# Vulcan South Coal Mine

Application Number: **01459** Commencement Date: **05/10/2022** Status: **Locked**

# 1. About the project

## 1.1 Project details

**1.1.1 Project title ***

Vulcan South Coal Mine

**1.1.2 Project industry type ***

Mining

**1.1.3 Project industry sub-type**

Coal

**1.1.4 Estimated start date ***

15/06/2024

**1.1.4 Estimated end date ***

15/06/2033

## 1.2 Proposed Action details

**1.2.1 Provide an overview of the proposed action, including all proposed activities. ***

Queensland Coking Coal Pty Ltd (QCC) and Queensland Coal Aust. No. 1 Pty Ltd (QCA1) hold the coal tenure associated with Vulcan South Coal Mine (the action). Both companies are fully owned by Vitrinite Pty Ltd (Vitrinite).

The project area is located approximately 35 km south of Moranbah in Queensland's Bowen Basin (central point coordinates: −22.3678, 148.2352). The action lies to the immediate west of several established mining operations including BMA's Peak Downs and Saraji mines, and south of Vitrinite's Vulcan Coal Mine. The predominant surrounding land uses include stock grazing with coal mining to the east of Saraji Road.

The action is a proposed small-scale mining operation, which includes an open-cut mining area and a smaller highwall mining trial area. It will take place within mining lease application area (MLA) 700073. The project area (referring to the entire MLA, of which only a portion will be impacted by the proposed action) is 3,819 ha. The proposed development footprint (or disturbance footprint) for the action is 1,476.4 ha, which includes the proposed infrastructure and areas potentially to be impacted directly or indirectly. It should be noted that areas that fall within the disturbance footprint that are not covered by specific infrastructure at this time, have conservatively been included in the disturbance footprint however may not be disturbed if not required to support proposed operations. The surface area above the highwall mining trial panels has also conservatively been included in the disturbance footprint, however is not expected to be disturbed.

The project area with reference to the broader region can be found in Figure 2-1, Att A, page 4. A layout plan of the proposed action can be found in Figure 2-2, Att A, page 4.

Premium hard coking coal will be extracted from three separate open-cut pits. The action will operate for approximately seven years (mid-2026 -to mid-2033), including primary rehabilitation works and following a two-year construction period (2024-2026). The action will extract approximately 13.5 Mt of run-of-mine (ROM) coal, consisting predominately of hard coking coal (with an incidental thermal secondary product) at a rate of up to 1.95 Million tonnes per annum (Mtpa).

A mine infrastructure area (MIA) will be established along with a modular coal handling and preparation plant (CHPP), rail loop and train load-out facility (TLO) at a location between the northern and central pits. The CHPP will include tailings dewatering technologies to maximise water recycling and to produce a dry tailings waste product for permanent storage within active waste rock dumps. No wet tailings are proposed and therefore no tailings dams are required.

At each of the three pits, out-of-pit waste rock dumps will be established prior to commencing in-pit dumping activities that will continue for the life of the operation. Ancillary infrastructure, including a ROM pad, offices, roads and surface water management infrastructure will be established to support the operation.

Realignment of the existing Saraji Road and services infrastructure to the eastern boundary of the MLA, adjacent to the existing rail easement, is also proposed in a number of locations. The re-alignment will occur within the MLA.

In-pit dumping (with the encapsulation of potential acid forming material with non-acid forming waste rock) will fill the majority of the pits during operations. The remaining voids will be backfilled upon cessation of mining, resulting in the establishment of low waste rock dump landforms over the former pit areas. Following backfill of the final voids, material remaining in the initial out-of-pit waste rock dumps will be rehabilitated in situ (Att J Geochemical Assessment, Section 5.4.1.2, page 34).

The action includes a small-scale highwall mining trial program in the north of the MLA area. The trial will involve the establishment of four highwall mining benches across a number of hillsides to facilitate extraction of coal utilising a CAT HW300 highwall miner, or similar. The highwall mining trial will target up to 750 kt of coal which will be transported by truck to the CHPP via a dedicated haul road within the MLA area. The trial is scheduled to be completed within the first year of mining operations.

The development of coal mining operations have associated direct and indirect impacts on the environment. The following are considered the most significant activities as part of the action:

- Vegetation clearing- the clearing of vegetation to accommodate the pits, overburden stockpiles and infrastructure is the principal ecological impact of the action. The extent of this impact has been minimised to the greatest extent practicable by utilising in-pit dumping of overburden, to reduce the overall size of the disturbance footprint and the partial use of highwall mining, which produces less waste rock material and disturbs less vegetation than open-cut or other underground methods.
  Clearing is discussed in more detail in Att A Terrestrial Ecology, Section 5.1.1, page 74.
- Mining- The mining process will involve coal being extracted via open-cut pits through truck-and-shovel mining operations in addition to the highwall mining trial in the northern aspect. The mining process is expected to have minor impacts on surface water- flooding and down stream water quality (Att B Surface Water, Section 11, page 166-167) and groundwater- drawdown (the maximum drawdown is predicted to be 10m in the vicinity of the Vulcan Main pit and only extend to 2km laterally; however, the directionality of this is toward the existing and already disturbed Saraji Mine and given the proposed pits are to be backfilled, no residual drawdown is expected to occur) (Att C Groundwater, Section 6.2.3, page 83-85) and groundwater quality (Att C Groundwater, Section 6.6, page 92)
- Coal transportation- Coal transportation will occur via a rail loop and load-out facility, located between the Vulcan North and Vulcan Main pits. Coal will be transported on the Goonyella Rail network to coal terminals at either Dalrymple Bay or Gladstone. The transportation of coal via the rail loop is expected to have minimal ecological impacts from dust (Att A terrestrial Ecology, Section 5.1.8, page 79), noise (Att A Terrestrial Ecology, Section 5.1.10, page 79), light (Att A Terrestrial Ecology, Section 5.1.11, page 79) and vehicle collisions (Att A Terrestrial Ecology, Section 5.1.7, page 78).
- Coal Handling and Processing- Haul trucks will deliver ROM coal from the pit to onsite CHPP via a dedicated haul road. Even though the CHPP will operate 24 hours a day, seven days per week, the establishment of a CHPP to process coal onsite is expected to have minimal impacts to the dust (Att A Terrestrial Ecology, Section 5.1.8, page 79), noise (Att A Terrestrial Ecology, Section 5.1.10, page 79) and light (Att A Terrestrial Ecology, Section 5.1.11, page 79).

The highwall mining trial will commence immediately given minimal infrastructure is required to support it and the trial is anticipated to be completed within a year (2024-2025). Construction of the following infrastructure will also commence in 2024:

- Explosive magazine
- Administration buildings and warehouses
- Fuel storage and workshops
- ROM pad
- CHPP
- Rail Loop and Train Load Out.

Key infrastructure will remain until operations at the southern pit cease.

Coal extraction in the north and main pit are expected to begin in the first year of operations, with the completion of extraction expected in year 3 for the north pit and year 7 for the main pit. Extraction at the southern pit is expected to begin in year 5 and be complete in year 7. Backfilling of each pit will occur progressively, whereby the pit will be completely backfilled once extraction is complete.

**Maintenance and mining cycle**

Infrastructure will be maintained on an as needs basis. Considering that infrastructure will only be operational for approximately 7 years, it is unlikely that extensive maintenance works will be required.

Further details about the proposed mining cycle and timeframes including extraction plan and times (Att J, Section 2.2.4, page 9) and storage conditions (Att J, Section 1.5, page 4 and 5.4.1.2, page 34) are contained within Att J Geochemical Assessment.

**Ongoing resource definition**

Small scale exploration, resource definition and sampling activities will continue within the project area while the Vulcan South Mine assessment and approval process proceeds. These activities will continue in accordance with associated State government approvals. These activities are not part of the action and are unlikely to be of a scale that will require separate referral.

**1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?**

No

**1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? ***

A mining lease application (MLA700073) has been submitted under *Queensland's Mineral Resources Act 1989*.

An Environmental Authority (EA) application and a Progressive Rehabilitation and Closure Plan (PRCP) have been submitted and approved by the Queensland Government under the *Environmental Protection Act 1994*.

Mining cannot proceed until all Queensland State Government approvals have been granted (approved ML, EA and PRCP).

**1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. ***

The Vulcan South Social Assessment Report (Att E Social Impact, Sections 1-7, pages 1-58) assesses environmental values and existing conditions and detailed the potential impacts and mitigation measures. The proposed action is not anticipated to have a significant impact on local or regional social infrastructure or community wellbeing.

The Barada Barna People (QUD380/08), represented by the Barada Barna Aboriginal Corporation RNTBC ICN 8343 (BBAC), are the native title holders for the broader area, and the 'Aboriginal party' for the action under the *Aboriginal Cultural Heritage Act 2003* (Qld). The proponent and the BBAC have entered into an indigenous land use agreement (body corporate agreement) (ILUA) for the action (NNTT number QI2020/006). The ILUA also contemplates the management of Aboriginal cultural heritage under the *Aboriginal Cultural Heritage Act 2003* (Qld).

The proponent has also consulted with stakeholders potentially affected by the action throughout the design and assessment phase of the action (Att D Stakeholder Engagement Plan, Section 2 and 3, pages 6-12). The primary stakeholder for the action is the landholder of the property underlying the MLA.

Vitrinite has consulted with the following government departments/bodies:

- Commonwealth Department of Climate Change, Energy, the Environment and Water;
- Queensland Department of Resources (DOR);
- Queensland Department of Environment and Science (DES);
- Queensland Department of Transport and Main Roads (DTMR); and
- Isaac Regional Council.

# 1.3.1 Identity: Referring party

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By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

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#### 1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

| | |
|---|---|
| **ABN/ACN** | 94143463316 |
| **Organisation name** | Mining & Energy Technical Services Pty Ltd |
| **Organisation address** | 310 Edward Street, Brisbane QLD 4000, Australia |

Referring party details

| | |
|---|---|
| **Name** | Laura Morgan |
| **Job title** | Environmental Consultant |
| **Phone** | 1300078518 |
| **Email** | laura.morgan@metserve.com.au |
| **Address** | 310 Edward Street, Brisbane City, QLD, 4000 |

## 1.3.2 Identity: Person proposing to take the action

#### 1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

#### 1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

| | |
|---|---|
| **ABN/ACN** | 71129600004 |
| **Organisation name** | Queensland Coking Coal Pty Ltd |

| | |
|---|---|
| **Organisation address** | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

Person proposing to take the action details

| | |
|---|---|
| **Name** | Michael Callan |
| **Job title** | Chief Operating Officer |
| **Phone** | (07) 3174 4816 |
| **Email** | michael@vitrinite.com.au |
| **Address** | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

**1.3.2.14 Are you proposing the action as part of a Joint Venture? ***

No

**1.3.2.15 Are you proposing the action as part of a Trust? ***

No

**1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. ***

Queensland Coking Coal Pty Ltd (owned by Vitrinite Pty Ltd) has an excellent record of responsible environmental management and has not received any infringement notices relating to any environmental incidents in their operating history. They are registered as suitable operators in Queensland (609708). There have been no previous referrals submitted for the proposed action under the EPBC Act.

**1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework**

Vitrinite is committed to effectively managing its impact on Environment, Social and Governance (ESG) matters. This ESG statement provides for sustainable environmental management, socially responsible operations and ethical business management, driven by the board of directors.

**Environment**

- We aim to tread lightly and leave all lands as they are or better than we found them.
- We promote resource stewardship and sustainable land management through establishment of post mining land uses.
- We optimise equipment selection and its use to reduce Greenhouse Gas Emissions.
- We regularly report on environmental outcomes and maintain accountability of sites until relinquishment.

**How we implement these values**
We operate on a policy of being a good neighbour and corporate citizen, holding ourselves to the highest standard. We strive to minimise our environmental footprint and offset unavoidable ecological impacts at Vitrinite's operations. We manage the impact of our projects by:

- Reducing vegetation clearing by prioritising pre-cleared sites and access tracks;
- Avoiding ecological impacts where possible; and
- Progressively rehabilitating sites as soon as practicable.

We endeavour to be active members of the communities within which we work, support local business and strive to maximise project benefits and opportunities. Our board of directors acknowledge the need to respect human rights, acknowledge the transition to a lower carbon future and foster a corporate culture that considers all stakeholders. Vitrinite actively fosters positive working relationships with traditional owner groups associated with the land upon which it operates, through the commitment to involve Traditional Owners — who are the guardians, keepers, and knowledgeholders of Aboriginal cultural heritage during our activities.

As residents of Queensland, we recognise the importance of the role we play in social, community, economic and environmental issues among our friends, family, neighbours and colleagues. We will never compromise any of these responsibilities and hold our role in the community paramount.

**Governance**

We are committed to human rights in line with the Guiding Principles on Business and Human Rights (United Nations). This also extends to elimination of modern slavery.

- Our suppliers are key partners in our commitment to operate in a way that is responsible, transparent and respects the rights of all.
- We have a zero-tolerance approach to bribery and corruption and are committed to conducting business with integrity.
- At Vitrinite, risk is managed in accordance with AS ISO 31000:2018 Risk Management—Guidelines.

**Social**

- We have a recruitment strategy with a preference for local employees.
- We use local business where they are technically capable and commercially competitive.
- We have implemented Indigenous employment targets.
- We have implemented procedures to facilitate Equal Opportunities in recruitment.
- We encourage Indigenous business opportunities and recruitment where practicable.
- We actively promote healthy lifestyle choices through education and training.
- We actively promote occupational health and safety through education and training, in order to minimise the incidence of workplace accidents.
- Involve families of workers through Family Fun Day.
- Sponsorship of Community Events.

Refer to the Vitrinite Environment, Social and Governance statement attached (Att G ESG statement, pages 1-2).

**Consideration of Ecologically Sustainable Development Principles**

The precautionary principal has been adopted throughout the action's risk assessment process and considered in all phases of action development. This includes the design, construction, operation, decommissioning and rehabilitation planning phases.

The ecological values of the site are well understood through intensive survey and assessment effort. Studies have been undertaken into the surface water, groundwater and geochemistry of the site, in order to identify potential sources of contaminants which may lead to environmental harm. In the specific case of the Koala, some vegetation within the impact footprint has been conservatively classed as habitat even though the trees present are of very limited value as food and no Koalas were recorded within that habitat type.

It is acknowledged that the action will result in impacts to the surrounding environment. The action will comply with required environmental legislation and the conditions of the action's Environmental Authority and EPBC conditions to address these impacts. Operations will also align with management plans that aim to ensure environmental sustainability and responsibility. Impacts to MNES over the short- and long-term have been assessed. The proposed offsets programme will aim to restore or enhance local environmental values in the long term.

**Greenhouse gas emissions**

A Projected Greenhouse Gas Emissions Assessment has been undertaken on the action. This includes projected Scope 1, 2 and 3 emissions associated with the action (Att L, Section 4.1, 4.2 and 4.3, page 17-22).

Over the Life of Mine (LOM), the action is estimated to contribute to a total of 960 kilo tonnes of carbon dioxide equivalent (856 ktCO2e of scope 1 (3.42% of total GHG emissions) and104 ktCO2e for scope 2 (0.42% of total GHG emissions)). These are the emissions under operational control of the action. The action It is also expected to contribute to 24, 059 ktCO2e of Scope 3 (96.16%). The total Scope 1, 2 and 3 contribution is a total of 25,019ktCO2e. A breakdown of these projected emissions are provided in Att L, Table 2, page 16. The actions GHG emissions are a relatively small proportion of both the Australian and Queensland's total GHG emissions, accounting for 0.02% of Australia's total GHG emissions and 0.08% of Queensland's GHG emissions. The action is expected to be significantly smaller in emissions and production than other mines in the area (see Att L, Figure 7, page 24). Mitigation and abatement measures include optimisation activities to be performed include the following:

- use of method 2 open cut fugitive GHG emissions
- CHPP operating settings and the use of additives to optimise yield and efficiency. This will result in a high-quality export product with a lower thermal coal byproduct.
- Improvements related to shift changeovers and work through crib times will improve the utilisation of excavators- which is expected to result in secondary GHG benefits.

- The implementation of variable speed drives, improving energy efficiency
- road optimisation techniques to reduce the rolling resistance of roads, decrease water usage, decrease damage to equipment and therefore reduce the frequency of equipment replacement and repair.

Vitrinite understands the contribution coal mining projects can have on greenhouse gas emissions and is committed to reducing unnecessary emissions where possible. Vitrinite acknowledges the National Climate Resilience and Adaptation Strategy 2021 – 2025.

## 1.3.3 Identity: Proposed designated proponent

#### 1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

| | |
|---|---|
| **ABN/ACN** | 71129600004 |
| **Organisation name** | Queensland Coking Coal Pty Ltd |
| **Organisation address** | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

Proposed designated proponent details

| | |
|---|---|
| **Name** | Michael Callan |
| **Job title** | Chief Operating Officer |
| **Phone** | (07) 3174 4816 |
| **Email** | michael@vitrinite.com.au |
| **Address** | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

## 1.3.4 Identity: Summary of allocation

**Confirmed Referring party's identity**

The Referring party is the person preparing the information in this referral.

| | |
|---|---|
| ABN/ACN | 94143463316 |
| Organisation name | Mining & Energy Technical Services Pty Ltd |
| Organisation address | 310 Edward Street, Brisbane QLD 4000, Australia |
| Representative's name | Laura Morgan |
| Representative's job title | Environmental Consultant |
| Phone | 1300078518 |
| Email | laura.morgan@metserve.com.au |

| | |
|---|---|
| Address | 310 Edward Street, Brisbane City, QLD, 4000 |

### Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

| | |
|---|---|
| ABN/ACN | 71129600004 |
| Organisation name | Queensland Coking Coal Pty Ltd |
| Organisation address | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |
| Representative's name | Michael Callan |
| Representative's job title | Chief Operating Officer |
| Phone | (07) 3174 4816 |
| Email | michael@vitrinite.com.au |
| Address | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

### Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

## 1.4 Payment details: Payment exemption and fee waiver

**1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? ***

No

**1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? ***

No

**1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?**

No

**1.4.7 Has the department issued you with a credit note? ***

No

**1.4.9 Would you like to add a purchase order number to your invoice? ***

No

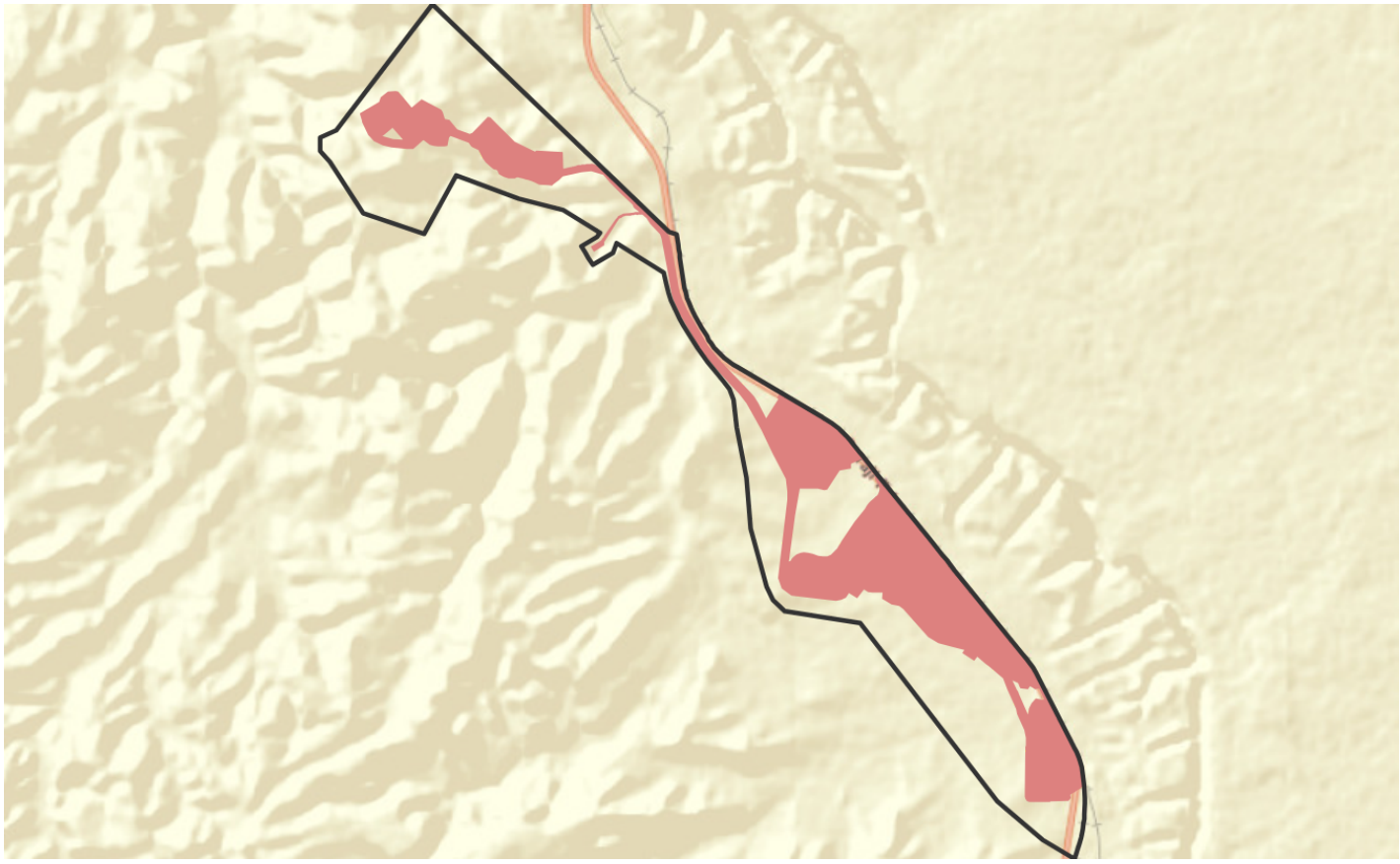
## 1.4 Payment details: Payment allocation

**1.4.11 Who would you like to allocate as the entity responsible for payment? ***

Person proposing to take the action

# 2. Location

## 2.1 Project footprint



## 2.2 Footprint details

**2.2.1 What is the address of the proposed action? ***

Saraji Road, Dysart QLD 4721: Lot 2-Plan SP296877, Lot 59-Plan SP235297, Lot 72-Plan SP137467, Lot 26-Plan CNS125

**2.2.2 Where is the primary jurisdiction of the proposed action? ***

Queensland

**2.2.3 Is there a secondary jurisdiction for this proposed action? ***

No

**2.2.5 What is the tenure of the action area relevant to the project area? ***

The action is proposed to take place within Mining Lease Application area MLA700073. The tenure of the underlying properties is leasehold.

# 3. Existing environment

## 3.1 Physical description

**3.1.1 Describe the current condition of the project area's environment.**

The action is located north of Dysart and approximately 35 kilometres (km) south of Moranbah in Queensland's Bowen Basin. The action lies to the immediate west of several established mining operations including the BHP Mitsubishi Alliance (BMA) Peak Downs and Saraji mines. It is also located to the south of Vitrinite's initial mining project, the Vulcan Coal Mine (VCM), which is located on Mining Lease (ML) 700060. The project area abuts ML700060, however, proposed activities will be implemented separately. The action is located within the Isaac Regional Council Local Government Area (LGA). The surrounding area is heavily developed and has a distinct mining influence. The land within the project area is zoned as Rural under the Isaac Regional Council Planning Scheme 2021. All adjoining land to the action is zoned as Rural (Att I Transport Impact Assessment, Section 1.1, page 6).

The project area (MLA area) comprises grazed, open grassy woodlands composed of 65.8% remnant vegetation, 7.4% high-value regrowth and 26.7% cleared pastures. The lease also contains a sealed road (Saraji Road) and a railway (Goonyella System) along its eastern boundary.

Most of the project area comprises a gently sloping plain, which is subjected to heavy grazing pressure from cattle. Heavier clay soils are dominated by exotic pasture grasses (*Cenchrus ciliaris, Bothriochloa pertusa* and *Urochloa mosambicensis*), while sandy alluvial soils are dominated by the exotic grasses, *Cenchrus ciliaris* and *Megathyrsus maximus*. Away from creek lines, sandy soils tend to be dominated by native grasses, especially annual species able to withstand heavy grazing pressure (e.g., *Alloteropsis cimicina, Setaria surgens, Dactyloctenium radulan* and *Perotis rara*) (Att A Terrestrial Ecology, Section 4.1.1, page 14-16).

In the northwest (location of the proposed highwall mining trial), the lease extends into the adjacent Harrow Range, a hilly sandstone ridge, intersected with gorges and creeks. Parts of the lease located on the Harrow Range are generally in good ecological condition. A high proportion of this range comprises remnant vegetation, there are relatively few weeds present, and grazing intensity is relatively light,

owing to a lack of water points (Att A Terrestrial Ecology, Section 4.1.1, page 14-16).

Most remnant vegetation within the project area is used by local landholders as a source of timber for fence posts, stockyards and other farm structures. As a result, heavily harvested species (e.g., *Acacia shirleyi, Acacia rhodoxylon* and *Eucalyptus crebra*) tend to be represented on site by relatively young stands. Furthermore, many of the *Acacia*-dominated communities growing on the Harrow Range experienced an intense bushfire in 2013, which destroyed most of the canopy and resulted in a dense shrub layer of regenerating saplings (Att A terrestrial Ecology, Appendix B. pages B1-B52),

All local drainage lines are highly ephemeral. The banks of all local drainage lines are heavily trampled by cattle and possess high weed cover. The creek beds themselves are sandy and lack pools that retain water for extended periods after rain. Most water flow along local creeks is likely subterranean. The creek banks themselves generally support a narrow but well developed fringe of large *Eucalyptus camaldulensis* and *Melaleuca* spp., which likely utilise this subterranean water (Att A Terrestrial Ecology, 4.1.1, page 14). Some trees in this location contain large hollows and are an important resource for local fauna. Hollows are also present, though in much lower densities, away from drainage lines (Att A Terrestrial Ecology, Section 4.3.2.3, page 45).

A Transport Impact Assessment (TIA) has been undertaken to assess the impacts on pavements of the adjoining road networks to the broader footprint that this action falls within. The TIA also included an intersection impact assessment to consider site access during the construction, operation and completion stages of the action.

The action is to gain direct access to Saraji Road by way of an intersection located approximately 4 km south of the Saraji Road & Peak Downs Mine Road intersection. The action's access intersection will be located south of the Saraji Road alignment works. The indicative locations of the construction and operations access arrangements are shown in Figure 2.1 - Att I Transport Impact Assessment, Section 2.4, page 14.

### 3.1.2 Describe any existing or proposed uses for the project area.

The project area is currently being used to graze cattle. The project area also contains a sealed road (Saraji Road) and a railway (Goonyella System) along its eastern boundary. Post-mining, the land is proposed to be returned to low intensity cattle grazing, with Saraji Road and the Goonyella Rail being retained. Further discussion on current and proposed land uses for project area is described in the attached Att F Soil and Land Suitability, Section 6, pages 50-68 and Section 9.1, page 77.

### 3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

The plain that comprises the bulk of the project area contains few outstanding natural features or unique environmental values. Small patches of the Brigalow threatened ecological community (TEC) either lack gilgais or, where present, these are shallow and do not support a large frog population (Att A Terrestrial Ecology, Section 5.3.3.1, page 87-88).

Riparian vegetation along local creeks provides an important corridor for fauna, including the Koala (Att A Terrestrial Ecology, Section 4.3.2.2, page 41-44) and Central Greater Glider (Att A Terrestrial Ecology, Section 4.3.2.3, page 45-46), as well as constituting a drought refuge, because the trees growing there have access to varying amounts of shallow groundwater (Att A Terrestrial Ecology, Section 4.3.2.2, page 43).

A small natural lagoon occurs in a former channel of Hughes Creek (Att A Terrestrial Ecology, Section 4.1.1, Figure 4-2, page 16), near the south-western edge of the MLA area. Its tree-lined banks are heavily grazed and there is little aquatic vegetation present. Farm dams provide a source of drinking water for wildlife, and one dam near the homestead just south of Hughes Creek is large enough to support waterfowl and other aquatic wildlife (Att A Terrestrial Ecology, Section 4.1.1, Figure 4-2, page 14).

In contrast, the Harrow Range west of the action supports a diversity of natural features, including tall, hollow trees, rock outcrops, gorges and small cliffs. These habitats support rock-dependent fauna with a patchy distribution in the northern Brigalow Belt. Sheltered gorges also support a flora that is more typical of wetter, coastal environments, such that the project area and nearby parts of the Harrow Range are the western distributional limit for several species (Att A Terrestrial Ecology, Section 4.1.1, Figure 4-2, page 14).

### 3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The plain that comprises the bulk of the project area varies in height between 210 metres Australian Height Datum (mAHD) and 260 mAHD. The gradient is generally shallower than 2.2% (equivalent to a slope angle of 1.3 degrees).

The highest point in the project area (where it extends into the Harrow Range) is 410 mAHD. Steep slopes occur along the periphery of this range, as well as on the sides of gorges containing creeks. Here, the slopes are often as steep as 45% (equivalent to a slope angle of 24 degrees). Vertical rock cliffs up to 4 m tall occur on the sides of some of these gorges. Many of the slopes have naturally occurring benches, resulting from alternating rock strata with varying erodibility. Furthermore, the crest of the range is relatively flat.

## 3.2 Flora and fauna

### 3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

The project area was subjected to a series of flora and fauna surveys as part of baseline assessments. These surveys sampled fauna at 127 locations and flora at 466 locations across a 6,566.5 ha survey area that was larger than, and encompassed, the project area (Att A Terrestrial Ecology, Section 1, page VII-VIII).

Field surveys detected 41 species of mammal, 135 species of bird, 36 species of reptile, 14 species of frog and 429 species of vascular plant within this broader survey area. Species accumulation curves fitted to the data estimated that the surveys successfully detected 83% of the plants, 100% of reptiles, 97% of amphibians, 100% of birds, 92% of non-bat mammals and 100% of the bats present within the survey area that could potentially have been detected using the methodology employed. This represents a thorough knowledge of the region's ecology. Nevertheless, as some listed species may only be transient visitors, or are difficult to detect, a review of published records in nearby regions complemented the field surveys, in order to assess the likelihood that such species may be present despite going undetected (Att A Terrestrial Ecology, Section 4.1.4, pages 30-31).

In general, the faunal and floral communities of the survey area were typical of the dry *Acacia* and *Eucalyptus* woodlands of the northern Brigalow Belt. The location of the action, midway between the mesic environments of coastal regions and the arid interior, results in a mixture of species from wetter and drier environments.

Habitat assessments for relevant listed threatened species and communities, including detailed mapping, are provided in Att A, Section 4.3.1 and 4.3.2 (page 33 to 59). Habitat assessments of migratory species are outlined in Section 4.3.3, Att A (page 59 to 66).

The following databases were consulted to assess the likelihood of threatened species occurring: 1) Queensland Government's Wildlife Online search tool (records within a 20 km buffer from the central point −22.3678, 148.2352); 2) Department of Environment and Energy's Protected Matters Search Tool (records within a 20 km buffer); 3) Atlas of Living Australia; 4) eBird; 5) the Australasian Virtual Herbarium Search tool; and 6) the Department of Environment and Science's regulated vegetation management mapping. For each species flagged during the literature review, but not recorded on site during field surveys, an assessment of the likelihood of their presence within the survey area and project area was undertaken. This was based on the reliability and recentness of the record(s) and whether suitable habitat, as described by the Australian Government's Species Profiles and Threats Database, species recovery plans, referral guidelines, and/or primary scientific literature, is present. These are summarised in Table 4-3, Att A, Section 4.3.2, page 35-36. Species recorded during the ecological surveys are summarised in Appendix C of Att A.

Field survey methodology is described in Section 3.2 of Att A, page 6-12. Flora and faunal survey methodology (including recommended seasonal timeframes) were undertaken in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland version 3.0 for the Brigalow Belt bioregion. Further information is included in Section 3.2, Att A (page 6-12). An analysis of trees with basal diameter >30 centimetres suitable for use by the Central Greater Glider (southern and central) (e.g. denning) in the identified areas of Eucalypt forest and adjacent to the project area were considered as part of the survey methodology for all survey sites, as provided in Appendix B of Att A.

**Habitat Assessment:**

**Squatter Pigeon (*Geophaps scripta scripta*):**

The vast majority of Squatter Pigeon sightings (69.7%) were in land zone 5, a finding that strongly accords with habitat preferences presented in the SPRAT profile. No Squatter Pigeons were recorded on land zones 4 or 9. The heavy clay soils in land zone 9 support an excessively dense grass cover. In remnant 11.9.2, vegetation covers an average of 63% of the ground, and this increases to 85% in areas where 11.9.2 has been cleared. The clay soils in land zone 4 are similarly unsuitable for Squatter Pigeons. Sites surveyed within this land zone fell into one of two categories. In areas where the canopy was open, vegetation covered far greater than 33% of the ground. In areas where the canopy was dense, there was very little grass as a source of seed and/or bare ground on which to forage (one or both categories constituted less than 10% of the total ground cover). In summary, data gathered on site strongly supports the habitat

preferences described in the SPRAT profile, in that land zone 5 constitutes the primary foraging and breeding habitat for Squatter Pigeons within the survey area, land zone 3 is utilised in the vicinity of water, and land zone 10 is mostly not utilised, except for regional ecosystem 11.10.7 on the foot slopes. The distribution of Squatter Pigeon habitat across the survey area is shown in Figure 4-8, Att A. In total, the survey area contains 3540.5 ha of foraging habitat (of which 2,146 ha is also breeding habitat) and 3,238.7 ha of dispersal habitat for the Squatter Pigeon. The disturbance footprint contains a total of 543.3 ha of foraging habitat (of which 441.0 ha is also breeding habitat) and 730.0 ha of dispersal habitat (Att A, Section 4.3.2.1, page 37-40).

**Koala (*Phascolarctos cinereus*):**

The distribution of koala food trees across the study area is summarised in Table 4-5 of Att A, page 42. All but one sighting of Koalas occurred in remnant vegetation. The single exception was in regrowth 11.3.25 along Barrett Creek. No Koalas were recorded in cleared vegetation units, despite detectability being higher in smaller trees and open landscapes. This aligns with known preferences of the species for tall trees. This finding conflicts with the broad definition of Koala habitat presented in the SPRAT profile as any remnant, regrowth and modified vegetation communities containing Koala food trees. As most cleared portions of the survey area contain widely scattered food trees, they therefore qualify as habitat under this definition, despite being of negligible importance to local Koalas. They are therefore mapped as the same low value as remnant units containing low densities of secondary food trees (e.g., 11.10.13 or 11.10.3). Non-remnant regrowth that had a canopy cover less than 5% is considered “non-woody” vegetation by the National Forest and Sparse Woody Vegetation Data (Department of Industry, Science, Energy and Resources 2021) and was accordingly mapped as non-habitat. The survey area contains 153.9 ha of high-value habitat, 2,226.6 ha of moderate-value habitat and 3,860.9 ha of low-value habitat for the Koala, while the disturbance footprint contains 7.56 ha of high-value habitat, 412.0 ha of moderate-value habitat and 571.6 ha of low-value habitat (Att A, Section 4.3.2.2, page 41-44).

**Central Greater Glider (*Petauroides volans*):**

The project area lies near the western edge of the distribution of the Central Greater Glider. Water availability limits the distribution of local populations (Kearney et al. 2010). Consequently, local populations are largely restricted to riparian environments, where large, hollow trees are most abundant, and subsoil moisture allows suitable food trees to grow fresh leaves over extended periods of the year.

With the exception of the single record in regional ecosystem 11.10.1, all other records were in riparian environments (regional ecosystems 11.3.25, 11.3.7, 11.3.27e and regrowth 11.3.25 with many retained large trees), despite these habitats comprising only 3.7% of the survey area. This is clear evidence for the importance of riparian habitats for local populations of the Central Greater Glider. Local populations are likely to be relatively large, as the species was recorded along all major drainage lines surveyed. Conservatively assuming that each pair occupies 16 ha (the home range in lower productivity forests and more open woodlands), there is expected to be at least 58 individuals inhabiting the survey area. This population could be larger than 450 individuals if an average home range of 2 ha is assumed (a more typical size). This local population is connected to the broader region via extensive tracts of eucalypt forests that cover the Harrow Range, to the west and south (regional ecosystem 11.10.1 is a subdominant community within this range). Non-remnant habitats (e.g. regrowth) are unlikely to be utilised by Central Greater Gliders, due to an absence of hollows for shelter. An exception is where many large, hollow trees were retained during clearing. The only part of the survey area where this was observed was in the far south, along Barrett Creek. Here, a pair of Central Greater Gliders was observed to emerge from one of the retained hollow dead trees. Riparian vegetation along Barrett Creek was therefore mapped as habitat, while regrowth elsewhere within the survey area was considered to be unsuitable for Central Greater Gliders. In total, 617.2 ha of Central Greater Glider habitat is present within the survey area, while the disturbance footprint contains 58.0 ha of habitat.

Suitable habitat for listed threatened species and communities are provided in Att 2 (Central Greater Glider), Att 3 (koala) and Att 4 (Squatter Pigeon). Further habitat assessments for species unlikely to occur are provided in Att A, Section 4.3, page 33 to 59.

**Brigalow (*Acacia Harpophylla*)**

Field-verified vegetation mapping reveals that a total of 49.2 ha within the survey area and 71.2 ha within the disturbance footprint. Of these, 67.2 ha constitute remnant vegetation and the remainder is regrowth.

Further information on flora and fauna recorded during field surveys can be found in Appendix C of Att A. Survey methodology can be found in Att A, Section 3.2, page 6-12.

### 3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

**Vegetation**

The project area contains 14 regional ecosystems under the Queensland classification system (Att A Terrestrial Ecology, Section 4.1.2, Table 4-1, page 19). The survey area contains a variety of remnant, regrowth and cleared habitats. The western half of the survey area is dominated by low sandstone ridges and escarpments of the Cherwell/Harrow Range. These escarpments rise 100-170 m above the surrounding plains, and mostly support remnant vegetation. Dominant tree species across the Cherwell/Harrow Range include *Corymbia citriodora*, *Corymbia aureola*, *Eucalyptus crebra*, *Corymbia trachyphloia*, *Eucalyptus melanophloia* and *Acacia shirleyi*. The sandstone escarpments contain an abundance of boulders and rock outcrops (Att A Terrestrial Ecology, Figure 4-1, page 15), which provide shelter for reptiles and rock-wallabies. Rock overhangs and small caves are also present, primarily in the northwest, and these provide potential shelter sites for bats and other fauna.

The plain that comprises the bulk of the project area is dominated by grassy woodlands of *Eucalyptus crebra, Eucalyptus populnea* and/or *Corymbia clarksoniana* on sandy soil or texture contrast soil with a sandy surface layer. A band of clay soil through the middle of the plain supports low, open woodland of *Eucalyptus orgadophila*. Smaller patches of clay support *Acacia harpophylla,* usually co-dominant with

*Casuarina cristata* or *Eucalyptus cambageana.* Most of the clay soils within the project area have been cleared to create open pasture (Att A Terrestrial Ecology, Section 3.2.2.2, Table 3-1, page 9).

The banks of drainage lines that cross the plain support a fringing forest of *Eucalyptus camaldulensis* and *Melaleuca* spp. The alluvial terraces of these drainage lines usually contain a band of grassy forest dominated by *Corymbia tessellaris, Corymbia clarksoniana, Corymbia dallachiana* and/or *Eucalyptus populnea.* The ground layer of vegetation on all alluvial soils was dominated by exotic pasture grasses (Att A Terrestrial Ecology, 4.1.3.1, Table 4-2, page 22-24).

The sandstone escarpments of the Harrow Range support dense *Acacia shirleyi* open forest interspersed with patches of *Corymbia aureola* and *Eucalyptus melanophloia* open forest, especially on plateaux with shallow, rocky soil. True RE 11.10.1 (open forest dominated by *Corymbia citriodora, Corymbia trachyphloia* and *Eucalyptus crebra*) grows on sheltered southern slopes and gorges. A small patch of semi-evergreen vine thicket is located in a rocky gorge that offers protection from fire (Att A Terrestrial Ecology, Section 3.2.2.2, Table 3-1, page 9).

**Soils**

Soil surveys identified eight soil management units (SMUs) within the project area, Crocodile, Fish, Kei, Komati, Limpopo, Orange, Sabie and Zambezi (Att F Soil and Land Suitability, Section 4.0, Table 16, page 15).

**Crocodile**

A shallow rocky soil unit associated with hill slopes and plateaus. Soil textures grade from loam at the surface, to loamy sands with depth; often containing rock material with little to no pedologic development throughout the solum. Vegetation associated with this unit includes *Eucalyptus crebra* and Bloodwood *Corymbia erythrophloia.* The Crocodile SMU is strongly acidic throughout the solum with only a minor increase in pH at depth. In the upper part of the profile (to an approximate depth of 0.3 m), this has the potential to limit the availability of essential nutrients and increase the risk of aluminium toxicity*. The topsoil is dominated by sand (52%) and gravel (30%) with 10% silt and 8% clay.* This particle size distribution could limit the ability of the soil to hold and store plant available water (Att F Soil and Land Suitability, Section 4.1.1, pages 17-20).

**Fish**

Predominantly sandy soil unit occurring on the flats of the south-eastern end of the study area. Soil textures grade from loamy sand at the surface, to clay and silty sands with depth. Vegetation associated with this unit includes largely *Acacia excelsa* and *Eucalyptus populnea.* The pH of the Fish SMU is considered strongly acidic throughout the profile, becoming more severe with depth to the point of introducing a risk of aluminium toxicity (pH less than 5.5). The surface soil is dominated by sand (60%) and silt (23%) with 15% clay and 2% gravel. Moderate organic matter content offers adequate structural stability while exchangeable sodium percentage (ESP) and the Ca/Mg ratio indicate that the topsoil is at risk of becoming dispersive if physically disturbed (Att F Soil and Land Suitability, Section 4.2.1, pages 21-24).

**Kei**

Brown coloured soil unit occurring on the flats of the south-eastern end of the study area. Soil textures grade from clayey to loamy sands at the surface, to medium clay with depth and orange to yellow mottles present in the deeper horizons. Vegetation associated with this unit largely includes *Eucalyptus populnea.* The Kei SMU has a neutral to slightly acidic pH in the upper horizons with an increase in alkalinity with depth.
The pH in the upper 0.6 m is not considered plant limiting, however, in the deeper horizons of the profile this has potential to reduce plant available nutrients. The surface soil of this unit is predominantly comprised of sand-sized particles (62%) with 25% silt, 12% clay and 1% gravel which is a contributing factor of the very low cation exchange capacity (CEC). The topsoil is non-sodic with a Ca/Mg ratio above 2. This, along with the moderate organic matter content of 2.4%, indicates this soil is not likely to disperse (Att F Soil and Land Suitability, Section 4.3.1, pages 25-28).

**Komati**

Dark brown coloured soil unit displaying vertic properties. Soil textures predominantly grade from light to medium clays with calcareous segregations occurring within the deeper horizons. Vegetation associated with this unit includes *Eucalyptus papuana* and open grassland. The Komati SMU is predominantly a strongly alkaline unit with pH ranging from 6.8 (neutral) at the surface to 9.5 (very strongly alkaline) in the subsoil. The higher pH has the potential to severely reduce the availability of essential plant nutrients such as nitrogen and phosphorous. The surface soil of the Komati SMU is composed of a moderately high clay content (32%), with 55% sand, 11% silt and 2% gravel. It has a moderate polyhedral structure with cracking occurring at the surface (Att F Soil and Land Suitability, Section 4.4.1, pages 29-32).

**Limpopo**

The Limpopo unit is a brown texture-contrast soil. Soil textures predominantly grade from sands to clay sands in the surface soils to light clays in deeper horizons. Vegetation associated with this unit includes *Eucalyptus populnea* and *Eucalyptus crebra.* The upper 0.3 m of the Limpopo SMU is strongly acidic with a pH of 5.5, increasing only slightly beyond this depth. This pH is not within the bounds best suited to plant growth. The particle size distribution reveals the A11 horizon of this SMU is strongly dominated by sand (79%) with silt and clay size particles comprising 8% and 10% of this horizon respectively. Organic matter content is regarded as moderate, contributing to average structural stability and low cohesiveness and suggesting the soil unit may be at a greater risk of erosion-induced movement (Att F Soil and Land Suitability, Section 4.5.1, pages 33-36).

**Orange**

Dark cracking clays associated with the flat grassy plains of the mid-eastern edge of the study area. The predominant textures of soils within this unit range from light clays in surface soils to light medium clays in deeper horizons. Vegetation associated with this unit is predominantly open grassland. The Orange SMU is characterised by high pH ranging from 8.1 in the topsoil to 9.6 in the subsoil, this is beyond the pH range at which all plant nutrients are available and thus not ideal for plant growth. Electrical conductivity (EC) values indicate low salinity in the upper 0.3 m of the profile and increases from what is considered medium to high at depth. The surface soil of the Orange SMU is composed of 51% sand, 28% clay, 19% silt and 2% gravel. It has a moderate lenticular structure with a cracking, self-mulching surface. This particle size distribution in conjunction with a high organic matter content (3.5%) will contribute to good structural stability of the topsoil (Att F Soil and Land Suitability, Section 4.6.1, pages 37-40).

**Sabie**

A dark-coloured texture-contrast soil with surface soils consisting of sands, increasing in clay content in deeper horizons. Lower horizons display red to orange mottles. Vegetation associated with this unit is dominated by *Eucalyptus crebra.* The surface soil of the Sabie SMU is strongly acidic (pH < 5) to a depth of 0.3 m which has potential to reduce plant available nutrients and induce aluminium toxicity. Beyond this depth pH increases to 6 which is suitable. The A11/A12 horizon of this SMU is dominated by sand-sized particles (75%) with 12% clay, 10% silt and 3% gravel. It has a loose single grain to weak platy structure with high organic matter content (4.1%). This information in conjunction with the ESP and Ca/Mg ratio of this topsoil layer suggest the topsoil is not prone to dispersion if undisturbed (Att F Soil and Land Suitability, Section 4.7.1, pages 41-44).

**Zambezi**

A predominantly grey coloured texture-contrast soil with surface soils consisting of sands, increasing in clay content in deeper horizons. Lower horizons display diffuse orange to yellow mottles. Vegetation associated with this unit is dominated by *Eucalyptus populnea.* The Zambezi SMU has a slightly acidic (6.4–6.7) pH in the upper 0.3 m of the profile which is not considered plant limiting. However, beyond this depth pH rises to very strongly alkaline (9), which is beyond the suitable pH range for plants (Att F Soil and Land Suitability, Section 4.8.1, pages 45-48).

## 3.3 Heritage

### 3.3.1 Describe any Commonwealth heritage places overseas or other places recognised as having heritage values that apply to the project area.

No Commonwealth heritage places occur within 100 km of the action. The action will not have any direct or indirect impacts on the values of any Commonwealth heritage places.

### 3.3.2 Describe any Indigenous heritage values that apply to the project area.

The Barada Barna People (QUD380/08), represented by the Barada Barna Aboriginal Corporation RNTBC ICN 8343 (BBAC), are the native title holders for the broader project area, and the ‘Aboriginal party’ for the action under the *Aboriginal Cultural Heritage Act 2003* (Qld). Vitrinite Pty Ltd and the BBAC have entered into an indigenous land use agreement (body corporate agreement) (ILUA) which addresses the area of the proposed action. The ILUA also contemplates the management of Aboriginal cultural heritage under the Aboriginal Cultural Heritage Act 2003 (Qld). Cultural heritage clearance of the project area has been completed.

# 3.4 Hydrology

### 3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

**Surface water**

Section 2.1 of the appended Surface Water Assessment report provides a table of report section cross references to the IESC information requirements (Att B Surface Water, Section 2.1, Table 2.1, pages 30-36). These sections of the report should be reviewed thoroughly.

The action is located within the Isaac River sub-basin of the greater Fitzroy Basin. Figure 4.1 shows the Upper Isaac River catchment to its confluence with Phillips Creek (Att B Surface Water, Figure 4.1, page 48). The Isaac River commences approximately 100 km to the north of the project area within the Denham Range. It drains in a south westerly direction through the Carborough and Kerlong Ranges before turning in a south easterly direction near the Goonyella Riverside Mine. It drains approximately 30 km to the east of the project area, and eventually flows to the Mackenzie River some 150 km to the southeast. Other than along the ranges, the majority of the Isaac River catchment has been cleared for agricultural use or for mining. There are several existing coal mines in the catchment, including Burton, North Goonyella, Goonyella Riverside, Broadmeadow, Broadlea North, Isaac Plains, Moranbah North, Millennium, Daunia, Poitrel, Grosvenor, Peak Downs, Saraji, Norwich Park and Lake Vermont mines (Att B Surface Water, Section 4.1, page 46).

The predominant catchment land uses of Boomerang Creek include undeveloped areas with some stock grazing to the west of Saraji Road and stock grazing and coal mining to the east. Boomerang Creek, Hughes Creek and Barrett Creek flow into the existing BHP Billiton Mitsubishi Alliance (BMA) operations (Peak Downs and Saraji). The existing BMA operations have diverted the original alignment of Boomerang Creek and its tributaries, as well as Harrow Creek to the north. Additional diversions of Boomerang Creek and its floodplain are also planned for approved operations further to the east (Att B Surface Water, Section 4.1, page 47).

A review of the below baseline water quality 80th percentile values surrounding the Project area (compared to combined upstream monitoring points data together with the actions Water Quality Objective (WQO) default trigger values and the DES Model Mine Conditions) shows they do not meet the Water Quality Objectives for the region:

- Aluminium (filtered and total);
- Zinc (filtered);
- Iron (filtered and total);
- Turbidity
- Hydrocarbons
- Total Phosphorous
- Total Nitrogen
- Chlorophyl a (Att B Surface water, Table 3.1, page 44-45 and Table 4.4, page 67-68).

The hydrology of the project area is discussed in further detail within the Vulcan South Surface Water Assessment (Att B Surface Water, Section 4, page 46-72).

**Groundwater**

Within the region, the Quaternary alluvium, Tertiary sediments, and Permian coal measures yield low volumes of groundwater and hence they would not typically be classified as aquifers in most hydrogeological settings. Groundwater is generally between 5 m and 40 m deep in the area surrounding the proposed pits. The nearest areas with depth to groundwater less than 5 m (orange colours) are to the west and south of the Vulcan South pit. The area of shallow depth to groundwater to the west of the Vulcan South pit correlates with a moderate potential aquatic groundwater dependent ecosystem (GDE) associated with Hughes Creek (as presented in Att C Groundwater, Figure 5.8, page 58).

Hydrogeologist.com.au has developed a numerical groundwater flow model of the survey area and broader region to predict the effects of the action on local groundwater levels (Att C Groundwater, Section 6.1, pages 74-79). The prediction shows a maximum inflow of less than 43 m3/d occurring in Year 5 (or 2027) of mining. Vulcan North and Vulcan South pits are both predicted to have less than 5 m3/d of groundwater inflow and will effectively be dry pits during mining. The majority of the inflow is predicted to occur during mining of the Vulcan Main pit (Att C Groundwater, Section 6.2.1, page 80).

The maximum predicted drawdown in the Tertiary / weathered zone (layer 2) is approximately 10 m in the vicinity of the Vulcan Main pit. Negligible drawdown is predicted in layer 2 in the vicinity of the Vulcan North pit and Vulcan South pit. The drawdown extent occurs some 2,200 m (from the pit crest to the 1 m drawdown contour) and the predicted drawdown preferentially propagates towards the east and the existing Saraji Mine (Att C Groundwater, Section 6.2.3, page 83). This limited drawdown propagation is mainly due to the limited extent of saturation in the disturbance footprint, the low hydraulic conductivities and low storage coefficients.

It was concluded that there was no significant surface-groundwater interaction in the disturbance footprint (Att B Surface Water, Section 5.6, page 54). While there are small pockets of high- and moderate potential aquatic GDEs shown within the maximum drawdown associated with the Vulcan Main pit, it was the interpretation of hydrogeologist.com.au that it is highly unlikely for aquatic GDEs to be present within 1 km of the proposed pits. For the reasons stated above, hydrogeologist.com.au interprets that there are no valid aquatic or

terrestrial GDEs within the maximum drawdown zones and impacts on GDEs are considered highly unlikely (Att C Groundwater, Section 6.5, page 88-89). No subterranean GDE's were identified in the vicinity of the project area based on desktop assessment and therefore, no further analysis was conducted on these (Att C Groundwater, Section 5.7.2, page 57).

**Geochemical and geotechnical information**

The Geochemistry Report outlines the geochemical characteristics of the ore, waste rock, chitter (coarse rejects) and tailings materials (Refer to Att J, Section 4.1.3 (raw coal), 4.1.1 (waste rock), 4.1.2 (coarse and fine rejects)). Overall, the results of the static and kinetic geochemical tests demonstrate that the overwhelming majority of the waste rock materials contain negligible sulfide content, have excess Acid Nuetralising Capacity, and are classified as Non-Acid Forming. These samples represent materials with a very low risk of acid generation and associated drainage. Water quality discussion has been included within the Geochemistry Assessment (Refer to Att J, Section 4.5, 29-31).

# 4. Impacts and mitigation

## 4.1 Impact details

**Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.**

| EPBC Act section | Controlling provision | Impacted | Reviewed |
|---|---|---|---|
| S12 | World Heritage | No | Yes |
| S15B | National Heritage | No | Yes |
| S16 | Ramsar Wetland | No | Yes |
| S18 | Threatened Species and Ecological Communities | Yes | Yes |
| S20 | Migratory Species | Yes | Yes |
| S21 | Nuclear | No | Yes |
| S23 | Commonwealth Marine Area | No | Yes |
| S24B | Great Barrier Reef | No | Yes |
| S24D | Water resource in relation to large coal mining development or coal seam gas | Yes | Yes |
| S26 | Commonwealth Land | No | Yes |
| S27B | Commonwealth heritage places overseas | No | Yes |
| S28 | Commonwealth or Commonwealth Agency | No | Yes |

### 4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

**4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

No

**4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. ***

No World Heritage properties occur within 100 km of the action. The nearest World Heritage place is the Great Barrier Reef, which is approximately 150 km east of the project area. Adherence to the water quality objectives specified in the EA conditions (for surface water downstream of the project area) will result in negligible risk to the Great Barrier Reef.

### 4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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#### 4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

#### 4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No National Heritage places occur within 100 km of the project area. The nearest National Heritage place is the Tree of Knowledge in Barcaldine, 327 km south-west.

### 4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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#### 4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

#### 4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The nearest Ramsar Wetland is Shoalwater Bay, 200 km east of the project area. The Isaac River catchment does not flow into this wetland. The action will not impact this wetland.

### 4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

#### Threatened species

| Direct impact | Indirect impact | Species |
|---|---|---|
| No | No | Calidris ferruginea |
| No | No | Dasyurus hallucatus |
| Yes | No | Denisonia maculata |
| No | No | Dichanthium queenslandicum |
| No | No | Egernia rugosa |
| No | No | Elseya albagula |
| No | No | Erythrotriorchis radiatus |
| No | No | Eucalyptus raveretiana |
| No | No | Falco hypoleucos |
| No | No | Furina dunmalli |
| Yes | No | Geophaps scripta scripta |
| No | No | Grantiella picta |
| No | No | Hemiaspis damelii |
| No | No | Lerista allanae |
| No | No | Macroderma gigas |
| No | No | Neochmia ruficauda ruficauda |
| No | No | Nyctophilus corbeni |
| Yes | Yes | Petauroides volans |
| Yes | Yes | Phascolarctos cinereus |
| No | No | Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) |
| No | No | Poephila cincta cincta |
| No | No | Rheodytes leukops |
| No | No | Rostratula australis |
| No | No | Samadera bidwillii |

| Direct impact | Indirect impact | Species |
|---|---|---|
| No | No | Stagonopleura guttata |

### Ecological communities

| Direct impact | Indirect impact | Ecological community |
|---|---|---|
| Yes | Yes | Brigalow (Acacia harpophylla dominant and co-dominant) |
| No | No | Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin |
| No | No | Poplar Box Grassy Woodland on Alluvial Plains |

**4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

Yes

**4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. ***

**Note on footprint:**

The surface area above the highwall trial plunges (158.1 ha) is not part of the clearing footprint but is conservatively included in the maximum disturbance footprint. This area includes 11.2 ha of moderate and 146.8 ha of low quality Koala habitat; 3.87 ha of foraging and 154.3 ha of dispersal Squatter Pigeon habitat, and 7.36 ha of Central Greater Glider habitat.

**Brigalow (*Acacia harpophylla* dominant and co-dominant)**

**Direct**

71.2 ha of Brigalow is to be cleared to accommodate the proposed mine and infrastructure (Att A, Figure 5-3, page 88). Of these, 67.2 ha constitute remnant vegetation and the remainder is regrowth that meets the criteria of being older than 15 years, in accordance with the definition of the community within the approved conservation advice. Note that this amount is less than what is indicated by the regulated vegetation map, which includes additional remnant regional ecosystems 11.4.8 and 11.4.9 (constituents of the Brigalow threatened ecological community) over the already-cleared Saraji Road and Norwich Park Branch Railway, along with a patch of regrowth 11.4.9 (which field surveys indicate does not exist) in the vicinity of the Vulcan Main pit.

**Indirect**

An additional 47.8 ha of Brigalow (*Acacia harpophylla* dominant and co-dominant) is located within 500 m of the disturbance footprint's boundary and may experience temporary effects of dust beyond the disturbance footprint.

**Squatter Pigeon (*Geophaps scripta scripta*)**

**Direct:**

A total of 543.3 ha of foraging habitat (of which 441.0 ha is also breeding habitat) and 730.0 ha of dispersal habitat are contained within the proposed maximum disturbance footprint of Vulcan South. However, not all of these will be cleared (154.3 ha of dispersal habitat and 3.9 ha of foraging habitat overlies the highwall mining panels and are unlikely to be affected).

By combining the effects of habitat clearance and water source modifications, the total breeding habitat that will be lost due to Vulcan South is expected to be 355.5 ha. Note that the amount of foraging and dispersal habitat to be cleared is unaffected by new water sources and remains 539.4 ha and 575.7 ha, respectively (Att A Terrestrial Ecology, Section 5.3.3.2, page 89-90).

The impacts of habitat clearance will persist at least for the short- to medium-term, until vegetation is re-established on mined land. Being a ground-dwelling bird, they are not dependent on old trees, and rehabilitated sites are expected to meet their requirements for a low, protective tree cover within 15 years post-rehabilitation. It is unknown whether the relatively simple understorey vegetation communities that typically establish on rehabilitated sites will meet the ecological needs of Squatter Pigeons. Their readiness to feed on introduced pasture species such as *Urochloa mosambicensis* and Stylosanthes spp. suggests that re-establishing appropriate food plants is likely to be achievable. Consequently, it is estimated that the duration of impacts will be approximately 24 years, with an expected loss of habitat for up to 27 pairs of Squatter Pigeons.

**Indirect:**

The action may also lead to localised increases in some weeds, which qualify as invasive species potentially threatening ground-feeding Squatter Pigeons. Weed introduction could potentially occur during the construction, operation and rehabilitation phases of the action. However, these impacts are not likely to extend far beyond Vulcan South’s disturbance footprint. As this impact assessment assumes all habitat within this footprint is to be removed, no additional impacts of weeds are anticipated.

**Koala (*Phascolarctos cinereus*)**

**Direct:**

A total of 991.1 ha of Koala habitat are contained within the disturbance footprint, and 833 ha of this will be cleared. The remainder lies above the highwall mining panels. Little of this (7.56 ha in the clearing footprint) is high-quality habitat (the habitat type in which most records occurred). Of the remainder, 412.0 ha of the disturbance footprint (400.8 ha of the clearing footprint) is moderate-quality habitat and 571.6 ha of the disturbance footprint (424.7 ha of the clearing footprint) is low-quality habitat (See Att A, Table 5-6, page 92 and Figure 5-5, page 94). The impact of clearing will last until mature food trees have re-established in rehabilitated areas post-mining. Re-colonisation of rehabilitated sites after six years has been observed in wetter climates in south-east Queensland but a more conservative estimate of 15 years is adopted here due to the drier climate and slower growth rates expected. As the final blocks of disturbed land can only commence rehabilitation at the cessation of mining activities (nine years after the commencement of the action), the duration of disturbance is estimated to be 24 years. Viable populations of Koalas are expected to be maintained in extensive neighbouring habitats (86.1% of the high-quality habitat within the survey area is being retained, and extensive tracts of moderate-quality habitat occur throughout the adjacent Harrow Range) throughout this disturbance period, providing a source of recruitment to rehabilitated areas in the future. Average Koala densities in the Brigalow Belt are thought to be 0.005 Koalas/ha. Given that the Cherwell-Harrow Range spans over 170,000 ha, the remaining koala population is expected to exceed 850 individuals.

**Indirect:**

An additional 59.4 ha of high-quality habitat, 667.9 ha of moderate-quality habitat and 1,151.2 ha of low-quality habitat are located within 500 m of the disturbance footprint and therefore may experience some disturbance from lighting, noise and dust. This disturbance is short-term, lasting only for the duration of the adjacent operations (1 to 9 years, depending on location). Freight of construction materials and daily commute of workers will increase traffic rates on existing roads by up to 2.8 % over baseline levels. This will lead to a negligible increase in risk of vehicles strikes. Due to the short duration and minor magnitude of these impacts, significant long-term impacts on local Koala populations are unlikely (Att A Terrestrial Ecology, Section 5.3.3.3, page 91-94).

**Central Greater Glider (*Petauroides volans*)**

**Direct:**

A total of 58.0 ha of Central Greater Glider habitat is contained within the disturbance footprint and 50.7 is to be cleared to accommodate the action (Att A, Figure 5-6). This represents a loss of 9.4 % of Central Greater Glider habitat located within the survey area. This impact will last until tree hollows have been replaced in rehabilitated areas post-mining. It is expected to take 120 years post-planting for trees to be large enough to form natural hollows. It is conservatively predicted that the loss of hollow trees (nest boxes require regular maintenance and replacement) constitutes a near-permanent loss. However, where hollows are available nearby, Central Greater Gliders are expected to commence foraging within rehabilitated areas within 15 years. As the majority of the disturbance is for haul roads, it is expected that most of this will be usable by Central Greater Gliders within 15 years after rehabilitation, as hollow trees will be retained nearby. Viable populations of Central Greater Gliders are expected to be maintained in extensive neighbouring habitats (88.5 % of Central Greater Glider habitat is retained in the broader landscape) throughout the disturbance period, providing a source of recruitment to rehabilitated areas in the future. No data on population density is available for Central Greater Gliders within the Brigalow Belt, but the related Central Greater Glider occurs at average densities of 0.6 to 4 individuals per hectare. With a conservative assumption that densities within the survey area are on the lower end of published data (i.e., 0.6 per hectare), the 546.1 ha of habitat that will remain uncleared within the survey area supports at least 327 individuals. Furthermore, this population is likely to be connected to others throughout the Harrow Range to the west. The location of this disturbance immediately west of existing mining operations means that no new barriers to dispersal are anticipated to arise as a result of the action. West of the disturbance footprint, continuous tracts of riparian habitat remain connected to forests in sheltered gorges of the Harrow Range.

**Indirect:**

An additional 259.1 ha of habitat for Greater Gliders is located within 500 m of the main operational areas (highwall mining and hauling, mine pit, waste rock dumps and offices) and therefore may experience some disturbance from lighting, noise and dust. This disturbance is short-term, lasting only for the duration of the adjacent operations (1 to 9 years, depending on location). There is also a potential for direct mortality, especially when clearing remnant vegetation with hollow bearing trees and increased traffic (Att A, Section 5.1.6, page 78).

Gliders are not anticipated to be majorly impacted by habitat fragmentation given most vegetation between Vulcan South and Peak Downs Mine (within the newly isolated strip) is young regrowth (based on regional ecosystem mapping), and Central Greater Gliders are unlikely to be present there due to an absence of hollow trees in such vegetation.

**Ornamental Snake (*Denisonia maculata*)**

**Direct**

The habitats present within the disturbance area are of marginal importance to Ornamental Snakes, given the limited development of gilgais, and small, patchy distribution of potential habitats. Nevertheless, 67.7 ha of potential primary habitat and 32.8 ha of potential secondary habitat will be removed to accommodate the Vulcan North, Main and South pits. In a worst-case scenario, up to 100.5 ha of potential habitat may be lost to Ornamental Snakes. Any impacts could be permanent, given the practical difficulties of recreating gilgai mounds and depressions on a rehabilitated mined surface.

**Indirect**

No indirect impacts are anticipated.

**4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? ***

Yes

**4.1.4.5 Describe why you consider this to be a Significant Impact. ***

A significant residual Impact assessment has been conducted in the Terrestrial Ecology assessment for all species with the potential to occur (Att A, Section 5.3.3, page 87-107). The results are summarised below, which concludes significant residual impacts of the action are anticipated for one threatened ecological community (Brigalow) and three threatened species (Squatter Pigeon, Koala and Central Greater Glider), as defined by the *Matters of National Environmental Significance Significant Impact Guidelines 1.1*. Impacts to the Ornamental Snake are unlikely to be significant.

**Brigalow (*Acacia harpophylla* dominant and co-dominant)**

According to the Matters of National Environmental Significance Significant Impact Guidelines 1.1, an action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- adversely affect habitat critical to the survival of an ecological community
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - assisting invasive species, that are harmful to the listed ecological community, to become established, or
    - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community that kill or inhibit the growth of species in the ecological community, or
- interfere with the recovery of an ecological community.

Based on the criterion that the extent of the ecological community will be reduced by the action, the residual impacts to the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community qualify as significant (Att A Terrestrial Ecology, Section 5.3.3.1, page 87-88).

**Squatter Pigeon (*Geophaps scripta scripta*)**

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1. lead to a long-term decrease in the size of an important population of a species;
2. reduce the area of occupancy of an important population;
3. fragment an existing important population into two or more populations;
4. adversely affect habitat critical to the survival of a species;
5. disrupt the breeding cycle of an important population;
6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
7. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
8. introduce disease that may cause the species to decline; or
9. interfere substantially with the recovery of the species.

As the project area lies north of the Carnarvon Ranges, the local population of Squatter Pigeons does not qualify as an "important population" according to the Department of Agriculture, Water and the Environment (2022), and hence criteria 1, 2, 3 and 5 are not relevant. The scale of habitat loss, relative to the large extent of habitat remaining in the local landscape, means that the action is not likely to jeopardise the viability of local populations (criterion 9 is not triggered).

Nevertheless, this local population is expected to temporarily decline by approximately 132 individuals, which triggers a significant impact under the sixth criterion listed above. Also, because habitat used for foraging, breeding, roosting and dispersal (qualifies as "habitat critical to the survival of a species" under the *Matters of National Environmental Significance Significant Impact Guidelines 1.1*) is proposed to be removed, criterion 4 is also triggered by the action.

Overall, Vulcan South is likely to have a significant residual impact on the Squatter Pigeon under the EPBC Act due to the expectation that it cause the loss of 355.5 ha of breeding and foraging habitat, 183.9 ha of foraging (but not breeding) habitat and 575.7 ha of dispersal habitat to the extent that the population is likely to decline, albeit to a limited extent and only temporarily (Att A Terrestrial Ecology, Section 5.3.3.2, page 89-91).

**Koala (*Phascolarctos cinereus*)**

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;

- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

The *National Recovery Plan for the Koala* defines "area of occupancy" as the area within the extent of occurrence that is occupied by the species using 2 km × 2 km grid cells. The action will result in one grid cell that is currently occupied by Koalas becoming unoccupied, triggering criterion 2. Furthermore, the action will adversely affect habitat critical to the survival of the species (habitat used for feeding and resting), and thereby triggers criterion 4. The action therefore qualifies as a significant residual impact under the EPBC Act (Att A Terrestrial Ecology, Section 5.3.3.3, page 91-94).

**Central Greater Glider (*Petauroides volans*)**

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

On the grounds that the action will reduce the area of occupancy of a population by 50.7 ha and adversely affect habitat critical to the survival of a species (i.e., by removing hollow trees), the action is likely to significantly impact the Central Greater Glider (Att A Terrestrial Ecology, Section 5.3.3.4, page 95-96).

**Ornamental Snake (*Denisonia maculata*)**

In accordance with the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles, "important habitat" for the Ornamental Snake is to be used as a surrogate for an "important population" when assessing the significance of potential impacts. Important habitat for Brigalow Belt reptiles is defined as:

- habitat where the species has been identified during a survey
- near the limit of the species' known range;
- 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); or
- a habitat type where the species is identified during a survey, but which was previously thought not to support the species.

No Ornamental Snakes were recorded on site during surveys, despite appropriate search effort during optimal seasonal conditions. The survey area is also not located near the limit of the known range of the Ornamental Snake. Suitable habitat for the species (i.e., gilgais) was very limited in extent, low in quality (gilgais were shallow and held water for short periods only) and very patchily distributed. The Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles offer the following comment in specific reference to defining important habitat for the Ornamental Snake: "habitat connectivity between gilgais and other suitable habitats is important". In light of the poor connectivity and low quality of local habitats on site, in addition to the failure to detect the species on site, impacts to the Ornamental Snake are unlikely to qualify as significant under the EPBC Act.

### 4.1.4.7 Do you think your proposed action is a controlled action? *

Yes

### 4.1.4.8 Please elaborate why you think your proposed action is a controlled action. *

Due to significant residual impacts on the Bigalow Threatened ecological community, Squatter Pigeon, Koala and Central Greater Glider (Att A Terrestrial Ecology, Section 5.3.3.1- 5.3.3.4, pages 87-97).

**4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. ***

The action has been strategically positioned to avoid disturbance to as many matters of state and/or national environmental significance as practicable. No protected conservation estates, wetlands or watercourses of high ecological significance or secured offset areas will be disturbed by the action.

Mitigation and management measures are provided in the following sections of the appended technical reports:

- Terrestrial Ecology Assessment report – Section 5.2 (Att A Terrestrial Ecology, Section 5.2, pages 81-83) .

Key mitigation measures relevant to threatened species are summarised in Att 1 using the Specific, Measurable, Achievable, Relevant, and Time-Bound (SMART) Principle.

These mitigation measures are provided below:

- Vitrinite employees and contractors will be made aware of environmental obligations and compliance requirements through the most up to date and relevant site induction program.
- The edges of the project's footprint will be marked out to prevent unnecessary accidental clearing of neighbouring habitats.
- Overburden will be mostly returned to the mined pits, to limit the total disturbance footprint of the project.
- Topsoil removed from each site in preparation for mining will be stored and managed in accordance with a Progressive Rehabilitation and Closure Plan, to protect a favourable growing medium for vegetation post-mining.
- Post-mine rehabilitation will aim to restore habitat values for the Squatter Pigeon, Koala and Greater Glider, and completion criteria pertaining to these goals have been included in the Progressive Rehabilitation and Closure Plan.
- All vehicles that enter undisturbed parts of the site must be washed and certified prior to arrival at the project site, to restrict the introduction of new weeds. Weed management activities must control weeds in high traffic areas.
- Light vehicles used for commuting between the project area and nearby towns (where they may be exposed to weeds) must be parked in the visitor carpark.
- Operational areas and the visitor carpark will be inspected one month after heavy rainfall (defined as >20 mm in 24-h period) to identify new infestations of restricted weeds. These must be treated within 2 weeks of detection, with follow-up treatment until populations are eradicated.
- Only native species, or species with low weed risk, will be included within seed mixes applied to rehabilitated sites.
- Clearing will occur in stages, to allow fauna the opportunity to exit the area.
- Injured fauna must be taken to the nearest wildlife carer or veterinarian.
- Any injury and/or mortality will be communicated to the Queensland Department of Environment and Science within 24 hours.
- Vitrinite employees and contractors will be made aware of environmental obligations and compliance requirements through the site induction program.
- When clearing is undertaken, there must be an observer to confirm the presence of aboreal mammalian species, such as the koala and/or Greater Glider, as well as the presence of nests. If these are sighted, the tree must be marked and the bulldozer is to cease the clearing of that tree and must allow at least 1 day for the mammal to move trees. If mammals or birds have not moved after 1 week, then a fauna spotter catcher is to be brought to site to evacuate the individual/s prior to the clearing of that tree.
- Buses must transport ~80% of workers daily from accommodation to site, to reduce the total number of vehicles using the roads.
- Trains used to transport coal must be of the largest size safely driven on the relevant tracks, to reduce the total number of trips required.
- On-site speed limits will be restricted to 60 km/h on all roads through or adjacent to habitat critical to the survival of the Koala during dawn and dusk and at night
- Artificial lighting used in operational areas will be angled away from habitats supporting sensitive species (e.g., riparian areas supporting Koalas and Greater Gliders).
- Floodlights with "low glare" louvres/attachments will be used to limit lateral transmission of light. Note that newer LED-type flood lights may have glare-reduction technology built-in.
- Any streetlights used will be of the "aeroscreen" type (flat glass lenses), to reduce sideways glare.
- Light fittings will be positioned as close to horizontally as possible.

**4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. ***

Direct offsets will be provided for the following:

- Brigalow TEC *Acacia harpophylla* dominant and co-dominant (endangered)
- Koala (combined populations of Queensland, NSW and the ACT), *Phascolarctos cinereus* (endangered);

- Squatter Pigeon (southern subspecies), *Geophaps scripta scripta* (vulnerable); and
- Central Greater Glider, *Petauroides volans* (endangered).

An Environmental Offsets Strategy has been developed to articulate and commit to a process that will be undertaken to identify and assess suitable offset sites, and to prepare a draft Offsets Area Management Plan (OAMP) prior to approval (Att H Offsets Strategy, all sections, all pages).

The offset strategy has considered the following:

- Habitat requirements
- Habitat quality
- Targeted BioCondition field methodologies which consider the foraging, breeding, sheltering and dispersal requirements of each species, along with local threat levels.
- Species specific management options for the (yet to be) proposed offset area is outlined in Att H, Table 4-1 to table 4-1, page 36-43.

Table 7-1 (Att H, page 46) outlines principles of the EPBC Act Environmental Offsets Policy and how they will be achieved through the action (Att H, Table 7-1, page 46-48). The Environmental Offsets Strategy only addresses impacts to MNES resulting from the proposed action (Att H Offsets Strategy, all sections, all pages). The Environmental Offsets Strategy is attached to this referral for further information (Att H Offsets Strategy, all sections, all pages).

A description and suitability assessment of the potential primary offset area is described in the attached Offset Suitability Assessment (Att M, page 1-4). The area is located on Lot 59 of Plan SP235297, south of the Project area (see Figure 1, page 2, Att M). The area is 10,048 ha in size, and comprises 87% remnant vegetation and 13% non-remnant vegetation (young regrowth), and is 6.8 times larger than the proposed impact area for Vulcan South. Field surveys have confirmed the presence of Koalas, Greater Gliders, Squatter Pigeons, the Brigalow threatened ecological community, and regional ecosystem 11.3.2 (Att M, page 1-4).

The impact site and potential primary offset area were surveyed in June, July and August 2023 and the findings presented in Section 3, page 3, Att M. The potential offset area is well connected to corridors and habitat outside of its boundaries. There is a major state biodiversity corridor of significance located to the west of the northern offset area and passes through the southern offset area that is associated with the Harrow Mountain ranges. There are also riparian corridors of regional significance that pass through the northern and southern area. Further, the potential primary offset area is located adjacent to the impact site and therefore populations impacted by the action will directly benefit from the acquisition of the habitat on this property (Att M, page 1-4).

The potential primary offset area is more than adequate for meeting the offset needs for the Koala, Greater Glider and Squatter Pigeon (Att M, page 4). It is therefore likely that a subset of this area will ultimately be selected as the eventual offset for Vulcan South. The use of this offset area is subject to ongoing commercial negotiations.

The potential primary offset area does not adequately offset the Brigalow threatened ecological community. Vitrinite has therefore, identified a supplementary Brigalow offset site on Lot 3 Plan HT141 near Dingo, Queensland. This second site is located adjacent to another of Vitrinite's established offset areas, is owned by the same landholder as their existing offset and Vitrinite has access to the block. It is yet to undergo habitat quality assessment, however based on an average BioCondition score and a risk of loss of 8% over 20 years (reflective of category B regulated vegetation on land zone 4), approximately 370 ha of Brigalow additional to that contained in the primary offset area will be required to meet offset obligations for Brigalow. According to certified regional ecosystem mapping, the supplementary offset site contains more than 500 ha of regional ecosystems 11.4.3, 11.4.8, 11.9.1 and 11.9.5, all of which are components of the Brigalow threatened ecological community (Att M, page 4).

A riparian corridor of regional significance passes through the second site. This site is within 5.5 km of a biodiversity corridor of state significance that connects Dawson Range to the south with Boomer Range to the north. Enhancing the quality of habitat adjacent to this corridor will increase the size and functionality of this corridor. Furthermore, adjacent offset sites are proposed for other projects within the same property and there is the potential that additional offset areas will be set aside into the future. Clustering offsets for multiple projects within the same region will lead to cumulative benefits (e.g., feral predator control) that are more difficult to achieve at single offset sites. The potential secondary offset site comprises a single, connected patch of vegetation, rather than multiple, isolated patches. This facilitates fauna movement within the property and between the property and neighbouring habitat corridors.

While this potential secondary offset area is still to be confirmed through site-based habitat quality assessments, it is considered highly likely that sufficient areas are available to offset all matters significantly impacted by Vulcan South. Vitrinite, through its broker, Earthtrade, has advanced discussion with the landholder of this block and will commence formal negotiations to secure it for Vulcan South (Att M, page 4).

### 4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

| Direct impact | Indirect impact | Species |
|---|---|---|
| No | No | Actitis hypoleucos |

| Direct impact | Indirect impact | Species |
|---|---|---|
| No | Yes | Apus pacificus |
| No | No | Calidris acuminata |
| No | No | Calidris ferruginea |
| No | No | Calidris melanotos |
| No | No | Cuculus optatus |
| Yes | No | Gallinago hardwickii |
| No | Yes | Hirundapus caudacutus |
| No | No | Motacilla flava |
| No | No | Pandion haliaetus |
| Yes | No | Rhipidura rufifrons |

**4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

Yes

**4.1.5.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. ***

**Rufous Fantail (*Rhipidura rufifrons*)**

Rufous Fantails are migratory birds protected under the Bonn Convention.

Rufous Fantails pass through the survey area during transit in spring and autumn. The species lives primarily along the east coast and nearby ranges, in rainforest and wet eucalypt forests with a dense, shrubby midstorey. During migration, they can inhabit drier woodlands further west. Two individuals were recorded on site in September-October 2019: one within vine-thicket and the other within dense Acacia regrowth. The subspecies of these individuals is not known, but given the suboptimal habitat usage, these were likely to be migrants. Therefore, they belonged either to *Rhipidura rufifrons rufifrons* (south-eastern Australian subspecies) or migratory sub-populations of *Rhipidura rufifrons intermedia* (Queensland subspecies) (Att A Terrestrial Ecology, Section 4.3.3.1, page 62).

It is likely that small numbers (5 to 10) pass through the project area during each northward or southward migration. According to population estimates provided by the Referral guideline for 14 birds listed as migratory species under the EPBC Act, this constitutes a tiny fraction (0.001% to 0.002%) of the total population size of the subspecies involved (Att A Terrestrial Ecology, Section 4.3.3.1, page 62).

Within the survey area, habitats possessing a dense midstorey of Acacia, Melaleuca or vine-thicket species are most likely to be used. In total, 2,453.3 ha of such habitat exist within the survey area. A total of 1,503.3 ha of potential habitat occur within the project area. This represents 23.6% of the habitat mapped within the survey area (Att A Terrestrial Ecology, Section 4.3.3.1, page 62). A total of 454.6 ha of potential habitat for transient Rufous Fantails is contained within the maximum disturbance footprint.

The survey area is of marginal significance for the Rufous Fantail, given that most of the population migrates through more coastal habitats further east (based on eBird and Atlas of Living Australia records). It is highly unlikely that the marginal habitats to be disturbed are a limiting factor constraining the migration of Rufous Fantails. Breeding has never been recorded in dry habitats west of the coastal ranges in central Queensland, and is not likely within the project area (Att A Terrestrial Ecology, Section 4.3.3.1, page 62). Impacts to this species are expected to be negligible (Att A Terrestrial Ecology, Section 4.3.3.1, page 62).

**White-throated Needletail (*Hirundapus caudacutus*)**

White-throated Needletails are migratory birds protected under the China-Australia Migratory Bird Agreement, Japan-Australia Migratory Bird Agreement and Republic of Korea-Australia Migratory Bird Agreement. The species is also protected as a threatened species under the EPBC Act, and is discussed in detail within the Threatened Species section of this referral (Att A Terrestrial Ecology, Section 4.3.3.2, page 62).

White-throated Needletails were recorded on site on a single occasion. The project area is likely to be west of their primary migration route, but flocks occasionally feed in the area when drawn west by low pressure systems. The project area is of no particular importance to the White-throated Needletail on a local or regional scale, and the action will not include any wind turbines, tall buildings, airports or other structures that threaten airspace used by the species for foraging and dispersal (Att A Terrestrial Ecology, Section 4.3.3.2, page 62). The clearance of vegetation may result in the temporary reduction of flying insect prey, although this effect will be highly localised and have negligible impact on this fast-moving and wide-ranging bird. Impacts to this species are expected to be negligible (Att A Terrestrial Ecology, Section 4.3.2.4, page 47).

**Latham's Snipe (*Gallinago hardwickii*)**

Latham's Snipe are migratory birds protected under the Bonn Convention, Japan-Australia Migratory Bird Agreement, Republic of Korea-Australia Migratory Bird Agreement and EPBC Act. In Queensland, they are also listed as Special Least Concern under the Nature Conservation (Wildlife) Regulation 2006.

Latham's Snipe inhabit the muddy edges of freshwater and brackish wetlands where there exists abundant low, dense vegetation for shelter. Important habitat for Latham's Snipe is defined in the Wildlife Conservation Plan for Migratory Shorebirds (Department of the Environment 2015b) as "areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species".

The Latham's Snipe was not recorded within the survey area, despite surveys coinciding with seasons when presence is most likely (August-April). Nevertheless, this is a cryptic species and small numbers may have gone undetected. Latham's Snipe commonly utilises relatively small farm dams, provided that its needs for a muddy substrate and vegetated margins are met. There are numerous records of the species within a 100 km radius of the survey area, in many cardinal directions.

Locations of potential habitat are as for the Australian Painted-Snipe (see Att A, Figure 4 14, page 55). None of these habitats are likely to support 18 individuals, and therefore do not qualify as important habitat (Att A, Section 4.3.3, page 64).

**Fork-tailed Swift (*Apus pacificus*)**

Fork-tailed Swifts are migratory birds protected under the China-Australia Migratory Bird Agreement, Japan-Australia Migratory Bird Agreement, Republic of Korea-Australia Migratory Bird Agreement and EPBC Act. In Queensland, they are also listed as Special Least Concern under the *Nature Conservation (Wildlife) Regulation 2006*.

Fork-tailed Swifts visit Australia during their non-breeding season (the austral summer). They are exclusively aerial, foraging for flying insects in airspace above most habitats, including cleared farmland. The species is ecologically similar to the White-throated Needletail, and the two species often flock together. The Fork-tailed Swift is the more likely of the two species to forage over inland plains. Flocks of Fork-tailed Swifts are highly mobile and don't remain long in any one location. While no Fork-tailed Swifts were recorded during ecological surveys, it is likely that passing flocks utilise the survey area briefly and intermittently during summer, but possibly not every year. The nearest record is from 45 km north of the survey area (Att A, Section 4.3.3, page 62).

### 4.1.5.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

### 4.1.5.6 Describe why you do not consider this to be a Significant Impact. *

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

The definitions of "important habitat" for each of these species are defined by the Referral Guideline for 14 birds Listed as Migrator, the Industry Guidelines for Avoiding, Assessing and Mitigating Impacts on EPBC Act listed Migratory Shorebird Species and the Revision of the East Asian-Australasian Flyway Population Estimates for 37 Listed Migratory Shorebird Species. These are summarised in Table 5 7, Att A, Section 5.3.3.17 and page 106-107.

It is highly unlikely that the marginal habitats to be disturbed are a limiting factor constraining the migration of any of the migratory bird species listed in Table 5 7, Att A, Section 5.3.3.17 and page 106-107. For this reason, it is considered unlikely that Vulcan South will result in a significant impact on any migratory species protected under the EPBC Act. This is summarised below for the four migratory species considered likely to occur within the disturbance footprint.

**Rufous Fantail (*Rhipidura rufifrons*)**

The survey area is of marginal significance for the Rufous Fantail, given that most of the population migrates through more coastal habitats further east (based on eBird and Atlas of Living Australia records). Breeding has never been recorded in dry habitats west of the coastal ranges in central Queensland and is not likely within the survey area.

**White-throated Needletail (*Hirundapus caudacutus*)**

The survey area is unlikely to be of great importance to the White-throated Needletail. It lies west of the species' usual migration route and the species is rarely recorded in the local region. The survey area is most likely to be used for foraging by flocks that are based in the Clarke Range, but which occasionally follow low-pressure systems further west.

**Latham's Snipe (*Gallinago hardwickii*)**

Locations of potential habitat are as for the Australian Painted-Snipe (see Figure 4 14). None of these habitats are likely to support 18 individuals, and therefore do not qualify as important habitat.

**Fork-tailed Swift (*Apus pacificus*)**

The survey area is of no particular importance to the Fork-tailed Swift on a local or regional scale, and the action will not include any wind turbines, tall buildings, airports or other structures that threaten airspace used by the species for foraging and dispersal.

**4.1.5.7 Do you think your proposed action is a controlled action? ***

No

**4.1.5.9 Please elaborate why you do not think your proposed action is a controlled action. ***

Due to the low likelihood of significant impacts to migratory species (Att A Terrestrial Ecology, Section 5.3.3.17, page 106).

**4.1.5.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. ***

Given the low importance of the project area for migratory species, no specific avoidance or mitigation measures are proposed for migratory birds, other than those described for threatened species (Att A Terrestrial Ecology, Section 5.2, page 81).

**4.1.5.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. ***

No offsets for migratory species are proposed.

### 4.1.6 Nuclear

**4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? ***

No

#### 4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The action does not involve nuclear actions.

### 4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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#### 4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

#### 4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action will not take place in a Commonwealth Marine Area. The only way that the proposed action could result in potential impacts to a Commonwealth Marine Area is via reduced water quality from the site impacting downstream surface water and groundwater, ultimately entering a Commonwealth Marine Area. The project area is located within the Isaac River sub-basin of the Fitzroy River Basin, which enters a Commonwealth Marine Area at Keppel Bay, over 580 km downstream of the disturbance footprint.

Historical agricultural practices at the project area cause the baseline water quality in local drainage lines to be poor. Local drainage lines regularly exceed default water quality objectives for Isaac Western Upland tributaries (stipulated by the *Environment Protection (Water and Wetland Biodiversity) Policy 2009*) for electrical conductivity, suspended solids, turbidity, aluminium, sulphates, iron, ammonia, total nitrogen and total phosphorus.

A water management system has been developed for the action to protect downstream water quality, including within Commonwealth Marine Areas. This water management system is described in detail within the attached Vulcan South Surface Water Assessment (Att B Surface Water, Section 5, page 74-85). The water management system includes the following water-related infrastructure:

- diverted water drains, bunds and drainage diversions to divert runoff from undisturbed catchments around areas disturbed by mining;
- flood protection levees along the southern side of the Vulcan North pit extent, along the western and southeastern sides of the Vulcan Main pit, and around the Vulcan South pit;
- sediment dams and drains to collect and treat runoff from waste rock emplacement areas; and
- mine-affected water (MAW) drains and dams to store water pumped out of the open cut mining areas and to collect runoff from the infrastructure areas (Att B Surface Water, Section 5.2, page 74).

The following key components will be employed throughout the highwall mining stage of the action to manage MAW:

- clean water drains/contour banks and rock chutes/drop structures above the plunges will divert natural catchment runoff to the proposed surface water drains/sediment control structures and prevent contamination where active plunges are located;
- bunds along the bench will be built as required. These will direct MAW into the adjacent plunges. Bunds will also divert haul road runoff to the surface water drainage systems;
- Where possible, there will be an interim panel separating the active panel and the water storage panel to limit the amount of seepage through the coal seam into the seam being actively mined.
- direct mine water runoff (via gravity) either directly into a plunge or via a sump that dewaters to the plunge;
- where plunges are no longer active, rehabilitation will commence to cover the voids at the surface (Att B Surface Water, Section 5.7, page 81-83).

An OPSIM model, which assessed varying climatic conditions using a daily timestep, revealed that there are no predicted water spills to the receiving environment during the life of the mine from the mine water dams or open-cut pits. The risk of offsite release of MAW is therefore very low under all modelled climatic conditions (Att B Surface Water, Section 7.3.7.1, page 1111 and Section 11.4, page 167).

Even in the unlikely event of MAW release, the quality of this water is expected to be relatively high. Geochemical analyses of local waste rock and coal revealed low sulphide content and excess acid-neutralising capacity and classified local geological material as “not acid-forming”. Furthermore, surface runoff and seepage from mining waste is expected to be pH neutral to slightly alkaline and have a low level of salinity. There is also no significant enrichment of metals and metalloids, and most metals are sparingly soluble at neutral to slightly alkaline pH (Att B Surface Water, Section 6.8, page 94 and Att J, Section 4.5, page 29-31).

The above data indicate that water management objectives, when implemented through appropriate management plans, will mitigate the effects of the action on natural surface water quantity and quality and flooding downstream of the mine site during operations (Att B Surface Water, Section 11.1, Page 166).

A hydraulic (TUFLOW) model was developed to assess the impact of the action on flooding. This revealed that impacts are generally confined to within the project area and the impact of the action on the hydraulic characteristics of Boomerang Creek, Hughes Creek and their tributaries do not affect the existing conditions significantly. It is expected that the channel and floodplain will undergo little, if any, adjustment to the altered hydraulic conditions upstream or downstream of the project area as a result of the action (Att B Surface Water, Section 11.3, page 166-167).

The action is not expected to have a measurable impact on receiving water quality or environmental values. Adherence to model mining conditions pertaining to water quality of receiving waters is expected to result in no measurable impacts to Commonwealth Marine Areas (Att B Surface Water, Section 11.4, page 167).

### 4.1.8 Great Barrier Reef

#### 4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

#### 4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The proposed action will not take place in the Great Barrier Reef Marine Park. The only way that the proposed action could result in potential impacts to the Great Barrier Reef Marine Park is via reduced water quality of downstream surface water and groundwater entering the Great Barrier Reef Marine Park. The action is located within the Isaac River sub-basin of the Fitzroy River Basin, which enters the Great Barrier Reef Marine Park at Keppel Bay, 580 km downstream of the project area.

Based on geochemical analysis of local rock and coal, and modelling of surface water flows and flooding, the proposed mine water management system will result in a negligible risk to the quality, quantity and flooding of downstream waters (Att B Surface Water, section 11, page 158-159). The action will not result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the downstream marine environment (Att B Surface Water, Section 11.4, page 167).

For further information regarding downstream risks to marine environments, refer to the section of this referral on Commonwealth Marine Area impacts.

### 4.1.9 Water resource in relation to large coal mining development or coal seam gas

#### 4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

Yes

#### 4.1.9.2 Briefly describe why your action has a direct and/or indirect impact on this protected matter. *

The construction of open-cut pits that intercept groundwater, and the increased risk of sediment erosion resulting from vegetation clearing and modification of the landform will potentially have localised impacts on surface water and groundwater quality and flow.

Detailed geochemical (Att J Geochemical Assessment, all sections and pages), surface water (Att B Surface water, all sections, all pages) and groundwater (Att C Groundwater, all sections, all pages) studies were undertaken on site. The Geotechnical Assessment of the Vulcan South in-pit and Ex-pit WRD's can be found in the attached Geotechnical Assessment for context (Att K Geotechnical Assessment, all sections, all pages).

**Surface Water**

With a water management system in place to divert surface water around active mining areas, reuse MAW, and capture and treat sediment-laden runoff from exposed surfaces, there are expected to be relatively minor impacts of the action on downstream water quality and flow regimes. Models indicate that there will be no water spills to the receiving environment during the life of the mine from the mine

water dams or open-cut pits (Att B Surface Water, Executive Summary, page 4). The only releases proposed for the action are sediment dam releases which have been modelled in Att B, Section 7.3.10, page 117-120, which concluded that Electrical conductivity will be below the 720 µS/cm WQO for baseflows of the project area.

The altered landform will cause negligible changes to the hydraulic characteristics of local drainage lines upstream or downstream of the project area (Att B Surface Water, 11.3, page 166-167). In light of the poor baseline water quality, it is unlikely that the action will have a measurable impact on receiving water quality or environmental values (Att B Surface Water, Section 11.4, page 167).

Potential impacts associated with water runoff from the WRD's will be managed through the Surface water management infrastructure, which will be established progressively to divert clean water catchments around operational areas and to manage runoff from disturbed areas. However, it is expected that the risk of potential impact on the quality of surface runoff and groundwater from bulk mining waste materials at the action will be low (Att J, Section 4.4, page 28). Based on the water extract results presented in Att J, Section 4.4, 28-29, the quality of any leachate from any co-disposed coal reject materials would be similar to leachate at areas of the dumps where co-disposal does not occur.

A series of mine water dams will be established to manage raw water supply, pit water and supply water for dust suppression. A series of drains and bunds will be established to direct runoff to sediment control structures (Att J Geochemical Assessment, Section 1.8, page 5 and Section 2.2.5, page 9). These are further discussed in Att J Geochemical Assessment, Section 5.4.1.2 (page 34) and 5.4.1.3 (page 34), together with Table E1 (attachment E of the Geochemical Assessment) and Att 5.

For the Highwall Mining area trial, clean water drains/contour banks and rock chutes/drop structures above the plunges will divert natural catchment runoff to the proposed surface water drains/sediment control structures and prevent contamination where active plunges are located. Bunds along the bench will be built as required which will direct MAW into the adjacent plunges. Where possible, there will be an interim panel separating the active panel and the water storage panel to limit the amount of seepage through the coal seam into the seam being actively mined. Bunds will also divert haul road runoff to the surface water drainage systems. Mine water runoff (via gravity) will either directly be diverted into a plunge or via a sump that dewaters to the plunge (Att B, Section 5.7, page 81-83). Vitrinite will commit to maintaining these water values through EA conditions mandating a monitoring program and water quality targets at downstream monitoring locations.

**Cumulative impacts**

The action will reduce the catchment area draining to receiving waters due to capture of runoff from disturbed catchment areas within the water management system. The actions catchment area represents approximately 0.2% of the total catchment area of the Isaac River to its confluence with Phillips Creek. Of this, approximately 40% will be managed through the action ESC and released back to receiving waters. The combined total catchment area of the existing mines (including the action) represents around 7.3% of the total catchment area of the Isaac River to the Phillips Creek confluence. The site water management system has been designed such that the risk of offsite release of mine affected water is very low (with no mine affected dam uncontrolled releases predicted under any modelled climatic conditions) (Att B, Section 10, page 159-165).

**Indirect Impacts**

The TUFLOW Hydraulic model was used to estimate design flood levels, velocities and extents across the project area and its tributaries for the 10%, 1% and 0.1% AEP design flood events for the existing, operational and the proposed final landform conditions. Key impacts are generally restricted to during and within the bounds of operation and relate to increases in peak water levels and peak velocities in some catchments. Only minor impacts on these features occur in the final landform (Att B, Section 8.6, 8.7 and 8.8, page 139-146).

**Groundwater**

A small amount of groundwater (<43 m3/day) is expected to seep into the pits, and most will be lost to evaporation on the pit face or as entrained moisture within the mined coal. The drawdown predicted from the action is limited in extent (maximum of 2 km to the east toward existing mining) and magnitude (up to 10 m in the deepest part of the Vulcan Main pit) (Att C Groundwater, Section 7.1.1, page 93-94). The action is highly unlikely to affect groundwater quality (Att C Groundwater, Section 6.6, page 92). Calibration constrained, null space Monte Carlo stochastic method uncertainty analysis has been carried out for the groundwater impact assessment. This uncertainty analysis has been completed in consideration of the IESC guidelines and confirms minimal inflows reporting to the pit, and limited drawdown extent and magnitude (Att C, Section 8, page 96).

The evaluation of groundwater EV in the project area (Att C, Section 5.8.3, page 67-69) indicated that groundwater is of no, or limited value for most uses because of the high salinity. Therefore, the risk of groundwaters within the backfilled pit impacting on surrounding groundwater quality is highly unlikely. All new mine infrastructure areas including workshops, fuel and chemical storage areas will include spill containment measures, for example bunding and / or spill kits. These structural and administrative controls will assist in preventing groundwater contamination. Impacts on groundwater quality, associated with local contamination from mine activities are considered highly unlikely (Att C, Section 6.6, page 92).

**Groundwater dependent ecosystem:**

The Groundwater Dependent Ecosystems Atlas, in addition to groundwater level data was used to determine potential impacts on aquatic GDE's. While there are small pockets of high- and moderate potential aquatic GDEs shown within the maximum drawdown associated with the Vulcan Main pit, in Section 5.7.2 (Att C, page 56-60) it was the interpretation of hydrogeologist.com.au that it is highly unlikely for aquatic GDEs to be present within 1 km of the proposed pits because they require connected or near-connected surface water - groundwater systems. Within or adjacent to the project area, the surface water systems are above the groundwater table (see Section 5.6, Att C, page 54) and the surface water system is hydraulically disconnected from the groundwater system. In addition, groundwater in the project area is brackish to saline and therefore unsuitable for the maintenance of freshwater GDEs (see Section 5.8, Att C, pages 61-71 for further information on groundwater quality).

Based on literature reviews, depth-to-groundwater data, national GDE mapping and water quality data, there are likely to be some terrestrial GDEs contained within the project area. The locations of these GDE's within the disturbance footprint are shown in Figure 4-5, Att A. Groundwater modelling indicated that there are no impacts of drawdown on GDE's (Terrestrial, or aquatic) within or outside of the disturbance footprint (Att A, Section 5.3.2, Att C, Section 6.5, page 88-89).

No subterranean GDEs (cave and aquifer ecosystems) have been identified in the vicinity of the action.

Furthermore, impacts on groundwater quality are assessed to be very unlikely, in any case, all local potentially groundwater-dependent ecosystems occur upgradient (in terms of the groundwater flow, which mimics the surface water drainage pattern from west to east) of potential effects.

There are no third-party groundwater users within the predicted extent of drawdown and hence impacts on existing users are considered very unlikely. A maximum probably drawdown extent has also been modelled which determined a potential for groundwater drawdown to impact third party bores. However, the bores are designed to monitor for mine related impact to the groundwater regime (Att C, Section 6.3, page 88 and Section 7.1, page 93 - 95).

**Cumulative Impacts to groundwater:**

Cumulative impacts have been assessed by representing historical and proposed mining for the VCM, Saraji Mine and Peak Downs Mine, the latter have been active since the 1970s.The minimal inflow rates predicted for the action (maximum inflow rate of 43 m3/d) represent less than a 1% increase in groundwater seepage within the mines considered. Therefore, cumulative impacts are minimal (Att C, Section 6.1, page 92).

**4.1.9.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? ***

No

**4.1.9.6 Describe why you do not consider this to be a Significant Impact. ***

Based on definitions within the *Significant impact guidelines 1.3: Coal seam gas and large coal mining developments—impacts on water resources*, an impact is likely to have a significant impact on a water resource if there is a real or not remote chance or possibility that it will directly or indirectly result in a change to:

- the hydrology of a water resource (flow regimes, recharge rates to groundwater, aquifer pressure, groundwater table, groundwater-surface water interactions, river-floodplain connectivity, inter-aquifer connectivity and coastal processes), and/or
- the water quality of a water resource (surface water or groundwater).

This change must be of sufficient scale or intensity as to reduce the current or future utility of the water resource for third party users, including environmental and other public benefit outcomes, or to create a material risk of such reduction in utility occurring.

For water-dependent ecosystems, a significant impact on water quality is likely if the predicted change in quality is greater than that required for ‘moderately to slightly disturbed’ systems as described in the relevant local or regional water quality objectives (typically the 80% to 95% ecosystem protection guideline values listed in the Australian Water Quality Guidelines). Note that other thresholds may apply where changes in water quality may impact on other matters of national environmental significance, such as threatened species or ecological communities.

The appended Groundwater Impact Assessment and the Surface Water Assessment anticipate that the action will have no measurable effect on downstream surface water flow or quality. There will be highly localised impacts on groundwater level but not groundwater quality. No third party users will be affected by the localised groundwater drawdown that is expected. This drawdown is also expected to have negligible effects on groundwater-dependent ecosystems. Therefore, the likely impacts of the action do not qualify as significant (Att B Surface water, Section 11, 158-159; Att C Groundwater, Section 8, page 96).

**4.1.9.7 Do you think your proposed action is a controlled action? ***

No

**4.1.9.9 Please elaborate why you do not think your proposed action is a controlled action. ***

Due to a lack of significant impacts on water resources.

**4.1.9.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. ***

**Surface Water Mitigation measures:**

Surface water related mitigation measures are described in Att 5.

**Groundwater:**

No formal mitigation measures are currently proposed or required as part of the action. There are no impacts predicted for third party groundwater users and surface water systems. Impacts to Groundwater Dependent Ecosystems are considered highly unlikely as are impacts on groundwater quality and EV. Should monitoring and subsequent assessment determine potential impacts, mitigation strategies would be considered commensurate with the level and risk of environmental impact.

However, the following adaptive management strategies will be implemented by Vitrinite:

- Acceptance of the groundwater monitoring network to include the site-specific monitoring bores, Queensland government monitoring bore RN 13040283.
- Development of interim groundwater quality guidelines (in consideration of DES [2021]). These guidelines will be derived from the current dataset and would be included as conditions in the Environmental Authority (EA).
- Quarterly groundwater sample collection, level measurement and datalogger download.
- Development of groundwater trigger levels and contaminant limits once 12 to 24 months of groundwater quality data is available, to be included as amended conditions in the EA.
- Develop a suitable WMP for the action that includes consideration of groundwater.
- Annual assessment of the suitability of the groundwater monitoring network for the action to provide a representative and spatially adequate understanding of the groundwater regime.
- Annual assessment of groundwater level and quality data in consideration of the Department of Environment and Science DES (2021).
- Every three years consider the requirement to redevelop, and or recalibrate the numerical groundwater model.

**Geochemical mitigation measures:**

The management of waste rock, coal rejects and materials are described in Att J, Section 5.4, page 33-36. One of the management measures expected to reduce impacts to a great extent, is the co-disposal of coarse and fine reject materials within waste rock dumps. This is because coal reject materials typically remain moist and any oxidation will only occur at surface (i.e., the fine reject will fill the gaps between the coarse reject particles and generally limit oxygen ingress). The coarse rejects also would also provide some geotechnical stability to a mixed reject cell structure. The disposal of mixed coarse and fine reject materials within waste rock dumps is also a low risk strategy as the much larger volume of waste rock typically has very low sulfur content and excess ANC. This mining waste management strategy is currently used at a number of coal mines in the Bowen Basin.

**4.1.9.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. ***

No offsets are proposed due to a lack of significant impacts on water resources.

## 4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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**4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

No

**4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. ***

The proposed action is not situated on Commonwealth Land, is not likely to impact Commonwealth Land, and will not be undertaken by a Commonwealth agency.

## 4.1.11 Commonwealth heritage places overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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**4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? ***

No

**4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. ***

The action will not impact any Commonwealth Heritage places in overseas territories.

## 4.1.12 Commonwealth or Commonwealth Agency

**4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? ***

No

# 4.2 Impact summary

### Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

- Threatened Species and Ecological Communities (S18)

### Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth heritage places overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

# 4.3 Alternatives

**4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? ***

No

**4.3.8 Describe why alternatives for your proposed action were not possible. ***

**Timing**

The action is a relatively small-scale coal mining project. The amount of coal resource available does not justify the use of larger mining machinery and processing facilities or a higher production rate, which would be required to complete the action in a shorter timeframe. Furthermore, a shorter timeframe could only be achieved if all pits were mined simultaneously. The sequential staging of mining (versus simultaneous mining of all pits) allows for progressive rehabilitation to occur. This reduces the total area disturbed at any one time and permits east-west dispersal of wildlife through the project area at all times.

**Location and activities**

Queensland Coking Coal Pty Ltd has considered a number of environmental and logistical constraints relevant to the positioning of infrastructure associated with the action. Firstly, the positioning of the project area further East is constrained by the location of Saraji Road and adjacent mining project tenements (such as Saraji Mine located directly east). Locating infrastructure further west is constrained by several watercourses as well as the Harrow Range. For this reason, proposed works have been planned to avoid the most western portion of the MLA.

The proposed location of infrastructure for the action has been determined to minimise the potential impacts to existing surface water drainage channels and watercourses in the eastern section of the MLA. For example, a large corridors have been maintained between the north pit, main pit and south pit to minimise impacts to drainage features and watercourses (as defined under the *Water Act 2000*) that exist between these pits and to reduce impacts on surface water flows. Specifically, this separated placement will avoid a tributary of Plumtree Creek (between the north and main pit) and the Hughes Creek watercourse and tributary (located between the main and south pit) that

contain high value habitat for the Koala and Central Greater Glider. These separations have also allowed the action (construction, operation and rehabilitation) to occur in stages and therefore, the disturbance footprint at any one-point-in-time is small and there will be available habitat for native species to utilise.

Excluding these intentional aforementioned corridors, infrastructure was generally designed to be located in a practical location to the coal seam as well as in close proximity to other related infrastructure (e.g. north in-pit waste rock dump next to the ex-pit waste rock dump). This achieves the following:

- reduced transportation disturbance footprint caused by roads
- minimised carbon emissions of vehicles required to travel between these locations (such as haul trucks traveling on haul roads); and
- the connection of essential infrastructure.

Key alternatives discarded through the design phase included larger out-of-pit waste rock dumps and maintenance of a final void in the closure stage. The proposed closure strategy (complete backfill of the final void) has sought to facilitate improved environmental outcomes and sustainable post mining land use. This approach has allowed re-instatement of native fauna habitat and the pre-mining land use.

Queensland Coking Coal Pty Ltd has also considered the alternative of the works not going ahead at all. The direct consequences of not proceeding with the action are the loss of sustained positive economic opportunities for the local area and region in the form of direct employment, procurement, community buy-in, royalty payments to the government and revenue to local businesses.

# 5. Lodgement

## 5.1 Attachments

1.2.1 Overview of the proposed action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | No | High |
| #2. | Document | Att B Surface Water<br>Surface Water Assessment | | No | High |
| #3. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | | High |
| #4. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | | High |

1.2.7 Public consultation regarding the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att D Stakeholder Engagement Plan<br>Stakeholder Engagement Plan | | No | High |
| #2. | Document | Att E Social Impact<br>Vulcan South Social Impact Assessment report | | | High |

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation’s environmental policy and planning framework

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att G ESG statement<br>Environment, social and governance statement by Vitrinite (owned by Queensland coking coal) | | | High |
| #2. | Document | Att L Greenhouse Gas Emissions Assessment.pdf<br>Greenhouse Gas Emissions assessment for Scope 1, 2 and 3. | | | High |
| #3. | Link | National Climate Resilience and Adaptation Strategy<br>https://www.dcceew.gov.au/sites/default/files/do.. | | | High |

3.1.1 Current condition of the project area's environment

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | High |
| #2. | Document | Att I Transport Impact Assessment<br>Transport Impact Assessment | | High |

3.1.2 Existing or proposed uses for the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att F Soil and Land Suitability<br>Soil and land Suitability Assessment | | | High |

3.1.3 Natural features, important or unique values that applies to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

3.2.1 Flora and fauna within the affected area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att 2 Vulcan South_CentralGreaterGliderHabitat.pdf<br>Central Greater Glider habitat Assessment | | | High |
| #2. | Document | Att 3 Vulcan South_KoalaHabitat.pdf<br>Koala habitat assessment | | | High |
| #3. | Document | Att 4 Vulcan South_SquatterPigeonHabitat.pdf<br>Squatter Pigeon habitat | | | High |
| #4. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |
| #5. | Link | Correlative and mechanistic models of species distribution provide congruent forecasts under climat<br>https://conbio.onlinelibrary.wiley.com/doi/10.11.. | 07/06/2010 | | High |
| #6. | Link | National Forest and Sparse Woody Vegetation Data (Version 6.0 - 2021 Release)<br>https://researchdata.edu.au/national-forest-spar.. | | | High |

3.2.2 Vegetation within the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |
| #2. | Document | Att F Soil and Land Suitability<br>Soil and land Suitability Assessment | | | High |

3.4.1 Hydrology characteristics that apply to the project area

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B Surface Water<br>Surface Water Assessment | | | High |
| #2. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | | High |
| #3. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | | High |
| #4. | Document | Att K Geotechnical Assessment<br>Geotechnical Assessment of the final landform in-pit and ex-pit WRDs for | | | High |

Vulcan South

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.4.5 (Threatened Species and Ecological Communities) Why you consider the direct and/or indirect impact to be a Significant Impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.4.8 (Threatened Species and Ecological Communities) Why you think your proposed action is a controlled action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att 1 Vulcan South Threatened Species Mitigation Measures.docx<br>Threatened species mitigation measures table | | | High |
| #2. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.4.11 (Threatened Species and Ecological Communities) Proposed offsets relevant to avoidance or mitigation measures

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att H Offset Strategy<br>Environmental offsets strategy | | No | High |
| #2. | Document | Att M Offset Suitability Assessment Memo.pdf<br>Offset Suitability Assessment | | | High |

4.1.5.2 (Migratory Species) Why your action has a direct and/or indirect impact on the identified protected matters

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.5.3 (Migratory Species) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.5.6 (Migratory Species) Why you do not consider the direct and/or indirect impact to be a Significant Impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.5.9 (Migratory Species) Why you do not think your proposed action is a controlled action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.5.10 (Migratory Species) Avoidance or mitigation measures proposed for this action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |

4.1.7.3 (Commonwealth Marine Area) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B Surface Water<br>Surface Water Assessment | | | High |
| #2. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | | High |

4.1.8.3 (Great Barrier Reef) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B Surface Water<br>Surface Water Assessment | | | High |

4.1.9.2 (Water resource in relation to large coal mining development or coal seam gas) Why your action has a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att A Terrestrial Ecology<br>Terrestrial Ecological Assessment | | | High |
| #2. | Document | Att B Surface Water<br>Surface Water Assessment | | | High |
| #3. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | | High |
| #4. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | | High |
| #5. | Document | Att K Geotechnical Assessment<br>Geotechnical Assessment of the final landform in-pit and ex-pit WRDs for Vulcan South | | | High |
| #6. | Link | Bureau of Meteorology<br>http://www.bom.gov.au/water/groundwater/gde/map... | | | High |

4.1.9.3 (Water resource in relation to large coal mining development or coal seam gas) Why your action is unlikely to have a direct and/or indirect impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att B Surface Water<br>Surface Water Assessment | | | High |
| #2. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | No | High |
| #3. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | No | High |
| #4. | Document | Att K Geotechnical Assessment<br>Geotechnical Assessment of the final landform in-pit and ex-pit WRDs for Vulcan South | | | High |

4.1.9.6 (Water resource in relation to large coal mining development or coal seam gas) Why you do not consider the direct and/or indirect impact to be a Significant Impact

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| #1. | Document | Att B Surface Water<br>Surface Water Assessment | No | High |
| #2. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | High |

4.1.9.10 (Water resource in relation to large coal mining development or coal seam gas) Avoidance or mitigation measures proposed for this action

| | Type | Name | Date | Sensitivity | Confidence |
|---|---|---|---|---|---|
| #1. | Document | Att 5 Vulcan South EPBC Referral Surface Water Mitigation Measures.docx<br>Surface water mitigation measures | | | High |
| #2. | Document | Att C Groundwater<br>Groundwater Impact Assessment | | | High |
| #3. | Document | Att J Geochemical Assessment<br>Geochemical Assessment of Waste Rock, coal rejects and Coal | | | High |
| #4. | Link | Using monitoring data to assess groundwater quality and potential environmental impacts<br>https://www.publications.qld.gov.au/ckan-publica.. | | | High |

## 5.2 Declarations

### Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

| | |
|---|---|
| ABN/ACN | 94143463316 |
| Organisation name | Mining & Energy Technical Services Pty Ltd |
| Organisation address | 310 Edward Street, Brisbane QLD 4000, Australia |
| Representative's name | Laura Morgan |
| Representative's job title | Environmental Consultant |
| Phone | 1300078518 |
| Email | laura.morgan@metserve.com.au |
| Address | 310 Edward Street, Brisbane City, QLD, 4000 |

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Laura Morgan of Mining & Energy Technical Services Pty Ltd**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

### Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

| | |
|---|---|
| ABN/ACN | 71129600004 |
| Organisation name | Queensland Coking Coal Pty Ltd |
| Organisation address | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |
| Representative's name | Michael Callan |
| Representative's job title | Chief Operating Officer |
| Phone | (07) 3174 4816 |
| Email | michael@vitrinite.com.au |
| Address | Level 6, Suite 2, 12 Creek Street, Brisbane, Qld, 4000 |

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Michael Callan of Queensland Coking Coal Pty Ltd**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

## ✔ Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Michael Callan of Queensland Coking Coal Pty Ltd**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *