Whitsunday Alliance (GW3), Local Content Leaders Network, the Regional Industry Network and any other appropriate stakeholders in establishing a local supplier listing tailored to the project.

In addition to the benefits for local businesses, the SIA identified a potential for large resource projects to monopolise demand and increase the costs and availability of necessary goods and services (for example, trade services such as electrical and mechanical expertise). This may result in a shortage of employment and skills in other industries due to additional demand for workers created by the project. To address these potential impacts the proponent will provide training opportunities targeted for young people and employment development programs. This would provide greater opportunities for youths to remain in local communities and career progression and upskilling of the workforce through training programs. I also note the commitment to STEM programs in local schools will also support the development of future workforce (not just in the mining industry).

During the SIA consultation, DTATSIPCA highlighted the importance of structuring procurement contracts in a way that enables Indigenous businesses to access them. The proponent has committed to developing a register of capable Indigenous businesses and to engage with DTATSIPCA and DYJESBT to develop a detailed project specific Indigenous content strategy. As part of the development of a RAP, the proponent has consulted and collaborated with the Barada Barna People to identify and implement training and skills development initiatives and facilitate and support delivery of a tender readiness program for Indigenous businesses.

I acknowledge the project's proposed actions to advance Aboriginal and Torres Strait Islander business participation outcomes in the Local Content Strategy, including an Indigenous business register. However, I consider the establishment of a target an important contributor to this goal. I therefore require a target for Aboriginal and Torres Strait Islander business procurement on the project be established as part of the Local Buy Strategy and the updated SIMP. The proponent must consult with the Barada Barna People and DTATSIPCA in the development of a target.

The proponent has committed to implementing a local content strategy which aligns with the Queensland Resources Council's *Code of Practice for Local Content* to maximise the opportunities for local business to provide goods and services to the project. The Isaac Regional Council submitted that the proponent adopt the definition of 'local' provided by the Queensland Local Content Leaders Network (QLCLN) 'Keeping it in the Regions'. The proponent has acknowledged the request and will take into consideration of 'local' as defined by the QLCLN. I expect that the revised local business and procurement plan include consideration of this definition.

5.5.6.2 Coordinator-General's conclusion: local business and industry procurement

To ensure that the project's procurement practices maximise opportunities for competitive and capable local businesses to provide goods and services to the project, I have stated a condition in Appendix 1 of this report requiring the proponent to prepare a local business and industry procurement plan as part of the SIMP for the construction and operational phases of the project to be submitted to me for approval at least 3 months before construction commences. I require a target for Aboriginal and Torres Strait Islander business be included in the updated workforce management plan.

5.5.7 Health and community wellbeing

The SIA includes an analysis of the availability and capacity of, and an assessment of the project's potential impacts on, existing social infrastructure and services in the local study area including:

- childcare services
- local schools
- hospital and health services
- emergency services
- community and civic services
- recreation and cultural facilities.

5.5.7.1 Potential impacts and management measures

Operational workers relocating with their families (new locals) to the Isaac LGA would generate an increase in demand for local social services, facilities, and infrastructure. While non-local workers would stay in a largely self-contained WAV during the operational phase while on shift, it is recognised that they might still access and generate additional demand on local services, such as health and emergency services. As raised by the Isaac Regional Council during the stakeholder engagement undertaken for the SIA, long term planning for the provision of local services remains a challenge due to fluctuations in demand on health and emergency services by the resources industry.

5.5.7.1.1 Childcare services

Consultation undertaken by the proponent during the preparation of the SIA emphasises a current shortage of childcare services in Moranbah. The social baseline identifies 5 early childhood education and care services in Moranbah, including 2 long day care centres (Simply Sunshine Childcare and Moranbah Early Learning Centre), that are both at capacity with long wait lists for placement. Shortages in the supply of childcare in Moranbah are largely attributed to difficulties in attracting and retaining qualified staff. I note the proponent's commitment to increasing opportunities for traditionally underrepresented groups in mining, such as women, and how the lack of childcare availability can act as a barrier to accessing employment opportunities and living locally.

The SIA identifies that the potential additional demand of up to 17 childcare places would be required, attributed to new locals from the operational workforce. To address the project's additional demands on an already critically constrained sector, the proponent has committed to providing the equivalent of a financial contribution of $200,000 (for the first 5 years of the project) to improve the availability of local childcare services. The proponent consultation with IAHT indicated that this contribution could be used to support access to housing for childcare workers. Attracting childcare workers to Moranbah has been identified as a barrier for the attraction of people to live in Moranbah and access to affordable housing would assist childcare centres to attract staff. I require the proponent to engage with childcare centres and relevant stakeholders to determine the most appropriate delivery arrangement to maximise benefits to the childcare sector.

I also require that commitments to manage social impacts will need to be for the life of the project; particularly as the local workforce increases over time. Therefore, the updated SIMPs to be provided to the Coordinator-General for approval (i.e. Year 4 of the project) will need to outline further childcare, affordable housing and health commitments, or similar commitments to social impact management prioritised through stakeholder engagement.

5.5.7.1.2 Community services and facilities

Community services and facilities in the local communities are supported by the Isaac Regional Council, state government funding and community management. Local settlement and neighbourhood programs are run by Moranbah District Support Services and the Dysart Community Support Group. As identified, new locals moving to the Isaac LGA during operations could result in additional demand for community services and facilities.

Consultation on the SIA noted that there were issues with unsupervised youth and the need for support programs that target young people. The Isaac Regional Council requested that the proponent partner with the Moranbah Youth and Community Centre (MYCC) by way of investment in the MYCC Trust Fund. The proponent has responded to this request and has committed to providing a contribution of $20,000 per year to the MYCC Trust Fund to support positive outcomes for youth in local communities. The Whitehaven Community Fund will comprise an annual total fund of $50,000 and 4 application rounds per year for the life of the project. Funding categories include health, education, environment, indigenous empowerment, regional sport, and whole of community.

5.5.7.1.3 Healthcare and hospitals

The SIA baseline outlines that both local and non-local workers rely on Moranbah's health infrastructure. Moranbah Hospital offers 12 beds and general medical services with patients requiring treatment beyond basic services sent to regional hospitals. During the SIA consultation, some stakeholders further raised concerns over the potential to increase pressure on existing healthcare services due to the influx of mining workers from all the projects in the area. It was highlighted that Moranbah health services continued to be under-resourced.

The proponent proposes to reduce additional demands on local health services through the provision of on-site first aid facilities for workers with appropriately trained personnel available that can assist with attending to minor workforce health issues.

To support community health outcomes the proponent is also committed to providing contributions as required to address identified equipment deficiencies ($50,000 for the first 5 years of the project) through partnering with the Moranbah Hospital, Moranbah and District Mental Health Service and other key health service providers. This time limited commitment will need to be revised following Year 4 of the project to provide an ongoing commitment that is responsive to the current social needs identified through stakeholder engagement. It is expected that the proponent will need to monitor the demands of the non-resident workforce on hospitals and local general practitioners.

5.5.7.1.4 Road Safety, police and emergency services

The project may increase road safety risks from driver fatigue with concerns raised by stakeholders in relation to Peak Downs Highway which has a poor safety record and receives heavy traffic associated with heavy vehicles and workers commuting from Mackay to the Bowen Basin.

During the project's construction phase, accessibility and response times of emergency services (fire, police, ambulance and other emergency services) may be impacted by increased project-related traffic. Increased demand for police services may also be experienced due to requirements for over-sized vehicle escorts. The impacts on local police and emergency services during operation would be similar to construction, with slightly greater demand for services due to the larger resident population.

The SIMP includes actions to reduce amenity impacts on the local community due to increased project-related traffic and reduce likelihood of vehicle collisions (and associated injuries) due to increased volume of heavy vehicles and driver fatigue. To mitigate potential impacts on road safety the proponent proposes to implement a Fatigue Management Policy for workers including a swipe card system to monitor hours worked, use of buses to transport workers, and coordinated car-pooling arrangements. The proponent has also committed to implementing an emergency response procedure in consultation with emergency services and to monitor staff access to emergency services.

The proponent would also collaborate with Queensland Police Service, camp accommodation providers and other stakeholders to identify and address any antisocial or disruptive workforce behaviour in local communities. The proponent will mitigate any potential negative impacts on workers in town by implementing a code of conduct which workers are required to adhere, and which includes disciplinary measures for any demonstrated breaches. As previously noted in section 5.5.5.1, it is important that the proponent develop and implement measures to facilitate non-resident workers to have positive interactions in local communities.

5.5.7.1.5 Utilities Infrastructure

The Isaac Regional Council relies on agreements with the mining companies who hold water allocations for Moranbah, Dysart and Middlemount to supply water to towns. Waste management facilities in the Isaac LGA have limited capacity.

The project would add pressure to current and planned capacity for water and waste services in the Isaac LGA. A larger population would require greater water and waste services capacity than is currently available. The project's waste management is addressed in section 5.8.4.

The proponent would need to consult with the Isaac Regional Council and reach agreement prior to construction commencing regarding water security for impacted towns.

5.5.7.2 Coordinator-General's conclusion: health and community wellbeing

I am satisfied that the proponent has considered measures to avoid or mitigate negative social impacts and capitalise on opportunities to improve the health and wellbeing of local and regional communities. To ensure that the project does not adversely impact the level of service to local and regional communities from existing social services, facilities and social infrastructure, I have stated a condition in Appendix 1 of this report requiring the proponent to prepare a health and community wellbeing plan as part of the SIMP for the construction and operational phases of the project to be submitted to me for approval at least 3 months before construction commences. The health and community wellbeing plan would also need to be updated in the revised SIMPs (every 2 years for the first 4 years and then every 3 years up to Year 10 of the project) for Coordinator-General approval. These Plan's will need to include updated commitments to manage social impacts that follow on from the time limited commitments to childcare and health.

5.5.8 Coordinator-General's conclusion: social

I am satisfied that the SIA was prepared generally in accordance with the SIA Guideline and that the strategies and mitigation measures prepared as part of the SIA demonstrate that the proponent is committed to ensuring that the project does not significantly impact on and enhances opportunities for the local communities.

I have considered the scale and duration of the project's construction phase and the capacity of the local communities to provide workers for the project's construction phase and determined that the project presents an opportunity for local employment during construction. While the project's workforce needs exceed the current capacity of local communities to provide workers, it is likely that there would be workers living locally with relevant skills. Therefore, I have decided to nominate the project as a large resource project for which the 100% FIFO prohibition and anti-discrimination provisions of the SSRC Act apply to the project's construction workforce.

Overall, I consider that the project presents opportunities for social benefits for the local communities in the Isaac LGA through local employment and training, business and new residents.

I have stated conditions in this report that seek to further enhance social benefits by ensuring that:

- there are targets for Aboriginal and Torres Strait Islander employment and business
- enough housing is available for construction and operation workers who wish to move to the Isaac LGA with their families and potential impacts on housing affordability and availability in the Isaac LGA are managed
- social services and facilities including childcare and healthcare have enough capacity to cater for additional demand from new locals.

To ensure that potentially significant impacts are avoided, minimised or at least mitigated, I have stated a condition in Appendix 1 of this report requiring the proponent to prepare a SIMP for the construction and operational phases of the project to be submitted to the Coordinator-General for approval at least 3 months before construction commences. The SIMP must include:

- community and stakeholder engagement plan
- workforce management plan
- workforce housing and accommodation plan
- local business and industry procurement plan
- health and community wellbeing plan.

I have stated a condition in Appendix 1 of this report that will ensure the SIMP is reviewed, and updated, every 2 years for the first 4 years of the project and every 3 years up to Year 10 of the project. This will support the development of new management measures and commitments that respond to the identified needs of stakeholders. This is in response to the time limited commitments for childcare and health (first 5 years operation) in the SIMP. I have also conditioned a SIMP for the cessation of mining to manage the social impacts of mine closure.

I have stated a condition in Appendix 1 of this report requiring the proponent to report to the Coordinator-General on the implementation and effectiveness of the SIMP annually during construction and for the first 5 years of operation.

5.6 Economics

Section 4.1.1 of the EIS provides the proponent's assessment of economic impacts for the project on the local, regional, and state economies, as well as national and international impacts relating to coal demand and decarbonisation of global economies. This section evaluates the project's potential economic benefits and opportunities in the context of the identified impacts.

5.6.1 Existing environment

The project is proposed within the Bowen Basin, an established coal field in Central Queensland. In June 2022, there were 46 coal mines and 2 metalliferous mines in production located in the Bowen Basin, along with coal seam gas and conventional gas operations.[50] Mining is a major industry within the Isaac and Mackay regional council LGAs, employing approximately 60% of the employed population (as at 2016 Census).[51] Mining was the highest paying industry in the Isaac and Mackay areas. The second largest employer in the Isaac and Mackay region is agricultural operations, with 538 beef cattle farms within the Mackay/Isaac/Whitsunday region (as at 2016 Census).[52]

The EIS stated the project area is mapped and ground-truthed as Class A1 agricultural land (approximately 1,077 ha) and Class B (approximately 21 ha), however, it was noted this land is currently used for cattle grazing, not cropping.

5.6.2 Submissions

The key issues regarding economic impacts raised in submissions on the EIS include:

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[50] Queensland Government, Queensland Government Statistician's Office, *Bowen Basin population report, 2022.*
[51] Australian Government, Australian Bureau of Statistics, *Population: Census,* 2016.
[52] Australian Government, Australian Bureau of Statistics, *Population: Census,* 2016.

- justification of future demand for metallurgical and thermal coal given global decarbonisation efforts
- discount rate and coal price range adopted in the cost-benefit analysis (CBA)
- net economic benefits from the project under a non-automated scenario
- project feasibility should import tariffs be introduced based on the carbon emissions incurred in the production of goods, referred to as the carbon border adjustment mechanism
- potential alternative pricing scenarios for the social cost of carbon for greenhouse gas emissions
- the potential for the computable general equilibrium (CGE) model in the regional impact analysis to overestimate the indirect (flow-on) procurement and employment opportunities for local business and residents.

This report has considered each submission received and the responses provided by the proponent in the evaluation of the project. Assessment of key matters is provided below.

5.6.3 Methodology

The economic impact assessment was undertaken in accordance with the *Economic impact assessment guideline*[53], *Project assessment framework – Cost-benefit analysis*[54] and *Business case development framework – Cost benefit analysis guide*[55]. The assessment included a regional impact analysis and a CBA of the project.

The regional impact analysis in the economic impact assessment used a CGE modelling approach to predict spending on goods, services, taxes etc during the construction and operation of the project and the distribution of income generated by the project. The regional impact analysis focused on the direct impact of the project on the local, regional and state economies. CGE modelling is a widely used tool for providing estimates of whole economy outputs by using actual economic data to estimate how an economy might react to changes in policy, technology or other external factors. Accordingly, CGE modelling may be appropriate where a project is strongly influenced by external factors or policy decisions of government.[56]

The CBA in the economic impact assessment was used to evaluate the overall benefits and costs of the project. The CBA established a base case to assess the economic impacts from the project and quantified benefits and costs such as capital expenditure and operating costs of the projects, royalties, company tax, income to workers and suppliers, as well externalities including social and environmental impacts. The anticipated future costs and benefits of the project were discounted to arrive at a present value. This takes into account the fact that projects may be constructed and operated over long timeframes and the values of costs and benefits depends on when they actually occur. By adding together all present values of the future costs and benefits, it calculates a project's NPV. If the NPV is positive, it concludes the project has economic merit.

The methodology used to undertake the project's economic impact assessment is considered adequate and addresses the project's TOR to present both a regional impact analysis and CBA. I acknowledge that there are uncertainties related to specific benefits and costs, but I am satisfied that the proponent has managed these via conducting a sensitivity analysis that examines how the net economic impacts of the project change when various key assumptions used in the modelling are changed. I am also satisfied

[53] Queensland Government, Department of State Development, *Economic impact assessment guideline*, April 2017.
[54] Queensland Government, Queensland Treasury, *Project assessment framework – Cost-benefit analysis*, July 2015.
[55] Queensland Government, Department of State Development, Infrastructure, Local Government and Planning, *Business case development framework – Cost benefit analysis guide*, Release 3, June 2021.
[56] Queensland Government, Department of State Development, *Economic impact assessment guideline*, April 2017, section 3.1.3.

that the CGE model in the regional impact analysis provided conservative estimates of potential indirect (flow-on) procurement and employment opportunities for local business and residents.

5.6.4 Impacts

Since the draft EIS was publicly notified in August and September 2021, the proponent obtained new geological data and coal quality data which resulted in a predicted additional 43 million tonnes of ROM coal being extracted from the project's targeted coal seams. The project's economic impact assessment was revised to account for the projected additional 43 million tonnes of ROM coal, which was publicly notified in November to December 2022.

5.6.4.1 Coal demand

The project would produce up to 17 Mtpa of ROM coal and 11 Mtpa of product coal over 28 years. Two types of coal would be produced by the project: metallurgical coal (approximately 58%) and thermal coal (approximately 42%).

The majority of the coal produced is metallurgical coal, which is essential in making steel and has no other viable alternative at present. According to the EIS, the demand for metallurgical coal worldwide is linked to industrialisation and urbanisation, and steel production plays a crucial role in developing renewable energy technologies like wind turbines and solar panels. The rest of the coal produced is thermal coal, which is used in generating electricity.

The EIS presented a forecast for project's coal production and coal prices. The project coal is proposed to be exported to Japan, South Korea, India, Vietnam, Taiwan and China. The project's coal demand forecast for metallurgical and thermal coal was supported by the IEA forecast under the Sustainable Development Scenario and the QRIDP.

The IEA provides alternative coal demand scenarios. The proponent referenced the IEA's Sustainable Development Scenario within the EIS.[57] Under the Sustainable Development Scenario, global metallurgical coal demand is forecast to be approximately 850 Mtce in 2030 and 410 Mtce in 2050; and global thermal coal demand is forecast to be 2,840 Mtce in 2030 and 770 Mtce in 2050. The project is proposing to export to the Asia region, which is expected to account for 85% of the total global demand in 2030 and 2050.

The proponent anticipates there would be a contraction in the number of operating coal mines in the world, as less efficient, higher-cost and higher-emission coal mines begin to close as global demand for coal falls. The proponent anticipates the project would supply high quality metallurgical and thermal coal under IEA's Sustainable Development Scenario.

Since 2022, the IEA has developed alternative coal demand scenarios, in addition to the Sustainable Development Scenario: the Stated Policies Scenario, Announced Pledges Scenario and Net Zero Emissions Scenario. The Announced Pledges Scenario includes similar temperature outcomes to that under the Sustainable Development Scenario. Each scenario sees a structural decline in coal demand in the current decade, though the pace of the decline depends on the stringency and effectiveness of climate policies.[58] Exporting countries under each scenario are affected by climate policies, but those serving the emerging Asian markets see a lesser decline and Australia remains the largest exporter of coal.[59] Under the Stated Policies Scenario, Australian coal production plateaus between 2021 and 2030, and under the Announced Pledges Scenario, Australian coal production falls over this period by 25%.

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[57] International Energy Agency, *World Energy Outlook 2021*.
[58] International Energy Agency, *Coal in Net Zero Transitions – Strategies for rapid, secure and people centred change*, November 2022, pg 37.
[59] International Energy Agency, *World Energy Outlook 2022*, pg 44.

Metallurgical coal production remains steady each year through to 2030, then falls further and faster after 2030 due to significant reductions in demand.[60]

The QRIDP acknowledges that future opportunities for both thermal and metallurgical coal will be supported further by mines decarbonising their operations to remain competitive globally. The Queensland Government has committed to work with the resources industry to investigate ways to reduce fugitive emissions from resource activities, particularly in the Bowen Basin. The QRIDP is discussed in section 2.4.

In November 2022, Queensland Treasury published *Queensland's coal industry and long-term global coal demand*[61]. This paper provides an overview of Queensland's coal industry and discusses the potential implications of the IEA's latest World Energy Outlook[62] in the context of Queensland's coal production and major export markets over the long-term. The IEA note that metallurgical coal demand is expected to decline much less than thermal coal. This paper demonstrates that Queensland's coal industry remains relatively well-placed over the long term, given Queensland's proximity to the fast-growing Asia region and the quality of Queensland's metallurgical coal.

It was noted in *Queensland's coal industry and long-term global coal demand* that uncertainty remains regarding the global demand for coal considering global greenhouse gas reduction efforts and the long-term nature of the projections.

5.6.4.2 Coal price

The EIS presented a forecast of coal prices from financial year 2024 to 2051 for each type of coal. High ash thermal coal price is predicted to remain stable at approximately $70 per tonne (/t) and semi-hard coking coal price is predicted to remain stable at approximately $150/t. The coal prices used in the economic analysis were developed by the proponent and compared to coal prices forecast by Consensus Economics, an international organisation that publishes economic forecasts. When compared, the EIS found the coal price forecasts used by the proponent were considered reasonable.

Concerns were raised by those submitting to the EIS about the coal price range used in the CBA. The CBA adopted a sensitivity analysis that looked at the effects of a sustained 25% and 50% decrease and increase in coal price, compared to the base case coal price, over the 28 year operational phase. The EIS found that, regardless of the scenario modelled, the project would bring a significant net benefit to Queensland.

I consider that the sensitivity analysis in the EIS is appropriate. It factored a sustained 50% decrease in coal price, which is a conservative assumption, and this sensitivity analysis answered the concerns raised by submitters regarding the project's financial feasibility due to global decarbonisation efforts and the potential for decrease in long-term demand for the project's thermal coal product.

5.6.4.3 Regional impacts

5.6.4.3.1 Gross product

The proponent estimates that the project would require capital expenditure of $1 billion. This includes project infrastructure costs, biodiversity offsets, agreements with impacted landholders, road infrastructure agreements with Isaac Regional Council and impact management and monitoring.

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[60] International Energy Agency, *Coal in Net Zero Transitions – Strategies for rapid, secure and people centred change*, November 2022, pg 45 and International Energy Agency, *World Energy Outlook 2022*, pg 419.
[61] Queensland Treasury, *Queensland's Coal Industry and Long-Term Global Coal Demand*, November 2022.
[62] International Energy Agency, *World Energy Outlook 2022*.

The EIS estimated the project would increase gross regional product by $7.8 billion and increase gross state product by $11 billion. The EIS estimated royalties for the production and sale of product coal to be $696 million in present value terms over life of the mine.

The proponent also considered the effects of not adopting automation at the mine. The economic assessment determined an additional 250 FTE jobs would be required during the operational phase (total of 750 FTE jobs); however, the gross regional product and gross state product is expected to be lower when compared with the project scenario (autonomous fleet).

5.6.4.3.2 Employment

The EIS stated the project would directly employ up to 500 FTE jobs during each year of the construction and operational phases. In addition to the direct jobs generated, the project could provide indirect (flow-on) procurement and employment opportunities for local business and residents.

A significant proportion of the workforce is expected to be employed from the region during both the construction and operations phases. The CGE modelling conducted for the regional impact analysis estimated that around 1,750 FTE indirect jobs in annual average terms could be generated in upstream and downstream industries such as suppliers, contractors, service providers and local business during the life of the project.

The proponent intends to implement procurement policies that provide full, fair and reasonable opportunity for capable local industry to complete for the supply of goods and services to the project, in accordance with the *Queensland Resources and Energy Sector Code of Practice for Local Content*[63] and *Australian Industry Participation National Framework*.[64] The EIS detailed management measures to maximise opportunities for local business and industry to benefit from the project. The proponent estimates that $5.7 billion in NPV[65] would accrue to Queensland suppliers over the life of the project. The project would also generate secondary effects such as the lifestyle expenditure of project employees in the local area. Local procurement is discussed on section 5.5.6.

The *QRIDP* expects resource proponents to improve employment outcomes for First Nations people by building capacity and capability to participate in the resources sector.[66] The proponent has committed to a range of initiatives to enhance direct employment and procurement opportunities for First Nations people and Indigenous owned local business. The proponent will continue engagement with the BBAC, the Department of Youth Justice, Small Business, Employment and Training and the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts to develop targeted employment initiatives and programs for First Nations people. This is discussed further in section 5.5.

5.6.4.4 Cost benefit analysis

The CBA estimated the project would provide the Queensland community a total net economic benefit over the life of the project of $882 million in NPV terms, assuming a 7% discount rate. The CBA considered operating costs, capital costs, rehabilitation and decommissioning costs, taxes, royalties, and benefits associated with wages paid to workers, payment to suppliers and externalities, including from greenhouse gas emissions. The costs associated with final landform and use options are discussed in section 5.6.4.

Submitters on the EIS raised concerns regarding the discount rate adopted in the CBA. A discount rate of 7% was adopted for the base case and a sensitivity analysis considered 3% and 10% discount rates.

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[63] Queensland Resources Council, *Queensland Resources and Energy Sector Code of Practice for Local Content*, 2013, pg 8
[64] Australian Government, *Australian Industry Participation National Framework*, April 2001.
[65] Excludes wages.
[66] Department of Resources, *Queensland Resources Industry Development Plan*, June 2022, pg 37.

In all sensitivity analyses, the net benefits of the project to Queensland exceed the costs. I am satisfied this approach is consistent with the *Economic impact assessment guideline*[67].

The EIS estimated royalties for the production and sale of product coal over the life of the project to be $696 million in present value terms. Royalties for Queensland's natural endowments, such as coal are important sources of revenue for the State to deliver essential services and infrastructure to meet the needs of a growing and ageing population. The Queensland Government has committed to investing coal royalties to deliver better infrastructure for regional Queensland.

5.6.4.4.1 Externalities associated with greenhouse gas emissions

The project is expected to generate environmental and social effects (both positive and negative), referred to in economics as externalities. The social costs of additional greenhouse gas (GHG) emissions (Scope 1 and 2) to Australia over the life of the project are estimated at $576 million in present value terms (July 2022). The GHG emission costs adopted in the CBA included a sensitivity analysis with alternative GHG costs from the European Union Emission Allowance Units long term forecast price, Australian Treasury Clean Energy Future Policy Scenario prices and United States Environmental Protection Agency Social Cost of Carbon. The EIS found in all modelled scenarios would have a substantial net benefit to Queensland, including those with a sensitivity analysis.

Submitters on the EIS also raised concerns that the quantification of costs associated with the project's Scope 3 emissions (emissions caused during the transport to and combustion of the product coal in export countries) were excluded from the CBA. The EIS stated the exclusion is in line with standard approaches to estimating greenhouse gas effects for mining projects and conventional CBAs where the potential direct costs and benefits of the project are considered together where the activity takes place. I am satisfied this approach is consistent with Australian Government GHG accounting established under the United Nations Framework Convention on Climate Change[68].

5.6.4.4.2 Carbon emission imports tariff

Submitters on the EIS raised concerns that the CBA did not evaluate the metallurgical and thermal coal demand scenarios that consider the potential introduction of import tariffs based on the carbon emissions incurred in the production of goods, referred to as the carbon border adjustment mechanism.

The EIS stated that tariffs are being considered by the European Union and China but have not been enacted. Initially, the tariffs would apply to Scope 1 emissions of imported goods, meaning the Scope 1 emissions of the project would be taken into account, not the Scope 3 emissions associated with the combustion of the project's coal. The revised economic impact assessment considered the potential implications of tariffs to all product coal and concluded the impact would be within the coal price sensitivity analysis, which determined the project would have a substantial net benefit to Queensland.

5.6.5 Coordinator-General's conclusion: economics

The EIS adequately identified and assessed the potential economic impacts and benefits associated with the project. I am satisfied that the data and assumptions used in the methodology were appropriate to adequately understand the potential impacts on the local, regional, state and national economies.

The EIS demonstrated the project would provide net economic benefits to the local region by employing up to 500 FTEs each year during the construction and operational phases and may have indirect economic benefits in the local region.

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[67] Queensland Government, Department of State Development, *Economic impact assessment guideline*, April 2017.
[68] United Nations Framework Convention on Climate Change, **https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/reporting-requirements**.

The proponent has committed to implementing policies to enhance direct employment and procurement opportunities for First Nations people and Indigenous owned local business and procurement policies that provide full, fair and reasonable opportunity for capable local industry to compete for the supply of goods and services to the project. I expect these to be fully implemented to realise the predicted benefits of the project.

Through the implementation of the proponent's commitments, potential economic impacts and benefits would be appropriately identified and managed.

5.7 Cultural heritage

Section 4.12 and Appendix L of the draft EIS provides the proponent's assessment of potential project impacts on Aboriginal and Torres Strait Islander peoples cultural heritage values and non-Indigenous cultural heritage values. This section evaluates these potential impacts and the proponent's proposed mitigations and management strategies.

5.7.1 Aboriginal cultural heritage impacts and mitigation

The project traverses the country of the Barada Barna People and is recognised as the relevant Aboriginal Party by the ACH Act. Native Title has been extinguished over land within the MLA and does not form part of the Barada Barna People's Native Title Determination.

No Aboriginal cultural heritage sites within the project area are recorded on the Aboriginal and Torres Strait Islander Cultural Heritage Register maintained by the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts.

The ACH Act imposes a 'duty of care' upon all persons undertaking development activities to take 'all reasonable and practicable' measures to ensure that their activities do not harm matters of Aboriginal and Torres Strait Islander peoples' cultural heritage. The project has the potential to harm or destroy Aboriginal cultural heritage during the construction phase from vegetation clearing activities and earthworks associated with establishing access tracks, ETL and water pipeline, and during mining operations.

Submitters on the EIS raised concerns that proponents of resource projects rarely take into consideration the views of traditional owners and local communities regarding protection of their land from fossil fuel development. The proponent consulted with the BBAC, the prescribed body corporate for the Barada Barna People, to develop a CHMP in accordance with the ACH Act. The CHMP describes the process for undertaking detailed Aboriginal cultural heritage field surveys prior to any ground disturbance and details how any identified Aboriginal cultural heritage would be recorded and managed.

I am satisfied that the implementation of the CHMP would adequately manage potential impacts on Aboriginal cultural heritage. The proponent has committed to maintaining long term respectful relations with the BBAC to facilitate cultural heritage management.

5.7.2 Queensland (non-Indigenous) cultural heritage impacts and mitigation

The EIS identified Queensland (non-Indigenous) cultural heritage values through historical and archival research and review of relevant Australian, state and local registers and databases, and site surveys undertaken in 2021.

The EIS identified 28 potential Queensland cultural heritage listed places within the study area (being the area traversed by the project). In 2021, site surveys were undertaken to determine that the listed sites or items did not have heritage significance to be protected under the *Queensland Heritage Act 1992*. The EIS concluded there is low potential for new sites or artefacts to be discovered during construction and operational activities.

I am satisfied the preparation and implementation of a management plan would adequately manage potential impacts on Queensland (non-Indigenous) cultural heritage values.

5.7.3 Coordinator-General's conclusion: cultural heritage

The EIS has adequately investigated and assessed potential impacts on Aboriginal and Torres Strait Islander peoples and Queensland (non-Indigenous) cultural heritage. The proponent has an approved CHMP, which must be implemented to carry out the cultural heritage duty of care under the ACH Act. The proponent has committed to develop a management plan for potential impacts on Queensland (non-Indigenous) cultural heritage.

5.8 Other topics

5.8.1 Noise and vibration

Appendix G of the draft EIS and Attachment 14 of the revised draft EIS provides the proponent's assessment of project noise and vibration impacts associated with the construction and operation of the project. This section evaluates these potential impacts and the proponent's proposed mitigations and management strategies.

5.8.1.1 Impacts and mitigation

The EIS stated the project is expected to generate noise and vibration impacts during construction, operation and rehabilitation activities including drilling and blasting; waste rock removal; ROM coal extraction; plant equipment, vehicle and train movements; train loading; onsite CHPP operations and backfilling of open cut pits.

The proponent modelled potential noise impacts for project years 5, 9, 19 and 27, in consideration of the scale of mining operations to examine 'worst case' project noise levels. Four homesteads were identified as sensitive receptors for the project. The EIS found that acoustic quality objectives specified in Schedule 1 of the Environmental Protection (Noise) Policy 2019 (EPP Noise) would be exceeded by up to 5 A-dBA during neutral weather conditions and up to 11 dBA during adverse weather conditions at the nearest sensitive receptor, the Olive Downs Homestead, during evening and night-time periods. Analysis of the noise model and noise sources indicated the CHPP is the dominant noise source contributing to noise levels at the Olive Downs Homestead, located 1.4 km north-east of the project. To mitigate potential noise impacts, the proponent has executed a non-residency agreement with the owner for the homestead to remain vacant during the life of the project. I have stated a condition for the EA (Appendix 1) which allows for the proponent to enter into agreements with the owner of a sensitive receptor to manage impacts experienced at the receptor.

The EIS found that with the implementation of the proposed mitigation measures, acoustic quality objectives at the 3 remaining homesteads, including sleep disturbance criteria, would be within the objectives. Mitigation measures proposed in the EIS include attenuation of the CHPP and implementation of proactive and reactive noise control measures such as real-time noise monitoring to modify mining operations as required to achieve applicable acoustic quality objectives.

To ensure acoustic quality objectives are met at the remaining 3 homesteads, located greater than 6.5 km from the project, I have stated conditions in Appendix 1 of this report which must be placed on the

EA, setting noise limits and requiring monitoring and management. The stated conditions require the proponent to prepare and implement a noise and vibration management plan prior to the construction phase. The stated conditions also require the proponent to undertake continuous noise monitoring at least at one location to determine noise emissions from the project, guide the day-to-day planning of mining operations, and implementation of both proactive and reactive mitigation measures to ensure compliance with acoustic quality objectives.

The EIS found typical maximum instantaneous charge sizes would result in blasting emissions below the vibration and air blast objectives specified in DES *Model mining conditions Guideline*[69] at all sensitive receptors. To ensure vibration and air blast objectives are met at the nearby sensitive receptors, I have stated conditions which must be placed on the EA setting ground vibration peak particle velocity and airblast overpressure limits. The noise and vibration plan must also detail a protocol for determining exceedance of these limits.

Submitters on the EIS raised concerns regarding noise and vibration impacts experienced at the Eagle Downs Mine from project blasting. The EIS determined operational noise levels are expected to comply with relevant acoustic quality objectives at the Eagle Downs Mine and Eagle Downs Exploration Shed. As these assets are a workplace, the acoustic quality objectives in the EPP Noise do not apply and instead, impacts would be regulated by the *Mining and Quarrying Safety and Health Act 1999* and *Coal Mining Safety and Health Act 1999* and subordinate legislation. To minimise noise and vibration impacts at the Eagle Downs Mine, the proponent has committed to ongoing engagement with Eagle Downs Coal Management Pty Ltd, owner of the Eagle Downs Mine, regarding operational blasting procedures to reduce the potential risks. As discussed above, I have stated a condition to require continuous monitoring of noise and implementation of proactive and reactive measures to manage impacts on the Eagle Downs Mine.

The EIS also assessed the potential cumulative noise impacts from the project and surrounding mines and found that with the implementation of the proposed mitigation measures, the cumulative noise impacts would be negligible at sensitive receptors other than Olive Downs Homestead (managed via the non-residency agreement).

5.8.1.2 Coordinator-General's conclusion: noise and vibration

The EIS adequately assessed potential noise and vibration impacts. To ensure potential noise and vibration impacts experienced at sensitive receptors and in the environment are adequately managed, I have stated conditions in Appendix 1 of this report regarding limits, monitoring and management. The stated conditions require the proponent to prepare and implement a noise and vibration management plan prior to construction. The stated conditions also require the proponent undertake continuous noise monitoring at least at one location to determine noise emissions from the project, guide the day-to-day planning of mining operations, and implementation of both proactive and reactive mitigation measures to ensure compliance with acoustic quality objectives. To ensure vibration and air blast objectives are met at the nearby sensitive receptors, I have stated conditions which must be placed on the EA setting ground vibration peak particle velocity and airblast overpressure limits.

To mitigate potential noise impacts at the Olive Downs Homestead, the proponent has executed a non-residency agreement with the owner for the homestead to remain vacant during the life of the project. I am satisfied that the ongoing consultation with Eagle Downs Coal Management Pty Ltd and implementation of proactive and reactive measures would manage noise and vibration impacts on the Eagle Downs Mine.

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[69] Queensland Government, Department of Environment and Science, *Model mining conditions Guidelines*, ESR/2016/1936, Version 6.02, 2017.

I am satisfied that the implementation of the stated conditions in Appendix 1 of this report would adequately manage noise and vibration impacts and address issues raised by submitters.

5.8.2 Visual amenity

The project is proposed in the Bowen Basin, where open cut mining is a key land use for the past decade and land within the project area is predominately used for cattle grazing.

The EIS identified and assessed potential impacts on visual amenity at the nearest sensitive receptors:

- Olive Downs Homestead
- Winchester Downs Homestead
- Vermont Park Homestead
- Coolibah Homestead
- Seloh Nolem 1 and Seloh Nolem 2 Homesteads.

No submissions were received on the EIS identifying potential visual amenity impacts.

5.8.2.1 Impacts and mitigation

The EIS stated the project has the potential to create visual amenity impacts from the development of mine infrastructure and elevated landforms during mining, which may impact direct regional and local views. The out-of-pit waste rock emplacements would result in the creation of several elevated landforms of up to 50 metres (255 metres Australian Height Datum).

The EIS determined that the project's proposed mine infrastructure is consistent with the existing land uses within the project area and is unlikely to impact visual amenity at the nearest sensitive receptors, the Olive Downs Homestead and Winchester Downs Homestead. This is due to the separation distances of these homesteads from the mine, 3 km and 6 km respectively. The proponent has executed a non-residency agreement with the owner of the nearest homestead, the Olive Downs Homestead, for the homestead to remain vacant during the life of the project.

To mitigate potential amenity impacts post-mining, I have the stated conditions for the EA require the proponent to progressively rehabilitated the mined land to support a final land use of low intensity grazing for the majority of the site, with remaining areas to support a final land use of water storage for agricultural use (stock drinking), native ecosystems and waterways providing for fish passage. These uses are consistent with the existing use of the project site.

5.8.2.2 Coordinator-General's conclusion: visual amenity

The EIS has adequately assessed potential impacts on visual amenity. I am satisfied the project would not have a material impact on visual amenity of nearby homesteads and that the project is consistent with the existing land uses in the project area.

5.8.3 Hazard and risk

Section 4.13 and Appendix N of the EIS provides the proponent's assessment of potential hazards and risk for the project including the use of storage of hazardous substances, bushfires, flooding, wind and other potential environmental and safety issues. This section evaluates these potential impacts and the proponent's proposed mitigations and management strategies.

The key issues regarding hazards and risk raised in submissions on the EIS include:

- potential hazards and risk impacts on the Eagle Downs Mine from overlapping mining tenure for the project's infrastructure corridor
- potential climate change risks, including risks of stranded project assets.

This report has considered each submission received and the responses provided by the proponent in evaluation of the project. Assessment of key matters is provided below.

5.8.3.1 Impacts and mitigation

Potential hazards and risks associated with the project were assessed using a preliminary hazard analysis which considered the use and storage of hazardous substances such as hydrocarbons, chemicals and explosives; and natural events which may pose a risk due to the locality and surrounding environment of the project, including bushfires, floods and wildlife hazards.

The EIS presented a preliminary risk assessment prepared in accordance with comply with the *Risk Management – Principles and guidelines*.[70] This methodology is considered adequate and addresses the project's ToR to present a preliminary risk assessment of potential hazards posed by natural events (for example, cyclone, flooding, bushfire) and implications related to climate change.

Sixteen risks were identified as part of the preliminary risk assessment. Of these, 6 risks were predicted to have a moderate residual risk (following mitigation and management) and the remainder were predicted to have a low residual risk. The hazards predicted to have a moderate residual risk include:

- risk to surface water due to overtopping of dams
- unexpected flooding event
- potential blasting impacts on rail infrastructure (i.e. damage from fly-rock)
- health impacts and reduced amenity from air quality impacts
- increase in traffic movement leading to a deterioration in road safety for users
- potential impacts on the rail corridor and interaction with Aurizon employees
- workforce pressure on housing and social infrastructure.

Submitters on the EIS raised concerns regarding the potential for fly-rock and vibration from blasting events to impact on the existing Norwich Park Branch Railway. The EIS stated that given the proximity of the open cut pits to the railway corridor, the proponent has committed to consult with Aurizon, the railway manager, regarding potential fly-rock impacts and vibration impacts and if necessary, temporary closure of the railway during blast events. To manage potential impacts on the Norwich Park Branch Railway, the report includes a recommended a condition in Appendix 3 to the Minister for Transport and Main Roads that the project must not disrupt the safety and operational integrity of the Norwich Park Branch Railway corridor, including all transport infrastructure and the land supporting this infrastructure from ground movement and vibration.

This report also includes a recommended condition that the proponent prepare and implement an earthworks and blasting management plan prior to the commencement of mining activities. The earthworks and blasting management plan must detail the blast management process and controls, including roles and responsibilities of relevant personnel, notification procedures, blast approval procedures and record keeping requirements, as well as a process to rectify any damage to the Norwich Park Branch Railway corridor and supporting land. Where monitoring identifies any damage to the Norwich Park Branch Railway, I have recommended a condition that the proponent must undertake all

[70] Standards Australia, *Risk management – Principles and guidelines*, AN/NZS ISO 31000:2018.

necessary rectification works. Potential impacts to the Norwich Park Branch Railway is discussed further in section 5.4.1.3.

To address other hazards and risks for the project, the proponent has committed to:

- develop and implement a risk management system
- handle, store and dispose of hazardous materials at the project site in accordance with relevant legislation, standards and guidelines
- make spill control kits available at all locations in which hazardous materials are stored
- conduct regular inspections of hazardous material storage areas including tanks and bunds to maintain structural integrity
- utilise licensed contractors to recover, collect, store, handle and dispose of hazardous wastes and materials utilised at the project site
- train all vehicle and equipment operators in processes and procedures such as safe and stable operation of machinery and emergency response
- store explosives behind a fence with signage in accordance with Australian standards and industry codes of practice
- ongoing consultation with relevant emergency authorities over the life of the project (e.g., the local disaster management group and community emergency services).

To prepare for an emergency event, the proponent has committed to prepare an emergency response procedure in consultation with emergency service agencies. The emergency response procedure would be implemented in the event of an incident to maintain the wellbeing of personnel, contractors and the public, and would describe the actions to be implemented if injury, illness, fire, unintended initiation of explosives, loss of containment of hazardous substances, natural event (e.g. flooding, bushfire, cyclone), vehicle accident, interaction with wildlife or accidental discharge of mine-affected water were to occur. To ensure hazards and risk are appropriately managed, I have stated conditions for the EA in Appendix 1 of this report requiring the proponent to prepare and implement a risk management system for mining activities to comply with the *Risk Management – Principles and guidelines*[71] and for the storage of chemicals and fuels in containers of greater than 15 L to be within a secondary containment system.

I am satisfied that with the implementation of the stated conditions, proponent commitments and emergency response plans that identified hazards and risks would be appropriately managed for all project phases.

5.8.3.1.1 Infrastructure corridor

The project's infrastructure corridor transects the Eagle Downs Mine. The construction of the project's ancillary infrastructure has the potential to create health and safety risks for workers of the project and the neighbouring Eagle Downs Mine from plant and equipment movement. Similarly, use of the access road during the construction and operation phases has potential to create safety incidents.

Submitters on the EIS raised concerns regarding overlapping mine health and safety responsibilities, potential health and safety risks to employees at the Eagle Downs Mine, and potential chemical spill, flooding and transport risks in the infrastructure corridor. To address these concerns, the proponent has consulted with Eagle Downs Coal Management Pty Ltd, manager of the Eagle Downs Mine, regarding the preferred alignment of the infrastructure corridor and potential risks. The EIS stated the infrastructure

[71] Standards Australia, *Risk management – Principles and guidelines*, AN/NZS ISO 31000:2018.

corridor is located outside of the 0.1% AEP flood event of the Isaac River and therefore there would be no flooding impacts to Eagle Downs Mine because of the infrastructure corridor. The proponent has also committed to ongoing engagement with Eagle Downs Coal Management Pty Ltd to manage overlapping mine health and safety responsibilities.

Should the Minister for Resources decide to grant MLA 700065 (the project's infrastructure corridor), section 271AB(6) of the *Mineral Resources Act 1989* requires the proponent to enter an agreed co-existence plan before commencing activities.

I am satisfied that ongoing engagement with the Eagle Downs Coal Management Pty Ltd and the requirement to enter into a co-existence agreement before commencing activities would adequately address health and safety risks of the overlapping tenure.

5.8.3.1.2 Climate change impacts

The EIS presented an assessment of the potential future climate risks to the project, including people and property associated with the project. The EIS assessment used the methodology outlined in Infrastructure Australia's *Guide to risk and uncertainty analysis*[72] and *Climate - EIS information guideline*.[73] This methodology is considered adequate and addresses the project's ToR to present a preliminary risk assessment of potential hazards posed by natural events (for example, cyclone, flooding, bushfire) and implications related to climate change.

The EIS stated that increased frequency and severity of cyclones, rainfall events, heatwaves are likely to occur on site as a consequence of climate change. The EIS stated that natural ecosystems on the project are considered to be vulnerable to climate change and habitat for some species will expand, contract and/or shift with the changing climate. The EIS also stated that changes to rainfall patterns, runoff patterns and river flow are predicted from climate change. The proponent has committed to implement an adaptive management approach to climate change impacts throughout the life of the project, including monitoring and reviewing information from the CSIRO and Australian Bureau of Meteorology relating to observed changes in the region's climate, identifying any emerging trends or potential impacts of a changing climate relevant to the project, and reviewing current mitigation measures with a view to implementing additional adaptation measures as required.

Regarding risk to project infrastructure, the proponent's parent company, Whitehaven Coal Limited, undertakes annual climate risk and scenario planning for the company's assets using the voluntary framework recommended by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). *Whitehaven Coal Limited's 2023 Sustainability Report* identified that natural hazards of fire and flood could disrupt operations, as well as disrupt access to critical inputs such as diesel fuel. Whitehaven Coal Limited also identified insufficient water being a risk for operations. Whitehaven Coal Limited identified transition risks such as changes to the Safeguard Mechanism and other government policies in export countries, changes in technology to reduce the demand for coal, as well as access to insurance and finances as risks to operations.

The Australian Government has committed to introduce legislation to require mandatory reporting of a company's climate-related financial risks from financial year 2024-25 onwards. The disclosure regime would expand upon the information to be voluntarily reported on under the TCFD.

The risks of flooding, fire and coastal inundation of the railway network(s) proposed to be used to transport project coal to a port for export is the responsibility of railway managers. Aurizon has released

[72] Australian Government, Infrastructure Australia, *Guide to risk and uncertainty analysis*, July 2021.
[73] Queensland Government, Department of Environment and Science, *Climate – EIS information guideline*, ESR/2020/5298, Version 1.01, April 2022.

a *Climate Strategy and Action Plan*[74] to continue to assess and enhance processes to manage climate-related risk and leverage opportunities by continuing to use scenario analysis to consider transition risks over short, medium and long-term horizons; continuing to enhance Aurizon's capability to assess physical risk to key assets and operations; and embedding consideration of climate-related risk into risk frameworks and investment standards.

5.8.3.2 Coordinator-General's conclusion: hazard and risk

The proponent has undertaken an appropriate assessment of potential hazards and risks associated with the project, including climate change risks. To manage potential hazard and risks from the overlapping tenure at the Eagle Downs Mine, the proponent to enter an agreed co-existence plan before commencing activities. To manage potential impacts on the Norwich Park Branch Railway, the report includes a recommended condition in Appendix 1 of this report to the Minister for Transport and Main Roads that the project must not disrupt the safety and operational integrity of the Norwich Park Branch Railway corridor, including all transport infrastructure and the land supporting this infrastructure from ground movement and vibration. The report also includes a recommended condition that the proponent prepare and implement an earthworks and blasting management plan prior to the commencement of mining activities.

To ensure hazards and risk are appropriately managed, I have stated conditions for the EA in Appendix 1 of this report requiring the proponent to prepare and implement a risk management system for mining activities to comply with the *Risk Management – Principles and guidelines*[75] and for the storage of chemicals and fuels in containers of greater than 15 L to be within a secondary containment system.

The proponent has also committed to develop management plans, engage with emergency services and implement adaptive management approach to addressing hazard and risks, including risks associated with climate change.

Through the implementation of the stated conditions, management plans and commitments, I am satisfised that the proponent will ensure that any potential hazards would be appropriately managed.

5.8.4 Waste management

The EIS identified excavated waste rock, coarse rejects and fine rejects as significant waste streams generated during project operations. Waste rock is overburden and interburden material removed to gain access to the coal seams. Reject material is generated from the CHPP which sorts and washes the project's run-of-mine coal to produce product coal, and coarse and fine rejects.

The project would also generate substantial streams of both regulated waste such as oils, sewage, chemicals and tyres and unregulated waste including general waste, recyclables, green waste, scrap metal and wastewater. The EIS stated that the majority of non-mining waste would be stored on site until collected by a licensed waste transport contractor and processed or disposed of off-site at licensed facilities.

Key matters raised in submissions related to waste management included:

- disposal and risk management methods for on-site disposal of waste rock, coal rejects and waste heavy vehicle tyres
- capacity of local waste facilities operated by the Isaac Regional Council

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[74] Aurizon, *Climate Strategy and Action Plan*, 2020.
[75] Standards Australia, *Risk management – Principles and guidelines*, AN/NZS ISO 31000:2018.

- types and quantities of project waste streams for all project stages.

5.8.4.1 Impacts and mitigation

The EIS identified types, volumes and proposed disposal methods for project waste during the construction and operation phases, details of which are provided in Table 5.9.

Table 5.9 Estimated maximum annual waste produced

Waste category	Quantity – construction	Quantity – operation	Proposed disposal location
Mine material waste			
Waste rock	N/A	87.8 million bank cubic metre (Mbcm) (73 Mbcm average)	Onsite in out-of-pit and in-pit waste rock emplacements
Coal rejects	N/A	8.0 million tonne (Mt) (6.5 Mt average)	Co-disposed with waste rock onsite in out-of-pit and in-pit waste rock emplacements
Non-regulated waste			
General waste	2,000 m^3	2,500 m^3	Licenced and approved landfill
Recyclable waste	500 m^3	1,400 m^3	Licenced and approved landfill
Green waste	240 ha	240 ha	Onsite within the MLA
Scrap metal	200 m^3	250 m^3	Licenced and approved landfill
Personal protective equipment	Less than one tonne	Less than one tonne	Licenced and approved landfill
Air filters	Less than one tonne	Less than one tonne	Licenced and approved landfill
Timber/wooden pallets	Less than 10 tonnes	Less than 10 tonnes	Licenced and approved landfill
Regulated waste			
Waste oils	1,000 kg	1,000 kg	Licenced and approved recycling facility or landfill
Empty waste oil containers	Less than 5 tonnes	Less than 10 tonnes	Licenced and approved recycling facility
Oil rag			Licenced and approved landfill
Engine oil/fuel filters	Less than 15 tonnes	Less than 50 tonnes	Licenced and approved recycling facility or landfill
Waste grease	Less than 150 kilolitres (kL)	Less than 200 kL	Licenced and approved recycling facility and landfill
Sewage	Less than 100 kL	Less than 100 kL	Licenced and approved sewage treatment facility or licenced and approved landfill

Waste category	Quantity – construction	Quantity – operation	Proposed disposal location
Paints	5,000 L	5,000 L	Licenced and approved recycling facility or landfill
Batteries	Less than one tonne	Less than one tonne	Licenced and approved recycling facility or landfill
Tyres	200 units	300 units	Onsite in out-of-pit and in-pit waste rock emplacements

5.8.4.1.1 General waste

To ensure waste is appropriately managed and does not impact on environmental values, I have stated a condition for the EA requiring the proponent to prepare a non-mineral waste management plan. The plan must detail the activities which will generate waste, how waste will be managed in accordance with the waste management hierarchy and the storage, transport and disposal of waste. The proponent has committed to manage waste generated by the project construction and operation in accordance with the waste and resource management hierarchy stipulated in the *Waste Reduction and Recycling Act 2011*: avoid, reduce, re-use, recycle, recover, treat and dispose. The hierarchy is a nationally and international accepted guide for prioritising waste and resource management practices as follow. Where waste must be disposed of, I have stated a condition for the EA for all waste generated in carrying out project activities must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

Submitters on the EIS raised concerns that local waste facilities operated by the Isaac Regional Council has insufficient capacity to accept waste generated by the project. The proponent has committed to consult with Isaac Regional Council regarding waste management and use of alternative waste management facilities outside of the LGA (if capacity is not available). I am satisfied this approach and implementation of the stated conditions would adequately manage issues raised by Isaac Regional Council.

5.8.4.1.2 Waste rock and coal rejects

The EIS stated waste rock would be placed in out-of-pit waste rock emplacements and within the open cut pits once mining operations advance. Coal rejects from the CHPP would be co-disposed with waste rock, preferentially in-pit, however coal reject disposal within the out-of-pit waste rock emplacement may be required for a short period of time at the commencement of the Railway Pit and Main Pit North when there is no in-pit storage available.

The waste rock and coal reject material would be used to progressively backfill and rehabilitate the open cut pits in accordance with the project's approved PRCP, which is discussed further in section 5.1.6.

The geochemistry assessment characterised the geochemical properties of waste rock and coal rejects. The assessment analysed the properties of 279 waste rock samples from 11 drill-holes sampled in 2019 and 2012, and 28 coarse reject samples from the proponent's coal quality test-work program undertaken in 2019. The assessment identified the following issues which could potentially result in adverse environmental impacts:

- waste rock and coal rejects are a potential source of salinity, particularly weathered waste rock
- waste rock is predominantly NAF, and with significant capacity to absorb acid generation
- some coal rejects may be sulfidic and potentially acid forming, albeit with a low capacity to generate significant acidity

- waste rock has some enrichment of metals (arsenic and beryllium), but surface water runoff is unlikely to exceed relevant water quality guidelines for those elements
- waste rock has the potential to be dispersive and prone to erosion.

Adverse impacts to surface water and groundwater could occur if waste rock and coal rejects are not appropriately managed due to the potential for acidity, salinity and erosion of dispersive materials. To minimise risks, the proponent has committed to:

- waste rock and coal rejects would undergo geochemical validation prior to disposal
- coal rejects would be buried by at least 10 metres of waste rock
- surface water runoff from out-of-pit waste rock emplacements where coal rejects are co-disposed will report to the mine-affected water system
- where dispersive waste rock is identified, it would not report to final landform surfaces and would not be used in construction activities, where practicable.

To ensure mine wastes do not impact on groundwater and surface water quality, aquatic ecology and rehabilitation success, I have stated conditions in Appendix 1 of this report. I also require a mineral waste management plan to be developed and implemented prior to project construction.

5.8.4.1.3 Waste tyres

Waste tyres can cause environmental harm when disposed in an inappropriate manner, potentially resulting in contamination of surface water and groundwater, fires or unstable landforms. Submitters on the EIS raised concerns regarding disposal of waste heavy vehicle tyres within waste rock emplacements.

To ensure waste heavy vehicles tyres are managed in accordance with the Queensland Government's waste targets and the principles of a circular economy, I have stated a condition for the EA for the scrap tyres to be stored and disposed of in accordance with DES *Operational Policy – Disposal and storage of scrap tyres at mine sites*.[76] The proponent has committed to investigate options for beneficial re-use including supplying waste tyres, referred to as 'end-of-life tyres', to a suitably qualified resource user in accordance with DES *End of waste code: End-of-life tyres (ENEW07503018)*.[77]

Where the waste tyres are not suitable for re-treading or use as a resource, they would be stockpiled on site before being disposed of in waste rock emplacements. To mitigate the risk of environmental harm, the proponent has committed to dispose of waste tyres:

- as deep into the waste rock emplacement area as practicable
- in locations that would not impede saturated aquifers
- with a minimum of 20 metres cover of waste rock
- more than 15 metres from any coal rejects to minimise the risk of spontaneous combustion
- in areas that would not compromise the stability or rehabilitation success of the final landform.

I am satisfied that the proposed commitment would adequately address the potential risks.

[76] Queensland Government, Department of Environment and Science, *Operational Policy – Disposal and storage of scrap tyres at mines sites*, ESR/2016/2380, Version 2.03, May 2023.
[77] Queensland Government, Department of Environment and Science, *End of waste code: End-of-life tyres (ENEW07503018)*, ESR/2020/5244, Version 2.00, February 2021.

5.8.4.2 Coordinator-General's conclusion: waste management

The EIS adequately assessed the project's impacts on waste generation and disposal for this stage of the project's development. I accept that the proponent's geochemistry assessment concluded that the majority of waste rock is likely to be NAF in the long term and salinity is expected to be generally low to moderate.

I have stated conditions in Appendix 1 of this report to ensure the effective management of mining waste. Under these conditions, the proponent must develop and implement a mineral waste management plan which will include methodologies for containment of reactive mine waste, a program of progressive sampling and characterisation to identify acid producing potential, salinity, metal and metalloid concentrations of waste rock and coal rejects.

I consider that these conditions are consistent with DES and the IESC's advice regarding mine waste management including uncertainty surrounding the acid-forming and metalliferous drainage potential of waste rock and coal rejects.

I have stated conditions relating to waste (Appendix 1, Schedule C), groundwater (Appendix 1, Schedule E) and surface water (Appendix 1, Schedule F) which will ensure any potential impacts arising from mining waste are managed appropriately.

I have stated a condition for the EA for the scrap tyres to be stored and disposed of in accordance with DES *Operational Policy – Disposal and storage of scrap tyres at mine sites*.[78] The waste impacts of the project would be appropriately managed through the implementation of the proponent's commitments, including waste management procedures and the conditions in this report (Appendix 1).

I consider that these conditions are consistent with DES' the IESC's advice regarding mine waste management including uncertainty surrounding the acid-forming and metalliferous drainage potential of waste rock and coal rejects.

I have stated conditions relating to surface water (Appendix 1, Schedule F) and groundwater (Appendix 1, Schedule E) which will ensure any potential impacts arising from mining waste are managed appropriately.

The waste impacts of the project would be appropriately managed through the implementation of the proponent's commitments, including waste management procedures and the conditions in this report (Appendix 1).

[78] Queensland Government, Department of Environment and Science, *Operational Policy – Disposal and storage of scrap tyres at mines sites*, ESR/2016/2380, Version 2.03, May 2023.

6. Matters of national environmental significance

6.1 Introduction

This chapter addresses the potential impacts of the proposed project on MNES protected under the EPBC Act.

On 24 May 2019, the proponent lodged referrals under the EPBC Act for each of the 3 project components: the ETL, the water pipeline, and the mine site and access road.

On 17 and 18 July 2019, the 3 project components were determined to be 'controlled actions' requiring assessment and approval under the EPBC Act. The following controlling provisions apply for each proposed action under the EPBC Act:

- ETL (EPBC 2019/8458)
  - listed threatened species and communities (sections 18 and 18A)
- water pipeline (EPBC 2019/8459)
  - listed threatened species and communities (sections 18 and 18A)
- mine site and access road (EPBC 2019/8460)
  - listed threatened species and communities (sections 18 and 18A)
  - a water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E).

The delegate for the Australian Minister for the Environment determined that the project should be assessed under the Bilateral Agreement. Under the Bilateral Agreement (made under section 45 of the EPBC Act), if a controlled action is a 'coordinated project' for which an EIS is required under the SDPWO Act, certain types of projects do not require assessment under Part 8 of the EPBC Act. The Bilateral Agreement enables the EIS to meet the impact assessment requirements of both Australian and Queensland legislation.

The following subsections summarise the Queensland Government's assessment of each referral against the relevant controlling provision/s.

6.2 Project description

The project involves the development and operation of an open cut coal mine and associated infrastructure in the Bowen Basin. The project would be located within the Isaac Regional Council LGA, approximately 30 km south-east of Moranbah, Queensland. The EIS states the project is to be located on approximately 11,239 ha site within MLA areas held by the proponent (MLA 700049, MLA 700050, MLA 700051 and MLA 700065) (Figure 6.1). The proposed mining lease infrastructure application 700065 would contain the ETL, raw water supply pipeline and access road, which transects the neighbouring Eagle Downs Mine.

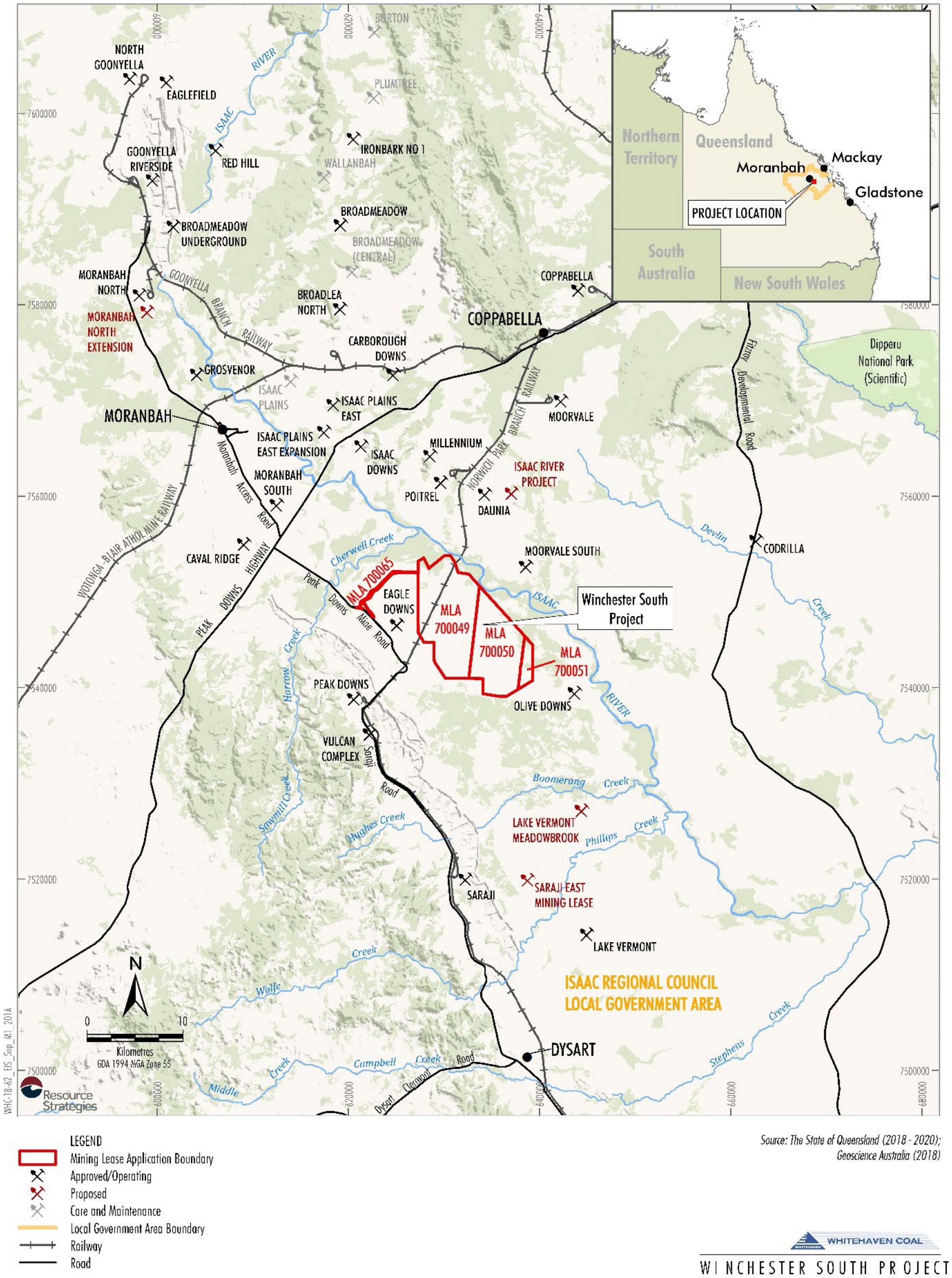


Figure 6.1 Project location

The project would also include the:

- construction of an access road from the Eagle Downs Mines Access Road, off the Peak Downs Mine Road to the mine infrastructure area
- construction of an approximately 8 km rail spur and loop connecting to the Norwich Park Branch Railway and train load-out facility, including product coal stockpiles for rail transport
- construction of a 132 kV ETL from Powerlink's existing Eagle Downs substation to the project and an onsite 132 kV/22 kV electricity switching/substation
- installation of approximately 13 km raw water supply pipeline connecting the project to the existing Eungella pipeline network
- connection to the existing telecommunications network
- construction of a mine infrastructure area including offices, onsite coal handling and preparation plant and workshops, and wastewater and sewage treatment plant.

The project is located adjacent to the approved but not yet constructed Eagle Downs Mine and approved and under construction Olive Downs Mine. Other mines within a 21 km radius of the site include the Peak Downs Mine, Daunia Mine, Poitrel Mine, Saraji Mine, Millennium Mine, Moranbah South Mine, Isaac Downs project, Isaac Plains East Mine, Caval Ridge Mine, Carborough Downs Mine, Moorvale Mine and Lake Vermont Mine. In June 2022, there were 46 coal mines operating in the Bowen Basin.

The project disturbance footprint is approximately 6,950 ha. The project proposes to connect to established water, electricity, rail, and road networks and co-locates infrastructure to minimise potential environmental impacts. Approximately 569 ha of the project contains remnant habitat classified as REs, with the remaining 6,381 ha either historically cleared or disturbed primarily for agricultural activities.

The proponent estimates capital expenditure for the project would be $1 billion with up to 500 FTE jobs created during construction and up to 500 FTE jobs during operation, when considering the use of automation. The open cut mine would produce a mix of products, including metallurgical coal, for use in the steel industry, and thermal coal. The mine is expected to extract on average approximately 17 Mtpa of ROM coal to deliver 11 Mtpa of product coal for overseas export across an anticipated operational life of 28 years (excluding construction and final landform establishment).

6.2.1 Project staging

6.2.1.1 Construction

The proposed timeframes identified in the EIS for each stage of the project are summarised in Table 6.1.

Pre-construction and construction would occur progressively prior to commencement of operations, with the major construction period forecast to take place in the first 36 months of the project. The works would commence as soon as practicable after all relevant planning approvals, EA, and MLA are granted.

Table 6.1 Project phases and approximate timeframes

Project phase	Approximate timeframe	Description
1	Year 1	Construction commences at the project (including overburden removal) and external ancillary infrastructure requirements (e.g. water supply pipeline, mine access road, ETL, rail spur and overpass).
2	Year 2	Construction of the MIA, including workshops and offices, and an on-site CHPP to process ROM coal from the project.

Project phase	Approximate timeframe	Description
		Overburden removal continues and ROM coal extraction commences.
3	Year 3	Construction of final stage of the CHPP. ROM coal extraction ramps up.
4	Year 4 – Year 26	ROM coal extraction reaches maximum extraction rate (17 Mtpa).
5	Year 27 – Year 29	Mining operations ramp down.
6	Year 30 - onward	Mine closure (e.g. decommissioning of infrastructure) and rehabilitation.

Construction activities would be based on the development of the following key project infrastructure:

- MIA (including the CHPP) and mine access road (including an overpass of the Norwich Park Branch Railway)
- rail spur and loop
- water management infrastructure (including flood protection levees)
- water and electricity supply infrastructure
- progressive development and augmentation of dams, sumps, pipelines, up-catchment diversions, storages and other water management equipment and structures
- progressive development of haul roads, light vehicle access roads and services
- construction and installation of ancillary infrastructure (e.g. electricity distribution infrastructure, explosives storage facilities, consumable storage areas, potable water supply, sewage treatment facilities, site communications, remote crib huts and security)
- replacement and/or upgrades to open cut mining and coal handling and processing machinery
- installation or replacement of environmental monitoring equipment.

The project construction period is expected to require approximately 0.6 Mt of road base gravel for construction of the mine access road, internal access/haul roads, rail formation and hardstands. An additional 0.05 Mt of quarried material would be required during this period for drainage aggregate, bedding, rock armour and railway ballast. While the majority of infrastructure components (e.g. CHPP, package plants, buildings, pipelines, etc.) would be manufactured off-site and transported to site for assembly and installation, the existing Winchester Quarry, located within the MIA, (Figure 6.2) (or a similar source in the region) would be used to meet the project's hard rock requirements.

Construction materials for the project would arrive at the MIA along the proposed Mine Access Road and/or Winchester Access Road off Eagle Down Mine Access Road/Peak Downs Mine Road. Equipment and fuel deliveries are anticipated to come from Moranbah or Mackay along the Moranbah Access Road and Peak Downs Highway.

The estimated development footprint during the course of the construction period is provided in Table 6.2.

Table 6.2 Approximate disturbance areas during construction period

Project component	Disturbance (ha)
Infrastructure corridor	135
MIA (and other infrastructure areas)	1,075
Water management infrastructure	50

Project component	Disturbance (ha)
Total	**1,260**

6.2.1.2 Operations

The ERAs and general project arrangement are displayed in Figure 6.2. The proposed operations schedule for the project as described in the EIS occurs over 4 broad stages and would progressively disturb approximately 6,950 ha of land across 28 years of operation:

- Mining Operation Stage 1
  - initial establishment of operations to 15 Mtpa of ROM coal extracted from mining within the Railway Pit, Main Pit North and Main Pit South
  - the out-of-pit waste rock emplacements to the west of the Railway Pit and east of Main Pit North would be constructed and partially rehabilitated, with out-of-pit waste rock emplacements to the east of Main Pit commencing
  - in-pit emplacement of the Railway Pit, Main Pit North and Main Pit South would also commence
- Mining Operation Stage 2
  - ROM coal extraction of approximately 15 Mtpa (and up to 17 Mtpa)
  - mining within the Railway Pit is completed
  - the out-of-pit waste rock emplacement to the west of the Railway Pit and the Railway Pit itself would be rehabilitated, with in-pit emplacement of the Main Pit South and Main Pit North continuing with the progression of the open cut. A portion of the Railway Pit would be retained for project water requirements
- Mining Operation Stage 3
  - steady ROM coal extraction
  - the east out-of-pit waste rock emplacement for Main Pit South would be established and partially rehabilitated
  - rehabilitation of the Main Pit North and Main Pit South in-pit emplacement would progressively occur
- Mining Operation Stage 4
  - establishment of operations in North-West Pit, West Pit and South Pit, with ROM coal extraction steadily declining as mining in the Main Pit North and Main Pit South is completed
  - emplacement within the Railway Pit, South Pit, North-West Pit and West Pit would progressively occur
  - residual voids would be established in the North-West Pit, West Pit and Main Pit.

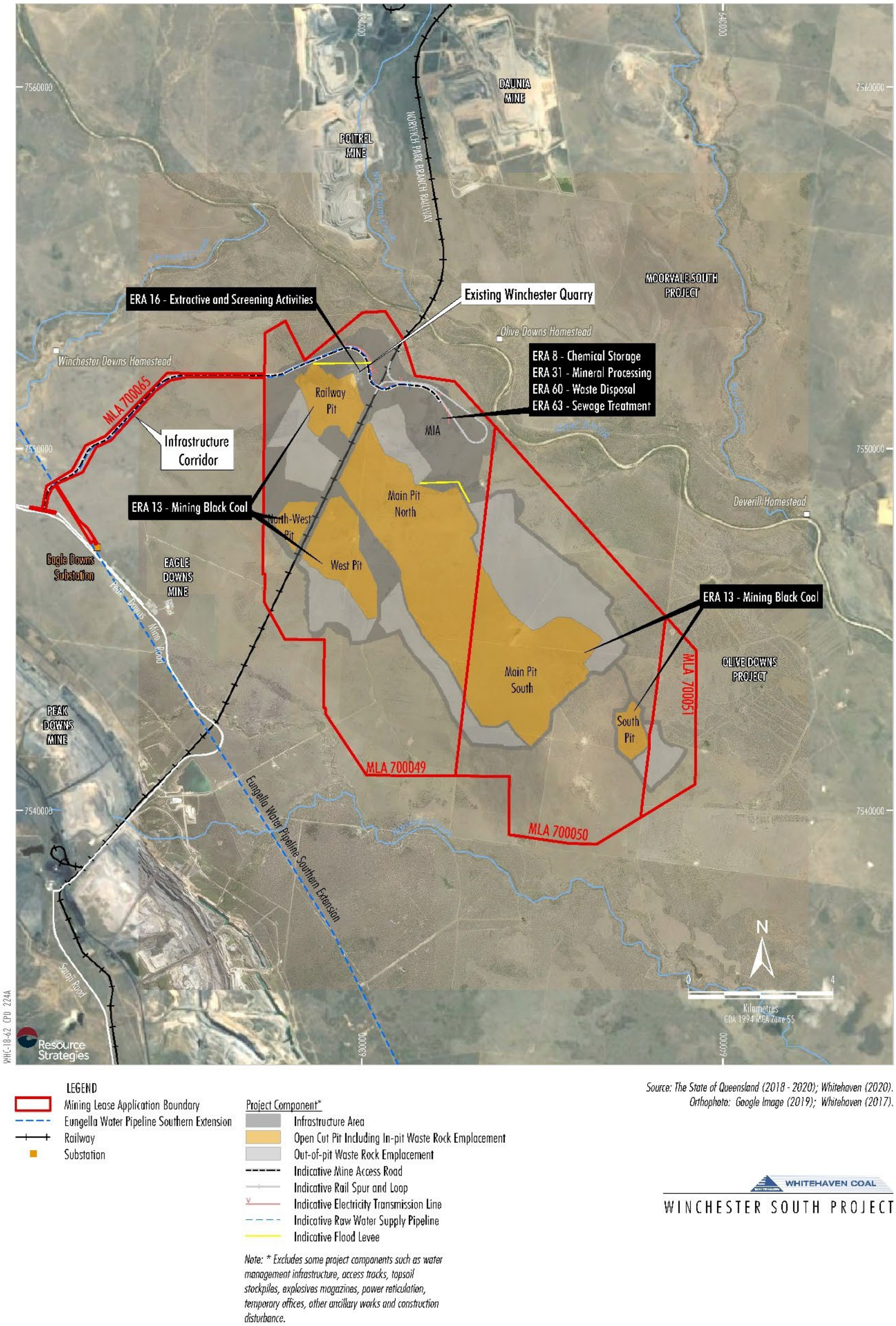


Figure 6.2 Environmentally relevant activities and general project arrangement

6.2.1.2.1 Winchester Quarry

As per section 6.2.1.1, the proponent will source materials from the existing Winchester Quarry, located within the MIA, during the construction phase to meet the project's hard rock requirements. The EIS states that the proponent proposes that the existing Winchester Quarry operations will continue for the first year of the construction phase. The proponent has committed to enter into an agreement with the quarry operator to minimise any interference arising as a result of the operations proceeding in parallel.

6.2.1.3 Decommissioning

The EIS indicates that the main decommissioning phase of the project, associated with major infrastructure (e.g. CHPP), would occur in Years 30 and 31, however decommissioning works would occur throughout the life of the project (e.g. sediment dams for the project would be progressively developed and commissioned as mining progresses). As the mining operations ramp down over the last 3 years of the project, there would be an opportunity to decommission components of the project flexibly and progressively as they become redundant, while maintaining other components as required.

The EIS states that all infrastructure associated with the project would be assessed on an individual basis and either decommissioned and removed or retained for future use as part of the final land use. Any retained infrastructure would be complementary to the low-intensity grazing final land use and may include (but would not be limited to) dams, access roads and fences. Any infrastructure proposed to be retained in the final landform would be determined in consultation with the relevant government agencies and the landowner.

As part of the progressive decommissioning of infrastructure (e.g. storage tanks, concrete footings, building materials, etc.), disposal of waste may be required. If waste must be disposed of, the proponent has committed to doing so in a way that prevents or minimises adverse effects on environmental values. Where infrastructure is decommissioned and removed, the land would be shaped, topsoiled, ripped, and revegetated.

Erosion and sediment control structures would be decommissioned only when disturbed areas have been stabilised, protective vegetation cover established, and surface water runoff meets the target criteria set in a PRCP. Perimeter drains and sediment dams would also be decommissioned and removed once water quality meets the target criteria set in a PRCP.

At the completion of mining, decommissioning and rehabilitation, the proponent would surrender the EA for the project. Surrender applications for EAs must also contain a post-surrender management report and include a compliance statement for the EA and the PRCP schedule. The compliance statement must state the extent to which the relevant activities carried out under the EA have complied with the conditions of the authority, whether the rehabilitation milestones and management milestones under the schedule have been met, the extent to which conditions imposed on the schedule have been complied with, and the extent to which the post-surrender management report is accurate.

6.2.2 Project location

The project is located approximately 30 km south-east of the township of Moranbah within the Brigalow Belt Bioregion (Figure 6.3). The bioregion's name is derived from the *Acacia harpophylla* (brigalow) forests and woodlands that dominated the landscape prior to widespread clearing for agricultural purposes. The Brigalow Belt Bioregion consists of a range of vegetation communities in addition to the remnant brigalow, including eucalypt forests and woodlands; grasslands; dry rainforest; cypress pine woodland; and riparian habitats. Of the 13 provinces within the Brigalow Belt Bioregion, 2 occur across the project site: Northern Bowen Basin and Isaac-Comet Downs. Both of these are characterised by undulating landscapes containing brigalow and eucalypt woodlands with native grasslands.

The project is located within a drainage subbasin of the Isaac River, which is within close proximity to the site (less than one kilometre at its closest). Three unnamed waterways are mapped as present on the project site, however there is limited riparian vegetation present due to the impacts of historical land clearing associated with cattle grazing. Gilgai that become inundated during the typically seasonal, wet summers also occur across much of the clay plains, providing habitat for threatened species and their prey.

Within a broader context, the project site is surrounded by a highly modified landscape that has been predominately cleared for cattle grazing and contains many active coal mines. The region is host to the majority of Queensland's active coal mines and is also a significant producer and exporter of natural gas. The cumulative impacts of these activities lead DCCEEW to highlight that remnant vegetation on the project site may be disproportionally important habitat for threatened species. Furthermore, pockets of remnant vegetation in proximity to waterways may provide important climate change refugia during increasingly extreme weather events.

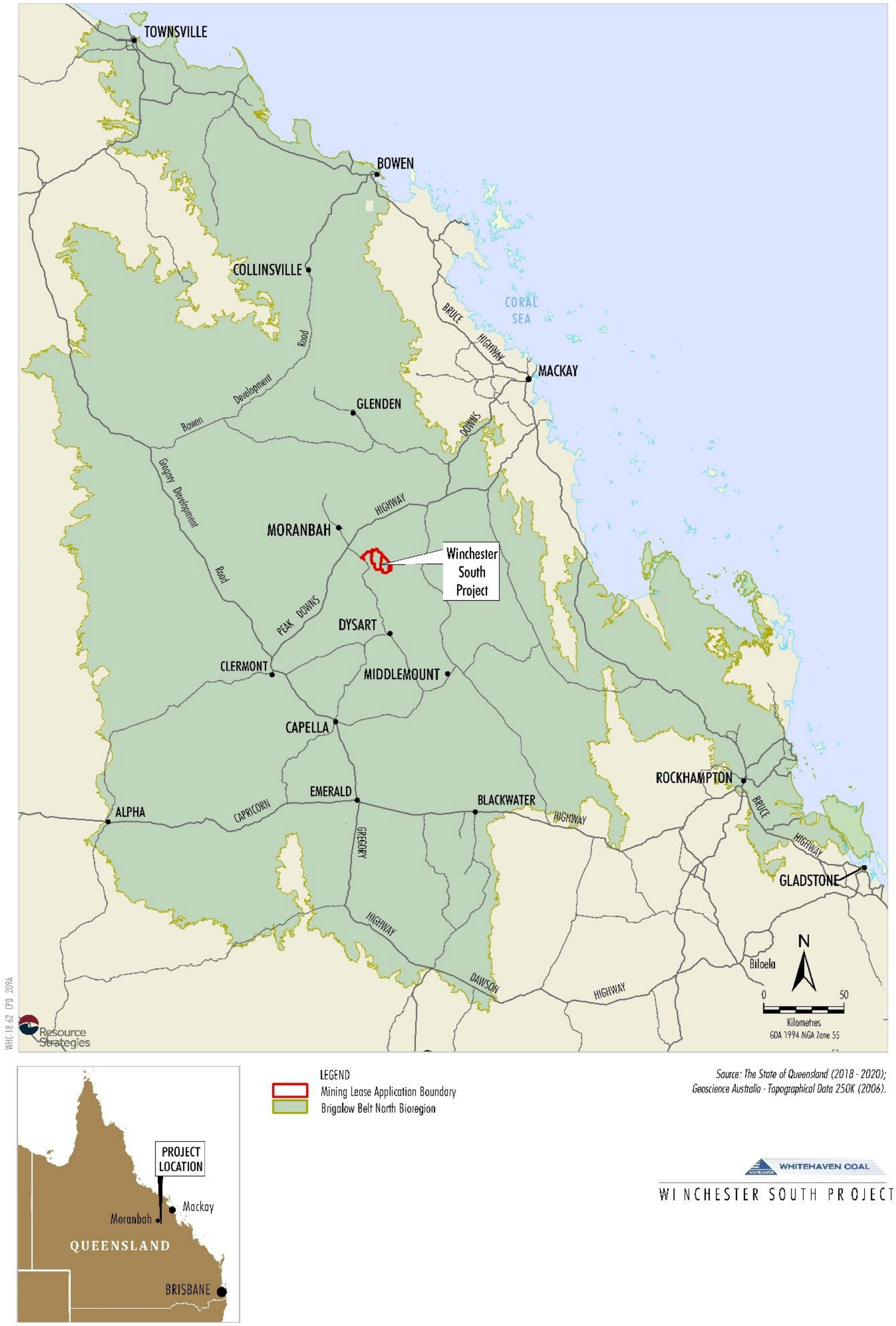


Figure 6.3 Project location within the Brigalow Belt Bioregion

6.2.3 Avoidance, rehabilitation and offsets

6.2.3.1 Avoidance

While the project location is determined by the presence of coal seams, the proponent has designed the project to avoid or minimise impacts to MNES through the following measures:

- minimising the overall mine footprint by optimising backfilling of the open cut
- avoiding clearance of riparian vegetation associated with the Isaac River
- design of the project to avoid the brigalow TEC located adjacent to the Main Pit South out-of-pit waste rock emplacement
- design of the western Main Pit South out-of-pit waste rock emplacement to avoid disturbance of ornamental snake habitat
- co-locating the mine access road, ETL and water pipeline within a single infrastructure corridor
- avoiding creek crossings/waterways for the infrastructure corridor
- avoiding palustrine wetlands on the boundary of the mining lease area and establishing a 50 metre buffer from the 2 wetlands
- optimisation of the project mine plan by reducing the overall surface disturbance extent of the project by approximately 179 ha when compared to the initial project design.

With regards to threatened species and communities, the optimised project mine plan would reduce the clearance of squatter pigeon (southern) breeding and foraging habitat by 145.7 ha, koala (combined populations of Queensland, NSW, and the ACT) breeding and foraging habitat by 145.7 ha, and greater glider (southern and central) breeding and foraging habitat by 34.3 ha. There would be no change to the clearance of TECs compared to the initial project design as the disturbance footprint had already been optimised in terms of minimising and avoiding impacts to TECs.

The proponent has also proposed clean water diversions that will facilitate the delivery of surface water flows back into the original alignment of the waterways when exiting the site, which would thereby prevent downstream impacts to receiving wetland ecosystems. This is an important consideration, as submissions on the EIS (section 6.2.4) raised concerns over the potential impacts to downstream receiving environments as a result of disturbance to the surface flow of water, in particular with regards to MNES habitat values for threatened species and communities. I have stated a condition for the EA to ensure that the diversions meet this objective.

6.2.3.2 Progressive rehabilitation and final land use

In accordance with the *Mined Land Rehabilitation Policy*,[79] the proponent must progressively rehabilitate mined land as it becomes available to minimise the risk of environmental impacts and reduce cumulative impacts of disturbed land. Land disturbed by mining activities is considered to be rehabilitated when it can be demonstrated it is safe, stable, does not cause environmental harm (non-polluting), and is able to sustain a final land use approved in the project's PRCP. The *Mineral and Energy Resources (Financial Provisioning) Act 2018* amended the EP Act to introduce requirements for a PRCP, which commenced on 1 November 2019. The transitional provisions in the *Mineral and Energy Resources (Financial Provisioning) Act 2018* apply to the project as the proponent lodged a site-specific application for an EA under the EP Act on 19 June 2019. The proponent later applied to change the EA application to

[79] Queensland Government, Department of Environment and Heritage Protection, Department of Natural Resources and Mines and Queensland Treasury, *Mined Land Rehabilitation Policy*, August 2017.

incorporate MLA 700065, which did not affect the transitional provisions. The transitional provisions mean the project must be assessed against the pre-amended EP Act. The proponent must submit a PRCP after the project's EA is issued, following the EIS process.

The project would create 6 mining pits over the course of mining. The proponent consulted with the community and potentially affected landholders during preparation of the EIS to discuss aspirations for the land post-mining. The proponent considered alternative landform and use options for the site and in response to submissions on the EIS, the proponent reviewed the project's mine plan and sequence with the aim of reducing the number of residual voids in the final landform, reducing impacts on threatened species habitat, and investigating alternative final land uses for the residual void areas.

The revised draft EIS proposed an optimised final landform which resulted in the proposal to completely backfill 3 pits by the end of mining and leave 3 residual voids, covering 11% of the project site with a proposed final land use of water storage for agricultural use (stock drinking). The proponent proposed the remainder of the project site would be returned to cattle grazing (approximately 89% of the project site) and 0.02% would be waterways to provide for fish passage. These uses are consistent with the existing land use and approved land use outcomes for mines and coal projects surrounding the project.

In assessing the environmental, economic, and social effects of the proposed 3 residual voids, I consider:

- the proposed final land use of water storage for agricultural use (stock drinking) for the Main Void to be acceptable. The EIS identified the Main void is capable of providing a sustainable and reliable supply of water for cattle within the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Primary Industries* (stock water guideline)[80] over the long term. I have stated conditions for the EA for the Main Void area to have 3 separate final land uses: water storage for agricultural use (stock drinking) for the void water, native ecosystem for highwalls/end walls, and low intensity grazing for low walls and ramps
- the proposed final land use of water storage for agricultural use (stock drinking) for the West Void to be acceptable. The residual void water model outlined in the EIS predicted salinity concentrations of the West Void water with abstraction for agricultural use would meet the preferred salinity limit for cattle consumption in the stock water guideline for the majority of the time over the modelled 500 year period. I have stated conditions for the EA for the West Void area to have 3 final land uses of water storage for agricultural use (stock drinking) for the void water; native ecosystem for highwalls/end walls; and low intensity grazing for low walls and ramps
- the North-West Void is unable to support the proposed final land use, as the residual void water model outlined in the EIS predicted salinity concentrations of the North-West Void water would more frequently exceed the preferred salinity limit for cattle consumption in the stock water guideline, and that the proposal to pump the water within the North-West Void to another location to manage the water quality, does not demonstrate the North-West Void can sustain the proposed final land use without abstraction over the long term. I have stated conditions for the EA for the North-West Pit to have a final land use of low intensity grazing
- the reinstatement of the excised portion of the northern unnamed waterway to provide for fish passage and the reinstatement of the excised portion of the central unnamed waterway to be acceptable final land use outcomes to be an acceptable final land use outcome. I have also stated conditions for the EA for the central unnamed waterway to be rehabilitated to a similar manner to its pre-development configuration to support downstream ecosystems

[80] Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3 Primary Industries,* October 2000.

- the Winchester Quarry area is to be rehabilitated to a low-intensity grazing final land use.

I have stated conditions for the EA which ensure the proposed final land use would meet the requirements of the EP Act of being safe, stable, and non-polluting. In addition, the 2 residual voids would be outside the Isaac River floodplain.

6.2.3.3 Biodiversity offset management strategy

The proponent has prepared an offset management strategy for the project, which identifies 3 properties as potential biodiversity offset sites. The land-based offset areas include parts of the Wynette, Inderi, and Ellensfield properties, with a total combined area of approximately 2,725 ha. The proposed offset properties occur within the same subregions as the project, with one site (the Wynette offset area), directly adjacent to the project site and Isaac River (Figure 6.4).

The proponent is proposing a staged offset approach consistent with the staged land clearance for the project, which is proposed to occur across 3 stages (Figure 6.5). The offset requirements for each stage of land clearance would be provided prior to clearing commencing for the relevant stage. The stages are indicative and may vary slightly following additional mine planning during construction and operation, however the quantified Stage 1 footprint has been set as a clearance limit and would not exceed the threshold amount. The Stage 1 clearance that would require offsets includes the ETL, water pipeline, mine access road, and initial infrastructure including the MIA, CHPP, train loadout facility, and rail spur.

The proponent has indicated that the proposed Stage 1 offsets would be met across the 3 identified properties, and that residual areas within these properties may be used to offset the impacts of further stages. A desktop review of potential properties that could provide a land-based offset for Stages 2 and 3 impacts to MNES has also been undertaken. The review identified at least 8 properties within the region where there is sufficient land and values to offset the impacts to MNES associated with the further stages.

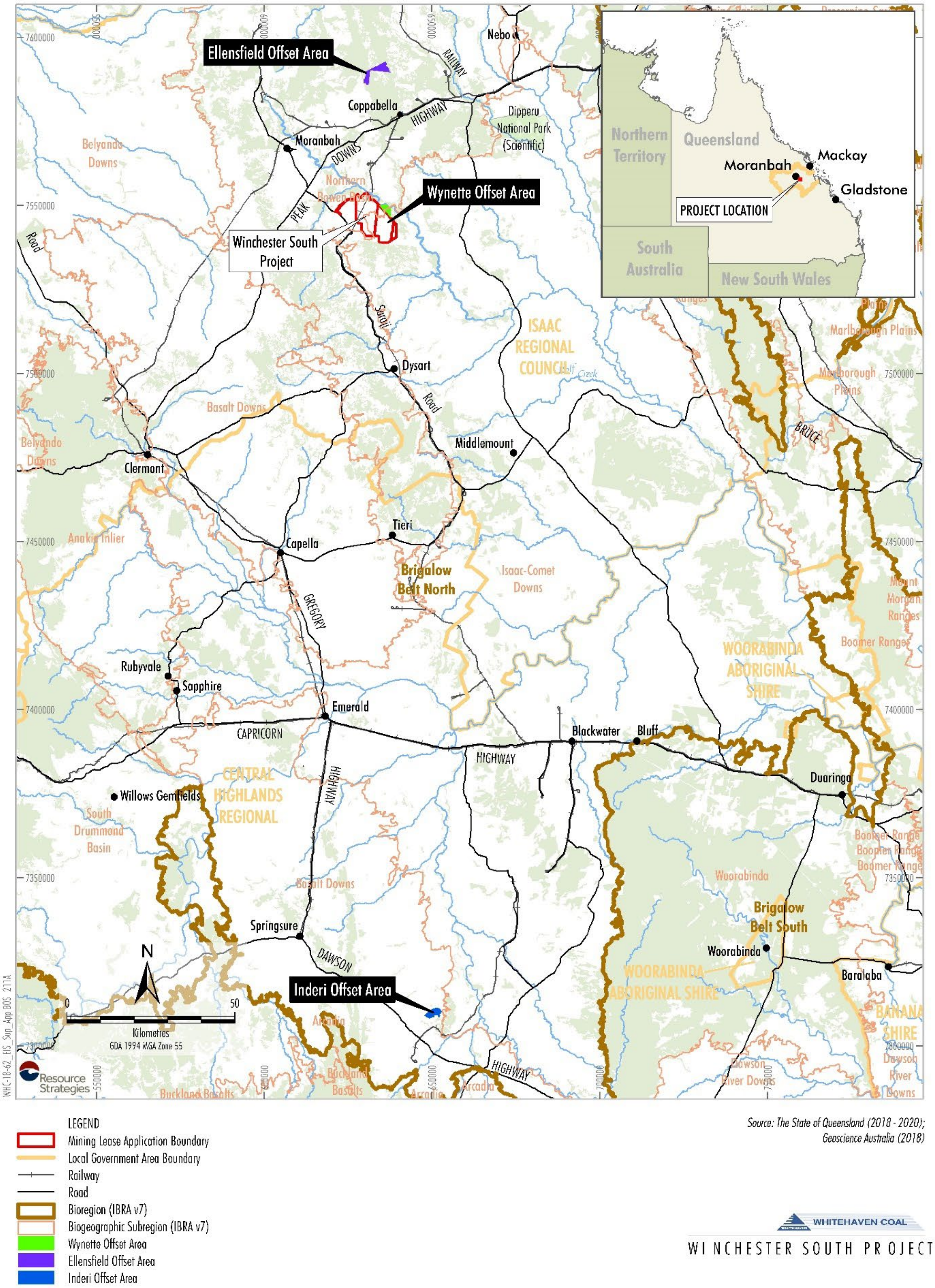
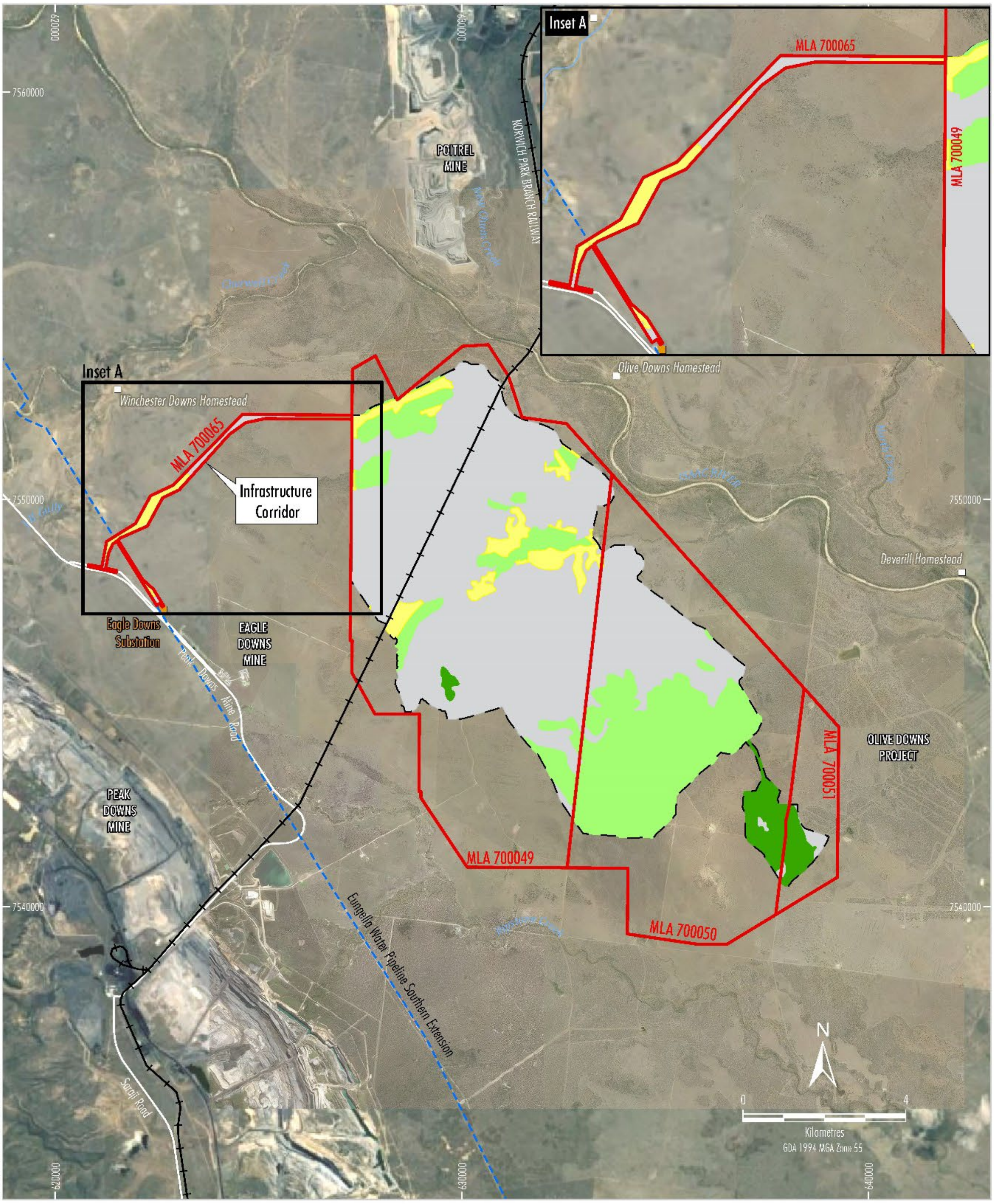


Figure 6.4 Biodiversity offset area locations



LEGEND
- Mining Lease Application Boundary
- Indicative Surface Disturbance Extent
- Railway
- Eungella Water Pipeline Southern Extension
- Substation
- Land without MNES or MSES

Disturbance Associated with Offset Stages*
- Stage 1
- Stage 2
- Stage 3

Note:
* Indicative layout shown based on current mine planning and is subject to change based on detailed mine planning with offsets provided prior to on-ground impacts.

- The entirety of the Electricity Transmission Line (EPBC 2019/8458), Water Pipeline (EPBC 2019/8459), and the Access Road component of the Mine Site and Access Road (EPBC 2019/8460) is contained within the Disturbance Associated with Offset Stage 1.

Source: The State of Queensland (2018 - 2020); Whitehaven (2020)
Orthophoto: Google Image (2019); Whitehaven (2017)

WHITEHAVEN COAL
WINCHESTER SOUTH PROJECT

Figure 6.5 Indicative biodiversity offset staging

In addition to the offset management strategy, I have recommended a condition to the Australian Minister for the Environment that would ensure the proponent submits an offset management plan to the Australian Government for approval prior to the commencement of each offset stage, whereby an agreed delivery arrangement would be entered into by the proponent and the Australian Government department to offset impacts to MNES. The offset management plans would be prepared in accordance with the *Environmental Management Plan Guidelines* (and the requirements to secure the offset areas under Queensland legislation) and would include:

- clear mapping of vegetation clearance for each project stage and how this corresponds to proposed offset stages
- the results of a field validation survey and baseline description of the current condition of the offset areas, including relevant MNES and/or their habitat
- a description and figures clearly defining the location and boundaries of the proposed offset areas, including the attributes of the offsets
- a description of the management measures (including timing, frequency and duration) that would be implemented in the offset areas
- a discussion of how proposed management measures take into account conservation advices approved under the EPBC Act for relevant threatened species and ecological communities, and are consistent with relevant recovery plans and threat abatement plans
- completion criteria and performance targets for evaluating the effectiveness of the offset management plan implementation and criteria for triggering corrective actions
- a program to monitor, report, and review the effectiveness of the offset management plan
- a description of potential risks to the successful implementation of the offset areas and contingency measures that would be implemented to mitigate against these risks.

6.2.4 Submissions

The key issues raised in submissions on the EIS regarding impacts to MNES include (but are not limited to):

- the remnant vegetation found within and adjacent to the project site may have disproportional significance due to the clearing and fragmentation of the surrounding landscape, particularly with respect to arboreal fauna species
- impacted regrowth areas provide important habitat for threatened species
- confirm the Brigalow regrowth areas are not classified as TECs
- impacts of groundwater drawdown and waterway excisions on habitat trees for threatened fauna and downstream TECs
- a lack of a suitable monitoring plan for GDEs and wetlands including ground-truthing of potential GDEs
- sampling techniques for surveys were inadequate, including a lack of recommended methods (harp trapping and hair tube sampling)
- impacts of noise and artificial lighting on threatened species
- details surrounding the arrangements for acquiring ownership of 2 of the offset areas are absent.

I have considered each submission received and the responses provided by the proponent in the evaluation of the project. Assessment of the key matters for each relevant MNES is provided below. After consideration of the avoid / mitigate / offset hierarchy and when no other options were available, a conditioning approach has been taken to ensure acceptable ecological outcomes are achieved in line with the precautionary principle, as per the EPBC Act.

6.3 Ecologically sustainable development – whole of project

As defined in Part 1, section 3A of the EPBC Act, the principles of ecologically sustainable development are:

- the integration principle: decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- the precautionary principle: if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the intergenerational principle: the present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations
- the biodiversity principle: the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making
- the valuation principle: improved valuation, pricing and incentive mechanisms should be promoted.

I have considered the above principles in the evaluation of project impacts.

This report is the culmination of an environmental impact assessment process addressing economic, environmental, social, and equitable considerations which included a public consultation process and the consideration of submissions lodged by the public, private organisations, and government agencies.

All long and short-term impacts on MNES for the project would be managed through my recommended conditions set for the Australian Minister for the Environment and the future EA that would be administered by the Queensland DES. I have adopted a precautionary approach and support for the biodiversity principle by including a condition requiring offsets for MNES which would supplement the proponent's management and impact mitigation measures.

A public comment period enabled the submitters to raise issues about the project in a fair and equitable manner. I have considered these issues in my evaluation of the project to ensure the interests of all stakeholders were considered and the intergenerational principle was applied.

I consider that the adoption of a comprehensive set of recommended conditions for the project would allow for the project to be constructed, operated, rehabilitated, and decommissioned in a sustainable manner, having regard to potential environmental risks to protect MNES and the environment for future generations.

I am satisfied that potential impacts of the project would be suitably compensated through the provision of offset areas in respect of areas disturbed by the project and that the valuation principle was applied.

6.4 Electricity transmission line (EPBC 2019/8458)

A 132 kV ETL would be constructed to connect a permanent supply of electricity to the project. The ETL would connect an on-site 132 kV / 22 kV substation (which would be located within the MIA) to the existing regional power network at the Eagle Downs Substation southwest of the project. During operations, the maximum electricity demand for the project is expected to be approximately 180,000 megawatt-hours per annum.

The ETL would be constructed during Stage 1 of the project, with construction expected to be completed within 12 months of commencement. A clearance width of approximately 10 metres would be required, with the ETL being constructed through the use of towers approximately 200 metres apart depending on topography and changes in direction. The alignment of the ETL would primarily traverse land used for agricultural purposes; however, some larger patches of remnant vegetation exist.

Alternative options were explored as a part of the EIS process (Figure 6.6). These options included connecting to the Eagle Downs Substation from the south (Option 2) and connecting to the Broadlea Substation to the north of the project (Option 3). The proponent has elected to minimise the impacts of the project by consolidating the disturbance for the ETL action, water pipeline action, and the access road component of the mine site and access road action into a single infrastructure corridor to reduce the indicative soil disturbance extent of the project (Option 1).

While each controlled action requires separate approval under the EPBC Act, DCCEEW has advised that overlapping impacts should be allocated to the core project in the first instance. As such, the impacts from the ETL action (and water pipeline action) will be allocated to the mine site and access road action and have therefore been included within section 6.6.

The ETL would remain operational for the life of the project and may be retained for use by future landowners. Should it be determined that the ETL is not to be retained onsite, it would be decommissioned, and the associated land rehabilitated in line with the proposed PMLU (low-intensity grazing).

6.5 Water pipeline (EPBC 2019/8459)

A raw (external supply) water pipeline would be constructed to supply approximately 3,000 to 4,000 mega-litres (ML) per year for construction and the initial establishment of operations for the project. The water pipeline would be approximately 13 km in length and would connect to the existing Eungella Water Pipeline Southern Extension network which runs generally north-south, approximately 5 km west of the project (Figure 6.6).

The water pipeline would be constructed during Stage 1 of the project, with construction expected to be completed within 12 months of commencement. The water pipeline would be located underground in some sections, with the alignment primarily traversing land used for agricultural purposes; however, some larger patches of remnant vegetation exist.

Alternative options were explored as a part of the EIS process (Figure 6.6). These options included connecting to the Eungella pipeline network to the south (Option 2) and sharing the pipeline alignment proposed by the future Olive Downs project to the north-west (Option 3). The proponent has elected to minimise the impacts of the project by consolidating the disturbance for the ETL action, water pipeline action, and the access road component of the mine site and access road action into a single infrastructure corridor to reduce the indicative soil disturbance extent of the project (Option 1).

In addition to the supply provided by the water pipeline, a significant proportion of mine site water requirements would be sourced from water collected on the site, including rainfall runoff from disturbed areas and groundwater inflows to the open cut pits. The proponent has indicated that rainfall runoff from disturbed areas and groundwater inflows would be stored in the mine-affected water storages for recycling and reuse as the preferential source of water for the project.

Until such time as the water pipeline is commissioned, water demands for construction would be met by:

- capture of incidental rainfall and runoff from disturbed areas within the project water management system as it is developed (i.e. stormwater and mine-affected water)
- a temporary pipeline from the existing Eungella pipeline network.

While each controlled action requires separate approval under the EPBC Act, DCCEEW has advised that overlapping impacts should be allocated to the core project in the first instance. As such, the impacts from the water pipeline action (and ETL action) will be allocated to the mine site and access road action and have therefore been included within section 6.6.

The water pipeline would remain operational for the life of the project and may be retained for use by future landowners. Should it be determined that the water pipeline is not to be retained onsite, it would be decommissioned, and the associated land rehabilitated in line with the proposed final land use (low-intensity grazing).

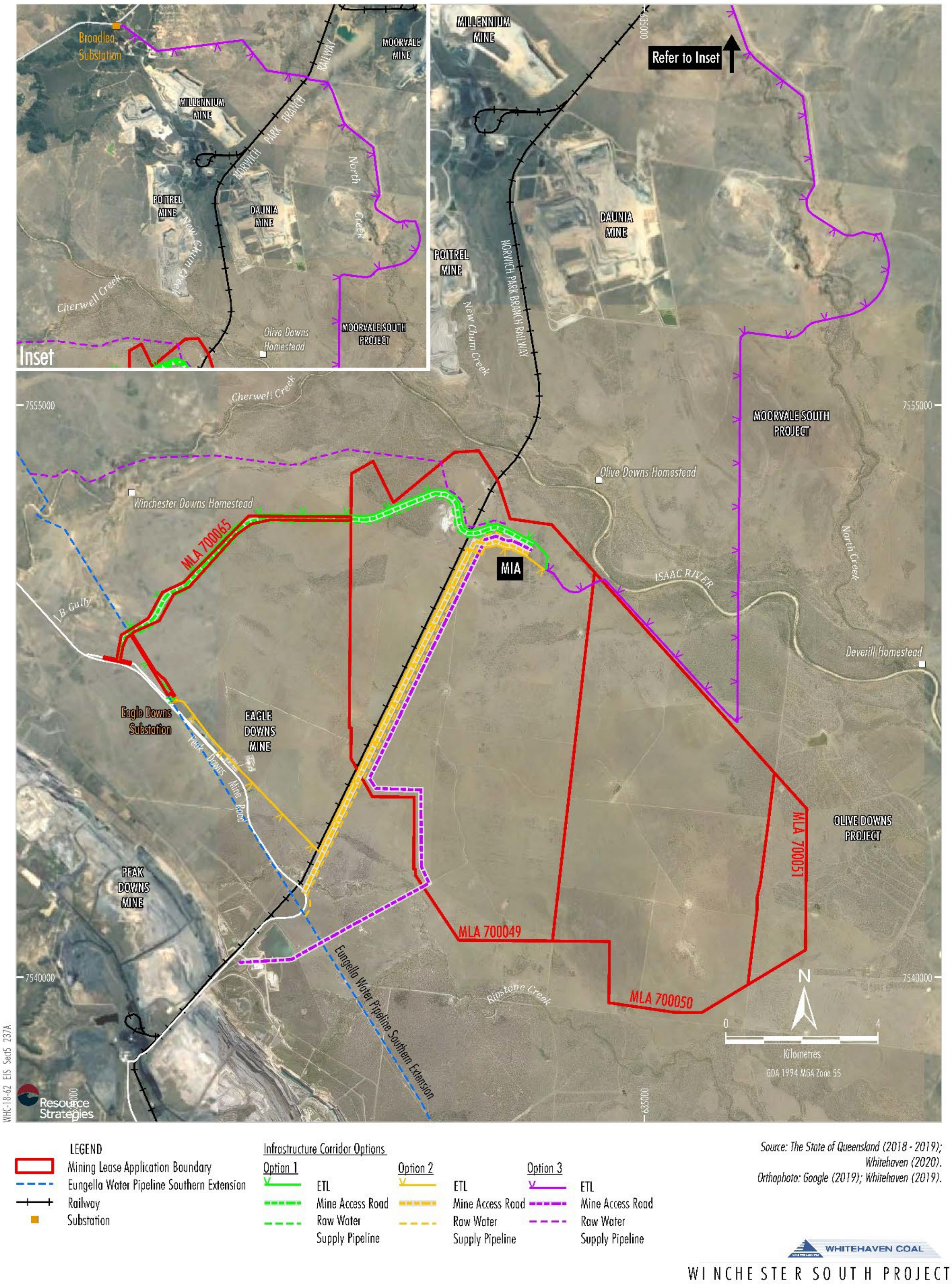


Figure 6.6 Project infrastructure alternatives

6.6 Mine site and access road (EPBC 2019/8460)

The referral includes works to be undertaken within the proposed mine site and the mine access road. As per the advice of DCCEEW, the impacts associated with the consolidated infrastructure corridor which contain the ETL action, the water pipeline action, and the access road component of the mine site and access road action, have been allocated to the core project in the first instance and will be assessed within this section of the report.

Construction for the project is expected to take a total of 3 years, with the major construction period forecast to take place in the first 36 months. Open cut mining would commence during construction activities in the second year and is expected to occur for approximately 28 years. A further 2 years have been allocated for the final landform shaping, yielding a total project lifespan of 31 years.

The open cut mining operations would be undertaken using conventional mining equipment including a combination of excavators and/or shovels and haul trucks, with a support fleet that includes dozers, graders, front end loaders, drill rigs and water trucks. Three main coal seams of the Rangal and Fort Cooper Coal Measures are to be targeted for the project: the Leichardt Seams; the Upper Vermont Seam; and the Vermont Middle Lower Seam. The EIS states that the seams will deliver a low-medium volatile coking coal product.

A total of approximately 396 Mt of ROM coal would be mined over the life of the project with a product coal yield of approximately 60%. Depending on variations in coal quality, detailed mine design, mine economics and market volume requirements, metallurgical coal would account for approximately 58% of coal products produced.

Mining operations would typically occur 24 hours per day, 7 days per week, with the following general mining sequence:

- progressive clearing of vegetation occurring in areas required for the mining operation in accordance with prescribed procedures
- stripping and stockpiling of soil from disturbed areas for storage and reuse in future rehabilitation of the mine landforms in accordance with prescribed procedures
- pre-stripping of weathered tertiary sediments (e.g. unconsolidated/friable overburden, including clays) using scrapers, excavators and trucks
- drilling and blasting (using commercial products, with the principal blasting agent being ammonium nitrate fuel oil only to be conducted during the daytime) for fragmentation of competent overburden and interburden as waste rock
- removal of waste rock and inter-seam partings to expose the underlying coal seams, and placement in out-of-pit waste rock emplacements, or as infill in the mine void behind advancing mining operations, using a combination of dozers, excavators and trucks
- mining of coal and haulage to the ROM coal handling facilities using a combination of dozers, excavators, loaders and trucks
- re-shaping of the waste rock emplacements, re-application of topsoil (or topsoil/subsoil) and revegetation of the final landform surfaces as described in the PRCP.

The MIA would be located on elevated ground to the northeast of the open cut extent at an appropriate distance from expected blasting operations. The MIA would include:

- ROM coal and product coal pads and stockpiles, ROM handling and dumping facilities, product coal stacking and reclaim facilities

- CHPP incorporating coal handling, reject handling, crushing, screening and washing infrastructure
- rail spur and loop and train load-out facilities
- administration, crib room, ablution and first aid facilities
- emergency management facilities
- light and heavy vehicle parking and delivery facilities
- bulk fuel, liquid petroleum gas, lubrication and other hazardous goods storage and handling facilities (including self-bunded storage units and bunded concrete fill-point slabs)
- stores, light vehicle and heavy vehicle workshop facilities
- tyre change and storage facilities
- communication facilities
- a laydown and waste management area
- vehicle wash facilities
- soil stockpiles
- light and heavy vehicle roads
- substation and electricity distribution infrastructure
- potable water treatment plant
- sewage treatment plant
- other associated minor ancillary infrastructure.

The project area is currently accessed via an existing private unsealed road that enters the site from the south-west. One of the initial construction activities would be the mine access road component of the consolidated infrastructure corridor. The mine access road would travel over the Eagle Downs Mine site and follow a north-east alignment to the MIA, crossing the railway via a new overpass (the existing level crossing would be utilised during the construction period).

Alternative options were explored as a part of the EIS process (Figure 6.6). These options included constructing the mine access road parallel to the existing railway line up to Peak Downs Mine Road (Option 2) and constructing the mine access road parallel to the existing railway line up to the MLA boundary, then following the boundary to the existing private unsealed access road before joining with Peak Downs Mine Road (Option 3). The proponent has elected to minimise the impacts of the project by consolidating the disturbance for the ETL action, water pipeline action, and the access road component of the mine site and access road action into a single infrastructure corridor to reduce the indicative soil disturbance extent of the project (Option 1).

The consolidation of the ETL and water pipeline with the mine access road was a key aspect of the proponent's project design. Consolidating these 3 components would result in a total disturbance of 135 ha for the infrastructure corridor and minimise potential environmental, social, and economic impacts of the project through the following constraints:

- minimise impacts to surrounding tenement holders, through the location of the corridors along tenement boundaries and geological features where practicable
- minimise surface development related impacts by co-locating the access road, water supply pipeline and ETL in a consolidated infrastructure corridor

- minimise the length of the infrastructure
- minimise potential interaction with mining operations
- minimise impact to existing stock routes
- avoid dwellings and existing/planned infrastructure.

The mine site and access road (including the infrastructure corridor) would result in a total disturbance area of approximately 6,950 ha, which includes potential habitat for a number of species and ecological communities listed under the EPBC Act and NC Act. The vegetation to be removed consists of approximately 569 ha of remnant vegetation, with the remaining 6,381 ha primarily improved/disturbed pasture dominated by non-native grasses and *Acacia harpophylla* regrowth shrublands. The project site has been subjected to historical clearing for agriculture, livestock impacts, pasture improvement, and weed encroachment.

6.6.1 Listed threatened species and communities

When considering approval of a proposal under subsections 18 or 18A of the EPBC Act, the Australian Minister for the Environment must not act inconsistently with Australia's obligations under the following:

- Convention on Biological Diversity
- Convention on Conservation of Nature in the South Pacific (Apia Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- a recovery plan or threat abatement plan (TAP).

The Australian Minister for the Environment must also, in deciding whether to approve the taking of the action, have regard to any approved conservation advice for the threatened species or ecological community that are likely to be or would be significantly impacted by the project.

This section assesses the project against the objectives and priority actions of conservation advice, recovery plans and TAPs for the relevant threatened species and communities. The residual significant impacts of the project on threatened fauna and TECs are also considered in this section.

For the EIS assessment, a search of the EPBC protected matters search tool (PMST) was utilised to provide an indication of the threatened species and communities which may occur within and surrounding the project. This was then ground-truthed during surveys undertaken for the EIS assessment. The adequacy of the surveys undertaken for each species was checked against relevant EPBC survey guidelines.

The TOR required the proponent to complete comprehensive field surveys to confirm the occurrence of MNES including threatened species and communities. I note that agencies with an interest in biodiversity (including DCCEEW) generally agreed that the survey effort undertaken by the proponent for listed threatened species was adequate.

6.6.1.1 Methodology of assessment – overview

6.6.1.1.1 Desktop assessment

A desktop assessment was undertaken to consolidate information from relevant databases, available mapping, aerial photography, and published literature to produce an initial characterisation of the ecological values of the project area and the surrounding landscape. This assessment included (but was not limited to):

- PMST database as issued by the former Australian Government Department of Agriculture, Water and the Environment (DAWE) (now the Australian Government Department of Agriculture, Fisheries and Forestry)
- Regulated Vegetation Management Map issued by the former Queensland Department of Natural Resources, Mines and Energy (DNRME) (Version 11.0)
- Queensland Remnant Regional Ecosystem mapping provided by DES (Version 11) and associated Regional Ecosystem Description Database (Version 11.1)
- DNRME Vegetation Management watercourse and drainage feature mapping (Version 4.0)
- Queensland Herbarium HERBRECS Specimen database
- DES Biodiversity Planning Assessment mapping
- Protected Plants Flora Survey Trigger Map
- latest available aerial photography
- a review of historical aerial photography from 1989 and 1990 to determine High Value Regrowth
- map of Queensland Wetland Environmental Values provided by DES
- DES Wetland Systems Mapping (Version 5.0)
- Groundwater Dependent Ecosystems Atlas provided by the Bureau of Meteorology
- existing Ecological Assessment Reports for the project and other adjacent projects.

Likelihood of occurrence assessment

A likelihood of occurrence assessment (LOA) evaluates the qualitative probability that a flora or fauna species can physically occupy the project area during all or part (e.g. breeding season, migration) of its life cycle. The assessment evaluates:

- species-specific ecological and physiological requirements
- previously recorded species observations
- the resources and constraints present in the project area informed by the desktop assessment
- the resources and constraints present in the project area informed by the field surveys.

The TOR listed a total of 18 threatened fauna and 3 threatened flora species that were to be examined for potential impacts from the project. The LOA added an additional 4 fauna and 2 flora species to the list of potentially impacted threatened species, with the results shown in Table 6.3.

Table 6.3 Threatened species likelihood of occurrence assessment

Known or likely to occur	Potential to occur or unlikely to occur
Flora	
N/A	• Black Ironbox (*Eucalyptus raveretiana*) • Bluegrass (*Dichanthium setosum*) • King Blue-grass (*Dichanthium queenslandicum*) • Marlborough blue (*Cycas ophiolitica*) • Quassia (*Samadera bidwillii*)
Bird	

Known or likely to occur	Potential to occur or unlikely to occur
• Australian Painted Snipe (*Rostratula australis*) • Squatter pigeon (southern) (*Geophaps scripta scripta*) • White-throated needletail (*Hirundapus caudacutus*)	• Curlew Sandpiper (*Calidris ferruginea*) • Painted Honeyeater (*Grantiella picta*) • Red Goshawk (*Erythrotriorchis radiatus*) • Southern black-throated finch (*Peophila cincta cincta*) • Star Finch (eastern) (*Neochmia ruficauda ruficauda*)
Fish	
N/A	• Murray cod (*Maccullochella peeli*) • Silver perch (*Bidyanus bidyanus*)
Mammals	
• Greater glider (southern and central) (*Petauroides volans*) • Koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*)	• Corbens long-eared bat (*Nyctophilus corbeni*) • Ghost bat (*Macroderma gigas*) • Northern hairy-nosed wombat (*Lasiorhinus krefftii*) • Northern quoll (*Dasyurus hallucatus*)
Reptile	
• Ornamental snake (*Denisonia maculata*)	• Allan's lerista (*Lerista allanae*) • Dunmall's snake (*Furina dunmalli*) • Fitzroy river turtle (*Rheodytes leukops*) • Southern snapping turtle (*Elseya albagula*) • Yakka skink (*Egernia rugosa*)

During the desktop assessment, the outcome of the LOA is used to guide the field design and planning phase. Threatened species that are known, likely or have the potential to occur in the project area were targeted during the field surveys (i.e. target species). Following the field surveys, the LOA is re-evaluated using the field data to modulate the target species list prior to further assessment.

6.6.1.1.2 Field assessment

Flora and fauna surveys were conducted over 2 wet season periods and 2 dry season periods to account for the seasonal variation in species presence, abundance and habitat utilisation (e.g. breeding, foraging).

Flora surveys

Flora surveys were conducted in accordance with the relevant Australian and State guidelines:

- Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland[81]
- Conservation Advice criteria for each TEC[82]
- Flora Survey Guidelines – Protected Plants (NC Act 1992)[83]

[81] Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Richter, D., Addicott, E.P. and Appelman, C.N. *Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland*. Version 6.0. Queensland Herbarium, Queensland Department of Environment and Science (2019)
[82] Australian Government, DAWE, *Species Profile and Threats (SPRAT) database*
[83] Queensland Department of Environment and Science, Flora Survey Guidelines – *Protected Plants* (NCS/2016/2534) (2020)

- Guide to Determining Terrestrial Habitat Quality[84]
- Random Meander Technique[85].

Flora survey sites were selected through the use of aerial imagery, regional ecosystem mapping, and geological information to stratify the project area. Sites were then selected which best represent the project area, with the following survey effort undertaken:

- 318 quaternary assessments
- 54 BioCondition assessments
- 6 tertiary assessments
- targeted searches (random meanders) for threatened species.

The random meander technique was used to survey for potential threatened flora throughout the project area and involved traversing potential habitat within the project area to search for flora species that may not have been located using more structured search methods. This technique is particularly suitable for locating species that typically occur at very low densities or that may be distributed in isolated clumps. Targeted surveys for threatened species using the random survey technique were undertaken for:

- species identified within the TOR, including king bluegrass (*Dichanthium queenslandicum*), quassia (*Samadera bidwillii*) and Marlborough blue (*Cycas ophiolitica*)
- species identified from the desktop assessment and literature review where potential habitat was identified within the project area.

Fauna surveys

Fauna surveys were conducted in accordance with the relevant Australian and State guidelines:

- Terrestrial Vertebrate Fauna Survey Guidelines for Queensland[86]
- Survey Guidelines for Australia's Threatened Mammals (Cth) [87]
- Survey Guidelines for Australia's Threatened Reptiles (Cth)[88]
- Survey Guidelines for Australia's Threatened Bats (Cth)[89]
- Survey Guidelines for Australia's Threatened Birds (Cth)[90]
- Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (Cth)[91]
- Species Profile and Threats Database (SPRAT) (Cth)[92]
- Species Approved Conservation Advice (Cth)[91]

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[84] Queensland Department of Environment and Science, *Guide to Determining Terrestrial Habitat Quality* (2020)
[85] Cropper SC, *Management of Endangered Plants*, CSIRO Publications (1993)
[86] Queensland Department of Environment and Science *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2018)
[87] Australian Government Department of Sustainability, Environment, Water, Populations and Communities, *Survey Guidelines for Australia's Threatened Mammals* (2011)
[88] Australian Government Department of Sustainability, Environment, Water, Populations and Communities, *Survey Guidelines for Australia's Threatened Reptiles* (2011)
[89] Australian Government Department of the Environment, Water, Heritage and the Arts, *Survey Guidelines for Australia's Threatened Bats* (2010)
[90] Australian Government Department of the Environment, Water, Heritage and the Arts, *Survey Guidelines for Australia's Threatened Birds* (2010)
[91] Australian Government Department of Sustainability, Environment, Water, Populations and Communities, *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (2011)
[92] Australian Government, Species Profile and Threats (SPRAT) database

- Species National Recovery Plans (Cth)[91].

Targeted species survey guidelines from the following sources:

- EPBC Act Referral Guidelines for the Vulnerable Koala[93]
- Koala (*Phascolarctos cinereus*) – Spot Assessment Technique (SAT)[94]
- Targeted Species Survey Guidelines for Yakka Skink (*Egernia rugosa*)[95]
- Targeted Species Survey Guidelines for Painted Honeyeater (*Grantiella picta*)[96]
- Targeted Species Survey Guidelines for Ghost Bat (*Macroderma gigas*)[97].

Species identified through the LOA were targeted during field surveys. A suite of methods was used to conduct the fauna surveys in the field including:

- establishing systematic trap sites for catch and release of fauna
- nocturnal spotlighting and call playback surveys
- auditory and visual bird surveys conducted early morning and evening
- Anabat detectors to detect and record the echolocation calls emitted by bats
- diurnal active searches
- fauna habitat surveys.

In response to submissions on the EIS, the proponent also undertook the following additional targeted survey methods:

- baited hair tubes
- harp trapping.

Survey sites were short-listed through the use of aerial imagery, regional ecosystem mapping, and geological information to stratify the project site. Sites which best represent the existing environment were then selected and surveyed in accordance with the relevant State and Australian survey guidelines.

Fauna surveys conducted within the project area aimed to meet the prescribed survey effort guidelines for each species listed in the TOR; however, in some cases, achieving the recommended survey effort in the guidelines was not necessary or was impractical, particularly where effort was measured by survey hours per potential habitat area. While the recommended survey effort in the guidelines was not achieved for some species, I consider the amount of survey effort undertaken to be sufficient as survey effort was supplemented by habitat assessments and in some instances, the target species was confirmed to be present.

Threatened ecological community surveys

In conjunction with the Tertiary and Quaternary assessments, additional TEC assessments were undertaken in the field within relevant vegetation communities to verify if key diagnostic characteristics

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[93] Department of the Environment, *EPBC Act Referral Guidelines for the Vulnerable Koala* (2014)
[94] Phillips & Callaghan 2011. The Spot Assessment Technique: *A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus,* Australian Zoologist volume 35 (2011)
[95] Ferguson, D. and Mathieson, M. 2014. Yakka skink, Egernia rugosa. Targeted species survey guidelines. Queensland Herbarium, Department of Environment and Science (2014)
[96] Rowland, J. 2012. *Painted honeyeater, Grantiella picta. Targeted species survey guidelines*. Queensland Herbarium, Department of Environment and Science (2012)
[97] Hourigan, C. 2011. Ghost bat, Macroderma gigas. *Targeted species survey guidelines*. Queensland Herbarium, Department of Environment and Science (2011).

and condition thresholds for TECs were met. Specific condition criteria and characteristics used for the assessment are based on respective information provided within each approved listing advice published for each TEC identified within the desktop assessment. A total of 98 TEC assessments were conducted, including:

- 4 Poplar Box TEC assessments
- 51 Natural Grasslands TEC assessments
- 3 Brigalow TEC assessments.

6.6.1.2 Threatened flora

I note that although the assessment identified that potential habitat for some of the threatened flora species is present within the mine site and access road (and the infrastructure corridor) and would be removed for the project, none of the listed threatened flora species were identified onsite during surveys. The lack of records onsite for many of the species identified in the Protected Matters Search Tool (PMST), combined with the survey effort undertaken by the proponent, indicate that the mine site and access road (and the infrastructure corridor) do not support populations of the majority of the threatened flora species identified.

The EIS details the results of survey efforts undertaken for King bluegrass (*Dichanthium queenslandicum*), which was previously recorded as present within the project site. I note that targeted surveys were conducted over the same area where the species was previously identified and suspected specimens were collected from the same locations where the species was previously recorded. These specimens were submitted to the Queensland Herbarium for formal identification and were confirmed to be *Sehima nervosum*, a common native grass species. The EIS concludes that previously identified King bluegrass were likely to have been misidentified and I accept this finding.

Given the prevalence of development within the region, the biodiversity values present within the region are well known and I am satisfied with the proponent's conclusions drawn in the EIS regarding the likelihood of presence for the threatened species identified in the PMST. I am also satisfied with the conclusions in the EIS that residual significant impacts for those species are unlikely to occur. Accordingly, potential impact to threatened flora are not discussed further as part of my assessment.

6.6.1.3 Threatened fauna

I note that many of the identified threatened species listed in Table 6.3 may occur onsite, however I am satisfied with the conclusions in the EIS that residual significant impacts are unlikely for those species that were not identified onsite during surveys. The lack of historical species records on site for many species identified in the PMST combined with the survey effort undertaken by the proponent indicate that the mine site and access road is unlikely to support populations of most of the threatened species identified as potentially occurring.

The surveys undertaken were in accordance with the relevant EPBC survey guidelines. I note that agencies with an interest in biodiversity (including DCCEEW) generally agreed that the survey effort undertaken by the proponent for threatened species was adequate. I also note that in response to submissions regarding the adequacy of the survey effort, the proponent conducted additional targeted surveys using baited hair tubes and harp trapping for the northern quoll and Corben's long-eared bat respectively.

As detailed in Table 6.3, the EIS concluded that 6 threatened fauna species are known or are likely to occur on the project site: the ornamental snake (*Denisonia maculate*); the squatter pigeon (southern) (*Geophaps scripta scripta*); the koala (combined populations of Qld, NSW and the ACT) (*Phascolarctos cinereus*); the greater glider (southern and central) (*Petauroides volans*); the Australian painted snipe

(*Rostratula australis*); and the white-throated needletail (*Hirundapus caudacutus*). Accordingly, my assessment of impacts to EPBC Act listed threatened species focuses on these species.

6.6.1.3.1 Ornamental snake

Background

The ornamental snake is a habitat specialist closely associated with gilgai on deep, cracking clay soils that support prey species of amphibians when inundated. As the water ebbs and the gilgai dries, deep cracks within the clay soil provide refuge habitat for the ornamental snake during the day and throughout prolonged dry periods. Gilgai are associated with brigalow (*Acacia harpophylla*), gidgee (*A. cambagei*), blackwood (*A. argyrodendron*) and/or coolabah (*Eucalyptus coolabah*) dominant vegetation communities.

Within the project area, ornamental snake habitat generally comprises remnant and regrowth brigalow, coolabah, and pastureland dominated vegetation communities that contain gilgai or ephemeral drainages. Specifically, the EIS found that sections of the project area including 3 REs associated with the ornamental snake (REs 11.3.3, 11.4.8, and 11.4.9) contained suitable microhabitat features and occur primarily across a large portion of the southeast section of the indicative surface disturbance extent of the project, with several smaller areas identified in the north-west and central zones of the project site.

Thirteen ornamental snakes were recorded during field surveys conducted for the EIS at multiple locations throughout the project area, primarily within brigalow regrowth that contains well developed gilgai. The microhabitat features where ornamental snakes were detected are characterised by:

- gilgai of varying depth (shallow to deep) with cracking clay soils (cracks depth varied between shallow and deep)
- coarse woody debris and/or ground litter
- regrowth brigalow (dominant)
- weeds, most frequently parthenium
- presence of native amphibians
- contiguous habitat patches.

Recovery plans, conservation advice and threat abatement

There is no specific recovery plan for the ornamental snake, however the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles*[98] are relevant.

There is approved conservation advice for this species: *Approved Conservation Advice for Denisonia maculata (Ornamental Snake)*[99].

Key threats to the species listed in the approved conservation advice relevant to the project include:

- land clearing
- habitat degradation by livestock (e.g. cattle grazing of gilgai habitat during wet season)
- destruction of wetland habitat by feral pigs

[98] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles*, Canberra, 2011.
[99] Australian Government, Department of the Environment, *Approved Conservation Advice for Denisonia maculata (Ornamental Snake)*, Canberra, 2014.

- competition for food sources (frogs)
- potential poisoning from cane toad ingestion
- invasive weeds
- alterations to landscape hydrology affecting gilgai habitat.

Relevant priority recovery and threat abatement actions listed in the approved conservation advice and draft referral guidelines include:

- identify populations of high conservation priority
- minimise adverse impacts from land use at known sites
- control introduced pests such as feral pigs
- develop and implement a cane toad management plan
- avoid habitat clearance
- exclude cattle from suitable habitat (particularly gilgai during wet seasons)
- design and implement monitoring programs
- maximise the establishment of appropriate reserves to protect habitat and landscape connectivity over the long term.

The ornamental snake is listed as a species that may be adversely affected by pest animal species in the following TAPs:

- *Threat Abatement Plan for the biological effects, including lethal toxic ingestion, caused by cane toads*[100]
- *Threat Abatement Plan for predation by Feral Cats*[101]
- *Threat Abatement Plan for predation by the European Red Fox*[102]
- *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs*[103].

Impacts and mitigation

Direct clearance of habitat

The EIS estimates that the mine site and access road (including the infrastructure corridor) would remove approximately 1,834.2 ha of habitat for the ornamental snake. The *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* states that clearance of 2 ha or more of 'important habitat' for the ornamental snake is considered to have a high risk of significant impact. 'Important habitat' for the ornamental snake is considered to be:

- habitat where the species has been identified during a survey
- near the limit of the species' known range

[100] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads,* Canberra, 2011.
[101] Australian Government, Department of the Environment, *Threat abatement plan for predation by feral cats*, Canberra, 2015.
[102] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for predation by the European red fox*, Canberra, 2008.
[103] Australian Government, Department of the Environment and Energy, *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa*, Canberra, 2017.

- large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations)
- a habitat type where the species is identified during a survey, but which was previously thought not to support the species.

As the species was identified onsite during surveys, the habitat provided within the mine site and access road (including the infrastructure corridor) is considered to be 'important habitat'.

Avoidance, mitigation, and management measures

The EIS states that the mine site and access road (including the infrastructure corridor) has been positioned to minimise disturbance to MNES, including through the consolidation of the ETL, water pipeline, and mine access road into a single infrastructure corridor.

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the following mitigation measures relevant to habitat clearing for the ornamental snake:

- boundaries of areas to be cleared and those not to be cleared would be defined during construction and operation
- land clearing would be carried out progressively over the life of the project to allow mobile fauna species the opportunity to disperse away from clearing areas
- pre-clearance fauna surveys would be undertaken by suitably experience and qualified persons to identify individual fauna at direct risk from clearing activities
- a suitably experienced and qualified fauna spotter/catcher would be present during the clearing of habitat areas
- management of fauna identified during clearing and pre-clearance surveys would include relocating individuals to adjacent habitat or treating injuries
- select habitat features (e.g. hollow-bearing trees, woody debris, logs and rocks) would be salvaged for re-use in rehabilitation of the project
- directional clearing towards retained vegetation would be undertaken where practical to enable the movement of fauna into retained vegetation
- during construction works, work areas and excavations (trenches) would be checked for fauna that may have become trapped
- if trenches remain open after daily site works have been completed, fauna ramps would be put in place.

Furthermore, the proponent has committed to the preparation and implementation of:

- an environmental management plan (EMP) that details the management, mitigation and monitoring of relevant impacts of the proposed actions, including vegetation clearing measures, weed management and monitoring, and animal pest management
- an MNES management plan including species-specific avoidance, mitigation, and monitoring strategies with evidence of how the measures consider relevant approved conservation advice and are consistent with relevant recovery plans and threat abatement plans.

Surface water quantity (hydrological impacts on gilgai)

During operations, the project's mine water management system would capture runoff from areas that previously flowed to receiving waters, acting to capture overland flows that potentially contributed to the recharge of wetlands and gilgai areas within and downstream of the mine site and access road footprint.

The project would result in a reduction in the total catchment area draining to Ripstone Creek by less than 5%, while the catchment draining to the Isaac River would reduce by less than 1% of the total catchment area. The EIS did not directly assess the potential impacts of the project on stream flows and water quantity in the unnamed waterways on site, but there will be significant excision of waterways and catchments on site as a result of direct disturbance and clean water diversions. The majority of these catchment excisions are within areas to be cleared or outside areas mapped as providing potential ornamental snake habitat, therefore are unlikely to have a significant impact within the mining lease. However, the significant (up to 70%) excision of the central unnamed waterway will reduce hydrological flows in the Wynette offset area which includes ornamental snake habitat.

Avoidance, mitigation, and management measures

The proponent has committed to clean water diversions that will direct surface water flows around the disturbance areas and into the lower reaches of the existing waterways exiting the lease area. Constructing the clean water diversions in this manner will reduce, but not prevent, impacts to receiving ecosystems by reducing the potential loss of surface flows from the excised waterways. I have stated a condition for the EA requiring that the proposed water management infrastructure is installed and operated in accordance with a water management plan, which provides for effective water management of actual and potential environmental impacts resulting from water management associated with the mining activities. I have also stated a condition that clean water diversions must discharge to downstream waterways and must not be harvested for use on site.

I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. As part of implementing this plan, the proponent would undertake further investigations and monitoring of wetlands including habitat for the ornamental snake. This would allow the early detection and management of any potential adverse impacts to the ecological values of the wetlands attributable the project.

The GDEWMP will detail:

- the current condition of the GDE or wetland and its ecological values
- the location of the GDE or wetland, environmental quality indicators
- analysis methodologies and impact thresholds and triggers
- corrective actions and timing to address impacts, if detected
- sampling and analysis reporting.

Surface water quality (hydrological impacts on gilgai)

The EIS anticipates that implementation of the mine water management system, application of mitigation measures such as erosion and sediment controls and controlled release limits would result in no measurable impact on surface water quality and therefore no adverse impacts to surrounding habitats.

Avoidance, mitigation, and management measures

The proponent has committed to preparing an ESCP and monitoring controlled release points, as well as standard management controls for the storage of fuels and chemicals.

To protect environmental values in the receiving environment, I have stated conditions for the EA authorising controlled releases with tiered flow criteria for the Isaac River and the central and northern unnamed waterways which will ensure that controlled releases can only occur when there are appropriate flows in all receiving waters. I have stated a condition that requires the proponent to install a gauging station and surface water monitoring point on each of the northern and central unnamed waterways upstream of the release points to determine flows and monitor water quality in the unnamed waterways. The proponent will need to ensure that the configuration of the project water management system, particularly clean water drain outfalls, will allow for sufficient flows in unnamed waterways for controlled releases to occur.

I have stated a condition for the EA requiring that the proposed water management infrastructure is installed and operated in accordance with a water management plan, which provides for effective water management of actual and potential environmental impacts resulting from water management associated with the mining activities. These measures would reduce the potential for adverse water quality impacts on the receiving environment and potential ornamental snake habitat.

Furthermore, I have stated a condition for the EA requiring the proponent to prepare a REMP which would include measures to monitor the condition of and impacts to receiving waters. This would allow the early detection and management of any potential adverse impacts on environmental values (including habitats which support the ornamental snake) due to changes in surface water quantity or quality.

Invasive pests – pest plants

Introduced pest plant species disrupt ecosystems by outcompeting and replacing native species, resulting in altered ecosystem diversity and function. Weed seeds can be transported in contaminated fill, the mud on machinery, or in the machinery itself. As the spread of weed species is facilitated by disturbance, construction activities have the potential for disturbing or introducing weeds, resulting in the establishment of weeds within and outside the project area.

Five weed species listed as WoNS and/or restricted matters under the *Queensland Biosecurity Act 2014* were recorded within the project area. These species include:

- *Cryptostegia grandiflora*
- *Harrisia martinii*
- *Opuntia stricta*
- *Opuntia tomentosa*
- *Parthenium hysterophorus*.

Avoidance, mitigation, and management measures

The proponent has committed to the preparation and implementation of a weed management plan within the EMP, which will include the following management measures to mitigate the impact of pest plant species on the project site and minimise the potential for pest plant species to spread to adjacent areas:

- bi-annual surveying of tracks, revegetation (rehabilitation) areas and soil stockpiles, etc. (or more frequently as required), to identify weeds requiring control
- washdown of machinery and vehicles when moving to/from weed infested areas
- mechanical removal of identified weeds and/or the application of approved herbicides
- weed control methods in accordance with those specified by DAF and the *Isaac Regional Biosecurity Plan 2020-2023*.

The weed management plan will be developed in consultation with the Isaac Regional Council and DAF with reference to local, regional, state, and national biosecurity management plans.

Invasive pests – pest animals

The presence and abundance of feral animals adversely impacts native fauna through increased competition of resources, predation, and habitat degradation. Eight pest fauna species were observed during field assessments within the project area:

- cane toad (*Rhinella marina*)
- common myna (*Acridotheres tristis*)
- cat (*Felis catus*)
- European hare (*Lepus europaeus*)
- European rabbit (*Oryctolagus cuniculus*)
- house mouse (*Mus musculus*)
- pig (*Sus scrofa*)
- wild dog (*Canis lupus*).

While the European red fox (*Vulpes vulpes*) was not identified during field surveys, the EIS considers the species likely to occur within the project area. Foxes, feral cats, and feral pigs are known threats to the ornamental snake. The cane toad is also a known threat, as it poses a risk to the ornamental snake through toxic ingestion and mortality.

Avoidance, mitigation, and management measures

The proponent has committed to the preparation and implementation of a feral animal management plan within the EMP, which will include the following management measures to mitigate the impact of pest animal species on the project site and adjacent areas:

- maintaining a clean, rubbish-free environment to deter feral animals
- engaging appropriately qualified persons to undertake biannual pest animal monitoring in the project mining lease areas, which may include coordination with adjoining mining operations/adjacent landowners
- feral animal control strategies (e.g. baiting and trapping) within the project mining lease areas in accordance with relevant standards and the *Isaac Regional Biosecurity Plan 2020-2023*
- monitoring of feral animals will be undertaken by an appropriately qualified contractor to identify whether new or additional control measures are required.

Edge effects

The EIS indicates that due to the highly fragmented landscape from historical land clearing practices for agriculture, edge effects are likely to have already manifested in the remaining vegetated areas and as such, the project is unlikely to increase the potential of edge effects in these areas.

Increased fire risk

Accidental ignitions in the project area may be caused by machinery, an accident or collision, scheduled burns getting out of control, hot works, spontaneous combustion of coal, or from the incorrect disposal of flammable items. These ignitions have the potential to cause uncontrollable fires that can have pronounced impacts on vegetation and habitat within and adjacent to the project area, including areas of ornamental snake habitat.

Avoidance, mitigation, and management measures

The proponent is proposing to implement fire prevention measures during the operation of the project to reduce the likelihood and impact of bushfires, which would include the following:

- construction and maintenance of fire breaks
- provision and maintenance of firefighting equipment around the project
- provision of firefighting equipment training for staff
- managing vegetation within the project mining leases to maintain safe fuel loads
- handling and disposing any chemicals used in the project area in accordance with the relevant Safety Data Sheet
- implementing access tracks, to be used by Queensland Fire and Rescue Service for emergency purposes
- implementing an Emergency Response Procedure prepared in consultation with emergency services.

Noise, vibration, and artificial lighting

The project is anticipated to operate throughout the day and night, which will result in artificial light, noise, and vibration that can disrupt local fauna roosting, breeding, and foraging activities. The increased light from artificial sources may result in changed behaviours to avoid lit areas, disturbance to activity levels, and poses risks to fauna as it allows predators to locate prey more easily. The noise and vibrations from mining activities can also make it harder for prey species to detect approaching predators.

Avoidance, mitigation, and management measures

The EIS predicted that any potential impact associated with the additional lighting required for the project to protected fauna would be minor, provided that lights are operated in accordance with relevant Australian Standards and in a way that focuses on work areas and minimises or avoids the lighting of remnant vegetation. The EIS also predicts that fauna within the local area may exhibit initial fright behaviour and either adapt to disturbance levels or temporarily move to similar habitats in the adjacent landscape.

I have stated a condition for inclusion in the EA which provides limits for noise generated by the mining activities and requirements for monitoring to ensure noise generation complies with the Queensland Environmental Protection (Noise) Policy 2008. These requirements would be expected to assist in reducing potential noise impacts on fauna, including the ornamental snake.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 1,894.2 ha of 'important habitat' for the ornamental snake would result in a residual significant impact that would require an offset under the EPBC Act. A summary of the amount of ornamental snake habitat to be cleared for the project and the amount of habitat available in the proposed Stage 1 offset area is provided in Table 6.4.

The EIS estimates that there is approximately 70.76 ha of suitable ornamental snake habitat within the proposed Stage 1 offset area. DCCEEW has advised that the offset assessment guide calculation provided within the EIS has incorrectly estimated the "risk of loss" to ornamental snake habitat within the proposed offset area. DCCEEW has advised that the proposed offset area will not meet the minimum

90% direct offset requirement required in accordance with the EPBC Act Environmental Offsets Policy and I agree with this conclusion.

Table 6.4 Habitat clearance totals for the ornamental snake

Total Stage 1 clearance (ha)	Total Stage 2 clearance (ha)	Total Stage 3 clearance (ha)	Total project clearance (ha)	Habitat available within the proposed Stage 1 offset area (ha)
50	1,523.1	261.1	1,834.2	70.76

I have recommended the following conditions to the Australian Minister for the Environment:

- an updated offset management strategy must be provided that includes an offset assessment guide calculation for the ornamental snake that uses the standard annual risk of loss for the Isaac Regional Council area
- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the ornamental snake. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes species-specific measures for the ornamental snake. The plan must align with the EPBC Act requirements, *Draft Referral guidelines for the Nationally Listed Brigalow Belt Reptiles*, approved conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of wetland vegetation which also provides potential habitat for the ornamental snake. If monitoring indicates that the condition of this vegetation (including ornamental snake habitat) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide further offsets.

I note that the EIS indicated that controlled grazing may be undertaken on the proposed Stage 1 offset areas. The *Draft Referral guidelines for the Nationally Listed Brigalow Belt Reptiles* highlights cattle grazing activities resulting in degradation of microhabitat features within 'important habitat' patches as having a high risk of significant impact. As the conservation advice for the ornamental snake identified overgrazing and trampling of habitat by cattle as a key threat to the species, I have recommended a condition to the Australian Minister for the Environment requiring that the proponent must prepare a sustainable livestock grazing plan prior to commencement of grazing on the proposed Stage 1 offset areas. The plan would encourage natural regeneration of vegetation and prevent further degradation of the habitat onsite, as well reduce the risk of injury to individual snakes from trampling by cattle. The plan must include provisions to ensure that suitable ornamental snake habitat is excluded from grazing areas.

Coordinator-General's conclusion: ornamental snake

I am satisfied that the EIS has considered the potential impacts that the project could have on the ornamental snake.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact to the ornamental snake. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the ornamental snake is delivered. I have also recommended a number of other conditions to address the project's impacts on the ornamental snake.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the *Draft Referral Guidelines for the Nationally*

Listed Brigalow Belt Reptiles and the approved conservation advice for this species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the ornamental snake are acceptable.

6.6.1.3.2 Squatter pigeon (southern)

Background

Squatter pigeon foraging and breeding habitat consists of remnant or regrowth open-forest to sparse, open-woodland or low-woodland dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species on well-draining, sandy, or loamy soils on low, gently sloping, flat to undulating plains and foothills with lateritic (duplex) soils on low 'jump-ups' and escarpments. It is distinguished by ground-layer vegetation that consists of patchy, native, perennial tussock grasses, or a mix of perennial tussock grasses and low shrubs or forbs and does not cover more than 33% of the ground. Foraging habitat is within 3 km of a suitable, permanent, or seasonal waterbody, while breeding habitat is located within one kilometre of a suitable, permanent, or seasonal waterbody. Within the project area, permanent water sources are limited to farm dams and water troughs.

Dispersal habitat for the squatter pigeon is any forest or woodland occurring between patches of foraging or breeding habitat which facilitates movement between patches of foraging habitat, breeding habitat, and/or waterbodies. Dispersal habitat includes vegetation where the groundcover layer has been thinned through current land use practices in a way that suits the species (e.g. light cattle grazing). The species will disperse into highly modified or degraded habitats, including cleared areas which are within 100 metre of remnant trees or patches of habitat.

The EIS mapped squatter pigeon foraging habitat consistent with the above habitat description, while breeding habitat was mapped within one kilometre of permanent water. Dispersal habitat for the squatter pigeon was then mapped as any vegetation community (remnant, non-remnant, or regrowth) located between 2 patches of foraging and/or breeding habitat, including exotic grassland pasture less than 100 metre wide.

Squatter pigeons were recorded over multiple survey events for the EIS from a single area within the vicinity of a farm dam located along the western boundary. All recorded sightings, including those from previous studies, occur outside of the indicative surface disturbance of the project, however many are within close proximity (less than 3 km).

Recovery plans, conservation advice and threat abatement

There is no recovery plan for the squatter pigeon (southern).

There is a conservation advice for this species: *Conservation Advice for Geophaps scripta (Squatter Pigeon (southern))*[104]. The Species Profile and Threats (SPRAT) database indicates that the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats.

Key threats to this species identified in the conservation advice relevant to the project include:

- vegetation clearance and fragmentation
- overgrazing of habitat by livestock and feral herbivores such as rabbits
- introduction of weeds

[104] Australian Government, Department of the Environment, *Conservation Advice Geophaps scripta scripta squatter pigeon (southern)*, Canberra, 2015.

- inappropriate fire regimes
- thickening of understorey vegetation
- predation by feral cats and foxes
- trampling of nests by domestic stock.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- identify sub-populations of high conservation priority
- protect and rehabilitate areas of vegetation that support important sub-populations
- develop and implement stock management plans for key sites
- develop and implement management plans for the control and eradication of feral herbivores in squatter pigeon habitat.

The following TAPs are relevant to the species:

- *Threat abatement plan for predation by feral cats*[105]
- *Threat abatement plan for competition and land degradation by rabbits*[106]
- *Threat abatement plan for predation by the European red fox*[107].

Impacts and mitigation

Direct clearance of habitat

The EIS estimates that the mine site and access road (including the infrastructure corridor) would result in the clearance of approximately 115.5 ha of breeding and foraging habitat and 612.8 ha of dispersal habitat for the squatter pigeon.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the ornamental snake, which would also be beneficial for the squatter pigeon. Furthermore, as detailed for the ornamental snake, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan which would include species-specific measures that address the project's impacts on the squatter pigeon.

Invasive pests – pest plants and animals

Introduced pest plant species contribute to squatter pigeon habitat degradation by competing with grass species which provide food for the squatter pigeon and reduce vegetative cover. The mechanisms of potential weed seed transportation detailed for the ornamental snake are also applicable to the squatter pigeon.

The pest animals listed for the ornamental snake are also relevant to the squatter pigeon, particularly feral cats, foxes, and rabbits. Feral cats and foxes are listed within the conservation advice for the squatter pigeon as key predators, while rabbits pose a threat through competition for food resources and through contributing to the degradation of habitat for the squatter pigeon.

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[105] Australian Government, Department of the Environment, *Threat abatement plan for predation by feral cats*, Canberra, 2015.
[106] Australian Government, Department of the Environment and Energy, *Threat abatement plan for competition and land degradation by rabbits*, Canberra, 2016.
[107] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for predation by the European red fox*, Canberra, 2008.

Avoidance, mitigation, and management measures

As detailed for the ornamental snake, the proponent has committed to the preparation and implementation of a weed management plan and a feral animal management plan within the EMP, which will include management measures that will also benefit the squatter pigeon.

Noise, vibration, artificial lighting, edge effects, and increased fire risk

The squatter pigeon would be susceptible to additional indirect impacts from noise, vibration, artificial lighting, edge effects, and increased fire risk. As the potential impacts would be similar for all species, further discussion is provided in the assessment of impacts on the ornamental snake.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 115.5 ha of breeding and foraging habitat for the squatter pigeon would result in a residual significant impact that would require an offset under the EPBC Act. A summary of the amount of squatter pigeon breeding and foraging habitat to be cleared for the project and the amount of habitat available in the proposed Stage 1 offset area is provided in Table 6.5.

Table 6.5 Habitat clearance totals for the squatter pigeon (breeding and foraging only)

Total Stage 1 clearance (ha)	Total Stage 2 clearance (ha)	Total Stage 3 clearance (ha)	Total project clearance (ha)	Habitat available within the proposed Stage 1 offset area (ha)
53.8	61.7	0	115.5	236.23

The EIS estimates that there is approximately 236.23 ha of suitable squatter pigeon breeding and foraging habitat within the proposed Stage 1 offset area. This would provide a 100% land-based offset for the Stage 1 residual significant impact to the squatter pigeon breeding and foraging habitat and exceeds the minimum 90% direct offset requirement required in accordance with the EPBC Act Environmental Offsets Policy.

I note that the EIS determined that there would not be a residual significant impact on the squatter pigeon for the loss of dispersal habitat. I do not agree with this conclusion. The *Matters of National Environmental Significance: Significant impact guidelines*[108] defines habitat critical to the survival of a species as including areas that are necessary for activities such as foraging, breeding, roosting, or dispersal. As such, I consider that the clearance of 612.8 ha of dispersal habitat for the squatter pigeon would result in a residual significant impact that would require an offset under the EPBC Act and DCCEEW agrees with this conclusion.

While the EIS does not detail the Stage 1 clearance for squatter pigeon dispersal habitat, it has indicated that there is a combined total of 1,576.08 ha of suitable squatter pigeon dispersal habitat within the proposed Stage 1 offset areas. I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include the squatter pigeon dispersal habitat and confirm that the maximum clearance for Stage 1 impacts to the squatter pigeon dispersal habitat can be suitably offset within the proposed Stage 1 offset areas.

I have also recommended the following conditions to the Australian Minister for the Environment:

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[108] Australian Government, Department of the Environment, *Matters of National Environmental Significance: Significant impact guidelines 1.1*, Canberra, 2013.

- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the squatter pigeon. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes species-specific measures for the squatter pigeon. The plan must align with the EPBC Act requirements, conservation advice, and any relevant TAPs.

Coordinator-General's conclusion: squatter pigeon

I am satisfied that the EIS has generally considered the potential impacts that the project could have on the squatter pigeon. However, I am not satisfied that the proponent has excluded the impacts on the squatter pigeon dispersal habitat when determining the residual significant impacts on the species. To address this, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include the squatter pigeon dispersal habitat and confirm that the maximum clearance for Stage 1 impacts to the squatter pigeon dispersal habitat can be suitably offset within the proposed Stage 1 offset areas.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact on the squatter pigeon. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the squatter pigeon is delivered. I have also recommended a number of other conditions to address the project's impacts on the squatter pigeon.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the conservation advice for this species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the squatter pigeon are acceptable.

6.6.1.3.3 Koala (combined populations of Queensland, NSW, and the ACT)

Background

The SPRAT database broadly defines koala habitat as any forest, woodland or shrubland containing koala food trees. Koala food trees are primarily Eucalyptus species supplemented by certain species in the genera of *Corymbia*, *Angophora* and *Lophostemon*. In addition to the presence of food trees, the SPRAT profile for koalas references the value of shelter (non-food) trees for koala thermoregulation as well as the importance of habitat connectivity.

The EIS found that 9 REs within the surveyed area are characterised by eucalyptus species and have potential to support koala habitat (REs 11.3.2, 11.3.25, 11.3.3c, 11.3.4, 11.4.8, 11.5.3, 11.5.9 and 11.9.2). Evaluating the suitability of potential koala habitat (remnant and regrowth vegetation) considered the following during in-situ habitat assessment surveys:

- direct observation or indirect evidence (e.g. scat, tree markings) of koala occurrence
- the abundance and maturity of koala food trees
- extent of canopy cover (limit exposure and facilitate koala movement)
- connectivity amongst koala habitat within fragmented landscapes
- the presence of threats (e.g. predation and vehicles).

The koala habitat present is comprised of remnant and regrowth eucalypt woodland with food trees occurring in several patches within the surveyed area on the borders of the project area. While no koalas were recorded on the project site during survey efforts, evidence of koalas (scats and scratches) was recorded at 2 locations both associated with large intact areas of eucalypt dominated communities adjoining riparian areas.

Recovery plans, conservation advice and threat abatement

There are no TAPs identified as being relevant to the species and, during the preparation of the EIS, there was no recovery plan for the koala. However, the *National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)*[109] has been in effect under the EPBC Act from 8 April 2022.

There is a conservation advice for the species: *Conservation Advice for Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)*[110]. The conservation advice was updated after the EIS process and has been in effect under the EPBC Act from 12 February 2022 to reflect the change in listing of the species to endangered status.

Key threats to this species identified in the recovery plan and conservation advice relevant to the project include:

- loss of climatically suitable habitat
- increased intensity and frequency of drought, heatwaves, and bushfires
- clearing, degradation, and fragmentation of habitat due to land use changes
- mortality due to disease, vehicle strikes, and dog attacks.

Relevant priority recovery and threat abatement actions listed in the recovery plan and conservation advice include:

- in order to halt the decline and promote recovery, the following should be avoided:
  - clearing of koala habitat used for feeding, resting, and during extreme events (heatwaves, drought/fire refuge)
  - reducing connectivity between patches of koala habitat by either clearing vegetation or erecting physical barriers
  - activities that will expose koalas to additional threats (e.g. vehicle strikes, dog attacks) in locations where koalas must use the ground to move between resting and feeding trees
- four supporting strategies and 2 on-ground (direct) strategies:
  - *Supporting strategies*
    - Strategy 1: Build and share knowledge
      - the actions here comprise knowledge-based inputs or activities that support direct conservation actions
    - Strategy 2: Strong community engagement and partnerships
      - actions include engaging citizens in koala conservation science, supporting and training professionals and koala carers in the community
    - Strategy 3: Increase habitat protection

[109] Australian Government, Department of Agriculture, Water and the Environment, *National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Canberra, 2022.
[110] Australian Government, Department of Agriculture, Water and the Environment, *Conservation Advice for Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Canberra, 2022.

        - while direct habitat protection forms some actions, this strategy primarily consists of developing incentives for such protection and thus this strategy has been included as a supporting strategy
    - Strategy 4: Koala conservation is integrated into policy and statutory and land-use plans
        - actions are needed to ensure harmonisation of existing and future planning and policy settings such that they collectively contribute appropriately to maximising the chances of long-term survival of koalas in the wild. Direct clearance of habitat
- *On-ground strategies*
    - Strategy 5: Strategic habitat restoration
        - these activities are to ensure that resources are targeted to the most strategic areas
    - Strategy 6: Active metapopulation management
        - metapopulation management concerns the movement of individuals and genes between populations. Management of fire, forest harvesting, and human activities and developments all influence koala metapopulations processes and must be managed to mitigate adverse impacts.

Impacts and mitigation

Direct clearance of habitat

Habitat loss resulting from land clearance is recognised as the primary adverse effect on habitat critical to the survival of the koala. The *Matters of National Environmental Significance: Significant impact guidelines*[111] consider that an action that is likely to have a real chance or possibility of adversely affecting habitat critical to the survival of a species is likely to have a significant impact. Further, the loss of 20 ha or more of high-quality habitat critical to the survival of the koala (habitat quality score of 8 or more) is considered highly likely to have a significant impact for the purposes of the EPBC Act.

The proponent assessed the potential habitat located within the project footprint in accordance with the *EPBC Act Referral Guidelines for the Vulnerable Koala*[112], which found that the habitat within the project site scored between 6 and 10. The EIS estimates that the mine site and access road (including the infrastructure corridor) would result in the clearance of approximately 168.9 ha of habitat for the koala, however, I note that several areas of vegetation that would be cleared and were identified as containing either remnant or regrowth eucalypt woodland with koala food trees were not included in this total. Further discussion is provided on these excluded areas in the below examination of residual significant impacts and offsets.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the ornamental snake, which would also be beneficial for the koala, as well as the following species-specific mitigation measure:

- if a koala is found, it would be left to move away from the clearance area on its own accord, if safe to do so.

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[111] Australian Government, Department of the Environment, *Matters of National Environmental Significance: Significant impact guidelines 1.1*, Canberra, 2013.
[112] Australian Government, Department of the Environment, *EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Canberra, 2014.

Furthermore, as detailed for the ornamental snake, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan which would include species-specific measures that address the project's impacts on the koala.

Vehicle strike

The conservation advice lists vehicle strikes as a threatening process to koalas. This is particularly relevant for the project, as the mine access road (and the infrastructure corridor) will dissect koala habitat. Koalas are known to be susceptible to vehicle strike when crossing road corridors located between areas of habitat. Koalas that remain within any suitable habitat left within the mine site and access road would be at risk of increased risk of vehicle strike, where any infrastructure constructed for the project passes through those areas.

Avoidance, mitigation, and management measures

The proponent has committed to implementing an EMP that will contain management measures to reduce impacts to fauna species due to vehicular strike, such as:

- designating speed limits for the project area (maximum speed of 60 km per hour on all internal access roads, which is consistent with the recommendations in the *EPBC Act referral guidelines for the vulnerable koala)*
- developing a process for the removal of roadkill to minimise the risk of attracting fauna to the roadway
- developing a process for the management of fauna injured by vehicle strike.

Spread of disease

Koalas are threatened primarily by diseases such as chlamydia and koala retrovirus. I consider that given the prevalence of both diseases in koala populations in Queensland, it is likely that the diseases already occur in the koala populations found on and around the mine site and access road (and infrastructure corridor). As such, any koalas identified during pre-clearance surveys that are subsequently translocated could act to spread disease.

Avoidance, mitigation, and management measures

As stated above, the proponent has committed to the preparation and implementation of an MNES management plan for the species to be impacted by the project. It is expected that koala management measures in the MNES management plan include provisions to address the spread of diseases relevant to the koala. Several of the mitigation measures committed to by the proponent are known to minimise stress to the species, which is linked with an increase in the expression of chlamydia in koalas. These measures include sequential clearing of vegetation, site speed limits, use of experienced spotter-catchers during clearing, and the requirement to allow koalas to self-disperse.

Increased risk of dog attack

Mortality in koalas due to dog attack is identified as one of the key threats to the species. Wild dogs were identified within the project area during surveys; however, no evidence of mortality was observed. The EIS considers that the project would not result in increased levels of threat of dog attack for the koala.

Avoidance, mitigation, and management measures

As detailed for the ornamental snake, the proponent has committed to the preparation and implementation of a feral animal management plan within the EMP, which will include management measures that will also benefit the koala such as the monitoring and control of wild dogs.

Groundwater drawdown impacts to riparian vegetation/ habitat

The *EPBC Act Referral Guidelines for the Vulnerable Koala* identifies that impacts likely to substantially interfere with the recovery of the koala may include changing hydrology which degrades habitat for the koala to the extent that the carrying capacity of the habitat is reduced. Groundwater drawdown could indirectly affect the koala and other arboreal species through reducing the ecological viability of habitat.

The EIS predicted that groundwater drawdown resulting from the project would be negligible, and that riparian vegetation which would provide koala habitat in proximity to the site are likely to be facultative GDEs that are dependent on groundwater during dry times only. The EIS considers that the riparian vegetation would not constantly rely on groundwater for survival, relying more on the replenishment of moisture in the soil following rainfall, rather than direct access to the groundwater system. The EIS concludes that riparian vegetation which would provide koala habitat in proximity to the site is unlikely to be impacted by groundwater drawdown as a result of the project; however, it could be potentially vulnerable to changes in surface water availability.

Avoidance, mitigation, and management measures

As detailed for the ornamental snake, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. As part of implementing this plan, the proponent would undertake further investigations and monitoring of GDEs including habitat for the koala. This would allow the early detection and management of any potential adverse impacts to the ecological values of riparian habitats attributable the project.

Noise, vibration, artificial lighting, edge effects, and increased fire risk

The koala would be susceptible to additional indirect impacts from noise, vibration, artificial lighting, edge effects, and increased fire risk. Nocturnal animals, including the koala, would be more susceptible to disturbance from artificial lighting and are also prone to noise and vibration disturbance due to their sensitivity to noise. Additionally, the *EPBC Act Referral Guidelines for the Vulnerable Koala* identify that a new action (such as a new mine development next to or within koala habitat) that increases the risk of high intensity fire in koala habitat may have a significant impact.

As the potential impacts would be similar for all species, further discussion is provided in the assessment of impacts to the ornamental snake.

Residual significant impacts and offsets

I note that the EIS concluded that the clearance of several areas of vegetation containing either remnant or regrowth eucalypt woodland with food trees would not incur a residual significant impact to the koala as the food trees are within a fragmented landscape without suitable connectivity or movement corridors.

I do not agree with this conclusion, as the *EPBC Act Referral Guidelines for the Vulnerable Koala* defines koala habitat as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees which includes remnant and non-remnant vegetation. Furthermore, the *Matters of National Environmental Significance: Significant Impact Guidelines* defines habitat critical to the survival of a species as including areas of habitat that are used during periods of stress, such as flood, drought, or fire, with the recovery plan and conservation advice also citing the loss of climatically suitable habitat as a key threat to the species.

As noted in section 6.2.4, the remnant vegetation found within and adjacent to the project site may have disproportional significance due to the clearing and fragmentation of the surrounding landscape, particularly with respect to arboreal fauna species. Mapping provided in the EIS shows that each area that was determined to be of minimal value occurs within riparian zones, with one area appearing to be located less than 500 metres from several sightings of koalas that were recorded during field surveys for the EIS.

I therefore consider that these areas meet the definition of koala habitat within the guidelines and that the clearing of these areas would result in a residual significant impact that would require an offset under the EPBC Act. The DCCEEW agrees with this conclusion, and I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include this habitat in residual significant impact calculations for the koala.

Based on the information provided in the EIS, I consider that the clearance of the 168.9 ha of habitat for the koala identified in the EIS (which excludes the above-mentioned remnant and regrowth areas) would also result in a residual significant impact that would require an offset under the EPBC Act.

The EIS estimates that there is approximately 1,719.48 ha of suitable koala habitat within the proposed Stage 1 offset area. I have recommended a condition to the Australian Minister for the Environment requiring the proponent to provide an updated offset management strategy that incorporates the excluded remnant and regrowth vegetation that contains koala food trees and to confirm that the maximum clearance for Stage 1 impacts to the koala can be suitably offset within the proposed Stage 1 offset areas.

I have also recommended the following conditions to the Australian Minister for the Environment:

- updated maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the koala. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes species-specific measures for the koala, including measures to address the risk of vehicle strike such as designating speed limits on all internal access roads. The plan must align with the EPBC Act requirements, recovery plan, conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of riparian vegetation which also provides potential habitat for the koala. If monitoring indicates that the condition of this vegetation (including koala habitat) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide offsets.

Coordinator-General's conclusion: koala

I am satisfied that the EIS has generally considered the potential impacts that the project could have on the koala. However, I am not satisfied that the proponent has excluded several areas of vegetation containing either remnant or regrowth eucalypt woodland with food trees when determining the residual significant impacts to the species on the basis that the vegetation areas are within a fragmented landscape without suitable connectivity or movement corridors. To address this, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include these areas and confirm that the maximum clearance for Stage 1 impacts to the koala can be suitably offset within the proposed Stage 1 offset areas.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact on the koala. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the koala is delivered. I have also recommended a number of other conditions to address the project's impacts on the koala.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the recovery plan and conservation advice for this species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the koala are acceptable.

6.6.1.3.4 Greater glider (southern and central)

Background

Greater glider habitat is largely restricted to eucalypt forests and woodlands. The species' diet comprises mostly eucalypt leaves and sometimes eucalypt flowers. During the day, greater gliders shelter in large tree hollows and a strong correlation exists between the number of large hollows abundance and the number of greater gliders. The greater glider also favours a diverse range of eucalypt species within their local range because of variability in food preference across seasons. There is no definition to distinguish breeding, foraging and dispersal habitats within the SPRAT database or approved conservation advice, however their breeding and foraging habitat is likely the same or similar due to their dependence on eucalypt species and large hollows for both processes.

Unlike the koala, greater gliders are not known to disperse across land that does not contain suitable food and shelter tree. This means they require connectivity of appropriate woodlands between patches of habitat and are sensitive to habitat fragmentation. As such, dispersal habitat is roughly the same as breeding and foraging habitat for the greater glider, with the extent of suitable habitat within the project area limited to contiguous eucalypt dominated communities with a high abundance of large-hollow-bearing trees.

The EIS found that sections of 5 different REs within the surveyed area were consistent with suitable greater glider habitat (REs 11.3.2, 11.3.25, 11.3.3c, 11.3.4, and 11.3.5). The remnant vegetation in these locations had low fragmentation and high abundances of hollow-bearing trees.

The species was recorded during survey efforts, however, each recorded sighting was outside of the indicative surface disturbance extent of the project. Additionally, the species had been recorded in previous studies in multiple locations within 3 km of the project site. The known records were primarily located within vegetation in close proximity to the Isaac River and its tributaries.

Recovery plans, conservation advice and threat abatement

There is no recovery plan for the greater glider (southern and central).

There is a conservation advice for the species: *Conservation Advice for Petauroides volans (greater glider (southern and central))*[113]. The conservation advice was updated after the EIS process and has been in effect under the EPBC Act from 5 July 2022 to reflect the change in listing of the species to an endangered status.

Key threats to this species identified in the conservation advice relevant to the project include:

- inappropriate fire regimes
- habitat clearing and fragmentation
- increased temperatures and changes to rainfall patterns (climate change)
- predation by introduced pests.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- protect, maintain, and restore areas of suitable habitat and habitat connectivity

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[113] Australian Government, Department of Climate Change, Energy, the Environment and Water, *Conservation Advice for Petauroides volans (greater glider (southern and central))*, Canberra, 2022.

- implement measures to reduce mortality and loss of hollow bearing trees
- reduce severity and impacts of fires through reassessing prescribed burning regimes
- protect habitat likely to be climate change refuges
- implement appropriate control measures and longer-term strategies to control predation by introduced pests
- replace top strands of barbed wire fences with plain wire to avoid entanglement.

The following TAPs are relevant to the species:

- *Threat abatement plan for predation by feral cats*[114]
- *Threat abatement plan for predation by the European red fox*[115].

Impacts and mitigation

Direct clearance of habitat

The EIS estimates that the mine site and access road (including the infrastructure corridor) would result in the clearance of approximately 132.8 ha of habitat for the greater glider. This area of clearance overlaps with the area of koala habitat being cleared by the project for the mine site, as both species occupy similar habitat. Koala habitat being cleared for the access road (and the infrastructure corridor) was not found to contain hollow-bearing trees and is therefore not considered to be suitable greater glider habitat.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the ornamental snake, which would also be beneficial for the greater glider. Furthermore, as detailed for the ornamental snake, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan which would include species-specific measures that address the project's impacts on the greater glider.

The EIS describes within the proponent's offset management strategy that a greater glider nest box programme will be adopted within the offset areas to compensate for the loss of hollow bearing trees. A total of 60 nest boxes designed specifically for the greater glider are to be installed with video/audio data collection capability for monitoring purposes. Barbed wire fencing management will also be undertaken within and surrounding the offset areas. Existing fencing would be modified so that the top strand is plain wire to reduce the risk of entanglement for the greater glider.

Groundwater drawdown impacts to riparian vegetation/ habitat

The greater glider would be susceptible to potential groundwater drawdown impacts to riparian vegetation/ habitat. As the potential impacts would be similar for both species, further discussion is provided in the assessment of impacts to the koala.

Noise, vibration, artificial lighting, edge effects, and increased fire risk

Being a nocturnal species, the greater glider would be susceptible to additional indirect impacts from noise, vibration, artificial lighting, edge effects, and increased fire risk. As the potential impacts would be

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[114] Australian Government, Department of the Environment, *Threat abatement plan for predation by feral cats*, Canberra, 2015.
[115] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for predation by the European red fox*, Canberra, 2008.

similar for all species, further discussion is provided in the assessment of impacts to the ornamental snake.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 132.8 ha of habitat for the greater glider would result in a residual significant impact that would require an offset under the EPBC Act. A summary of the amount of greater glider habitat to be cleared for the project and the amount of habitat available in the proposed Stage 1 offset area is provided in Table 6.6.

Table 6.6 Habitat clearance totals for the greater glider

Total Stage 1 clearance (ha)	Total Stage 2 clearance (ha)	Total Stage 3 clearance (ha)	Total project clearance (ha)	Habitat available within the proposed Stage 1 offset area (ha)
42.1	90.7	0	132.8	316.69

The EIS estimates that there is approximately 316.69 ha of suitable greater glider habitat within the proposed Stage 1 offset area. This would provide a 100% land-based offset for the Stage 1 residual significant impact to the greater glider habitat and exceeds the minimum 90% direct offset requirement required in accordance with the EPBC Act Environmental Offsets Policy.

I have recommended the following conditions to the Australian Minister for the Environment:

- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the greater glider. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes species-specific measures for the greater glider, including measures to address existing barbed wire fencing within and surrounding any offset areas and the installation of nest boxes with suitable video/audio monitoring. The plan must align with the EPBC Act requirements, conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of riparian vegetation which also provides potential habitat for the greater glider. If monitoring indicates that the condition of this vegetation (including greater glider habitat) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide offsets.

I note that a 4 year case study undertaken by Lindenmayer et al. (2017)[116] found that within a studied offset area, squirrel gliders (*Petaurua norfolcensis*) were using between zero and 2.1% of the accessible nest boxes during the survey period. The study found that the low levels of use of the nest boxes by target species suggested the offset program would not have counterbalanced the loss of hollow bearing trees.

Accordingly, I have recommended a condition to the Australian Minister for the Environment that if monitoring of the offset area indicates that greater gliders are not utilising the nest boxes, the proponent is required to provide details of additional measures that would be implemented to improve the availability of habitat for the greater glider within the proposed offset area/s.

[116] Lindenmayer et al. 2017, *The anatomy of a failed offset, Biological Conservation*, Volume 210, Part A, 2017, pp.286-292,

Coordinator-General's conclusion: greater glider

I am satisfied that the EIS has considered the potential impacts that the project could have on the greater glider.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact to the greater glider. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the greater glider is delivered. I have also recommended a number of other conditions to address the project's impacts on the greater glider.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the conservation advice for this species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the greater glider are acceptable.

6.6.1.3.5 Australian painted snipe

Background

The Australian painted snipe generally forages in a variety of shallow wetlands, however breeding habitat requires specific microhabitat features. Breeding habitat includes shallow wetlands with areas of bare wet mud with canopy cover nearby. Nests are almost always recorded on or near small islands in freshwater wetlands, which provide a combination of water, exposed mud, dense low cover, and sometimes dense canopy cover.

The EIS found that 9.2 ha of potential breeding and foraging habitat occurs directly adjacent to the east of the project site within 500 metres of the indicative surface disturbance extent of the project. A further 1,859.3 ha of potential intermittent foraging habitat also occurs within the project site. The intermittent foraging area is available after significant rainfall events and is associated with gilgai soils and a small wetland.

While the Australian painted snipe was not detected during the field surveys, the species has been previously recorded within the project area. The observation was made within a brigalow lined waterway in the central portion of the project site (RE 11.3.1), which is consistent with the mapped intermittent foraging habitat. Additionally, the species has been recorded along wetland and riparian habitat during ecological surveys for adjacent projects.

Recovery plans, conservation advice and threat abatement

During the preparation of the EIS, there was no recovery plan for the Australian painted snipe. However, the *National Recovery Plan for the Australian Painted Snipe (Rostratula australis)*[117] has been in effect under the EPBC Act from 8 March 2023.

There is an approved conservation advice for this species: *Approved Conservation Advice for Rostratula australis (Australian painted snipe)*[118].

Key threats to this species identified in the recovery plan and approved conservation advice relevant to the project include:

- loss and degradation of wetlands (including impacts of grazing on wetland habitats)
- predation by feral animals (e.g. nest predation by foxes and feral cats)

[117] Australian Government, Department of Climate Change, Energy, the Environment and Water, *National Recovery Plan for the Australian Painted Snipe (Rostratula australis),* Canberra, 2022.
[118] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Approved Conservation Advice for Rostratula australis (Australian painted snipe)*, Canberra, 2013.

- replacement of native wetland vegetation by invasive weeds
- hydrological changes to habitat from fresh water diversions.

Relevant priority recovery and threat abatement actions listed in the recovery plan and approved conservation advice include:

- protect areas of habitat critical for survival (in particular, breeding sites)
- manage threats at known habitat sites (e.g. stock management, predation of nesting sites)
- develop and implement management plans for invasive weeds
- manage any changes to hydrology and disruptions to water flows
- develop and implement a suitable fire management strategy.

The following TAPs are relevant to the species:

- *Threat abatement plan for predation by feral cats*[119]
- *Threat abatement plan for predation by the European red fox*[120].

Impacts and mitigation

Direct clearance of habitat

The EIS indicates that the habitat within the mine site and access road area (and infrastructure corridor) is not critical habitat for the species, and that there are no areas of 'important habitat' or important populations within the mine site and access road area.

The EIS estimates that the mine site and access road (and infrastructure corridor) would result in the removal of approximately 1,859.3 ha of potential Australian painted snipe foraging habitat associated with gilgai soils and a small wetland. It is considered that the species may use the wetted gilgai areas and wetland for occasional foraging following rainfall. The EIS concludes that the species would only use these areas for short periods after rainfall and the removal of this habitat is unlikely to have a significant impact as it is widely available within the greater area.

I do not agree with this conclusion. The *Matters of National Environmental Significance: Significant impact guidelines*[121] defines habitat critical to the survival of a species as including areas that are necessary for activities such as foraging, breeding, roosting, or dispersal. As such, I consider that the clearance of 1,859.3 ha of potential Australian painted snipe foraging habitat would result in a residual significant impact that would require an offset under the EPBC Act.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the ornamental snake, which would also be beneficial for the Australian painted snipe, as well as the following species-specific mitigation measures:

- remove cattle and avoid clearing 2 palustrine wetlands to the north of the project
- establish 50 metres buffers on 2 of the wetlands.

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[119] Australian Government, Department of the Environment, *Threat abatement plan for predation by feral cats*, Canberra, 2015.
[120] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for predation by the European red fox*, Canberra, 2008.
[121] Australian Government, Department of the Environment, *Matters of National Environmental Significance: Significant impact guidelines 1.1*, Canberra, 2013.

Furthermore, as detailed for the ornamental snake, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan. I have recommended a condition to the Australian Minister for the Environment which would ensure the proponent includes species-specific measures that address the project's impacts on the Australian painted snipe within the EMP and MNES management plan.

Surface water quantity and quality (hydrological impacts on gilgai)

The Australian painted snipe would be susceptible to hydrological impacts on gilgai from changes to surface water quantity and quality. As the potential impacts would be similar for both species, further discussion is provided in the assessment of impacts to the ornamental snake.

Invasive pests – pest plants and animals

Introduced pest plant species contribute to Australian painted snipe habitat degradation by competing with native species and degrading wetland habitat. The mechanisms of potential weed seed transportation detailed for the ornamental snake are also applicable for the Australian painted snipe.

The pest animals listed for the ornamental snake are also relevant to the Australian painted snipe, particularly feral cats and foxes. Feral cats and foxes are listed within the recovery plan and approved conservation advice for the Australian painted snipe as key predators.

Avoidance, mitigation, and management measures

As detailed for the ornamental snake, the proponent has committed to the preparation and implementation of a weed management plan and a feral animal management plan within the EMP, which will include management measures that will also benefit the Australian painted snipe.

Noise, vibration, artificial lighting, edge effects, and increased fire risk

The Australian painted snipe would be susceptible to additional indirect impacts from noise, vibration, artificial lighting, edge effects, and increased fire risk. As the potential impacts would be similar for all species, further discussion is provided in the assessment of impacts to the ornamental snake.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 1,859.3 ha of foraging habitat for the Australian painted snipe would result in a residual significant impact that would require an offset under the EPBC Act and DCCEEW agrees with this conclusion. I note that the proponent has not provided a summary of the amount of Australian painted snipe habitat to be cleared for the project or the amount of habitat available in the proposed Stage 1 offset area. However, I note that areas of foraging habitat for the Australian painted snipe are also gilgai habitat that provide habitat for the ornamental snake, and that the offsets proposed for the ornamental snake would compensate some of this impact.

While the EIS does not detail the Stage 1 clearance for the Australian painted snipe foraging habitat, it has indicated that there is a combined total of 70.76 ha of suitable ornamental snake habitat within the proposed Stage 1 offset areas that may also be suitable to provide offsets for the Australian painted snipe. I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include the Australian painted snipe foraging habitat and confirm that the maximum clearance for Stage 1 impacts to the Australian painted snipe can be suitably offset within the proposed Stage 1 offset areas.

I have also recommended the following conditions to the Australian Minister for the Environment:

- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the Australian painted snipe. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage

- an MNES management plan must be prepared that includes species-specific measures for the Australian painted snipe. The plan must align with the EPBC Act requirements, recovery plan, approved conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of wetland vegetation which also provides potential habitat for the Australian painted snipe. If monitoring indicates that the condition of this vegetation (including Australian painted snipe habitat) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide offsets.

I note that the EIS indicated that controlled grazing may be undertaken on the proposed Stage 1 offset areas. As the approved conservation advice for the Australian painted snipe identifies the control and eradication of feral herbivores (including grazing stock) in areas inhabited by the Australian painted snipe as a management priority, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a sustainable livestock grazing plan prior to commencement of grazing on the proposed Stage 1 offset areas. The plan would encourage natural regeneration of vegetation and prevent further degradation of the habitat onsite, as well reduce the risk of injury to individual birds from trampling by cattle. The plan must include provisions to ensure that suitable Australian painted snipe habitat is excluded from grazing areas.

Coordinator-General's conclusion: Australian painted snipe

I am satisfied that the EIS has generally considered the potential impacts that the project could have on the Australian painted snipe. However, I am not satisfied that the proponent has excluded the impacts to the Australian painted snipe foraging habitat when determining the residual significant impacts to the species. To address this, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to include the Australian painted snipe foraging habitat and confirm that the maximum clearance for Stage 1 impacts to the Australian painted snipe can be suitably offset within the proposed Stage 1 offset areas.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact to the Australian painted snipe. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the Australian painted snipe is delivered. I have also recommended a number of other conditions to address the project's impacts on the Australian painted snipe.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the recovery plan and approved conservation advice for this species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the Australian painted snipe are acceptable.

6.6.1.3.6 White-throated needletail

Background

The white-throated needletail is widespread across eastern and south-eastern Australia, occurring in all coastal regions of Queensland including inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. The species does not breed in Australia and is restricted to foraging during their non-breeding season.

In Australia, the white-throated needletail is primarily aerial and forages from heights of one metre up to 1000 metres above the ground. The SPRAT database indicates that because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, however certain preferences are exhibited by the species. While they do occur over most habitat types, they are predominately recorded above wooded areas, including open forest and rainforest.

The white-throated needletail was not detected during the field assessments, however the species has been previously recorded within 50 km of the project area. It is therefore considered likely to occur within the project area.

Recovery plans, conservation advice and threat abatement

There is no recovery plan or TAPs relevant to white-throated needletail.

There is conservation advice for this species: *Conservation Advice Hirundapus caudacutus (White-throated Needletail)*[122].

Key threats to this species identified in the recovery plan and conservation advice relevant to the project include:

- loss of roosting sites
- loss of forest and woodland habitat reducing invertebrate prey species.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- important habitats are identified and protected
- support initiatives to improve habitat management at key sites.

Impacts and mitigation

Direct clearance of habitat

The EIS concludes that because the white-throated needletail is almost exclusively aerial within Australia, no habitat for the species would be cleared as a result of the project and I accept this finding.

Noise, vibration, artificial lighting, edge effects, and increased fire risk

The white-throated needletail may be susceptible to indirect impacts from noise, vibration, artificial lighting, edge effects, and increased fire risk. As the potential impacts would be similar for all species, further discussion is provided in the assessment of impacts to the ornamental snake.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that there would be no clearance of habitat for the white-throated needletail and that the project would be unlikely to result in a residual significant impact to the species that would require an offset under the EPBC Act.

Coordinator-General's conclusion: white-throated needletail

I am satisfied that the EIS has considered the potential impacts that the project could have on the white-throated needletail.

The mine site and access road (including the infrastructure corridor) would be unlikely to result in a residual significant impact to the white-throated needletail.

[122] Australian Government, Department of the Environment and Energy, *Conservation Advice Hirundapus caudacutus White-throated Needletail*, Canberra, 2019.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the conservation advice for this species has been considered and the impacts on the white-throated needletail are acceptable.

6.6.1.4 Threatened ecological communities

An ecological community is a naturally occurring group of plants, animals and other organisms that are interacting in a unique habitat. Its structure, composition and distribution are determined by environmental factors such as soil type, position in the landscape, altitude, climate, and water availability. An ecological community becomes threatened when it is at risk of extinction.

A search of the PMST identified 3 TECs listed as endangered under the EPBC Act with the potential to occur within and surrounding the project area:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin
- Poplar Box Grassy Woodland on Alluvial Plains.

An additional TEC listed as endangered under the EPBC Act was also identified in the TOR as having the potential to occur within and surrounding the project area:

- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.

The proponent applied the condition thresholds outlined in the relevant Australian listing advice for each vegetation community identified onsite to determine whether they met TEC status. The details of the comprehensive desktop and field assessments undertaken by the proponent, including targeted TEC surveys, are discussed in section 6.6.1.

The EIS determined that the following TECs occur within and surrounding the project site:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin
- Poplar Box Grassy Woodland on Alluvial Plains.

The EIS found that the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions TEC was not present within the project site and I accept that finding. Accordingly, potential impacts to the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions TEC are not discussed further as part of my assessment.

6.6.1.4.1 Brigalow (*Acacia harpophylla* dominant and co-dominant)

Background

The Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC is characterised by the presence of *Acacia harpophylla* as one of the most abundant tree species. *A. harpophylla* is either dominant in the tree layer or co-dominant with other species (notably *Casuarina cristata* (belah), other species of *Acacia*, or species of *Eucalyptus*). Occasionally, these other species may be more common than *A. harpophylla* within the broad matrix of brigalow woodlands vegetation. The Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC has a considerable range of vegetation structure and composition united by a suite of species that tend to occur on acidic and salty clay soils. However, not all vegetation in which *A. harpophylla* is dominant or co-dominant is part of the listed ecological community.

Several patches of brigalow were recorded during the field surveys. The surveyed patches that met the condition thresholds for Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC were represented by the regional ecosystesms RE 11.4.8 and RE 11.9.5. The majority of brigalow surveyed did not meet the condition thresholds for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC due to areas containing:

- regrowth (<15 years old)
- a cover of exotic perennial species greater than or equal to 50%.

Recovery plans, conservation advice and threat abatement

There is no recovery plan for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

There is an approved conservation advice for the TEC: *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community*[123]. The SPRAT database indicates that the approved conservation advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed Endangered ecological community.

Key threats to this TEC identified in the approved conservation advice relevant to the project include:

- clearing
- fire
- weeds and pest animals
- inappropriate grazing regimes
- climate change.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- protect and conserve remnant and regrowth areas
- undertake targeted weed and feral animal control programs with a focus on feral pigs and high biomass exotic grasses
- implement appropriate fire regimes
- establish buffer zones to protect remnant TECs
- facilitate conservation agreements
- offset unavoidable impacts in areas which emulate the qualities of affected patches
- encourage landholders to balance primary production with conservation goals.

The following TAP is relevant to the TEC:

- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*[124].

Lethal toxic ingestion of cane toads by native fauna species that inhabit the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC is identified as a key matter for management.

[123] Australian Government, Department of the Environment, *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community*, Canberra, 2013.
[124] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*, Canberra, 2011.

Direct removal of habitat

A total of approximately 28.9 ha of Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC was identified within the surveyed area. A single patch adjacent to the project site was identified as potentially being impacted, however following deliberate mine design, this patch has been avoided.

Avoidance, mitigation, and management measures

The EIS states that the mine site and access road (including the infrastructure corridor) has been positioned to minimise disturbance to MNES, including through the consolidation of the ETL, water pipeline, and mine access road into a single infrastructure corridor.

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the following mitigation measures relevant to habitat clearing for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC:

- boundaries of areas to be cleared and those not to be cleared would be defined during construction and operation
- directional clearing towards retained vegetation would be undertaken where practical to enable the movement of fauna into retained vegetation.

Furthermore, the proponent has committed to the preparation and implementation of:

- an EMP that details the management, mitigation and monitoring of relevant impacts of the proposed actions, including vegetation clearing measures, weed management and monitoring, and animal pest management
- an MNES management plan including ecological community-specific avoidance, mitigation, and monitoring strategies with evidence of how the measures consider relevant approved conservation advice and are consistent with relevant recovery plans and threat abatement plans.

Increased fire risk

According to the 2016 CSIRO *Priority Threat Management for Imperilled Species of the Queensland Brigalow Belt*[125], the most cost-effective strategies for improving the overall persistence of imperilled species in the region is the management of fire regimes and invasive plants. The approved conservation advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC states that the low density of herbage in most types of brigalow vegetation suggests that fire has been historically rare in the TEC. Fire poses a serious threat to remnant brigalow where the vegetation composition has been changed by the high presence of biomass provided by invasive pest plants. The conservation advice recommends fire-exclusion as the most appropriate fire regime for the TEC.

Accidental ignitions in the project area may be caused by machinery, an accident or collision, scheduled burns getting out of control, hot works, spontaneous combustion of coal, or from the incorrect disposal of flammable items. These ignitions have the potential to cause uncontrollable fires that can have pronounced impacts on vegetation and habitat within and adjacent to the project area, including areas of Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

Avoidance, mitigation, and management measures

[125] Ponce Reyes, R, Firn, J, Nicol, S, Chadès, I, Stratford, DS, Martin, TG, Whitten, S, Carwardine, J, *Priority Threat Management for Imperilled Species of the Queensland Brigalow Belt*, Brisbane, 2016.

The proponent is proposing to implement fire prevention measures during the operation of the project to reduce the likelihood and impact of bushfires, which would include the following:

- construction and maintenance of fire breaks
- provision and maintenance of firefighting equipment around the project
- provision of firefighting equipment training for staff
- managing vegetation within the project mining leases to maintain safe fuel loads
- handling and disposing any chemicals used in the project area in accordance with the relevant Safety Data Sheet
- implementing access tracks, to be used by Queensland Fire and Emergency Services for emergency purposes
- implementing an Emergency Response Procedure prepared in consultation with emergency services.

Invasive pests – pest plants and animals

The approved conservation advice states that pest plants can alter the structure and function of brigalow ecosystems and affect their suitability as habitat for native species. As described above, introduced grasses pose the greatest threat by drawing fires into the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC and increasing fire severity. Fragmented remnants, patchy regrowth, and patches in low rainfall areas are particularly vulnerable.

The approved conservation advice also states that feral pigs, which were identified during field surveys, are probably the most widespread and problematic pest animal in the ecological community. Feral pigs can cause substantial degradation by destroying young plants and disturbing soil. Additionally, cane toads are described as having a negative impact to native fauna populations, including frogs, goannas, snakes, and mammalian carnivores such as quolls.

Avoidance, mitigation, and management measures

The proponent has committed to the preparation and implementation of a weed management plan and a feral animal management plan within the EMP, which will include the following management measures to mitigate the impact of pest plant and animal species on the project site and minimise the potential for pest plant species to spread to adjacent areas:

- bi-annual surveying of tracks, revegetation (rehabilitation) areas and soil stockpiles, etc. (or more frequently as required), to identify weeds requiring control
- washdown of machinery and vehicles when moving to/from weed infested areas
- mechanical removal of identified weeds and/or the application of approved herbicides
- weed control methods in accordance with those specified by DAF and the *Isaac Regional Biosecurity Plan 2020-2023*
- maintaining a clean, rubbish-free environment to deter feral animals
- engaging appropriately qualified persons to undertake biannual pest animal monitoring in the project mining lease areas, which may include coordination with adjoining mining operations/adjacent landowners
- feral animal control strategies (e.g. baiting and trapping) within the project mining lease areas in accordance with relevant standards and the *Isaac Regional Biosecurity Plan 2020-2023*

- monitoring of feral animals will be undertaken by an appropriately qualified contractor to identify whether new or additional control measures are required.

Groundwater drawdown impacts to habitat

The EIS predicted that groundwater drawdown resulting from the project would be negligible, and that potential GDEs in proximity to the site are likely to be facultative GDEs that are dependent on groundwater during dry times only. The EIS considers that the potential GDEs would not constantly rely on groundwater for survival, relying more on the replenishment of moisture in the soil following rainfall rather than direct access to the groundwater system. The EIS concludes that potential GDEs in proximity to the site, including the patches of Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, are unlikely to be impacted by groundwater drawdown as a result of the project; however, it could be potentially vulnerable to changes in surface water availability.

Avoidance, mitigation, and management measures

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. As part of implementing this plan, the proponent would undertake further investigations and monitoring of potential GDEs including the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. This would allow the early detection and management of any potential adverse impacts to the ecological values of the TEC attributable to the project.

The GDEWMP is recommended to detail:

- the current condition of the GDE or wetland and its ecological values
- the location of the GDE or wetland, environmental quality indicators
- analysis methodologies and impact thresholds and triggers
- corrective actions and timing to address impacts, if detected
- sampling and analysis reporting.

Edge effects

The EIS concluded that due to the highly fragmented landscape from historical land clearing practices for agriculture, edge effects are likely to have already manifested in the remaining vegetated areas and as such, the project is unlikely to increase the potential of edge effects in these areas.

Residual significant impacts and offsets

The approved conservation advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC states that all patches of the TEC that meet the key characteristics and condition thresholds for the ecological community are critical to its survival. Furthermore, the *Matters of National Environmental Significance: Significant impact guidelines*[126] states that for critically endangered and endangered ecological communities, a significant impact is likely if there is a real chance or possibility that an activity will adversely affect habitat critical to the survival of an ecological community.

Based on the information provided in the EIS, I consider that there would be no clearance of habitat for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC and that the project would be unlikely to result in a residual significant impact to the ecological community that would require an offset under the EPBC Act.

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[126] Australian Government, Department of the Environment, *Matters of National Environmental Significance: Significant impact guidelines 1.1*, Canberra, 2013.

I have recommended the following conditions to the Australian Minister for the Environment:

- an MNES management plan must be prepared that includes ecological community-specific measures for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. The plan must align with the EPBC Act requirements, recovery plan, approved conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of potential GDEs including the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. If monitoring indicates that the condition of this vegetation (including Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide offsets.

Coordinator-General's conclusion: Brigalow (*Acacia harpophylla* dominant and co-dominant)

I am satisfied that the EIS has considered the potential impacts that the project could have on the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

The mine site and access road (including the infrastructure corridor) would be unlikely to result in a residual significant impact to the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the approved conservation advice for this ecological community has been considered; the proposed management actions are consistent with the relevant TAP; and the impacts on the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC are acceptable.

6.6.1.4.2 Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin

Background

The Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC are native grasslands typically composed of perennial native grasses. They are found on soils that are fine textured (often cracking clays) derived from either basalt or fine-grained sedimentary rocks, on flat or gently undulating rises. These grasslands occur in areas with relatively high summer rainfall and a tree canopy usually absent, but when present projective crown cover is no more than 10%.

Due to their vulnerability to disturbance and degradation associated with agricultural land uses, 2 condition classes, 'best quality' and 'good quality', are described for the TEC. Determination of the associated condition class is dependent of a variety of criteria including patch size, richness of specific native grass indicator species, tussock density, woody cover, and cover of exotic species.

The surveyed patches that met the condition thresholds for 'good quality' Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC were represented by RE 11.4.4 and RE 11.9.3. Larger areas of REs 11.4.4 (native grasslands on Cainozoic clay plains) and 11.9.3 (native grassland on fine grained sedimentary rock) that were recorded throughout the surveyed area did not meet condition thresholds for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC due to areas containing:

- greater than 30% cover of non-native species
- projective tree canopy cover exceeding 10%.

Recovery plans, conservation advice and threat abatement

There is no recovery plan for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

There is an approved conservation advice for the TEC: *Approved Conservation Advice for Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin*[127]. The SPRAT database indicates that the approved conservation advice is an effective, efficient, and responsive document to guide the implementation of priority management actions, mitigate key threats, and support the recovery of this EPBC Act listed Endangered ecological community.

Key threats to this TEC identified in the approved conservation advice relevant to the project include:

- grazing, cropping and pasture improvement
- weeds and pest animals
- mining activities
- construction of roads and other infrastructure
- climate change.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- avoid mowing, slashing, and burning during peak flowering season (spring to summer)
- ensure weed control methods do not adversely impact the TEC
- minimise the impacts on known sites from road widening and maintenance activities
- implement formal conservation arrangements
- develop and implement management plans for the prevention and eradication of weeds that could threaten the TEC
- undertake grazing management to maintain a good cover of perennial grasses and legumes
- conduct grazing outside of the growing season when plants are not fertile
- favour intermittent grazing regime over burning.

The following TAP is relevant to the TEC:

- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*[128].

Lethal toxic ingestion of cane toads by native fauna species that inhabit the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC is identified as a key matter for management.

Impacts and mitigation

Direct removal of habitat

Approximately 80.9 ha of 'good quality' Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC would be cleared for the project. Two smaller patches of Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC would be cleared for the infrastructure corridor, along with 3 larger patches adjacent to the central unnamed waterway which will be cleared for the mine site itself.

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[127] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Approved Conservation Advice for Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin*, Canberra, 2008.
[128] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads,* Canberra, 2011.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, which would also be beneficial for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC. Furthermore, as detailed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan which would include ecological community-specific measures that address the project's impacts on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

Invasive pests – pest plants and animals

The approved conservation advice lists pest plants as a key threat to the TEC and addressing invasive weeds as a priority action. Pest plants can alter the structure and function of ecological communities and affect their suitability as habitat for native species. The impacts of inappropriate grazing regimes are also noted, as is the threat posed by the house mouse (*Mus musculus*), which was identified during field surveys.

Avoidance, mitigation, and management measures

As detailed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, the proponent has committed to the preparation and implementation of a weed management plan and a feral animal management plan within the EMP, which will include management measures that will also benefit the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

Edge effects and increased fire risk

The Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC would be susceptible to additional indirect impacts from edge effects and increased fire risk. The approved conservation advice recommends an intermittent grazing regime in preference to burning, and to avoid burning during peak flowering season. As the potential impacts would be similar for all ecological communities, further discussion is provided in the assessment of impacts to the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 80.9 ha of habitat for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC would result in a residual significant impact that would require an offset under the EPBC Act. A summary of the amount of Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC habitat to be cleared for the project and the amount of habitat available in the proposed Stage 1 offset area is provided in Table 6.7.

Table 6.7 Habitat clearance totals for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC

Total Stage 1 clearance (ha)	Total Stage 2 clearance (ha)	Total Stage 3 clearance (ha)	Total project clearance (ha)	Habitat available within the proposed Stage 1 offset area (ha)
80.9	0	0	80.9	227.74

The EIS estimates that there is approximately 227.74 ha of suitable Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC habitat within the proposed Stage 1 offset area. This would provide a 100% land-based offset for the Stage 1 residual significant impact to the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC habitat and exceeds the minimum 90% direct offset requirement required in accordance with the EPBC Act Environmental Offsets Policy.

I have recommended the following conditions to the Australian Minister for the Environment:

- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes ecological community-specific measures for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC. The plan must align with the EPBC Act requirements, recovery plan, approved conservation advice, and any relevant TAPs.

I note that the EIS indicated that controlled grazing may be undertaken on the proposed Stage 1 offset areas. As the approved conservation advice for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC identifies grazing management as a management priority, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a sustainable livestock grazing plan prior to commencement of grazing on the proposed Stage 1 offset areas. The plan would encourage natural regeneration of vegetation and prevent further uncontrolled degradation of the habitat onsite by cattle. The plan must include provisions to ensure that suitable Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC habitat is managed in accordance with the recommendations detailed in the approved conservation advice.

Coordinator-General's conclusion: Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin

I am satisfied that the EIS has considered the potential impacts that the project could have on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact to the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC is delivered. I have also recommended a number of other conditions to address the project's impacts on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the approved conservation advice for this ecological community has been considered; the proposed management actions are consistent with the relevant TAP; and the impacts on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC are acceptable.

6.6.1.4.3 Poplar Box Grassy Woodland on Alluvial Plains

Background

The Poplar Box Grassy Woodland on Alluvial Plains TEC is typically a grassy woodland with a canopy dominated by *Eucalyptus populnea* and understorey mostly of grasses and other herbs. The TEC mostly occurs in gently undulating to flat landscapes and occasionally on gentle slopes on a wide range of soil types of alluvial and depositional origin. It is also sometimes found in close proximity to ephemeral watercourses and depressions. The soils in these watercourses are considered alluvial and the regularity of flow after heavy rain curtails shrub growth.

Three condition classes (Class A, B and C) are identified for the Poplar Box Grassy Woodland on Alluvial Plains TEC and are based on:

- crown cover of canopy trees
- percentage cover of native perennial vegetation in the groundlayer
- native species richness within the groundlayer
- density of mature trees (>30 cm diameter at breast height (DBH)).

One patch of Poplar Box Grassy Woodland on Alluvial Plains TEC was identified during the EIS surveys that met the condition thresholds for 'good quality' (Class B) and was represented by the regional ecosystem RE 11.3.2. This patch did not meet the condition thresholds for Class A due to the high percentage of foliage cover of non-native grasses (>30%). Other areas of RE 11.3.2 that were recorded during the survey efforts did not meet condition thresholds for the Poplar Box Grassy Woodland on Alluvial Plains TEC due to:

- the cover of exotic pasture grasses (>50%)
- having less than 10 mature trees per hectare.

Recovery plans, conservation advice and threat abatement

There is no recovery plan for the Poplar Box Grassy Woodland on Alluvial Plains TEC.

There is conservation advice for the TEC: *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains*[129]. The SPRAT database indicates that the conservation advice would provide sufficient protection from extinction and guidance on the recovery of the ecological community and that a decision to have a recovery plan is unlikely to lead to substantial additional conservation benefits given the resources required to develop a plan.

Key threats to this TEC identified in the conservation advice relevant to the project include:

- clearance and fragmentation
- weed invasion
- inappropriate fire and grazing regimes
- dieback
- impacts from agricultural chemicals
- hydrological changes
- salinization
- nutrient enrichment
- invasive fauna
- climate change.

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[129] Australian Government, Department of the Environment and Energy, *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains*, Canberra, 2019.

Relevant priority recovery and threat abatement actions listed in the conservation advice include:

- prevent vegetation clearance and direct habitat degradation
- prevent weed invasion and manage invasive grasses
- monitor for signs of disease (e.g. myrtle rust)
- manage feral animals
- implement appropriate fire management and grazing regimes
- enhance climate change resilience by relieving other pressures.

The following TAPs are relevant to the TEC:

- *Threat abatement plan for competition and land degradation by unmanaged goats*[130]
- *Threat abatement plan for competition and land degradation by rabbits*[131]
- *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi*[132]
- *Threat abatement plan for predation by European Red Fox*[133]
- *Threat abatement plan for predation by feral cats*[134]
- *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads*[135]
- *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs*[136]
- *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses*[137].

Impacts and mitigation

Direct removal of habitat

A total of 9.6 ha of 'Good Quality' (Class B) Poplar Box Grassy Woodland on Alluvial Plains TEC would be cleared for the project. A single patch was identified within a large patch of remnant vegetation in the northern extent of the project site.

Avoidance, mitigation, and management measures

In addition to the avoidance measures described in section 6.2.3.1, the proponent has committed to the mitigation measures listed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, which would also be beneficial for the Poplar Box Grassy Woodland on Alluvial Plains TEC. Furthermore, as

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[130] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for competition and land degradation by unmanaged goats*, Canberra, 2008
[131] Australian Government, Department of the Environment and Energy, *Threat abatement plan for competition and land degradation by rabbits*, Canberra, 2016.
[132] Australian Government, Department of the Environment and Energy, *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomic*, Canberra, 2018.
[133] Australian Government, Department of the Environment, Water, Heritage and the Arts, *Threat abatement plan for predation by the European red fox*, Canberra, 2008.
[134] Australian Government, Department of the Environment, *Threat abatement plan for predation by feral cats*, Canberra, 2015.
[135] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads,* Canberra, 2011.
[136] Australian Government, Department of the Environment and Energy, *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa*, Canberra, 2017.
[137] Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses*, Canberra, 2012.

detailed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, the proponent has committed to the preparation and implementation of an EMP and an MNES management plan which would include ecological community-specific measures that address the project's impacts on the Poplar Box Grassy Woodland on Alluvial Plains TEC.

Invasive pests – pest plants and animals

The conservation advice lists pest plants as a key threat to the TEC and addressing invasive weeds as a priority action. Weeds compete with locally indigenous flora species for available resources (water, light, nutrients) and lead to a decline in the diversity and regenerative capacity of native vegetation. Introduced grasses for grazing can also result in more intense and frequent fires, which can substantially reduce the understorey diversity within the TEC.

The impacts of pest animals are also noted. The Poplar Box Grassy Woodland on Alluvial Plains TEC provides habitat for many ground dwelling birds and animals. Pest species such as foxes and cats impact these small to medium native animal species through predation and also compete for resources. Rabbits can selectively remove the most palatable herbs and grasses and suppress regeneration, while pigs damage ground layer vegetation by digging and turning over soil, thus impacting on the structure and integrity of the ecological community.

Avoidance, mitigation, and management measures

As detailed for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, the proponent has committed to the preparation and implementation of a weed management plan and a feral animal management plan within the EMP, which will include management measures that will also benefit the Poplar Box Grassy Woodland on Alluvial Plains TEC.

Edge effects and increased fire risk

The Poplar Box Grassy Woodland on Alluvial Plains TEC would be susceptible to additional indirect impacts from edge effects and increased fire risk. The conservation advice recommends integrating appropriate grazing management regimes with fire management requirements. As the potential impacts would be similar for all ecological communities, further discussion is provided in the assessment of impacts to the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC.

Residual significant impacts and offsets

Based on the information provided in the EIS, I consider that the clearance of 9.6 ha of habitat for the Poplar Box Grassy Woodland on Alluvial Plains TEC would result in a residual significant impact that would require an offset under the EPBC Act. A summary of the amount of Poplar Box Grassy Woodland on Alluvial Plains TEC habitat to be cleared for the project and the amount of habitat available in the proposed Stage 1 offset area is provided in Table 6.8.

Table 6.8 Habitat clearance totals for the Poplar Box Grassy Woodland on Alluvial Plains TEC

Total Stage 1 clearance (ha)	Total Stage 2 clearance (ha)	Total Stage 3 clearance (ha)	Total project clearance (ha)	Habitat available within the proposed Stage 1 offset area (ha)
0	9.6	0	9.6	80.37

The EIS estimates that there is approximately 80.37 ha of habitat within the Stage 1 offset area at the Wynette Offsite site that currently does not meet the condition thresholds for the Poplar Box Grassy Woodland on Alluvial Plains TEC however, active management to reduce the density of exotic grasses and promote native species recruitment may enable these areas to meet the Poplar Box Grassy Woodland on Alluvial Plains TEC threshold criteria in the future. The proponent has proposed using this area to provide a 100% land-based offset for the Stage 1 residual significant impact to the Poplar Box Grassy Woodland on Alluvial Plains TEC habitat which would exceed the minimum 90% direct offset requirement required in accordance with the EPBC Act Environmental Offsets Policy.

I have recommended the following conditions to the Australian Minister for the Environment:

- the areas of RE 11.3.2 identified within the Stage 1 offset areas (totalling 80.37 ha) may be used to offset the total impact of the project to the Poplar Box Grassy Woodland on Alluvial Plains TEC
- maximum habitat disturbance limits and a requirement for the proponent to provide an offset management plan for each offset stage of the project to address the project's residual significant impact on the Poplar Box Grassy Woodland on Alluvial Plains TEC. The proponent must obtain written approval from the Minister on an offset management plan for each offset stage of the project prior to commencing each offset stage
- an MNES management plan must be prepared that includes ecological community-specific measures for the Poplar Box Grassy Woodland on Alluvial Plains TEC. The plan must align with the EPBC Act requirements, recovery plan, conservation advice, and any relevant TAPs
- a GDEWMP must be prepared that includes monitoring the condition of potential GDEs including the Poplar Box Grassy Woodland on Alluvial Plains TEC. If monitoring indicates that the condition of this vegetation (including Poplar Box Grassy Woodland on Alluvial Plains TEC) has declined as a likely result of hydrological changes (quantity or quality) or groundwater drawdown attributable to the project, the proponent must undertake measures to mitigate this impact or provide offsets.

I note that the EIS indicated that controlled grazing may be undertaken on the proposed Stage 1 offset areas. As the approved conservation advice for the Poplar Box Grassy Woodland on Alluvial Plains TEC identifies grazing management as a management priority, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to implement a sustainable livestock grazing plan prior to commencement of grazing on the proposed Stage 1 offset areas. The plan would encourage natural regeneration of vegetation and prevent further degradation of the habitat onsite by cattle. The plan must include provisions to ensure that suitable Poplar Box Grassy Woodland on Alluvial Plains TEC habitat is managed in accordance with the recommendations detailed in the approved conservation advice.

Furthermore, I have stated a condition of the EA requiring the proponent to prepare a REMP which would include measures to monitor the condition of and impacts to receiving waters. This would allow the early detection and management of any potential adverse impacts on environmental values (including the Wynette Offset area) due to changes in surface water quantity or quality.

Coordinator-General's conclusion: Poplar Box Grassy Woodland on Alluvial Plains

I am satisfied that the EIS has considered the potential impacts that the project could have on the Poplar Box Grassy Woodland on Alluvial Plains TEC.

The mine site and access road (including the infrastructure corridor) would result in a residual significant impact to the Poplar Box Grassy Woodland on Alluvial Plains TEC. I have recommended conditions to the Australian Minister for the Environment that would ensure that an appropriate offset for the Poplar Box Grassy Woodland on Alluvial Plains TEC is delivered. I have also recommended a number of other conditions to address the project's impacts on the Poplar Box Grassy Woodland on Alluvial Plains TEC.

In consideration of the proposed mitigation and offset measures, the proponent's commitments, and the conditions recommended in this report, I conclude that the conservation advice for this ecological community has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the Poplar Box Grassy Woodland on Alluvial Plains TEC are acceptable.

6.6.2 Water resource in relation to coal seam gas and large coal mining

The proponent has proposed to take an action which involves a large coal mine development which is likely to have a significant impact on water resources.

Under the EPBC Act (section 528) a 'large coal mining development' is defined as any coal mining activity that has, or is likely to have, a significant impact on water resources (including any impacts of associated salt production and/or salinity):

- in its own right or
- when considered with other developments, whether past, present or reasonably foreseeable developments.

In accordance with section 131AB of the EPBC Act, advice was sought from the IESC on Coal Seam Gas and Large Coal Mining Development.

On 20 July 2021, the Office of the Coordinator-General submitted to the IESC a joint request for advice with the former Department of Agriculture, Water and the Environment (DAWE, now DCCEEW)) on water matters for the project. The IESC provided its advice on 5 September 2021.

The IESC advice identified key areas which required additional information to the support the draft EIS. The advice indicated that the proponent should:

- provide a better conceptualisation of connectivity (e.g., groundwater flow) between the different groundwater units
- determine the groundwater-dependency of potential terrestrial GDEs, (e.g., using techniques recommended in the IESC's information guidelines on assessing groundwater dependent ecosystems)[138] so that potential drawdown impacts can be evaluated more precisely and incorporated into an appropriate ecohydrological conceptual model
- provide an assessment of how changes to the ephemeral creeks (diversion, loss, alienation from their catchments) will affect floodplain biota, wetlands and GDEs both within vicinity of and downstream of the project area up to the creeks' confluence with the Isaac River. This is particularly important because there are listed threatened species and TECs known in the area
- provide further information on the potential cumulative impacts of the project on groundwater and water-dependent ecosystems within and in the vicinity of the project area.

I have responded to each of these matters in the groundwater and surface water sections of this report.

6.6.2.1 Methodology

6.6.2.1.1 Surface water

Potential impacts on surface water, water quality and water resources were fully or partly assessed in the following technical reports prepared for the EIS:

- Surface Water and Flooding Assessment
- Geomorphology Assessment

[138] Doody TM, Hancock PJ, Pritchard JL 2019. Information Guidelines Explanatory Note: Assessing groundwater-dependent ecosystems. Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2019.

- Groundwater Assessment
- Geochemistry Assessment
- Soils and Land Suitability Assessment
- Aquatic Ecology and Stygofauna Assessment
- Terrestrial Ecology Assessment.

Impacts were assessed, predicted and quantified in the above reports using a range of methods:

- desktop reviews of:
  - environmental assessment reports for other mines
  - a range of water quality guidelines, including:
    - Australian and New Zealand Guidelines for fresh and Marine Water Quality [139]
    - Australian and New Zealand Governments Toxicant default guideline values for aquatic ecosystem protection[140]
    - Australian Drinking Water Guidelines[141]
    - Department of Environment and Heritage Protection *Queensland Water Quality Guidelines*[142]
    - Department of Environment and Heritage Protection *Model water conditions for coal mines in the Fitzroy Basin*[143].
  - publicly available data (including spatial data) on:
    - climate and weather
    - watercourse classification
    - wetlands mapping
    - water quality monitoring
    - water licences
    - environmental authority conditions.
  - privately available monitoring data from other mines
- field surveys of watercourses and wetlands
- project-specific water quality monitoring and analysis
- geochemical analysis of mine materials including waste rock and coal rejects
- project water balance model (including salt balance) using operational simulation model (OPSIM) methodology
- assessment of salinity dilution ratios for controlled and uncontrolled releases.

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[139] Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Volume 3 Primary Industries (2000)
[140] Australian and New Zealand Governments, *Toxicant default guideline values for aquatic ecosystem protection* (2020)
[141] National Health and Medical Research Council, *Australian Drinking Water Guidelines* (2011).
[142] Queensland Government, Department of Environment and Heritage Protection, *Queensland Water Quality Guidelines* (2009)
[143] Queensland Government, Department of Environment and Heritage Protection *Model water conditions for coal mines in the Fitzroy Basin* (ESR/2015/1561) (2013)

Surface water monitoring network

The proponent established a surface water monitoring network for the project, with data from 9 monitoring points, 2 located on site, and the remainder located upstream or downstream of the lease area. Monitoring points targeted water in the northern, central and southern unnamed waterways downstream of the project, and upstream and downstream monitoring points in the Isaac River and Ripstone Creek. Between 2 and 14 sample events took place for each monitoring point for a range of parameters between March 2019 and December 2022.

The proponent also made use of public surface water data from the Deverill, Burton Gorge and Goonyella gauging stations managed by the DRDMW, and private monitoring points in the surrounding area associated with the Olive Downs and Red Hill mining projects.

Water balance model

A computer-based OPSIM was used to assess the dynamics of the mine water balance under conditions of varying rainfall and catchment conditions throughout the development of the project. The OPSIM model dynamically simulates the operation of the water management system and keeps complete account of all site water volumes and representative water quality on a daily time step. The project was modelled in 6 discrete phases to represent changes in the mine layout and catchments over the 28 year operational mine life.

Flood model

Two hydrological models were developed for the project using the XPRafts runoff-routing model – one for the Isaac River, and one for Ripstone Creek.

The Isaac River XPRafts model was used to estimate 10%, 5%, 1% and 0.1% AEP and PMF discharges based on design rainfall data (rainfall depths, areal reduction factors and temporal patterns) applied in accordance with procedures in the Australian Rainfall and Runoff (AR&R) guidelines. The peak design discharges for the 10%, 5% and 1% AEP events were validated against the peak discharges estimated using a Flood Frequency Analysis (FFA) of the recorded annual maximums at the Deverill gauging station. The Isaac River flood model was calibrated using historical data from the Deverill and Goonyella gauges for 3 historical flood events – 2008, 2010 and 2017 – selected as they had occurred during the last 15 years. A climate change analysis was also performed for the 1% and 0.1% AEP events which included a 12% increase in rainfall.

The Ripstone Creek XPRafts model was used to estimate a 0.1% AEP discharge based on design rainfall data and the AR&R guidelines. There was no continuous streamflow data for Ripstone Creek available for calibration, so the Ripstone Creek model used Isaac River Flood Frequency Estimates (RFFE) and Rational Method techniques to verify design discharges.

A TUFLOW hydrodynamic model was used to simulate the flow behaviour of Isaac River, Cherwell Creek and Ripstone Creek, based on the XPRafts runoff models described above and LiDAR topographic data. The Isaac River TUFLOW model area extends 6 km upstream to include Cherwell Creek and the Aurizon rail bridge and rail embankment, and 12 km downstream of Deverill Gauge. The Ripstone Creek TUFLOW model area extends along the southern edge of the mine lease until it reaches the Olive Downs project.

6.6.2.1.2 Groundwater

Potential impacts on groundwater, water quality and water resources were fully or partly assessed in the following technical reports prepared for the EIS:

- Groundwater Assessment

- Geochemistry Assessment
- Surface Water and Flooding Assessment
- Aquatic Ecology and Stygofauna Assessment
- Terrestrial Ecology Assessment.

Impacts were assessed, predicted and quantified in the above reports using a range of methods:

- desktop reviews of:
  - environmental assessment reports for other mines
  - a range of water guidelines, including:
    - Australian and New Zealand Guidelines for Fresh and Maring Water Quality[144]
    - Australian and New Zealand Governments Toxicant default guideline values for aquatic ecosystem protection[145]
    - *Australian Drinking Water Guidelines*[146]
    - Department of Environment and Heritage Protection, *Queensland Water Quality Guidelines*[147]
    - Department of Environment and Heritage Protection, *Model water conditions for coal mines in the Fitzroy Basin*[148]
    - *Australian Groundwater Modelling Guidelines*[149]
    - IESC guidelines[150][151][152]
  - publicly available data (including spatial data) on:
    - climate and weather
    - geological mapping
    - groundwater dependent ecosystem mapping
    - groundwater bores
    - water quality monitoring
    - water licences
    - environmental authority conditions
  - privately available monitoring data from other mines
- project-specific groundwater quality monitoring and analysis data

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[144] Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Australian and New Zealand *Guidelines for Fresh and Marine Water Quality* Volume 3 Primary Industries (2000)
[145] Australian and New Zealand Governments, Toxicant default guideline values for aquatic ecosystem protection (2020)
[146] National Health and Medical Research Council, *Australian Drinking Water Guidelines* (ADWG 2011).
[147] Queensland Government, Department of Environment and Heritage Protection, *Queensland Water Quality Guidelines* (2009)
[148] Queensland Government, Department of Environment and Heritage Protection *Model water conditions for coal mines in the Fitzroy Basin* (ESR/2015/1561) (2013)
[149] Barnett et al, National Water Commission, *Australian groundwater modelling guidelines* (2012).
[150] Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Information guidelines for proponents preparing coal seam gas and large coal mining development proposals (2018)
[151] Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Information guidelines explanatory note: Uncertainty analysis—Guidance for groundwater modelling within a risk management framework (2018)
[152] Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development, Information guidelines explanatory note: Assessing groundwater dependent ecosystems(2019)

- geochemical analysis of mine materials including waste rock and coal rejects
- project groundwater numerical model using MODFLOW-USG methodology.

Groundwater monitoring network

The proponent established a groundwater monitoring network for the project, with data from 12 monitoring bores on site, 3 monitoring bores off-site between the lease boundary and the Isaac River, and 2 vibrating wire piezometers (VWPs) used to characterise groundwater levels and water quality. The on-site monitoring bores targeted water in the Leichhardt and Vermont coal seams and the Rangal Coal Measures interburden, the off-site bores targeted water in the Isaac River alluvium, and the VWPs targeted overburden, coal seams and underburden in the Fort Cooper Coal Measures. Water quality data was collected for a range of parameters between February 2019 and December 2022.

The proponent also made significant use of data from groundwater monitoring bores in the surrounding area, particularly bores associated with the Olive Downs, Moorvale South and Eagle Downs projects.

Conceptual and numerical groundwater models

Data from a range of monitoring and exploration bores was used to develop a conceptual groundwater model, which characterised the stratigraphy, distribution, saturation and hydraulic parameters of relevant geological formations. Data from project bores was used to characterise the hydraulic parameters in the interburden and coal seams of the Rangal Coal Measures, however off-site data was relied on to characterise the hydraulic parameters of the Isaac River alluvium and regolith.

A Class 2 numerical groundwater model using the MODFLOW-USG methodology was developed for the site, adopting model geometry from the Olive Downs and Moorvale South projects, with a 10 km extension toward the north-west. The model used 14 layers to represent key geological units including the Isaac River alluvium, regolith, Rewan Group, Rangal Coal Measures, Fort Cooper Coal Measures and Moranbah Coal measures. The model underwent steady state and transient calibration in accordance with the Australian Groundwater Modelling Guidelines[153] with the objective being to replicate the groundwater levels monitored on site and in the surrounding area. Two numerical model scenarios were used to predict groundwater drawdown for the project alone, and cumulatively for the project and all approved and foreseeable surrounding mines in the study area. Post-closure impacts were modelled for the final landform over 2,000 years, and incorporated in the site water balance model for the surface water assessment.

6.6.2.2 Submissions

6.6.2.2.1 Surface water

Key issues raised in submissions include:

- adequacy of the provided information to assess the potential impacts of the project on water resources and water quality
- adequacy of baseline water quality data
- lack of information on the operation of clean water infrastructure to maintain stream flows and water quality to provide for fish passage, and support downstream ecosystems

[153] Barnett et al, National Water Commission, *Australian groundwater modelling guidelines* (2012).

- adequacy of the water management system to minimise the discharge of water with elevated levels of sediment, salinity, acidity, sulfates, metals and metalloids, hydrocarbons, nitrates and/or other contaminants as a result of:
  - surface water runoff from areas not yet rehabilitated
  - surface water runoff from areas where mine-affected water is used for dust suppression
  - disposal of waste rock in in-pit and out-of-pit waste rock emplacements
  - disposal of coal rejects in in-pit and out-of-pit waste rock emplacements
  - storage and handling of other waste, fuel and chemicals
- potential impacts of the required water allocations on the existing water supply network
- potential impacts of the project on the Great Barrier Reef catchment
- adequacy of the proposed surface water monitoring network, including proposed locations, parameters and frequency of monitoring
- the storage capacity of the mine-affected water system
- the adequacy of rules/conditions for controlled releases of mine-affected water to protect environmental values
- lack of proposed erosion and sedimentation controls for controlled releases of mine-affected water
- cumulative impacts of releases of mine-affected water with other projects which also discharge to the Isaac River
- adequacy of proposed mitigation measures to protect environmental values.

6.6.2.2.2 Groundwater

Key issued raised in submissions include:

- adequacy of the groundwater model to support the conclusions in the groundwater assessment
- lack of site-specific data for hydraulic parameters and water quality
- inconsistency between groundwater conceptualisation and groundwater model
- uncertainty around vertical and horizontal connectivity between units
- uncertainty around surface water and groundwater interactions
- impacts of excised or diverted waterways on alluvial groundwater recharge
- adequacy of the cumulative groundwater model
- impacts of groundwater drawdown on water quality
- adequacy of the geochemical assessment to understand long-term impacts on water quality
- adequacy of stygofauna sampling
- potential impacts on bores accessing the interburden
- confidence of groundwater dependency of potential GDEs
- potential impacts on GDEs, particularly the Brigalow TEC within the Wynette offset area
- quality and volume of groundwater and surface water inflows to residual voids

- feasibility of residual void water use for stock watering when dependent on void water quality and ongoing external management
- behaviour of residual voids as groundwater sinks or sources over time
- uncertainty and sensitivity analyses for groundwater and void models
- adequacy of the proposed groundwater monitoring network, including proposed locations, parameters and frequency of monitoring.

6.6.2.3 Existing environment

6.6.2.3.1 Surface water

The project is located within the headwaters of the Isaac River sub-catchment of the Fitzroy Basin.

The Isaac River is the main watercourse near the project site. It flows in a south-easterly direction past the township of Moranbah and the Isaac Downs and Poitrel coal mines upstream, before passing the project site to the east, and passing the Olive Downs Mine immediately downstream. Ripstone Creek is a tributary of the Isaac River which flows in a south-easterly direction to the south-east of the site, converging with the Isaac River approximately 18 km south-east of the site. The Isaac River commences in the Denham Range approximately 75 km north of the site, and merges with the Connors River approximately 105 km downstream; the Isaac River converges with the Mackenzie River a further 45 km downstream, then flows into the Fitzroy River before discharging to the Coral Sea south-east of Rockhampton.

The site is primarily drained by 3 waterways which discharge to the Isaac River, mapped as stream (Strahler) order 1 and 2, known as the north, central and south unnamed waterways. The southernmost parts of the site drain by overland flow to Ripstone Creek. All 3 unnamed waterways, and sections of the catchment which drains to Ripstone Creek will be intersected by project disturbance.

The Isaac River and its tributaries are ephemeral, typically experiencing flow only after sustained or intense rainfall and runoff in the catchment. As a result, stream flows can be highly variable throughout the year ranging from full flowing systems to dry channels, with most channels drying out during winter to early spring when rainfall and runoff is historically low. Surface water can remain as small pools even during the dry season in some sections of waterways and floodplains in areas that are underlain by clay-rich sediments. The clay-rich sediments slow the downward seepage of water creating a temporary perched aquifer that has minimal interaction with underlying sediments. These pools are likely to provide refuge habitat for aquatic fauna during periods of low rainfall.

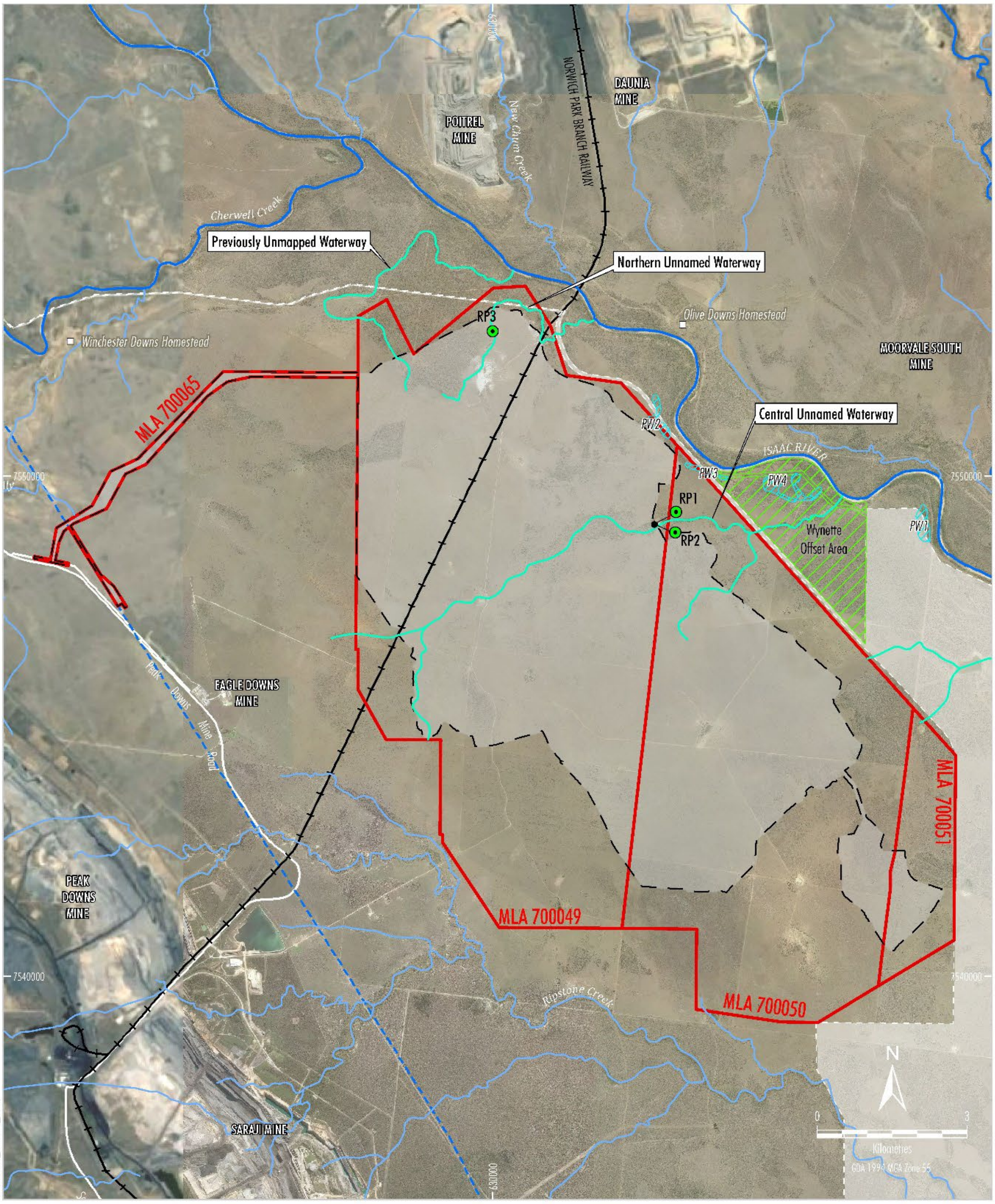
The EIS indicated that approximately 25% of the disturbance area (around 1,700 ha) is mapped as containing vertosol soils which are clay-rich soils (more than 35% clay) which typically exhibit gilgai microrelief. Gilgai are small depressions in the soil surface as result of the expanding and shrinking clay soils following wet and dry periods, and can hold water after periods of inundation, providing a water source and habitat for local species, including the EPBC Act-listed Ornamental snake, Australian painted snipe and others.

The project area supports a range of other surface water resources including lacustrine and palustrine wetlands, as well as riparian vegetation associated with the floodplains of the Isaac River and its tributaries. The EIS identified 11 mapped and unmapped lacustrine (lake type) wetlands on site, all of which comprised farm dams. These dams provide a water source for livestock, aquatic and terrestrial fauna; and provide foraging and breeding habitat for a range of the fauna species including frogs, waterbirds and turtles. The EIS identified 2 palustrine (marsh type) wetlands mapped on site (PW2 and PW3), another in the proposed Wynette offset area (PW4) and one wetland of high ecological significance (PW1) one kilometre east of the Wynette offset area and 2.5 km east of the mine lease.

There are 7 surface water licences to take water from the Isaac River downstream of the project, 3 within 10 km of the project, and the remainder more than 100 km downstream. Most of the licences are for agricultural related activities (e.g. irrigation and stock watering).

The EIS indicated that water quality of the Isaac River for the most part meets the water quality objectives to protect its environmental values. Assessment of the regional water quality of the lower (based on sampling at the Deverill gauging station) and upper Isaac River (based on sampling at Goonyella gauging station and as part of the Red Hill mining lease EIS) indicated that the Isaac River has generally good quality with some exceedances for metals and other parameters (i.e. aluminium, copper, zinc, nitrate, total suspended sediment (TSS) and turbidity) for water quality objectives for aquatic ecosystems.

The Isaac River is already subject to releases from at least 10 mines which have permits to release water upstream of the project, and occasionally experiences exceedances of water quality objectives due to combined releases from these mines. Assessment of baseline datasets (inclusive of data collected for the surrounding mines) show that the water quality in the Isaac River during and after significant flow events has exceeded the Isaac River water quality objectives for electrical conductivity (EC)(salinity) for short periods due to releases from operating coal mines upstream.



LEGEND

- Mining Lease Application Boundary
- Eungella Water Pipeline Southern Extension
- Railway
- Indicative Surface Disturbance Extent
- Indicative Approved Olive Downs Project Disturbance
- Wynette Offset Area
- Release Point
- Waterways Providing for Fish Passage*
- Waterway - Major (Strahler Order 4 and above)
- Waterway - Minor (Strahler Order 3 and below)
- Palustrine Wetlands

Source: The State of Queensland (2018 - 2020); Whitehaven (2022); DAF (2023)
Orthophoto: Google Image (2019); Whitehaven (2017)

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* Waterways providing for fish passage as classified by DAF

Figure 6.7 Existing surface water environment

6.6.2.3.2 Groundwater

Overview

The project lies within the Isaac Connors Groundwater Management Area, under the *Water Plan (Fitzroy Basin) 2011* (Water Plan). Under the Water Plan, the Isaac Connors Alluvium groundwater sub-area (Groundwater Unit 1) broadly aligns with the distribution of the Isaac River alluvium, while the remainder of the site forms part of the Isaac Connors sub-artesian groundwater sub-area (Groundwater Unit 2).

The project would exercise underground water rights for the duration of mining, dewatering groundwater as required to access the target coal seams - the Leichhardt and upper Vermont seams of the Rangal Coal Measures, and the lower Vermont seam of the Fort Cooper Coal Measures.

The following geological units are found within the project area and relevant to project groundwater:

- Quaternary deposits made up of:
  - alluvium associated with the Isaac River (known informally as the Isaac River alluvium)
  - other alluvium and colluvium collectively termed 'regolith'
- Triassic deposits made up of:
  - Rewan Group
- Permian deposits made up of:
  - Rangal Coal Measures (which contain the Leichhardt and upper Vermont seams targeted by the project)
  - Fort Cooper Coal Measures (which contain the lower Vermont seam targeted by the project).

The Isaac River alluvium, regolith and Permian coal measures have the potential to provide water for landholders, and the Isaac River alluvium and regolith have the potential to support ecological systems.

Isaac River alluvium

The EIS indicated that the Isaac River alluvium is an unconfined aquifer, typically made up of coarse-grained sand, interspersed with layers of gravel and clay associated with the Isaac River floodplain, and broadly follows the alignment of the Isaac River. Lithology can be variable, with clay lenses and palaeochannels affecting the vertical and horizontal movement of groundwater within the unit.

Groundwater in the Isaac River alluvium is primarily recharged from rainfall, as well as streamflow from losing streams (where surface water seeps into underlying strata). Groundwater is typically lost through evapotranspiration from riparian vegetation which access groundwater, and privately owned bores, however the EIS did not directly identify any privately owned bores that access the Isaac River alluvium.

Groundwater levels follow the flow direction of the Isaac River toward the south-east, and range between 14 and 16 metres below ground level (mbgl) at 3 bores included in the project's groundwater monitoring network. Groundwater levels at 2 of the bores (Knob Hill 1 and 2) fluctuated with rainfall, while levels in the third bore (Winnet Bore) remained stable, possibly due to the presence of clay layers which can limit groundwater movement. Hydraulic conductivity of the Isaac River alluvium ranges between 0.01 m/day to 10 m/day, and pumping tests for the nearby Moorvale South project reported hydraulic conductivity of 2.1 m/day to 2.7 m/day.

Groundwater monitoring for the 3 bores in the Isaac River alluvium indicated the groundwater is brackish to moderately saline, with EC ranging from 517 µS/cm in Knob Hill 2 to 8,890 µS/cm in Knob Hill 2. Water quality can be highly localised, as evidenced by the variability in salinity between Knob Hill 1 and 2 which are located 600 metres apart.

Regolith

The EIS indicated that the regolith is typically made up of highly weathered alluvial and colluvial deposits of fine to coarse grained sand, clay, sandstone and claystone. The regolith is older than the Isaac River alluvium, and weathering extends into the underlying Permian coal measures.

The EIS includes limited site-specific data on the presence and quality of groundwater in the regolith, and relies on groundwater data from the Olive Downs and Moorvale South mining projects. The regolith is stated to act as an unconfined and largely unsaturated aquifer, and any groundwater flow is expected to reflect topography. Hydraulic conductivity of the regolith is based on off-site data, and is stated to range between 0.01 m/day and 0.5 m/day.

The presence of clay layers in the regolith limits groundwater recharge from rainfall and streamflow. The EIS did not discuss potential users of groundwater in the regolith, however the bore census undertaken for the Olive Downs project, and included as an appendix to the groundwater assessment, included bores on or close to the project site that were stated to access groundwater in the regolith.

The EIS included no site-specific information on water quality parameters in the regolith, and used off-site baseline data from 2 bores from the Olive Downs Mine monitoring network to characterise salinity of the regolith. Monitoring records for these bores indicated the groundwater is brackish to highly saline, ranging from 2,179 µS/cm to 27,761 µS/cm. The Olive Downs Mine bore census also included water quality data for 2 stock bores on the Winchester South site which were stated to access the regolith; the salinity for these bores was brackish to moderately saline, ranging from 2,063 µS/cm to 3,003 µS/cm. As with the Isaac River alluvium, salinity in the regolith may be highly localised.

The project groundwater monitoring network does not include any bores which monitor water quality or levels in the regolith. The proponent has committed to installing a bore in the regolith which will be used to monitor groundwater levels and quality as the project develops.

Rewan Formation

The Rewan Formation outcrops on site, overlying the Rangal Coal Measures, and underlying the regolith in places. It is typically made up of weathered sandstone, siltstone, mudstone and clay. The Rewan Formation typically has very low hydraulic conductivity, and acts as an aquitard.

Permian coal measures

The EIS indicated that the Permian coal measures are made up of the Rangal Coal Measures and underlying Fort Cooper Coal Measures, and both underlie the Rewan Formation, regolith and Isaac River alluvium in places. The Rangal Coal Measures typically comprise cemented sandstone, siltstone, mudstone and shale (interburden) as well as the lower Leichhardt and upper Vermont coal seams – 2 of the target seams for the project. The boundary between the Rangal Coal Measures and the Fort Cooper Coal Measures is marked by the Yarrabee Tuff which immediately overlies the lower Vermont seam also targeted by the project. The remainder of the Fort Cooper Coal Measures is made up of sandstone, claystone, mudstone and conglomerate.

The Permian coal measures are heavily faulted, with the north-south oriented Isaac thrust fault bisecting the project area, with the West and North-West pits to the west of the fault, and the Main, Railway and South pits to the east of the fault. The EIS stated that the Isaac thrust fault displaces the geological units more than 80 metres, and is likely to behave as a barrier to groundwater flow as a result of calcite infill.

Groundwater in the Permian coal measures is sub-artesian and largely restricted to the more porous coal seams, where hydraulic conductivity is facilitated through fractures. At shallower depths, sub-artesian groundwater elevations in the coal measures are generally at or below groundwater elevations within the overlying unconfined sediments, however, hydraulic conductivity reduces with depth. Pumping tests for the nearby Moorvale South project reported hydraulic conductivity of 0.5 m/day to 1.5 m/day in the Leichhardt and Vermont seams.

The interburden typically acts as a confining aquitard with limited hydraulic conductivity (<0.01 m/day), however slug testing in 2 bores on site identified hydraulic conductivity of up to 1 m/day, likely to be associated with faults and fractures nearby.

Groundwater recharge occurs from rainfall and streamflow where units are located at or near the surface, and discharge occurs via evaporation and abstraction from mining operations.

The project groundwater monitoring network includes 5 monitoring bores in the Leichhardt seam, 2 bores in each of the upper and lower Vermont seams, and 3 bores in the Rangal Coal Measures interburden. There are also 2 VWPs which monitor groundwater levels and pressure in the overburden, interburden and lower Vermont seam in the Fort Cooper Coal Measures.

Groundwater levels vary across the site from 138.9 metres AHD to 189.5 metres AHD, and do not seem to correlate with topography or geology.

Groundwater is typically saline to highly saline within the coal seams and interburden units. Salinity ranges from 5,500 µS/cm to 32,800 µS/cm in the Leichardt seam, 4,100 µS/cm to 30,000 µS/cm in the Vermont seam, and 3,910 to 21,100 µS/cm in the interburden. Some bores show highly variable salinity, and others show a trend of decreasing salinity, however the EIS did not provide interpretation of these trends.

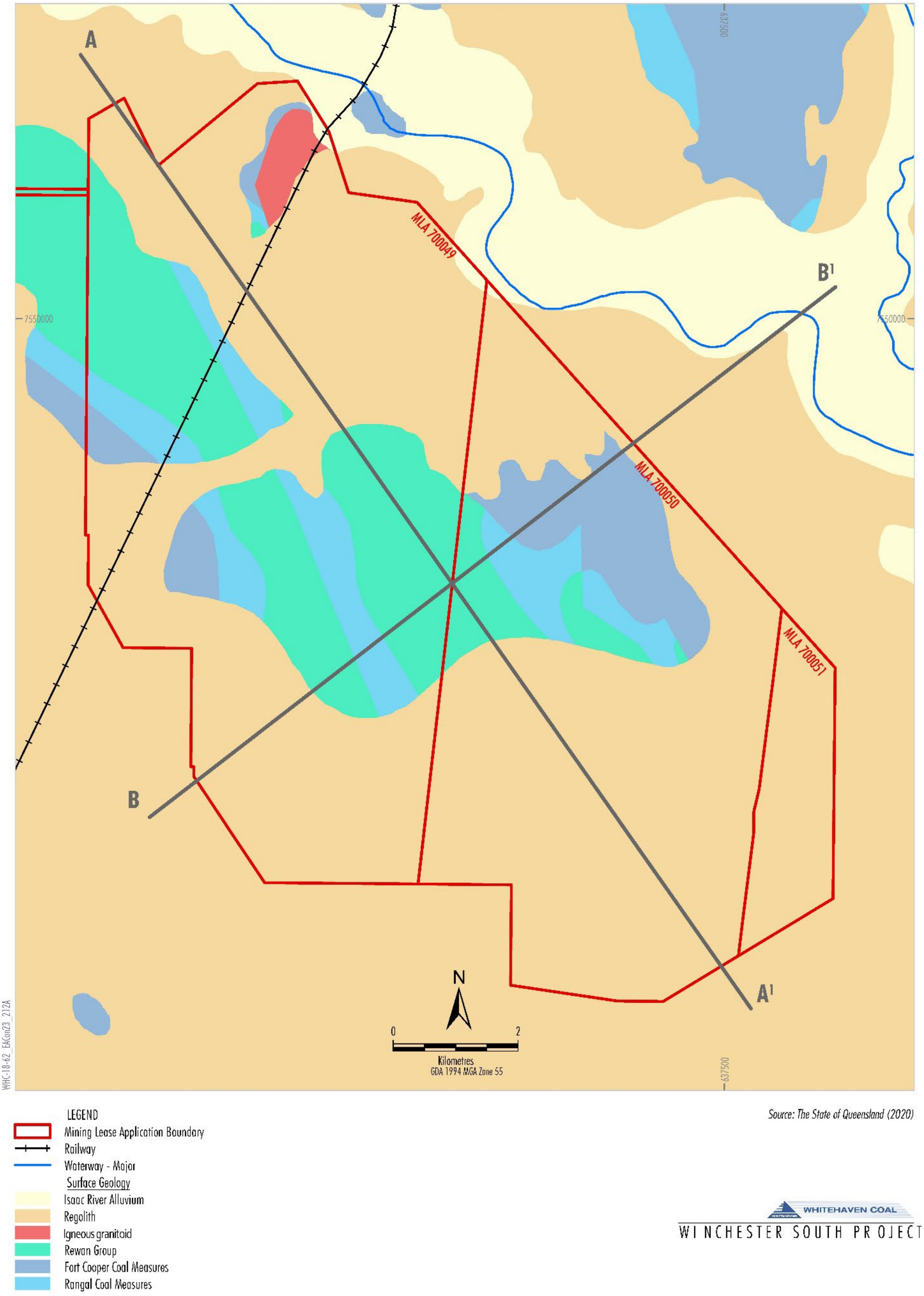
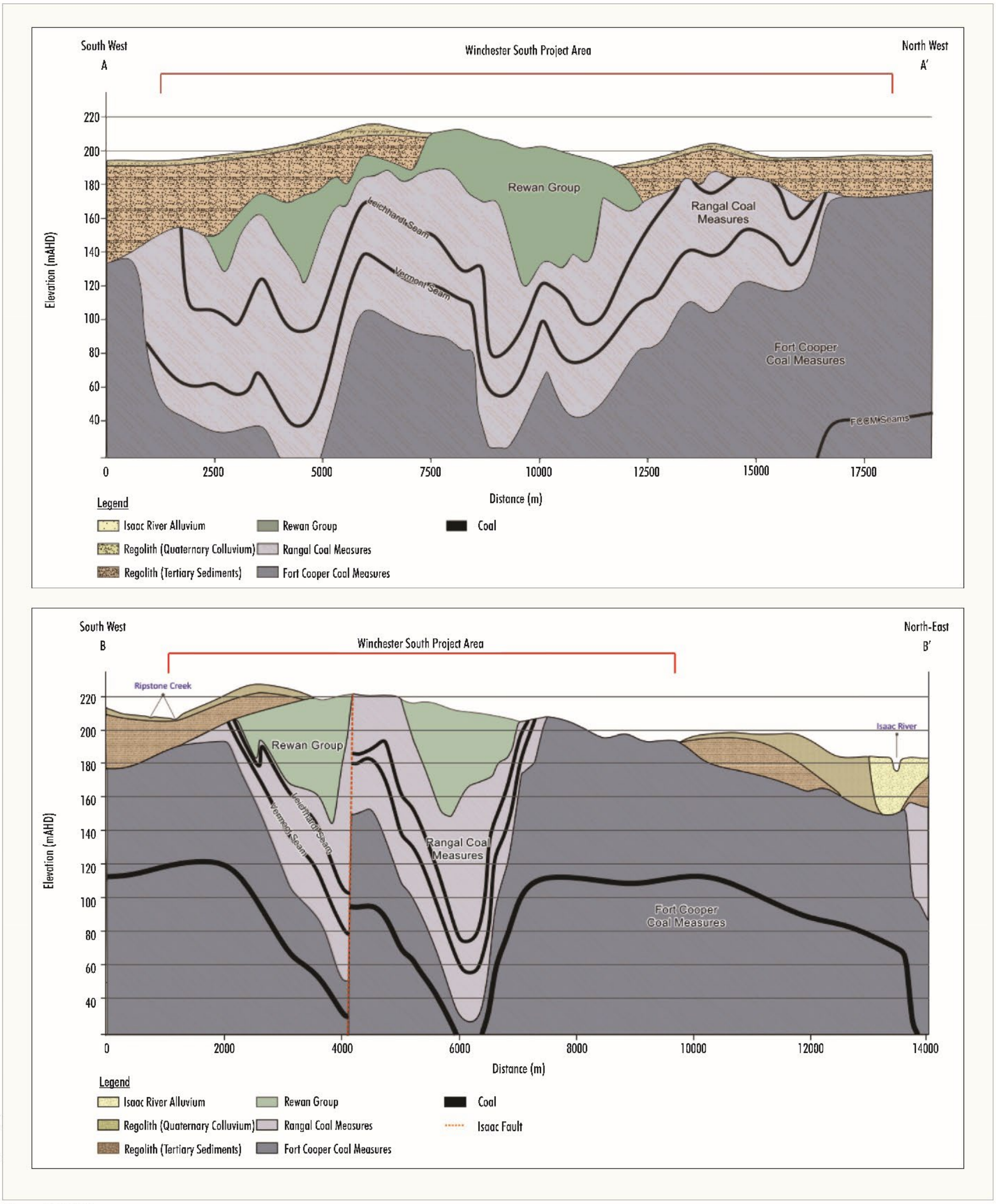


Figure 6.8 Geological context



Source: SLR (2021)

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Figure 6.9 Geological context

6.6.2.4 Impacts and mitigation

6.6.2.4.1 Surface water

Project water management

Water management strategy

Mines use water management infrastructure such as diversion drains and sediment ponds to limit the amount of clean water that comes into contact with disturbed areas, and to minimise the discharge of sediment laden and potentially contaminated water to the environment. Water management infrastructure can be highly effective at reducing impacts to surface water quality, however the diversion or capture of surface water runoff on site results in the excision of catchments that would previously have flowed naturally into waterways, and can reduce the quantity of water entering the receiving environment.

The water management strategy for the project proposed in the EIS is based on the separation of water from different sources based on predicted water quality, and comprises 3 main water types defined in the EIS as follows:

- clean water would comprise surface water runoff from undisturbed or fully rehabilitated areas, which would be diverted around disturbed areas and pass to the downstream receiving environment
- mine-affected water would include groundwater, inflows to pits, process water used in the CHPP, and rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff managed as sediment water
- sediment water would include surface water runoff from areas that are disturbed by mining operations (including active out-of-pit waste rock emplacements), but have not come into contact with coal or other carbonaceous material. Sediment water is proposed to be discharged through release points associated with erosion and sediment control structures (e.g., sediment dams).

The project would also manage raw water from an external water supply, potable water for human consumption, wastewater from the sewage treatment plant and contaminated water from areas containing hazardous materials.

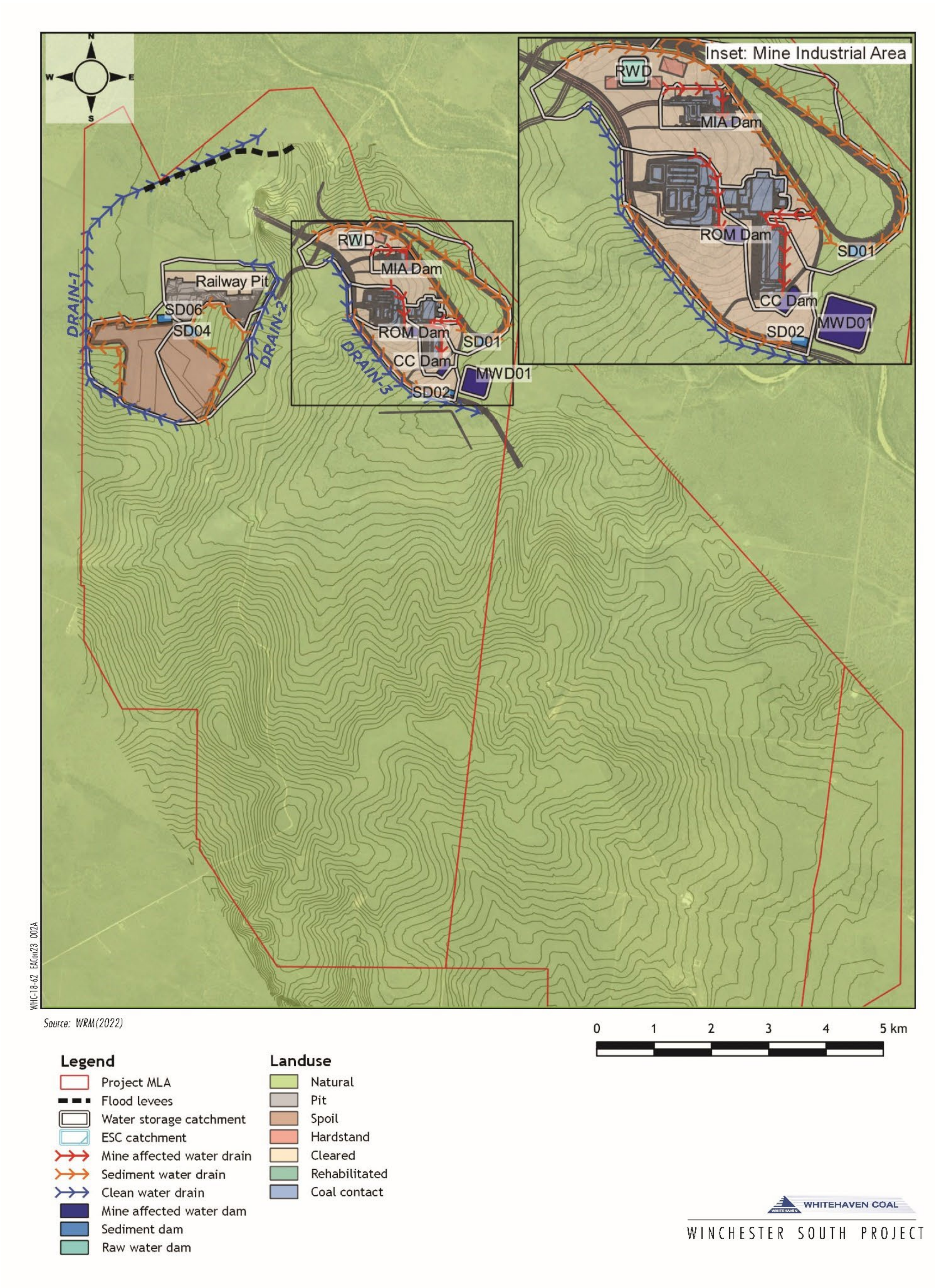

Figure 6.10 Project water management system (Phase 1)

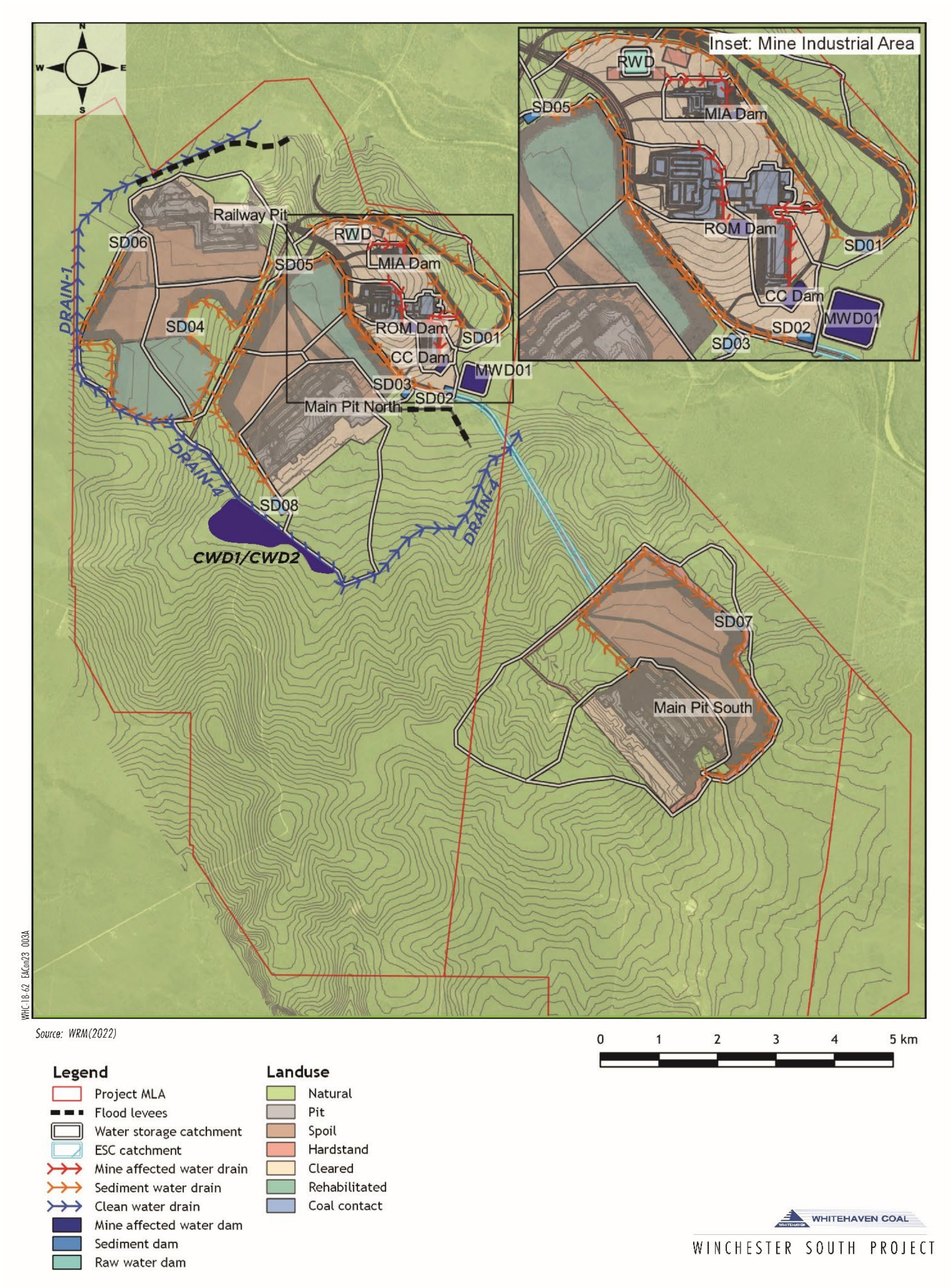

Figure 6.11 Project water management system (Phase 2)

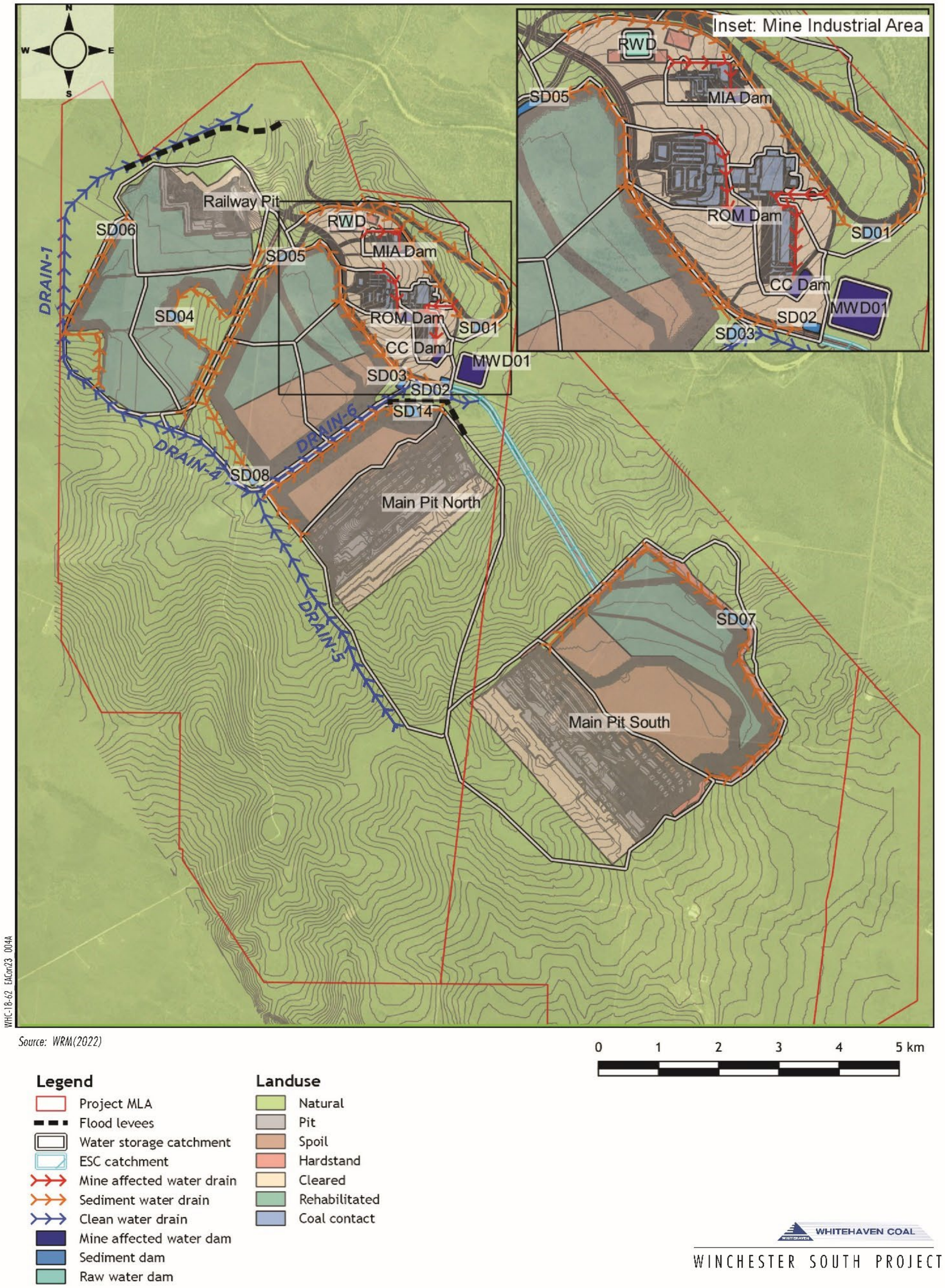

Figure 6.12 Project water management system (Phase 3)

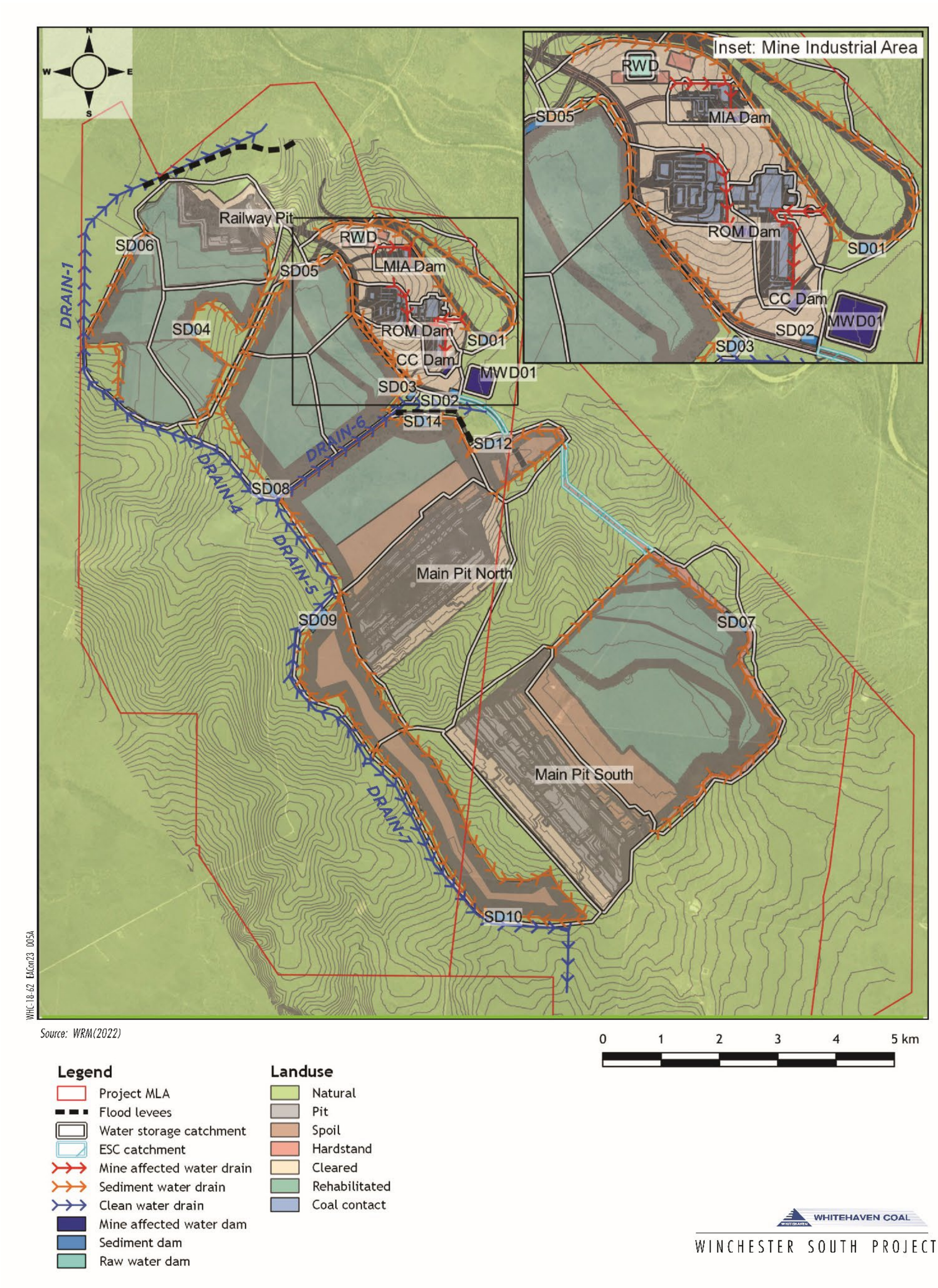

Figure 6.13 Project water management system (Phase 4)

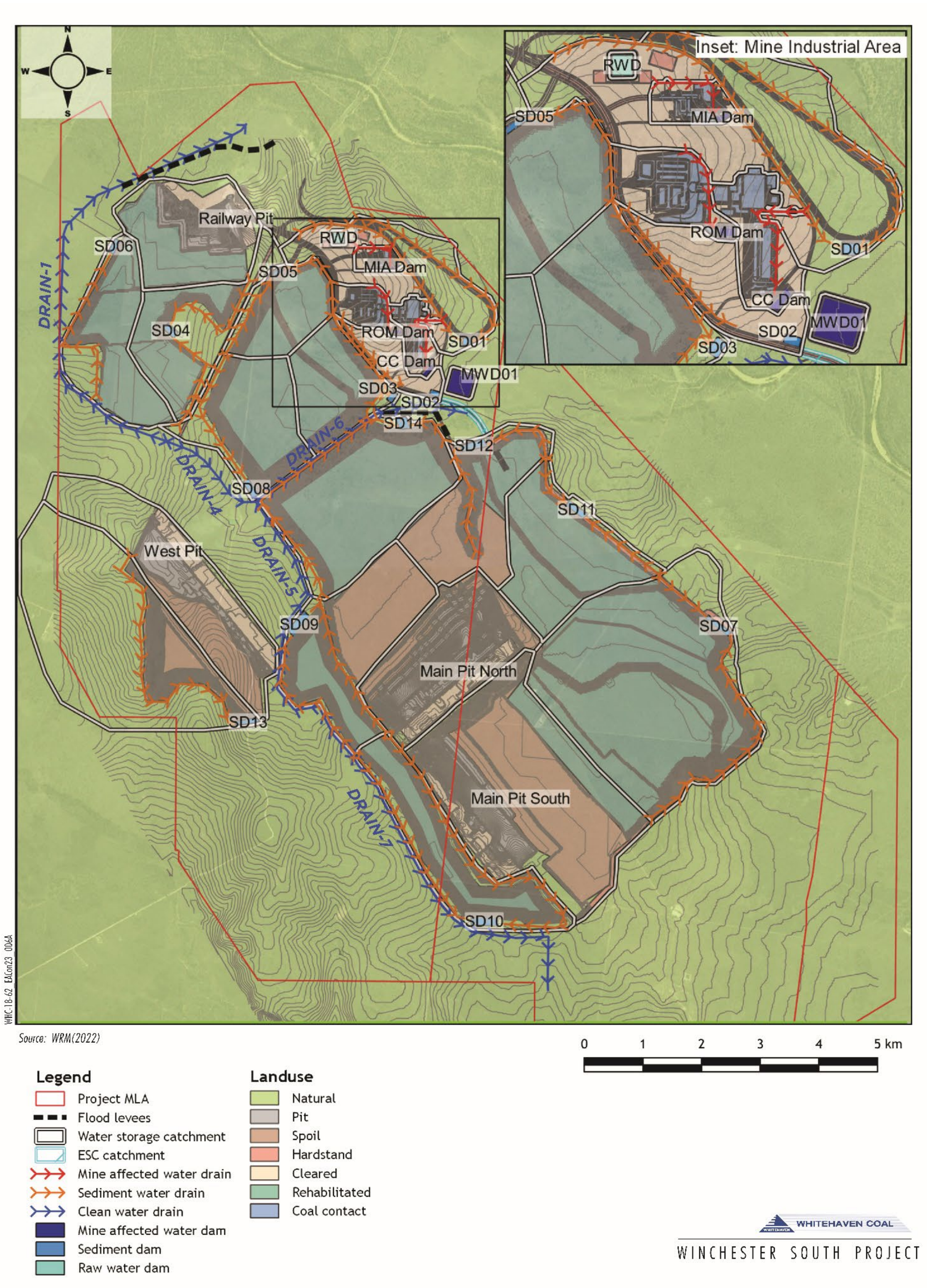

Figure 6.14 Project water management system (Phase 5)

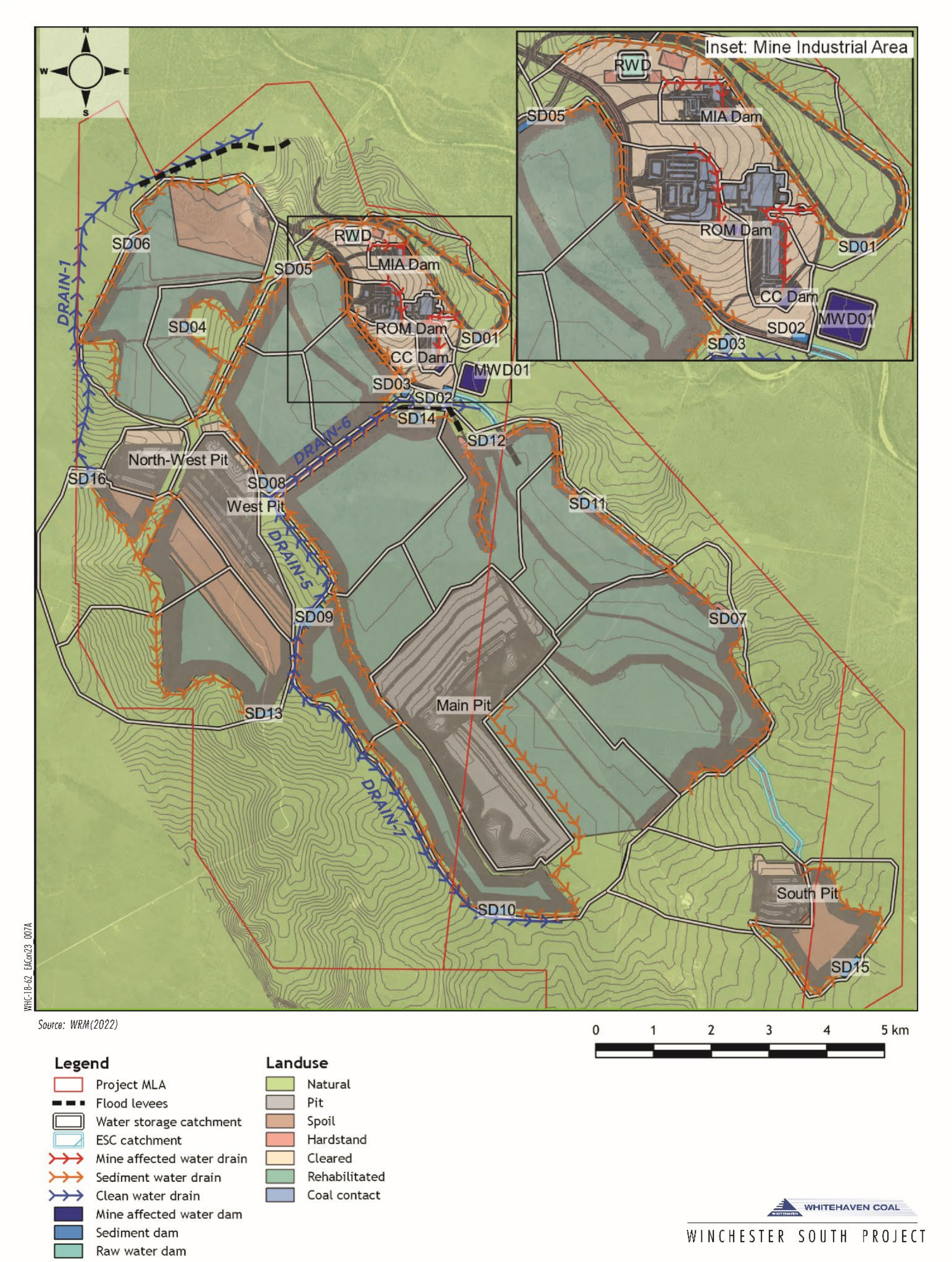

Figure 6.15 Project water management system (Phase 6)

Water management system

During mining operations, the project water management system would divert clean water around project disturbance, and capture runoff from disturbed areas that would have previously flowed to the unnamed waterways on site, the Isaac River and Ripstone Creek. Where clean water is captured within disturbed areas of the project, it would be managed as part of the mine-affected water management system or sediment water management system, as appropriate. The project would also include flood levees to protect the open cut pits from inundation during flooding events – these are discussed further below.

Clean water

A series of up-catchment clean water drains are proposed to temporarily divert clean surface water runoff around active mining areas during operations.

Clean water drains proposed in the EIS would intercept water in upstream reaches of the unnamed waterways as well as overland flow, and convey that water around disturbed areas and discharge into the reaches of the unnamed waterways downstream of the disturbance area. Clean water diversion (CWD) drains are designed to manage a 1% AEP event discharge and would have batter slopes with a 1:3 (vertical:horizontal) ratio, a bed width of 10 metres and scour protection at appropriate locations. The location of clean water drains would vary through each phase of the project, depending on where active mining is taking place, and drains would be rehabilitated once no longer required.

The EIS indicated that 2 CWD dams may be required during Phase 2 and Phase 3 of operations, which would temporarily hold clean water runoff before being pumped to the downstream receiving environment. The CWD dams would only be used if the topography of the clean water catchment does not allow for only gravity-driven clean water drains. During operation, water in the CWD dams would be pumped (at a rate of approximately 100 litres/second) as soon as practicable after rainfall events, to a volume as low as practicable. The CWD dams would remain in place until the drainage path across the rehabilitated landform is suitably stable. Once the drainage path through the rehabilitated landform is established, clean up-catchment water would flow through the corridor (e.g. with no requirement for the clean water dams). The proponent has made a commitment that it will not harvest water from the CWD drains or dams for use on site.

Under the Water Plan (Fitzroy Basin) 2011, the proponent may construct a storage with a maximum capacity of 50 ML without requiring a water licence; this occurs regardless of any action taken after the capture (e.g. pumping to a waterway). If the capacity is greater than 50 ML, a water licence will be required in accordance with the Water Plan.

Mine-affected water

The definition of mine-affected water is included in the Queensland Government *Model mining conditions* (DES 2017)[154] as follows:

'*mine affected water'*

(a) means the following types of water:

(i) pit water, tailings dam water, processing plant water

(ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the Environmental Protection Regulation 2008 if it had not formed part of the mining activity

(iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through

[154] Department of Environment and Science, *Model mining conditions* ESR/2016/1936

release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an ESCP to manage such runoff, provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water

(iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated

(v) groundwater from the mine's dewatering activities

(vi) a mix of mine affected water (under any of paragraphs i)-v) and other water.

(b) does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by mining activities that have not yet been completely rehabilitated, has only been in contact with:

(i) land that has been rehabilitated to a stable landform and either capped or revegetated in accordance with the acceptance criteria set out in the environmental authority but only still awaiting maintenance and monitoring of the rehabilitation over a specified period of time to demonstrate rehabilitation success, or

(ii) land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the water has been in contact does not cause environmental harm to waters or groundwater, for example:

(A) areas that are been capped and have monitoring data demonstrating hazardous material adequately contained with the site

(B) evidence provided through monitoring that the relevant surface water would have met the water quality parameters for mine affected water release limits in this environmental authority, if those parameters had been applicable to the surface water runoff or

(iii) both.

The EIS stated that mine-affected water would be contained within the following water storages:

- mine water dam (MWD) – dead storage volume (DSV) of 100 ML, maximum operating volume (MOV) of 750 ML
- MIA Dam – DSV of 10 ML and MOV of 75 ML
- Coal Contact (CC) Dam - DSV of 10 ML and MOV of 60 ML
- ROM Dam - DSV of 4 ML and MOV of 32 ML.

Mine-affected water from active pits and active areas would be primarily stored in the MWD until discharged from controlled release points in accordance with the conditions of the EA. Additional storage within inactive pits would be available in Railway Pit (Phase 2 onward) and Main Pit (Phase 6) to temporarily store mine-affected water if required.

Sediment water

The EIS proposed that sediment water would be managed in accordance with the ESCP for the project, and would be based on the principles of drainage control, erosion control and sediment control. Catchment runoff (i.e., overland flow) from both active and newly rehabilitated waste rock emplacements would be collected by drains and taken to sediment dams to allow suspended sediment to settle; flocculants may be added to sediment dams to enhance sedimentation, if required.

The EIS stated that sediment water would not come into contact with coal or other carbonaceous material, and may contain high sediment loads, but wouldn't contain elevated levels of other water quality parameters such as salinity, pH, metals or metalloids. The objective of sediment water management would be to maintain the quality of water discharging from erosion and sediment control structures to as close to background level as reasonably possible.

Sediment dams would be designed and sized in accordance with the *Best Practice Erosion and Sediment Control Guideline*, and would be Type D sediment dams, designed to manage an 85th percentile 5 day duration rainfall event. The proposed design standards would not provide 100% containment for runoff from disturbed areas, and would overflow (i.e., uncontrolled discharge) if rainfall exceeds the design standard. The EIS proposed that sediment water would be retained for use on site where possible (e.g., for dust suppression or CHPP demand).

Under section 110(2) of the Water Plan, the proponent would be authorised to capture overland flow due to the impact of mining activities as assessed in the EIS and for which an EA is issued. The take of overland flow under these circumstances would only apply to internally draining flows from disturbed areas classed as sediment water or mine-affected water, and not clean water diverted from upstream catchments.

External water demands

The EIS indicated that a significant proportion (25% to 50%) of mine site water requirements would be sourced from water collected and stored in sediment dams and mine-affected water dams (i.e. water from surface water runoff and groundwater inflows) which would be recycled and reused within the mine water management system.

Raw water for the project is proposed to be sourced from the existing Eungella water pipeline network which is operated by Sunwater Limited, or through water sharing arrangements with surrounding mining operations. The need for raw water from external sources would be dependent on climatic conditions, and the water balance model predicted a 50% likelihood of requiring 2,890 ML/year (or more) from external sources, and a 10% likelihood of requiring 4,230 ML/year from external sources. Water allocations from Sunwater are being sought by the proponent, but have not yet been secured. The proponent does not propose to abstract water from the Isaac River to meet raw water needs.

Potable water would be trucked to site during construction until the water treatment plant is operational. Once operational, the plant will treat raw water to a standard compliant with the Australian Drinking Water Guidelines.

Impacts and mitigation – quantity

The EIS identified activities which have the potential to impact the availability of surface water resources within the Isaac River catchment, including the Isaac River itself, unnamed waterways on site and wetlands. Relevant activities would include:

- construction and operation of water management infrastructure and systems that redirect and/or capture overland surface water flows, potentially reducing the amount of surface water runoff in the catchment and availability of surface water to the receiving waterways, wetlands and flora and fauna
- construction and operation of flood protection levees adjacent to the open pits to manage flood risks, reducing the catchment area of the Isaac River floodplain and altered flood dynamics in the catchment.

The EIS determined that the project's use of raw and potable water from external sources would be managed through an external water supplier, therefore would be unlikely to impact regional water availability.

Impacts on the Isaac River and Ripstone Creek

Water balance modelling undertaken for the EIS indicated that the project water management system (including sediment water management) would be expected to capture up to 1% (53 km^2 of 5,166 km^2) of surface water runoff from the Isaac River catchment, and up to 4.5% (13 km^2 of 286 km^2) of surface water runoff from the Ripstone Creek catchment.

At the completion of mining, the EIS stated that an area of approximately 13.7 km^2 (0.3%) of the Isaac catchment and 4.3 km^2 (1.5%) of the Ripstone Creek catchment would continue to drain to the 3 proposed residual voids.

The EIS stated that areas where surface water runoff is managed as sediment water under an ESCP would drain from the site into the Isaac River and Ripstone Creek, therefore concluded that loss of catchment flows would be indiscernible. The EIS concluded that on that basis, catchment excision associated with the project would have a negligible impact on the duration and extent of instream flows in the Isaac River and Ripstone Creek immediately adjacent to the project. However, the EIS also stated that surface water runoff managed as sediment water under an ESCP would be retained for use on site where possible, therefore it is unlikely that sediment water managed under an ESCP would drain to the Isaac River or Ripstone Creek. The EIS didn't comment on potential impacts of the loss of catchment flows if sediment water was retained on site.

The flood protection levees would only interact with the Isaac River for flood events with a 1% AEP frequency and above, and were not predicted to have a discernible impact on the Isaac River catchment.

The EIS concluded that the inclusion of the project in cumulative catchment excision of the Isaac River would increase it to 9.5% for the area to the confluence of the Isaac River with Stephens Creek, and that the overall loss of catchment area and stream flow is relatively small. The EIS didn't comment on potential impacts of cumulative excision of Ripstone Creek.

I accept the conclusion that the project's impact on the Isaac River and Ripstone Creek catchments is not significant at the regional scale and it not expected to limit availability of surface water resources to the ecosystems in these catchments.

Impacts on other waterways

The Water Act 2000 defines a watercourse as a river, creek or stream in which water flows permanently or intermittently and includes the bed and banks and any other element of a river, creek or stream confining or containing water. The DRDMW administers a watercourse identification map of Queensland that identifies the Isaac River and Ripstone Creek as the only watercourses on or adjacent to the site; the northern, central and southern unnamed waterways are classed as drainage features, not watercourses.

Clean water drains proposed in the EIS would intercept water in upstream reaches of the unnamed waterways as well as overland flow, and convey that water to reaches of the unnamed waterways downstream of the disturbance area.

Of the unnamed ephemeral waterways on site, approximate maximum excision is expected to be as follows:

- northern unnamed waterway:
  - 6.9 km waterway excision, of which 3.65 km provides fish passage
  - approximately 850 ha catchment excision (20% of total catchment)
- central unnamed waterway:
  - 10.5 km waterway excision, all of which provides fish passage

- approximately 3,750 ha catchment excision (70% of total catchment)
- southern unnamed waterway:
  - 3.25 km waterway excision, none of which provides fish passage
  - approximately 1,625 ha catchment excision (40% of total catchment).

Maximum excision would occur during the final phases of the project, where CWD drains remain in place and water from internally draining catchments (sediment water and mine-affected water) is available for project use.

At the completion of mining, with the Main and West Voids retained as residual voids, approximately 23% of the catchment of the central unnamed waterway would either drain to the residual voids, or flow to Ripstone Creek as a result of changes to landform and drainage patterns.

The EIS did not directly assess the potential impacts of the project on stream flows and water quantity in the unnamed waterways, however potential impacts on aquatic ecology values and provision of fish passage in those waterways were assessed. The aquatic ecology assessment concluded that potential impacts to aquatic ecosystems downstream of the project could occur as a result of impacts to water flows, however aquatic ecosystem values were considered to be similar to and representative of ephemeral systems in the broader region, therefore loss of aquatic habitat as a result of the project would not have significant impacts to the aquatic ecological values of the region.

The EIS determined that only parts of the northern unnamed waterway provided for fish passage, however during the EIS process, DAF determined the entirety of the central unnamed waterway and other parts of the northern unnamed waterway also provides for fish passage.

The IESC raised concerns that the excision of ephemeral waterways and catchments would alter ecologically important flow components along the lower reaches of the unnamed waterways down to their confluence with the Isaac River. To further understand these potential impacts, IESC requested the proponent assess how changes to ephemeral creeks and their catchments would affect floodplain ecology and wetlands between the project disturbance area and the confluence with the Isaac River. This was highlighted as being of particular importance due to the presence of listed threatened species and TECs in the area, and the disproportionate significance of intact MNES in the project area due to disturbed and degraded ecosystems.

The proponent responded to the IESC's concerns by stating that aquatic habitat conditions in the ephemeral waterways were poor to fair with high levels of disturbance, and re-stating the conclusion that the loss of catchment flows to the Isaac River would be indiscernible, concluding that impacts to aquatic ecosystems downstream were not expected.

The Office of Water Science (OWS) reviewed the proponent's responses and concluded that the issue had not been addressed to the level of confidence expected by IESC. In a further response to OWS advice, the proponent re-stated the conclusions of the revised draft EIS and did not provide any further information.

Impacts on wetlands and terrestrial ecosystems

The palustrine wetlands on site and in the adjacent Wynette offset area are located within the catchment for the central unnamed waterway, and are considered to rely on surface water runoff held by clay-rich substrates to satisfy their water requirements, therefore they are potentially vulnerable to changes in surface water availability.

An integrated GDE assessment was undertaken to identify the presence of GDEs in the project area, and understand any potential impacts as a result of the project. Potential GDEs were identified through desktop review and surveyed as part of the terrestrial and aquatic ecology surveys. The integrated GDE assessment concluded that riparian vegetation associated with the Isaac River and tributaries had a moderate to high potential to meet the definition of a terrestrial GDE, however any dependency on groundwater in the Isaac River alluvium was likely to be facultative, during dry times. The GDE assessment concluded that due to the likely depth to groundwater, the primary water source would be from rainfall and surface water infiltration; this would mean that these riparian ecosystems could be more vulnerable to changes in surface water availability.

The IESC stated that the significant reduction in catchment would change the hydrological regime (i.e., the volume, depths, timing, duration or frequency of flows) of the central unnamed waterway, and could result in an increase in zero- and low-flow days, and consequential impacts on wetlands and riparian ecosystems.

Catchment excision and reduced overland flow could also reduce the availability of water resources in gilgai used for breeding and foraging habitat by EPBC Act listed species, however the majority of catchment excisions are within disturbance areas or outside gilgai areas, therefore are unlikely to have a significant impact on these species within the mining lease. However, the significant excision of the central unnamed waterway will reduce hydrological flows in the Wynette offset area which includes ornamental snake habitat.

As described above, the IESC requested further assessment of potential impacts from the excision of waterways and their catchments by the proponent, but this was not done.

Coordinator-General's conclusion: impacts on waterways, wetlands and terrestrial ecosystems

The proponent has committed to clean water diversions that will direct surface water flows around the disturbance areas and into the lower reaches of the existing waterways exiting the lease area. Constructing the clean water diversions in this manner will reduce, but not prevent impacts to receiving ecosystems by reducing the potential loss of surface flows from the excised waterways.

Based on the determination in the EIS that the northern unnamed waterway provides for fish passage, the proponent committed to re-establish excised portions of the northern waterway in the final landform and re-establish a post-mining surface water drainage that was sympathetic with the natural drainage lines. As a result of the central unnamed waterway being determined by DAF to provide fish passage, as well as the significance of the central unnamed waterway to the Wynette offset area, I also require the proponent to reinstate the central unnamed waterway post-mining. As the proponent has committed to financial offsets for impacts to fish passage, I have not included the requirement that the central unnamed waterway must provide for fish passage, but my stated conditions will ensure the waterway will function in a similar manner to its pre-development configuration and will support downstream ecosystems after rehabilitation.

To ensure the reinstated northern and central unnamed waterways are safe, stable and non-polluting, and to ensure the northern unnamed waterway is able to provide for fish passage, I have stated conditions in Appendix 1 that the waterways must have:

- similar pre-mining hydraulic characteristics
- a gradient of no more than 5%
- depth and velocity of water within the waterway is suitable to provide adequate fish passage during one, 2 and 5 year average recurrence intervals (northern unnamed waterway only)
- woody debris to create habitat diversity within the water
- natural features such as pools and meanders, bed and bank profiles.

Despite requests from IESC for further assessment of catchment excision on ecosystems reliant on the unnamed waterways on site and overland flow, the EIS only assessed the impacts of catchment excision on the Isaac River and Ripstone Creek, and concluded that impacts on these watercourses would be negligible.

I am not satisfied that the EIS has fully considered the potential impacts of catchment excision on local ecosystems associated with waterways, wetlands and gilgai. A significant excision (70%) of the central unnamed waterway catchment is likely to have more than a negligible impact on the hydrological regime of the waterway and associated downstream ecosystems, despite the proponent’s commitment to clean water diversions. I have therefore stated a condition that water in clean water diversions must discharge to downstream waterways and must not be harvested for use on site to reduce the impacts of catchment excision.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs, waterways and wetlands associated with the project. As part of implementing this plan, the proponent would undertake further investigations and monitoring of relevant indicators to assess the health and integrity of wetlands and GDEs, including groundwater levels, hydrological flows in associated waterways and water quality as well. This would allow the early detection and management of any potential adverse impacts to the ecological values of the wetlands attributable the project.

The GDEWMP would be approved by DCCEEW prior to the commencement of the action, and would detail:

- the nature and ecological values of each potentially affected GDE and wetland
- the nature and ecological values of GDEs and wetlands of comparable reference sites that are not affected by project activities or the drawdown from groundwater
- a field validation survey and baseline description of the current condition of potentially affected GDEs and wetlands as well as reference sites, including wet and dry conditions, to record pre-impact ecosystem health
- if any potential GDEs or wetlands within the project area are found to not be groundwater dependent, a description of the source of water the ecosystem is dependent on and the evidence used to draw this conclusion
- updated conceptual and numerical groundwater models developed in consultation with DCCEEW
- a map and coordinates of the location of the GDEs and wetlands subject to the management plan, including justification for the selected locations
- a monitoring network sufficient to detect fluctuation in relevant parameters such as groundwater levels, water quality and hydrological flows
- indicators that would be monitored to assess the health and integrity of the wetlands and GDEs being monitored and that can show the success of proposed mitigation measures
- sampling, analysis, reporting and quality assurance methodologies for detecting impacts associated with the project including information on how cumulative impacts will be managed and monitored
- impact thresholds and triggers for groundwater levels and quality and ecological values of GDEs and wetlands that are able to provide an indication of potential and actual impacts within a relevant timescale
- corrective actions and timing to address impacts associated with mining activities, including cumulative impacts.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Regional water availability

Raw water for the project is proposed to be sourced from the existing Eungella water pipeline network or through water sharing arrangements with surrounding mining operations. The proponent has not yet secured an allocation of raw water from the Eungella network or from other mines, but is confident this can be achieved prior to commencement of works.

Potable water would be trucked to site during construction until the water treatment plant is operational, however the EIS did not state either the quantity required or the proposed source.

In submissions, Isaac Regional Council raised concerns regarding the source and quantity of potable water required, as well as the need for a water supply agreement to contribute to raw water supplies for the town of Moranbah. The proponent has committed to ongoing engagement with Isaac Regional Council on a number of matters. To ensure that the project does not negatively impact raw and potable water supplies in the Isaac Regional Council area, I have stated conditions for that the SIMP must be prepared in consultation with Isaac Regional Council prior to project commencement.

DES also raised concerns on how project water requirements would be met if water from the Eungella network or other mines was not available in years where the external water supply was insufficient to meet site demands. The proponent responded with a proposed EA condition that would allow unlimited take of overland flow to meet project requirements. DRDMW and DES advised that the proponent's proposed EA condition was not aligned with relevant legislation and would not be accepted. To ensure that the project's water demands do not negatively impact regional water availability, I have stated a condition that clean water diversions must not discharge to downstream waterways and must not be harvested for use on site.

Impacts and mitigation – quality

The project would involve activities which have the potential to impact the quality of surface water runoff in the downstream environment. Erosion can cause increased sediment loads, and surface water runoff from some areas (e.g. coal stockpiles, active waste rock emplacements etc.) may have increased concentrations of salts and other potential contaminants when compared to natural runoff. Salts and other contaminants may be dissolved within the water, or within fine sediment carried by the water. Activities which have the potential to cause impacts to surface water quality include:

- land disturbances associated with the extraction of coal including the earthworks, removal of waste rock material and the construction of mine-related infrastructure
- placement and stockpiling waste rock material, backfilling voids and the storage and disposal of coal rejects from the CHPP
- controlled releases from water management system infrastructure
- uncontrolled releases (overflow) from sediment and mine dams
- use of mine-affected water on site, e.g. dust suppression
- storage and management of fuels, chemicals and waste materials
- land based irrigation of treated sewage effluent.

As described above, the EIS indicated that the water quality of surface water resources would be managed through implementation of the mine water management system which would control the flow and storage of surface water across the site.

I have stated a condition for the EA requiring that the proposed water management infrastructure is installed and operated in accordance with a water management plan, which provides for effective water management of actual and potential environmental impacts resulting from water management associated with the mining activities.

Land disturbance

Land will be disturbed and rehabilitated progressively over the life of the mine. The project water management system will be adapted progressively to minimise the generation of mine-affected water and maximise the flows of clean water to the receiving environment.

Disturbed ground will require erosion and sediment controls to minimise soil erosion (particularly from dispersive soils and materials), control drainage paths and velocities, and trap or retain suspended sediment in runoff.

The proponent has made several commitments in regard to erosion and sediment controls, including:

- erosion and sediment controls will be developed and documented for the project
- waste rock emplacements have been designed with shallow slopes, approximately 10° (18%) or lower, that will be revegetated to minimise erosion
- sediment dams will be designed based on the *Best Practice Erosion and Sediment Control Guideline*
- where highly sodic and/or dispersive waste rock is identified, it will not report to final landform surfaces and will not be used in construction activities, wherever practicable.

I have stated conditions requiring the development and implementation of an ESCP, prior to the commencement of any ground disturbance, to minimise erosion and the release of sediment to receiving waters and contamination of stormwater. The ESCP must be reviewed annually, and must demonstrate how erosion and sediment control measures adequately minimise the release of sediment to receiving waters, detail the locations and descriptions of all erosion and sediment control measures, and provide an audit schedule to ensure erosion and sediment controls are being maintained.

Waste rock emplacement areas

Waste rock is overburden and interburden material removed to gain access to the coal seams. Reject material is generated from the CHPP which sorts and washes the project's run-of-mine coal to produce product coal, and coarse and fine rejects.

The EIS stated waste rock would be placed in out-of-pit waste rock emplacements and within the open cut pits once mining operations advance. Coal rejects from the CHPP would be co-disposed with waste rock, preferentially in-pit, however coal reject disposal within the out-of-pit waste rock emplacement may be required for a short period of time at the commencement of the Railway Pit and Main Pit North when there is no in-pit storage available.

The waste rock and coal reject material would be used to progressively backfill and rehabilitate the open cut pits in accordance with the project's approved PRCP, which is discussed further in section 5.1.6.

The geochemistry assessment characterised the geochemical properties of waste rock and coal rejects. The assessment analysed the properties of 279 waste rock samples from 11 drill-holes sampled in 2019 and 2012, and 28 coarse reject samples from the proponent's coal quality test-work program undertaken in 2019. The assessment identified the following issues which could potentially result in adverse environmental impacts:

- waste rock and coal rejects are a potential source of salinity, particularly weathered waste rock
- waste rock is predominantly NAF, and with significant capacity to absorb acid generation
- some coal rejects may be sulfidic and potentially acid forming (PAF), albeit with a low capacity to generate significant acidity
- waste rock has some enrichment of metals (arsenic and beryllium), but surface water runoff is unlikely to exceed relevant water quality guidelines for those elements
- waste rock has the potential to be dispersive and prone to erosion.

Adverse impacts to surface water could occur if waste rock and coal rejects are not appropriately managed due to the potential for generating acid, saline or contaminated runoff and seepage.

The EIS stated that surface water runoff from both active and rehabilitated out-of-pit waste rock emplacements would be managed as sediment water and would not drain to the mine-affected water system. The EIS concluded that there would be no impacts to surface water quality as a result of the project, stating that risks from waste rock and coal rejects were low due to low potential for acidity and salinity to be generated.

The IESC raised concerns about the reactiveness of waste rock and coal reject material and recommended further geochemical characterisation be undertaken. DES also raised concerns that surface water runoff from out-of-pit waste rock emplacements, especially those that include co-disposed coal rejects, should not discharge from erosion and sediment control structures without the requirement to meet authorised water quality limits. The proponent responded stating that surface water runoff would be monitored for a range of water quality parameters, and that coal rejects from the CHPP would undergo geochemical validation prior to disposal.

OWS reviewed the proponent's responses to IESC concerns in the revised draft EIS, concluded that the proponent's response did not address the potential risks associated with geochemical reactivity or serve as a preventative management strategy, and requested further geochemical testing and more information on the proposed handling and disposal of coal rejects. The proponent responded with further information on proposed management of surface water runoff from waste rock emplacements, and committed to collect surface water runoff from out-of-pit waste rock emplacements where coal rejects are co-disposed and direct it to the mine-affected water system.

To minimise risks to surface water, the proponent has also committed to:

- geochemically validate waste rock and coal rejects prior to disposal
- bury coal rejects by at least 10 metres of waste rock.

To ensure mine wastes do not impact on surface water, I have stated conditions in Appendix 1 of this report, including a requirement for the proponent to monitor surface water quality to identify and address any potential impacts associated with runoff from waste rock dumps. I also require preparation of a mineral waste management plan prior to commencement of mining activities which will include requirements for further geochemical testing.

Controlled releases

The EIS indicated that the controlled release of mine-affected water from the water management system would occur via 3 mine-affected water storages (MWD, CC Dam and Railway Pit, referred to as release points (RP) 1, 2 and 3 respectively). The EIS stated that controlled releases would occur directly to the Isaac River, however subsequent clarification from the proponent confirmed that controlled releases from RP1 and RP2 would both discharge to an artificial channel that subsequently discharges to the unnamed central waterway at the edge of the mine disturbance area, and controlled releases from RP3 would discharge to an artificial channel that subsequently discharges to the northern unnamed waterway. The combined discharge point for RP1 and RP2 into the unnamed central waterway is 2.2 km upstream of the Wynette offset area and 4.2 km upstream of the waterway's confluence with the Isaac River. No controlled release points are proposed to discharge to Ripstone Creek.

The controlled release strategy proposed in the EIS uses salinity, sulphate and TSS as water quality indicators, and release limits are tiered, contingent on flow rates in the Isaac River at Deverill Gauge, located downstream of the confluence of the northern and central unnamed waterways and the Isaac River and upstream of the Olive Downs Mine. Higher flow rates in the Isaac River would permit higher release limits for the water quality indicators. Releases would commence with a 4 m^3/s flow in the Isaac River at Deverill Gauge the trigger for releases of up to 1,000 µS/cm salinity, 300 mg/l sulphate and 55 mg/l TSS, up to a 300 m^3/s flow the trigger for releases of up to 10,000 µS/cm salinity, 400 mg/l sulphate and 400 mg/l TSS.

The water balance model for the EIS indicated that controlled releases of mine-affected water would only be required for very wet (one percentile) climatic conditions. The EIS assessed the modelled dilution ratios for controlled releases and determined that the salinity of the Isaac River including project-related controlled releases would remain below the high-flow water quality objective of 250 µS/cm, and therefore controlled releases would have a negligible impact on water quality in the Isaac River.

The EIS assessed the impacts of controlled releases on the geomorphology of the unnamed receiving waterways, and determined that controlled releases could result in erosion of the northern and central unnamed waterway. The EIS proposed a BACI (before/after/control/intervention) monitoring approach with visual inspections after each release and topographic surveys taken every 5 years (or after a 5% AEP flood event) to identify any scouring. If geomorphic impacts were observed, mitigation measures were proposed ranging from doing nothing (self-sealing) to engineered protection.

The IESC and DES raised several concerns about the potential impacts on water quality as a result of controlled releases, and requested the following information:

- more detail on proposed mitigation measures and monitoring to address erosion risks in the northern and central unnamed waterways, particularly related to dispersive soils in the area
- assessment of water quality impacts on ecological values in the unnamed waterways prior to their confluence with the Isaac River, noting the importance of the central unnamed waterway due to the presence of listed threatened species and TECs in the area
- monitoring of water-related ecological values to detect changes in water quality and trigger-action response plans (TARPs) to protect those values if water quality thresholds are reached
- further baseline data collection, including information on water quality, surface water flow regimes and the extent of floodplain inundation for the unnamed waterways
- assessment of combined impacts of erosion, sedimentation, controlled releases and catchment excision on the unnamed northern and central waterways
- a revised controlled release strategy determined by flow rates in the receiving waterways, not the Isaac River – the Isaac catchment is very large and rainfall in upstream areas could result in Isaac River flow triggers being reached with no natural flows occurring in the receiving waters of the unnamed northern and central waterways
- further discussion and assessment of cumulative impacts of controlled releases of mine-affected water and uncontrolled releases on downstream ecosystems in the Isaac River
- further information on how controlled releases would be managed and monitored.

The proponent responded to the IESC and DES' concerns in the revised draft EIS with reference to information included in the surface water and flooding assessment, and further clarifications. The proponent made the following statements in response:

- erosion mitigation measures were included in the geomorphology assessment, and an ESCP would be developed and implemented for the project
- aquatic habitat conditions in the ephemeral waterways were poor to fair with high levels of disturbance, and impacts to aquatic ecosystems downstream were not expected, therefore further baseline monitoring (other than water quality) and TARPs were not required
- surface water quality monitoring would continue
- controlled release conditions were based on the *Model mining conditions* (DES 2017) and the recently approved Olive Downs project which was based on the Isaac River as the receiving waterway
- cumulative impacts were already assessed within the context of the regulatory framework, and therefore would have negligible cumulative impacts on the Isaac River
- information on controlled releases were included in the surface water and flooding assessment.

OWS and DES reviewed the proponent's responses to concerns raised in the revised draft EIS, and concluded that while some issues had been addressed, many had not been to the level of confidence expected in the EIS. These included the following issues:

- while it was acknowledged that an ESCP had been committed to, it was not provided for assessment and concerns around erosion risks remained
- impacts to the erosion and salinity risks in unnamed waterways had not been adequately considered
- that intact MNES that may be supported by surface water flows were of disproportionate significance due to disturbed and degraded ecosystems
- further baseline data on water quality, flow regimes and floodplain inundation was still required
- a cumulative assessment, particularly considering the assimilative capacity of the Isaac River for salinity from controlled and uncontrolled discharges was still required
- the controlled release strategy was still based on flows in the Isaac River not the receiving waterways.

In a further response to OWS and DES advice, the proponent provided additional baseline water quality data, as well as further information related to erosion risks, water quality risks in the central unnamed waterway and cumulative impacts on the Isaac River, discussed below.

Erosion risks

In response to potential erosion impacts on the unnamed central waterway, the proponent provided a 1D hydraulic model of the pre-development central unnamed waterway and catchment, and discussed the impacts of controlled releases in this context. The discussion concluded that the maximum controlled release rate of 5 m^3/s (432 ML/day) would be within the predicted natural flow rates of one to 5,940 ML/day, and less than 30 percentile background flow rates, therefore discharges would remain in the natural waterway channel and flooding and erosion impacts on the receiving environment would be negligible.

The proponent also provided details of additional measures to reduce erosion risks and downstream impacts. These include vegetation, soft engineering (e.g. coir matting and stakes); and/or hard-engineering (e.g. rock riprap) for the channel between RP1 and RP2 and the central unnamed waterway. Similar mitigation measures were also proposed for the channel discharge point into the central unnamed waterway.

Water quality risks in the central unnamed waterway

While the hydrological model of the central unnamed waterway used pre-development flow rates to demonstrate the capacity of the banks of the downstream waterway to contain flows and discharges (and reduce flooding and erosion impacts), it did not consider reduced flows as a result of catchment excision, and therefore could not be used to demonstrate compliance with other water quality indicators, including salinity. The proponent stated that controlled releases would only be required for one percentile climatic conditions when the central unnamed waterway and Isaac River would have high flows and low salinity, therefore a high dilution capacity would be available.

Cumulative impacts on the Isaac River

The proponent modelled an assessment of salinity and sulphate levels from project related controlled releases in the Isaac River cumulatively with controlled releases from the Isaac Downs and Olive Downs projects. It was assumed that all 3 operations were releasing at maximum flow rate and maximum salinity and sulphate concentrations for each tier, which was stated to be a conservative assessment. Baseline salinity and sulphate levels were based on water quality data from Deverill Gauge.

Other projects were not included in the cumulative assessment as most EAs do not include a volumetric limit on releases, making it difficult to predict volumes and contaminant loads, and many releases would already be included in baseline values from Deverill Gauge. The cumulative assessment also didn’t consider the salinity of uncontrolled discharges from Winchester South or any other projects.

The cumulative model predicted that salinity would range between 681 µS/cm (very high flow) to 784 µS/cm (medium flow). Sulphate was predicted to range between 45 mg/l (very high flow) to 150 mg/l (medium flow). The proponent concluded that salinity was below the proposed downstream receiving trigger level of 1,000 µS/cm and that sulphate was below the proposed downstream receiving trigger level of 250 mg/l, therefore there was significant capacity within the Isaac River to accommodate concurrent controlled releases.

While the downstream receiving trigger levels in the *Model water conditions for mines in the Fitzroy Basin* (DES 2013) are 1,000 µS/cm and 250 mg/l for salinity and sulphate respectively, these would only apply to the local receiving waters, and not stretches of the Isaac River several kilometres downstream. The model water conditions state that assessment of impacts on the receiving environment should be against water quality objectives and relevant guidelines. The relevant water quality objectives for the upper Isaac River are included in the *EPP (Water) Isaac River Sub-basin Environmental Values and Water Quality Objectives*[155], and identify water quality objectives for the protection of moderately disturbed aquatic ecosystems as being 720 µS/cm (low flow) and 250 µS/cm (high flow) for salinity, 25 mg/l (all flows) for sulphate. The cumulative model demonstrates that these objectives would be exceeded in all cumulative controlled release scenarios.

In addition, while it is acknowledged that inclusion of other projects can be problematic due to lack of details, there are several mines that discharge to tributaries of the Isaac River that converge downstream of Deverill Gauge (i.e. wouldn’t be included in baseline values) but within the area included in the cumulative assessment.

Coordinator-General’s conclusion: controlled releases

I am not satisfied that the proponent’s proposed strategy and mitigation measures for controlled releases align with the objectives of the relevant guidelines to provide protection of environmental values, including moderately disturbed aquatic ecosystems which apply to the Isaac River and on-site waterways. This is a particular concern for the central unnamed waterway where palustrine wetlands on

[155] Queensland Government, Department Environment and Science, *Environmental Protection (Water) Policy 2009 – Isaac River Sub-basin Environmental Values and Water Quality Objective,* Sept 2011.

site and in the adjacent Wynette offset area are considered to rely on surface water runoff held by clay-rich substrates to satisfy their water requirements, therefore they are potentially vulnerable to changes in surface water quality.

The EIS states that impacts on receiving waters would be negligible due to the rarity of release events and high flows in receiving waters when discharges would occur. This explanation fails to account for the requested low-flow release limits and high salinity release limits, which may be exercised in post rainfall event dewatering scenarios when the Isaac River flows have receded, yet the mine continues to release waters captured during the rain event. In this scenario the proposed use of Isaac River flow rates as the discharge criteria is unlikely to be indicative of flow in the central unnamed waterway and cannot be considered protective of environmental values in that location.

To protect environmental values in the receiving environment, I have stated conditions for the EA authorising controlled releases to the central unnamed waterway from RP1 and RP2, and to the northern unnamed waterway from RP3. The release conditions retain the tiered flow criteria proposed by the proponent for the Isaac River, and I have stated flow criteria for the northern and central unnamed waterways which will ensure that controlled releases can only occur when there are appropriate flows in all receiving waters. I have stated a condition that requires the proponent to install a gauging station and surface water monitoring point on each of the northern and central unnamed waterways upstream of the release points to determine flows and monitor water quality in the unnamed waterways. The proponent will need to ensure that the configuration of the project water management system, particularly clean water drain outfalls, will allow for sufficient flows in unnamed waterways for controlled releases to occur.

To ensure that the water management system meets its objectives, the proponent has committed to undertake end-of-pipe monitoring at all release points and notification and reporting of all release events. I have also stated conditions for the EA that require the proponent to develop and implement a receiving environment monitoring program for the northern and central unnamed waterways and the Isaac River within 10km downstream of the mine lease. This would be used to monitor, identify and describe any adverse impacts on water quality and flows from releases from the mine site. The conditions also include contaminant trigger levels to ensure corrective actions are implemented, should water quality impacts on the receiving environment (i.e. unnamed waterways and Isaac River) be detected. The receiving environment monitoring program must be submitted to DCCEEW prior to the commencement of mining activities. I have also stated a condition for the EA requiring the proponent to prepare a water management plan which includes an updated water balance model for the site and adaptive management measures to avoid or reduce impacts to environmental values.

To ensure controlled releases do not cause erosion and increase sedimentation in the receiving waters, the proponent has proposed to incorporate measures to reduce water velocities to minimise the potential for erosion including gabion rock structures below the outlet pipes where they connect to the open drains. To prevent or minimise environmental harm, I have stated a condition for inclusion in the EA, requiring that controlled releases are undertaken so not to cause erosion of the bed and banks of receiving waters (i.e. the northern and central unnamed waterways), and for the proponent to prepare an ESCP.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Uncontrolled releases

Uncontrolled releases from water storages typically occur as a result of water inflows greater than the design capacity of the dam.

Mine-affected water dams

The EIS stated that the MWD, MIA Dam and CC Dam could potentially overflow directly to the receiving environment if rainfall exceeded a one per percent AEP rainfall event volume.

DES made a submission requesting clarification of alternative storage of mine-affected water, and a quantitative assessment of mine-affected water storage capacities over the life of the project. The proponent responded with a statement that the Railway Pit would be available to provide 25 gigalitres (GL) additional storage from Phase 3 onward, and would be able to contain predicted volumes of mine-affected water under all climatic conditions.

Sediment water dams

The project's sediment water management system described in the EIS includes 16 IECA Type D sediment dams across the site that would receive surface water runoff from both active and rehabilitated out-of-pit waste rock emplacements, and other disturbed areas 'not impacted by mining operations'.

Sediment dams would range in total volume from 14 ML to 199 ML dependent on catchment size. The total volume of a Type D sediment dam is made up of the sediment storage volume (one third of the volume) that progressively fills up with sediment until the basin is de-silted, and the remainder as the settling zone (two thirds of the volume) based on an eighty-fifth percentile 5 day duration rainfall event which must be restored within 5 days of a runoff event.

Sediment dams would be developed progressively as the mine develops, and retained until no longer required for site water demand, or until vegetation within sediment dam catchments is successfully established and captured runoff has similar water quality characteristics to areas undisturbed by mining. By Phase 6, sediment dams would drain up to 5,544 ha of catchment if all were retained.

The proposed design standards for Type D sediment dams do not provide 100% containment for runoff from disturbed areas, and would overflow (i.e., uncontrolled discharge) if rainfall exceeds the design standard. The site water balance predicted that sediment dam overflows would increase over the project life as the area of disturbance expands, with the annual risk of sediment dam overflows ranging from 64% at the commencement of the project to 80% by the end of the project. Sediment dam overflows were predicted to be zero during dry climatic conditions, between 7 ML/year and 76 ML/year during median climatic conditions, between 700 ML/year and 3,336 ML/year during wet climatic conditions and between 1,859 ML/year and 15,535 ML/year during very wet climatic conditions.

The salt balance undertaken as part of the project water balance demonstrated that the largest contributor to salt load was rainfall runoff from various surfaces on site, with hardstand runoff assumed to have the highest salinity of 900 µS/cm, active spoil with a salinity of 520 µS/cm and natural, cleared and rehabilitated runoff with a salinity of 300 µS/cm. Salt would be lost through water usage for dust suppression, CHPP water demand and sediment dam overflows. Average annual salt loads lost through sediment dam overflows were predicted to range from 76 tonnes/year in Phase 1 to 337 tonnes/year in Phase 6.

Water in sediment dams would be saline as a result of direct runoff from disturbed areas. Sediment dams would also receive runoff from areas subject to dust suppression watering. The EIS proposes to use mine-affected water for dust suppression, which could result in elevated levels of salinity in sediment dams which receive runoff from areas subject to frequent dust suppression watering, such as haul roads.

The EIS assessed the impacts of sediment dam overflows on salinity levels in the Isaac River, and concluded that the increase in salinity would be generally less than 7%, a value that was stated to be negligible. The EIS also compared the results of the geochemical assessment to baseline surface water monitoring data and concluded that various metals were naturally elevated above guideline values for aquatic ecology (95% species protection), therefore the management of surface water runoff from waste rock emplacements as sediment water (as opposed to mine-affected water) was not considered to pose a risk to the downstream receiving environment.

The EIS proposed quarterly monitoring of sediment dams to validate the anticipated quality of surface water runoff reporting to the sediment dams.

IESC and DES raised several concerns regarding the proposed approach to managing water in sediment dams and the risks of uncontrolled releases, including:

- lack of assessment of potential impacts to aquatic and riparian ecosystems in the unnamed northern and central waterways
- lack of cumulative assessment of the potential impacts of controlled and uncontrolled discharges occurring simultaneously
- lack of information on anticipated water quality of sediment dams
- that runoff from active waste rock emplacements should not be classified as 'sediment water' as it meets the definitions of mine-affected water as defined in the *Model mining conditions* (DES 2017)
- elevated levels of metal concentrations from the geochemistry assessment when compared to relevant water guideline values
- risks to the receiving environment not fully addressed in the impact assessment
- risks to the receiving environment being greater from uncontrolled releases from sediment dams than from controlled releases of mine-affected water
- large volumes of uncontrolled sediment dam releases with no discharge characterisation, no requirement to meet authorised water quality limits or controlling provisions such as receiving water flow rates
- lack of monitoring of sediment dam discharges
- lack of near-field receiving water monitoring proposed for Ripstone Creek which would receive overflows from 4 sediment dams.

The proponent responded to the IESC and DES' concerns in the revised draft EIS with reference to information included in the surface water and flooding assessment, and further clarifications. The proponent made the following statements in response:

- sediment dams would only overflow during significant rainfall events which would also generate runoff in undisturbed catchments providing sufficient dilution that impacts would not occur
- there was no geochemical basis to require a different approach to the management of overburden runoff at the project compared to other nearby recently approved projects
- proposed surface water quality and water storage monitoring EA conditions were commensurate with other existing mine operations in Queensland
- proposed a management approach for sediment dams as follows:
  - if the Isaac River flow was less than 50 ML/day and/or the salinity within a sediment dam was greater than 2,000 µS/cm, or if water quality parameters during quarterly sampling exceeded mine affected water trigger levels, the water in the sediment dam would be:
    - pumped back to the mine-affected water management system or

- treated through flocculation prior to discharge.

OWS reviewed the proponent's responses to IESC concerns in the revised draft EIS, and concluded that while some issues raised by the IESC had been addressed, many had not been to the level of confidence expected by IESC. DES also raised similar concerns. Further information was requested on:

- comprehensive water monitoring data for the northern and central unnamed waterways
- information on what flocculants were proposed
- an updated impact assessment to determine combined impacts on the northern and central unnamed waterways as a result of water quantity changes and water quality changes from controlled and uncontrolled releases
- an updated impact assessment and water balance in accordance with the definition of mine-affected water in the Model mining conditions (DES 2017).

The proponent made the following statements in response:

- surface water runoff from waste rock emplacements was not pit water, tailings water or workshop water, therefore should not be classified as mine affected water
- managing surface water runoff from waste rock emplacements as mine affected water would have wide-reaching adverse environmental and industry outcomes and was inconsistent with the recommendations of the Queensland Floods Commission of Inquiry (2012)
- the proposed land use changes for the project area from grazing to mining would reduce nutrient and sediment runoff, and reduce potential impacts the Great Barrier Reef.

While OWS and DES indicated there are still unresolved issues related to the management of surface water runoff at the site, I am satisfied that enough information has now been provided to allow for evaluation and conditioning.

Coordinator-General's conclusion: uncontrolled releases

I am not satisfied that the proponent's proposed strategy and mitigation measures for surface water runoff described in the EIS as 'sediment water' align with the definition of mine affected water in the Model mine conditions, and do not provide sufficient protection of environmental values.

I am not satisfied that a 7% increase in Isaac River salinity would be classed as negligible, and I am not satisfied that the EIS adequately assessed the potential impacts of uncontrolled releases in the unnamed waterways on site. This is a particular concern for the central unnamed waterway where palustrine wetlands on site and in the adjacent Wynette offset area are considered to rely on surface water runoff held by clay-rich substrates to satisfy their water requirements, therefore they are potentially vulnerable to changes in surface water quality.

The classification of surface water runoff from active waste rock emplacements as sediment water rather than mine affected water in the EIS also means that the project water balance is not reflective of how surface water runoff would be managed to comply with the conditions of the EA. As a result, the assessment of potential impacts of controlled releases of mine affected water is likely to underestimate the volume and frequency of controlled releases, and consequently the potential impacts on downstream environmental values in the central unnamed waterway and the Wynette offset area.

To manage the risk of uncontrolled releases from sediment dams containing mine affected water, I have stated a condition for the EA that requires water storages (including erosion and sediment control structures) to be monitored on a monthly basis for a range of relevant parameters. If those parameters exceed stated limits in erosion and sediment control structures, all water in that water storage must be transferred to a dedicated mine-affected water storage.

To avoid or minimise impacts to environmental values, I have stated conditions for the proponent to prepare a range of management plans, including:

- a water management plan which includes an updated water balance model for the site, contingency procedures for incidents and events, and adaptive management measures
- an ESCP, prior to the commencement of any ground disturbance, to minimise erosion and the release of sediment to receiving waters and contamination of stormwater
- a receiving environment monitoring program to monitor, identify and describe any adverse impacts on water quality and flows from the project.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Fuel and chemical storage

The project will store, handle and use a range of fuels, chemicals and waste materials that have the potential to contaminate surface water if not managed appropriately.

The EIS stated that a contaminated water management system would be implemented that collects and contains all potentially contaminated water on-site. This water would be recycled for use on-site without releasing it to the receiving environment.

The EIS concluded that there is limited potential for contamination to occur with standard management controls committed to by the proponent. These are that all fuel and chemical storage areas would be developed in accordance with current Australian Standards, including refuelling areas and chemical storage areas to be designed with adequate bunding and equipped for immediate spill clean-up.

I am satisfied that the proposed management controls will limit the potential for contamination, and that regular surface water monitoring will detect any potential issues if they occur.

Sewage effluent

The EIS stated that site wastewater would be treated in a packaged sewage treatment plant, located in the MIA. The plant would be designed to meet a Class C effluent quality for irrigation, and the biosolids produced would be stored on-site and collected by a licensed contractor for disposal off-site at a licensed facility. The EIS proposed that treated effluent would be transferred to the mine-affected water system for use on site, however Class C effluent has limitations on its use as a result of health risks, which were pointed out in a DES submission on the matter. DES stated that if the proponent wished to use treated effluent for dust suppression and firefighting (proposed uses for mine-affected water) the effluent must be to a Class A standard.

The proponent responded by stating that the class of effluent produced by the sewage treatment plant would be determined during detailed design after the EIS process is complete. The proponent stated that only Class A effluent would be used in the mine-affected water system, and if Class C effluent was produced, it would be disposed of via land-based irrigation, which was supported by an assessment in the revised draft EIS.

The revised draft EIS included Model for Effluent Disposal Using Land Irrigation (MEDLI) modelling of the proposed irrigation of Class C treated effluent to land indicated an area of approximately 2 ha and a wet weather storage volume of 900 kL would be required for an automated workforce, and an irrigation area of 3 ha and a wet weather storage volume of 1,450 kL would be required for a non-automated workforce to accommodate effluent generated by the proposed workforce. Soil sampling was undertaken to determine the most suitable location for the irrigation field, and determined that the irrigation field should be placed where soil unit T3 is present to avoid pooling of effluent above clay rich soils. The Effluent Disposal Using Land Irrigation report identified a recommended location for the irrigation field, however this location is identified as being the indicative location for the construction office and hardstand.

The proponent proposed for the sewage effluent class to be determined during the detailed design phase of the project, after the EIS process. To ensure the sewage effluent can be used in the mine-affected water system, I have stated conditions for the EA for Class A effluent limits. The proponent may apply to DES to change these requirements for Class C effluent after the EA is issued.

Surface water monitoring network

The IESC raised concerns around the lack of baseline water quality monitoring in the unnamed waterways, and recommended a minimum of 2 years monitoring of surface water quality, flow regimes and the extent of floodplain inundation. DES also raised concerns around the lack of sampling events in the context of the Queensland Water Quality Guidelines which recommend a minimum of 12-24 samples taken over a 24 month period.

The proponent responded with monitoring data from an additional 3 monitoring events in late 2022, but did not address the IESC's concerns regarding flow regimes in the unnamed waterways.

While the additional monitoring events improved the statistical robustness of the baseline data, insufficient data has been collected to justify the derivation of locally derived trigger values according to the criteria set-out in the Queensland Water Quality Guidelines. I have stated conditions for the EA that water quality objectives in the EPP Water Fitzroy Basin will apply where minimum criteria have not been met. I have also stated a condition that the proponent must prepare a receiving environment monitoring program to monitor, identify and describe any adverse impacts on water quality and flows from the project.

6.6.2.4.2 Groundwater

Impacts and mitigation – quantity

A net loss of groundwater from the underlying geological units is expected as result of exercising the underground water rights for the project.

The EIS stated that during mining, there would be no direct take from Groundwater Unit 1 (Isaac River alluvium) under the Water Plan. Modelling undertaken for the EIS indicated there would be an indirect take from the Isaac River alluvium of less than 0.01 ML/year (considered negligible), which would result in groundwater drawdown of less than 0.3 metres. This largely relates to increased leakage of groundwater to the underlying Permian coal measures that are depressurised as a result of the project. There would also be negligible indirect take from the Isaac River alluvium after mining as a result of groundwater flow into residual voids.

The EIS stated that during mining, there would be direct take from the Groundwater Unit 2 (sub-artesian regolith and Permian coal measures) under the Water Plan. Modelling undertaken for the EIS indicated the project would directly intercept an average of 0.42 ML/day (155 ML/year) and a maximum of 0.77 ML/day (280 ML/year) of groundwater inflows to the open cut operations. This would result in groundwater drawdown extending 1.8 km north-west and 1.5 km south-east of the lease boundary.

After mining, the EIS stated that there would be a 13 ML/year groundwater take from Groundwater Unit 2 as a result of groundwater flow into residual voids.

Due to the nature of groundwater drawdown being an inherent aspect of mining for the project, there are no mitigation measures proposed to avoid or minimise impacts. Management of drawdown impacts will be primarily through the monitoring of groundwater levels and quality.

Groundwater characterisation and modelling

The IESC commented on several issues in the DEIS related to characterisation of groundwater at the site, and the adequacy of the groundwater conceptual model and groundwater numerical model.

The IESC raised concerns that the characterisation of the groundwater units was not clearly supported by the information provided, particularly in relation to vertical and horizontal flow between the units. A key concern was that predicted drawdown in the regolith to the east of the main pit could induce drawdown in the Isaac River alluvium greater than was predicted by the numerical model, and impact potential GDEs, including the Wynette offset area. There was also concern that diversion and removal of the northern and central unnamed waterways would reduce the amount of groundwater recharge in the alluvium and regolith, resulting in reduced groundwater levels and impacts on potential GDEs, including the Wynette offset area.

Several recommendations were made for improvements to both the conceptual and numerical groundwater models. These were related to:

- characterisation of the Isaac River alluvium and regolith
- vertical connectivity and conductivity between units, particularly alluvium and regolith
- interaction of groundwater and surface water in waterways and wetlands
- modelling of waterway and catchment excision effects on alluvial recharge
- inclusion of other projects in the cumulative model scenario
- modelling of fault zones
- uncertainty and sensitivity analyses.

The numerical groundwater model and groundwater assessment were revised for the revised draft EIS, although this was principally as a result of mine optimisation rather than to respond issues raised in submissions, and there was no change to the conclusions of the groundwater impact assessment as a result of this revision.

The proponent responded to the IESC's concerns in the revised draft EIS with reference to information included in the groundwater assessment report and the groundwater modelling report, and some clarifications. The proponent made the following statements in response:

- the characterisation of the alluvium and regolith, including vertical connectivity and conductivity between the units, was based on relevant data from surrounding projects
- clay layers would limit the interaction between surface water and wetlands and underlying groundwater
- other projects suggested by IESC were too distant to influence cumulative drawdown impacts
- uncertainty analysis in accordance with IESC guidelines was undertaken for the groundwater numerical model (including modelling of fault zones) and was sufficient to address IESC concerns.

OWS reviewed the proponent’s responses to IESC concerns in the revised draft EIS, and concluded that while some issues raised by the IESC had been addressed, many had not been to the level of confidence expected by IESC. These included the following issues:

- lack of site-specific data to characterise the conductivity and connectivity between groundwater units, and between surface water and groundwater
- exclusion of excised or diverted waterways from the groundwater model
- lack of evidence to support the assertion that projects not included in the cumulative model were too distant to influence cumulative drawdown impacts
- limited scenarios and variables included in the uncertainty analysis.

In a further response to OWS advice, the proponent:

- provided site-specific data on site lithology to support characterisation of geological units on site
- described how excised catchments were included in the numerical model
- justified the extent of the cumulative model
- described how the provision of site-specific data resolved the need for further uncertainty or sensitivity analysis.

The proponent has committed to maintaining a groundwater monitoring network and installing additional monitoring bores in the regolith and Leichhardt seam to allow additional monitoring of groundwater at the site. The proponent has also committed to assessing the validity of the groundwater model every 5 years, and making updates if monitoring data indicate a significant divergence for the model predictions.

While OWS indicated there are still significant unresolved issues related to the conceptualisation and modelling of groundwater at the site, I am satisfied enough information has now been provided to allow for evaluation, and potential impacts can be managed through the implementation of conditions.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would require the numerical groundwater model to be updated in consultation with DCCEEW which will resolve outstanding modelling and conceptualisation issues. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Groundwater drawdown on existing bores

The EIS stated that there are no known privately-owned bores within the unconsolidated (Isaac River alluvium and regolith) or consolidated (Permian coal measures) aquifers that lie within the modelled extent of project only drawdown greater than one metre. However, the EIS does not identify privately-owned bores within the cumulative drawdown extent. The EIS also didn’t directly identify any privately owned bores that could be impacted by the project (other than drawdown), despite the presence of 2 stock bores within the footprint of the West Void which would be removed during the course of mining.

Following OWS’ review of groundwater information in the revised draft EIS, additional information was requested on predicted drawdown for interburden units as bores intercepting the interburden units were identified in the groundwater assessment. The proponent responded by stating that the interburden had aquitard properties, therefore did not meet the definition of an aquifer. The proponent also stated that predicted drawdown was not expected to propagate to privately-owned bores in the Permian coal measures, however supporting information was not provided.

OWS also requested additional information on privately-owned bores that could potentially reach the relevant triggers in the *Water Act 2000* for make-good measures. The proponent re-stated that there would be no privately-owned bores that would be impacted by the project.

If the project does impact privately-owned bores, the proponent will be required to provide make good arrangements with affected landholders under the *Water Act 2000* to ensure they have access to a similar quantity and quality of water for the bores authorised purpose. This may include works to increase bore pumping capacity, constructing a new bore, providing an alternative water source or financial compensation.

To ensure project-related and cumulative groundwater drawdown is monitored, I have stated conditions in Appendix 1 of this report, including a requirement for the proponent to develop and implement a groundwater monitoring program prior to the commencement of activities, and to monitor groundwater levels at a frequency which will detect potential drawdown impacts.

Groundwater drawdown on groundwater dependent ecosystems

GDEs are ecosystems that rely on groundwater for their continued existence. These ecosystems are sensitive to changes in the groundwater regimes that support them, as an increase in depth to groundwater may draw water down beyond the reach of vegetation roots or remove water from aquifer systems, creating water stress for the GDEs. GDEs are classified into 3 broad types:

- aquifer and cave ecosystems (i.e. subterranean GDEs)
- ecosystems dependent on the sub-surface presence of groundwater (i.e. terrestrial GDEs) and
- ecosystems dependent on the surface expression of groundwater (i.e. aquatic GDEs which can include rivers and wetlands fed by groundwater base-flow).

GDEs can require access to groundwater on a permanent (obligate – i.e. solely dependent on groundwater) or intermittent (facultative – may use groundwater opportunistically) basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services.

The EIS identified the presence of potential GDEs within and surrounding the project area including:

- terrestrial GDEs in the riparian corridors and wetlands associated with the Isaac River and its tributaries
- subterranean GDEs supporting stygofauna (invertebrates which are primarily obligate, groundwater-adapted organisms) in groundwater bores in the study area.

Potential aquatic GDEs were identified in the study area associated with the Isaac River, palustrine wetlands and farm dams, however these were determined in the EIS to largely not be dependent on the surface expression of groundwater.

Terrestrial GDEs

An integrated GDE assessment was undertaken to identify the presence of GDEs in the project area and determine any potential impacts as a result of the project. Potential GDEs were identified through a desktop review and surveyed as part of the terrestrial and aquatic ecology surveys. The assessment concluded that the riparian vegetation associated with the Isaac River and tributaries had a moderate to high potential to meet the definition of a terrestrial GDE, and any dependency on groundwater in the Isaac River alluvium was likely to be facultative, during dry times.

The IESC made several comments related to potential terrestrial GDEs that could be impacted by the project. These included:

- concerns around the effects of groundwater drawdown on potential GDEs, particularly in the Wynette offset area which may be affected by groundwater drawdown from the project, as well as the Olive Downs project
- the lack of ground-truthing to determine the groundwater dependency of potential terrestrial GDEs, particularly in the Wynette offset area
- the disproportionate importance of potential terrestrial GDEs, including riparian corridors, in the surrounding degraded landscape.

To further understand these potential impacts, IESC requested the proponent undertake the following:

- refinements to the groundwater numerical model and conceptual model as described above, including consideration of excised waterways and catchments
- ground-truthing of potential GDEs in accordance with the relevant IESC guideline
- a more conservative impact assessment that considers the high sensitivity of potential terrestrial GDEs, including riparian corridors.

The proponent responded to the IESC's concerns in the revised draft EIS with reference to the predicted drawdown in the groundwater numerical model, information from additional surveys on the quality of terrestrial habitat conditions of potential GDEs, and an assessment of catchment excision in the context of the Isaac River catchment as a whole.

The proponent concluded that:

- there was no mechanism for project only or cumulative impacts to potential GDEs supported by the Isaac River alluvium, therefore no need for ground-truthing as:
  - groundwater drawdown in the Isaac River alluvium was predicted by the groundwater numerical model to be negligible
  - groundwater was too deep to be accessed by most terrestrial species
- any groundwater use by potential terrestrial GDEs in the regolith was likely to be facultative during dry times rather than obligate
- potential terrestrial GDEs in the regolith would be unlikely to be dependent on groundwater due to high levels of salinity
- impacts on aquatic and terrestrial habitat associated with ephemeral creeks would be limited due to the disturbed nature of the existing environment, and the fact that no listed threatened species were identified during field surveys
- excision of catchments proposed for the project would have negligible impacts as they only made up 1% of the Isaac River catchment.

OWS reviewed the proponent's responses to IESC concerns in the revised draft EIS and concluded that several issues raised had not been addressed to the level of confidence expected by IESC. These included the following issues:

- there was still uncertainty about the confidence of drawdown modelling predictions in the Isaac River alluvium and regolith

- there was no site-specific data of depth to groundwater, or water quality in the regolith, therefore depth to groundwater and salinity could not be used as a justification for lack of groundwater dependence
- the proponent hadn't assessed the impacts of excised waterways and catchments on alluvial aquifers associated with the northern and central unnamed waterways prior to their confluence with the Isaac River
- that intact MNES in the project area were of higher importance due to disturbed and degraded ecosystems, not lower importance as justified by the proponent.

In a further response to OWS advice, the proponent re-stated the conclusions of the revised draft EIS and did not provide any further information.

While OWS indicate there are still significant unresolved issues related to potential impacts on GDEs, I am satisfied that enough information has now been provided to allow for evaluation, and potential impacts can be managed through the implementation of conditions.

I have stated conditions in Appendix 1 of this report which requires the proponent to develop and implement a groundwater monitoring program prior to the commencement of mining activities.

To account for the lack of GDE ground-truthing during the EIS, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would require the numerical groundwater model to be updated in consultation with DCCEEW which will resolve uncertainty regarding the potential for impacts to GDEs as a result of the project. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Subterranean GDEs supporting stygofauna

A stygofauna assessment was undertaken to assess the presence of stygofauna at the site, and understand any potential impacts as a result of the project. Sampling for stygofauna was undertaken at 11 project groundwater monitoring bores on 2 occasions in 2019 and 2020, however no stygofauna were detected. The assessment concluded that stygofauna were unlikely to be present on site outside the Isaac River alluvium, and that there would be no impacts on stygofauna as predicted drawdown in the Isaac River alluvium was negligible.

The IESC commented that there was insufficient stygofauna sampling to adequately characterise presence in the alluvium and regolith, and that further stygofauna sampling was required.

The proponent responded to the IESC's concerns in the revised draft EIS with information from additional stygofauna surveys, but concluded that although obligate stygofauna were detected in one alluvial bore during the additional sampling round, there was no mechanism for impact as drawdown in the Isaac River alluvium would be negligible. The proponent also concluded that stygofauna were unlikely to be present in the regolith due to high levels of salinity, however the 'regolith' bore sampled during the additional stygofauna sampling (MB3) is actually in the Rewan Formation, not the regolith.

OWS reviewed the proponent's responses to IESC concerns in the revised draft EIS, and concluded that there was still uncertainty about the confidence of drawdown modelling predictions in the Isaac River alluvium and regolith, and that stygofauna sampling methods lacked consistency and validation, and did not sample the regolith.

To account for limited stygofauna sampling during the EIS, I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Aquatic GDEs and waterway baseflow

The EIS stated that the Isaac River behaves primarily as a losing stream, where surface water seeps into underlying alluvium. The Isaac River alluvium does experience occasional periods where baseflow is provided to the Isaac River, however this only occurs after prolonged rainfall or flood events. The EIS concluded that aquatic in-stream ecosystems associated with the Isaac River would not be dependent on groundwater, and only use it opportunistically when underlying aquifers were saturated.

The EIS also stated that negligible impacts to surface drainage and waterway baseflow were predicted, as seepage from the Isaac River to the underlying alluvium would increase by 3.65 ML/year during operation. This is stated to be less than 0.01% of the total Isaac River discharge, and would not increase the number of days the Isaac River runs dry.

Terrestrial vegetation and aquatic habitats associated with the palustrine wetlands were stated in the EIS to be unlikely to access groundwater, due to the depth to groundwater (10-20 metres), and more likely to be present as a result of sub-surface clay layers retaining surface water run-off.

The IESC requested further information on the characterisation of the ephemeral waterways on site to justify the conclusion that they also behave as losing streams, and to indicate whether potential losses due to seepage could lead to an increase in zero- or low-flow days in those waterways.

The proponent responded by stating that drawdown that intersects with ephemeral waterways was generally limited to those waterways that would be disturbed as part of the mining activity, and therefore any impacts had already been considered as part of the surface disturbance.

OWS reviewed the proponent’s responses to IESC concerns in the revised draft EIS and concluded that the proponent should undertake further characterisation of the Isaac River alluvium and interaction with waterways.

I have recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP which would allow for the proponent to detect and manage any potential adverse impacts on GDEs and wetlands associated with the project. The GDEWMP would also outline corrective actions and timings to address any detected impacts, and would need to be approved by DCCEEW prior to the commencement of mining operations.

In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

Impacts and mitigation – groundwater - water quality

The project would involve activities which have the potential to increase the risk of contaminants entering groundwater, including:

- seepage from waste rock emplacements
- seepage from fuel, chemical and waste storage areas

- concentration of void water in residual voids
- land based irrigation of treated sewage effluent.

The EIS concluded the following:

- no predicted water quality impacts to the alluvium and regolith from waste rock emplacements due to:
  - groundwater flowing towards open pits during mining and residual voids after mining
  - the presence of underlying clay layers
  - geochemical characteristics of waste rock
- no impacts to water quality from workshops, fuel and chemical storage due to proposed design of refuelling areas and chemical storage areas to include bunding
- no impacts to water quality from sewage effluent due to location of irrigation area
- no impacts to water quality from residual voids after mining is complete
- no cumulative impacts to water quality, as there are no project impacts to water quality.

I am satisfied that the mitigation measures and stated conditions for fuel, chemical and waste storage, and land-based irrigation of treated sewage effluent described in the surface water section above will also limit potential impacts to groundwater from those activities and that regular groundwater monitoring will detect any potential issues if they occur.

Waste rock emplacement areas

Waste rock emplacements will be made up primarily of waste rock and coal rejects, however waste heavy vehicle tyres will be disposed of in waste rock emplacements if they are not suitable for re-treading or for use as a resource.

Adverse impacts to groundwater water quality could occur if waste rock, coal rejects and waste tyres are not appropriately managed due to the potential for generating acid, saline or contaminated seepage.

The EIS concluded that there would be no impacts to groundwater quality as a result of the project. The EIS stated that risks from waste rock and coal rejects were low due to low potential for acidity and salinity to be generated. In addition, the presence of open cut pits during and after mining would create a hydraulic flow gradient that would draw groundwater toward the pits, and ensure any seepage would not leave the site. The EIS also stated that underlying clay layers would inhibit seepage from waste rock emplacements into the Isaac River alluvium and regolith.

The IESC raised concerns about the risk of leachate from waste rock emplacements seeping into underlying strata. The proponent responded stating that surface water runoff and seepage would be monitored for a range of water quality parameters, and that coal rejects from the CHPP would undergo geochemical validation prior to disposal.

OWS reviewed the proponent’s responses to IESC concerns in the revised draft EIS and requested further information on the strata underlying proposed waste rock placements, and methods for the management and disposal of waste rock and coal rejects. The proponent responded with lithological data on the underlying strata, and further information on disposal methods.

To minimise risks to groundwater, the proponent has committed to:

- geochemically validate waste rock and coal rejects prior to disposal
- bury coal rejects by at least 10 metres of waste rock
- dispose of waste tyres in locations that would not impede saturated aquifers

- collect seepage from out-of-pit waste rock emplacements where coal rejects are co-disposed and direct it to the mine-affected water system.

To ensure mine wastes do not impact on groundwater, I have stated conditions in Appendix 1 of this report, including a requirement for the proponent to monitor groundwater quality to identify and address any potential groundwater quality impacts associated with the seepage of from waste rock dumps. I also require development and implementation of a mineral waste management plan prior to the commencement of mining activities. For the purposes of the EA, mining activities are defined to include all mining disturbance including land clearing, construction of infrastructure, overburden removal and active mining, therefore any conditions with a requirement to take place prior to mining activities must be undertaken prior to any land disturbance including project construction.

Residual voids

Following the cessation of mining and site rehabilitation the EIS proposed that there would be 3 residual voids remaining in the landscape, the Main Void, West Void, and North-West Void. The voids would gradually fill with water from rainfall, surface water runoff and groundwater inflows, and lose water through evaporation and abstraction.

Void water in residual voids in the Bowen Basin is typically saline as a result of dissolved salts in surface water runoff and groundwater inflows (direct base flow from water in coal seams and interburden, and indirect percolation of rainwater through saline material in backfilled spoil within the original pit shell).

The salinity of void water in residual voids can influence water quality and groundwater flow after mining is complete, therefore it is important to demonstrate that residual voids will be safe, stable, not cause environmental harm and can sustain a final land use.

Water in residual voids can impact the environment in the following ways:

- overtopping of voids where water levels exceed the pit crest and void water flows out as surface water runoff
- flooding of voids where flood water enters the residual void and displaces void water as surface water flows
- migration of void water into surrounding permeable strata (i.e. aquifers) as groundwater
- use of void water by fauna e.g., bats and birds.

Proposed beneficial use

The proponent proposed a final land use for the residual voids of water storage for agriculture (stock drinking), and proposed to abstract 70 ML/year of residual void water that would be used to provide drinking water for cattle. The consistent abstraction of water would provide a beneficial use for void water, as well as providing a mechanism to remove salt from the residual voids, and reduce the likelihood of voids becoming hypersaline (i.e. >52,000 μS/cm or >35,000 mg/L TDS). The proposed beneficial use for water in residual voids was supported in the EIS by void water modelling, purported to demonstrate that the void water would be suitable for use as stock water for cattle.

Relevant guidelines

The Australian Government has prepared guidance and default guideline values applicable to both groundwater and surface water quality provided for livestock drinking water (the stock water guideline). The stock water guidelines for salinity in beef cattle are as follows:

- 0 – 4,000 mg/L TDS (~6,000 μS/cm): no adverse effects

- 4,000 – 5,000 mg/L TDS (~6,000 – 7,500 μS/cm): animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production
- 5,000 – 10,000 mg/L TDS (~7,500 – 15,000 μS/cm): loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually.

The guidelines state that livestock generally find water of high salinity unpalatable. Water of marginal quality can cause gastrointestinal symptoms and a reduction in weight gain and milk production. However, livestock can acclimatise physiologically to some extent to water of higher salinity when the level is adjusted over several weeks.

Void water model methodology

The proponent used a GOLDSIM model to predict the long-term water level and salinity of each residual void, using 133 years of rainfall and evaporation data to create and indicative long-term climate record. The volume of groundwater inflows used in the void model were derived from the groundwater numerical model, and took into account the movement of water between the residual voids and backfilled spoil in the original pit shell (i.e. in-pit waste rock dump). The salinity of groundwater inflows used in the void model were derived as follows:

- indirect inflows through backfilled spoil: 1,012 μS/cm, derived from the geochemical assessment of waste rock
- direct inflows from coal seams and interburden:
  - North-West and West voids: 8,400 μS/cm, derived from water quality data from nearby groundwater bores
  - Main Void 13,230 μS/cm derived from water quality data from nearby groundwater bores.

Salinity of surface water runoff was assumed to be 520 μS/cm from unrehabilitated spoil, and 300 μS/cm from rehabilitated landforms, and was applied at a fixed concentration, and did not allow for a reduction in salinity over time.

Abstraction of water for cattle drinking was based on an annual extraction rate of 70 ML/year, split across the voids as follows:

- North-West Void – 10.5 ML/year (15%)
- West Void – 28 ML/year (40%)
- Main Void – 31.5 ML/year (45%).

Water level and salinity model results – beneficial use scenario

Outputs for the beneficial use model in the EIS were presented in graph format and supported the following conclusions:

- North-West Void:
  - water level would reach equilibrium (i.e., when water inputs and outputs are balanced) between 118 metres above AHD and 131 metres AHD after approximately 100 years, and would generally vary between these levels throughout the remaining 400 years of the simulation
  - maximum modelled water level would be approximately 78 metres below the North-West Void FSL
  - salinity would reach equilibrium within the first 100 years of the simulation

- salinity ranged from 2,000 to 9,000 µS/cm during wetter climatic conditions, with spikes of up to 18,000 µS/cm during drier climatic conditions when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates
- salinity concentrations would exceed the preferred salinity limit for cattle consumption (6,000 µS/cm or 4,000 mg/L TDS) 32% of the time, and would exceed the upper limit for cattle consumption (7,500 µS/cm or 5,000 mg/L TDS) 25% of the time

- West Void:
  - water level would reach equilibrium between 90 metres AHD and 109 metres AHD after approximately 100 years, and would generally vary between these levels throughout the remaining 400 years of the simulation
  - maximum modelled water level would be approximately 87 metres below the West Void FSL
  - salinity would reach equilibrium within the first 100 years of the simulation
  - salinity ranged from 2,000 up to 3,800 µS/cm during wetter climatic conditions, with spikes of up to 8,500 µS/cm during drier climatic conditions when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates
  - salinity concentrations would exceed the preferred salinity limit for cattle consumption (6,000 µS/cm or 4,000 mg/L TDS) 20% of the time, and would exceed the upper limit for cattle consumption (7,500 µS/cm or 5,000 mg/L TDS) 5% of the time
- Main Void:
  - water level would reach equilibrium between 128 metres AHD and 148 metres AHD after approximately 100 years, and would generally vary between these levels throughout the remaining 400 years of the simulation
  - maximum modelled water level would be approximately 59 metres below the Main Void FSL
  - salinity would not reach equilibrium until model year 2,500
  - salinity in the first 500 years would range from 1,000 up to 4,000 µS/cm during wetter climatic conditions, with spikes of up to 6,300 µS/cm during drier climatic conditions when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates. After 500 years, salinity was predicted to trend upwards to 8,500 µS/cm, with spikes of up to 13,600 µS/cm
  - salinity concentrations in the first 500 years would exceed the preferred salinity limit for cattle consumption (6,000 µS/cm or 4,000 mg/L TDS) 2% of the time, and would not exceed the upper limit for cattle consumption (7,500 µS/cm or 5,000 mg/L TDS), however after 1000 years, void water would exceed the upper limit for the majority of the time.

The EIS concluded that the abstraction of water for beneficial use was able to support a sustainable and reliable supply of water for cattle consumption with only relatively small periods of elevated salinity in the 2 smaller voids, but that the Main Void would be able to supply water within stock water guidelines during these periods.

The proponent has proposed to pump water from the 2 smaller voids into the Main Void during periods when salinity exceeds stock water guidelines. This would not impact the capacity of the Main Void to provide stock water of adequate quality due to the significantly larger volume of lower salinity water within the Main Void.

Without abstraction of water (and dissolved salts within that water), the salinity of water in each void would increase over time, and eventually become hypersaline (i.e. >52,000 µS/cm or >35,000 mg/L TDS).

Water level and salinity model results – storm event and climate change scenarios plus beneficial use scenario

The EIS also assessed the effects of storm events and climate change on water and salinity levels in residual voids for the beneficial use scenario.

The storm event assessment determined that even during a probable maximum precipitation (PMP) storm event there would be a minimal impact on the water level in the residual voids, with final water levels remaining between 48 metres and 65 metres below the FSL.

The climate change assessment was based on the projections and methodologies given in the CSIRO and the Australian Bureau of Meteorology report entitled Climate Change in Australia Technical Report (CSIRO, 2015). The conservative Representative Concentration Pathway 8.5 (RCP8.5) emissions scenario was adopted, with 2090 selected as the representative year, being approximately 40 years post-mine closure and the limit of current climate change projections defined by CSIRO.

Three climate models were used:

- ‘best case’ using model GFDL-ESM2M with a 34% decrease in rainfall and a 14.5% increase in evapotranspiration
- ’maximum consensus’ using model ACCESS1-0 with a 15% decrease in rainfall and a 15% increase in evapotranspiration
- ‘worst case’ using model NorESM1-M with a 19% increase in rainfall and an 8.3% increase in evapotranspiration.

The climate change assessment determined that the greatest increase in void water level occurred in the ‘worst case’ scenario, and resulted in equilibrium and peak water levels between 6 metres and 12 metres higher than under baseline climate conditions.

For salinity, the assessment outcomes were more variable, both between climate models and voids:

- North-West Void salinity was broadly similar to baseline conditions for the ‘maximum consensus’ scenario; the ‘best case’ scenario had a peak salinity of 28,000 µS/cm in the first 15 years, but was otherwise similar to baseline, and the ‘worst case’ scenario had a slightly higher salinity range with peaks of up to 24,000 µS/cm (compared to 18,000 µS/cm for the base case)
- West Void salinity was broadly similar to baseline conditions for the ‘best case’ and ‘maximum consensus’ scenarios. The ‘worst case’ scenario resulted in significantly greater salinity, with peaks of up to 24,000 µS/cm (compared to 8,500 µS/cm for the base case)
- Main Void salinity was broadly similar to baseline conditions for the ‘worst case’ scenario. The ‘best case’ and ‘maximum consensus’ scenarios resulted in increased salinity, with peaks of up to 8,400 and 9,000 µS/cm, respectively (compared to 6,200 µS/cm for the base case).

The storm event and climate change scenarios were not modelled for a scenario where there was no beneficial use of void water.

Water level and salinity model – no beneficial use scenario

DES and the Office of the Coordinator-General raised concerns about the viability of the proposed beneficial use for void water, particularly when salinity levels were modelled to exceed stock water guidelines, and requested modelling of void salinity without the abstraction of water for cattle.

The proponent responded with additional modelling that concluded:

- North-West Void:
  - maximum modelled water level would be approximately 80 metres below the North-West Void FSL
  - salinity would increase over time, and was not predicted reach equilibrium within the first 500 years of the simulation
  - salinity broadly ranged from 2,000 up to 60,000 μS/cm, with spikes of up to 340,000 μS/cm when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates
- West Void:
  - maximum modelled water level would be approximately 85 metres below the West Void FSL
  - salinity increases over time, and would not reach equilibrium within the first 500 years of the simulation
  - salinity broadly ranged from 4,000 up to 10,000 μS/cm, with spikes of up to 24,500 μS/cm when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates
- Main Void:
  - maximum modelled water level would be approximately 60 metres below the Main Void FSL
  - salinity would increase over time, and would not reach equilibrium within the first 500 years of the simulation
  - salinity broadly ranged from 1,000 up to 6,000 μS/cm for the first 400 years, then increased with occasional periods of elevated salinity up to 15,000 μS/cm when the stored volume within the void would be lower as a result of low rainfall and high evaporation rates.

The modelling of residual void salinity without abstraction predicted that water from the Main Void was typically within stock water guidelines for approximately 480 years with no additional management. Water in the North-West and West voids exceeded stock water guidelines after approximately 30 and 150 years respectively.

Modelling uncertainties and other considerations

Submitters on the revised draft EIS raised concerns regarding the adequacy of the void modelling and supporting assumptions and other considerations.

Advice from DES during the evaluation of the EIS determined that the stocking rate of 2.4 ha per head of cattle within the MLA area is overly optimistic for rehabilitated landforms in the Bowen Basin and is likely to cause erosion and a reduction in groundcover. A review of relevant literature indicated that a stocking rate of 4.6 ha per head of cattle was more appropriate. This would result in a water demand of 36.5 ML/year, significantly less than the 70 ML/year demand on which the modelling was based.

The salinity of groundwater flows through backfilled spoil was modelled to be 1,012 μS/cm based on provided geochemical data, however appeared to be undercounted, and the true value should have been 1,120 μS/cm, a variation of 10%.

IESC and DES raised concerns that residual void modelling only considered salinity, and didn't consider potential groundwater impacts as a result of accumulation or enrichment of metals and metalloids, major ions, nutrients, acidity and hydrocarbons in residual voids.

The proponent responded by stating that the abstraction of water for beneficial use would limit accumulation or enrichment of metals and metalloids. The proponent proposed to monitor residual voids to ensure suitability of water parameters for the proposed post-mine land use. The proponent proposed to manage the risk of excess nutrients and algal blooms by restricting cattle access to the water storages and reticulating water to tanks, dams and troughs for consumption.

Interaction of residual void water with groundwater

There are 2 principal mechanisms for void water to move from residual voids into the surrounding groundwater:

- movement of void water into unsaturated backfill material within the original pit shell (i.e., in-pit waste rock dump). As the water level in the residual void increases (from rainfall runoff and direct groundwater flow from coal seams and interburden), the groundwater levels in the backfilled spoil rise as water moves from the residual void into the unsaturated backfilled material. This continues until the backfilled material becomes saturated, and the hydraulic gradient reverses and water flows from the saturated backfill material into the residual voids, drawn in by evaporation of water in the void. In this scenario, movement of void water into the surrounding strata is typically limited to the original pit shell
- movement of dense saline void water in residual voids into less saline (and less dense) groundwater in surrounding strata, known as density driven flow. If water in residual voids has a higher density than the surrounding groundwater, it will cause void water to migrate into the surrounding groundwater. This only occurs after backfilled material has already become saturated. Saline void water can mobilise contaminants such as dissolved metals, and therefore density driven flow can be a mechanism that transports contaminants into surrounding groundwater.

When water moves from residual voids into the surrounding groundwater, the void is referred to as a source. When water moves from the surrounding groundwater into the residual void, the void is referred to as a sink.

Typically, the presence of an equilibrated residual void that behaves as a sink (i.e., where void water is subject to evaporation and creates a hydraulic gradient towards the void), prevents groundwater from moving away from the void.

The EIS stated that for the beneficial use scenario, once equilibrated, the water levels in the residual voids would be between 24 metres and 71 metres below the pre-mining groundwater levels in the Permian coal measures, therefore would act as groundwater sinks in perpetuity. Prior to equilibrium, the Main Void acts as a groundwater source, while the surrounding backfilled material becomes saturated, but after 100 years post-mining, the Main Void behaves as a sink.

The groundwater assessment for the EIS included a flow path simulation that modelled the movement of groundwater particles in each of the model layers over a 2,000 year post-mining simulation to predict the transport of potential contaminants in groundwater. The simulation predicted that while there was movement of groundwater within the lease, particle movement was toward the residual voids. This included movement for particles in the backfilled Railway and South pits, which were both predicted to move towards the Main Void.

The IESC raised concerns regarding the residual void modelling, particularly in relation to the consideration of density driven flow, as well as uncertainty analysis for groundwater inflows.

The proponent responded by describing the sensitivity analysis undertaken for the residual void modelling in relation to climate change scenarios. The sensitivity analysis was used to create a scenario where each void was modelled as having the highest salinity and the maximum water level (not predicted to occur at the same time), i.e., the optimum conditions for density driven flow to occur. The proponent concluded that any changes in the potentiometric head of the void water as a result of salinity and water level would be below the post-mining groundwater level in the Isaac River alluvium, and therefore not cause migration of void water into the surrounding groundwater. The proponent also clarified that direct groundwater inflows comprised only 3% of void inflows, therefore any uncertainties in groundwater inflows (e.g., as a result of cumulative impacts on groundwater drawdown) would have a negligible effect on residual void modelling.

Consideration of options analysis for final land use

The EIS included residual void modelling in support of an analysis of alternative final landform options, including:

- Scenario 1: each residual void backfilled, with no residual void water body
- Scenario 2: each residual void backfilled to a level 5 metres above the pre-mining groundwater level
- Scenario 3: exposed coal seams within each residual void covered with waste rock.

Each scenario was applied to all 3 residual voids, and there was no assessment of options where different scenarios were applied to different voids. This somewhat limited the functionality of the assessment, and meant that it was not possible to understand the implications for groundwater interaction in a potential scenario where, for example, the smaller voids were backfilled but the Main Void was left as a residual void.

A summary of the groundwater implications for each assessed scenario is described below.

Scenario 1

With all pits backfilled, no pit lake would form, and groundwater levels were predicted to return to pre-mining levels and reach equilibrium within 1,000 years. After this time, there would be no mechanism for groundwater movement to be limited within the mine lease. The flow path simulation for this scenario predicted movement of groundwater particles off-site, primarily south-east toward the residual voids of the Olive Downs project, as well as some movement of particles within the regolith towards the Isaac River.

Scenario 2

Despite being above the pre-mining groundwater levels, a shallow pit lake was predicted to still form within each residual void as a result of rainfall and surface water runoff, however this would not be sufficient to support a beneficial use of the pit water.

The West and Main voids were predicted to largely remain as shallow groundwater sinks, while the North-West Void alternated between a sink and a source. However, the reduction in hydraulic gradient was predicted to result in water from out-of-pit waste rock emplacements migrating into the surrounding groundwater systems.

The flow path simulation for this scenario predicted some movement of groundwater particles off-site, primarily particles in the regolith and shallower layers of the Permian coal measures. Groundwater from the North-West and West voids was predicted to move north and north-east. Groundwater from the Main Void was predicted to have very limited movement, but particles in the waste rock dumps between the Main Pit and the Isaac River were predicted to move toward the Isaac River. Particles from the South Pit were predicted to move south-east toward the residual voids of the Olive Downs project.

In the assessment of void water levels and salinity, none of the 3 pit lakes were predicted to reach equilibrium over the 500 year simulation, and pit lakes ranged in in depth from empty (i.e., zero depth) to 3 metres, depending on climatic conditions. Salinity for the North-West Void fluctuated sharply between 320 µS/cm and 32,000 µS/cm, with a variable salt load, as salt was predicted to move toward the other voids when the North-West Void behaved as a source. Salinity in the West and Main voids remained very low until the underlying backfilled spoil became saturated after approximately 75 years, after which salinity fluctuated sharply up to 510,000 µS/cm (the maximum solubility of salt in water at 25°C).

Scenario 3:

This scenario was very close to the optimised landform scenario (i.e. the base case) assessed in full for the EIS. This scenario resulted in 3 residual void pit lakes with similar groundwater interactions to the base case, i.e. voids typically behaved as groundwater sinks, and the flow path simulation predicted that no groundwater would leave the mine lease.

In the assessment of void water levels and salinity, the water levels in the 3 pit lakes were predicted to reach equilibrium after 130 years, and water levels in pit lakes were approximately 2 metres to 5 metres higher than predicted for the base case, although it's not clear if this is as a result of the height of the pit floor increasing, or the volume of water increasing.

Salinity for the North-West Void fluctuated between 2,000 µS/cm and 6,000 µS/cm, with spikes up to 15,000 µS/cm, which was generally lower than in the optimised landform scenario. Salinity in the West Void fluctuated between 2,000 µS/cm and 5,000 µS/cm, with spikes up to 12,500 µS/cm, which was generally higher than in the optimised landform scenario. Salinity in the Main Void fluctuated between 1,000 µS/cm and 4,500 µS/cm, with spikes up to 6,400 µS/cm, which was slightly higher than in the optimised landform scenario. Salinity of pit lakes did not reach equilibrium for any of the residual voids within the 500 year modelling period.

Summary

I acknowledge that as the project is subject to the transitional provisions of the *Mineral and Energy Resources (Financial Provisioning) Act 2018*, and the proponent will be required to submit a detailed PRCP after the EA is issued, following the EIS process.

In balancing the environmental, economic and social effects of the residual voids, I am satisfied that the Main Void and the West Void can support final land-uses of low intensity cattle grazing, native ecosystems and water storage for agriculture (stock drinking). I am not satisfied that the North-West Void is able to support the proposed final land use of water storage for agriculture (stock drinking) over the medium to long term, and have stated conditions in Appendix 1 of this report for the final land use to be low intensity grazing.

For the purposes of this EIS, I am satisfied the proponent has appropriately assessed the potential groundwater quality risks associated with residual voids. I am also satisfied that with the Main Void and West Void retained as residual voids, the hydraulic gradient for the surrounding groundwater will be towards the Main Void, and this will prevent migration of groundwater off-site and limit impacts to groundwater quality.

6.6.2.4.3 Flooding and flow dynamics

The project lies in a lowland area, partially within the Isaac River floodplain. The area is generally flat to slightly undulating with elevation ranging from approximately 185 metres AHD in the north-east of the project to approximately 235 metres AHD in the higher areas to the south-west of the project area. The Isaac River flows in a north-west to south-east direction near the mine lease's north-eastern boundary. The project does not involve any mining activities or infrastructure within the banks of the Isaac River and no diversion of the Isaac River is proposed.

Tributaries of the Isaac River relevant to the project include the 3 unnamed waterways on site which flow in a north-easterly direction, Ripstone Creek west of the mine lease's south-western boundary (which converges with the Isaac River downstream of the project), New Chum Creek to the north and Cherwell Creek, to the north-west.

Flow diversions and flood levees

Up-catchment clean water diversions described in section 6.6.2.4.1 will allow runoff from undisturbed areas to flow around project disturbance, minimising the potential volume of water captured into the mine water management system. CWD drains have been designed for a 1% AEP discharge – discharges greater than the design criteria would result in uncontrolled overland flow.

The EIS also described flood protection levees to protect the open cut pits from inundation during flooding events of 1% AEP and above. These would be constructed progressively as mining develops, and would be removed once no longer required.

Flood modelling and impact assessment

The EIS included flood modelling to assess the potential impacts of flooding from the Isaac River or Ripstone Creek on the project, and to identify any impacts the flood protection levees would have on the Isaac River floodplain and flood dynamics in the catchment.

Flood modelling was undertaken for a range of design flood events (10%, 5%, 1% and 0.1% AEP, and a probable maximum flood (PMF) event) and 2 development scenarios:

- existing conditions including approved neighbouring mining projects
- proposed conditions including existing conditions and proposed project infrastructure (including flood levees and dam embankments).

The EIS concluded that there were no significant impacts on flood levels and velocities predicted in the Isaac River channel and floodplain during operations and post-mining. Project infrastructure was only predicted to interact with the Isaac River for the rarer flood events (1% and 0.1% AEP and PMF), with impacts generally localised and relatively small in magnitude. The geomorphic impact of the project on the Isaac River and floodplain was determined to be negligible. No impacts were predicted on flood levels and velocities in Ripstone Creek, as the project is located outside of the Ripstone Creek floodplain and 0.1% AEP peak flood extent would not interact with any project infrastructure. Model results also demonstrated that the proposed levee alignments and extents would prevent the inundation of the open cut pits throughout the life of the project.

Climate change flood scenarios were also modelled which included an additional 12% rainfall, with results showing that impacts would not be significantly different under the climate change scenario, when compared to the current climate scenario.

A submission from the operator of the adjacent Eagle Downs Mine raised concerns relating to changes to surface water runoff flow patterns as a result of the infrastructure corridor. The proponent has committed to further consultation with Eagle Downs Coal Management Pty Ltd, owner of the Eagle Downs Mine to minimise impacts as part of the project's SIMP.

Other submissions related to flooding raised concerns regarding potential impacts on agricultural land, final landforms and the rail network. These comments are addressed in sections 5.1.5.1.1, 5.1.6.4 and 5.4.4.2 respectively, and I have stated conditions to address these concerns.

I am satisfied that the proponent has adequately assessed the potential flooding risks of the project and mine would include appropriately constructed structures to prevent the ingress of floodwaters in mining operation areas. I am also satisfied that these structures would also be designed to avoid adverse impacts on neighbouring properties and ecosystems within the project area.

Regulated structures – flood levees

The EIS described flood levees that would be designed and operated as regulated structures to prevent ingress of flood waters into the operational areas of the mine up to a 0.1% AEP flood event. The levees would be constructed progressively as required, to the north of the Railway Pit, and to the north-east of the Main Pit, to prevent inundation of the open cut during operations. The EIS provided an indicative design, with varying levee height depending on location in the landscape, to allow a freeboard of 0.5 metres from a 0.1% AEP flood event.

Prior to construction, the proponent has committed to developing detailed design plans, including scour protection as required, of the proposed temporary levees together with a consequence category assessment and certification by a suitably qualified and experienced person.

To ensure temporary levees are appropriately designed, constructed and managed, I have stated a condition for the EA which requires the design, construction and monitoring of the levees to be in accordance with the *Manual for assessing hazard consequence and hydraulic performance of structures Version 5.02* (ESR/2016/1933).

Regulated structures – dams

An assessment of consequences category was made using the preliminary design for all proposed mine-affected water dams in accordance with the Manual. The MWD, MIA Dam and CC Dam could discharge to the receiving environment, and were assigned a preliminary consequence category assessment of 'low' for the failure to contain criteria based on the predicted water quality results from the water balance model. The ROM dam discharges to the CC Dam, and was assigned a preliminary category of low consequence due to the low risk of significant consequence in the event of a failure to contain or dam break.

To ensure any dam structures are appropriately sized, designed and managed, I have stated a condition for the EA which requires the consequence category of any structure be assessed by a suitably qualified and experienced person in accordance with the Manual for assessing consequence categories and hydraulic performance of structures prior to the design and construction of the structure.

6.6.2.5 Coordinator-General's conclusion: water impacts

6.6.2.5.1 Coordinator-General's conclusion: surface water

Based on the project water management system and the comprehensive requirements of the EA conditions, I am satisfied that the proponent would manage any significant potential impacts of the project on environmental values supported by surface water quality and quantity.

The proposed water management system would be designed to protect the environmental values of local and regional surface water resources. This would include measures to ensure mine-affected water is contained and separated from other water streams and to prevent uncontrolled discharges of mine-affected water to the receiving environment. Controlled releases would only occur in accordance with the proposed controlled release strategy and would need to meet the release limits stipulated in the EA.

I have stated a range of conditions for the EA to ensure that acceptable water quality outcomes for the receiving environment are achieved. The conditions include specific water quality objectives, release limits, and trigger levels which would require further investigation and management action if exceeded. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project.

6.6.2.5.2 Coordinator-General's conclusion: groundwater

Due to the nature of groundwater drawdown being an inherent aspect of mining for the project, there are no mitigation measures proposed to avoid or minimise impacts. Management of drawdown impacts will be primarily through the monitoring of groundwater levels and quality.

I have stated conditions for the EA which require the proponent to develop and implement a groundwater monitoring program prior to the commencement of activities, and to monitor groundwater levels at a frequency which will detect potential drawdown impacts. The groundwater monitoring program will also be used to identify and address any potential groundwater quality impacts associated with the seepage from project activities. I have also recommended a condition to the Australian Minister for the Environment requiring the proponent to develop and implement a GDEWMP to detect and manage any potential impacts on GDEs and wetlands associated with the project. In addition to the GDEWMP, I have recommended conditions to prepare an offset management plan and MNES management plan which will require monitoring of the Wynette offset area and MNES species that could be affected by project impacts to GDEs and wetlands.

I am satisfied the proponent has appropriately assessed the potential groundwater quality risks associated with residual voids. I am also satisfied that with the Main Void and West Void retained as residual voids, the hydraulic gradient for the surrounding groundwater will be towards the Main Void, and this would prevent migration of groundwater off-site and limit impacts to groundwater quality.

6.6.2.5.3 Coordinator-General's conclusion: flooding

I am satisfied that the proponent has adequately assessed the potential flooding risks of the project and mine would include appropriately constructed structures to prevent the ingress of floodwaters in mining operation areas. I am also satisfied that these structures would also be designed to avoid adverse impacts on neighbouring properties and ecosystems within the project area.

To ensure any regulated structures including dams, temporary levees and high wall emplacements are constructed and managed to prevent the ingress of floodwaters in the operational areas of the mine, I have stated a condition for the EA which requires the design, construction and monitoring of these structures to be in accordance with relevant guidelines.

6.7 Cumulative impacts – surrounding development

6.7.1 Existing environment

The mine site and access road (including the infrastructure corridor) is located within an existing mining precinct. Nearby existing or approved coal mining operations include:

- Olive Downs Mine (adjacent to the east and south-east)
- Eagle Downs Mine (adjacent to the west)
- Moorvale South Mine (approximately 2 km north-east)
- Peak Downs Mine (approximately 6 km west)
- Daunia Mine (approximately 7.5 km north)
- Poitrel Mine (approximately 8 km north)
- Millennium Mine (approximately 10.5 km north-west)
- Isaac Downs Mine (approximately 14 km north-west)
- Isaac Plains East Mine (approximately 25 km north-west)
- Moorvale Mine (approximately 19 km north)

- Saraji Mine (approximately 19.5 km south)
- Lake Vermont Mine (approximately 21 km south-east)
- Goonyella Riverside and Broadmeadow Mines – coordinated project (approximately 50 km north-west).

6.7.2 Cumulative biodiversity impacts

The Winchester South project would clear a total of 569 ha of remnant vegetation, representing less than 0.2% of the remaining remnant vegetation in the Northern Bowen Basin and Isaac-Comet Downs biodiversity subregions. A total of 6,381 ha of non-remnant vegetation would also be cleared. The impacts of the project's clearance totals are summarised in Table 6.9. As the proponent did not include an analysis for the Australian painted snipe, the habitat available for the ornamental snake has been used as a proxy. Furthermore, the combined total for the squatter pigeon has been used (i.e. breeding and foraging plus dispersal habitat), and the total project clearance for the koala is the area reported in the EIS (i.e. not including the remnant and regrowth areas that I have recommended to be included).

Table 6.9 Impact of listed threatened species and communities habitat clearance totals for Winchester South project

MNES	Total project clearance (ha)	Habitat available within the Northern Bowen Basin and Isaac-Comet Downs biodiversity subregions (ha)	Proportion of habitat clearance attributed to the project
Ornamental snake	1,834.2	111,103	<2%
Squatter pigeon	728.3	431,721	<0.2%
Koala	168.9	1,052,403	<0.02%
Greater glider	132.8	1,052,403	<0.02%
Australian painted snipe	1,859.3	111,103	<2%
Natural Grasslands TEC	80.9	402,689	0.02%
Poplar Box TEC	9.6	72,618	<0.02%

The EIS determined that the habitat proposed to be removed for the project represents only a small portion of the habitat available within the subregions. I consider the project's impacts at the subregion scale to be acceptable given the abundance of suitable habitat within those areas. While the project's impacts to threatened species and communities habitat is significant at the local scale, I am satisfied that these impacts can be offset in accordance with the proponent's offset management plan.

6.8 Coordinator-General's conclusion: MNES

6.8.1 Listed threatened species

I am satisfied that the EIS has identified the potential impacts that the mine site and access road (including the infrastructure corridor) could have on the ornamental snake, squatter pigeon, koala, greater glider, and Australian painted snipe.

I consider that the proposed offsets for Stage 1 of the project are not sufficient to compensate for the project's Stage 1 impacts to listed threatened species, however, I am satisfied that offsets for Stage 1 and for future stages of the project could be delivered on the landholdings around the project site. I have however recommended conditions to the Australian Minister for the Environment requiring the proponent to submit an updated offset management strategy that incorporates the additional areas of impact to the Australian painted snipe, squatter pigeon (southern), and the koala, and that the details of offsets for each offset stage of the project are confirmed by the proponent and approved by the Minister prior to the commencement of each offset stage.

In consideration of the proposed mitigation and offset measures, the proponent’s commitments, and the conditions recommended in this report, I conclude that the available recovery plans and approved conservation advice for each species has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the ornamental snake, squatter pigeon, koala, greater glider, and Australian painted snipe are acceptable.

6.8.2 Threatened ecological communities

I am satisfied that the EIS has identified the potential impacts that the mine site and access road (including the infrastructure corridor) could have on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC and the Poplar Box Grassy Woodland on Alluvial Plains TEC.

I consider that the proposed offsets for Stage 1 of the project are sufficient to compensate for the project’s Stage 1 impacts to listed TECs. I am also satisfied that offsets for future stages of the project could be delivered on the landholdings around the project site. I have recommended conditions to the Australian Minister for the Environment requiring that the details of offsets for future offset stages of the project are confirmed by the proponent and approved by the Minister prior to the commencement of each offset stage.

In consideration of the proposed mitigation and offset measures, the proponent’s commitments, and the conditions recommended in this report, I conclude that the approved conservation advice for each ecological community has been considered; the proposed management actions are consistent with the relevant TAPs; and the impacts on the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC and the Poplar Box Grassy Woodland on Alluvial Plains TEC are acceptable.

7. Conclusions

In undertaking my evaluation, I have considered the draft and the revised draft EIS, submissions on the draft and revised draft EIS and agency advice.

I am satisfied that the requirements of the SDPWO Act have been met and that sufficient information has been provided to enable the evaluation of potential impacts, and development of mitigation strategies and conditions of approval. I consider that the mitigation measures, all commitments and the conditions stated in this report would result in acceptable overall outcomes.

Based on the information provided by the proponent in the EIS, I conclude that there are significant local, regional and state benefits to be derived from the project, and that environmental effects can be adequately avoided, minimised, mitigated or offset as required through the implementation of the measures outlined in the EIS documentation. The conditions I have specified in this report have been formulated to further manage all potential impacts associated with the construction, operation, and decommissioning of the project.

I am satisfied that the SIA is generally in accordance with the *SIA Guideline* (2018) and that the strategies prepared as part of the SIA demonstrate that the proponent is committed to ensuring that the project does not adversely impact on and enhances opportunities for the local communities. I have decided that the 100% FIFO prohibition and anti-discrimination provisions of the SSRC Act apply to the project's construction workforce.

Accordingly, I approve the project, subject to the stated conditions in Appendix 1, the recommendations in Appendix 2 and Appendix 3 and the proponent commitments in Appendix 4. In addition, it is expected that the proponent's commitments will be fully implemented as presented in the EIS documentation and summarised Appendix 4 of this report.

To proceed further, the proponent will be required to obtain the following key approvals prior to project commencement:

- obtain EPBC Act approval
- obtain relevant development approvals
- an EA with relevant ERAs under the EP Act
- mining leases under the *Mineral Resources Act 1989*.

If there are any inconsistencies between the project (as described in the EIS documentation) and the conditions in this report, the conditions shall prevail. The proponent must implement all the conditions of this report.

Section 6 of this report describes the extent to which the material supplied by the proponent addresses the actual or likely impacts on MNES of each controlled action for the project.

Copies of this report will be issued to:

- the Australian Minister for the Environment
- the Queensland Minister for the Environment and the Great Barrier Reef
- DCCEEW
- DES
- Department of Resources
- Isaac Regional Council.

I conclude that any adverse environmental impacts can be adequately avoided, minimise, mitigated and/or offset as required through conditions I have stated and recommended in this report, and proponent commitments outlined in the EIS.

Accordingly, I recommend that the project proceed, subject to conditions and recommendations included in this report. I expect that the commitments made by the proponent in the EIS will be fully implemented.

A copy of this report will also be available on the Department of State Development, Infrastructure, Local Government and Planning's website at **www.statedevelopment.qld.gov.au/winchestersouth**.

This report will lapse 3 years following the publication date of this report, unless the Coordinator-General sets another date at a future time that extends the report.

Appendix 1. Stated conditions

Part A. Conditions stated under the *Environmental Protection Act 1994* for an environmental authority

Schedule A. General

A1 No more than 17 million tonnes per annum (Mtpa) of run-of-mine coal is to be extracted in a year.

A2 No more than 17 Mtpa of run-of-mine coal is to be processed on site in a year.

A3 The maximum area of disturbance for each mine feature authorised in Table A1 – Authorised disturbance areas and depicted in Figure A1 – Authorised disturbance areas must not be exceeded.

A4 Mining activities must not be undertaken beyond the authorised disturbance area depicted in Figure A1 – Authorised disturbance areas.

For the purposes of this condition only, the following activities are not relevant to this condition:

(a) installation and operation of monitoring equipment

(b) monitoring or sampling required by a plan or program required by a condition of this environmental authority and

(c) exploration activities conducted in accordance with the standard conditions in the 'Eligibility criteria and standard conditions for exploration and mineral development projects'.

Table A1 Authorised disturbance area

Mine domain	Mine feature name	Location	Maximum disturbance area (ha)
Infrastructure	Infrastructure corridor	Figure A1 – Authorised disturbance area	135.77
	MIA (and other infrastructure areas)		1,902.96
	Water management infrastructure		18.87
Open cut pits and ramps (including in-pit waste rock emplacement)	Main Pit (North and South) South Pit West Pit North-West Pit Railway Pit		3,041.60
Out-of-pit waste rock emplacement areas	Out-of-pit waste rock emplacement areas		1,867.34
Exploration	Exploration activities	ML700049, ML700050, ML700051	As per the standard conditions in the most recent version of the 'Eligibility criteria and standard conditions for exploration and mineral development projects' (ESR/2016/1985) and Table I1: Significant residual impacts to prescribed environmental matters of this environmental authority

A5 All reasonable and practicable measures must be taken to prevent or minimise environmental harm caused, or likely to be caused, by the activities.

A6 Unless specifically authorised by a condition of this environmental authority, this environmental authority does not authorise a relevant act which is:

(a) an act that causes serious or material environmental harm or an environmental nuisance or

(b) an act that contravenes a noise standard or

(c) a deposit of a contaminant, or release of stormwater run-off, mentioned in section 440ZG of the *Environmental Protection Act 1994*.

Contravention of conditions

A7 Unless specifically authorised by a condition of this environmental authority, details of any contravention of a condition of this environmental authority must:

(a) be reported to the administering authority within 24 hours of becoming aware of the contravention and

(b) include the nature and circumstances of the contravention and any immediate actions taken.

A8 Within 28 days of a report made under condition A7 (or a longer period agreed to in writing by the administering authority), an investigation must be undertaken to determine:

(a) the potential circumstances and actions that may have contributed to the contravention and

(b) the reasonable and practicable measures that have been, or will be, implemented to address the cause of the contravention to prevent future contraventions of this nature.

A9 Within 28 days of investigating a contravention under condition A7 (or a longer period agreed to in writing by the administering authority), the reasonable and practicable measures identified in the investigation must be implemented.

A10 The outcome of the investigation carried out under condition A8, and the reasonable and practicable measures implemented under condition A9, must be recorded.

Complaints

A11 The following details must be recorded for all complaints received and provided to the administering authority upon request:

(a) if authorised by the person making the complaint, their name and contact details

(b) the time and date the complaint was received and

(c) the nature and details of the complaint.

A12 As soon as reasonably practicable but no later than 7 days of receiving a complaint (or a longer period agreed to in writing by the administering authority), an investigation must be undertaken to determine:

(a) the potential circumstances and actions on site that may have contributed to the basis of the complaint and

(b) the reasonable and practicable measures that will be, or have been, implemented to address the complaint.

A13 As soon as reasonably practicable but no later than 7days of investigating a complaint under condition A11 (or a longer period agreed to in writing by the administering authority), the reasonable and practicable measures identified in the investigation must be implemented.

A14 The outcome of the investigation carried out under condition A12, and the reasonable and practicable measures implemented under condition A13, must be recorded.

Risk Management

A15 The holder of this environmental authority must develop and implement a risk management system for mining activities which mirrors the content requirements of the most recent version of Standard for Risk Management (ISO31000), or the latest edition of an Australian Standard for risk management.

Maintenance of measures, plant and equipment

A16 The holder of this environmental authority must:

(a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority

(b) maintain such measures, plant and equipment in a proper and efficient condition

(c) operate such measures, plant and equipment in a proper and efficient manner and

(d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

A17 Records of installation, calibration and maintenance carried out under condition A16 must be kept.

Monitoring and sampling

A18 All monitoring and sampling required by the conditions of this environmental authority must be carried out, interpreted, and recorded by an appropriately qualified person.

Record keeping

A19 Unless otherwise specified by a condition of this environmental authority, records must be kept for the period outlined in Table A2 - Record keeping requirements at a minimum.

Table A2 Record keeping requirements

Description of records	Retention requirement
Monitoring results	Retain for 15 years
All other records	Retain for 5 years

Plans, reports, and programs

A20 All plans, reports, and programs required by a condition of this environmental authority must be developed and reviewed by an appropriately qualified person.

A21 Upon request from the administering authority, copies of any monitoring results, records, registers, management plans, programs and/or reports required by the conditions of this environmental authority must be made available and provided within:

(a) 14 days of receiving the request or

(b) an alternative timeframe agreed between the administering authority and the environmental authority holder.

A22 Unless otherwise authorised in writing by the administering authority, all laboratory analyses required under this environmental authority must be carried out by a laboratory that has National Association of Testing Authorities accreditation for such analyses.

Notification of Emergencies, Incidents and Exceptions

A23 The holder of this environmental authority must notify the administering authority in writing within 24 hours, or within the timeframe outlined in the relevant condition of this environmental authority, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.

A24 Within 14 days, or within the timeframe outlined in the relevant condition of this environmental authority, following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:

(a) results and interpretation of any samples taken and analysed

(b) outcomes of any action/s taken at the time to prevent or minimise unlawful environmental harm and

(c) proposed actions to prevent a recurrence of the emergency or incident.

Third-party Reporting

A25 The holder of this environmental authority must:

(a) within one year of the grant of any of the mining leases relevant to this environmental authority, obtain from an appropriately qualified person, a report on compliance with the conditions of this environmental authority

(b) obtain further such reports at regular intervals, not exceeding 3 yearly intervals, from the completion of the report referred to above and

(c) provide each report to the administering authority within 90 days of its completion.

A26 Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority, and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must:

(a) comply with the amended or changed standard, policy or guideline within 2 years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation, or where the amendment or change relates specifically to regulated structures referred to in Schedule J: Regulated structures of this environmental authority - the time specified in that condition and

(b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.

Chemical storage

A27 Chemicals and fuels in containers of greater than 15 litres must be stored within a secondary containment system.

Non-sensitive location agreement(s)

A28 The environmental authority holder may enter into agreements with the owner of a sensitive place (e.g., non-sensitive location agreements).

A29 The holder of this environmental authority must notify the administering authority of any non-sensitive location agreement upon its commencement, amendment, transfer, extension, and/or conclusion of the agreement.

A30 The holder of this environmental authority must establish and maintain a register of non-sensitive location agreements.

Commencement of mining activities

A31 Within forty-eight (48) hours of commencing any mining activities, the holder must provide the administering authority with written notification of commencement.

For the purposes of this condition only, the following activities are not relevant to this condition:

(a) installation and operation of monitoring equipment

(b) monitoring or sampling required by a plan or program required by a condition of this environmental authority and

(c) exploration activities conducted in accordance with the standard conditions in the 'Eligibility criteria and standard conditions for exploration and mineral development projects'.

Schedule B. Air

B1 The environmental authority holder must ensure that air emissions generated by the mining activities do not cause the criteria in Table B1 - Air Quality Limits and Monitoring Methods to be exceeded at any sensitive place or commercial place.

The measurement of air emissions for a sensitive place or commercial place is either:

(i) at that place (if measured there) or

(ii) at a monitoring location representative of the sensitive place or commercial place as agreed to by the administering authority.

B2 The environmental authority holder must, at the locations determined by condition B6, monitor the air quality indicators in accordance with the corresponding monitoring standard stated in Table B1 – Air Quality Limits and Monitoring Methods at a frequency of:

(a) continuous for meteorological conditions

(b) continuous for PM_{10} and

(c) monthly for dust deposition.

B3 The monitoring carried out in accordance with condition B2 must commence prior to commencement of mining activities.

B4 If the monitoring carried out in accordance with condition B2 indicates an exceedance of the relevant limits stated in Table B1 – Air quality limits and monitoring methods, then the holder of this environmental authority must:

(a) immediately implement measures to reduce the contributions resultant from the mining activities conducted under this environmental authority to levels below those specified in Table B1 – Air quality limits and monitoring methods, and

(b) notify the administering authority in writing within 24 hours of becoming aware of the exceedance, and include the following information:

(i) the location/s and time/s of the exceedance/s

(ii) the type/s of air emission and contraction/s recorded and

(iii) if any complaint/s were received in association with the exceedance.

B5 Within 14 days of notifying under condition B4, the environmental authority holder must submit a report to the administering authority that details:

(a) the air quality data recorded

(b) the meteorological conditions recorded

(c) the air quality data upwind of the mining activities and

(d) details the measures taken to reduce the air emissions generated by the mining activities and an assessment of the effectiveness of those measures.

Continuous monitoring

B6 At least 4 continuous monitoring stations must be installed prior to the commencement of mining activities to monitor PM_{10} concentrations and meteorological conditions at locations, as determined by an appropriately qualified person, for:

(a) the real-time monitoring and determination of air emissions resultant from activities conducted under this environmental authority and

(b) guiding the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with the conditions of this environmental authority and

(c) determination of upwind PM_{10} concentrations and the mine's contribution to PM_{10} concentrations recorded downwind of mining activities conducted under this environmental authority.

B7 All monitoring data collected under condition B6 must be made publicly available, in real time, and online on the environmental authority holder's website, or another location as required by the administering authority, presented:

(a) spatially

(b) for each monitoring location:

(i) real-time rolling over 1-hour average data on 24-hour basis

(ii) links to historical data on one hour basis and

(iii) links to historical 24-hour data.

B8 The real-time, online publication of monitoring parameters in accordance with condition B7 must commence within 3 months of the commencement of mining activities.

Table B1 Air quality limits and monitoring methods

Air quality determination /indicator	Air quality limit	Averaging period	Monitoring standard
Particulate matter less than 10 µm in aerodynamic diameter (PM_{10})	50 µg/m^3	24 hour	AS3580.9.8 *Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM_{10} continuous direct mass method using tapered element oscillating microbalance analyser.* Or, where real-time monitoring is not being conducted, in accordance with the latest edition of the relevant Australian Standard (or a method approved by any other Australian, European or North American jurisdiction/EPAs where monitoring requirements are not described in the Australian Standards).
Dust deposition	120 mg/m^2/day	monthly	AS3580.10.*1 Methods for sampling and analysis of ambient air—Determination of particulate matter —Deposited matter –Gravimetric method.*
$PM_{2.5}$	25 µg/m^3	24 hour	AS/NZS 3580.9.13 *Methods of sampling and analysis of ambient air, Determination of suspended particulate matter – $PM_{2.5}$ continuous direct mass method using a tapered element oscillating microbalance monitor.*
Meteorological data (including but not limited to wind speed and direction, relative humidity, temperature, precipitation and rainfall intensity, solar radiation)	N/A	Continuous (minimum 1-hour average)	(1) Monitoring by automatic meteorological station(s) (2) Australian Standard AS3580.*14 Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications* or (3) an alternative method approved by the administering authority.
Siting of monitoring equipment	N/A	N/A	Determined by an appropriately qualified person.

B9 When requested by the administering authority, air emissions monitoring must:

(a) be undertaken at the locations and frequency specified by the administering authority, and the results thereof provided to the administering authority within 14 days following completion of the monitoring. This includes providing interim reports if the monitoring lasts for more than one month and

(b) be carried out in accordance with the monitoring standard for each relevant air quality indicator stated in Table B1 – Air quality limits and monitoring methods, unless otherwise specified by the administering authority.

B10 If the monitoring required by condition B9 indicates an exceedance of the relevant limits in Table B1 – Air quality limits and monitoring methods, then abatement measures must be implemented as soon as reasonably practicable to ensure air emissions from the mining activities do not result in further exceedances.

Air Quality Management Plan

B11 An Air Quality Management Plan must be developed and implemented prior to the commencement of mining activities.

B12 The Air Quality Management Plan required by condition B11 must:

(a) provide for the effective management of air emissions generated by the activities authorised under this environmental authority

(b) identify any sensitive and commercial place/s that may be impacted on by air emissions from the mining activities, including any location subject to a Non-Sensitive Location Agreement

(c) identify all sources of air emissions that may occur as a result of the mining activities

(d) provide for an air emissions monitoring program in accordance with Table B1 – Air quality limits and monitoring methods

(e) detail the locations, and the considerations made in determining the location, for the continuous monitoring of PM_{10} and meteorological conditions as determined by condition B6

(f) detail mitigation and control measures to prevent environmental nuisance and the limits specified in Table B1 – Air quality limits and monitoring methods being exceeded, at any sensitive place or commercial place

(g) include a Trigger Action Response Program that uses a combination of predictive meteorological forecasting and real time air monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with the conditions of this environmental authority and the air quality limits in Table B1 – Air quality limits and monitoring methods and

(h) detail roles and responsibilities of the personnel responsible for the effective implementation of the plan.

B13 The Air Quality Management Plan required by condition B11 must be reviewed and updated by 30 June each year, and include any recommendations relating to:

(a) the suitability of the Air Quality Management Plan to meet its objective under condition B11 and the content requirements stated in condition B12

(b) improvements to the air quality management plan, including whether additional monitoring locations are required to satisfy the requirements of condition B12(d) and

(c) the results of the air emissions monitoring program and actions taken to reduce potential impacts on sensitive and commercial places from mining activities.

Odour

B14 The release of noxious or offensive odour(s) or any other noxious or offensive airborne contaminant(s) resulting from the mining activity must not cause an environmental nuisance at any sensitive or commercial place.

Greenhouse gas abatement plan

B15 A greenhouse gas (GHG) abatement plan must be developed and implemented prior to the commencement of mining activities. The GHG abatement plan must include:

(a) an inventory of projected unmitigated annual Scope 1 and Scope 2 emissions for each GHG over the life of the project

(b) the intended objectives, measures and performance standards to avoid and mitigate GHG emissions consistent with the latest version of the Queensland Climate Action Plan and relevant targets

(c) a process for regularly reviewing, assessing, and implementing new technologies to identify opportunities to further reduce GHG emissions and energy use and progressively improve energy efficiency

(d) A program for annual monitoring, auditing and reporting on GHG emissions from all relevant activities and the success of measures to avoid and mitigate GHG emissions and achieve relevant targets and

(e) a biennial review and update of the effectiveness of the plan.

B16 The results of the program conducted under condition B15(d) must be made publicly available on a website.

Schedule C. Waste

C1 Unless otherwise authorised by the conditions of this environmental authority, all waste generated in carrying out the activity must be lawfully reused, recycled or removed to a facility that can lawfully accept the waste.

C2 Unless otherwise permitted by the conditions of this environmental authority, waste must not be burnt.

C3 The holder of this environmental authority may burn vegetation cleared while carrying out the mining activity, provided the burning does not cause environmental harm at any sensitive place or commercial place.

C4 Unless otherwise authorised by the conditions of this environmental authority, non-mineral waste, except scrap tyres and green waste, must not be disposed of on site

C5 Coal rejects must not be disposed of in out-of-pit waste rock emplacements except for the Railway Pit Waste Rock Emplacement and the Main Pit Waste Rock Emplacement 1 as identified in Figure A1 – Authorised disturbance areas.

Storage and disposal of tyres

C6 Scrap tyres must be stored and disposed of in accordance with the Operational Policy – Disposal and storage of scrap tyres at mine sites (DES, 2023).

Non-mineral Waste Management Plan

C7 A Non-mineral Waste Management Plan must:

(a) be developed and implemented prior to the commencement of mining activities and

(b) be reviewed at regular intervals, not exceeding 2 years.

C8 The Non-mineral Waste Management Plan required by condition C7 must include:

(a) a description of the activities that may generate waste

(b) waste management strategies including:

(i) recording of the types and amounts of wastes generated by the mining activity

(ii) segregation of the wastes

(iii) storage of the wastes

(iv) transport of the wastes

(v) disposal of waste including leachate management and

(vi) monitoring and reporting matters concerning the waste

(c) the hazard characteristics of the wastes generated including disposal procedures for regulated wastes

(d) a program for reusing, recycling or disposing of all wastes

(e) how waste will be managed in accordance with the waste and resource management hierarchy, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices in the waste management hierarchy (i.e., avoidance, reuse, recycling, energy recovery, disposal)

(f) how the waste will be stored, handled and transferred in a proper and effective manner

(g) procedures for identifying and implementing opportunities to minimise the amount of waste generated, promote efficiency in the use of resources and improve the waste management practices employed

(h) procedures for dealing with accidents, spills, and other incidents that may impact on waste management

(i) details of any accredited management system employed, or planned to be employed, to manage waste

(j) how often the performance of the waste management practices will be assessed

(k) indicators or other criteria on which the performance of the waste management practices will be assessed and

(l) staff training and induction to the waste management program.

Mineral Waste Management Plan

C9 A Mineral Waste Management Plan must:

(a) be developed and implemented prior to the commencement of mining activities and

(b) be reviewed at regular intervals, not exceeding 2 years.

C10 The Mineral Waste Management Plan required by condition C9 must include:

(a) a program for the effective characterisation of mineral waste to predict, under the proposed placement and disposal strategy, the quality of runoff and seepage generated concerning salinity, acidity, alkalinity and dissolved metals, metalloids, and non-metallic inorganic substances

(b) a program of progressive sampling and characterisation to identify dispersive and non-dispersive spoil, the salinity and metal/metalloid concentrations of waste rock and the salinity, sulphate, acid and alkali producing potential and metal concentrations of co-disposed coal rejects

(c) a materials balance and disposal plan demonstrating how potentially acid forming and acid-forming waste rock and coal rejects will be selectively placed and/or encapsulated to minimise the potential generation of acid mine drainage

(d) a disposal plan demonstrating how highly sodic and dispersive waste rock is identified and selectively placed and/or encapsulated to ensure that it will not report to final landform surfaces and will not be used for construction activities

(e) a disposal plan demonstrating how rejects has been preferentially emplaced in-pit

(f) a methodology for the containment of coal rejects, including encapsulation by at least 10 metres of waste rock

(g) where relevant, a sampling program to verify encapsulation and/or placement of potentially acid-forming and acid-forming waste

(h) details regarding the management of seepage and leachates

(i) a methodology for maintaining records of the relative locations of coal rejects including fine and coarse rejects disposed within the out-of-pit emplacement areas and in-pit and implementation of record keeping

(j) a rehabilitation strategy that is consistent with any relevant requirement stated in Table H2 - Rehabilitation requirements and

(k) monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of waste rock, co-disposed coal reject areas, including the prevention and management of acid mine drainage, saline drainage, erosion minimisation and establishment of vegetation cover.

Schedule D. Noise

Noise limits

D1 Noise resulting from the mining activity must not exceed the limits identified in Table D1 – Noise limits at any sensitive place or commercial place.

Table D1 Noise limits

Noise level dB(A) measured as:	Noise measured at a sensitive place or a commercial place					
	Monday to Saturday			Sundays and Public Holidays		
	7.00 am to 6.00 pm	6.00 pm to 10.00 pm	10.00 pm to 7.00 am	9.00 am to 6.00 pm	6.00 pm to 10.00 pm	10.00 pm to 9.00 am
$L_{Aeq,\ adj,\ 15\ mins}$	40	35	35	35	35	35
$L_{A1,\ adj,\ 15\ mins}$	40	40	40	40	40	40

Monitoring

D2 The environmental authority holder must, at location(s) determined by condition D3, continuously monitor noise emissions resultant from mining activities conducted under this environmental authority, in accordance with requirements stated in condition D5

Monitoring locations

D3 At least one continuous monitoring station must be installed prior to commencement of mining activities (as per condition A31) to monitor noise emissions at location(s), as determined by an appropriately qualified person for:

(a) the real-time monitoring and determination of noise emissions resultant from activities conducted under this environmental authority and

(b) guiding the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measure to ensure compliance with the conditions of this environmental authority.

D4 All continuous monitoring required by condition D2 must be made publicly available in real time, online, and on the environmental authority holder's website, and include:

(a) the noise limits stated in Table D1 – Noise limits

(b) LAeq, adj 15 min interval levels

(c) LAmax, 15 min interval levels and

(d) any exclusion times and a brief statement for the reason for the exclusion.

D5 All noise monitoring conducted under the requirements of this environmental authority must be in accordance with the following requirements:

(a) be in accordance with the most recent version of the Queensland Government's '*Noise Measurement Manual*' (ESR/2016/2195), the relevant Australian Standard, and the Environmental Protection Regulation 2019

(b) source noise levels must be expressed as component noise levels for the purposes of comparison with noise limits and

(c) all noise monitoring devices must be calibrated in accordance with *AS/NZS IEC 61672.1-2019 Electroacoustics – Sound level meters specifications*.

Compliance monitoring and reporting

D6 When requested by the administering authority, compliance noise monitoring and recording must be undertaken to investigate any complaint of environmental nuisance at any sensitive place or commercial place (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the administering authority).

D7 In response to a request under condition D6, the environmental authority holder must:

(a) undertake continuous noise monitoring of not less than 7days to capture weather-related variations in different operational conditions on site

(b) undertake the monitoring at a place(s) relevant to the potentially affected sensitive place or commercial place and

(c) provide the results to the administering authority within 14 days following completion of monitoring.

D8 If monitoring conducted under condition D2 or D6 or both, reveals that noise caused by the mining activity exceeds the limits in Table D1 – Noise limits, then the holder of this environmental authority must:

(a) address the relevant complaint and

(b) implement noise abatement measures to ensure noise emissions from the mining activity do not result in further exceedances.

D9 Noise monitoring and recording must include the following descriptor characteristics and matters:

(a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins)

(b) background noise LA90

(c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels

(d) atmospheric conditions including temperature, relative humidity and wind speed and directions

(e) effects due to any extraneous factors such as traffic noise

(f) location, date and time of monitoring and

(g) if monitoring is conducted because of a complaint as a result of low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10–200Hz range.

D10 A Noise and Vibration Management Plan must be:

(a) developed and implemented prior to the commencement of mining activities; and

(b) reviewed at regular intervals, not exceeding 2 years.

D11 The Noise and Vibration Management Plan required by condition D10 must include:

(a) a map identifying any sensitive and commercial place/s that may be impacted by noise emissions from the mining activities, including any location subject to a Non-Sensitive Location Agreement

(b) a detailed description of the noise monitoring program implemented to ensure compliance with Table D1 – Noise limits

(c) a description of noise mitigation measures that would be implemented to ensure best practice noise management, which are regularly reviewed in line with contemporary requirements to ensure continual improvement

(d) a noise management system that uses a combination of predictive meteorological forecasting and real time noise monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive mitigation measures to ensure compliance with the conditions of this environmental authority

(e) a protocol for determining exceedances of the limits in Table D1 – Noise limits and Table D2 – Blasting noise limits that complies with the Noise Measurement Manual

(f) a protocol for determining the contribution of mining activities, conducted under this environmental authority, to the exceedance of any limit

(g) a protocol for recording and responding to complaints and

(h) any updates as recommended following each annual review.

Airblast overpressure

D12 The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in Table D2 – Blasting noise limits to be exceeded at any sensitive place or commercial place.

D13 The holder of this environmental authority must develop and implement a blast monitoring program prior to the commencement of mining activities to monitor compliance with the requirements in Table D2 – Blasting noise limits for:

(a) at least 20% of all blasts undertaken in each year, at the nearest sensitive place or commercial place and

(b) all blasts conducted during any time period specified by the administering authority at the nearest sensitive place or commercial place.

Table D2 Blasting noise limits

Blasting noise limits	Sensitive place and commercial place limits	
	7.00 am to 6.00 pm	6.00 pm to 7.00 am
Airblast overpressure	115 decibels (dB) (Linear) Peak for 9 out of 10 consecutive blasts initiated and not greater than 120 dB (Linear) Peak at any time	No blasting to occur
Ground vibration peak particle velocity	5 mm/s* peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/s* peak particle velocity at any time	No blasting to occur

*mm/s = millimetres per second.

Schedule E. Groundwater

E1 The holder of this environmental authority must not release contaminants to groundwater.

E2 A groundwater monitoring program must be developed and implemented within one month of the grant of any of the relevant mining leases or prior to the commencement of mining activities, whichever is sooner.

E3 The groundwater monitoring program required by condition E2 must be developed and implemented to:

(a) identify potential sources of contamination to groundwater from the mining activity

(b) identify potential groundwater impacts due to the mining activity

(c) document a sampling, monitoring and data analysis methodology designed to achieve the following objectives:

(i) establish baseline datasets for all monitoring bores

(ii) detect any impacts to groundwater levels due to the mining activity

(iii) detect any impacts to groundwater quality due to the mining activity

(iv) determine trends in groundwater quality and

(v) determine trends in groundwater level

(d) include an appropriate quality assurance and quality control program

(e) include a numerical groundwater model

(f) be capable of assessing any potential drawdown in the alluvium proximal or within to the proposed Wynette offset area

(g) include a review process to assess if the current program as specified in Table E1 - Groundwater monitoring locations and frequency remains fit for purpose and

(h) recommend any improvements to the program.

E4 The groundwater monitoring program required by condition E2, must be reviewed annually to determine if it continues to meet the requirements stated in condition E3.

E5 The groundwater numerical model required by condition E3(e) must be reviewed and validated (including boundary and recharge conditions) to incorporate groundwater monitoring data and measured mine dewatering volumes. The review must be conducted within 2 years of commencement of the mining activities and at least every 5 years thereafter, or at other intervals specified by the administering authority in writing.

Additional and replacement bores

E6 Monitoring bores NB_1R, NB_2P, NB_3P, NB_X1 and NB_X2 must be installed at or within the vicinity of the locations identified in Table E1 – Groundwater monitoring locations and frequency, a minimum of eighteen (18) months prior to the commencement of mining activities and with sufficient time to establish the baseline water quality for these bores in accordance with the methodology and matters stated in the guideline "*Using monitoring data to assess groundwater quality and potential environmental impacts*", February 2021 as amended from time to time.

E7 The bores required by condition E6 must be suitable to monitor for the parameters identified in Table E2 – Groundwater quality limits and be capable of targeting the aquifer specified in Table E1 – Groundwater monitoring locations and frequency.

E8 Upon the establishment of a baseline dataset in accordance with condition E6, the groundwater quality in the bores required by condition E6 must be compared with the limits detailed in Table E2 – Groundwater quality limits to enable detection of a significant change to groundwater quality values and groundwater levels due to mining activities carried out under this environmental authority.

E9 A report detailing the comparison conducted under condition E8 must be developed and provided to the administering authority within 28 days of completion of the comparison conducted under condition E8. This report must include details of any changes required to Table E1 – Groundwater monitoring locations and frequency or Table E3 – Groundwater level monitoring or Figure E1 – Groundwater monitoring locations.

E10 Replacement or additional bores must be installed within 3 months of the environmental authority holder becoming aware of either of the following:

(a) access is denied to sample bores targeting Isaac River alluvium, as defined in Table E1 – Groundwater monitoring locations and frequency or

(b) bore representativeness to assess potential drawdown in the alluvium proximal to or within the proposed Wynette offset area is inadequate as required by condition E3(f).

Replacement or additional bores must be capable of screening the alluvium proximal to the bore to be replaced, and/or within the proposed Wynette offset area and be capable of assessing any potential drawdown.

E11 Within 28 days of the installation of any bore under condition E10, provide the administering authority with a report that includes:

(a) all details required for Table E1 – Groundwater monitoring locations and frequency and Table E3 – Groundwater level monitoring and any updates required to Figure E1 – Groundwater monitoring locations and

(b) detail of the actions and timeframes for the establishment of limits for Table E2 – Groundwater quality limits in accordance with the methodology and matters stated in the guideline "Using monitoring data to assess groundwater quality and potential environmental impacts", February 2021 as amended from time to time.

E12 Upon receipt of comments from the administering authority on the report provided by under condition E11, implement the actions proposed under condition E11(b) in the timeframes proposed, following any update required to address the comments made by the administering authority.

E13 Within 3 months of the completion of the actions required under condition E12, provide a report of the proposed limits for Table E2 – Groundwater quality limits.

Groundwater quality

E14 Groundwater quality must be monitored at the locations and frequencies specified in Table E1 – Groundwater monitoring locations and frequency and shown in Figure E1 – Groundwater monitoring locations, for the quality characteristics identified in Table E2 – Groundwater quality limits.

E15 Groundwater measured at monitoring bores identified in Table E1 – Groundwater monitoring locations and frequency must not exceed the parameter limits specified in Table E2 - Groundwater quality limits on any 3 consecutive sampling occasions. For the parameter limits identified in Table E2 – Groundwater quality limits as 5 consecutive exceedance limit, the relevant parameter limit must not be exceeded on any 5 consecutive sampling occasions.

E16 If groundwater measured at any monitoring point identified in Table E1 – Groundwater monitoring locations and frequency exceeds the corresponding parameter limits in Table E2 – Groundwater quality limits on any single sampling occasion, the relevant bore must be resampled for the exceeded parameter/s within 14 days of receipt of the results. Where the result of the resampling event exceeds for the same parameter/s, a further resample is not required for that sampling occasion and parameter/s.

Note: any resample taken under this condition is for QA/QC purposes. The resample required by this condition is not an additional 'sampling occasion' that will contribute the 'consecutive sampling occasions' referenced in condition E15.

E17 If exceedances of groundwater parameter limits are confirmed by the resampling required by condition E15, the holder of this environmental authority must:

(a) notify the administering authority via Water Tracking and Electronic Reporting System (WaTERS) or subsequent updated system within 14 days of receiving the resampling result under condition E16 and

(b) within 3 months of receiving the result under condition E16, complete and submit via WaTERS, an investigation that includes:

(i) details of the investigations carried out

(ii) whether the exceedance is the result of mining activities conducted under this environmental authority, and, if so:

(1) whether environmental harm has occurred and

(2) any action required, or taken, to mitigate environmental harm and

(iii) complete a review of the groundwater quality limits specified in Table E2 - Groundwater quality limits, and, if the exceedance was not a result of the mining activities, provide a revised groundwater quality limit for the relevant parameter/s in Table E2 - Groundwater quality limits for consideration by the administering authority.

Table E1 Groundwater monitoring locations and frequency

Monitoring point		Latitude (GDA2020)	Longitude (GDA2020)	Approximate elevation (metre AHD)	Screen depth (mbgl)	Monitoring frequency	Target aquifer
C2105R		-22.223470	148.306460	209.09	57.0 – 60.0	D/Q	Leichhardt Seam
C2136		-22.175047	148.277810	199.39	62.6 – 65.6	D/Q	Leichhardt Seam
G2304R		-22.211711	148.292722	216.24	53.0 – 56.0	D/Q	Vermont Seam
G2307		-22.169684	148.269412	194.42	78.0 – 81.0	D/Q	Vermont Seam
R2008		-22.217293	148.269820	220.32	31.5 – 33.0	D/Q	Leichhardt Seam
R2009R		-22.215100	148.274195	220.24	77.0 – 83.0	D/Q	Rangal Coal Measures interburden
R2010R		-22.212739	148.278035	216.67	60.0 – 63.0	D/Q	Leichhardt Seam
R2032		-22.187696	148.265830	205.31	78.1 – 81.1	D/Q	Leichhardt Seam
R2034R		-22.192343	148.257171	221.60	36.0 – 39.0	D/Q	Rangal Coal Measures interburden
R2035		-22.194568	148.253233	223.54	34.4 – 37.4	D/Q	Vermont Seam
R2054		-22.167432	148.253477	203.60	79.5 – 82.5	D/Q	Rangal Coal Measures interburden
R2055		-22.169669	148.249211	207.46	64.9 – 67.9	D/Q	Vermont Seam
Knob Hill 1‡		-22.115211	148.270125	191	-	Q	Isaac River Alluvium
Knob Hill 2‡		-22.113565	148.264546	193	-	D/Q	Isaac River Alluvium
Winnet Bore		-22.149704	148.307145	187	-	D/Q	Isaac River Alluvium
VWP1	Sensor 1	-22.152207	148.283131	192.81	50.0	D	Fort Cooper Coal Measures overburden
	Sensor 2				90.0		Fort Cooper Coal Measures coal seam
	Sensor 3				150.0		Fort Cooper Coal Measures underburden
VWP2	Sensor 1	-22.182743	148.316373	201.68	50.0	D	Fort Cooper Coal Measures overburden
	Sensor 2				90.0		Fort Cooper Coal Measures overburden
	Sensor 3				150.0		Fort Cooper Coal Measures coal seam

Monitoring point	Latitude (GDA2020)	Longitude (GDA2020)	Approximate elevation (metre AHD)	Screen depth (mbgl)	Monitoring frequency	Target aquifer
NB_1R#	-22.162189	148.296681	200	22 – 25	D/Q	Regolith
NB_2P#	-22.156908	148.242950	207	122 – 125	D/Q	Leichhardt Seam
NB_3P#	-22.229013	148.320230	202	82 – 85	D/Q	Leichhardt Seam
NB_X1#	-22.152207	148.283131			D/Q	Fort Cooper Coal Measures
NB_X2#	-22.182743	148.316373			D/Q	Fort Cooper Coal Measures

D daily level monitoring using automatic logger
Q quarterly water quality sampling
‡ Privately-owned bore, inclusion in monitoring network dependent on continued approval to access the bore from bore owner
# Approximate location, replacement bore to be placed in the vicinity of this location as determined by an appropriately qualified person

NBX1 and NB_X2 are arbitrary names and are included in this table to represent the replacement of VWP1 and VWP2.

Table E2 Groundwater quality limits

Bore	Parameter (mg/L) limits																				
	Field pH	Field EC (µS/cm)	Al Dissolved	Fe Dissolved	F Total	Mn Dissolved	SO_4	Zn Dissolved	As Dissolved	B Dissolved	Cd Dissolved	Cr Dissolved	Co Dissolved	Cu Dissolved	Pb Dissolved	Hg Dissolved	Mo Dissolved	Ni Dissolved	Se Dissolved	V Dissolved	Ag Dissolved
C2105R	6.3–6.6	32,380	0.055[1]	0.3[4]	0.4[3]*	0.620	12	0.031[4]*	0.013[1]	0.94	0.0002[1]	0.001[1]	0.0014[1]	0.0050	0.0056[4]	0.0001[6]	0.034[1]	0.011[1]	0.05	0.01[1]	0.001[1]
C2136	6.7-6.8	16,940				0.020	127	0.008[1]						0.0020[1]	0.0034[1]				0.01[5]		
G2304R	6.6-7.1	29,760				0.320	25	0.049						0.0050	0.0056[4]				0.05		
G2307	6.9-7.2	16,110				0.040		0.025						0.0020[1]	0.0034[1]				0.01[5]		
R2008	6.9-7.3	16,730				0.050		0.028													
R2009R	7.0-7.7	16,000[3]*				0.420	155	0.008[1]	0.026				0.007					0.017[4]*			
R2010R	6.7-7.0	27,860				0.060	25	0.031[4]*	0.057				0.0014[1]	0.0050	0.0056[4]			0.011[1]	0.05		
R2032	6.9-7.2	11,820				0.004		0.044	0.013[1]					0.0020[1]	0.0034[1]				0.01[5]		
R2034R	6.8-7.1	18,640				1.480	3,980	0.108	0.033				0.024	0.0050				0.040			
R2035	7.0-7.7	4,880				0.140	4	0.008[1]	0.013[1]				0.0014[1]	0.0020[1]				0.011[1]			
R2054	7.2-7.4	8,420				0.003	25	0.016													
R2055	6.9-7.2	8,450				0.012		0.027													
Knob Hill 1‡	6.6-6.9	8,210			0.5[3]*	0.710	582	0.008[1]						0.0050							
Knob Hill 2‡	6.7-7.1	1000				1.210	21	0.008[1]					0.004	0.0020[1]							
Winnet‡	6.6-6.9	3,110				0.450	99	0.017					0.0014[1]								
NB_1R	7.1-8.1[3]*	5,970[2]			0.4[3]*	0.100	25	0.008[1]													
NB_2P		16,000[3]*				0.560		0.031[4]*						0.0050	0.0056[4]						
NB_3P																					
NB_X1	7.4-8.1[3]*					0.100		0.008[1]						0.0020[1]	0.0034[1]						
NB_X2																					

* 'Five consecutive exceedance limit' applicable to condition E15

‡ 'or replacement bore' as per condition E10

All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered) concentrations. Groundwater quality limits are based on dissolved metals, unless otherwise nominated. The limit of reporting (LOR) for a laboratory analytical method should be lower than the relevant benchmark to which the results will be compared such as water quality objective i.e., use ICPMS for metals and metalloids. For those indicators where ICPMS is unable to meet this criteria, the lowest possible LOR must be sought.

Calcium, magnesium, sodium, chloride, and water hardness should be monitored for each groundwater sample to assist with interpretation of monitoring data and monitor for potential water input changes.

(1) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) - aquatic 95th percentile

(2) Isaac River Sub-basin Environmental Values and Water Quality Objectives – Stock (DEHP, 2011)

(3) Isaac River Sub-basin Chemistry zone 34 (DEHP, 2011)

(4) Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Aquatic 80% or 90% or low reliability (iron) (ANZG, 2018)

(5) Australian drinking water guidelines (Australian Government, 2011)

(6) LOR

Table E3 Groundwater level monitoring

Monitoring point		Level trigger threshold (metre AHD)	Pre-mining baseline water level (metre AHD)
C2105R		149.8	166.8
C2136		122.8	165.4
G2304R		142.7	166.7
G2307		104.7	166.7
R2008		180.1	182.1
R2009R		136.9	138.9
R2010R		174.2	176.2
R2032		157.4	185
R2034R		180.2	182.2
R2035		186.5	188.5
R2054		102	181.2
R2055		180	187.5
Knob Hill 1‡*		171.2	173.2
Knob Hill 2‡*		176.3	178.3
Winnet Bore*		167.9	169.9
VMP1	Sensor 1	157.7	159.7
	Sensor 2	165	167
	Sensor 3	161.8	163.8
VMP2	Sensor 1	161.5	163.5
	Sensor 2	165.3	167.3
	Sensor 3	156.2	158.2
NB_1R		> 2.1 metres beyond baseline data ranges	To be determined by condition E9
NB_2R		> 10.0 metres beyond baseline data ranges	To be determined by condition E9
NB_3R		> 20.6 metres beyond baseline data ranges	To be determined by condition E9
NB_X1		To be determined by condition E9	To be determined by condition E9
NB_X2		To be determined by condition E9	To be determined by condition E9

‡ Privately-owned bore, inclusion in monitoring network dependent on continued approval to access the bore from bore owner
* Appropriately located and agreed additional monitoring bores in alluvium may replace these bores.

Groundwater levels

E18 Groundwater standing water level when measured at bores specified in Table E1 - Groundwater monitoring locations and frequency and shown in Figure E1 - Groundwater monitoring locations must not exceed the corresponding level trigger threshold specified in Table E3 - Groundwater level monitoring.

E19 If a groundwater level trigger threshold specified in Table E3 - Groundwater level monitoring is exceeded, the holder of this environmental authority must:

(a) notify the administering authority via WaTERS within 24 hours of receiving the result and

(b) conduct an investigation to determine the cause of the exceedance

(c) if the investigation carried out under part b) determines that the mining activities are a potential cause or contributor to the exceedance:

  (i) notify the administering authority via WaTERS within 24 hours of making the determination and

  (ii) take immediate action to ensure compliance with condition E1 of this environmental authority and notify the administering authority of when action has been completed.

E20 Within 3 months of notifying the administering authority under condition E19, provide a report of the findings of and actions taken under condition E19 along with:

(a) a review of the groundwater level trigger thresholds specified in Table E3 – Groundwater level monitoring and

(b) if the exceedance/s was not a result of mining activities, provide a revised groundwater level trigger threshold to update Table E3 – Groundwater level monitoring to the administering authority for consideration.

Groundwater monitoring

E21 Results of all groundwater quality and level monitoring must be submitted to the administering authority via WaTERS by 1 November each calendar year.

Bore construction, maintenance and decommissioning

E22 The construction, maintenance, management and decommissioning of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain accurate and reliable data collection.

E23 A bore report must be kept for each monitoring bore which includes:

(a) a unique identification reference number and geographic coordinate location

(b) construction information including but not limited to the depth of bore, depth and length of casing, depth and length of screening and bore sealing details

(c) stratigraphy and target hydrogeological unit of the bore and

(d) depth at which groundwater was intercepted and the final standing water level after bore development.

E24 Where a monitoring point stated in Table E1 – Groundwater monitoring locations and frequency is removed as a direct result of mining activities, the impact on the groundwater monitoring program required by condition E2 must be evaluated.

If the evaluation concludes that the groundwater monitoring program is unable to meet the requirements stated in condition E3 as a result of the monitoring point/s removal, a replacement bore/s must be constructed in a similar location and target the relevant aquifer and predicted groundwater directional movements.

Groundwater dependent ecosystems

E25 The activities authorised under this environmental authority must not cause environmental harm to any groundwater dependent ecosystems.

Schedule F. Surface water

F1 Contaminants that will, or have the potential to, cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activity, except as permitted under the conditions of this environmental authority.

F2 The release of mine affected water to waters under condition F3 is not authorised until:

(a) a stream flow gauging station in the northern unnamed tributary, associated with RP3 release location defined in Table F1 - Mine affected water release points, sources and receiving waters, has been located and installed at a minimum distance from the proposed release points, such that water flow under trigger flow events will not significantly diminish before reaching the discharge point and

(b) an upstream monitoring point within the central unnamed tributary of Isaac River, or similar creek system, has been determined that is accessible during wet weather and is representative of the receiving waters defined in Table F1 - Mine affected water release points, sources and receiving waters and

(c) their spatial locations are included in this environmental authority.

F3 Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table F1 - Mine affected water release points, sources and receiving waters and depicted in Figure F1 – Mine affected water release points and monitoring locations.

F4 The release of mine affected water to waters in accordance with condition F2 must not exceed the release limits stated in Table F2 - Mine affected water release limits and Table F3 - Mine affected water release during flow events when measured at the monitoring points specified in Table F1 - Mine affected water release points, sources and receiving waters for each quality characteristic.

F5 The release of mine affected water to waters must be monitored at the locations specified in Table F1 - Mine affected water release points, sources and receiving waters for each quality characteristic and at the frequency specified in Table F2 - Mine affected water release limits, Table F3 - Mine affected water release during flow events and Table F4 - Release contaminant trigger investigation levels.

Table F1 Mine affected water release points, sources and revieving waters

Release point	Latitude (GDA2020)	Longitude (GDA2020)	Mine affected water storage source and location	Monitoring point	Receiving waters description
RP1	-22.158759	148.292234	MWD	Pipe Outlet of MWD	Central unnamed tributary, flows through Wynette offset area and then to Isaac River
RP2	-22.158759	148.292234	CC Dam	Pipe Outlet of CC Dam	Central unnamed tributary, flows through Wynette offset area and then to Isaac River
RP3	-22.124098	148.260444	Railway Pit	Pipe Outlet of Railway Pit	Northern unnamed tributary which flows to Isaac River

Table F2 Mine affected water release limits

Quality characteristic	Release limits	Sampling frequency
Electrical conductivity (μS/cm)	Release limits specified in Table F3 - Mine affected water release during flow events for variable flow criteria	Real time telemetry with minimum hourly mean or daily grab sample if telemetry equipment is not functional
pH (pH Unit)	6.5 (minimum) - 9.0 (maximum)	
Sulphate (SO_4^{2-}) (mg/L)	Release limits specified in Table F3 - Mine affected water release during flow events for variable flow criteria	As a minimum, daily during release (the first sample must be taken within two hours of commencement of release)
Turbidity (NTU)	300 or no greater than the upstream turbidity, compared at a minimum frequency of daily.	As a minimum, daily during release (the first sample must be taken within two hours of commencement of release).

Table F3 Mine affected water release during flow events

Receiving water/stream	Release point (RP)	Gauging station/s[1]	Gauging station latitude (GDA2020)	Gauging station longitude (GDA2020)	Receiving water flow recording frequency	Receiving water flow criteria for release (m^3/s)	Maximum release rate (for all combined RPs)	Release limits
Central unnamed tributary, flows through Wynette offset area and then to Isaac River.	MWD (RP1) CC Dam (RP2)	130410A Isaac River at Deverill and Gauging station in the central unnamed tributary, upstream of RP1 and RP2 release location.	-22.170765 -22.15913	148.384174 148.29072	Real time telemetry with hourly frequency. If telemetry is unavailable, daily and prior to release commencement	**Medium flow**		
						4 m^3/s (130410A) and 0.5 m^3/s (tributary)	0.5 m^3/s	1,000 µS/cm 300 mg/L SO_4^{2-}
						10 m^3/s and 0.6 m^3/s (tributary)	1.0 m^3/s	1,200 µS/cm 300 mg/L SO_4^{2-}
						High flow		
						50 m^3/s and 1.5 m^3/s (tributary)	2.0 m^3/s	4,000 µS/cm 400 mg/L SO_4^{2}
						100 m^3/s And 3.0 m^3/s (tributary)	3.0 m^3/s	6,000 µS/cm 400 mg/L SO_4^{2-}
						Very high flow		
						300 m^3/s and 5.0 m^3/s (tributary)	5.0 m^3/s	10,000 µS/cm 400 mg/L SO_4^{2-}
Northern unnamed tributary which flows to Isaac River	Railway Pit (RP3)	130410A Isaac River at Deverill and	-22.170765 and	148.384174	Continuous (minimum daily)	**Medium flow**		
						4 m^3/s (130410A) and 0.5 m^3/s (tributary)	0.5 m^3/s	1,000 µS/cm 300 mg/L SO_4^{2-}

Receiving water/stream	Release point (RP)	Gauging station/s[1]	Gauging station latitude (GDA2020)	Gauging station longitude (GDA2020)	Receiving water flow recording frequency	Receiving water flow criteria for release (m^3/s)	Maximum release rate (for all combined RPs)	Release limits
		Gauging station in the northern unnamed tributary, associated with RP3 release location.	A location in northern unnamed tributary as determined by condition F2			10 m^3/s and 0.6 m^3/s (tributary)	1.0 m^3/s	1,200 µS/cm 300 mg/L SO_4^{2-}
						High flow		
						50 m^3/s and 1.5 m^3/s (tributary)	2.0 m^3/s	4,000 µS/cm 400 mg/L SO_4^{2-}
						100 m^3/s and 3.0 m^3/s (tributary)	3.0 m^3/s	6,000 µS/cm 400 mg/L SO_4^{2-}
						Very high flow		
						300 m^3/s and 5.0 m^3/s (tributary)	5.0 m^3/s	10,000 µS/cm 400 mg/L SO_4^{2-}

1. If gauging station 130410A Isaac River at Deverill is not available, a gauging station downstream of the release points in a similar location may be used for monitoring purposes.

Table F4 Release contaminant trigger investigation levels

Quality characteristic[1]	Trigger levels (µg/L)	Comment on trigger level	Monitoring frequency
Aluminium	55	For aquatic ecosystem protection, based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	Commencement of release (first sample taken within two hours) and weekly during releases thereafter
Arsenic (total)	13	For aquatic ecosystem protection, based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Cadmium (total)	0.2	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Chromium	1	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Copper	1.4	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Iron	300	For aquatic ecosystem protection, based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Lead	3.4	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Mercury	0.2	For aquatic ecosystem protection, based on LOR for ICP-MS[3]	
Nickel	11	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Zinc	8	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Boron	940	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2020)[5]	
Cobalt	1.4	For aquatic ecosystem protection, based on low reliability guideline (ANZG, 2018)[4]	
Manganese	1,900	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Molybdenum	34	For aquatic ecosystem protection, based on low reliability guideline (ANZG, 2018)[4]	
Selenium	5	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)[2]	
Silver	0.5	For aquatic ecosystem protection, based on LOR for ICP-MS[3]	

Quality characteristic[1]	Trigger levels (µg/L)	Comment on trigger level	Monitoring frequency
Uranium	1	For aquatic ecosystem protection, based on LOR for ICP-MS3	
Vanadium	10	For aquatic ecosystem protection, based on LOR for ICP-MS3	
Ammonia	900	For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2018)2	
Nitrate (TN)	1,100	For aquatic ecosystem protection, based on ambient Queensland Water Quality Guidelines (EPA, 2006) for TN6	
Petroleum Hydrocarbons (C_6 – C_9)	20	For aquatic ecosystem protection, based on LOR for GC-MS3	
Petroleum Hydrocarbons (C_{10} – C_{36})	100	For aquatic ecosystem protection, based on LOR for GC-MS3	
Fluoride (total)	2,000	Protection of livestock and short-term irrigation guideline (ANZECC and ARMCANZ, 2000)7	
Sodium	180,000	Australian Drinking Water Guidelines (NMRC 2011)	

LOR limit of reporting
ICP-MS Inductively Coupled Plasma mass spectrometry
GC-MS gas-chromatography mass spectrometry
ANZG Australian and New Zealand Governments
EPA Queensland Environmental Protect Agency

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (<0.45 µm filtered). Contaminant limits for metals and metalloids are only considered to be exceeded if the results for dissolved metal or metalloid exceed the trigger level.

2. Table 3.4.1 of ANZG (2018): trigger values for slightly to moderately disturbed systems, (95% level of protection). For Selenium, 99% level of protection.

3. LOR – typical reporting for method stated. ICPMS/CV FIMS/GCMS – analytical method required to achieve LOR.

4. Low reliability guideline – refers to Section 8.3.7 of ANZG (2018): low reliability guideline.

5. Based on 95% level of protection in Toxicant default guideline values for aquatic ecosystem protection: Boron in fresh water (ANZG, 2020).

6. Based on ambient WQGs (2006) for total nitrogen –standard trigger value for contemporary environmental authorities in Bowen Basin.

7. Based on short-term trigger value in irrigation water for fluoride (ANZECC and ARMCANZ, 2000).

F6 Monitoring for major ions and water hardness must be undertaken for interpretation purposes

Mine affected water release events

F7 The holder of this environmental authority must ensure a stream flow gauging station is installed, operated, and maintained to determine and record stream flows at the locations, and flow recording frequency, specified in Table F3 - Mine affected water release during flow events.

F8 The release of mine affected water to waters in accordance with condition F3 must only take place during periods of natural flow in accordance with the receiving water (i.e., unnamed tributaries and Isaac River) flow criteria specified in Table F3 - Mine affected water release during flow events for the release point(s) specified in Table F1 - Mine affected water release points, sources and receiving waters.

F9 The release of mine affected water to waters in accordance with condition F3 must not exceed the maximum release rate (for all combined release point flows) for each receiving water flow criterion specified in Table F3 - Mine affected water release during flow events when measured at the monitoring points specified in Table F1 - Mine affected water release points, sources and receiving waters.

F10 The daily quantity of mine affected water released from each release point must be measured and recorded at the monitoring points stated in Table F1 - Mine-affected water release points, sources and receiving waters.

F11 Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters or cause a material build-up of sediment in such waters.

Notification of release event

F12 The environmental authority holder must notify the administering authority via WaTERS as soon as practicable and no later than 24 hours after commencing a release of mine affected water to the receiving environment.

A notification must be submitted for each individual release point and include:

(a) release commencement date and time

(b) details regarding the compliance of the release with the conditions of this environmental authority (i.e., contaminant limits, natural flow rate/s, discharge volume flow rate/s)

(c) release point/s

(d) expected release cessation date/time

(e) release rate/s

(f) release salinity and

(g) receiving water/s, including the natural flow rate/s.

Note: If for unforeseen technical reasons WaTERS is unavailable, please provide the notification to the administering authority via the Pollution Hotline.

F13 The environmental authority holder must notify the administering authority via WaTERS no later than 24 hours after cessation of a release event notified under condition F12 and provide the following information in writing:

(a) release/s cessation date/time

(b) natural flow rate in the receiving waters

(c) volume/s of water released

(d) details regarding the compliance of the release with the conditions of this environmental authority (i.e., contaminant limits, natural flow rates, discharge volume)

(e) all in-situ water quality monitoring results and

(f) any other matters pertinent to the water release event.

Note: Successive or intermittent releases occurring within 24 hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions F12 and F13.

Note: If for unforeseen technical reasons WaTERS is unavailable, please provide the notification to the administering authority via the Pollution Hotline.

F14 The holder of this environmental authority must within 28 days after cessation of a release event notified under condition F13 provide a report and supporting raw data to the administering authority via WaTERS, which must include the following information:

(a) all continuous and in-situ water quality monitoring results (including laboratory analyses) and

(b) any further matters pertinent to the water release event.

Release limit exceedance

F15 If the release limits defined in Table F2 - Mine affected water release limits are exceeded, the holder of the environmental authority must notify the administering authority via WaTERS within 24 hours of receiving the results.

F16 The authority holder must, within 28 days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

(a) the reason for the release

(b) the location of the release

(c) all water quality monitoring results

(d) any general observations

(e) all calculations and

(f) any other matters pertinent to the water release event.

Release trigger exceedance

F17 If quality characteristics of the release exceed any of the trigger levels specified in Table F4 - Release contaminant trigger investigation levels during a release event, the environmental authority holder must compare the downstream results in the receiving waters to the trigger values specified in Table F4 - Release contaminant trigger investigation levels and:

(a) where the trigger values are not exceeded then no action is to be taken or

(b) where the downstream results exceed the trigger values specified Table F4 - Release contaminant trigger investigation levels for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and

(i) if the result is less than the background monitoring site data, then no action is to be taken or

(ii) if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 28 days, outlining:

(1) details of the investigations carried out and

(2) actions taken to prevent environmental harm.

Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with b(ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

F18 If an exceedance in accordance with condition F17(b)(ii) is identified, the holder of the authority must notify the administering authority via WaTERS within 14 days of receiving the result.

Receiving environment monitoring and contaminant trigger levels

F19 The quality of the receiving waters must be monitored at the monitoring points specified in Table F5 - Receiving water background sites and monitoring points and depicted in Figure F1 – Mine affected water release points and monitoring locations for each quality characteristic and at the monitoring frequency stated in Table F6 - Receiving waters contaminant trigger levels for SW5 (Isaac River) or Table F7 - Receiving waters contaminant trigger levels for SW2 and SW3 (unnamed tributaries).

F20 If a water quality characteristic measured at a downstream compliance monitoring site specified in Table F5 - Receiving water upstream background sites and downstream monitoring points exceeds any trigger levels specified in Table F6 - Receiving waters contaminant trigger levels the holder of this environmental authority must compare this result to the applicable control site and:

(a) if the quality measured at a downstream compliance monitoring point is equal to or less than the quality measured at the applicable upstream control monitoring point, no further action is required or

(b) if the quality measured at a downstream compliance monitoring point is greater than the quality measured at the applicable upstream control monitoring point, complete an investigation into the cause of the deterioration in water quality and the potential for environmental harm and submit a written report to the administering authority within 28 days outlining:

(i) details of the investigation carried out including any assumptions and limitations of the investigation

(ii) findings of the investigation including an explanation of the cause identified

(iii) recommendations of the investigation and

(iv) actions taken to comply with the conditions of the environmental authority and to prevent environmental harm.

Table F5 Receiving water background sites and monitoring points

Monitoring points	Receiving waters location description	Latitude (GDA2020)	Longitude (GDA2020)
Upstream monitoring point			
SW4	Isaac River – upstream of RP1, RP2, and RP3	-22.114402	148.269078
SW# - As per condition F2	Upstream in central unnamed tributary of Isaac River, or similar creek system as determined under condition F2 and included here prior to any release of mine affected water under condition F3	As per condition F2	As per condition F2
Downstream monitoring point			
SW2	Central unnamed tributary of Isaac River	-22.158708	148.318067
SW3	Northern unnamed tributary of Isaac River	-22.125102	148.270803
SW5	Isaac River – downstream of RP1, RP2 and RP3	-22.153447	148.328597
Other sites			
SW6	Ripstone Creek	-22.246762	148.284223
SW7	Ripstone Creek	-22.216853	148.222996
SW8	Unnamed tributary of Isaac River	-22.183646	148.332025
SW9	Unnamed tributary of Ripstone Creek	-22.245291	148.302170

SW# is the relevant upstream monitoring point to SW2 and SW3
SW4 is the relevant upstream monitoring point to SW5

Table F6 Receiving waters contaminant trigger levels for SW5 (Isaac River)

Quality characteristic	Trigger level	Monitoring frequency
pH (pH units) (range)[1]	6.5 – 8.5	Continuous monitoring (minimum 30 min mean) or daily grab sample if continuous monitoring equipment is not functional.
Electrical conductivity[1]	<720 µS/cm	
Sulphate (SO4)[1]	<25 mg/L	Daily during releases from RP1, RP2 and RP3.
Turbidity (NTU)[1]	<50	

[1]Based on the Isaac River Sub-basin Water Quality Objectives.

Table F7 Receiving waters contaminant trigger levels for SW2 and SW3

Quality characteristic	Trigger level	Monitoring frequency
pH (pH units) (range)[1]	6.5 – 8.5	Continuous monitoring (minimum 30 min mean) or daily grab sample if continuous monitoring equipment is not functional.
Electrical conductivity	<1000 µS/cm	
Sulphate (SO_4^{2-})	<250mg/L	Daily during the releases from RP1, RP2 and RP3.
Turbidity (NTU)	<100	

[1]Based on the Isaac River Sub-basin Water Quality Objectives.

F21 All determinations of water quality, water flow and biological monitoring must be performed in accordance with the methods prescribed in the latest edition of the administering authority's Monitoring and Sampling Manual.

Water storage monitoring

F22 All water storages, including erosion and sediment control structures, must be monitored monthly for:

(a) the water quality characteristics specified in Table F2 – Mine affected water release limits, and Table F4 – Release contaminant trigger investigation levels; and

(b) the volume of water held in each storage.

F23 If water storage monitoring required by condition F22, for any erosion and sediment control structure, identifies an exceedance of any of the following parameters, all water in that structure must be transferred to a storage listed in Table F1 - Mine-affected water release points, sources and receiving waters.

Parameters:

(a) a water quality characteristic specified in Table F4 – Release contaminant trigger investigation levels

(b) a pH range outside of 6.5-8.5

(c) an electrical conductivity of >1000µS/cm or

(d) sulphate >25mg/L.

Receiving environment monitoring program

F24 Prior to the commencement of mining activities, a Receiving Environment Monitoring Program (REMP) Design Document must be:

(a) prepared in accordance with condition F27 and

(b) submitted to the administering authority.

For the purposes of the REMP, the receiving environment refers to the waters of the Isaac River and connected or surrounding waterways within 10 kilometres downstream of the mining activity.

F25 Any comments made by the administering authority on the REMP Design Document must be addressed to the reasonable satisfaction and within a timeframe specified by the administering authority.

F26 A REMP that has been prepared in accordance with the REMP Design Document must be implemented prior to the commencement of mining activities.

F27 The REMP must at a minimum:

(a) address and comply with the latest version of the administering authority's guideline Receiving environment monitoring program guideline (ESR/2016/2399)

(b) identify and describe all environmental values of the receiving environment

(c) identify, describe and monitor any adverse impacts to surface water environmental values, quality, and flows

(d) include an assessment of the potential impacts of the activity and propose appropriate mitigation measures

(e) assess the status of and any change to aquatic ecosystem health, including aquatic flora and fauna within and immediately surrounding the project area

(f) assess the status of and any change to riparian vegetation health within and immediately surrounding the project area

(g) assess the long-term condition or state of surface waters, sediment, and aquatic ecosystem health

(h) include the locations listed in Table F1 – Mine affected water release points, sources and receiving waters and Table F5 – Receiving water background sites and monitoring points

(i) assess the receiving environment monitoring results against water quality objectives in Table F4 – Release contaminant trigger investigation levels

(j) apply procedures and/or guidelines from ANZG 2018 and other relevant standards and guideline documents

(k) describe sampling and analysis methods and quality assurance and control and

(l) incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

F28 A REMP Annual Report must be prepared by 1 August each year and submitted to the administering authority on request.

F29 The REMP Annual Report required by condition F28 must:

(a) be prepared in accordance with the latest version of the administering authority's guideline Receiving environment monitoring program guideline (ESR/2016/2399) – REMP result report and

(b) outline the findings of the REMP, including but not limited to:

(i) an assessment of long-term upstream water quality

(ii) an assessment of the long-term condition or state of surface waters, sediment and aquatic ecosystem health

(iii) recommendations for further investigation or actions

(iv) recommendations for changes or improvements to the monitoring program

(v) potential changes to management of the authorised activity to minimise impacts

(vi) all monitoring results and

(vii) a description of all conclusions formed.

Water re-use

F30 Mine affected water may be transferred and deposited into artificial water storage structures, such as water storages, farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third-party (with the consent of the third-party), providing that the transfer does not contravene any other condition of this environmental authority.

F31 If mine affected water is transferred to another person in accordance with condition F30:

(a) the transfer must only occur with a written agreement of the receiver (the third-party agreement)

(b) the third-party agreement must include:

(i) a commitment from the person utilising the contaminated water (the receiver) to use it in such a way as to prevent environmental harm or public health incidents

(ii) a statement of recognition regarding the General Environmental Duty (GED) under the *Environmental Protection Act 1994*

(iii) information regarding the intended use of the water disposal and management measures necessary to meet the GED and

(c) the third-party agreement must be signed by all parties subject to the agreement.

Water monitoring reporting

F32 The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority via WaTERs:

(a) the date on which the sample was taken

(b) the time at which the sample was taken

(c) the monitoring point at which the sample was taken

(d) the measured or estimated daily quantity of mine affected water released from all release points

(e) the release flow rate at the time of sampling for each release point

(f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority and

(g) water quality monitoring data (release, receiving environment, REMP, water storages, sewage treatment plant and groundwater).

Water Management Plan

F33 A Water Management Plan must be developed and implemented prior to the commencement of mining activities.

F34 The Water Management Plan required by condition F33 must:

(a) provide for effective water management of actual and potential environmental impacts resulting from water management associated with the mining activities carried out under this environmental authority and

(b) include at least the following components:

(i) identification of the source of actual and potential contaminants

(ii) a water balance model for the site

(iii) details of catchment areas and environmental values

(iv) a description of the water management system for the site that, at a minimum, demonstrates:

(1) clean water that comes into contact with disturbed areas is minimised through use of upstream diversions

(2) loss of surface water flows from excised catchments and waterways is minimised through discharge of diverted clean water to downstream waterways

(3) the discharge of sediment laden and potentially contaminated water is minimised

(v) details of locations and design standards of water management infrastructure

(vi) measures to manage and prevent saline drainage

(vii) measures to manage and prevent acid rock drainage

(viii) adaptive management measures to avoid or minimise impacts to environmental values

(ix) contingency procedures for incidents and emergencies and

(x) a program for monitoring and review of the effectiveness of the Water Management Plan.

(c) at a minimum, align with the following plans:

(i) the Non-mineral Waste Management Plan required by condition C7

(ii) the Mineral Waste Management Plan required by condition C9

(iii) the Groundwater Monitoring Program required by condition E2

(iv) the Receiving Environment Monitoring Program required by condition F24

(v) the Erosion and Sediment Control Plan required by condition F37.

F35 A written review of the Water Management Plan must be undertaken by 1 November each year. The review must:

(a) assess the plan against the requirements under condition F34

(b) include recommended actions to ensure actual and potential environmental impacts are effectively managed

(c) provide details of the actions to be taken and timeframes for their completion and

(d) identify any amendments made to the Water Management Plan.

Stormwater and water sediment controls

F36 An Erosion and Sediment Control Plan must be developed and implemented prior to the commencement of any ground disturbance including construction, to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

F37 The Erosion and Sediment Control Plan must:

(a) be consistent with the latest version of the International Erosion Control Associate Best Practice Erosion and Sediment Control Guideline

(b) demonstrate how erosion and sediment control measures adequately minimise the release of sediment to receiving waters and must include at least the following:

(i) assessment of all catchment areas

(ii) assessment of soil types, including sodic dispersive soils and

(iii) specify design criteria for erosion and sediment control structures, including sediment basins, which must be designed as a minimum standard to a Type D sediment basin in accordance with the latest version of the International Erosion Control Associate Best Practice Erosion and Sediment Control Guideline

(c) detail the locations and descriptions of all erosion and sediment control measures and

(d) provide an audit schedule to ensure erosion and sediment controls are being maintained.

F38 A written review of the Erosion and Sediment Control Plan must be undertaken by 1 November each year. The review must:

(a) assess the plan against the requirements under condition F37

(b) include recommended actions to ensure actual and potential environmental impacts are effectively managed

(c) provide details of the actions to be taken and timelines for their completion and

(d) identify any amendments made to the Erosion and Sediment Control Plan.

F39 Stormwater, other than mine affected water, is permitted to be released to waters from:

(a) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by conditions F36 and F37 and

(b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with conditions F33 and F34, for the purpose of ensuring water does not become mine affected water.

F40 Water in clean water diversions must discharge to downstream waterways and must not be harvested for use on site.

Schedule G. Sewage

G1 Treated sewage effluent and/or water or stormwater contaminated by sewage treatment activities must not be released from the site to any waters or the bed and banks of any waters.

G2 The only contaminant permitted to be released to land is treated sewage effluent in compliance with the release limits stated in Table G1 - Contaminant limits for sewage effluent.

G3 Treated sewage effluent is only permitted to be released to the following locations:

(a) mine affected water storages and

(b) to land for the purpose of dust suppression and/or firefighting.

G4 The application of treated sewage effluent to land must be carried out in a manner such that:

(a) vegetation is not damaged

(b) there is no surface ponding of effluent and

(c) there is no run-off of effluent.

G5 Monitoring must be undertaken, and records kept of a monitoring program of contaminant releases to land and mine affected water storages at the monitoring points, frequency, and for the parameters specified in Table G1 - Contaminant limits for sewage effluent.

G6 Treated sewage effluent, when measured at the monitoring point/s specified in Table G1 - Contaminant limits for sewage effluent, must not exceed the limits specified in Table G1 - Contaminant limits for sewage effluent.

G7 The following information must be recorded in relation to all monitoring conducted for condition G5:

(a) the date on which the sample was taken

(b) the time at which the sample was taken

(c) the monitoring point at which the sample was taken

(d) the measured or estimated daily flow of effluent at the time of sampling and

(e) the results of all monitoring.

G8 The daily volume of treated sewage effluent released for dust suppression, firefighting water and/or to mine affected water storages must be measured and records kept.

G9 A record must be kept of any removal of treated sewage effluent off site for lawful disposal, including:

(a) date of pickup of treated effluent

(b) volume of treated effluent removed from the site

(c) destination of the treated effluent and

(d) the transporter.

Table G1 Contaminant limits for sewage effluent

Contaminant	Unit	Release limit	Limit type	Frequency	Monitoring point
5-day Biochemical Oxygen Demand	mg/L	20	Maximum	Monthly	End of disinfection treatment

Contaminant	Unit	Release limit	Limit type	Frequency	Monitoring point
Total Suspended Solids	mg/L	30	Maximum	Monthly	
Total nitrogen (as nitrogen)	mg/L	30	Maximum	Monthly	
Total phosphorus (as phosphorus)	mg/L	15	Maximum	Monthly	
E-coli	Organisms/100 ml	10	Maximum	Monthly	
pH	pH units	6.0-9.0	Range	Monthly	

Schedule H. Land and rehabilitation

H1 Land disturbed by mining must be rehabilitated to a stable landform with self-sustaining final land use in accordance with Table H1 – Final landform and Land Use, Table H2 – Rehabilitation requirements, Figure H1 - Conceptual final landform and final land use.

H2 Rehabilitation must commence progressively as soon as areas become available.

Table H1 Final landform and Land Use

Mine domain	Disturbance type/mine feature	Final landform	Final land use
Infrastructure	Infrastructure corridor	Pre-mining landform	Grazing pasture – Land Suitability class 3 or native ecosystem
	MIA (and other infrastructure areas)	Pre-mining landform	
	Water management infrastructure	Pre-mining landform or water storage (where a landowner retention agreement applies)	Grazing pasture – Land Suitability class 3 or native ecosystem
	Reinstated northern and central unnamed waterways	Reinstated waterway as per Table H2	Riparian vegetation as part of: Grazing pasture – Land Suitability class 3 or native ecosystem
	Pre-existing quarry (Winchester Quarry)	Pre-mining landform	Grazing pasture – Land Suitability class 3
Open cut mining pits and ramps (inclusive of coal reject disposal areas)	Main Pit below maximum waterbody level of 149 metres AHD, and West Pit below maximum waterbody level of 109 metres AHD	Residual void waterbody (includes areas of highwalls, end walls, low wall and ramps that are below maximum waterbody level)	Water storage for agricultural use (stock drinking)
	Main Pit (North and South) and West Pit – Highwalls and end walls	Highwalls and end walls (above maximum waterbody level)	Native ecosystem
	Main Pit (North and South) and West Pit –	Backfilled and/or reshaped low wall and	Grazing pasture – Land Suitability class 3

Mine domain	Disturbance type/mine feature	Final landform	Final land use
	Low walls, ramps and fully backfilled areas	ramps (above maximum waterbody level) Safe access to void water body for cattle	
	Reinstated central unnamed waterway	Reinstated waterway as per Table H2	Riparian vegetation as part of: Grazing pasture – Land Suitability class 3 or native ecosystem
	North-West Pit (including ramp)	Backfilled mining pit with in-pit waste rock emplacement	Grazing pasture – Land Suitability class 3
	South Pit (including ramp)		Grazing pasture – Land Suitability class 3 or native ecosystem
	Railway Pit (including ramp)		
Out-of-pit waste rock emplacement areas	Out-of-pit waste rock emplacement areas (including rejects disposal permitted in Railway Pit waste rock emplacement and Main Pit waste rock emplacement 1)	Reshaped out-of-pit emplacement as per Table H2	
Exploration	Exploration activities	Pre-mining landform	Pre-mining land use

Contaminated land

H3 Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for the final land use.

H4 Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition H1.

Rehabilitation Monitoring Program

H5 The holder of the environmental authority must develop and implement a Rehabilitation Monitoring Program prior to the commencement of mining activities, which must include sufficient spatial and temporal replication to enable statistically valid conclusions as established under the rehabilitation monitoring program.

H6 The Rehabilitation Monitoring Program required by condition H5, including results, must be reviewed at intervals not exceeding every 3 years, describing:

(a) how the rehabilitation objectives in Table H2 - Rehabilitation requirements will be achieved and

(b) verification of rehabilitation success.

Reference sites

H7 A range of reference sites are to be chosen to verify rehabilitation success against Table H2 - Rehabilitation requirements. The reference sites must be:

(a) located outside of rehabilitation zone and recorded to have latitude and longitude coordinates (GDA2020)

(b) provide a comparison of rehabilitation requirements for each mine domain and final land uses in Table H2 - Rehabilitation requirements

(c) have similar conditions and circumstances to facilitate the comparison such as natural sites, low intensity grazing sites and native ecosystem

(d) have similar geographical location and landform to the mine domain and final land uses in Table H2 - Rehabilitation requirements and landform to minimise any differences due to weather/rainfall, climate, aspect and year-to-year naturally occurring regular and irregular climatic events

(e) have similar physical factors and landform including topography, slope length and gradient to ensure comparison is as representative as possible and

(f) have similar other relevant factors such as soil type, chemical, biological, ecological and erosional factors to ensure comparison is as representative as possible.

Topsoil Management Plan

H8 A Topsoil Management Plan must be developed and implemented prior to the commencement of mining activities.

H9 The Topsoil Management Plan required by condition H8 must describe:

(a) a strategy for stripping topsoil in advance of mining activities

(b) how topsoil stockpiles are to be established and managed, so they do not become sterile

(c) a strategy to place topsoil directly onto areas requiring rehabilitation wherever possible and

(d) management of topsoil and topsoil stockpiles in accordance with the Erosion and Sediment Control Plan.

H10 All exploration activities carried out under this environmental authority must be rehabilitated in accordance with the standard conditions in the most recent version of the 'Eligibility criteria and standard conditions for exploration and mineral development projects' (ESR/2016/1985).

Schedule I. Biodiversity

Impacts to Prescribed Environmental Matters

I1 Significant residual impacts to prescribed environmental matters are not authorised under this environmental authority or the *Environmental Offsets Act 2014* unless the impact(s) is specified in Table I1 - Significant residual impacts to prescribed environmental matters and located within the '*Surface Disturbance Extent*' shown on Figure I1 – Location of significant residual impact to Matters of State Environmental Significance.

I2 All impacts to Matters of State Environmental Significance must be determined, documented, and mapped.

I3 Records of impacts to Matters of State Environmental Significance in condition I2 must be kept for the life of the environmental authority and include:

(a) the size and extent of impact

(b) details about the condition of the Matters of State Environmental Significance (e.g., dominant vegetation and remnant status) and

(c) a determination of whether the impact is a significant residual impact.

I4 Records demonstrating impacts to prescribed environmental matters in Table I1 - Significant residual impacts to prescribed environmental matters where offsets were not required, did not, or is not likely to, result in a significant residual impact, to that matter must be kept for the life of the environmental authority.

Environmental offsets

I5 An environmental offset must be made in accordance with the *Environmental Offsets Act 2014* and the most recent version of the Queensland Environmental Offsets Policy (EPP/2015/1658) for the maximum extent of impact to each prescribed environmental matter requiring an offset listed in Table I1 - Significant residual impacts to prescribed environmental matters.

Note: Deemed conditions provided in section 16 of the *Environmental Offsets Act 2014* also apply to this authority. Any contravention of a deemed condition will be dealt with under the *Environmental Protection Act 1994*.

Staged impacts

I6 The significant residual impacts to a prescribed environmental matter authorised in condition I1 for which an environmental offset is required by condition I5 may be carried out in stages. An environmental offset can be delivered for each stage of the impacts to prescribed environmental matters.

I7 A report which includes an analysis of the following must be provided to the administering authority 4 months prior to the commencement of each stage:

(a) for the forthcoming stage—the estimated significant residual impacts to each prescribed environmental matter and

(b) for the previous stage, if applicable, the actual significant residual impacts to each prescribed environmental matter, to date.

I8 A notice of election for the staged environmental offset referred to in condition I6, must be provided to the administering authority no less than 3 months before the proposed commencement of that stage, unless a lesser timeframe has been agreed to by the administering authority.

I9 Within six (6) months from the completion of the final stage of the project, a report which includes the following matters, must be provided to the administering authority:

(a) an analysis of the actual impacts of prescribed environmental matters resulting from the final stage and

(b) if applicable, a notice of election to address any outstanding offset debits for the authorised impacts.

Table I1 Significant residual impacts to prescribed environmental matters

Prescribed environmental matter	Maximum extent of impact	State environmental offset required
Regulated vegetation		
Endangered Regional Ecosystem – RE 11.3.1	64.5 ha	Yes
Endangered Regional Ecosystem – RE 11.4.8	2.4 ha	Yes
Endangered Regional Ecosystem – RE 11.4.9	23.1 ha	Yes
Endangered Regional Ecosystem – RE 11.9.5	17.7 ha	Yes
Of Concern Regional Ecosystem – RE 11.3.2*	9.6 ha*	No*
Of Concern Regional Ecosystem – RE 11.3.3c	6.9 ha	Yes
Of Concern Regional Ecosystem – RE 11.3.4	39.8 ha	Yes
Regional ecosystem within the defined distance of a vegetation management watercourse – RE 11.3.1	1.3 ha	Yes
Regional ecosystem within the defined distance of a vegetation management watercourse – RE 11.4.4*	0.1 ha*	No*
Regional ecosystem within the defined distance of a vegetation management watercourse – RE 11.9.3	3.1 ha	Yes

Prescribed environmental matter	Maximum extent of impact	State environmental offset required
Connectivity areas		
Connectivity area that is a regional ecosystem (not in urban area) – RE 11.3.1, RE 11.3.2, RE 11.3.3c, RE 11.3.4, RE 11.4.4, RE 11.4.8, RE 11.4.9, RE 11.5.3, RE 11.9.2, RE 11.9.3, RE 11.9.5	569.3 ha	Yes
Protected wildlife habitat#		
Habitat for a plant that is endangered wildlife – *Solanum adenophorum*	0.2 ha	Yes
Habitat for an animal that is endangered wildlife – Australian painted snipe (*Rostratula australis*)*	TBC	No*
Habitat for an animal that is vulnerable wildlife – Ornamental Snake (*Denisonia maculata*)*	1,834.2 ha*	No*
Habitat for an animal that is vulnerable wildlife – Squatter Pigeon (southern subspecies) (*Geophaps scripta scripta*)*	TBC*	No*
Habitat for an animal that is vulnerable wildlife – Koala (combined populations of QLD, NSW and the ACT) (Phascolarctos cinereus)*	TBC*	No*
Habitat for an animal that is vulnerable wildlife – Greater Glider (*Petauroides volans*)*	132.8 ha*	No*
Waterway providing for fish passage		
Fish passage (not in an urban area) – Waterways Providing for Fish Passage Mapped by the Department of Agriculture and Fisheries (2023)	6.8 ha	Yes

* This matter is proposed to be offset under the EPBC Act approval conditions
# The REs and species habitats overlap (i.e., the REs and species habitats are not mutually exclusive)
RE = regional ecosystem
ha = hectares.

Schedule J. Regulated structures

Assessment of consequence category

J1 The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the 'Manual for assessing consequence categories and hydraulic performance of structures', at the following times:

(a) prior to the design and construction of the structure, if it is not an existing structure or

(b) prior to any change in its purpose or the nature of its stored contents.

J2 A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.

J3 Certification must be provided by the suitably experienced and qualified person who undertook the assessment, in the form set out in the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933).

Design and construction of a regulated structure

J4 All regulated structures must be designed by, and constructed under the supervision of, a suitably experienced and qualified person in accordance with the requirements of the Manual for assessing consequence categories and hydraulic performance of structures (ESR/2016/1933).

J5 Construction of a regulated structure is prohibited unless:

(a) the holder has submitted a consequence category assessment report and certification to the administering authority and

(b) certification for the design, design plan and the associated operating procedures has been certified by a suitably qualified and experienced person in compliance with the relevant condition of this authority.

J6 Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan in the form set out in the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933) and must be recorded in the Register of Regulated Structures (condition J28).

J7 Regulated structures must:

(a) be designed and constructed in compliance with the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933)

(b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:

(i) floodwaters from entering the regulated dam from any watercourse or drainage line

(ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line and

(c) have the floor and sides of the dam designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the dam during the operational life of the dam and for any period of decommissioning and rehabilitation of the dam.

J8 Certification by the suitably qualified experienced and qualified person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that:

(a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure and

(b) construction of the regulated structure is in accordance with the design plan.

Notification of affected persons

J9 All affected persons must be provided with a copy of the emergency action plan in place for each regulated structure:

(a) for existing structures that are regulated structures, within 14 days of this condition taking effect

(b) prior to the operation of the new regulated structure and

(c) if the emergency action plan is amended, within 7 days of it being amended.

Operation of a regulated structure

J10 Operation of a regulated structure, except for an existing structure, is prohibited unless the holder has submitted to the administering authority in respect of the regulated structure, all of the following:

(a) one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition J5

(b) a set of 'as constructed' drawings and specifications

(c) certification of the 'as constructed drawings and specifications' in accordance with condition J8

(d) where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the Design Storage Allowance (DSA) volume across the system, a copy of the certified system design plan

(e) the requirements of this authority relating to the construction of the regulated structure have been met

(f) the holder has entered the details required under this authority, into a Register of Regulated Structures and

(g) there is a current operational plan for the regulated structure.

J11 Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in compliance with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.

Mandatory reporting level

J12 Conditions J13 to J16 inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.

J13 The Mandatory Reporting Level (MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.

J14 The holder must, as soon as practicable but within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL.

J15 The holder must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.

J16 The holder must record any changes to the MRL in the Register of Regulated Structures.

Design storage allowance

J17 The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system, taken prior to 1 July of each year.

J18 By 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the DSA volume for the dam (or network of linked containment systems).

J19 The holder must, as soon as practicable but within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.

J20 The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on a nominated date of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

Annual inspection report

J21 Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.

J22 At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include a recommendations section, with any recommended actions to ensure the integrity of the regulated structure or a positive statement that no recommendations are required.

J23 The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933).

J24 The holder must, within 28 days of receipt of the annual inspection report, provide to the administering authority:

(a) the recommendations section of the annual inspection report

(b) if applicable, any actions being taken in response to those recommendations and

(c) if, following receipt of the recommendations and (if applicable) recommended actions, the administering authority requests a copy of the annual inspection report from the holder, provide this to the administering authority within 14 days of receipt of the request.

Transfer arrangements

J25 The holder must provide a copy of any reports, documentation and certifications prepared under this environmental authority, including but not limited to any Register of Regulated Structures, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this authority.

Decommissioning and rehabilitation

J26 Regulated structures must not be abandoned but be either:

(a) decommissioned and rehabilitated to achieve compliance with condition J28 or

(b) left in-situ for a use by the landholder provided that:

(i) it no longer contains contaminants that will migrate into the environment

(ii) it contains water of a quality that is demonstrated to be suitable for its intended use(s)

(c) the holder of the environmental authority and the landholder agree in writing that the:

(i) regulated structure will be used by the landholder following the cessation of the environmentally relevant activities and

(ii) landholder is responsible for the regulated structure, on and from an agreed date.

J27 Before surrendering this environmental authority, the site must be rehabilitated to achieve the rehabilitation requirements in Table H2- Rehabilitation requirements.

Register of Regulated Structures

J28 A Register of Regulated Structures must be established and maintained by the holder for each regulated structure.

J29 The holder must provisionally enter the required information in the Register of Regulated Structures when a design plan for a regulated dam is submitted to the administering authority.

J30 The holder must make a final entry of the required information in the Register of Regulated Structures once compliance with conditions J10 and J11 has been achieved.

J31 The holder must ensure that the information contained in the Register of Regulated Structures is current and complete on any given day.

J32 All entries in the Register of Regulated Structures must be approved by the chief executive officer for the holder of this environmental authority, or their delegate, as being accurate and correct.

J33 The holder must supply to the administering authority a copy of the records contained in the Register of Regulated Structures, in the electronic format required by the administering authority.

Definitions

Key terms and/or phrases used in this document are defined in this section. Where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

'acid mine drainage' means drainage that is characterised by low pH, elevated metal concentrations, high sulphate concentrations and high salinity.

'administering authority' is the agency or department that administers the environmental authority provisions under the *Environmental Protection Act 1994*.

'airblast overpressure' means energy transmitted from the blast site within the atmosphere in the form of pressure waves. The maximum excess pressure in this wave, above ambient pressure is the peak airblast overpressure measured in decibels linear (dBL).

‘annual inspection report’ means an assessment prepared by a ‘suitably qualified and experienced person’ containing details of the assessment against the most recent consequence assessment report and design plan (or system design plan), including:

1. against recommendations contained in previous annual inspections reports
2. against recognised dam safety deficiency indicators
3. for changes in circumstances potentially leading to a change in consequence category
4. for conformance with the conditions of this authority
5. for conformance with the ‘as constructed’ drawings
6. for the adequacy of the available storage in each regulated dam, based on an actual observation or observations taken after a nominated date each year but prior to six months following that date, of accumulated sediment, state of the containment barrier and the level of liquids in the dam (or network of linked containment systems) and
7. for evidence of conformance with the current operational plan.

‘appropriately qualified person’ means a person who:

(a) has professional qualifications, training, skills or experience relevant to the nominated subject matter and

(b) can give authoritative assessment, advice and analysis in relation to the nominated subject matter using relevant protocols, standards, methods or literature.

‘aquifer’ a sub-surface rock formation containing water in recoverable quantities.

‘assessed’ or ‘assessment’ by a ‘suitably qualified and experienced person’ in relation to a consequence assessment of a dam, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit of the assessment:

1. exactly what has been assessed and the precise nature of that determination
2. the relevant legislative, regulatory and technical criteria on which the assessment has been based
3. the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts and
4. the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

‘background’ with reference to the water schedule means the average of samples taken prior to the commencement of mining from the same waterway that the current sample has been taken.

‘baseline’ with reference to the groundwater schedule, means the average of samples taken prior to the commencement of mining from the same groundwater monitoring bores.

‘blasting’ means the use of explosive materials to fracture:

1. rock, coal and other minerals for later recovery or
2. structural components or other items to facilitate removal from a site or for reuse.

‘catchment’ the entire land area from which water (e.g., rainfall drains to a specific watercourse or water body).

‘certification’ means assessment and approval must be undertaken by a suitably qualified and experienced person in relation to any assessment or documentation required by the ‘Manual for assessing consequence categories and hydraulic performance of structures’ (ESR/2016/1933), including design plans, ‘as constructed’ drawings and specifications, construction, operation or an annual report regarding regulated structures, undertaken in accordance with the Board of Professional Engineers of Queensland Policy Certification by RPEQs (ID: 1.4 (2A)).

‘certification’ ‘certifying’ or ‘certified’ by an appropriately qualified and experienced person in relation to a design plan or an annual report regarding dams/structures, means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

1. exactly what is being certified and the precise nature of that certification
2. the relevant legislative, regulatory and technical criteria on which the certification has been based
3. the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts and
4. the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

'commercial place' means a workplace used as an office or for business or commercial purposes, which is not part of the mining activity and does not include employees' accommodation or public roads.

'completion criteria' means the measures by which the actions implemented to rehabilitate the land are deemed to be complete. The completion criteria indicate the success of the rehabilitation outcome or remediation of areas which have been significantly disturbed by the mining activities. Acceptance criteria may include information regarding:

1. vegetation establishment, survival and succession
2. vegetation productivity, sustained growth and structure development
3. fauna colonisation and habitat development
4. ecosystem processes such as soil development and nutrient cycling, and the recolonisation of specific fauna groups such as collembola, mites and termites which are involved in these processes
5. microbiological studies including recolonisation by mycorrhizal fungi, microbial biomass and respiration
6. effects of various establishment treatments such as deep ripping, topsoil handling, seeding and fertiliser application on vegetation growth and development
7. resilience of vegetation to disease, insect attack, drought and fire and
8. vegetation water use and effects on ground water levels and catchment yields.

'consequence' in relation to a structure as defined, means the potential for environmental harm resulting from the collapse or failure of the structure to perform its primary purpose of containing, diverting or controlling flowable substances.

'consequence category' means a category, either low, significant or high, into which a dam is assessed as a result of the application of tables and other criteria in the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933).

'consecutive sampling occasions' means consecutive sequential sampling occasions regardless of frequency.

'construction' or 'constructed' in relation to a regulated structure includes building a new regulated structure and lifting or otherwise modifying an existing regulated structure but does not include investigations and testing necessary for the purpose of preparing a design plan.

'dam' means a land-based structure or a void that contains, diverts or controls flowable substances, and includes any substances that are thereby contained, diverted or controlled by that land-based structure or void and associated works.

'decommissioning' removal or reuse of infrastructure.

'design plan' is a document setting out how all identified consequence scenarios are addressed in the planned design and operation of a regulated structure.

'design storage allowance or DSA' means an available volume, estimated in accordance with the 'Manual for assessing consequence categories and hydraulic performance of structures' (ESR/2016/1933) published by the administering authority, must be provided in a dam as of 1 November each year in order to prevent a discharge from that dam to an AEP specified in that manual.

‘disturbance’ of land includes:

1. compacting, removing, covering, exposing or stockpiling of earth
2. removal or destruction of vegetation or topsoil or both to an extent where the land has been made susceptible to erosion
3. carrying out mining activities within a watercourse, waterway, wetland or lake
4. the submersion of areas by tailings or hazardous contaminant storage and dam/structure walls
5. temporary infrastructure, including any infrastructure (roads, tracks, bridges, culverts, dam/structures, bores, buildings, fixed machinery, hardstand areas, airstrips, helipads etc) which is to be removed after the mining activity has ceased and
6. releasing of contaminants into the soil or underlying geological strata.

However, the following areas are not included when calculating areas of ‘disturbance’:

1. areas off lease (e.g., roads or tracks which provide access to the mining lease)
2. disturbance that pre-existed the grant of the tenure, excluding:
    (a) disturbance associated with exploration activities conducted under the pre-requisite tenures to the mining leases relevant to this environmental authority
    (b) disturbance associated with the Quarrico (or its subsequent owner) quarry located within the mine infrastructure area
    (c) areas within the authorised disturbance areas depicted in Figure A1 - Authorised disturbance areas.

‘effluent’ means treated wastewater released from sewage treatment plants.

‘electrical conductivity’ the ability of a substance (either solid, liquid or gas) to transmit electricity.

‘emergency action plan’ means documentation forming part of the operational plan held by the holder of this environmental authority or a nominated responsible officer, which identifies emergency conditions that sets out procedures and actions that will be followed and taken by the dam owner and operating personnel in the event of an emergency. The actions are to minimise the risk and consequences of failure, and ensure timely warning to downstream communities and the implementation of protection measures. The plan must require dam owners to annually update contact information.

‘EP Act’ means *Environmental Protection Act 1994.*

‘essential habitat’ as defined in the *Vegetation Management Act 1999*.

‘flowable substance’ means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

‘holder of this environmental authority’ means:

1. where this document is an environmental authority, any person who is the holder of, or is acting under, that environmental authority or
2. where this document is a development approval, any person who is the registered operator for that development approval.

‘hydraulic performance’ means the capacity of a regulated dam to contain or safely pass flowable substances based on the design criteria specified for the relevant consequence category in the ‘Manual for assessing consequence categories and hydraulic performance of structures’.

‘infrastructure’ means water storage dams, levees, roads and tracks, buildings and other structures built for the purpose of the mining activity.

‘$L_{A1\ adj,15\ mins}$’ means the A-weighted sound pressure level, adjusted for noise character, measured in the presence of the noise under investigation and exceeded for one per cent of the time period of fifteen minutes, using Fast response.

'$L_{Aeq\ adj,15\ mins}$' means the equivalent continuous A-weighted sound pressure level, adjusted for noise character, measured in the presence of the noise under investigation over a time period of fifteen minutes, using Fast response.

'in-situ' a term used to distinguish material (e.g., soils, minerals, fossils, etc.) found in its original position of formation, deposition, or growth, as opposed to transported material.

'leachate' means a liquid that has passed through or emerged from or is likely to have passed through or emerged from, a material stored, processed or disposed of at the operational land which contains soluble, suspended or miscible contaminants likely to have been derived from the said material.

'mandatory reporting level' or 'MRL' means a warning and reporting level determined in accordance with the criteria in the 'Manual for assessing consequence categories and hydraulic performance of structures', published by the administering authority.

'maximum extent of impact' means the total, cumulative, residual extent and duration of impact to a prescribed environmental matter that will occur over a project's life after all reasonable avoidance and reasonable on-site mitigation measures have been, or will be, undertaken.

'measures' includes any measures to prevent or minimise environmental impacts of the mining activity such as bunds, silt fences, diversion drains, capping, and containment systems.

'mine-affected water' means:

(a) the following types of water:

   (i) pit water, tailings dam water, processing plant water

   (ii) water contaminated by a mining activity which would have been an environmentally relevant activity under Schedule 2 of the Environmental Protection Regulation 2008 if it had not formed part of the mining activity

   (iii) rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures that have been installed in accordance with the standards and requirements of an Erosion and Sediment Control Plan to manage runoff containing sediment only , provided that this water has not been mixed with pit water, tailings dam water, processing plant water or workshop water

   (iv) groundwater which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated

   (v) groundwater from the mine's dewatering activities

   (vi) a mix of mine-affected water (under any of paragraphs i)-v)) and other water

(b) does not include surface water runoff which, to the extent that it has been in contact with areas disturbed by mining activities that have not yet been completely rehabilitated, has only been in contact with:

   (i) land that has been rehabilitated to a stable landform and either capped or revegetated in accordance with the completion criteria set out in the environmental authority but only still awaiting maintenance and monitoring of the rehabilitation over a specified period of time to demonstrate rehabilitation success or

   (ii) land that has partially been rehabilitated and monitoring demonstrates the relevant part of the landform with which the water has been in contact does not cause environmental harm to waters or groundwater, for example:

      (1) areas that have been capped and have monitoring data demonstrating hazardous material adequately contained within the site

(2) evidence provided through monitoring that the relevant surface water would have met the water quality parameters for local water quality objectives in this environmental authority, if those parameters had been applicable to the surface water runoff or

(iii) both.

'mineral waste' means waste materials resulting from the extraction of coal including overburden, inter-burden, waste rock and rejects (including coarse and fine).

'mining activities' means the following activities:

1. authorised as per the definition in section 110 of the *Environmental Protection Act 1994*
2. all environmentally relevant activities authorised under this environmental authority
3. all mining disturbance including land clearing, construction of infrastructure, overburden removal and active mining
4. all care and maintenance activities and
5. rehabilitation.

'natural flow' means the flow of water through waters caused by nature.

'Non-sensitive Location Agreement' means a written agreement between the holder of this environmental authority and the Landowner of a Sensitive or Commercial Place that addresses specific impacts of environmental nuisance (dust, particulate, noise, odour, and blasting pressure) that interferes with the Landowner's, or any other occupier's, use, occupation or enjoyment of the land.

'non-polluting' means having no adverse impacts upon the receiving environment.

'notice of election' has the meaning in section 18(2) of the *Environmental Offsets Act 2014*.

'neutral drainage' means drainage that is characterised by near-neutral pH, elevated heavy metal concentrations and high sulphate salinity.

'operational plan' includes:

1. normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA) and
2. contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure.

'peak particle velocity (ppv)' means a measure of ground vibration magnitude which is the maximum rate of change of ground displacement with time, usually measured in millimetres/second (mm/s).

'pH' a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acidic, 7 is neutral, and 14 is most basic (alkaline).

'prescribed environmental matters' has the meaning in section 10 of the *Environmental Offsets Act 2014*, limited to the matters of Prescribed environmental matters—matters of State environmental significance listed in schedule 2 of the Environmental Offsets Regulation 2014.

'progressive rehabilitation' means rehabilitation (defined below) undertaken progressively or a staged approach to rehabilitation as mining operations are ongoing.

'recharge' the addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems.

'Receiving Environment Monitoring Program' or 'REMP' means a monitoring program designed to monitor and assess the local receiving waters for the specified discharge locations and the potential impacts of controlled and/or uncontrolled releases of contaminants to the environment from the activity by assessing the overall condition of the local receiving waters and assessment should be against water quality objectives and relevant guidelines.

‘receiving waters’ means the waters into which this environmental authority authorises releases of mine-affected water.

‘register of regulated structure’ includes:

1. date of entry in the register
2. name of the structure, its purpose and intended/actual contents
3. the consequence category of the dam as assessed using the ‘*Manual for assessing consequence categories and hydraulic performance of structures*’ (ESR/2016/1933)
4. dates, names, and reference for the design plan plus dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam
5. name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings
6. for the regulated dam, other than in relation to any levees
    (a) the dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam
    (b) coordinates (latitude and longitude in GDA2020) within 5 metres at any point from the outside of the dam including its storage area
    (c) dam crest volume (megalitres)
    (d) spillway crest level (metres AHD)
    (e) maximum operating level (metres AHD)
    (f) storage rating table of stored volume versus level (metres AHD)
    (g) design storage allowance (megalitres) and associated level of the dam (metres AHD) and
    (h) mandatory reporting level (metres AHD)
7. the design plan title and reference relevant to the dam
8. the date construction was certified as compliant with the design plan
9. the name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan
10. details of the composition and construction of any liner
11. the system for the detection of any leakage through the floor and sides of the dam
12. dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year
13. dates when recommendations and actions arising from the annual inspection were provided to the administering authority and
14. dam water quality as obtained from any monitoring required under this environmental authority as at 1 November of each year.

‘regulated structure’ means any structure in the significant or high consequence category as assessed using the ‘Manual for assessing consequence categories and hydraulic performance of structures’ (ESR/2016/1933) published by the administering authority. A regulated structure does not include:

1. a fabricated or manufactured tank or container, designed and constructed to an Australian Standard that deals with strength and structural integrity of that tank or container
2. a sump or earthen pit used to store residual drilling material and drilling fluid only for the duration of drilling and well completion activities
3. a flare pit.

‘rehabilitation’ means the process of reshaping and revegetating land to a stable condition in accordance with the completion criteria set out in this environmental authority and, where relevant, includes remediation of contaminated land.

‘release event’ means a surface water discharge from mine affected water storages or contaminated areas on the mine site.

‘representative’ means a sample set which covers the variance in monitoring or other data either due to natural changes or operational phases of the mining activities.

‘residual void’ means an open pit resulting from the removal of ore and/or waste rock which will remain following the cessation of all mining activities and completion of rehabilitation processes.

‘resample’ means the additional sampling required to be undertaken following an exceedance of a limit of a sampling occasion to verify the result is not the result of sampling error, for quality assurance and quality control purposes.

‘restricted invasive plants’ means those plants identified in fact sheet called ‘Restricted invasive plants of Queensland’ (Department of Agriculture and Fisheries, 2020 or a subsequent version or any successor) under the *Biosecurity Act 2014*.

‘runoff’ a portion of precipitation (rain, hail and snow) that flows across the ground surface as water.

‘saline drainage’ means drainage that is characterised by high sulphate salinity but near-neutral pH and low concentrations of heavy metals.

‘salinity’ means the total content of dissolved solids in groundwater or surface water, commonly expressed as parts of dissolved solids per million parts of solution, or milligrams of dissolved solids per litre of solution (mg/L).

‘sampling occasion’ means the collection of a sample undertaken in accordance with the specified sampling frequency specified, and where an exceedance is recorded the sampling occasion together with the resample.

‘self-sustaining’ means an area of land which has been rehabilitated and has maintained the required completion criteria without human intervention for a period nominated by the administering authority.

‘sensitive place’ means:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other occupied residential premises or
2. a motel, hotel or hostel or
3. an educational institution or
4. a medical centre or hospital or
5. a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area or
6. a public park or gardens.

Note: The definition of ‘sensitive place’ and ‘commercial place’ is based on Schedule 1 of EPP Noise. That is, a sensitive place is inside or outside on a dwelling, library, educational institution, childcare, kindergarten, school, playground, hospital, surgery or other medical institution, commercial and retail activities, protected area or an area identified under a conservation plan under *Nature Conservation Act 1992* as a critical habitat or an area of major interest; marine park under *Marine Parks Act 2004*, park or garden that is outside of the mining lease and open to the public for the use other than for sport or organised entertainment. A commercial place is inside or outside a commercial or retail activity.

A mining camp (i.e., accommodation and ancillary facilities for mine employees or contractors or both, associated with the mine the subject of the environmental authority) is not a sensitive place for that mine or mining project, whether or not the mining camp is located within a mining tenement that is part of the mining project the subject of the environmental authority. For example, the mining camp might be located on neighbouring land owned or leased by the same company as one of the holders of the environmental authority for the mining project, or a related company. Accommodation for mine employees or contractors is not a sensitive place if the land is held by a mining company or related company, and if occupation is restricted to the employees, contractors and their families for the particular mine or mines which are held by the same company or a related company.

However, a township (occupied by the mine employees, contractors and their families for multiple mines that are held by different companies) would be a sensitive place, even if part or all of the township is constructed on land owned by one or more of the companies.

‘significant residual impact’ has the meaning in section 8 of the *Environmental Offsets Act 2014*.

‘site’ means the Winchester South Coal Project to which this environmental authority relates.

‘spillway’ means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the dam, normally under flood conditions or in anticipation of flood conditions.

‘stable’ has the meaning in Schedule 8 of the Environmental Protection Regulation 2019 and, for a site, means the rehabilitation and restoration of the site is enduring or permanent so that the site is unlikely to collapse, erode or subside.

‘suitably qualified and experienced person’ in relation to regulated structures means a person who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the *Professional Engineers Act 2002*, and has demonstrated competency and relevant experience:

1. for regulated dams, an RPEQ who is a civil engineer with the required qualifications in dam safety and dam design
2. for regulated levees, an RPEQ who is a civil engineer with the required qualifications in the design of flood protection embankments.

Note: It is permissible that a suitably qualified and experienced person obtain subsidiary certification from an RPEQ who has demonstrated competence and relevant experience in either geomechanics, hydraulic design or engineering hydrology.

‘system design plan’ means a plan that manages an integrated containment system that shares the required DSA and/or extreme storm surge volume across the integrated containment system.

'the Act’ means the *Environmental Protection Act 1994*.

‘the project’ means the Winchester South Coal Project to which this environmental authority relates.

‘total suspended particulates (TSP)’ means the mass of all particulate matter suspended in a solution (e.g., the air).

‘total suspended solids (TSS)’ a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit volume (e.g., milligrams per litre).

‘µS/cm’ means micro siemens per centimetre.

‘void’ means any man-made, open excavation in the ground.

'waste’ as defined in section 8AA of the *Waste Reduction and Recycling Act 2011*.

‘waste and resource management hierarchy’ has the meaning in Section 9 of the *Waste Reduction and Recycling Act 2011*.

‘waste rock emplacements’ means landforms made up of waste rock material from overburden and interburden material.

‘water’ is defined under Schedule 4 of the *Water Act 2000*.

‘watercourse’ has the meaning in Schedule 4 of the *Environmental Protection Act 1994* and means a river, creek or stream in which water flows permanently or intermittently—

1. in a natural channel, whether artificially improved or not or
2. in an artificial channel that has changed the course of the watercourse.

Watercourse includes the bed and banks and any other element of a river, creek or stream confining or containing water.

‘water quality’ means the chemical, physical and biological condition of water.

‘Water quality objective’ (WQO) means a numerical concentration limit or narrative statement that has been established to support and protect the designated uses of water at a specified site. It is based on scientific criteria or water quality guidelines but may be modified by other inputs such as social, cultural or economic constraints. WQOs are specified in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (Part 4, Section 11).

‘waters’ includes:

1. river, creek, stream in which water flows permanently or intermittently either:
2. lake, lagoon, pond, swamp, wetland, dam or
3. unconfined surface water or
4. storm water channel, storm water drain, roadside gutter or
5. bed and banks and any other element of a river, creek, stream, lake, lagoon, pond, swamp, wetland, storm water channel, storm water drain, roadside gutter or dam confining or containing water or
6. groundwater or
7. non-tidal or tidal waters (including the sea) or
8. any part-thereof.

‘water monitoring’ means all water quality parameters and samples, discharge flow rates, volume of discharge per event, duration of discharge event, flow rate of receiving water for surface water and groundwater level for groundwater.

‘WaTERS’ means Water Tracking and Electronic Reporting System or subsequent updated system, used to submit monitoring data and notify the Queensland Government. It is available at www.waters.des.qld.au or by contacting psd.help@qld.gov.au.

Table H2 Rehabilitation requirements

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
All	Open cut mining pits and ramps to be fully backfilled-- South Pit, Railway Pit, and North-West Pit; and the backfilled areas of Main Pit and West Pit. Out-of-pit and in-pit waste rock emplacement areas, inclusive of coal reject disposal areas. Infrastructure areas, including the MIA and infrastructure corridor, and pre-existing quarry.	Non-polluting	No serious environmental harm from discharge, seepage and run-off.	Surface water run-off from rehabilitated areas. Groundwater monitoring undertaken in the rehabilitated landform. Site investigation report.	Surface water runoff from all rehabilitation areas entering the receiving environment must not result in impacts to surface water values and must comply with the following water quality limit:

Table A - Rehabilitated landform water quality limits

Quality characteristic (unit) [1]	Water quality limit
pH (range)[2]	6.5 – 8.5
Electrical conductivity (mS/cm)[2]	720
Sulphate (mg/L)[2]	25
Turbidity (NTU)[2]	50
Aluminium (µg/L)[3]	55
Arsenic (total) (µg/L)[3]	13
Cadmium (total) (µg/L)[3]	0.2
Chromium (µg/L)[3]	1
Copper (µg/L)[3]	1.4
Iron (µg/L)[3]	300
Lead (µg/L)[3]	3.4
Mercury (µg/L)[3]	0.2
Nickel (µg/L)[3]	11
Zinc (µg/L)[3]	8
Boron (µg/L)[4]	940

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria	
					Cobalt (µg/L)[3]	1.4
					Manganese (µg/L)[3]	1,900
					Molybdenum (µg/L)[3]	34
					Selenium (µg/L)[3]	5
					Silver (µg/L)[3]	0.5
					Uranium (µg/L)[3]	1
					Vanadium (µg/L)[3]	10
					Ammonia (µg/L)[3]	900
					Nitrate (TN) (µg/L)[5]	1,100
					Total recoverable hydrocarbons (C6-C9) (µg/L)[6]	20
					Total recoverable hydrocarbons (C10-C36) (µg/L)[6]	100
					Fluoride (µg/L)[7]	2,000
					Major ions (mg/L) calcium, chloride, potassium, magnesium, sodium, bicarbonate, carbonate.	For interpretation purposes only.
					Hardness (mg/L)	For interpretation purposes only.
					[1] All metals and metalloids must be measured as total (unfiltered) and dissolved (<0.45 µm filtered). Contaminant limits for metals and metalloids are only considered to be exceeded if the results for dissolved metal or metalloid exceed the trigger level.	

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					[2] Based on the Isaac River Sub-basin Water Quality Objectives. [3] For aquatic ecosystem protection, based on slightly to moderately disturbed ecosystems (ANZG, 2018). [4] For aquatic ecosystem protection, based on based on slightly to moderately disturbed ecosystems (ANZG, 2020). [5] For aquatic ecosystem protection, based on ambient Queensland Water Quality Guidelines (EPA, 2006) for total nitrogen (TN). [6] For aquatic ecosystem protection, based on limit of reporting for GC-MS (gas-chromatography mass spectrometry). [7] Protection of livestock and short-term irrigation guideline (ANZECC and ARMCANZ, 2000). Groundwater quality results comply with the limits in Table E2 – Groundwater quality limits. Contaminated land survey confirms that no contamination causing the land to be unsuitable for the post-mining land use is present. Upon cessation of out-of-pit coal reject disposal, a final cover system must be installed which results in no ponding of water and minimises: (a) infiltration of water into the coal reject disposal structures and (b) the likelihood of any erosion occurring to either the final cover system, dumped spoil material or deposited coal rejects. Upon cessation of in-pit coal reject disposal, a final cover system must be installed to in-pit

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					coal reject disposal structures, to ensure they are safe, stable and non-polluting. The final cover system of any in-pit and out-of-pit coal reject disposal structures must include an inert layer, of at least ten metres, that reduces infiltration and an upper/final layer of NAF material that is capable of sustaining plant growth.
All	Open cut mining pits and ramps to be fully backfilled—South Pit, Railway Pit, and North-West Pit; and the backfilled areas of Main Pit (excluding residual void) and West Pit (excluding residual void). Out-of-pit and in-pit waste rock emplacement areas, inclusive of coal reject disposal areas. Infrastructure areas, including the MIA and infrastructure corridor, and pre-existing quarry	Self-sustaining	Grazing pasture – Land Suitability class 3 or Native ecosystem	Soil testing Slopes analysis Vegetation monitoring	With the exception of any infrastructure to remain as part of the final landform or where infrastructure is agreed to be retained by the landholder as evidenced by a signed landholder agreement, the following are complete: i. all services disconnected, terminated and removed ii. all buildings and associated infrastructure dismantled and removed offsite iii. all hardstand, concrete areas and roads (bitumen, blue metal, aggregate etc.) removed iv. all fencing that is not part of final landform requirements removed v. all pipelines drained and removed vi. all waste removed vii. all surface water drainage infrastructure removed viii. all drillholes, bores, sediment ponds and sumps decommissioned ix. all machinery and equipment removed from site and x. all dams dewatered and desilted.

<table>
<tr><th>Rehabilitation area</th><th>Mine feature name</th><th>Rehabilitation goal</th><th>Rehabilitation objectives</th><th>Indicators</th><th>Completion criteria</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Topsoil is to be applied at a minimum depth of 0.20 metres
Soil testing indicates the following parameters are met:
<table>
<tr><th>Parameter</th><th>Criteria</th></tr>
<tr><td>Plant Available Water Capacity (PAWC)</td><td>>75mm</td></tr>
<tr><td>Bicarbonate P (at 0-10cm depth)</td><td>≥5ppm</td></tr>
<tr><td>Electrical Conductivity (1:5 dilution) (in the root zone at 60 cm depth)</td><td><0.9mS/cm</td></tr>
<tr><td>Soil pH as measured at any part of the root zone</td><td>>5.0 - <9.0</td></tr>
<tr><td>Exchangeable Sodium Percentage (ESP %) (at 0-10 cm depth)</td><td><15%</td></tr>
</table>
Conformance of the final landforms to the design criteria—
(1) For grazing pasture slopes ≤15%
(2) For native ecosystem on slopes up to 17.6% (10º).
For grazing pasture outcome, monitoring confirms:
(1) Established and persistent pasture groundcover ≥ 70%
(2) Weed presence is a maximum of 10% of total vegetative groundcover confirmed in annual monitoring. Weed management recommendations to be provided in annual reports and
(3) At least 4 perennial species established.</td></tr>
</table>

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					For native ecosystem outcome, monitoring confirms: ≥50% established and persistent ground cover (vegetative and/or rock mulch) for all slopes from 0-17.6%. Species richness composing of: (1) ≥ 2 tree species (2) ≥ 3 shrub species (3) ≥ 5 groundcover species. From one or a combination of regional ecosystems from the list below: (1) 11.3.1 (2) 11.3.2 (3) 11.3.3c (4) 11.3.4 (5) 11.4.8 (6) 11.4.9 (7) 11.5.3 (8) 11.9.2 (9) 1.9.5
All	Open cut mining pits and ramps to be fully backfilled--South Pit, Railway Pit, and North-West Pit, and the backfilled areas of Main Pit and West Pit.	Safe and stable	Safe for humans and animals	Structural and geotechnical adequacy Minimal erosion	Certification from a RPEQ that the landform is geotechnically stable and achieves a factor of safety ≥ 1.5. Average erosion rate of <5 t/ha/yr with the maximum erosion rate at any point on the landform of <10 t/ha/yr.

<table>
<tr><th>Rehabilitation area</th><th>Mine feature name</th><th>Rehabilitation goal</th><th>Rehabilitation objectives</th><th>Indicators</th><th>Completion criteria</th></tr>
<tr><td></td><td>Out-of-pit and in-pit waste rock emplacement areas.
Infrastructure areas, including the MIA and infrastructure corridor, and pre-existing quarry.</td><td></td><td></td><td></td><td>No evidence of erosion classified as ‘moderate’ or ‘severe’ as defined in the following table.
<table>
<tr><th rowspan="2">Erosion type</th><th colspan="3">Erosion classification[156]</th></tr>
<tr><th>Minor</th><th>Moderate</th><th>Severe</th></tr>
<tr><td>Rill and Gully erosion</td><td><0.3m deep
Occasional rills</td><td>>0.3m deep
Common rills</td><td>>0.3m deep
Numerous rills forming corrugated ground surface</td></tr>
<tr><td>Tunnel erosion</td><td>Absent</td><td>Absent</td><td>Present</td></tr>
<tr><td>Mass movement</td><td>Absent</td><td>Absent</td><td>Present</td></tr>
</table></td></tr>
<tr><td>All</td><td>Reinstated central unnamed waterway (see Figure H1 – Conceptual final landform and final land use)</td><td>Safe and stable</td><td>Safe for humans and animals</td><td>Structural, geotechnical and hydraulic adequacy.

Minimal erosion.</td><td>Hydraulic characteristics of reinstated central unnamed waterway are:
(1) similar to pre-mining hydraulic characteristics.
(2) have a gradient of no more than 5%.
(3) habitat and geomorphic features include material such as woody debris to create habitat diversity.
(4) natural features such as pools and meanders, bed and bank profiles, and providing a mix of suitable substrate types.
Certification from a RPEQ that the landform is geotechnically stable.</td></tr>
</table>

[156] Adapted from:
The National Committee on Soil and Terrain. (2009). *Australian Soil and Land Survey Field Handbook* (3rd ed.). Collingwood, Victoria: CSIRO Publishing.

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					No active erosion is present (as defined in the Australian Soil and Land Survey Field Handbook third edition, or a more recent version).
		Non-polluting	No serious environmental harm from discharge, seepage and run-off.	Surface water discharge	Surface water discharge must not result in impacts to surface water values and must comply with the water quality limits in Table A – Rehabilitated landform water quality limits.
		Self-sustaining	Riparian vegetation	Vegetation monitoring	Reinstatement of central unnamed waterway monitoring confirms: (1) ≥50% established and persistent ground cover (vegetative and/or rock mulch) for all vegetated slopes and (2) an AQP certifies that dominant species from RE 11.4.4/11.9.2/11.3.1 are regenerating where riparian vegetation has been cleared due to mining activities.
Infrastructure areas	Reinstated northern unnamed waterway (see Figure H1 – Conceptual final landform and final land use)	Safe and stable	Safe for humans and animals	Structural, geotechnical and hydraulic adequacy. Minimal erosion.	Hydraulic characteristics of northern unnamed waterway are: (1) similar to pre-mining hydraulic characteristics (2) has a waterway gradient of no more than 5% (3) conditions within the waterway (depth and velocities) are suitable to provide adequate fish passage during 1, 2 and 5 year Average Recurrence Intervals (4) habitat and geomorphic features include material such as woody debris to create habitat diversity within the waterway and

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					(5) natural features such as pools and meanders, bed and bank profiles, and providing a mix of suitable substrate types. Certification from a RPEQ that the landform is geotechnically stable. No active erosion is present (as defined in the Australian Soil and Land Survey Field Handbook third edition, or a more recent version).
		Non-polluting	No serious environmental harm from discharge, seepage and run-off	Surface water discharge	Surface water discharge must not result in impacts to surface water values and must comply with the water quality limits in Table A – Rehabilitated landform water quality limits.
		Self-sustaining	Riparian vegetation	Vegetation monitoring	Reinstatement of northern unnamed waterway monitoring confirms: (1) ≥50% established and persistent ground cover (vegetative and/or rock mulch) for all vegetated slopes and (2) an AQP certifies that dominant species from RE 11.3.2/11.3.7/11.3.1 are regenerating where riparian vegetation has been cleared due to mining activities.
Residual Voids	Main Pit and West Pit voids	Safe and stable	Safe for humans and animals	Geotechnical stability Minimal erosion	No public access to high wall and end wall (bunding, security fencing and signage as a minimum). Safe access to void water body for cattle. Certification from a RPEQ that the landform is geotechnically stable and achieves a factor of safety ≥ 1.5. No active erosion is present (as defined in the Australian Soil and Land Survey Field

<table>
<tr><th>Rehabilitation area</th><th>Mine feature name</th><th>Rehabilitation goal</th><th>Rehabilitation objectives</th><th>Indicators</th><th>Completion criteria</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Handbook third edition, or a more recent version).</td></tr>
<tr><td></td><td>Main Pit and West Pit voids</td><td>Non-polluting</td><td>No serious environmental harm from discharge, seepage and run-off</td><td>Groundwater monitoring undertaken in the rehabilitated landform.
Site investigation report</td><td>Groundwater quality results comply with the limits in Table E2 – Groundwater quality limits.
Contaminated land survey confirms that no contamination causing the land to be unsuitable for the post-mining land use is present.</td></tr>
<tr><td></td><td>Main Pit and West Pit voids</td><td>Self-sustaining</td><td>Grazing pasture</td><td>Soil testing
Slopes analysis
Vegetation monitoring</td><td>For areas of low walls and ramps of Main Pit and West Pit voids
Topsoil is to be applied at a minimum depth of 0.20 metres.
Soil testing indicates the following parameters* are met:
<table>
<tr><th>Parameter</th><th>Criteria</th></tr>
<tr><td>Plant Available Water Capacity (PAWC)</td><td>>75mm</td></tr>
<tr><td>Bicarbonate P (at 0-10cm depth)</td><td>≥5ppm</td></tr>
<tr><td>Electrical Conductivity (1:5 dilution) (in the root zone at 60 cm depth)</td><td><0.9mS/cm</td></tr>
<tr><td>Soil pH as measured at any part of the root zone</td><td>>5.0 - <9.0</td></tr>
<tr><td>Exchangeable Sodium Percentage (ESP %) (at 0-10 cm depth)</td><td><15%</td></tr>
</table>
Conformance of the final landforms to the design criteria— Maximum slope of ≤15%.</td></tr>
</table>

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria
					For grazing pasture outcome, monitoring confirms: (1) established and persistent pasture groundcover ≥ 70% (2) weed presence is a maximum of 10% of total vegetative groundcover confirmed in annual monitoring. Weed management recommendations to be provided in annual reports and (3) at least 4 perennial species established.
	Main Pit and West Pit voids	Self-sustaining	Native ecosystem	Slopes analysis Vegetation monitoring	For areas of highwall and end wall of Main Pit and West Pit voids For native ecosystem outcome, monitoring confirms: Presence of bare and vegetated land surfaces with native plant species richness: (a) Trees ≥2 (b) Shrubs ≥2 (c) groundcover species ≥3 from one or a combination of REs from the list below: (1) 11.3.1 (2) 11.3.2 (3) 11.3.3c (4) 11.3.4 (5) 11.4.8 (6) 11.4.9 (7) 11.5.3 (8) 11.9.2 (9) 11.9.5

<table>
<tr><th>Rehabilitation area</th><th>Mine feature name</th><th>Rehabilitation goal</th><th>Rehabilitation objectives</th><th>Indicators</th><th>Completion criteria</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Perennial grass & organic litter cover ≥10%.
Invasive plant species ≤25%.
Conformance of the final landforms to the design criteria— Maximum slope of ≤25%.</td></tr>
<tr><td></td><td>Main Pit and West Pit voids</td><td>Self-sustaining</td><td>Water storage for agricultural use (stock drinking)</td><td>Surface water monitoring</td><td>Water in the Main Pit and West Pit residual void lakes must comply with the following water quality limits:
<table>
<tr><th>Quality characteristic (unit)[1]</th><th>Test value</th><th>Contaminant limit</th></tr>
<tr><td>pH (pH unit)</td><td>Range</td><td>>4 to <9[2]</td></tr>
<tr><td>EC (µS/cm)</td><td>Maximum</td><td>5,970[3]</td></tr>
<tr><td>Sulphate (mg/L)</td><td></td><td>1000[3]</td></tr>
<tr><td>Aluminium (mg/L)</td><td></td><td>5[3]</td></tr>
<tr><td>Arsenic (mg/L)</td><td></td><td>0.5[3]</td></tr>
<tr><td>Copper (mg/L)</td><td></td><td>1[3]</td></tr>
<tr><td>Cadmium (mg/L)</td><td></td><td>0.01[3]</td></tr>
<tr><td>Chromium (mg/L)</td><td></td><td>1[3]</td></tr>
<tr><td>Cobalt (mg/L)</td><td></td><td>1[3]</td></tr>
<tr><td>Lead (mg/L)</td><td></td><td>0.1[3]</td></tr>
<tr><td>Nickel (mg/L)</td><td></td><td>1[3]</td></tr>
<tr><td>Uranium (mg/L)</td><td></td><td>0.2[3]</td></tr>
</table></td></tr>
</table>

Rehabilitation area	Mine feature name	Rehabilitation goal	Rehabilitation objectives	Indicators	Completion criteria		
					Selenium (mg/L)		0.02[3]
					Zinc (mg/L)		20[3]
					Fluoride (mg/L)		2[3]
					[1] With the exception of pH and EC, total measurements (unfiltered) must be taken and analysed for each quality characteristic. [2] Page 4.2-15 of ANZECC & ARMCANZ (2000) “Soil and animal health will not generally be affected by water with pH in the range of 4–9”. [3] Contaminant limit based on ANZECC & ARMCANZ (2000) stock water quality guidelines.		

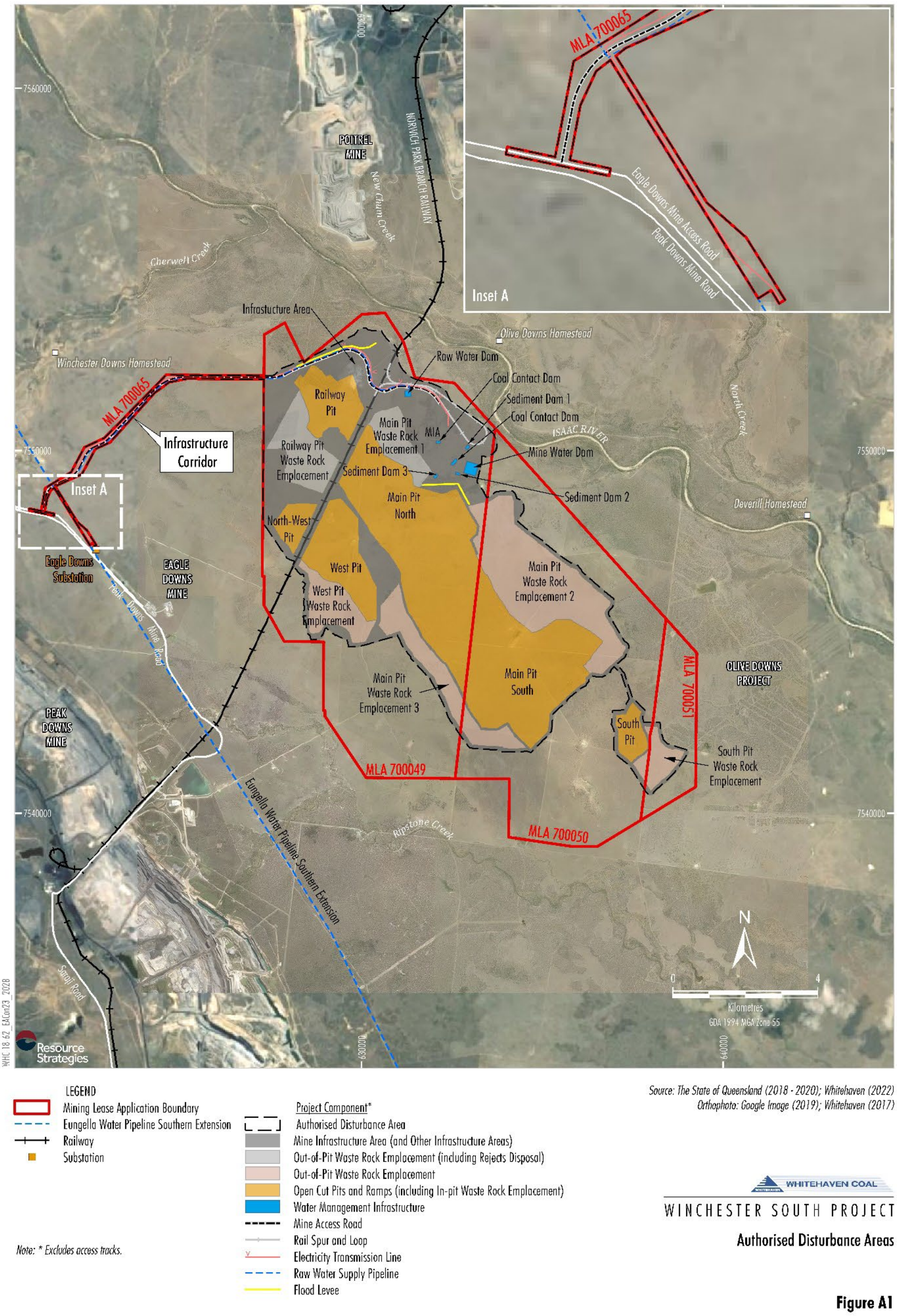

Figure A1 - Authorised disturbance areas

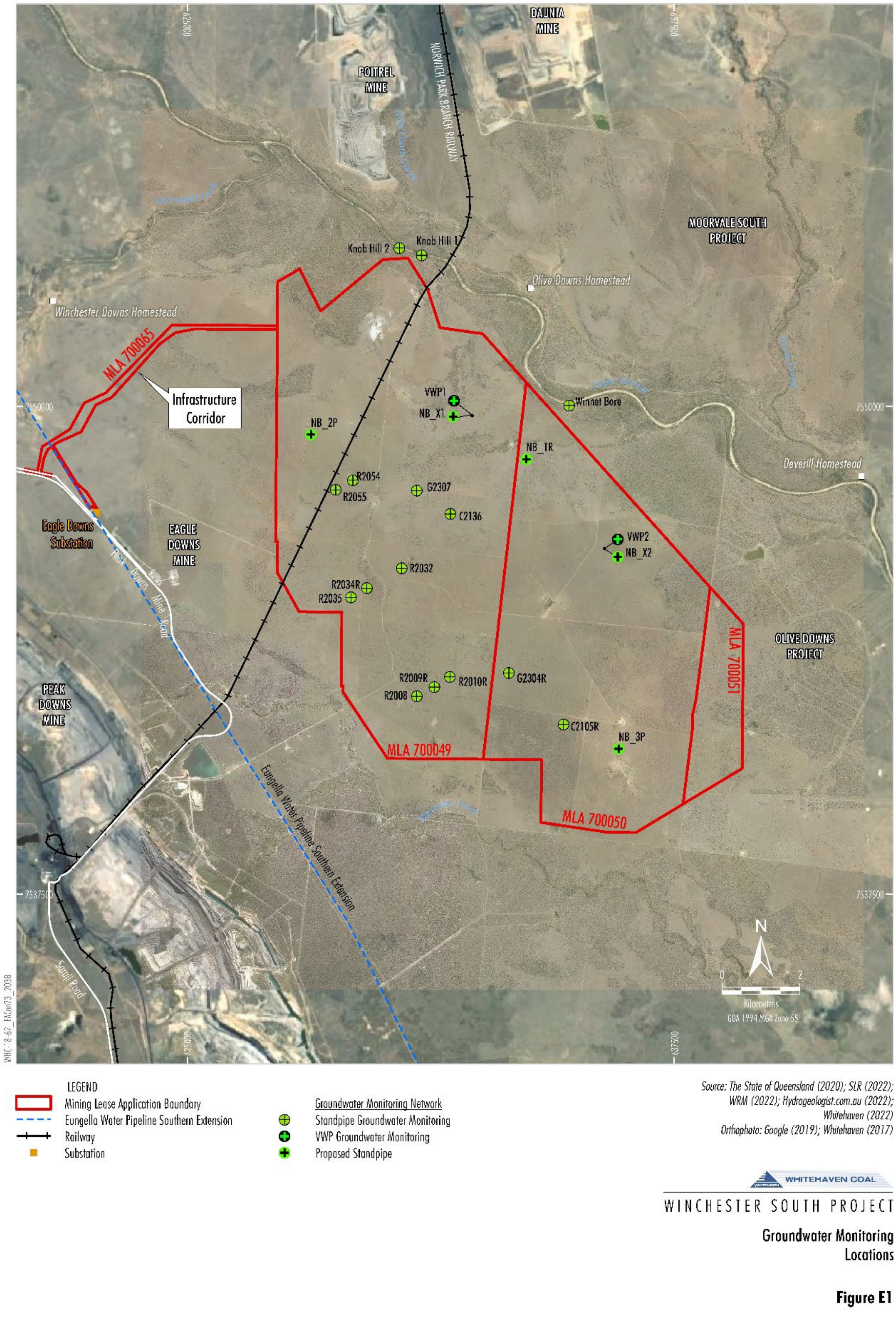

Figure E1 - Groundwater monitoring locations

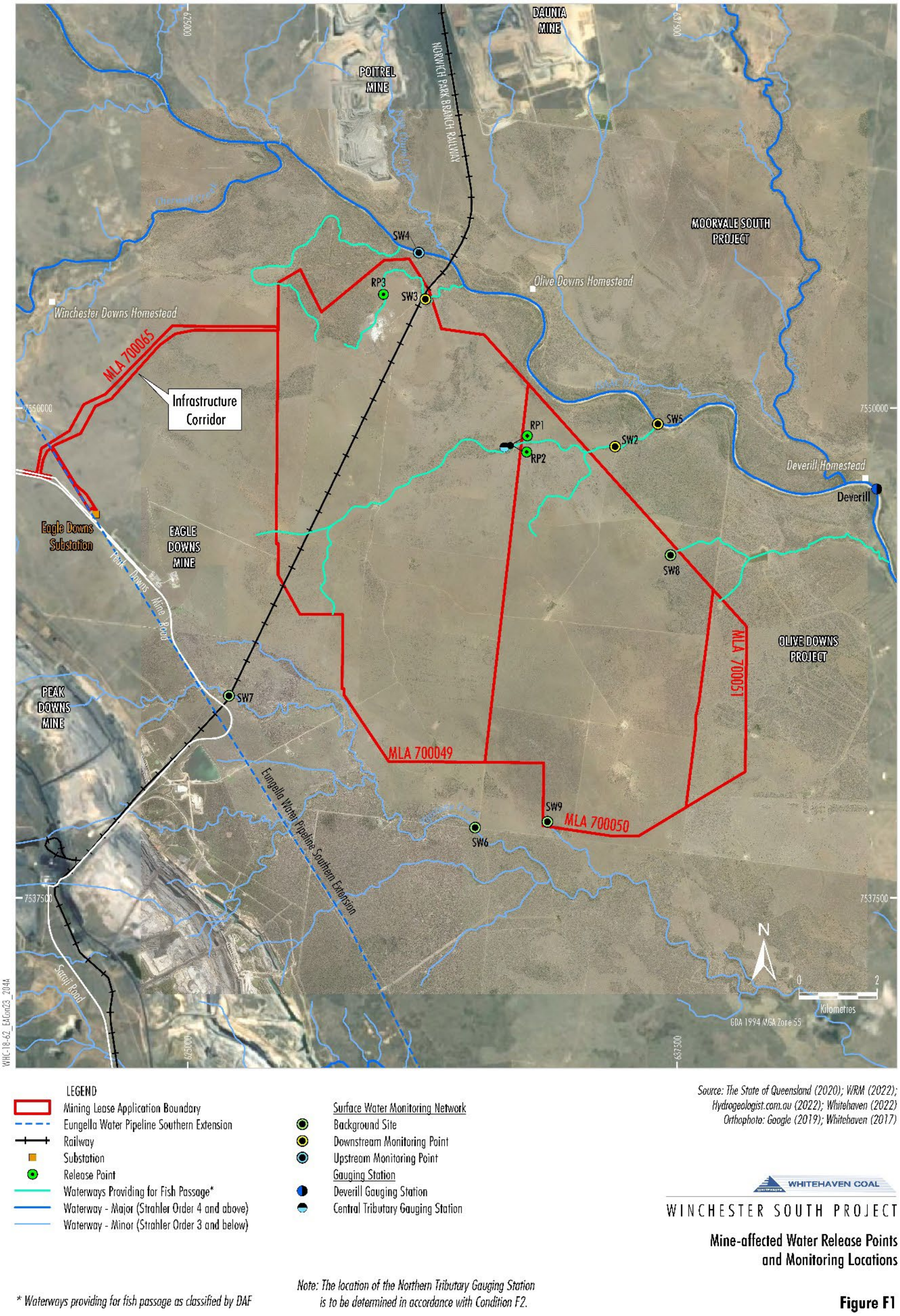

Figure F1 - Mine affected water release points and monitoring locations

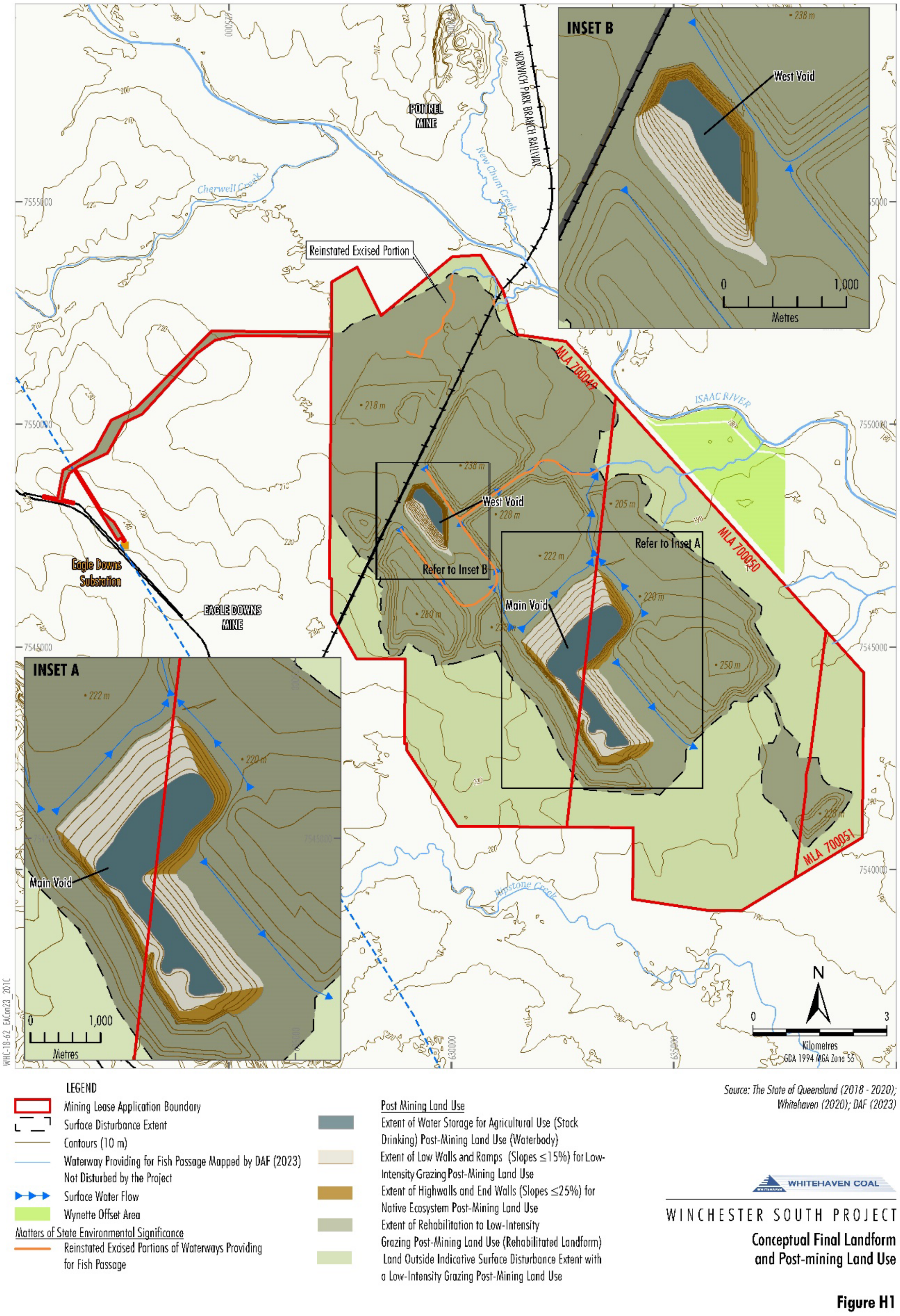

Figure H1 - Conceptual final landform and final land use

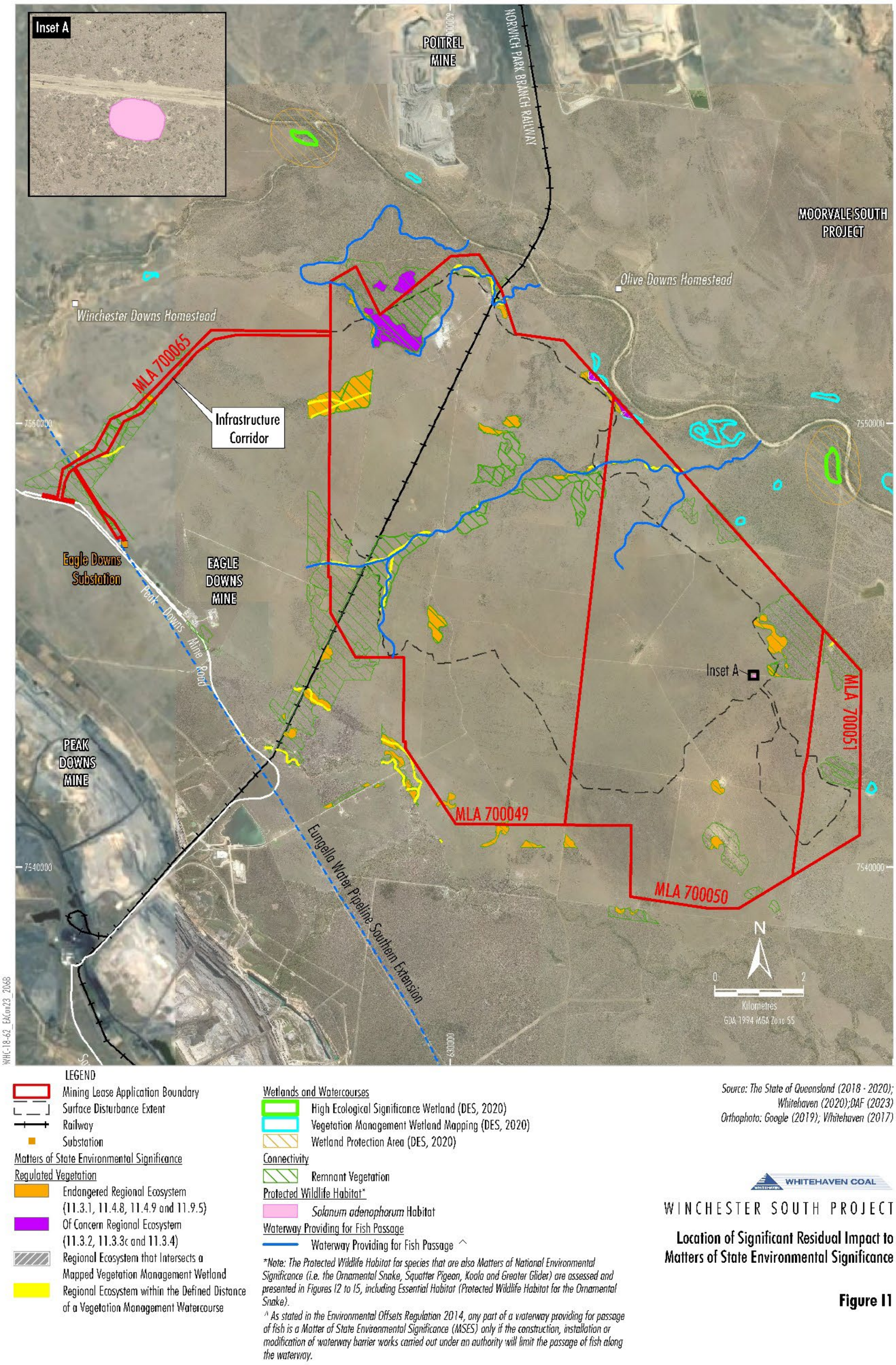

Figure I1 - Location of significant residual impacts on MSES

Part B. Conditions stated under the *Strong and Sustainable Resource Communities Act 2017* to manage the project's social impacts

Condition 1. General conditions

(a) The proponent must advise the Coordinator-General in writing that construction of the project has commenced within 5 business days of construction commencing.

(b) The proponent must advise the Coordinator-General in writing that operation of the project has commenced within 5 business days of operation commencing.

Condition 2. Social Impact Management Plan

(a) The proponent must develop and implement a detailed social impact management plan to manage the potential social impacts of the project identified in the social impact assessment (SIA) through ongoing community and stakeholder engagement.

(b) The proponent must submit to the Coordinator-General for approval a social impact management plan at least 3 months prior to commencement of construction.

(c) The social impact management plan must be prepared in consultation with the Isaac Regional Council.

(d) The social impact management plan must include the following plans:

- (i) community and stakeholder engagement plan in accordance with Condition 3
- (ii) workforce management plan in accordance with Condition 4
- (iii) workforce housing and accommodation plan in accordance with Condition 6
- (iv) local business and industry plan in accordance with Condition 8 and
- (v) health and community wellbeing plan in accordance with Condition 9

(e) The social impact management plan must include a monitoring and evaluation strategy that ensures the social impact management plan is reviewed, and updated, every 2 years for the first 4 years of the project and every 3 years up to Year 10 of the project.

(f) The updated social impact management plan (including updated project social commitments) must be prepared in consultation with the Issac Regional Council and submitted to the Coordinator-General for approval at the time of the annual SIMR (Condition 10(b)).

(g) A social impact management plan for the closure of the mine must be prepared and submitted to the Coordinator-General for approval at least 24 months prior to the conclusion of operations.

(h) The proponent must publish the revised social impact management plan on their website within one month of the Coordinator-General's approval of the plan. The proponent must notify the Coordinator-General within 5 business days of the social impact management plan being made publicly available on the proponent's website.

Condition 3. Community and stakeholder engagement plan

(a) The proponent must engage with all relevant stakeholders to ensure they are informed about the project and that identified potential social impact issues are effectively managed and monitored.

(b) The proponent must prepare a community and stakeholder engagement plan that is to be submitted as part of the social impact management plan to the Coordinator-General for approval, in accordance with Condition 2.

(c) The community and stakeholder engagement plan must address the construction and operation phases of the project, and include:

- (i) objectives and key performance indicators
- (ii) an analysis of key stakeholders and stakeholder issues

(iii) action plans for ongoing engagement including details of proposed communication tools, timeframes for activities and roles and responsibilities for engagement

(iv) processes for incorporating stakeholder feedback into the further development of project-specific management measures

(v) details of any stakeholder agreements to be negotiated, including agreements with state and local government agencies

(vi) a complaints management process and

(vii) monitoring and reporting protocols.

(d) The community and stakeholder engagement plan must:

(i) be consistent with the community and stakeholder engagement management plan outlined in Section 7.6 of Attachment 11 of the Revised Draft EIS (Whitehaven WS, 2022) and

(ii) incorporate the proponent's commitments listed in the Coordinator-General's evaluation report for the project.

(e) The community and stakeholder engagement plan must provide details for:

(i) providing advanced notice to directly affected landholders and residents of nearby homesteads of project works that may potentially impact on the amenity and activities of the properties

(ii) consulting with emergency service providers to develop an emergency response procedure for the project and

(iii) consulting with the Isaac Regional Council, local service providers and relevant state agencies about potential impacts from the project on primary healthcare, childcare and social housing and measures to manage potential impacts.

Condition 4. Workforce management plan

(a) The proponent must prioritise recruitment of workers from local and regional communities and those who would relocate to regional communities and minimise the proportion of FIFO workers.

(b) The proponent must support the health and wellbeing of the project workforce.

(c) The proponent must prepare a workforce management plan that is to be submitted as part of the social impact management plan to the Coordinator-General for approval, in accordance with Condition 2.

(d) The workforce management plan must address the construction and operational phases of the project, and include:

(i) objectives and key performance indicators

(ii) summary workforce profile, including the estimated proportions of new local and FIFO workers

(iii) roster arrangements for local and FIFO workers

(iv) measures that implement the recruitment strategy described in the social impact management plan for the Winchester South Project

(v) measures to enhance potential employment opportunities for local communities including Indigenous people, and mitigate potential negative social impacts

(vi) proposed training and development initiatives to improve local and regional skills including initiatives for traditionally underrepresented groups

(vii) programs to support the physical and mental health and wellbeing of workers

(viii) the level of on-site health services to be provided for workers

(ix) details of any workforce code of conduct to govern worker interactions with local communities and

(x) monitoring and reporting protocols.

(e) The workforce management plan must:

   (i) be consistent with the workforce management plan outlined in Section 7.2 of Attachment 11 of the Revised Draft EIS (Whitehaven WS, 2022) and

   (ii) incorporate the proponent's commitments listed in the Coordinator-General's evaluation report for the project.

Condition 5. Maximising Aboriginal and Torres Strait Islander outcomes

(a) Prior to commencing the construction of the project, the proponent must consult with the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts to develop:

   (i) a target for Aboriginal and Torres Strait Islander employment of the project and

   (ii) a target for Aboriginal and Torres Strait Islander business procurement on the project.

(b) The Aboriginal and Torres Strait Islander employment target, including justification for the target, must be included within the workforce management plan (Condition 2(d)(ii)) as part of the social impact assessment plan).

(c) The Aboriginal and Torres Strait Islander business procurement target, including justification for the target, must be included within the local business and industry workforce plan (Condition 2(d)(iv)) as part of the social impact management plan.

Condition 6. Housing and accommodation plan

(a) The proponent must limit or mitigate negative social impacts of the project to housing and accommodation affordability and availability in local and regional communities.

(b) The proponent must prepare a workforce housing and accommodation plan that is to be submitted as part of the social impact management plan to the Coordinator-General for approval, in accordance with Condition 2.

(c) The housing and accommodation plan must address the construction and operational phases of the project, and include:

   (i) objectives and key performance indicators

   (ii) measures to enhance potential benefits for project workers and the community

   (iii) measures to mitigate potential negative social impacts

   (iv) policies regarding housing and accommodation support to be provided to project workers and their families who wish to move to the local communities and

   (v) monitoring and reporting protocols.

(d) The housing and accommodation plan must:

   (i) be consistent with the housing and accommodation plan outlined in Section 7.3 of Attachment 11 of the Revised Draft EIS (Whitehaven WS, 2022) and

   (ii) incorporate the proponent's commitments listed in the Coordinator-General's evaluation report for the project.

(e) The housing and accommodation plan must be developed in consultation with the Isaac Regional Council and provide:

   (i) an updated assessment of local housing availability and demand, housing tenure, dwelling stock, sales and rental volumes, and prices

   (ii) the likely impact of the project on the housing market and housing demand

   (iii) support for investment in non-resource worker housing

   (iv) the arrangements for housing the project's FIFO workforce including the location of the workers' accommodation village and beds secured for construction and operational workforce

(v) analysis of the dwelling type preferences for the resident workforce

(vi) a description of the currently available options through the proponent for the provision of accommodation and

(vii) the housing register to be made available for workers and their families who wish to reside in the local communities.

Condition 7. Accommodation

(a) The proponent must construct a minimum of 34 dwellings in Moranbah dedicated for project employees in the following sequence:

(i) prior to the end of Year 2 – 18 dwellings

(ii) prior to the end of Year 6 – 8 dwellings

(iii) prior to the end of Year 11– 8 dwellings.

(b) The types of dwellings required (i.e. houses, units, number of bedrooms) and the availability of existing housing in Moranbah will be informed by the housing and accommodation plan (Condition 2(d)(iii)) as part of the social impact management plan).

Note: The number of dwelling mentioned in (a) above can be delivered earlier than identified.

Condition 8. Local business and industry procurement plan

(a) The proponent must ensure that opportunities for local businesses to provide goods and services for the project are maximised during the construction and operational phases.

(b) The proponent must prepare a local business and industry procurement plan that is to be submitted as part of the social impact management plan to the Coordinator-General for approval, in accordance with Condition 2.

(c) The local business and industry procurement plan must address the construction and operational phases of the project, and include:

(i) objectives and key performance indicators

(ii) procurement strategies and initiatives for local and regional suppliers, including Aboriginal and Torres Strait Islander owned businesses, and actions to facilitate participation

(iii) proposed policies and programs to build local and regional capacity and capability, and reduce barriers to entry

(iv) processes that embed the local business and industry procurement strategies into the contracting model for the project

(v) measures to mitigate any potential negative social impacts on local industries

(vi) details of any established industry guidelines or codes of practice which the proponent has committed to compliance and

(vii) monitoring and reporting protocols.

(d) The local business and industry procurement plan must:

(i) be consistent with the local business and industry procurement management plan outlined in Section 7.4 of Attachment 11 of the Revised Draft EIS (Whitehaven WS, 2022) and

(ii) incorporate the proponent’s commitments listed in the Coordinator-General’s evaluation report for the project.

Condition 9. Health and community well-being plan

(a) The proponent must limit or mitigate negative social impacts of the project and capitalise on opportunities to improve the health and well-being of local and regional communities.

(b) The proponent must limit or mitigate adverse impacts of the project on the level of service (social services, facilities and infrastructure) currently provided to local communities.

(c) The proponent must prepare a health and community well-being plan that is to be submitted as part of the social impact management plan to the Coordinator-General for approval, in accordance with Condition 2.

(d) The health and community well-being plan must address the construction and operational phases of the project, and include:

   (i) objectives and key performance indicators

   (ii) measures to ensure that the level of service provided to the local community by existing social services, facilities and infrastructure is not reduced

   (iii) measures to mitigate potential health and well-being impacts on local communities, and enhance potential benefits

   (iv) emergency response arrangements and management measures agreed with emergency service providers, for incidents associated with the project, both on and off the project site

   (v) details of any community development programs to be implemented, and the outcomes to be achieved and

   (vi) monitoring and reporting protocol.

(e) The health and community well-being plan must:

   (i) be consistent with the preliminary health and community well-being plan outlined in Section 7.5 of Attachment 11 of the Revised Draft EIS (Whitehaven WS, 2022) and

   (ii) incorporate the proponent's commitments listed in the Coordinator-General's evaluation report for the project.

(f) The health and community well-being plan must provide details for the following matters:

   (i) measures developed in consultation with the Isaac Regional Council to limit potential adverse impacts of the project on the level of childcare service provided to the local community

   (ii) measures developed in consultation with the Isaac Regional Council, Queensland Health and primary healthcare providers, including local general practitioners, to limit potential adverse impacts of the project on the level of primary healthcare service provided to the local community and

   (iii) measures developed in consultation with the Isaac Regional Council, Emergency and Long-term Accommodation Moranbah and the Isaac Affordable Housing Trust to limit potential adverse impacts of the project on the level of social housing service provided to the local community.

Condition 10. Reporting on the implementation and effectiveness of social impact management measures

(a) The proponent must prepare an annual SIMR for each year of construction and the first 5 years of operation; the report must also be submitted Year 10 of operations to include the discharge of the housing requirements and reporting on the project commitments in place for the life of the project.

(b) The annual SIMR must be submitted to the Coordinator-General for approval within 30 business days after the end of the relevant 12 month period from the commencement of the construction of the project.

(c) Using the monitoring protocol described in the social impact management plan, the SIMR must detail:

   (i) an assessment of the social impacts of the project against the potential social impacts identified in the social impact assessment, including the consideration of other proposed developments in local communities

   (ii) the progress and effectiveness of the social impact management measures identified in the social impact management plan

(iii) where monitoring indicates measures have not been effective, describe how those social impact management measures have been modified

(iv) the actions taken to implement commitments made by the proponent.

(d) The social impact management plan must present the total workforce profile including:

(i) total number of workers employed

(ii) proportion of local workers, new local workers, Aboriginal and Torres Strait Islander workers and FIFO workers.

(e) Each SIMR must be publicly available on the proponent's website within 30 business days of the Coordinator-General's approval of the relevant report. The proponent must notify the Coordinator-General within 5 business days of the SIMR being published on proponent's website.

Definitions

'commencement of construction' is defined as the commencement of construction of the mine access road connecting to Eagle Downs Mine Access Road as outlined in section 2.4 of the Consolidated Project Description.

'commencement of operation' is mining and processing of coal.

'FIFO worker' is a worker who does not live in one of the local or regional communities and must commute to work and stay at the workforce accommodation village while on shift.

'local communities' are the eleven nearby regional communities identified in the evaluation report.

'local worker' is a worker who lives in one of the local communities.

'new local worker' is a worker for the project that moves to the local area.

'the project' the Winchester South project.

Appendix 2. Recommended conditions for the Australian Minister for the Environment

In accordance with section 87 of the EPBC Act, this appendix recommends conditions for consideration by the Australian Minister for the Environment in making an approval decision on the proposed actions under the EPBC Act.

During the EIS process, DCCEEW advised that while each controlled action for the project requires separate approval under the EPBC Act, overlapping impacts should be allocated to the core project in the first instance. The proponent has consolidated the disturbance for the ETL action (EPBC 2019/8458), the water pipeline action (EPBC 2019/8459), and the access road component of the mine site and access road action (EPB 2019/8460) into a single infrastructure corridor to reduce the indicative soil disturbance extent of the project. As such, the impacts from the ETL action and water pipeline action will be allocated to the core project (i.e. the mine site and access road controlled action).

Accordingly, the following recommended conditions for the mine site and access road action (EPBC 2019/8460) are applicable to all impacts on matters of national environmental significance attributable to the project.

Schedule 1. Electricity transmission line action (EPBC 2019/8458)

All disturbance associated with the ETL action (EPBC 2019/8458) for the project has been allocated to the mine site and access road action (EPBC 2019/8460). Disturbance of listed threatened species and ecological communities required for the ETL action (EPBC 2019/8458) must not commence until the offset management plan for Stage 1 of the mine site and access road action (EPBC 2019/8460) has been approved by DCCEEW.

Schedule 2. Water pipeline action (EPBC 2019/8459)

All disturbance associated with the water pipeline action (EPBC 2019/8459) for the project has been allocated to the mine site and access road action (EPBC 2019/8460). Disturbance of listed threatened species and ecological communities required for the water pipeline action (EPBC 2019/8459) must not commence until the offset management plan for Stage 1 of the mine site and access road action (EPBC 2019/8460) has been approved by DCCEEW.

Schedule 3. Mine site and access road action (EPBC 2019/8460)

Part A. Listed threatened species and ecological communities

Condition 1. Maximum disturbance limits

The outcome sought by this condition is to ensure the approval holder does not impact on more than the defined maximum disturbance limits for habitat for listed threatened species and ecological communities.

(a) The approval holder must not impact more than the maximum disturbance limit of habitat for each listed threatened species or ecological community specified in Table A2.1 for each stage of the action.

(b) The approval holder must update the listed threatened species habitat which are marked as ‘TBC’ in Table A2.1 consistent with Condition 2.

Table A2.8 Maximum disturbance limits to habitat for listed threatened species and ecological communities

Listed threatened species or community	Stage 1 impact (ha)	Stage 2 impact (ha)	Stage 3 impact (ha)	Total impact (ha)
ornamental snake (*Denisonia maculata*)	50	1,523.1	261.1	1,834.2
squatter pigeon (*Geophaps scripta scripta*)	TBC	TBC	TBC	TBC
koala (*Phascolarctos cinereus*)	TBC	TBC	TBC	TBC
greater glider (*Petauroides volans*)	42.1	90.7	0	132.8
Australian painted snipe (*Rostratula australis*)	TBC	TBC	TBC	TBC
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin TEC	80.9	0	0	80.9
Poplar Box Grassy Woodland on Alluvial Plains TEC	0	9.6	0	9.6

Condition 2. Offset management strategy

The outcome sought by this condition is to update the residual significant impact figures and offset obligations for the listed threatened species identified in Condition 1.

(a) In consultation with DCCEEW, update the offset management strategy from the version provided for the environmental impact statement evaluation to include:

   (i) updated impact figures which are marked as 'TBC' for the listed threatened species in Table A2.1 in Condition 1, for each offset stage of the action

   (ii) information to support the updated impact figures in the offset management strategy, including:

      (1) detailed justification for the updated impact figure

      (2) a clear description of project staging identifying which project impacts correspond to which offset stage

      (3) information which demonstrates that there is suitable available land in the proposed offset areas to compensate for the residual significant impact on the listed threatened species and/or details of additional offset areas (including maps in electronic Geographic Information System format)

      (4) updated EPBC Act offset assessment guide calculations and justifications, informed by the updated impact figures in Table A2.1, including an updated calculation for the ornamental snake that uses the standard annual risk of loss for the Isaac Regional Council LGA

      (5) a general description of interim performance measures and completion criteria to be achieved by the offset for each species/ecological community.

(b) The approval holder must submit the updated offset management strategy for the written approval of the Australian Minister for the Environment prior to commencement of the action.

(c) In addition to the offset management strategy, the approval holder must submit an offset management plan consistent with each offset stage of the project for the written approval of the Australian Minister for the Environment prior to commencing each offset stage of the action.

Condition 3. Offset area for Poplar Box Grassy Woodland on Alluvial Plains TEC

The outcome sought by this condition is to compensate for the residual significant impacts of the action on the Poplar Box Grassy Woodland on Alluvial Plains TEC.

(a) The approval holder may use the areas of regional ecosystem RE 11.3.2 identified within the Stage 1 offset areas proposed in the Environmental Impact Statement to offset the impact of the project to the Poplar Box Grassy Woodland on Alluvial Plains TEC identified in Condition 1.

(b) If the approval holder chooses to use the areas of regional ecosystem RE 11.3.2 identified within the Stage 1 offset areas proposed in the Environmental Impact Statement to offset the impact of the project to the Poplar Box Grassy Woodland on Alluvial Plains TEC identified in Condition 1, the approval holder must:

  (i) in consultation with DCCEEW, determine the offset liability for the impacts to the Poplar Box Grassy Woodland on Alluvial Plains TEC identified in Condition 1

  (ii) improve the quality of the offset area habitat to at least a Class B condition for the Poplar Box Grassy Woodland on Alluvial Plains TEC to ensure a conservation gain is delivered that adequately compensates for the ecological community being impacted

  (iii) provide an alternative offset site for the Poplar Box Grassy Woodland on Alluvial Plains TEC identified in Condition 1 should the current proposed offset site not succeed.

(c) The approval holder must submit an offset management plan that includes management measures, completion criteria, and performance targets for the Poplar Box Grassy Woodland on alluvial plains TEC consistent with Condition 4.

Condition 4. Offset management plans

The outcome sought by this condition is to compensate for the residual significant impacts of the action on the listed threatened species and ecological communities identified in Condition 1.

(a) The approval holder must submit an offset management plan for the written approval of the Australian Minister for the Environment prior to commencing each offset stage of the action.

(b) The approval holder must not commence each offset stage of the action until the Australian Minister for the Environment has approved the relevant offset management plan.

(c) The offset management plan must be informed by the updated offset management strategy required by Condition 2.

(d) Each offset management plan must meet the requirements of the Environment Offsets Policy and the Environmental Management Plan Guidelines to the satisfaction of the Australian Minister for the Environment.

(e) The offset management plan must:

  (i) be prepared by a suitably qualified person in accordance with the Australian Government department's *Environmental Management Plan Guidelines*

  (ii) include:

    (1) details of offsets for residual significant impacts to the listed threatened species and ecological communities in Condition 1

    (2) details of how the proposed offset/s and offset management plan meet the requirements of the EPBC Act Environmental Offsets Policy

    (3) a field validation survey and baseline description of the current condition (prior to any management activities) of the offset areas, including existing vegetation and habitat for the listed threatened species and ecological communities identified in Condition 1

    (4) a description and map (including shapefiles) to clearly define the location and boundaries of the proposed offset area/s, accompanied by the offset attributes

(5) information about how the proposed offset area/s provide connectivity with other relevant habitats and biodiversity corridors

(6) a description of the management measures (including timing, frequency and duration) that will be implemented in each offset area/s

(7) a discussion of how proposed management measures take into account relevant approved conservation advices and are consistent with the measures contained in relevant recovery plans and threat abatement plans

(8) completion criteria and performance targets for evaluating the effectiveness of the offset management plan implementation, and criteria for triggering corrective actions

(9) a monitoring program, which must include:

(A) gathering evidence that effectively determines progress towards, attainment of and maintenance of the ecological benefits for the threatened species and ecological communities, including suitable audio/video data collection capability for nest boxes installed as part of the proposed greater glider nest box programme

(B) measurable performance indicators to gauge attainment of the ecological benefits for the threatened species and ecological communities

(C) trigger values for corrective actions and

(D) the timing and frequency of monitoring to detect trigger values and changes in the performance indicators

(10) a description of potential risks to the successful implementation of the offset/s, and contingency measures that would be implemented to mitigate against these risks

(11) a sustainable livestock grazing plan to ensure the proposed offset areas for ornamental snake, squatter pigeon, Australian painted snipe, Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC, and Poplar Box Grassy Woodland on Alluvial Plains TEC are not compromised. The sustainable livestock grazing plan must include provisions to ensure that suitable ornamental snake, squatter pigeon, and Australian painted snipe habitat located within the proposed offset areas is excluded from grazing areas to prevent the destruction of habitat within the offset areas, and that suitable Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC and Poplar Box Grassy Woodland on Alluvial Plains TEC habitat is managed in accordance with the recommendations detailed in the approved conservation advices

(12) details of additional measures that would be implemented to improve the availability of breeding/denning habitat for the greater glider within the offset areas, should the monitoring program show that greater gliders are not utilising the nest boxes that have been placed in the offset areas

(13) details of timing and the mechanism to legally secure the environmental offsets.

(f) The approval holder must legally secure the offsets within 12 months of the date the offset management plan was approved in writing by the Australian Minister for the Environment for each offset stage.

(g) The approval holder must not impact on ornamental snake (*Denisonia maculata*), squatter pigeon (*Geophaps scripta scripta*), koala (*Phascolarctos cinereus*), greater glider (*Petauroides volans*), Australian painted snipe (*Rostratula australis*), Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC, and Poplar Box Grassy Woodland on Alluvial Plains TEC habitat until the Australian Minister for the Environment has approved the offset management plan.

(h) The approved offset management plans must be implemented for the duration of the approval.

(i) At the completion of each offset stage of the action and at 5 yearly intervals for the duration of this approval, an audit must be conducted by the proponent and submitted to the Australian Minister for the Environment demonstrating that agreed performance criteria have been achieved and all residual significant impacts to

EPBC Act listed threatened species and ecological communities have been suitably offset. If the audit finds that the offset requirements have not been met, further offsets must be provided to meet any deficits.

Condition 5. Matters of National Environmental Significance Management Plan

The outcome sought by this condition is to ensure that prior to the commencement of each offset stage of the action, the approval holder has a management plan in place which includes species/ecological community-specific management measures for the listed threatened species and ecological communities identified in Condition 1.

(a) The approval holder must submit a MNES management plan for the written approval of the Australian Minister for the Environment prior to commencing each offset stage of the project.

(b) The approval holder must not impact on ornamental snake (*Denisonia maculata*), squatter pigeon (*Geophaps scripta scripta*), koala (*Phascolarctos cinereus*), greater glider (*Petauroides volans*), Australian painted snipe (*Rostratula australis*), Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin TEC, and Poplar Box Grassy Woodland on Alluvial Plains TEC habitat until the Australian Minister for the Environment has approved the MNES management plan.

(c) The MNES management plan must:

- (i) be generally in accordance with the flora and fauna management and mitigation measures proposed in the EIS and incorporated in a flora and vegetation management plan and fauna management plan
- (ii) be prepared by a suitably qualified person in accordance with the Australian Government department's Environmental Management Plan Guidelines and include:
  - (1) measures that will be implemented to avoid, mitigate, and manage impacts to EPBC Act listed threatened species and communities and their habitat during vegetation clearance, construction, operation, and decommissioning of the action, including:
    - (A) EPBC Act listed threatened species habitat identified within the EIS that occurs either downstream or adjacent to the project site
    - (B) EPBC Act listed threatened ecological communities identified within the EIS that occur either downstream or adjacent to the project site
  - (2) a monitoring program to determine the success of management measures that informs adaptive implementation of the MNES management plan for the duration of this approval
  - (3) details of how proposed management measures take into account relevant approved conservation advices and are consistent with the measures contained in relevant recovery plans and threat abatement plans.

(d) For the squatter pigeon (*Geophaps scripta scripta*) the MNES management plan must incorporate the following measures to mitigate potential impacts to the squatter pigeon, as a minimum:

- (i) areas of potential habitat must be flushed immediately prior to any clearing works.

(e) For the koala (*Phascolarctos cinereus*) the MNES management plan must incorporate the following measures to mitigate potential impacts to the koala, as a minimum:

- (i) a 60 km/h speed limit must be enforced within the project area
- (ii) koala proof fencing must be incorporated into the design of any infrastructure constructed for the project where it passes through areas of critical koala habitat
- (iii) fauna underpasses must be provided at suitable intervals for any infrastructure constructed for the project where it passes through areas of critical koala habitat
- (iv) clearing within koala habitat must be undertaken sequentially and outside of peak breeding season as a priority.

(f) For the greater glider (*Petauroides volans*) the MNES management plan must incorporate the following measures to mitigate potential impacts to the greater glider, as a minimum:

(i) new and existing barbed wire fencing within and surrounding any offset areas must be modified so that the top strand is plain wire to reduce the risk of entanglement for the greater glider

(ii) a greater glider nest box programme to compensate for the loss of hollow bearing trees.

(g) The approved MNES management plan must be implemented.

Condition 6. Groundwater dependent ecosystem and wetland management plan

The outcome sought by this condition is to ensure that all GDEs and wetlands potentially impacted by the action are identified and any impacts are avoided, mitigated or residual impacts are offset in accordance with the EPBC Act Environmental Offsets Policy.

(a) The approval holder must submit a GDEWMP for the written approval of the Australian Minister for the Environment prior to commencing the action.

(b) The approval holder must not commence the action until the Australian Minister for the Environment has approved the GDEWMP.

(c) The GDEWMP must:

(i) be generally in accordance with the flora and fauna management and mitigation measures proposed in the environmental impact statement and incorporated in a flora and vegetation management plan and fauna management plan

(ii) be prepared by a suitably qualified person in accordance with Australian Government department's Environmental Management Plan Guidelines and include:

(1) the nature and ecological values of each potentially affected GDE and wetland

(2) the nature and ecological values of GDEs and wetlands of comparable reference sites that are not affected by project activities or the drawdown from groundwater

(3) a field validation survey and baseline description of the current condition of potentially affected GDEs and wetlands as well as reference sites, including wet and dry conditions, to record pre-impact ecosystem health

(4) update conceptual and numerical groundwater models developed in consultation with the department

(5) if any potential GDEs or wetlands within the project area are found to not be groundwater dependent, a description of the source of water the ecosystem is dependent on and the evidence used to draw this conclusion

(6) a map and coordinates of the location of the GDEs and wetlands subject to the management plan, including justification for the selected locations

(7) a monitoring network sufficient to detect fluctuation in relevant parameters such as groundwater levels, water quality and hydrological flows

(8) indicators that would be monitored to assess the health and integrity of the wetlands and GDEs being monitored and that can show the success of proposed mitigation measures

(9) sampling, analysis, reporting and quality assurance methodologies for detecting impacts associated with the project including information on how cumulative impacts will be managed and monitored

(10) impact thresholds and triggers for groundwater levels and quality and ecological values of GDEs and wetlands that are able to provide an indication of potential and actual impacts within a relevant timescale

(11) corrective actions and timing to address impacts associated with mining activities, including cumulative impacts.

(d) A report of the findings of the GDEWMP, including all monitoring results and interpretations, must be prepared annually and made available on request to DCCEEW. The report must include:

(i) an assessment of background reference groundwater levels

(ii) the condition of each GDE and wetland compared with previous monitoring results

(iii) (iii) any exceedances of impact thresholds and triggers for groundwater quality and ecological values

(iv) the suitability of current groundwater trigger thresholds

(v) detail on the effectiveness of avoidance, mitigation and management actions in curtailing adverse impacts on GDE ecosystems

(vi) a description of any adaptive management initiatives implemented

(vii) any offsets required for residual significant impacts.

(e) If any offsets for residual significant impacts are required, the approval holder must, within 12 months from the detection of the impacts, submit an offset management plan to address residual harm to protected matters to DCCEEW for the Australian Minister's written approval.

(f) The offset management plan must be consistent with Condition 4 and implemented by the approval holder from when it is approved by the Australian Minister for the Environment in writing until the expiry date of this approval.

Appendix 3. Coordinator-General's recommendations

This appendix includes recommendations, made under section 43 or 52 of the SDPWO Act. The recommendations relate to the applications for development approvals for the project.

While the recommendations guide the assessment managers in assessing the development applications, they do not limit their ability to seek additional information nor power to impose conditions on any development approval required for the project.

Each recommendation nominates the entity to be consulted by the proponent.

Schedule 1. *Transport Infrastructure Act 1994*

This schedule is relevant to applications for which the *Transport Infrastructure Act 1994* is applicable, which is administered by DTMR.

Recommendation 1. Earthworks adjacent to the railway corridor

(a) At all times, any extractive activity (including extraction, processing, stockpiling and associated environmental controls), excavation, filling/backfilling/compaction, retaining structures, batters, stormwater management measures and any other works involving ground disturbance must not:

- (i) encroach upon or destabilise or cause damage to the railway corridor, including all transport infrastructure or the land supporting this infrastructure, or cause similar adverse impacts
- (ii) adversely impact on the Norwich Park Branch Railway corridor through the addition or removal of loading such as, but not limited to, lateral, vertical or surcharge loading
- (iii) adversely impact on the Norwich Park Branch Railway corridor as a result of directly or indirectly disturbing groundwater
- (iv) result in vibration, structural and/or ground movement impacts on the railway corridor during excavation, drilling, blasting or similar activities or otherwise adversely impact on the structural integrity of the railway corridor or
- (v) cause obstruction, nuisance or sedimentation in the Norwich Park Branch Railway corridor as a result of stockpiling.

Recommendation 2.

(a) Certification from a Registered Professional Engineer of Queensland must be provided to DTMR (mackay.whitsunday.idas@tmr.qld.gov.au) confirming that the rail interface and infrastructure crossing has been designed in accordance with Recommendation 1.

Recommendation 3.

(a) At all times, the project must be carried out in accordance with Recommendation 1 and Recommendation 2.

Recommendation 4. Traffic impact assessment

(a) The project must manage and mitigate its traffic impacts to maintain the safety and efficiency of the state-controlled road network.

Recommendation 5.

(a) The proponent must provide a traffic impact assessment prepared by a RPEQ in accordance with the *Guide to Traffic Impact Assessment*[157] to DTMR (mackay.whistunday.idas@tmr.qld.gov.au) 6 months prior to the commencement of construction which considers (and includes where appropriate) the following:

  (i) a pavement impact assessment that considers cumulative impacts of project-related traffic on the state-controlled road network, and identifies any mitigation measures required to manage project-related traffic impacts and

  (ii) a road safety risk assessment which includes, but is not limited to:

    (A) a road safety audit of the current conditions of the state-controlled road network and identifies mitigation measures as necessary to improve road safety

    (B) confirms the total project-related transport task including workforce, inputs and outputs, during the construction and operational phases (including a description of the expected volumes, weights and origins/destinations of materials, products, hazardous goods or wastes for the development)

    (C) confirms existing pavement conditions and defects which may lead to safety issues

    (D) existing intersection performance from a safety perspective and

    (E) existing state-controlled road infrastructure and impacts of project related traffic.

Recommendation 6.

(a) The proponent must implement the mitigation measures identified in the traffic impact assessment and pavement impact assessment to the satisfaction of DTMR and obtain all relevant approvals as required under the *Transport Infrastructure Act 1994*.

Recommendation 7. Road use management plan

(a) The operational management of the project must avoid and manage the impact of project-related traffic on the safety, efficiency and integrity of state-controlled roads.

Recommendation 8.

(a) The proponent must provide a road use management plan to DTMR (mackay.whistunday.idas@tmr.qld.gov.au) 6 months prior to the commencement of construction which considers (and includes, where appropriate) the following:

  (i) haulage routes for construction and operational phases of the project

  (ii) public safety at worksites

  (iii) obstruction to road users

  (iv) workforce management strategies to reduce traffic generation including, but not limited to:

    (A) provision of a shuttle service for workers to reduce private vehicle usage and overall traffic generation

    (B) provision of a ride sharing scheme to increase worker vehicle occupancy and decrease overall traffic generation and

    (C) scheduling shift times and heavy vehicle movements such that project-related traffic does not coincide with road network peak periods, where possible

  (v) management of driver behaviour to minimise health and safety risks

  (vi) driver fatigue management strategies

[157] Queensland Government, Department of Transport and Main Roads, *Guide to Traffic Impact Assessment*, December 2018.

(vii) providing a system of identifying project-related vehicles and provision of a community hotline for other road users to contact if they have concerns, queries or complaints about driver behaviour

(viii) defining responsibilities and procedures for implementation, monitoring and review of the road use management plan

(ix) management strategies to limit the potential impacts associated with over-size and over-mass loads through the National Heavy Vehicle Regulator

(x) management strategies for the transportation of hazardous materials such as fuels and chemicals and

(xi) ongoing monitoring for road safety impacts from project activities (e.g. dust, debris/construction materials on roads and lighting etc).

Recommendation 9.

(a) The construction and operation of the project must be in accordance with the road use management plan.

Recommendation 10.

(a) At all times, the project must not disrupt the safety and operational integrity of the Norwich Park Branch Railway corridor, including all transport infrastructure or the land supporting this infrastructure from ground movement and vibration.

Recommendation 11. Earthworks and blasting management plan

(a) An earthworks and blasting management plan must be:

(i) developed in accordance with Section 8.6 Vibration of Transport and Main Roads Specifications MRTS51 *Environmental Management* (June 2023)

(ii) supported by relevant geotechnical assessments, modelling and stability analyses

(iii) certified by a RPEQ

(iv) approved by the DTMR at least 6 months prior to mining activities commencing and re-approved by DTMR (or relevant administering authority) at least 6 months prior to the commencement of blasting activities associated with the development of the West and North-West pits and

(v) implemented prior to the commencement of mining activities.

Recommendation 12.

(a) The earthworks and blasting management plan must include:

(i) the outcomes of relevant geotechnical assessments, modelling and stability analyses, including the outcomes of any validation undertaken

(ii) detailed engineering design drawings and supporting technical documentation for mine excavation

(iii) baseline structural, ground movement and vibration parameters

(iv) identification of potential impacts that would adversely affect the Norwich Park Branch Railway (including supporting land and relevant users)

(v) ground movement and vibration criteria to protect the Norwich Park Branch Railway (including supporting land and relevant users)

(vi) identification and evaluation of mitigation measures to comply with the criteria in (a)(v)

(vii) blast management processes and controls, including roles and responsibilities of relevant personnel, notification procedures, blast approval procedures and record keeping requirements

(viii) a process to rectify any damage to the Norwich Park Branch Railway (and supporting land), caused by the project in agreement with relevant stakeholders (DTMR, Aurizon and others as required)

(ix) a program to review and update this plan to ensure it remains fit for purpose

(x) a ground movement and vibration monitoring plan that includes:

(A) a schedule for pre and post dilapidation surveys of potentially impacted sections of the Norwich Park Branch Railway (and supporting land)

(B) a ground movement and vibration monitoring program, including monitoring and inspection methods, locations, frequency, instruments/sensors, reporting and record-keeping requirements

(C) protocols for exceedances of the movement and trigger levels and/or identification of potential damage, including specific actions to be undertaken, responsibilities, notification, investigation and reporting processes, lines of communication, and stop work procedures.

Recommendation 13.

(a) If the monitoring and investigation carried out in accordance with Recommendation 12 identifies any damage to the Norwich Park Branch Railway (and supporting land) as a result of this project, then the proponent must:

(i) undertake all necessary works to the Norwich Park Branch Railway (and supporting land) as agreed with relevant stakeholders, at the proponent's expense and

(ii) provide RPEQ certification to relevant stakeholders confirming that all necessary rectification works have been completed as agreed.

Recommendation 14. Dangerous goods

(a) Dangerous goods must not adversely impact on the safety or operational integrity of the Norwich Park Branch Railway corridor.

Recommendation 15.

(a) Certification from a Registered Professional Engineer of Queensland must be provided to DTMR (mackay.whitsunday.idas@tmr.qld.gov.au) including the following documentation:

(i) a risk assessment in accordance with Appendix 1 of the *Guide for development in a transport environment: rail*

(ii) details of the measures that have been incorporated into the design and management of the project to minimise any identified risks, including but not limited to:

(A) minimising or controlling the outbreak of fire

(B) controlling smoke and/or gas release and dispersion

(C) minimising heat build-up in structures

(D) limiting the possibility of structural components being blast damaged

(E) providing stability or contingency measures in the proposed project

(F) providing safe emergency access and egress and

(G) ensuring effective containment and clean-up of dangerous goods incidents.

Recommendation 16.

(a) The project must implement dangerous goods management measures at all times during relevant activities in accordance with Recommendation 14 and Recommendation 15.

Recommendation 17. Stormwater and flooding management

(a) Stormwater and flooding management of the project must not cause actionable nuisance to the Norwich Park Branch Railway.

Recommendation 18. Stormwater and flooding management

(a) Any works associated with the project must not, without written approval from DTMR:

(i) create any new discharge points for stormwater runoff onto the railway corridor

(ii) interfere with and/or cause damage to the existing stormwater drainage on the railway corridor

(iii) surcharge any existing culvert or drain on the railway corridor

(iv) reduce the quality of stormwater discharge onto the railway corridor

(v) worsen the flood immunity of the Norwich Park Branch Railway associated with project activities or

(vi) impede or interfere with overland flows paths and/or hydraulic conveyance on the site.

Appendix 4. Proponent commitments

Commitment number	Commitment
Rehabilitation	
1.	The project will be progressively rehabilitated to achieve the rehabilitation objectives established for each domain in accordance with the PRCP. The progress of the rehabilitation will be monitored against rehabilitation milestones and completion criteria to demonstrate successful rehabilitation of the project. The rehabilitation goals for the project will be to create a post-mining landform that is safe, stable, non-polluting, and able to sustain a post-mining land use (PMLU).
2.	The rehabilitation monitoring program will be developed and carried out by an appropriately qualified and experienced person. The monitoring program will be designed to reflect the rehabilitation milestones and completion criteria and to identify the requirement for intervention and/or remedial activities.
3.	Waste rock emplacements have been designed with shallow slopes, approximately 10° (18%) or lower, that will be revegetated to minimise erosion and sustain low-intensity cattle grazing PMLU.
4.	Residual void highwalls will be designed to remain stable in the long-term, based on site-specific geological data and geotechnical modelling.
5.	Residual void highwalls will be bunded and fenced to prevent access.
6.	Disturbance due to exploration activities in areas not scheduled or authorised to be mined within 2 years will be rehabilitated in accordance with provisions detailed in the *Eligibility Criteria and Standard Conditions for Exploration and Mineral Development Projects* (Department of Environment and Heritage Protection, 2016).
7.	Residual voids are located outside the extent of predicted flooding events in the Isaac River, up to and including the PMF event.
8.	All of the project area will be rehabilitated to sustain a PMLU of low-intensity grazing, consistent with the pre-mining land use within and surrounding the project area. The rehabilitation monitoring program will detail plant species to be used or the target REs/broad vegetation groups (RE/BVG) to provide an understanding of species composition in the rehabilitated landform.
9.	Providing a use for all remaining proposed residual voids (i.e. no NUMAs).
10.	All infrastructure associated with the project will be assessed on an individual basis and either decommissioned and removed or retained for future use as part of the PMLU. Any retained infrastructure will be commensurate with the low-intensity grazing PMLU and may include (but will not be limited to) dams, access roads and fences. Where infrastructure is decommissioned and removed, the land will be shaped, topsoiled, ripped and revegetated. Disturbed areas will be rehabilitated with an appropriate seed mix to enable revegetation.
11.	In accordance with the *EIS Information Guideline –Contaminated Land* (Department of Environment and Science [DES], 2020), potentially contaminated land will undergo preliminary (Stage 1) and detailed (Stage 2) site investigations by a suitably qualified person to identify any existing land contamination.
12.	Backfilling an additional void, the South Pit mine void.
13.	Whitehaven WS will re-establish excised portions of the northern waterway in the final landform and re-establish a post-mining surface water drainage that is sympathetic with the natural drainage lines. An alert-to-action be incorporated into the waterway diversion monitoring.

Commitment number	Commitment
14.	Whitehaven WS will amend the relevant soil structures where necessary in the PRCP (or other relevant management plan). A soil inventory will be maintained during the life of the project and detailed in the PRCP (or other management plan) and comply with descriptions in the Australian Soil and Land Survey Field Handbook. The soil inventory will account for the volumes and locations of soil to be progressively stripped, stockpiled and reapplied. Stripping and handling measures will be undertaken in accordance with the PRCP (or other management plan) to be developed for the project.
Surface water	
15.	Key principles that will be applied for the project include: • separation of clean, sediment-laden and mine-affected water, within the limitations of operational requirements • minimisation of surface disturbance areas, thus minimising the volume of sediment-laden and mine-affected water generated by the project • all water storage dams, structures and facilities will be designed, constructed and managed in accordance with the *Manual for assessing consequence categories and hydraulic performance of structures* (DES, 2016) • water storage dams that manage mine-affected water will be designed and operated to minimise uncontrolled releases to the receiving environment • water for construction and operational purposes will be preferentially sourced from dedicated on-site water storage dams • water collected in water storage dams and sediment dams will be captured and retained for reuse on-site where possible (e.g. dust suppression, CHPP demand) and/or controlled release off-site to the receiving environment in accordance with the *Model water conditions for coal mines in the Fitzroy basin* (DES, 2013) • surface runoff from rehabilitated waste rock emplacements during operation of the project will be directed to dedicated sediment dams for settling and release to the receiving environment or to mine-affected water storages for reuse • where feasible, sourcing external water requirements from surrounding mining operations to reduce take from the environment or raw water supplies • surface water runoff and seepage from co-disposed coal reject emplacement areas will, prior to capping, drain to the mine-affected water management system • coal rejects will be buried by at least 10 metes of waste rock.
16.	Mine-affected water will be managed through the site water management system which is designed to operate in accordance with *Guideline – Model mining conditions* (DES, 2017) and the *Model water conditions for coal mines in the Fitzroy basin* (DES, 2013).
17.	A water management plan will be prepared cognisant of DES guideline for the *Preparation of water management plans for mining activities* (Department of Environment and Resource Management, 2010).
18.	To achieve the 'no mine-affected water storage uncontrolled release' objective, the project will be operated such that water could be temporarily stored in the active open pit if required (e.g. as a result of exceedance of the design capacity of the water management system).
19.	Whitehaven WS will prepare a REMP for the project in accordance with the *Guideline – Model mining conditions* (DES, 2017).
20.	Conditions have been developed for potential controlled water releases to the Isaac River based on the *Guideline - Model mining conditions* (DES, 2017) and *Model water conditions for coal mines in the Fitzroy basin* (DES, 2013) and site-specific data.
21.	Monitoring of upstream, on-site and downstream water quality will assist in demonstrating that the site water management system is effective in meeting its objective of minimal impact on

Commitment number	Commitment
	receiving water quality. Monitoring will also allow for early detection of any impacts and appropriate corrective action.
22.	Surface runoff and seepage from waste rock emplacements, including any rehabilitated areas during operations, will be monitored for 'standard' water quality parameters, including but not limited to pH, EC, alkalinity, major anions, major cations, total dissolved solids (TDS) and a broad suite of soluble metals/metalloids.
23.	Sediment dams will be designed based on the *Best Practice Erosion and Sediment Control Guideline* (International Erosion Control Association, 2018).
24.	Additional sediment dam management and mitigation measures associated with Isaac River flows and monitored salinities within the sediment dams.
25.	All water storages for the project will be monitored for water quality and volume on a quarterly basis.
26.	Whitehaven WS will implement a number of mitigation and management measures for the mine-affected water dams including: • operational measures that will allow for the practical limitations of being able to redistribute stored volumes across the containment system (including operability of equipment under extreme weather conditions) • annual inspections to assess the condition and adequacy of all components of the regulated structures • establishing and maintaining a register of regulated structures.
Groundwater	
27.	Monitoring of groundwater levels from existing monitoring bores and VWPs will continue and will enable natural groundwater level fluctuations (such as responses to rainfall) to be distinguished from potential groundwater level impacts due to depressurisation resulting from proposed mining activities. Several bores within the extent of proposed mining operations will continue to be monitored until they are no longer available due to mine progression.
28.	Groundwater quality monitoring will continue to be undertaken on a quarterly basis. In addition to collecting field parameters (EC and pH), water samples will be submitted to a NATA accredited laboratory for analysis of: • physio-chemical indicators (TDS and TSS) • major ions, hardness and ionic balance • total alkalinity as $CaCO_3$, HCO_3, CO_3 • total and dissolved metals • nutrients and • organics.
29.	Subject to accessibility, quarterly groundwater quality monitoring will continue to be conducted on privately-owned bores near to the project.
30.	The groundwater quality and level limits developed in accordance with *Using monitoring data to assess groundwater quality and potential environmental impacts* (DES, 2021) will be documented in the water management plan.
31.	An annual review of groundwater quality trends will be conducted by a suitably qualified person. The review will assess the change in groundwater quality over the year, compared to historical trends and impact assessment predictions.
32.	Every 5 years, the validity of the groundwater model predictions will be assessed and if the data indicates significant divergence from the model predictions, the groundwater model will be updated for simulation of mining.

Commitment number	Commitment
33.	An underground water impact report will be prepared in accordance with Chapter 3 of the *Water Act 2000* and relevant guidelines.
34.	Additional monitoring bores for the regolith and Leichhardt Seam groundwater units in the vicinity of the project will be installed and incorporated into the groundwater monitoring program for the project. This allows natural groundwater level fluctuations to be distinguished from potential groundwater level impacts due to depressurisation resulting from proposed mining activities. Whitehaven WS has also committed to installing additional monitoring alluvial bores in the vicinity of the existing Winnet and Knob Hill bores.
Flood management	
35.	Temporary flood levees will be progressively constructed as required to provide flood protection to project operations.
36.	The temporary flood levees will be designed to a height that will provide protection against the peak flood height associated with a 0.1% AEP flood event.
37.	Detailed design plans of the proposed temporary flood levees together with a consequence assessment and certification by a suitably qualified and experienced person(s) will be prepared prior to construction for assessment and approval by DCCEEW in accordance with proposed environmental authority conditions
38.	During the detailed design phase, the model results will be used to identify potential locations of high flow velocity and scour potential. This information will be used to inform the appropriate level of scour protection along the proposed temporary levees.
39.	Whitehaven WS will continue to consult with the Isaac Regional Council and will provide meteorological data recorded on-site, if requested, to assist with inputs into regional flood modelling and disaster management planning managed by Isaac Regional Council.
Biodiversity offsets	
40.	Where the project will result in a significant residual impact, Whitehaven WS will provide an environmental offset.
41.	Offsets will be established for the project in stages, in accordance with the *Queensland Environmental Offsets Policy (Version 1.11)* (DES, 2021), accounting for the progressive disturbance of the project.
Waste rock and rejects	
42.	A waste management program will be developed that describes the handling and disposal of wastes associated with the project, including waste rock, coal rejects and other wastes generated by the project.
43.	Where highly sodic and/or dispersive waste rock is identified, it will not report to final landform surfaces and will not be used in construction activities, wherever practicable.
44.	It may not be practical to selectively handle and preferentially emplace highly sodic and dispersive waste rock during operation of the project. However, reasonable measures will be taken to identify and selectively place (or alternatively manage) highly sodic and dispersive waste rock.
45.	Where waste rock is used for construction activities, this will be limited (as far as practical and feasible) to unweathered Permian sandstone, as this material is widely accepted to be more suitable for construction and for use as embankment covering on final landform surfaces.
46.	Regardless of the waste rock type, especially where engineering or geotechnical stability is required, laboratory testing and rehabilitation field trials will be undertaken to determine the propensity for dispersion and erosion of waste rock landforms.
47.	Geochemical test-work validation for coal reject from the CHPP will be undertaken during development of the project, particularly during the first 2 years of CHPP operation and whenever new seams/plies are being processed. Test-work will comprise a broad suite of

Commitment number	Commitment
	environmental geochemical parameters, such as pH, EC, acid-base account parameters and total and soluble metals/metalloids. Surface water runoff and seepage from co-disposed coal reject emplacement areas will, prior to capping, drain to the mine-affected water management system and coal rejects will be buried by at least 10 metres of waste rock.
Flora and fauna	
48.	Whitehaven WS will develop and implement an environmental management plan outlining (amongst other things) vegetation clearing measures, weed management and animal pest management. A monitoring program that includes weed monitoring and animal pest monitoring will be included.
49.	Whitehaven WS will prepare a species management program in accordance with the *Nature Conservation (Animals) Regulation 2020* for approval by DES prior to undertaking any activities that will disturb animal breeding places.
50.	Pest and weed control/management measures will be implemented every 6 months, or as required during weather conditions which are conducive to the outbreak of weeds and feral animal populations.
51.	Whitehaven WS will implement artificial lighting in accordance with Australian Standards, and in a way that focuses on disturbance/work areas and minimises/avoids lighting of remnant vegetation (E2M, 2021).
52.	Whitehaven will implement fencing to exclude livestock from the portion of the northern unnamed waterway that is outside the development footprint and inside the mining lease.
53.	Vegetation clearance measures will be developed and implemented for the project: • pre-clearance fauna surveys will be undertaken by suitably experience and qualified persons to identify individual fauna at direct risk from clearing activities • a suitably experienced and qualified fauna spotter/catcher will be present during the clearing of SES and MNES habitat areas • management of fauna identified during clearing and pre-clearance surveys will include relocating individuals to adjacent habitat or treating injuries • if a koala is found, it will be left to move away from the clearance area on its own accord if safe to do so • boundaries of areas to be cleared, and those not to be cleared will be clearly defined during clearing activities • select habitat features (e.g. hollow-bearing trees, woody debris, logs and rocks) will be salvaged for re-use in rehabilitation of the project • land clearing will be carried out progressively over the life of the project to allow mobile fauna species the opportunity to disperse away from clearing areas • directional clearing towards retained vegetation will be undertaken where practical to enable the movement of fauna into retained vegetation • during construction works, work areas and excavations (trenches) will be checked for fauna that may have become trapped • if trenches remain open after daily site works have been completed, fauna ramps will be put in place.
54.	The following feral animal management measures will be implemented: • maintaining a clean, rubbish-free environment to deter feral animals • engaging appropriately qualified persons to undertake biannual pest animal monitoring in the project mining lease areas, which may include coordination with adjoining mining operations/adjacent landowners • feral animal control strategies (e.g. baiting and trapping) within the project mining lease areas in accordance with relevant standards and the *Isaac Regional Biosecurity Plan 2020-2023* (Isaac Regional Council, 2020a)

Commitment number	Commitment
	• monitoring of feral animals will be undertaken by an appropriately qualified contractor to identify whether new or additional control measures are required.
55.	During the life of the project, the following management measures will be implemented, to mitigate the abundance and species of weeds in the project area and surrounds and minimise the potential for weeds to spread to adjacent areas: • bi-annual surveying of tracks, revegetation (rehabilitation) areas and soil stockpiles, etc. (or more frequently as required), to identify weeds requiring control • washdown of machinery and vehicles when moving to/from weed infested areas • mechanical removal of identified weeds and/or the application of approved herbicides • weed control methods in accordance with those specified by DAF and the *Isaac Regional Biosecurity Plan 2020-2023* (Isaac Regional Council, 2020a) • the weed management plan will be developed in consultation with Isaac Regional Council and DAF and with reference to local, regional, state and national biosecurity management plans.
56.	Whitehaven WS will implement management measures to reduce impacts to fauna species due to vehicular strike such as (E2M, 2021): • designating speed limits for the project area • developing a process for the removal of roadkill to minimise the risk of attracting fauna to the roadway and • developing a process for the management of fauna injured by vehicle strike.
Social	
57.	The operational workforce for the project will not be a 100% FIFO workforce.
58.	A SIMP has been prepared for the project which comprises a workforce management plan, housing and accommodation plan, local business and industry procurement plan, health and community wellbeing plan, and a community and stakeholder engagement plan.
59.	Whitehaven WS's recruitment strategy for the project will provide equitable access to employment opportunities and prioritise local recruitment by applying the following order of priority for recruitment: (1) the 'local' towns of Moranbah, Dysart and Coppabella (2) nearby regional communities within a 125 km radius from the project entrance (3) the Isaac region as per the Isaac Regional Council local government area (4) the Mackay Whitsunday region (5) the State of Queensland (6) outside the State of Queensland.
60.	Key commitments made by Whitehaven WS with regard to workforce management include: • implementing a recruitment hierarchy which prioritises employment of local residents • applying the Whitehaven Equal Employment Opportunities Policy to all employment aspects of the project • identifying specific positions which qualify for job share/flexible shift arrangements. Such jobs may be made available as both full-time or job share/flexible shift and will be advertised in local towns as a priority • not advertising any job opportunities as FIFO only • collaborating with the Barada Barna Aboriginal Corporation, the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts, the Department of Youth Justice, Employment, Small Business and Training and other government agencies to design and implement programs (such as 'Skilling Queenslanders for Work') which support target groups such as youth

Commitment number	Commitment
	• providing on-site first aid facilities for workers with appropriately trained personnel available that can assist with attending to minor workforce health issues, as well as providing first response services for emergency situations and site accidents • ongoing consultation and collaboration with police, workforce accommodation providers and other stakeholders to identify and address any antisocial or disruptive workforce behaviour in local communities • managing workforce health and safety through implementation of the Health and Safety Management System.
61.	Key commitments made by Whitehaven WS with regard to housing and accommodation include: • facilitating the construction of a minimum of 34 new dwellings in Moranbah for Project employees • providing a financial contribution of $500,000 over the project life to the Isaac Affordable Housing Trust and/or Emergency and Long-Term Accommodation Moranbah Inc for the construction of additional affordable housing in Moranbah • providing subsidised housing costs for members of the workforce who choose to live locally (equating to approximately $13,000 per annum per Project employee) • providing high quality workforce accommodation to non-resident personnel and monitoring workforce satisfaction with the provided accommodation • providing support to members of the workforce seeking to move to local communities (e.g. providing connections to local advice and support).
62.	Key commitments made by Whitehaven WS with regard to local business and industry procurement include: • preparing and adopting a procurement policy and plan consistent with relevant regulations • collaborating with the Moranbah Traders Association, Local Content Leaders Network, Regional Industry Network and any other appropriate stakeholders in establishing a local supplier listing tailored to the project • maximising opportunities for local businesses to provide goods and services to the project • facilitating and supporting delivery of a tender readiness program for Indigenous businesses, in collaboration with the Barada Barna Aboriginal Corporation, the Department of Youth Justice, Employment, Small Business and Training, the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts and any other appropriate stakeholders.
63.	Key commitments made by Whitehaven WS with regard to health and community wellbeing include: • collaborating with the Isaac Regional Council to determine the most effective contribution which may be made to a childcare solution ($200,000 within Years 1 to 3 of the project) • monitoring workforce demands on childcare and education services and working with the Isaac Regional Council to support solutions to cumulative demands on social services • supporting the establishment of, and participating in, a Moranbah Cumulative Reference Group which is appropriately represented across government and industry, providing a forum for a partnered approach to cumulative effects • support community health outcomes through partnering with the Moranbah Hospital, Moranbah District Mental Health Service and other key health service providers providing contributions as required to address identified equipment deficiencies ($50,000 within Years 1 to 3 of the project) • providing a contribution of $30,000 per year for the life of the project, split between local mental health, domestic violence and suicide prevention programs

Commitment number	Commitment
	• monitoring and managing dust, noise and vibration issues associated with the project, including preparation of an Air Quality Management Plan, and regularly communicating the results with the local community • providing shuttle buses to transport a portion of workers for the project • notifying stakeholders of material Project traffic related activities, such as closures due to roadworks, and implementing a complaints mechanism to identify, track and remediate (in accordance with any conditions of the environmental authority) community complaints • developing and implementing a workforce code of conduct describing positive behavioural outcomes and prohibiting negative behaviours • ongoing consultation and collaboration with police, workforce accommodation providers and other stakeholders to identify and address any antisocial or disruptive workforce behaviour in local communities • developing and implementing measures to facilitate non-resident workers to have positive interactions in local communities • providing a contribution to support community culture and well-being through the Whitehaven Community Fund which will invite community organisations to apply for annual funding.
64.	Key commitments made by Whitehaven WS with regard to community and stakeholder engagement include: • maintaining a Project officer as a dedicated community contact point • continuing to engage with local and surrounding landholders to monitor overall Project impacts • continuing to engage with local service providers including schools, health and other social services regarding Project related activities that have potential to impact on the community (e.g. blasting or road closures) • establishing, publicising and maintaining a readily accessible community complaints and resolution process • establishing and maintaining long-term respectful relations with the Barada Barna Aboriginal Corporation, including managing cultural heritage in accordance with the cultural heritage management plan and meeting the requirements of any native title agreement • regularly engaging with the Isaac Regional Council to monitor the implementation of the SIMP • continuing to engage with emergency service providers (e.g. Queensland Police Service, Queensland Ambulance Service and Queensland Fire and Emergency Services) and government agencies (e.g. Department of Youth Justice, Employment, Small Business and Training Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts) over the life of the project.
65.	The SIMP as a whole will also be reviewed regularly to assess the effectiveness and relevancy of the SIMP. Whitehaven WS will review and update the SIMP every 2 years for the first 4 years of the project and every 3 years up to Year 10 of the project. The SIMP may be reviewed and revised within a shorter period of time should Whitehaven WS consider the amendment of the SIMP necessary. The SIMP will also be prepared for the closure of Project.
66.	Whitehaven WS will consult with relevant stakeholders to revise the SIMP to ensure actions accurately reflect the existing socio-economic context and updated operational elements, such as additional workers.
67.	The revised SIMP will provide further detail regarding people with disability and elderly persons as follows: • including more specific baseline data in relation to people with disability • considering provision of community services for people with disability and elderly persons

Commitment number	Commitment
	• acknowledging that employment opportunities will include opportunities for traditionally underrepresented groups such as people with disability • acknowledging that there are very limited services for elderly persons • acknowledging that the project will contribute to a negative effect on housing availability, affordability and accessibility in the local study area and recognising the impact on disadvantaged and lower-income individuals and families • identifying the valuable contribution of elderly persons in the workplace, with employers and younger workers reaping the benefits of their wisdom and experience • including in the social impact management plan, actions for maximising employment opportunities for people with disability and elderly persons and • including reference to engagement with people with disability and elderly persons.
Noise	
68.	Whitehaven WS has executed a non-residency agreement with the land owner of the Olive Downs Homestead and the non-residency agreement will be implemented for the project.
69.	Project noise adaptive management measures will include: • response to community issues or complaints including discussions with relevant landowners • refinement of on-site noise mitigation measures and mine operating procedures, where required and practicable • use of real-time noise and meteorological monitoring as a management tool and • if necessary (i.e. as informed by operational noise monitoring results and subject to any agreements), implementation of feasible and reasonable mitigation at relevant sensitive receptors, in accordance with the Noise EPP.
Blast management	
70.	Noise and vibration management and monitoring will be undertaken for the project.
71.	Whitehaven WS will consult with Aurizon, operators of the railway, regarding proposed blasting events (including consideration of potential vibration or fly-rock impacts) and, if necessary, implement management and mitigation measures (e.g. temporary closure of the railway during blast events) to minimise risks.
Air quality	
72.	Whitehaven WS has executed a non-residency agreement with the land owner of the Olive Downs Homestead and the non-residency agreement will be implemented for the project.
73.	General dust mitigation measures will be implemented for the project to minimise dust generated by wheel- generated dust and grading, drilling, ROM unloading at the CHPP, crushing and train loading activities and by wind erosion of product coal stockpiles.
74.	Whitehaven WS will implement chemical dust suppressant on selected haul roads (or alternative technologies with equivalent effectiveness) as required.
75.	Whitehaven WS will implement proactive and reactive dust control measures. These measures will include the use of weather forecasting and real-time measurement of dust levels and meteorological conditions to modify mining operations as required in order to achieve compliance with applicable air quality objectives at the nearest privately-owned receivers.
76.	Potential emissions associated with product coal transport (i.e. via rail) will be managed by profiling of the coal in wagons and the use of a veneering system (i.e. spray of the coal surface in the wagons).
77.	Meteorological data and dust levels will be monitored on an ongoing basis at the project for the implementation of operational dust controls.

Commitment number	Commitment
78.	If necessary (i.e. as informed by operational air quality monitoring results and subject to any agreements), feasible and reasonable mitigation at relevant sensitive receptors will be implemented, in accordance with the *Environmental Protection (Air) Policy 2019*.
Greenhouse gas management	
79.	Whitehaven WS will develop and implement a Greenhouse Gas Management and Abatement Plan to abate carbon dioxide emissions, which will include the following initiatives to mitigate, reduce and manage greenhouse gas emissions from the project: • regular maintenance of plant and equipment to minimise fuel consumption and associated emissions, including training staff on continuous improvement strategies regarding efficient use of plant and equipment • regular assessment, review and evaluation of greenhouse gas reduction opportunities • procurement of policies that require the selection of energy efficient equipment and vehicles • monitor and maintain equipment in accordance with manufacturer recommendations • optimise diesel consumption through logistics analysis and planning (e.g. review of the mine plan to optimise haul lengths, dump locations, and road gradients) • implementation of high-efficiency motors • limiting vegetation clearance, as far as practical, within the project area • monitoring and reducing waste in accordance with the project waste management plan, including implementation of a waste recycling program for the project to promote and encourage recycling of materials such as paper, cardboard and scrap metal • purchase of carbon neutral electricity, abating all estimated Scope 2 greenhouse gas emissions associated with the project • commitment to fund research targeted at reducing greenhouse gas emissions associated with the project • implementation of greenhouse gas reduction opportunities where determined to be feasible (e.g. carbon capture and storage, pre-drainage of methane and zero emission trucks) • implementation of an automatic haulage system to reduce diesel use where found to be feasible • investigation of lower emissions dual fuel haulage truck solutions and implementation where found to be feasible • preparation of a research program for the project in consultation with DES. The research program is to be submitted to DES for approval within 3 years of issuing of the environmental authority • implementation of the outcomes of the research program where found to be feasible • the greenhouse gas management and abatement plan will be reviewed, if necessary, following submission of each annual energy audit by Whitehaven WS, in consultation with the relevant Government agencies. Greenhouse gas emissions from the project will be tracked and reported each year in the Australian Government's National Greenhouse and Energy Reporting Scheme and National Pollutant Inventory.
Transport	
80.	Whitehaven WS will implement the following mitigation and management measures regarding road transport: • project travel demand management through strategies outlined in the SIMP including fatigue management policy (swipe card system, shuttle bus services to transport workers, coordinated car-pooling) and staggering of shift times • design and construction of the new intersection of the Mine Access Road with Eagle Downs Mine Access Road in accordance with the relevant TMR and Austroads guidelines.

Commitment number	Commitment
	Intersection design to be in consultation with the Eagle Downs Mine Joint Venture and Isaac Regional Council, with construction to be funded by the proponent • Whitehaven WS will enter into an Infrastructure Agreement with Isaac Regional Council at least 3 months prior to the commencement of construction. The Infrastructure Agreement will detail appropriate financial contributions to Isaac Regional Council to improve road safety as outlined in the Road Transport Assessment or otherwise agreed with Council for the: – maintenance of Moranbah Access Road and Peak Downs Mine Road to address specific safety risks identified during the risk assessment. • appropriate contributions to DTMR and Isaac Regional Council to support pavement reconstruction and rehabilitation works.
81.	The project rail spur will be designed and constructed in consultation with Aurizon and in accordance with Aurizon's requirements to access its Central Queensland Coal Network to minimise potential impacts on the existing environment in accordance with relevant guidelines, including the *Guide to Development in a Transport Environment: Rail* (DTMR, 2015).
82.	Project trains will be operated and coordinated by Aurizon or another suitably qualified operator.
83.	Existing local and regional infrastructure will be used to transport product coal to the port for export.
84.	Providing an updated traffic impact assessment, including a pavement impact assessment and associated marginal cost calculations, prepared in accordance with the *Guide to Traffic Impact Assessment* (DTMR, 2018), to DTMR for assessment and approval no later than 6 months prior to construction commencing.
85.	Whitehaven WS will continue to consult with Aurizon and DTMR regarding the ALCAM assessment of the existing railway level crossing of Norwich Park Branch Railway and Peak Downs Mine Road.
86.	Whitehaven WS will continue to consult with DTMR over the life of the project regarding flooding management and earthworks adjacent to the Norwich Park Branch Railway corridor.
Land	
87.	Erosion and sediment controls will be developed and documented for the project.
88.	Soil stripping and handling measures will be undertaken in accordance with the PRCP (or other management plan) to be developed for the project.
89.	A soil inventory will be maintained during the life of the project and detailed in the PRCP (or other management plan) and comply with descriptions in the Australian Soil and Land Survey Field Handbook. The soil inventory will account for the volumes and locations of soil to be progressively stripped, stockpiled and reapplied. Stripping and handling measures will be undertaken in accordance with the PRCP (or other management plan) to be developed for the project.
90.	Whitehaven WS will implement appropriate mitigation measures and management to prevent or reduce the potential for contamination from the project. If evidence of unexpected contamination is identified, work will cease in that area and action taken to appropriately delineate the contaminated soil or fill material which will be managed or remediated and validated under supervision of a suitably qualified person.
91.	Prior to any activity associated with the project upon any relevant lands, all appropriate land tenure will be secured and all necessary approvals and/or consents from all parties holding a lawful interest in the relevant lands will be obtained. A tenure management plan for components related to the project would be developed in consultation with the Department of Resources.
Biosecurity	

Commitment number	Commitment
92.	Whitehaven WS will implement mitigation and management measures to minimise the spread of weeds, pest animals and control existing weeds and pests through an environmental management plan. Control measures will be implemented at commencement of the project and continue through to relinquishment of the project area.
93.	Whitehaven WS will ensure that all personnel tasked with feral animal and weed management and control hold current and valid permits, including chemical licences for pesticide use.
94.	Consistent with the general biosecurity obligations Whitehaven WS will: • know the biosecurity risks associated with the project activities • take all reasonable and practical steps to prevent or minimise each potential biosecurity risk • prevent or minimise the adverse effects the risk could have and refrain from doing, or omit to do, something that might exacerbate the adverse effects, or potential adverse effects.
Bushfire risk	
95.	Whitehaven WS will implement fire prevention measures during the operation of the project to reduce the likelihood and impact of bushfires, which will include the following: • construction and maintenance of fire breaks • provision and maintenance of firefighting equipment around the project • provision of firefighting equipment training for staff • managing vegetation within the project mining leases to maintain safe fuel loads • handling and disposing any chemicals used in the project area in accordance with the relevant Safety Data Sheet • implementing access tracks, to be used by Queensland Fire and Rescue Service for emergency purposes • implementing an emergency response procedure prepared in consultation with emergency services. It is noted that the Queensland Fire and Emergency Services supported the assessment of bushfire risk presented in the Draft EIS (Whitehaven WS, 2021) and the commitments to manage risk from bushfire.
Waste	
96.	Whitehaven WS will manage the waste produced at the project in accordance with the waste and resource management hierarchy in the *Waste Reduction and Recycling Act 2011* (i.e. “avoid, reduce, reuse, recycle, recover, treat, and dispose”). If waste must be disposed of, Whitehaven WS will do so in a way that prevents or minimises adverse effects on environmental values.
97.	A waste management program will be developed that describes the handling and disposal of wastes associated with the project, including waste rock, coal rejects and other wastes generated by the project, and will describe the objectives and measures for protecting environmental values from potential impacts associated with waste.
98.	Whitehaven WS will continue to consult with the Isaac Regional Council regarding waste management and use of alternative waste management facilities outside the Isaac Regional Council local government area (if capacity is not available).
99.	Disposal of waste heavy vehicle tyres will include stockpiling and transport to identified disposal locations within the waste rock emplacement areas, as determined by mine progression. The disposal methodology will generally include the following: • operational personnel will initiate tyre disposal once a stockpile has accumulated that warrants a feasible disposal event

Commitment number	Commitment
	• completion of a pre-task risk assessment for each waste tyre disposal event, to consider both the location and manner in which the tyres will be disposed, as well as required monitoring • relocation of the tyres will be undertaken in accordance with Whitehaven WS' internal Mine Tyre Disposal Environmental Procedure • tyres will be placed as deep into the waste rock emplacement area as is reasonably practical, with a minimum of 20 metres of material to be emplaced over all tyre disposal areas • tyres will not be disposed of in areas with potential to impede saturated aquifers, compromise the stability of the consolidated final landform or have any long-term effects on rehabilitation • tyre dumps will be located more than 15 metres from any coal rejects to minimise the potential for spontaneous combustion. The pre-task risk assessment must consider the following: • fire hazards and their management • safety hazards and their management • potential for interaction with the surrounding groundwater systems • required depth to prevent uprising and ensure stability of the final consolidated landform • proximity to coal rejects and depth of cover. Stockpiling of tyres at the allocated disposal area may be required prior to final coverage and burial. Stockpiles will be sized and located in consideration of potential fire risk and will be temporary only.
Safety	
100.	The following processes and measures will be implemented: • development and implementation of a Risk Management System • handling, storage and disposal of Hazardous Materials at the project will be in accordance with relevant legislation, standards and guidelines • the management of all chemicals stored and used at the project will be in accordance with the relevant safety data sheet for each chemical • vehicle and equipment operators will be trained in processes and procedures such as safe and stable operation of machinery and emergency response • licenced contractors will be used to recover, collect, store, handle and dispose of hazardous wastes and materials utilised at the project • regular inspections of hazardous material storage areas including tanks and bunds will be conducted to maintain structural integrity • spill control kits will be available at all locations in which hazardous materials are stored • Whitehaven WS will continue to liaise with community stakeholders including the relevant community emergency services • the explosives magazine for the project will be fenced, signed and maintained in accordance with AS 2187:1998 *Explosives - Storage, transport and use Storage* • ongoing consultation with relevant emergency authorities over the life of the project (e.g. the Local Disaster Management Group).
101.	Whitehaven WS will prepare an Emergency Response Procedure in consultation with emergency services. The Emergency Response Procedure will describe the actions that will be implemented if the following incidents were to occur: • injury or illness • fire • unintended initiation of explosives

Commitment number	Commitment
	• loss of containment of hazardous substances • natural events (e.g. flooding, bushfire, cyclone) • vehicle accident • unapproved mine-affected water discharge off-site.
102.	The Emergency Response Procedure may include, but not be limited to: • contact details for key stakeholders in case of any emergency • emergency and evacuation planning, maps and response procedures • a description of the proposed communication mechanisms and required infrastructure • treatment plans for injured workers due to chemical processes used on site, including proposed consultation • a description of notification requirements for planned exercises • a fatigue management policy.
103.	Whitehaven WS will perform a risk assessment specific to hazardous chemicals stored on-site during the detailed design phase of the project, in accordance with relevant standards and codes.
104.	Implementation of an adaptive management approach to climate change impacts throughout the life of the project, including monitoring and reviewing information from the CSIRO and Bureau of Meteorology relating to observed changes in the region's climate, identifying any emerging trends or potential impacts of a changing climate relevant to the project, and reviewing current mitigation measures with a view to implementing additional adaptation measures as required.
Tenure	
105.	Whitehaven WS will develop a tenure management plan in consultation with the Department of Resources prior to construction. The tenure management plan for components related to the project would include: • all land impacted by the project • the current land tenure of all lands impacted by the project • proposed future land tenure of all lands impacted by the project • the proponents proposed future management and ownership arrangements for the lands associated with the project • the final proposed land tenure, landform and rehabilitation outcomes that will be achieved at the decommissioning of the project and how these tenures will interact with the surrounding lands following decommissioning.

Acronyms and abbreviations

Acronym	Definition
ABS	Australian Bureau Statistics
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
ADWG	Australian drinking water guidelines
AEIS	additional information to the environmental impact statement
AEP	annual exceedance probability
AHD	Australian height datum
ALCAM	Australian Level Crossing Assessment Model
ANZECC	Australian and New Zealand Environment and Conservation Council
ATP	authority to prospect
BACI	Before-After-Control-Impact
BBAC	Barada Barna Aboriginal Corporation
Bilateral Agreement	Queensland Assessment Bilateral Agreement
CALPUFF	California Puff Model
CFMEU	Construction, Forestry, Mining and Energy Union
CHMP	cultural heritage management plan
CHPP	coal handling and preparation plant
CO_2	carbon dioxide
CO_2-e	carbon dioxide equivalent
CSEMS	community and stakeholder engagement management strategy
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
CWD	clean water diversion
DAF	Department of Agriculture and Fisheries
dBA	A-weighted decibels
DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science
DRDMW	Department of Regional Development, Manufacturing and Water
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
DTATSIPCA	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts
DTMR	Department of Transport and Main Roads
DYJESBT	Department of Youth Justice, Employment, Small Business and Training
EA	environmental authority (under EP Act)
EC	electrical conductivity
EIS	environmental impact statement
EMR	environmental management register

Acronym	Definition
EO Regulation	Environmental Offsets Regulation 2014
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPC	exploration permit for coal
EPP Air	Environmental Protection (Air) Policy 2019
EPP Noise	Environmental Protection (Noise) Policy 2019
EPP Water and Wetland Biodiversity	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ERA	environmentally relevant activity
ESCP	erosion and sediment control plan
FIFO	fly-in fly-out
Framework EMP	Framework environmental management plan
FTE	full time equivalent
GDE	groundwater dependent ecosystem
GDEWMP	groundwater dependent ecosystem and wetland management plan
GHG	greenhouse gas
GTE	GT Environmental Pty Ltd
GTIA	Guide to traffic impact assessment
ha	hectare
HES	high ecological significance
HR Act	*Human Rights Act 2019* (Qld)
IAHT	Isaac Affordable Housing Trust
IEA	International Energy Agency
IESC	International Erosion Control Association
IESC	Independent Expert Scientific Committee on Coal Seam Gas and Large Resource Coal Mining Development
kL	kilolitres
km	kilometres
kV	kilovolts
LGA	local government area
LOA	likelihood of occurrence assessment
m^3/t	cubic metres per tonne
Mbcm	million bank cubic metre
Mbgl	metres below ground level
mg/L	milligram per litre
MEDLIw	model for effluent disposal using land irrigation
METS	mine equipment and technology sector
MIA	mine infrastructure area
ML	megalitres (or mining lease, depending on context)

Acronym	Definition
ML/year	megalitres per year
MLA	mining lease application
MNES	matters of national environmental significance
MSES	matters of state environmental significance
Mt	megaton
Mtpa	million tonnes per annum
MYCC	Moranbah Youth and Community Centre
NAF	non-acid forming
NATA	National Association of Testing Authorities
NDC	nationally determined contributions (under the Paris Agreement)
NC Act	*Nature Conservation Act 1992* (Qld)
NPV	net present value
NUMAs	non-use management areas
OPSIM	operational simulation model
OWS	Office of Water Science
PAF	potentially acid forming
PHA	preliminary hazard analysis
PM	particulate matter
$PM_{2.5}$	particulate matter with a diameter less than 2.5 micrometres
PM_{10}	particulate matter with a diameter less than 10 micrometres
PMF	probable maximum flood
PMLU	post mining lease use
PMST	protected matters search tool
PRA	preliminary risk assessment
PRCP	progressive rehabilitation and closure plan
QLCLN	Queensland Local Content Leaders Network
QRIDP	Queensland Resource Industry Development Plan (June 2022)
RAP	reconciliation action plan
REs	regional ecosystems
REMP	receiving environment monitoring program
RE/BVG	regional ecosystems/broad vegetation groups
RIN	regional industry network
ROM	run-of-mine
RUMP	road use management plan
SDPWO	*State Development Public Works Organisation Act 1971* (Qld)
SIA	social impact assessment
SIMP	social impact management plan
SPRAT	Species Profile and Threats Database (Cth)
SRI	significant residual impact

Acronym	Definition
SSRC Act	*Strong and Sustainable Resource Communities Act 2017* (Qld)
STEM	Science, Technology, Engineering and Mathematics
TAP	threat abatement plan
TAPM	The Air Pollution Model
TIA	traffic impact assessment
TDS	total dissolved solids
TEC	threatened ecological community
TCFD	Task Force on Climate -related Financial Disclosure
TOR	terms of reference
TSS	total suspended soils
UWIR	underground water impact report
VM Act	*Vegetation Management Act 1999* (Qld)
VWPs	vibrating wire piezometers
WAV	workers accommodation village
Whitehaven WS	Whitehaven WS Pty Ltd
WoNS	weeds of national significance

Glossary

Term	Definition
annual exceedance probability (AEP)	The probability that a flood of a defined magnitude or larger will occur in a year
alluvium	Unconsolidated deposits such as sands, gravels and clays deposited by flowing water such as rivers and streams
aquifer	A sub-surface rock formation containing water in recoverable quantities
aquifer – confined	An aquifer overlain by an aquitard
aquifer – perched	An aquifer separated from a deeper aquifer by unsaturated materials
aquifer – unconfined	An aquifer that is not overlain by an aquitard
aquitard	A layer in the geological profile that separates 2 aquifers and restricts the flow between them
assimilative capacity	The ability of a body of water to cleanse itself; its capacity to receive waste waters or toxic materials without deleterious effects and without damage to aquatic life or humans who consume the water
baseflow	Groundwater flow into a surface water stream
baseline monitoring	Monitoring to gather information on the specific characteristics of an area prior to the project commencing
Bilateral Agreement	The agreement between the Australian and Queensland governments that accredits the State of Queensland's EIS process. It allows the Australian Minister for the Environment to rely on specified environmental impact assessment processes of the state of Queensland in assessing actions under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)
bore	A hole drilled in the ground to obtain samples of soil or rock, to intersect groundwater for extractive use, monitoring or investigation
carbonaceous	material rich in carbon (e.g. coal)
catchment	The entire land area from which water (e.g. rainfall) drains to a specific waterway or water body
catchment excision	Removal of an area of runoff or waterway from a catchment
colluvium	Sedimentary deposit formed primarily by gravity forces (e.g. landslide or slump)
controlled action	A proposed action that is likely to have a significant impact on a matter of national environmental significance; the environment of Commonwealth land (even if taken outside Commonwealth land); or the environment anywhere in the world (if the action is undertaken by the Commonwealth). Controlled actions must be approved under the controlling provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth)
controlling provision	The matters of national environmental significance, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), that the proposed action may have a significant impact on
coordinated project	A project declared as a ' coordinated project' under section 26 of the SDPWO Act
Coordinator-General	The corporation sole constituted under section 8A of the *State Development and Public Works Organisation Act 1938* and preserved, continued in existence and constituted under section 8 of the SDPWO Act
dewatering	Removal of water through control of inflows or pumping to lower groundwater levels
dispersive soils	Soil that is structurally unstable in water and breaks down to disperse its constituent sediments

Term	Definition
drawdown	A lowering of the groundwater levels in an aquifer caused by dewatering
EIS	Refers to the draft EIS and revised draft EIS documents collectively. However, this term is not used when necessary to compare draft EIS and revised draft EIS information
electrical conductivity (EC)	The ability of a substance to transmit electricity, used as a measurement of salinity in water
environmental value	As defined in section 9 of the EP Act, is: (a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety or (b) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.
environmental management plan guideline	Means the environmental management plan guidelines, or subsequent revision
environmentally relevant activities	An activity that has the potential to release contaminants into the environment. Environmentally relevant activities are defined in Part 3, section 18 of the *Environmental Protection Act 1994* (Qld)
ephemeral	A waterway or water body that exists for a limited period following rainfall
evapotranspiration	A waterway or water body that exists for a limited period following rainfall
fault	A structural discontinuity in a rock mass or geological formation
flocculation	The process by which very fine clay particles suspended in water come together into larger masses, making them easier to remove
gilgai	Depressions in the surface of expanding clay soils where ephemeral water bodies can be formed after rainfall
groundwater	Sub-surface water, generally present in an aquifer
groundwater dependent ecosystems (GDEs)	Ecosystems that need access to groundwater to meet all or some of their water requirements
GDEs – facultative	GDEs with an infrequent or partial dependence on groundwater
GDEs – obligate	GDEs with a continuous or entire dependence on groundwater
groundwater recharge	The addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems
hydraulic conductivity	The rate at which a material allows water to move through it
hydraulic gradient	The change in groundwater elevation and pressure that may result in the movement of groundwater
hypersaline	Water that is more saline than typical seawater
initial advice statement (IAS)	A scoping document, prepared by a proponent, that the Coordinator-General considers in declaring a coordinated project under Part 4 of the SDPWO Act. An IAS provides information about: • the proposed development • the current environment in the vicinity of the proposed project location • the anticipated effects of the proposed development on the existing environment • possible measures to mitigate adverse effects.
interburden	Waste rock material that separates economically viable coal seams
lacustrine	Relating to lakes

Term	Definition
leachate	Water carrying impurities which has percolated through the ground
matters of national environmental significance	The matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999*. The 8 matters are: – world heritage properties – national heritage places – wetlands of international importance (listed under the Ramsar Convention) – listed threatened species and ecological communities – migratory species protected under international agreements – Commonwealth marine areas – the Great Barrier Reef Marine Park – nuclear actions (including uranium mines)
numerical groundwater model	A complex simulation that predicts the potential movement and response of groundwater to mining activities
outcrop	An exposure of bedrock
overburden	Waste rock which overlies economically viable coal seams and must be removed prior to mining of coal
palaeochannel	An historical stream or river channel cut into the rock or soil and overlaid by sediment after the stream has changed its course or dried up
palustrine	Relating to swamps or marshes
Permian	Geological period covering a span between approximately 290 and 250 million years before present
piezometer	A type of monitoring device which records changes in groundwater pressure
potable	Suitable for drinking
progressive rehabilitation	The holder of an environmental authority is required to plan for how, where and when activities will be carried out on land in a way that maximises the progressive rehabilitation of land to stable condition
properly made submission	Defined under Schedule 2 of the SDPWO Act as a submission that: (1) is made to the Coordinator-General in writing (2) is received on or before the last day of the submission period (3) is signed by each person who made the submission (4) states the name and address of each person who made the submission (5) states the grounds of the submission and the facts and circumstances relied on in support of the grounds
proponent	The entity or person who proposes a coordinated project. It includes a person who, under an agreement or other arrangement with the person who is the existing proponent of the project, later proposes the project
project area	The area on which the project components are proposed within the mining lease application areas
quaternary	Geological period between 2.6 million years ago and the present day
regolith	Unconsolidated soil and weathered rock that overlies bedrock
regulated structure	Dams or levees regulated by an environmental authority, and which if improperly constructed and maintained, could have a serious or damaging impact on the environment and human health
rejects	Material generated from the coal handling and preparation plant which sorts and washes the project’s run-of-mine coal to produce product coal, and coarse and fine

Term	Definition
	rejects. Typically, rejects have an ash content too high for the coal to be economically viable
riparian	Relating to, or situated on, the bank of a body of water, especially a waterway such as a river
runoff	A portion of precipitation that flows across the ground surface as water
salinity	The total content of dissolved solids in groundwater or surface water, commonly expressed as milligrams of dissolved solids per litre of solution (mg/L)
sandstone	A rock formed by the consolidation of sand, the grains being held together by a natural cement of silica, lime, gypsum etc.
scope 1 emissions	Direct emissions from sources owned or controlled by the proponent
scope 2 emissions	Indirect or upstream emissions which arise from the generation of purchased electricity consumed by the proponent
scope 3 emissions	All other indirect emissions which occur in sources not owned
sediment	Unconsolidated geological material which has been formed by a process of deposition as discrete particles
seepage	Liquid which passes gradually through a porous substance
sink	A void where void water is subject to evaporation and creates a hydraulic gradient toward the void, drawing groundwater in
sodic	A high proportion of sodium ions in a soil relative to other cations
source	A final landform where the hydraulic gradient causes groundwater to move away from the landform into surrounding groundwater
Strahler stream order	Classification system that gives a waterway an ‘order’ according to the number of tributaries associated with it
study area	the area which was subject to the EIS assessment undertaken for each specific impact assessment topic (e.g. social, transport, flora and fauna)
stygofauna	Aquatic fauna which are primarily obligate, groundwater-adapted organisms and live within pore spaces or fractures of an aquifer
sub-artesian	Groundwater that rises to a level above the water table, but below the ground level
surface water	Water flowing or held in streams, rivers or other wetlands in the landscape
the project	Winchester South project
the proponent	Whitehaven WS Pty Ltd
Triassic	Geological period covering a span between approximately 250 and 200 million years before present
unconsolidated	Soil or rock which is loosely arranged and not stratified or cemented
waste rock	Overburden and interburden material removed to gain access to coal seams
water balance model	A simulation that predicts water supplies, demands, and storages over the life of the project

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