Referral Document

Caravel Copper Project

CARAVEL MINERALS LIMITED

10-02-2023

Contents

Caravel Copper Project – APP-0000120

Referral Document

1 The proposal

1.1 Proposal information

Proposal name: Caravel Copper Project

Type of proposal: Refer a proposal

Proposal description

Caravel Minerals Limited (Caravel) is seeking to develop the Caravel Copper Project (the Proposal) based on a 30 km porphyry copper mineralisation system located in the WA Wheatbelt approximately 150 km northeast of Perth (Attachment 1, Figure 1). The resource the subject of this Proposal is primarily hosted in the Bindi and Dasher deposits which represent 6 km of the overall system. These deposits are a new style of mineralisation for the region and are presently the largest undeveloped copper resources in Australia.

With the accelerating transition to renewables and electrification over the next decade, copper is forecast to become the world's most in-demand metal. The Proposal's large resources, technical simplicity, access to existing infrastructure and location in a sound social, economic, and political setting all contribute to the Proposal being one of very few large undeveloped copper projects globally that can be brought into production in this timeframe.

The mine development plan is based on extensive use of automation and electrification of the mining fleet, with a fully autonomous haulage fleet using electric power from a 'trolley assist' system. The use of Automation, Communication and Electrification (ACE) technologies is a key part of Caravel's planning to maximise safety and efficiency and reduce environmental impacts.

Process plant design is based on traditional crush-grind-float technologies configured in a single processing train delivering a total capacity of 28 million tonnes per annum and producing around 62,000 tonnes per annum of copper metal in concentrate. Concentrate will be trucked on the existing public road network to existing ports at Bunbury or Geraldton. The Proposal includes mine pits, waste rock landforms, tailings storage, ore processing and transfer infrastructure and associated infrastructure such as workshops, laydown areas, landfill, communications, offices, ablutions, wastewater treatment, fuel storage, renewable energy, temporary and permanent accommodation villages and water storage.

Water supply for the Proposal will be via a combination of developing new water resources and purchasing existing allocations. A remote borefield and pipeline network will be developed at Gillingarra, approximately 60 km west of the mine, to supply water to the Proposal. A long-term operations accommodation village may be located on the MSDE or at Wongan Hills. A temporary construction village will also be required at the mine site to accommodate the construction workforce.

Power supply for the construction of the Proposal will come from diesel generation; however, Caravel is working closely with Western Power to obtain all operational power supply from the existing regional electrical grid adjacent to the site within the Southwest Interconnected Network's North Country subregion. To the extent that Western Power cannot deliver power to site due to network constraints Caravel may at times supplement with onsite diesel and/or renewable energy solutions depending on the capacity and

reliability of the grid power. To be conservative, this Proposal includes a worst-case scenario where diesel power is generated on site for all operations until the company confirms grid access with Western Power.

The Proposal will include an 8,541 ha Mine Site Development Envelope (MSDE), within which up to 6,547 ha will be disturbed. An initial concept design has produced an indicative disturbance footprint shapefile of 5,868 ha. This indicative footprint shapefile does not include contingency for design changes or miscellaneous items that were not considered during the initial concept design, such as additional mine roads, laydown areas, topsoil storage, workshops etc. As a result, the proposed maximum disturbance has been presented as 6,547 ha, which includes a 10% contingency. There are ongoing design studies being undertaken to further refine the site layout. Caravel will make every effort to avoid using the contingency area and minimise the area of disturbance for the proposed action.

The majority of the area to be disturbed has been previously cleared for grain production (Attachment 1, Figure 3), with the remaining areas of native vegetation within the MSDE ranging from highly degraded to pristine condition. The highly degraded areas of native vegetation are generally associated with areas of salinisation which are now dominated by salt tolerant native species.

The extent of native vegetation to be disturbed in the MSDE will be determined by further studies and refined during the course of the assessment. The field surveys conducted to date recorded that approximately:

- 85% of the mine study area was cleared land for cropping;
- 12% was considered to be very good to pristine condition native vegetation; and
- The remaining 3% being degraded, poor or planted vegetation types (Mattiske 2022a; Attachment 2).

The Proposal also includes an 8,257 ha Borefield Development Envelope (BDE) and a 928 ha Pipeline Development Envelope (PDE). It is anticipated that up to 100 ha of disturbance may be required for the BDE and up to 120 ha of disturbance within the PDE. A minor proportion of this disturbance may be native vegetation if it cannot be avoided, however the extent of disturbance will be determined based on further studies and will be refined during the course of the assessment. The boundary of the MSDE and indicative borefield and pipeline corridor locations are shown in Attachment 1, Figure 2. An indicative project infrastructure layout within the MSDE is shown in Attachment 1 Figure 3.

The physical, construction and operational elements of the Proposal are described in Attachment 3.

1.2 Referrer information

Who referred the proposal: Proponent

Name of the referrer: MICHAEL PHILLIP KLVAC

Contact details

Suite 1, 245 Churchill St

Subiaco WA 6008

Australia

1.3 Proponent information

Name of the proponent/s: CARAVEL MINERALS LIMITED

ABN/ACN No.: 41120069089

Contact details

Suite 1, 245 Churchill St

Subiaco WA 6008

Australia

1.4 Proposal Elements

Element 1: Additional Infrastructure

- **Maximum Extent:** Up to 100 ha of disturbance within BDE and up to 120 ha of disturbance may be required within the PDE.
- **Associated activity element:** 1: Clearing of native vegetation
    - **Phase:** Construction
    - **Maximum extent, range or capacity of this activity**

      Disturbance of up to 100 ha within the BDE
- **Associated activity element:** 2: Clearing of native vegetation
    - **Phase:** Operational
    - **Maximum extent, range or capacity of this activity**

      Disturbance of up to 120 ha within the PDE.
- **Associated activity element:** 3: Groundwater abstraction/dewatering

- **Phase:** Operational
- **Maximum extent, range or capacity of this activity**

  Abstraction of no more than 16 gigalitres/annum from the bore fields in and around Gillingarra (unnamed aquifer) and from the fractured rock aquifers at the mining and processing areas for use in mineral processing, dust suppression and accommodation and ablution activities (Attachment 1, Figure 2).

- **Associated activity element:** 4: Groundwater abstraction/dewatering
  - **Phase:** Construction
  - **Maximum extent, range or capacity of this activity**

    Abstraction of no more than 5 GL/annum from the Gillingarra bore fields (unnamed aquifer) and from the fractured rock aquifers within the MSDE for use in construction activities (Attachment 1, Figure 2).

Element 2: Mine and Associated Infrastructure

- **Maximum Extent:** Disturbance of no more than 6,547 within an 8,541 ha MSDE.
- **Associated activity element:** 1: Clearing of native vegetation
  - **Phase:** Construction
  - **Maximum extent, range or capacity of this activity**

    Disturbance of no more than 6,547 ha within a 8,541 ha Mine Site Development Envelope. 679 ha of disturbance (~10%) of the indicative disturbance footprint is being requested as contingency.

- **Associated activity element:** 2: Ore processing
  - **Phase:** Operational
  - **Maximum extent, range or capacity of this activity**

    Production of up to 62,000 tonnes per annum of copper concentrate (Attachment 1, Figure 3).

- **Associated activity element:** 3: Power/energy production
  - **Phase:** Operational
  - **Maximum extent, range or capacity of this activity**

    Up to 125 megawatts from the South-West Interconnected Network and other power generation plant and equipment on site (Attachment 1, Figure 3).

1.5 Proposal Stages

Maximum proposal life: 30 years
Proposed start date: 01-01-2025
Proposed end date: 25-07-2055

Construction phase length: Approximately 18 months
Commissioning schedule Commissioning of the processing facility to be undertaken subject to operational limits.
Operations phase length: 28 years
Decommissioning phase length: Approximately 2 years after cessation of operations
Decommissioning schedule Removal of all above-surface and buried infrastructure within 2 years of cessation of operations.
Rehabilitation schedule Areas temporarily cleared during the construction phase will be rehabilitated following construction. Final closure and rehabilitation to commence within 1 year of cessation of operations.

1.6 Greenhouse gas emissions

Construction **Total Scope 1 greenhouse gas emissions:** 38152
Scope 1 emissions source and quantification method Power supply for the construction of the Proposal will come from diesel generation. The sources for the Scope 1 are based on consumption of diesel and the resultant emissions. The key sources of emissions include: bulk earthworks; civil engineering works; construction of plant and equipment, and non-processing infrastructure (including bore field and water pipeline); camp construction and operations; freight and logistics and workforce transportation. The calculation methodology and assumptions are contained in the uploaded spreadsheet titled GHG Construction Emissions (Attachment 4).
Total Scope 2 greenhouse gas emissions: 0
Scope 2 emissions source and quantification method NA

Total scope 3 greenhouse gas emissions: 0
Scope 3 emissions source and quantification method NA
<u>Operation</u> **Total Scope 1 greenhouse gas emissions:** 3367700
Scope 1 emissions source and quantification method Caravel is working closely with Western Power to obtain all operational power supply from the existing regional electrical grid adjacent to the site within the Southwest Interconnected Network's North Country subregion. To the extent that Western Power cannot deliver power to site due to network constraints Caravel may at times supplement with onsite diesel and/or renewable energy solutions depending on the capacity and reliability of the grid power. To be conservative, this Proposal includes a worst-case scenario where diesel power is generated on site for all operations until the company confirms grid access with Western Power. The key sources of emissions include: groundwater abstraction (and pumping of water supply via a 60km pipeline to site); mining operations (including hauling, shovel operations and drill and blast activities); processing activities (including: crushing, milling and floatation and stockpiling of product).
Total Scope 2 greenhouse gas emissions: 0
Scope 2 emissions source and quantification method NA
Total scope 3 greenhouse gas emissions:0
Scope 3 emissions source and quantification method 0

2 Stakeholder information

2.1 Decision-making authorities

DMA: 1: Ms Michelle Andrews	
Organisation	Chief Executive Officer, Department of Water and Environmental Regulation
Legislation	Environmental Protection Act 1986
Approval required	
Mitigation of Impacts	Relevant Impact: Noise Emissions Key Environmental Factor: Social Surroundings: Can the DMA mitigate impacts and how will the EPA's factor be met? Yes While not expected to be significant, the primary source of noise emissions from the Proposal is the Processing Plant and the design of the plant will be assessed under Part V of the EP Act to ensure noise emissions are minimised and do not result in significant impacts to any sensitive receptors. Noise emissions from other aspects of the site are not expected to be significant and are unlikely to require additional regulation under Part IV of the EP Act in order to meet the objective for this factor. Relevant Impact: Dust Emissions Key Environmental Factor: Flora and Vegetation and Social Surroundings Can the DMA mitigate impacts and how will the EPA's factor be met? Yes While not expected to be significant, a primary source of dust emissions from the Proposal is the Processing Plant and the design of the plant will be assessed under Part V of the EP Act to ensure dust emissions are minimised and do not result in significant impacts to any sensitive receptors. In addition to regulation under Part V of the EP Act, dust emissions from all aspects of the site are regulated under the Mining Act 1978 (refer below) and are not expected to be significant. These emissions are unlikely to require additional

	regulation under Part IV of the EP Act in order to meet the objective for this factor.

DMA: 2: Ms Karen Caple	
Organisation	Executive Director, Resource and Environmental Compliance Division
Legislation	Mining Act 1978
Approval required	
Mitigation of Impacts	Relevant Impact: Changes to the stability of the landscape Key Environmental Factor: Terrestrial Environmental Quality, Inland Waters, Flora and Vegetation, Terrestrial Fauna Can the DMA mitigate impacts and how will the EPA's factor be met? Yes A Mining Proposal will be submitted to DMIRS prior to any disturbance at the Proposal and will include auditable outcomes for key DMIRS factors (Biodiversity, Water Resources, Land and Soils). These outcomes will be defined and approved by DMIRS to ensure that the impacts on the key DMIRS factors are mitigated to an acceptable level. In the context of landscape stability this will include an auditable outcome that the landscape will be safe and stable during mining to prevent slumps or collapsed walls which could have environmental impacts. An MCP will be submitted to DMIRS with the Mining Proposal prior to any disturbance at the Proposal and will be revised every 3 years. It will include auditable closure and rehabilitation outcomes and criteria which will be defined and approved by DMIRS to ensure that impacts on key DMIRS factors are mitigated to an acceptable level. The MCP will include an auditable outcome that the landscape will be safe and stable post-closure to prevent slumps or collapsed pits which could have environmental impacts. The implementation of the Mining Proposal and MCP under the Mining Act 1978 is considered suitable to mitigate this impact such that the EPA's objectives can be met. By meeting DMIRS's Factors, the Proposal will also meet the EPA's objectives for the relevant factors. Additional regulation under Part IV of the EP Act is therefore unlikely to be required for this potential impact. Relevant Impact: Clearing of native vegetation

	Key environmental Factor: Flora and Vegetation, Terrestrial Fauna Can the DMA mitigate impacts and how will the EPA's factor be met? Partially A Mining Proposal will be submitted to DMIRS prior to any disturbance at the Proposal and will include auditable outcomes for the key DMIRS factor: Biodiversity. These outcomes will include requirements for best-practice topsoil stripping and storage, rehabilitation, minimising the clearing footprint and taking accurate records. A MCP will be submitted to DMIRS with the Mining Proposal prior to any disturbance at the Proposal and will be revised every 3 years. It will include auditable closure and rehabilitation outcomes and criteria which will be defined and approved by DMIRS to ensure that cleared areas are rehabilitated to an acceptable level. In the context of vegetation clearing this will include an auditable outcome that the rehabilitated areas will meet specific closure criteria designed to ensure flora, vegetation and fauna values are reinstated. The implementation of the Mining Proposal and MCP under the Mining Act 1978 is considered suitable to mitigate rehabilitation and impacts during clearing however it is not considered suitable to mitigate impacts associated with the loss of vegetation. This is expected to require assessment under Part IV of the EP Act to ensure that the EPA's objectives can be met. Relevant Impact: Introduction and spread of weeds Key Environmental Factor: Flora and Vegetation Can the DMA mitigate impacts and how will the EPA's factor be met? Yes The approved Mining Proposal and MCP will define outcomes to ensure that the Factors defined in DMIRS's Environmental Objectives - Policy and Mining (DMIRS, 2020) are met for the Proposal. The DMIRS Factor: Biodiversity, is relevant to this impact: DMIRS's objective for this factor is: Maintain representation, diversity, viability and ecological function at the species, population and community level. These outcomes will be defined and approved by DMIRS to ensure that impacts associated with weeds are mitigated to an acceptable level. This will include an auditable outcome to

	prevent the introduction or spread of any new weed species or populations during construction, operation or closure. By meeting these outcomes and the objective of DMIRS's Biodiversity Factor, the Mining Proposal and MCP will ensure that the EPA's objective for flora and vegetation is met. Therefore, further regulation for the impact of the introduction and spread of weeds is not required to be assessed by the EPA. Relevant Impact: Alteration to the post mining land use Key Environmental Factor: Social Surroundings Can the DMA mitigate impacts and how will the EPA's factor be met? Yes Approval of a Mining Proposal and MCP will ensure that the Factors defined in DMIRS's Environmental Objectives - Policy and Mining (DMIRS, 2020) are met for the Proposal. The DMIRS Factor: Rehabilitation and Mine Closure, is relevant to this impact. DMIRS's objective for this factor is: Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/non-contaminating, and capable of sustaining an agreed post-mining land use, and without unacceptable liability to the State. By meeting the objective of DMIRS's Rehabilitation and Mine Closure Factor, the Proposal will also meet the EPA's objectives for social surroundings that are relevant to this impact. Additional regulation under Part IV of the EP Act is therefore unlikely to be required for this potential impact.

DMA: 3: Mr Iain Dainty	
Organisation	Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety
Legislation	Dangerous Goods Safety Act 2004
Approval required	
Mitigation of Impacts	Relevant Impact: Contamination of soils, groundwater and surface water (hydrocarbon spills), Fire (combustion of stored fuel) Key Environmental Factor: Terrestrial Environmental Quality, Inland Waters, Flora and Vegetation, Terrestrial Fauna

	Can the DMA mitigate impacts and how will the EPA's factor be met? Yes The storage and management of hydrocarbons will already be regulated under Part V of the EP Act and the Mining Proposal/MCP however the DG Licence provides additional mitigation for the design and storage of larger volumes of dangerous goods (if large volumes of hydrocarbons (>100,000 L) are required to be stored on site). A DG Licence sets standards for the way in which DGs are stored on site. These standards are aimed at ensuring DGs are stored safely and in such a way that will not result in impacts to the environment. Having a DG Licence ensures potential spills and combustion risks from the Proposal are mitigated. A DG Licence (in combination with the Part V and Mining Act 1978 approvals) will meet the objectives of the EPA for both factors by minimising the risk of contamination of soils and water, and protecting flora and vegetation, and terrestrial fauna by minimising the risk of fire. Regulation of the potential impacts on the environment from the storage of DG is therefore not expected to be required under Part IV of the EP Act.

DMA: 4: Mr Stuart Taylor	
Organisation	Chief Executive Officer, Shire of Wongan-Ballidu
Legislation	Local Government Act 1995
Approval required	
Mitigation of Impacts	Relevant Impact: Noise emissions, Dust emissions Key Environmental Factor: Social Surroundings Can the DMA mitigate impacts and how will the EPA's factor be met? No A development approval is only required for works outside of Mining Act 1978 tenure. This process considers the impacts from small portions of the Proposal to an extent but does not regulate emissions from the Proposal. Potential impacts including emissions of noise and dust are regulated under Part V of the EP Act and are discussed further in the section above.

DMA: 5: Hon. Dave Kelly

Organisation	Minister for Water
Legislation	Rights in Water and Irrigation Act 1914
Approval required	
Mitigation of Impacts	Relevant Impact: Abstraction of groundwater from the unnamed Aquifers, Alteration of surface water flows Key Environmental Factor: Inland Waters Can the DMA mitigate impacts and how will the EPA's factor be met? Yes A 26D Licence ensures that bores are drilled, constructed, and maintained appropriately to ensure the aquifer and the groundwater resource is not compromised. A 5C Licence regulates the taking of water and assesses the impacts of the abstraction on the environment and other users. A 5C Licence is only granted if the impacts from the abstraction are shown to be sustainable with minimal environmental impacts or impacts to other users. 26D licences for the Proposal have been issued. Licence holders are obligated to comply with their resource allocation and any conditions included in the licence. Licence holders are also required to use water efficiently and responsibly, minimising impacts to the water resource. These Licences will ensure the Proposal meets the EPA's objective for Inland Waters by maintaining the hydrological regime of groundwater. Regulation of the potential impacts on the environment from the drilling and abstraction of groundwater is therefore not expected to be required under Part IV of the EP Act. A Bed and Banks Permit is required on a mining lease within a proclaimed surface water area for the taking, storing or diverting of water. Depending on the final footprint a Bed and Banks Permit may be required for the Proposal. The Bed and Banks Permit will allow the obstruction or interference with the bed and banks of a watercourse.

DMA: 6: Hon. Dr Tony Buti	
Organisation	Minister for Aboriginal Affairs
Legislation	Aboriginal Heritage Act 1972
Approval required	
Mitigation of Impacts	Relevant Impact: Disturbance of Aboriginal Heritage Sites

	Key Environmental Factor: Social Surroundings Can the DMA mitigate impacts and how will the EPA's factor be met? Yes Given the flexibility available to the Proposal the disturbance of Aboriginal Heritage sites is unlikely to be required. However, an application for a permit under Section 18 of the AH Act or Part 6 of the ACH Act will assess the significance of the proposed disturbance and determine what mitigation measures are required to obtain consent for any disturbance to an Aboriginal Heritage Sites. This consultation and assessment process will meet the EPA's objective for Social Surrounds by protecting registered Aboriginal Heritage sites from significant harm. Relevant Impact: Disturbance or indirect impacts to areas or artefacts of Aboriginal cultural value Key Environmental Factor: Social Surroundings Can the DMA mitigate impacts and how will the EPA's factor be met? No (if avoidance is not possible) Given the flexibility available to the Proposal areas or artefacts of significant Aboriginal cultural value are expected to be able to be avoided. However, if disturbance or indirect impacts within these areas cannot be avoided then assessment and potential regulation under Part IV of the EP Act may be required.

DMA: 7: Ms Tanya Plibersek	
Organisation	Department of Climate Change, Environment, Energy, and Water
Legislation	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
Approval required	
Mitigation of Impacts	Relevant Impact: Direct impacts to Threatened Fauna (Vehicle Strike) Key Environmental Factor: Terrestrial Fauna Can the DMA mitigate impacts and how will the EPA's factor be met? No While there is likely to be significant overlap in regulation, the EPBC Act is a Commonwealth Act and as such cannot be relied upon to regulate impacts under WA legislation.

	Relevant Impact: Clearing of potential Threatened Flora or Fauna habitat Key Environmental Factor: Flora and Vegetation, Terrestrial Fauna Can the DMA mitigate impacts and how will the EPA's factor be met? No While there is likely to be significant overlap in regulation, the EPBC Act is a Commonwealth Act and as such cannot be relied upon to regulate impacts under WA legislation.

2.2 Tenure and Local Government approvals

Local Government Authority in which the proposal is located.

Shire of Wongan Ballidu and Shire of Victoria Plains

Rezoning details

Current land use

The Proposal is to be implemented on a mix of freehold farmland, Unallocated Crown Land, and Mining Leases and Licences. The Proposal will also cross railway and road reserves.

Legal access requirements

Land Tenure

The Proposal is to be implemented on a mix of freehold farmland, Unallocated Crown Land, and Mining Leases and Licences. The Proposal will also cross railway and road reserves.

Other Decision-Making Authorities, Approvals and Regulation

Other key approvals and regulations that apply to the Proposal are detailed below:

- Mining Proposal and Mine Closure Plan is required under the Mining Act for all proposed activities on Mining Act tenure;
- Project Management Plan is required under the Mines Safety and Inspection Act 1994 for all proposed activities on Mining Act tenure;
- 26D Licence is required under the Rights in Water and Irrigation Act 1914 (WA) for exploration for groundwater sources;
- 5C Licence is required under the Rights in Water and Irrigation Act 1914 (WA) for groundwater abstraction;
- Bed and Banks Permit is required under the Rights in Water and Irrigation Act 1914 (WA) to interfere or obstruct a watercourse (if required based on final design);
- Works Approval and Licence is required under Part V EP Act (WA) for ore processing and other associated activities;
- Section 18 approval may be required under the Aboriginal Heritage Act 1972 (AH Act), or Part 4 of the Aboriginal Cultural Heritage Act 2021 (ACH Act) for the disturbance of Aboriginal heritage sites (if recorded and cannot be avoided); and
- Dangerous Goods Licence may be required under the Dangerous Goods Safety Act 2004 (WA) for Fuel and/or chemical storage (if above prescribed volumes).

Tenure details

Activity: Mining	
Land tenure/access	Mining Lease
Type of approval & regulating legislation	Mining lease under the Mining Act 1978

2.3 Key stakeholders, consultation register, and consultation summary

Key stakeholders

Name: Environmental Protection Authority	
Organisation	Department of Water and Environmental Regulation
Role	

Name: Department of Climate Change, Energy, the Environment and Water	
Organisation	Department of Climate Change, Energy, the Environment and Water
Role	

Name: Member for Moore	
Organisation	
Role	

Name: Department of Mines, Industry Regulation and Safety	
Organisation	Department of Mines, Industry Regulation and Safety
Role	

Name: Department of Jobs, Tourism, Science and Innovation	
Organisation	Department of Jobs, Tourism, Science and Innovation
Role	

Name: Department of Primary Industries and Regional Development	
Organisation	Department of Primary Industries and Regional Development
Role	

Name: Minister for Environment	
Organisation	
Role	

Name: Minister for Water	
Organisation	
Role	

Name: Minister for Regional Development	
Organisation	
Role	

Name: Shire of Wongan-Ballidu	
Organisation	Shire of Wongan-Ballidu
Role	

Name: Shire of Victoria Plains	
Organisation	Shire of Victoria Plains
Role	

Name: Main Roads Western Australia	
Organisation	Main Roads Western Australia
Role	

Name: Western Power	
Organisation	Western Power
Role	

Name: Wheatbelt Development Commission	
Organisation	Wheatbelt Development Commission
Role	

Name: Wongan-Ballidu Progress Association	
Organisation	Wongan-Ballidu Progress Association

Role	

Name: Landowners/Farmers	
Organisation	Landowners/Farmers
Role	

Name: Wheatbelt Business Network	
Organisation	Wheatbelt Business Network
Role	

Name: Regional Development Australia - Wheatbelt Inc.	
Organisation	Regional Development Australia
Role	

Name: South West Land and Sea Council	
Organisation	South West Land and Sea Council
Role	

Name: Yued People	
Organisation	Yued People
Role	

Name: Ballardong People	
Organisation	Ballardong People
Role	

Name: Centre for Transformation in Mining Economies	
Organisation	Centre for Transformation in Mining Economies
Role	

Describe Stakeholders

Caravel has a Consultation Strategy which identifies key external stakeholders and determines how they will be impacted by the Proposal and what influence they have over its implementation.

Caravel has held pre-referral meetings with the Department of Climate Change, Energy, The Environment and Water (DCCEEW), EPA Services, and Industry Regulation and Water Licencing at the Department of Water and Environmental Regulation (DWER) regarding the Caravel Copper Project, and their comments have been incorporated into this Section 38 Referral where applicable.

Caravel has also consulted with the Local, State and Commonwealth Governments, Aboriginal groups with a connection to the Proposal lands, existing landholders and other community stakeholders.

In preparation of this referral, Caravel has consulted with environmental consultants regarding the potential impacts to the Key Environmental Factors. The outcomes of this consultation have led to the current design of the Proposal, which provides flexibility to minimise direct impacts to this factor.

Consultation register

Name: Environmental Protection Authority	
Date of consultation	27-01-2022
Interactions and outcomes	Pre-referral meeting

Name: Department of Climate Change, Energy, the Environment and Water	
Date of consultation	27-01-2022
Interactions and outcomes	Pre-referral meeting

Consultation summary

Extensive consultation has been completed across a broad range of stakeholders.

Caravel have met many times and continue to meet with the Yued Aboriginal Group on which who's land the Project is planned to be constructed and operated and has completed heritage surveys across the entire mining and processing disturbance footprint.

Caravel has met with all the regulators that are required to provide approvals for the Project and continue to consult with them as necessary.

Caravel meets regularly with the local Shire and shire members to consult on proposed Project development and operation and how to best integrate this with the shire and local towns.

Caravel has spent many years building relationships with the farming community and farm owners who's land the project is proposed to be constructed and operated.

Caravel is currently preparing a comprehensive stakeholder consultation report in preparation for the ERD.

Lead agency status and relevant information

- **Lead agency status (yes/no):** No

2.4 Commonwealth Government approvals

- **Actions that may be or are a controlled action under the EPBC Act (yes/no):** Yes
- **Referral to the Commonwealth (yes/no):** Yes
    - **Date of referral:** 05-12-2023
    - **EPBC Reference number:** EPBC 2022/09422
    - **Decision made (yes/no):** No
        - **Controlled or not a controlled action:** Not Controlled
        - **Bilateral/Accredited assessment details:**

- **Approvals required from other Commonwealth Government department's (yes/no):** No
    - **Details of approvals required**

3 Alternatives to the proposal

Description of alternative considerations:

Alternative 1	
Type	No Development
Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

Alternative 2	
Type	Timeline
Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

Alternative 3	
Type	Location
Description	This is not being considered as the mineralisation is unique to this location.
Description of the changes to impacts and mitigations	This is not being considered

Alternative 4	
Type	Element
Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

Alternative 5	
Type	Activity

Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

Alternative 6	
Type	Technology
Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

Alternative 7	
Type	Other
Description	This is not being considered
Description of the changes to impacts and mitigations	This is not being considered

4 Environmental Review

4.1 Aspects

Aspect 1: Altered light	
Type	Altered light
Description	
Characterisation	Construction and operation activities may generate light emissions resulting in impacts to habitat vegetation health or alterations to fauna behaviours (including feeding or breeding behaviours). Mining operations, processing and haulage of product has the potential to emit light.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Power/energy production*) • Mine and Associated Infrastructure(*Ore processing*)

Aspect 2: Altered surface water regimes	
Type	Altered surface water regimes
Description	
Characterisation	Alterations to surface water regimes may result in indirect impacts to the health of downstream vegetation or direct impacts to aquatic fauna. Alteration to surface water flow regimes within the MSDE resulting in indirect impacts to Lake Ninan and small claypans/playas downstream of the MSDE. Changes to surface water flows from the construction of a reservoir within the bore field.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 3: Change in groundwater levels (abstraction / dewatering)	
Type	Change in groundwater levels (abstraction / dewatering)
Description	
Characterisation	Alterations to groundwater regimes may result in indirect impacts to the health of downstream groundwater-dependent vegetation or direct impacts to aquatic fauna. Abstraction of 16 GL of groundwater per year from the unnamed aquifers pumped via an approximately 60 km pipeline to the mine site. Groundwater drawdown due to dewatering at the mine site impacting on aquifers.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*) • Additional Infrastructure(*Groundwater abstraction/dewatering*)

Aspect 4: Clearing of vegetation	
Type	Clearing of vegetation
Description	
Characterisation	Direct disturbance that includes clearing areas of native vegetation within an 8,541 ha MSDE and within the Additional Infrastructure (PDE and BDE) areas.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*) • Additional Infrastructure(*Groundwater abstraction/dewatering*)

Aspect 5: Direct/indirect Anthropogenic	
Type	Direct/indirect Anthropogenic
Description	
Characterisation	Vehicle traffic and earthmoving activities may result in death or injury to fauna from vehicle strike.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 6: Dust Deposition	
Type	Dust Deposition
Description	
Characterisation	Construction and operation activities may generate dust which may impact on vegetation health and condition, including fauna habitat, or generate dust resulting in alterations to fauna behaviors (including feeding or breeding behaviors).
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 7: Emissions to air	
Type	Emissions to air
Description	
Characterisation	The Proposal will generate GHG emissions predominantly from energy consumed from the Western Power grid and supplementary fuel combustion and power generation should Western Power supply be inadequate. GHG emissions during the Proposal construction phase were estimated at 38,152 t CO2-e by Ausenco. The planned operating model is to use ACE technologies to maximise safety and efficiency and significantly reduce

	GHG emissions. The ACE model is the current preferred operating model subject to feasibility studies and appropriate commercial agreements. GHG emissions for the Proposal operations phase have been estimated at a worst case average of 129,000 t CO2-e per year, peaking at 170,000 t CO2-e at peak operating capacity. The worst-case model has been utilised as Caravel has not secured final energy supply agreements with Western Power and assumes utilisation of fossil fuel powered fixed and mobile equipment and power generated by onsite diesel generators during operations. Under the preferred operating model, where power supply is sourced from the existing regional electrical grid, the GHG emissions will include Scope 2 GHG emissions.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 8: Introduction / spread of invasive species	
Type	Introduction / spread of invasive species
Description	
Characterisation	Vehicle traffic and earthmoving equipment may introduce or spread weeds. Clearing of land resulting in favourable conditions for predatory fauna and subsequently, increased predation or competition from introduced fauna.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 9: Land degradation - Salinity	
Type	Land degradation - Salinity
Description	

Characterisation	Salinity reducing the likelihood of rehabilitation success at closure.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 10: Land degradation - Soil erosion	
Type	Land degradation - Soil erosion
Description	
Characterisation	Erosion associated with vegetation clearing and changes to surface water regimes. Loss of sediment to the surrounding terrestrial environment during construction. Ongoing impacts from erosion associated with mine closure if not carried out properly.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 11: Noise	
Type	Noise
Description	
Characterisation	Mining operations, processing and haulage of product has to potential to emit noise. Construction and operation activities may generate noise emissions resulting in alterations to fauna behaviours (including feeding or breeding behaviours).
Elements and Activities Sources	• Additional Infrastructure(*Groundwater abstraction/dewatering*) • Additional Infrastructure(*Groundwater abstraction/dewatering*) • Mine and Associated Infrastructure(*Ore processing*)

Aspect 12: Release / contamination to land	
Type	Release / contamination to land
Description	
Characterisation	Potential impact from acid-forming material in waste rock landforms and tailings storage facility. Disturbance of acid sulphate soils. Ongoing impacts from contamination associated with mine closure if not carried out properly. Mining activities may result in indirect impacts such as hydrocarbon spills.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 13: Releases to water (groundwater / surface water)	
Type	Releases to water (groundwater / surface water)
Description	
Characterisation	Leaks or spillages of hydrocarbons during construction and operations resulting in groundwater or surface water contamination. Sedimentation during construction or from pit dewatering resulting in downstream impacts to surface waters. Seepage, runoff and/or discharge from mine impoundments such as ROM pads, stockpiles, and tailings storage impacting surface and groundwater quality. Formation of pit lake at closure that impacts on water quality.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

Aspect 14: Social surroundings	
Type	Social surroundings
Description	
Characterisation	The Proposal will require the clearing of native vegetation and ground disturbance which may result in potential disturbance to Aboriginal Heritage sites or artifacts that have not yet been discovered or recorded (additional surveys required), although the Proposal is likely to be able to avoid impacting the integrity of all significant sites. Mining operations, processing and haulage of product has to potential to emit noise, light and dust. Impacts to visual amenity from mine infrastructure and waste rock landforms.
Elements and Activities Sources	• Mine and Associated Infrastructure(*Ore processing*)

4.2 Mitigations

Mitigation 1: Design Considerations	
Description	The waste landforms and tailings storage facility will be designed in consideration of relevant flood events.
Related aspects:	• Releases to water (groundwater / surface water)

Mitigation 2: Dust Mitigation	
Description	Water or dust suppressants will be applied to disturbed areas, mining areas and product

	transfer/storage areas as required to minimise dust generation
Related aspects:	• Dust Deposition

Mitigation 3: Excluded Areas	
Description	Koodjee Nature Reserve and Lake Ninan Nature Reserve have been excluded from the Proposal footprint so as to eliminate direct impacts to fauna habitat within the Reserves. Modifying the Proposal MSDE so as to exclude Carnaby's Cockatoo breeding or foraging habitat as much as possible. Modifying the Proposal MSDE so as to exclude the two brackish sites found to provide habitat for the western minnow and avoiding impacting the sites where aquatic invertebrate fauna with potential conservation significance where recorded.
Related aspects:	• Clearing of vegetation

Mitigation 4: Fauna Habitat Management Plan	
Description	A Fauna Habitat Management Plan that addresses the restoration of Carnaby's Cockatoo habitat will be developed and implemented.
Related aspects:	• Clearing of vegetation • Introduction / spread of invasive species • Direct/indirect Anthropogenic

Mitigation 5: Flexibility

Description	Provide flexibility within the Development Envelopes to allow for, as much as possible, the avoidance of any significant flora / habitat.
Related aspects:	• Clearing of vegetation

Mitigation 6: Flora and Vegetation Management Plan	
Description	Development and implementation of a Flora and Vegetation Management Plan
Related aspects:	• Clearing of vegetation • Introduction / spread of invasive species • Altered surface water regimes • Dust Deposition • Land degradation - Soil erosion

Mitigation 7: Ground Disturbance Procedures	
Description	Vegetation clearing will be managed through internal ground disturbance procedures/ground disturbance permit system.
Related aspects:	• Clearing of vegetation

Mitigation 8: Groundwater Integrity	
Description	Groundwater abstraction at bore fields will target sustainable yield thereby ensuring that aquifers are not overdrawn to below pre-European disturbance levels (as defined by groundwater studies described below) in vegetated areas eliminating potential impacts to Groundwater Dependent Vegetation and aquatic fauna.

	Abstraction will also target: 1. Saline groundwater sources to reduce the contamination of freshwater resources in close proximity to them; and 2. Groundwater close to the surface in order to potentially reduce waterlogging in salt-affected areas which is currently causing degradation of agricultural land.
Related aspects:	• Change in groundwater levels (abstraction / dewatering) • Land degradation - Salinity

Mitigation 9: Implementation of Industry Standard Measures	
Description	Implementation of industry standard measures for hydrocarbon storage and handling to minimise the risk and impact of hydrocarbon spills Implement industry-standard controls for sedimentation Implement industry standard controls for dust management Implement industry standard controls for noise management
Related aspects:	• Release / contamination to land • Releases to water (groundwater / surface water) • Dust Deposition • Noise

Mitigation 10: Management and Mitigation of GHG Emissions	
Description	Utilisation of ACE operating model Use of renewable sources of energy A GHG Management Plan will be developed and implemented to enable the Proposal to achieve its objectives of net-zero GHG emissions by 2050 Caravel will mitigate potential impacts from GHG emissions according to the mitigation hierarchy; avoid, reduce and offset. Where carbon emissions cannot be avoided or reduced to enable Caravel to achieve its objectives, carbon offsets will be acquired. Caravel will investigate opportunities to offset carbon (as required) through revegetation projects on farmlands both within the MSDE, and in surrounding areas.
Related aspects:	• Emissions to air

Mitigation 11: Management of Acid Sulfate Soils	
Description	Identification and management of acid sulfate soils (if present).
Related aspects:	• Release / contamination to land • Releases to water (groundwater / surface water)

Mitigation 12: Management of Surface Water Flows	
Description	Maintain existing surface water flow regimes as much as possible with the installation and maintenance of surface water/drainage infrastructure across the MSDE

	Capture and treat contaminated water from disturbance areas and return to process water or dispose of prescribed waste
Related aspects:	• Altered surface water regimes • Land degradation - Soil erosion • Releases to water (groundwater / surface water)

Mitigation 13: Mine Closure	
Description	Implementation of a Mine Closure Plan under the Mining Act 1978. Materials characterisation will be undertaken to understand potential for impact from acid forming materials in tailings and waste rock landforms and tailings storage facilities will be managed in accordance with Mining Act 1978 approvals. Undertake engineering studies to ensure remaining waste rock landforms and tailings management facilities are safe and stable.
Related aspects:	• Altered surface water regimes • Release / contamination to land • Releases to water (groundwater / surface water) • Introduction / spread of invasive species • Clearing of vegetation • Land degradation - Salinity

Mitigation 14: Minimum Extent of Disturbance

Description	The MSDE will be developed to the minimum extent required to ensure safe and adequate construction and operation and will, as much as possible, maximise the usage of previously disturbed areas
Related aspects:	• Clearing of vegetation

Mitigation 15: Revegetation	
Description	Undertaking revegetation programs to improve the vegetation condition of existing TECs within the MSDE. Planting native vegetation windrows along several roadside boundaries of the mine site and road realignment development envelope so as to improve visual amenity and provide fauna connectivity corridors. Progressive clearing and rehabilitation will be undertaken.
Related aspects:	• Altered surface water regimes • Clearing of vegetation

Mitigation 16: Social Surroundings	
Description	Results of Aboriginal Heritage surveys have been, and will be, utilised to design the development envelopes so as to minimise impact to recorded areas of Aboriginal heritage significance. Additional Aboriginal Heritage surveys will continue to be conducted in the development envelopes during the Part IV EP Act assessment process.

	Provide flexibility within the development envelopes to allow the avoidance of any significant cultural heritage sites. Approval will be sought under Section 18 of the AH Act or Part 4 of the ACH Act for the Moore River crossing and any registered Aboriginal Heritage sites that cannot be avoided. Caravel will investigate potential construction options for the pipeline crossing that do not involve disturbing the Moore River crossing, in consultation with the Yued People. Continued consultation with the Traditional Owners regarding the minimisation of impacts to traditional uses of the area. A Social, Cultural and Heritage Management Plan (SCHMP) will be developed. Vegetation clearing will be managed through internal ground disturbance procedures/ground disturbance permit system. Native vegetation will be planted in windrows along several roadside boundaries of the mine site and road realignment development envelope to improve visual amenity and provide fauna connectivity corridors. Ongoing stakeholder consultation with Shire of Wongan-Ballidu regarding integration of project into the local and regional community. Potential property acquisition with access and amenity agreements with landowners.
Related aspects:	• Social surroundings • Clearing of vegetation

	• Dust Deposition • Noise • Altered light

Mitigation 17: Surface Water Management Plan	
Description	A Surface Water Management Plan will be developed and implemented for the Proposal.
Related aspects:	• Altered surface water regimes • Releases to water (groundwater / surface water) • Land degradation - Soil erosion

Mitigation 18: Weed Management	
Description	Weed hygiene and management measures/procedures will be implemented to prevent spread and introduction of weeds as a result of construction and operation.
Related aspects:	• Introduction / spread of invasive species

4.3 Environmental factors

Legislative context

Environmental Protection Act 1986 (WA)

The Proposal is expected to require assessment under Part IV of the Environmental Protection Act 1986 (WA; EP Act). Caravel will be seeking that the EPA conduct an accredited assessment for this Proposal if the Department of Climate Change, Energy, the Environment and Water (DCCEEW) consider it to be a 'Controlled Action'.

Land Tenure

The Proposal is to be implemented on a mix of freehold farmland, Unallocated Crown Land, and Mining Leases and Licences. The Proposal will also cross railway and road reserves, as described below.

Other Decision-Making Authorities, Approvals and Regulation

Mining Proposal and Mine Closure Plan is required under the Mining Act for all proposed activities on Mining Act tenure.

Project Management Plan is required under the Mines Safety and Inspection Act 1994 for all proposed activities on Mining Act tenure;

26D Licence is required under the Rights in Water and Irrigation Act 1914 (WA) for exploration for groundwater sources;

5C Licence is required under the Rights in Water and Irrigation Act 1914 (WA) for groundwater abstraction;

Bed and Banks Permit is required under the Rights in Water and Irrigation Act 1914 (WA) to interfere or obstruct a watercourse (if required based on final design);

Works Approval and Licence is required under Part V EP Act (WA) for ore processing and other associated activities;

Section 18 approval may be required under the Aboriginal Heritage Act 1972 (AH Act), or Part 4 of the Aboriginal Cultural Heritage Act 2021 (ACH Act) for the disturbance of Aboriginal heritage sites (if recorded and cannot be avoided); and

Dangerous Goods Licence may be required under the Dangerous Goods Safety Act 2004 (WA) for Fuel and/or chemical storage (if above prescribed volumes).

Local and Regional context

The Proposal is to be implemented on a mix of freehold farmland, Unallocated Crown Land, and Mining Leases and Licences. The Proposal will also cross railway and road reserves.

The Proposal is situated across three IBRA sub-regions. The mine site is within the Avon Wheatbelt Bioregion (AVW02 – Katanning) and the borefield is within the JAF01 (Northern Jarrah Forest) and SWA01 (Dandaragan Plateau) sub-regions. The Proposal is situated predominantly within cleared farmland used for cropping.

The Proposal occurs on predominantly degraded farm cropland and salt affected areas. Mattiske (2022b, Attachment 1) described the vegetation of the mine site area ranging from degraded to pristine. Large areas of crop farmland were considered to be completely degraded. Most of the larger remnant vegetation patches (those greater than 2 ha) had a condition rating of “degraded” to “pristine”, with the majority rated as “very good”.

There are no significant features within the MSDE. The closest significant features are Lake Ninan which lies to the north of the MSDE and the Moore River, a registered Aboriginal Site (20749) (DPLH, 2020), which will be crossed by the bore field pipeline. Koodjee Nature Reserve and Lake Ninan Nature and Recreational Reserves have been excluded from the footprint therefore the Proposal is not expected to directly impact these habitats..

Potentially significant environmental factors for the proposal:

- **Air quality:** No
- **Benthic communities and habitats:** No
- **Coastal processes:** No
- **Flora and vegetation:** Yes
- **Greenhouse gas emissions:** Yes
- **Human health:** No
- **Inland waters:** Yes
- **Landforms:** No
- **Marine environmental quality:** No
- **Marine fauna:** No
- **Social surroundings:** Yes
- **Subterranean fauna:** No
- **Terrestrial environmental quality:** Yes
- **Terrestrial fauna:** Yes

4.3.1 Air quality

Environmental objective

To maintain air quality and minimise emissions so that environmental values are protected.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

Health issues associated with dust emissions are likely to be minimal given the composition of the ore and the implementation of controls required by Works Approvals and Licences issued under Part V of the EP Act to minimise airborne dust. Impacts to amenity from dust emissions will be assessed under the Social Surroundings factor.

The Proposal may result in air emissions from power generation and vehicle exhaust but this will likely be reduced through the adoption of the ACE operating model and use of

renewable energy sources. Impacts will be further reduced through Caravel's strategy of acquiring properties located in proximity to (and within) the Proposal footprint. As a result, this factor is unlikely to be a Key Environmental Factor for the Proposal.

4.3.2 Benthic communities and habitats

Environmental objective

To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

Not Applicable

4.3.3 Coastal processes

Environmental objective

To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

Not Applicable

4.3.4 Flora and vegetation

Environmental objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

- An *Interim Flora and Vegetation Assessment* (comprising both desktop and field studies) was undertaken for the majority of the MSDE (Attachment 1, Appendix 3).
- An *Interim Threatened and Priority Ecological Communities* survey (comprising both desktop and field studies) was also undertaken for the majority of the MSDE (Attachment 1, Appendix 4).
- The Caravel Copper Project is situated across three IBRA sub-regions. The mine site is within the Avon Wheatbelt Bioregion (AVW02 – Katanning) and the borefield is within the JAF01 (Northern Jarrah Forest) and SWA01 (Dandaragan Plateau) sub-regions.
- The Proposal is situated predominantly within cleared farmland used for cropping.
- One species of Threatened Flora taxa pursuant to the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was recorded within the survey area. *Banksia serratuloides* subsp. *serratuloides* was recorded within the Koodjee Nature Reserve (within the bore fields study area) within two quadrats. The current records constitute a range extension for this species. Koodjee Nature Reserve has been excluded from the Proposal footprint therefore the Proposal is not expected to impact this species.
- Six priority flora taxa, as listed by the WA Herbarium (WAH) were recorded within the survey area. This included two from the mine site area and four from the Koodjee Nature Reserve. Records from within the study area constitute a range extension for *Eucalyptus arachnaea* subsp. arrecta (P3) and *Petrophile plumosa (P3)*. As above, Koodjee Nature Reserve has been excluded from the Proposal footprint and will not be included in the future development envelope for the borefield and pipeline. The planned pipeline corridor has changed since the above survey was undertaken. The amended pipeline corridor will utilise mostly previously disturbed farmland. Some scattered patches of remnant vegetation will be encountered. All areas of remnant vegetation along the amended pipeline corridor have been surveyed in September 2022, with a finalised report expected by Q1 2023.
- Two threatened ecological communities (TEC), as listed under the EPBC Act (both also listed as Priority 3 ecological communities (PEC's) by the Department of Biodiversity, Conservation and Attractions (DBCA) pursuant to the BC Act), either intersect or occur within the current broader study area. These are:
    - *Eucalypt Woodlands of the Western Australian Wheatbelt*, listed as Critically Endangered; and,
    - *Banksia Woodlands of the Swan Coastal Plain*, listed as Endangered.
- Additional field surveys were undertaken in September 2022, with future surveys also planned for October 2022, with finalised reports expected by Q1 2023.

- A total of 50 introduced species were recorded within the mine site study area, including one declared pest organism pursuant to the *Biodiversity and Agriculture Management Act 2007* (BAM Act), *Moraea flaccida* (one-leaf Cape tulip)
- The vegetation of the mine site study area ranged from degraded to pristine. Large areas of cropped farmland were considered to be completely degraded. Most of the larger remnant vegetation patches (those greater than 2 ha) had a condition rating of "degraded" to "pristine", with the majority rated as "very good".

EPA policy and guidance

EPA Objective: To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

Key EPA Documents

Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);

Statutory Guidelines for Mine Closure Plans (MCPs) (DMIRS, 2020);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare *Environmental Protection Act 1986* (EP Act) Part IV Environmental Management Plans (EPA, 2021d).

Relevant EPA Factor Guidelines

Environmental Factor Guideline - Flora and Vegetation (EPA, 2016a).

Relevant EPA Technical Guidance

Technical Guidance – Flora and Vegetation Surveys for EIA (EPA, 2016c); and
Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems (EPA, 2006).

Application of policies and guidance

This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
EPA technical guidance for Flora and Vegetation has been and will be used during the survey phase of the Proposal.

Description of environmental impacts

- Direct disturbance that includes clearing areas of native vegetation within an 8,541 ha MSDE, and disturbance within the borefield and pipeline corridor, including;
    - Potential impact to threatened and priority flora species; and
    - Potential impact to *Eucalypt Woodlands of the WA Wheatbelt* and *Banksia Woodlands of the Swan Coastal Plain* TECs/PECs.
- Vehicle traffic and earthmoving equipment may introduce or spread weeds;
- Construction and operation activities may generate dust which may impact on vegetation health and condition;
- Alterations to surface water and groundwater regimes may result in indirect impacts to the health of downstream groundwater-dependant vegetation (GDV); and
- Mining activities may result in indirect impacts such as hydrocarbon spills

Environmental Values Impact Assessments:

Offset explanation

Will be addressed in the ERD

Application of the mitigation hierarchy

Caravel will mitigate potential impacts to flora and vegetation according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset. The following measures are proposed to manage and mitigate the potential environmental impacts:

- The MSDE will be developed to the minimum extent required to ensure safe and adequate construction and operation and will, as much as possible, maximise the usage of previously disturbed areas;
- Provide flexibility within the Development Envelopes to allow for, as much as possible, the avoidance of any significant flora.
- Koodjee Nature Reserve has been excluded from the Proposal development envelopes;
- Modifying the MSDE so as to exclude areas identified as TEC/PEC as much as possible, and potentially undertaking revegetation programs to improve the vegetation condition of existing TECs within the MSDE;
- Planting native vegetation windrows along several roadside boundaries of the mine site and road realignment development envelope so as to improve visual amenity and provide fauna connectivity corridors;
- Development and implementation of a Flora Management Plan;
- Vegetation clearing will be managed through internal ground disturbance procedures/ground disturbance permit system;
- Progressive clearing and rehabilitation will be undertaken;
- Water or dust suppressants will be applied to disturbed areas, mining areas and product transfer/storage areas as required to minimise dust generation;
- Emergency and fire response capabilities will be maintained to respond to fire outbreaks where possible;
- Implementation of industry standard measures to minimise the risk and impact of hydrocarbon spills;
- Weed hygiene and management measures/procedures will be implemented to prevent spread and introduction of weeds as a result of construction and operation;
- Maintain existing surface water flow regimes as much as possible with the installation and maintenance of surface water/drainage infrastructure across the Proposal site;

- Groundwater abstraction at bore fields will target sustainable yield thereby ensuring that aquifers are not overdrawn (as defined by groundwater studies described below) in vegetated areas. Abstraction will also target saline groundwater sources and groundwater close to the surface in order to potentially reduce waterlogging in salt-affected areas causing degradation of agricultural land;
- Compliance with future approvals including a Ministerial Statement, Works Approval(s) and Mining Proposal;
- Implementation of a MCP under the *Mining Act 1978*; and
- Inclusion of offsets (as required) to mitigate any significant residual impact from the Proposal.

Assessment and significance of residual impacts

- Vegetation clearing resulting in direct disturbance of native vegetation within the MSDE, and native vegetation disturbance within the bore field and pipeline corridor is likely to be considered significant, including some potential *Eucalypt Woodlands of the Western Australian Wheatbelt* and the *Banksia Woodlands of the Swan Coastal Plain* TECs/PECs.
- There may be localised indirect impacts resulting from introduction or spread of weeds, generation of dust or hydrocarbon spills. However, through the implementation of mitigation measures described above, these incidents are expected to be rare and controlled and therefore not result in a significant impact.
- Given the widespread, significant impacts of secondary salinisation in the Wheatbelt region, abstraction of groundwater associated with the Proposal intends to target brackish groundwater and groundwater close to the surface in order to potentially reduce waterlogging in salt-affected areas which is causing degradation of agricultural land.

Likely environmental outcomes

The MSDE will be developed to the minimum extent required to ensure safe and adequate construction and operation and will, as much as possible, maximise the usage of previously disturbed areas.
Known locations of Threatened Flora will be avoided and indirect impacts from groundwater drawdown will be managed to ensure they are not significant. The Proposal may impact priority flora however the extent will not be understood until additional surveys are undertaken.
The borefield and pipeline corridor will utilise mostly previously disturbed farm cropland and vegetation disturbance will be minimised as much as possible therefore impacts are not likely to be significant.
To the extent possible, Caravel will modify the Proposal MSDE to exclude areas identified as TEC/PEC and will potentially undertake revegetation programs to improve the vegetation condition of existing TECs within the development footprint. In addition, native vegetation will be planted in windrows along several roadside boundaries of the mine site to improve visual amenity and provide fauna connectivity corridors. The planting of trees may also lower rising groundwater levels in the MSDE and create fauna habitat.

Offsets may be proposed to counterbalance residual impacts to these TECs/PECs.
Where possible, native vegetation disturbed for the Proposal will be progressively rehabilitated.
The Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained.

4.3.5 Greenhouse gas emissions

Environmental objective

To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

Not applicable to this factor.

EPA policy and guidance

EPA Objective: To reduce net greenhouse gas (GHG) emissions in order to minimise the risk of environmental harm associated with climate change.
Key EPA Documents
Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);
Statutory Guidelines for MCPs (DMIRS, 2020);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021d).
Relevant EPA Factor Guidelines
Environmental Factor Guideline – Greenhouse Gas Emissions (EPA, 2020c).
Application of Policies and Guidance
The Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
Surveys, studies and consultation for this factor are conducted in accordance with the guidance identified above.

Total calculated scope 1 emissions: 3405852

Total calculated scope 2 emissions: 0

Are there additional sources of Greenhouse Gas Emissions (yes/no – *if yes, then a description and additional source GHG estimation is provided*)

No

Description

Additional GHG Source:

<u>Commencement emissions summary:</u>

- **Scope 1 commencement emissions:**
- **Scope 2 commencement emissions:**
- **Scope 3 commencement emissions:**

<u>Net Scope 1 emissions:</u>

- **Commencement to 31 December 2024:**
- **1 January 2025 to 30 December 2029:**
- **1 January 2030 to 30 December 2034:**
- **1 January 2035 to 30 December 2039:**
- **1 January 2040 to 30 December 2044:**
- **1 January 2045 to 30 December 2050:**
- **30 December 2050 onwards:**

<u>Net Scope 2 emissions:</u>

- **Commencement to 31 December 2024:**
- **1 January 2025 to 30 December 2029:**
- **1 January 2030 to 30 December 2034:**
- **1 January 2035 to 30 December 2039:**
- **1 January 2040 to 30 December 2044:**
- **1 January 2045 to 30 December 2050:**
- **30 December 2050 onwards:**

Impact/emissions validation and verification

Proposal GHG emissions may be produced as a result of:

- Energy produced from the SWIS
- Energy produced from onsite power generation
- Vehicle fuel usage
- Clearing of vegetation (land use change).

The Proposal will generate GHG emissions predominantly from energy consumed from the Western Power grid and supplementary fuel combustion and power generation should Western Power supply be inadequate:

- GHG emissions during the Proposal construction phase were estimated at 38,152 t CO_2-e by Ausenco.
- The planned operating model is to use ACE technologies to maximise safety and efficiency and significantly reduce GHG emissions. The ACE model is the current preferred operating model subject to feasibility studies and appropriate commercial agreements.
- GHG emissions for the Proposal operations phase have been estimated at a worst case average of 129,000 t CO_2-e per year, peaking at 170,000 t CO_2-e at peak operating capacity. The *worst-case* model has been utilised as Caravel has not secured final energy supply agreements with Western Power and assumes utilisation of fossil fuel powered fixed and mobile equipment and power generated by onsite diesel generators during operations.

Under the preferred operating model, where power supply is sourced from the existing regional electrical grid, the GHG emissions will include Scope 2 GHG emissions.
Caravel will continue to refine predicted GHG emissions during ongoing feasibility studies for the Proposal and the ERD will provide evidence based bench-marking against similar projects.

Application of the mitigation hierarchy (proposed mitigation)

The following measures are proposed to manage and mitigate the potential environmental impacts from GHG emissions:

- Utilisation of ACE operating model;
- Use of renewable sources of energy;
- A GHG Management Plan will be developed and implemented to enable the Proposal to achieve its objectives of net-zero GHG emissions by 2050;
- Caravel will mitigate potential impacts from GHG emissions according to the mitigation hierarchy; avoid, reduce and offset. Where carbon emissions cannot be avoided or reduced to enable Caravel to achieve its objectives, carbon offsets will be acquired.
- Caravel will investigate opportunities to offset carbon (as required) through revegetation projects on farmlands both within the MSDE, and in surrounding areas.

Baseline monitoring and measurements for greenhouse gases

Will be addressed in the ERD

Monitoring and reporting program to measure atmospheric concentrations and process leakages

Will be addressed in the ERD

Assessment and significance of residual impacts

Implementation of the Proposal will generate GHG emissions, however through implementation of the ACE operating model, use of renewable energy sources, and carbon offsets as required, these will be significantly reduced and will enable Caravel to achieve its objective of Net Zero GHG emissions by 2050.
Therefore, the GHG emissions generated by the Proposal are not expected to have a significant impact

Likely environmental outcomes

The Proposal will be implemented to achieve an outcome of Net Zero GHG emissions by 2050 as will be demonstrated by a GHG Management Plan.
The Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to reduce net GHG emissions in order to minimise the risk of environmental harm associated with climate change.

4.3.6 Human health

Environmental objective

To protect human health from significant harm.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

The Proposal does not pose any foreseeable risk to Human Health

4.3.7 Inland waters

Environmental objective

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

A *Hydrogeological Assessment* (Pendragon, 2018a) was undertaken for the Proposal.

- The geology of the area comprises paleochannel sediments within and underlain by granite/gneiss bedrock which has been faulted and intruded by dykes of dolerite. The primary aquifers are:
    - Sediments confined to paleo channels or valleys; and
    - Weathered/fractured granite-gneiss bedrock, faulted in places and intruded by near-vertical dykes of dolerite.
- Groundwater has elevated concentrations of Total Dissolved Solids (between 1,900 mg/L and 5,000 mg/L), predominantly Chloride and Sodium, which often exceed the Australian Drinking Water Guidelines.
- The mine will be supplied with water from a bore field located west of the mine site via an approximately 60 km pipeline. The Koodjee Nature Reserve sits within the study area for the proposed bore field but has been excluded from the disturbance footprint. An approximately 60 ha reservoir may be excavated within the borefield to capture winter flood waters and store water abstracted from the bore field.
- Due to limited volumes available from mine dewatering, Caravel will target two potential sources of additional water from unnamed aquifers. One is located to the east of the Perth Basin proclaimed area in the Gillingarra Paleochannel. The second is located in an area characterised by DWER as containing fractured rock aquifers between the Muchea and Darling Faults. This location is within the proclaimed area but distinct to the Perth Basin.
- In addition, Caravel will consider purchasing existing allocations from other Licensees.
- An additional water source to provide approximately 1 GL of hypersaline water per annum from a bore field immediately north of the mine site (within the DE, as indicated in Figure 3) is being investigated, pending further studies).
- The Proposal can utilise brackish water therefore drawdown may have the benefit of reducing waterlogging in salt-affected areas.
- The final water source will be determined pending further studies. This includes bore field pump testing and further hydrogeological investigations for the mine and bore field areas, including detailed groundwater modelling for the bore field. It is anticipated that these will be concluded by Q1 2023.

A *Hydrological (Surface Water) Assessment* (Pendragon, 2018b) was undertaken for the Proposal and Biologic (2022) also describes the hydrology for the Proposal:

- The Proposal falls within the Mortlock River North Catchment, a tributary of the Avon River. The Mortlock River system discharges significant flow, salt and nutrients, particularly total phosphorus to the Avon River west of Northam. There are a range of minor creek and perched water bodies across the Project Area; the creek systems remain dry for the majority of the year.
- The mine site is located within the proclaimed Avon River Catchment Area (Surface Water Area proclaimed under the *Rights in Water and Irrigation Act 1914*) and Avon River Management Area (*Waterways Conservation Act 1976*).
- Agricultural land use within the Wheatbelt has resulted in significant hydrological imbalance as once perennial woodlands and shrubs were converted to annual crops.
- The broad landscapes in the Wheatbelt are very flat and often filled with mosaics of saline, seasonally filled claypans/playas.
- Water levels are determined by a combination of surface run-off, subsurface flow and groundwater discharge as winter rains recharge aquifers. Most years, rainfall is insufficient to cause systems to flow, and the high rates of evaporation mean that many aquatic habitats are dry for much of the year.
- Although wetlands in the Wheatbelt are commonly saline, fresh and brackish wetlands can occur adjacent to highly saline systems. Such fresh systems provide an important refuge for freshwater aquatic fauna in the region.
- Further surface water studies will be undertaken for the MSDE. It is anticipated that these will be concluded by Q1 2023

EPA policy and guidance

EPA Objective: To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

Key EPA Documents

Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);
Statutory Guidelines for MCPs (DMIRS, 2020);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021d).

Relevant EPA Factor Guidelines

Environmental Factor Guideline – Inland Waters (EPA, 2018).

Application of Policies and Guidance

The Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
Groundwater and surface water investigations will be conducted in accordance with the guidance identified above.
Key EPA documents and Factor Guidelines for inland waters will be used during the refinement of the Proposal design to minimise impact to inland waters and in determining mitigation strategies for the Proposal.

Description of environmental impacts

- Abstraction of 16 GL of groundwater per year from the unnamed aquifers pumped via an approximately 60 km pipeline to the mine site.
- Groundwater drawdown due to dewatering at the mine site impacting on aquifers.
- Alteration to surface water flow regimes within the MSDE resulting in indirect impacts to Lake Ninan and small claypans/playas downstream of the MSDE.
- Changes to surface water flows from the construction of a reservoir within the bore field.
- Leaks or spillages of hydrocarbons during construction and operations resulting in groundwater or surface water contamination.
- Sedimentation during construction or from pit dewatering resulting in downstream impacts to surface waters.
- Seepage, runoff and/or discharge from mine impoundments such as ROM pads, stockpiles, and tailings storage impacting surface and groundwater quality.
- Formation of pit lake at closure that impacts on water quality.

Environmental Values Impact Assessments:

Offset explanation

Application of the mitigation hierarchy

The following measures are proposed to manage and mitigate the potential environmental impacts to inland waters:

- Groundwater abstraction at the bore field will target sustainable yield thereby ensuring that aquifers are not overdrawn (as defined by groundwater studies) in vegetated areas. Abstraction will also target saline groundwater sources and groundwater which is close to the ground surface which is causing degradation of agricultural land.
- Obtaining and complying with Licences issued under the *Rights in Water and Irrigation Act 1914* (WA) for the drilling and abstraction of 16 GL/yr from the unnamed aquifers (if required).
- Identification and management of acid sulfate soils (if present).
- Lake Ninan Nature Reserve has been excluded from the MSDE.
- Maintain existing surface water flow regimes as much as possible with the installation and maintenance of surface water/drainage infrastructure across the MSDE.
- The waste landforms and tailings storage facility will be designed in consideration of relevant flood events.
- A Surface Water Management Plan will be developed and implemented for the Proposal.

- Obtaining and complying with and required Licences/Permits for the Avon River Catchment Area proclaimed under the *Rights in Water and Irrigation Act 1914* and Avon River Management Area under the *Waterways Conservation Act 1976*.
- Implementation of industry standard measures to minimise the risk and impact of hydrocarbon spills.
- Compliance with future approvals including a Ministerial Statement, Works Approval(s) and Mining Proposal.
- Implementation of a MCP under the *Mining Act 1978*

Assessment and significance of residual impacts

Lake Ninan Nature Reserve has been excluded from the Proposal footprint therefore no Proposal-attributable impact to the lake is anticipated.
Surface water regimes will be maintained to the extent possible and groundwater abstraction will target sustainable yield thereby ensuring that aquifers are not overdrawn in vegetated areas.
There may be localised indirect impacts resulting from hydrocarbon spills or sedimentation however, through the implementation of mitigation measures described above, these incidents are expected to be rare and controlled and therefore not result in a significant impact.

Likely environmental outcomes

The Proposal will require the abstraction of groundwater. Caravel intends to target brackish groundwater and groundwater close to the surface in order to potentially reduce waterlogging in salt-affected areas which is causing degradation of agricultural land. Furthermore, Caravel will target sustainable yields thereby ensuring that aquifers are not overdrawn and Groundwater Dependent Ecosystems are not adversely impacted Caravel will undertake additional hydrogeological and surface water investigations to determine the most appropriate water source for the Proposal, and to ensure that impacts from abstraction are not significant and may potentially provide some environmental benefit through lowering the water table in salt-affected areas.
Existing surface water flow regimes will be maintained to the extent possible via the installation and maintenance of surface water/drainage infrastructure across the site.
Contamination of Inland Waters is possible from unintentional discharges to the environment. By implementing the mitigation measures described above, Caravel expects that the Proposal will be appropriately managed and unintentional discharges would be unlikely to result in significant impacts to the environment.
The Proposal can be implemented consistent with the EP Act principles and achieving the EPA's objective to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Mine closure will need to meet DMIRS requirements to be safe, stable and non-polluting including for any pit lakes that are formed. Whilst groundwater abstraction will also be licensed as required under the *Rights in Water and Irrigation Act 1914* within proclaimed areas and for artesian bore abstraction

4.3.8 Landforms

Environmental objective

To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

The MSDE does not contain any significant landforms and the water pipeline and borefield are unlikely to traverse significant landforms. The Landforms factor is therefore not relevant to the Proposal.

4.3.9 Marine environmental quality

Environmental objective

To maintain the quality of water, sediment and biota so that environmental values are protected.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

Not Applicable

4.3.10 Marine fauna

Environmental objective

To protect marine fauna so that biological diversity and ecological integrity are maintained.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

Not Applicable

4.3.11 Social surroundings

Environmental objective

To protect social surroundings from significant harm.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

An archaeological and ethnographic *Aboriginal heritage survey* was undertaken for the MSDE (Dortch Cuthbert, 2022).

- The Proposal lies within the former Yued native title claim boundaries (WAD6192/1998), now referred to as the Yued Indigenous Land Use Agreement Area (Yued ILUA, WI2015/009).
- The survey was undertaken with consultation between Yued representatives, the South West Aboriginal Land and Sea Council (SWALSC) and Caravel, as well as an archaeologist and an anthropologist from Dortch Cuthbert.
- Although archaeological and anthropological studies of the region surrounding the MSDE are very limited, they indicate considerable antiquity of land use and retention of cultural and environmental knowledge among Yued People. Investigation of records held by Department of Planning, Lands, and Heritage for the area surrounding the MSDE revealed relatively few heritage sites, due to the limited amount of heritage survey work. Nevertheless, available reports indicated the importance of waterways, which were created and maintained by the Noongar Spirit Ancestor, the Waugal. Other sites in the region included stone structures, an artefact scatter, and a scarred tree.
- Archaeological survey of selected areas within the MSDE revealed seven archaeological sites, all comprising concentrations of stone artefacts indicating past use of these places by ancestors of the Yued people. Three of these places (CP2201, CP2204, CP2207) contained sandy deposits which might cover more artefacts, and one of these, CP2201, contains a 2 m high dune which is likely to contain numerous artefacts, possibly deriving from repeated occupation over many millennia. This site is of potential archaeological interest.

- As agreed with SWALSC, an archaeological survey of vegetated areas within the bore field will be conducted once hydrological surveys are completed and the bore field DE is determined.
- The Proposal pipeline corridor may impact one registered site (Moore River crossing) and therefore any disturbance of this site will require approval under Section 18 of the *Aboriginal Heritage Act 1972* (AH Act) or Part 4 of the *Aboriginal Cultural Heritage Act 2021* (ACH Act).
- A social impact assessment, noise assessment, and visual impact assessment will be undertaken for the Proposal. It is anticipated that these will be concluded by Q1 2023.
- There are several freehold farming properties within the MSDE. Caravel is engaging in ongoing negotiations with landowners regarding the purchase of all freehold land required for the Proposal. Caravel has land access agreements in place with all landowners underlying *Mining Act 1978* tenure for the MSDE. Caravel has been granted a Mining Lease and General Purpose Lease under the *Mining Act 1978* over the Dasher Deposit and associated infrastructure, satisfying the conditions of consent from the landowner. Caravel also has land access agreements with some of the landowners for the bore field area and is in active discussions with the other landowners with a view to forming agreement in 2023

EPA policy and guidance

EPA Objective: To protect social surroundings from significant harm.

Key EPA Documents

Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);
Statutory Guidelines for MCPs (DMIRS, 2020b);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021d).

Relevant EPA Factor Guidelines

Environmental Factor Guideline – Social Surroundings (EPA, 2016g).

Application of Policies and Guidance

The Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
Surveys, studies and consultation for this factor are conducted in accordance with the guidance identified above.

Description of environmental impacts

- The Proposal will require the clearing of native vegetation and ground disturbance which may result in potential disturbance to Aboriginal Heritage sites or artifacts that have not yet been discovered or recorded (additional surveys required), although the Proposal is likely to be able to avoid impacting the integrity of all significant sites.
- Mining operations, processing and haulage of product has to potential to emit noise, light and dust.

- Impacts to visual amenity from mine infrastructure and waste rock landforms

Environmental Values Impact Assessments:

Offset explanation

Application of the mitigation hierarchy

The following measures are proposed to manage and mitigate the potential environmental impacts to social surroundings:

- Results of Aboriginal Heritage surveys have been, and will be, utilised to design the DE's so as to minimise impact to recorded areas of Aboriginal heritage significance.
- Additional Aboriginal Heritage surveys will continue to be conducted in the DE's during the Part IV EP Act assessment process.
- Provide flexibility within the DE's to allow the avoidance of any significant cultural heritage sites.
- Approval will be sought under Section 18 of the AH Act or Part 4 of the ACH Act for the Moore River crossing and any registered Aboriginal Heritage sites that cannot be avoided.
- Caravel will investigate potential construction options for the pipeline crossing that do not involve disturbing the Moore River crossing, in consultation with the Yued People.
- Continued consultation with the Traditional Owners regarding the minimisation of impacts to traditional uses of the area.
- A Social, Cultural and Heritage Management Plan (SCHMP) will be developed.
- Vegetation clearing will be managed through internal ground disturbance procedures/ground disturbance permit system.
- Obtaining and complying with a Mining Proposal issued under the *Mining Act 1978*.
- Implementation of a MCP under the *Mining Act 1978*.
- The Proposal will be designed so as to minimise impacts to dust, noise, light and visual amenity.
- Implement industry-standard controls for dust, noise and light.
- Native vegetation will be planted in windrows along several roadside boundaries of the mine site and road realignment development envelope to improve visual amenity and provide fauna connectivity corridors.
- Ongoing stakeholder consultation.
- Potential property acquisition with access and amenity agreements with landowners.

Assessment and significance of residual impacts

Implementation of the Proposal will require clearing of vegetation and ground disturbing activities. No registered Aboriginal Heritage sites have been identified within the MSDE however one site considered to be of potential archaeological interest has been identified. Additional surveys are planned during the assessment process. A Section 18 of the AH Act or Part 4 approval under the ACH Act will be obtained for the Moore River crossing and any registered Aboriginal Heritage sites that cannot be avoided. It is likely that any significant heritage sites or areas of high cultural value that are discovered will be able to be avoided through flexibility in the Proposal development footprint and via the use of Caravel's ground disturbance permitting process.

There may be localised indirect impacts to resulting from dust, noise, or light however, through the implementation of mitigation measures described above, these incidents are expected to be rare and controlled and therefore not result in a significant impact

Likely environmental outcomes

No registered Aboriginal Heritage sites have been identified within the MSDE. One site considered to be of potential archaeological interest has been identified. Additional surveys are planned during the assessment process. A Part 4 approval under the ACH Act will be obtained for the Moore River crossing and any registered Aboriginal Heritage sites that cannot be avoided. It is likely that any significant heritage sites or areas of high cultural value that are found in future surveys will be able to be avoided. An SCHMP will also be developed to demonstrate that the Proposal can meet the EPA's objectives for Social Surroundings.

Implementation and operation of the Proposal will require clearing of vegetation, ground disturbing activities, mining activities, processing activities and waste management activities which will result in emissions of noise, light and dust. The Proposal is not expected to significantly impact any sensitive receptors, given the strategy of acquiring properties located in proximity to (or within) the Proposal site.

The Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect social surroundings from significant harm.

4.3.12 Subterranean fauna

Environmental objective

To protect subterranean fauna so that biological diversity and ecological integrity are maintained.

Potential key environmental factor (yes/no)

No

Description of receiving environment

Not Applicable

Justification

The Proposal may impact subterranean fauna through excavation and groundwater abstraction however the impact to the overall availability of habitat is not expected to be significant. Groundwater abstraction at bore fields will target sustainable yield thereby ensuring that aquifers are not overdrawn (as defined by groundwater studies) in vegetated areas, and will target saline groundwater sources. A Subterranean Fauna Assessment comprising of a desktop troglofaunal and field stygofauna assessment was conducted (Bennelongia, 2022) which concluded that it is unlikely the Proposal will adversely impact subterranean fauna conservation values given the limited suitable habitat for subterranean fauna with the Proposal footprint.

4.3.13 Terrestrial environmental quality

Environmental objective

To maintain the quality of land and soils so that environmental values are protected.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

Preliminary soil analyses and geochemical studies have been undertaken.
A *Contaminated Sites Desk Study* was undertaken (Pendragon, 2018c) for the Proposal and surrounding area.

- Most of the project area, which has known elevated soil and water salinities, supports rural agricultural activity which has been the dominant land use within the region for a period exceeding at least twenty years. There is thus a potential for prolonged agricultural operations to have impacted both soil and water quality by a wide range of contaminants/chemicals of concern including Total Petroleum Hydrocarbons from greases, oils and fuels, carbamates, pesticides, herbicides and insecticides, heavy metals and nutrients.

A *Soil and Waste Characterisation Desk Study* (Pendragon, 2018d) was undertaken for the Proposal.

- Soils across the Proposal comprise sand and sandy loams having low natural nutrition with induced subsoil acidity and salinity related to rising water tables.
- The data used contained samples with elevated concentrations of Sulphur with a number of samples exceeding 1.0%. Concentrations in excess of 1% are considered materials with a high potential for acid generation. However, the overall impression is sporadic occurrences of elevated concentrations at varying depths but generally deeper than 50 m within an ore body containing primarily low sulphur concentrations.
- The samples contain elevated concentrations of some heavy metals which coupled with elevated concentrations of Sulphur warrant further investigation and assessment.

Further soil and geochemical studies will be undertaken for the mine site. It is anticipated that these will be concluded by Q1 2023.
As stated above, an *Interim Flora and Vegetation Assessment* (comprising both desktop and field studies) was undertaken for the Proposal and surrounding areas (Mattiske, 2022a).

- The vegetation of the mine site area ranged from degraded to pristine. Large areas of crop farmland were considered to be completely degraded. Most of the larger remnant vegetation patches (those greater than 2 ha) had a condition rating of "degraded" to "pristine", with the majority rated as "very good".

EPA policy and guidance

EPA Objective: To maintain the quality of land and soils so that environmental values are protected.
Key EPA Documents
Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);
Statutory Guidelines for MCPs (DMIRS, 2020);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021d).
Relevant EPA Factor Guidelines
Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016b).
Application of Policies and Guidance
The Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
Surveys, studies, and consultation for this factor are conducted in accordance with the guidance identified above.

Description of environmental impacts

Potential impacts to terrestrial environmental quality include:

- Erosion associated with vegetation clearing and changes to surface water regimes.
- Salinity reducing the likelihood of rehabilitation success at closure.
- Impact from acid-forming material in waste rock landforms and tailings storage facility.
- Disturbance of acid sulphate soils.
- Loss of sediment to the surrounding terrestrial environment during construction.
- Hydrocarbon spillage risks.
- Ongoing impacts from erosion and contamination associated with mine closure if not carried out properly.

Environmental Values Impact Assessments:

Offset explanation

Application of the mitigation hierarchy

The following measures are proposed to manage and mitigate the potential environmental impacts to terrestrial environmental quality:

- Maintain existing surface water flow regimes as much as possible with the installation and maintenance of surface water/drainage infrastructure across the MSDE.
- Materials characterisation will be undertaken to understand potential for impact from acid forming materials in tailings and waste rock landforms and tailings storage facilities will be managed in accordance with *Mining Act 1978* approvals.
- Identify and manage acid sulfate soils (if present).
- Implement industry-standard controls for sedimentation and hydrocarbon storage and handling.
- Implementation of a MCP under the *Mining Act 1978*.

Assessment and significance of residual impacts

Implementation of the Proposal will require clearing of vegetation and ground disturbing activities. Lake Ninan Nature Reserve has been excluded from the Proposal footprint therefore no Proposal-attributable impact to this nature reserve is anticipated. The Proposal occurs on predominantly degraded farm cropland and salt affected areas. There may be localised indirect impacts to resulting from hydrocarbon spills or sedimentation however, through the implementation of mitigation measures described above, these incidents are expected to be rare and controlled and therefore not result in a significant impact.

Likely environmental outcomes

The Proposal will require clearing of vegetation. Existing surface water flow regimes will be maintained to the extent possible via the installation and maintenance of surface water/drainage infrastructure across the site.
Contamination is possible from unintentional discharges to the environment. By implementing the mitigation measures described above, Caravel expects that the Proposal will be appropriately managed and unintentional discharges would be unlikely to result in significant impacts to the environment

The Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to maintain the quality of land and soils so that environmental values are protected.
The Proposal is subject to regulation under the *Mining Act 1978* and it is expected that mine closure can be adequately managed through the requirements to prepare a MCP in accordance with the *Statutory Guidelines for MCPs* (DMIRS, 2020b)

4.3.14 Terrestrial fauna

Environmental objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

Potential key environmental factor (yes/no)

Yes

Description of receiving environment

- A *Detailed Vertebrate Fauna Survey* (Western Wildlife, 2022) has been undertaken for the Proposal, including a 15 km buffer area on the mine site.
- Thirteen fauna habitats were identified across the mine site study area and five fauna habitats were identified in the Koodjee Nature Reserve. As described above, the Koodjee Nature Reserve and Lake Ninan Nature and Recreational Reserves have been excluded from the footprint therefore the Proposal is not expected to directly impact these habitats.
- The identified habitats support a predicted faunal assemblage of up to ten frogs, 62 reptiles, 177 birds, 20 native mammals and six introduced mammals. However, the faunal assemblage of the study area is likely to be somewhat depauperate, mainly due to widespread habitat loss and fragmentation, and the impacts of salinity. The observed assemblage on the Western Wildlife 2022 survey included four frogs, 25 reptiles, 98 birds, 12 native mammals and six introduced mammals.
- There are 42 vertebrate fauna of conservation significance that potentially occur in the study area. Of these:
    - Six are identified as *Threatened* under the EPBC Act and BC Act. The study area provides habitat critical for the survival of Carnaby's Cockatoo: potential breeding habitat in eucalypt woodlands and foraging habitat in eucalypt woodlands, banksia woodlands, heath and some planted vegetation such as pines. Although not recorded during this survey (due to the survey timing), the region around Calingiri is known to support a breeding population of the species. 2,504 potential habitat trees were recorded, of which 263 had potential hollows suitable for breeding and 26 showed evidence of use by Carnaby's Cockatoos. The planned pipeline corridor has changed since the above survey was undertaken. The amended pipeline corridor will utilise mostly previously disturbed farmland. Some scattered patches of remnant vegetation will be encountered. All areas of remnant vegetation along the amended pipeline corridor have been surveyed in September 2022, with a finalised report expected by Q1 2023.
    - The Curlew Sandpiper may occur, but the salt pans and lakes are unlikely to regularly support this species, as it prefers coastal habitats. The Australian Painted Snipe may occur on the lakes, but this species is uncommon in the southwest and these habitats are disturbed by livestock. The Western Spiny-tailed Skink may possibly occur, but the habitats lack the log piles this

species uses for shelter and the study area is outside its current known range.

The Chuditch and Malleefowl may disperse through the study area but are not likely to be resident as the habitats are too fragmented.

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    - Seven species are identified as *Migratory* in the EPBC Act and BC Act. Although Migratory shorebirds may occur on occasion, the salt pan and lake habitats of the study area are unlikely to regularly support nationally or internationally significant numbers of any species.

The Fork-tailed Swift is a Migratory species that is thought to be almost entirely aerial when visiting Australia, so the study area is not likely to provide important habitat for this species.

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    - One species is identified as *Specially Protected* in the BC Act. The Peregrine Falcon (*Falco peregrinus*) is likely to occur, foraging in open habitats including farmland. This species is widespread, and its population is considered secure.
    - Five listed as *Priority* by DBCA. The Hooded Plover is known to occur in the region and may occur on the salt pans on occasion.

The Blue-billed Duck may occur on salt pans or lakes when inundated, but the study area is unlikely to be an important site for this species.
Although Western Brush Wallaby and Inland Western Rosella may occur in the study area, the likelihood is low as the habitats in the study area are probably too fragmented to support this species.
The Woma is probably locally extinct, as there have been no Wheatbelt records of this species since the 1980s.

- An *Aquatic Ecosystem Assessment* (Biologic, 2021) of lakes and claypans was undertaken at nine sites, six within the Proposal area and three reference sites located outside of the Proposal footprint.
- The Study Area comprises a number of brackish and salt lakes amongst open *Casuarina* sp. overstorey with samphire (saltbush) shrubs in the middle-storey. Water quality was characterised by brackish to hypersaline waters, with wide ranging dissolved oxygen saturation, circum-neutral to basic pH, and low dissolved metal concentrations. Total nitrogen (total N) and total phosphorus (total P) were variable across sites.
- A total of 88 aquatic invertebrate taxa (including invertebrates and micro-crustacea) were recorded during the study. While most aquatic invertebrates were common, ubiquitous species, three species, recorded at sites outside the MSDE, were considered to be of potential conservation or scientific significance including
    - The ostracod *Reticypris* sp. (at CP05) is undescribed and likely to be new to science.

    - The ostracod *Australocypris* sp. n. (at CP05, LN01 and LH01) is also potentially new to science.
    - The fairy shrimp, *Parartemia extracta* (CP05, LH01 and an un-named wetland within the Study Area) is known from only a few populations (nine).
- Overall, there was a significant difference in aquatic invertebrate assemblages between saline and brackish sites, but not between the study area and reference sites.
- One native freshwater fish species, the western minnow *Galaxias occidentalis*, was recorded from two brackish sites within the Study Area. More than half (52%) of the total fish population recorded were juveniles, indicating that the study area supports conditions conducive to breeding and recruitment. Although not a species of conservation significance, these records from the Wheatbelt are important given there are few populations of freshwater fish remaining in the region.
- Eleven species of waterbird were recorded utilising sites within the study area, with the greatest richness at CP03 (eight taxa), followed by CP04. A large (10,000 individuals) feeding flock of banded stilt (*Cladorhynchus leucocephalus*) was also recorded at Lake Ninan. Lake Ninan Nature Reserve have been excluded from the footprint therefore the Proposal is not expected to have direct impacts on this species.
- Two sites (CP03 and CP04) supported at least two frog species, including the banjo frog (*Limnodynastes dorsalis*). These sites will not be impacted by the Proposal.
- Due to the widescale land clearing in the Wheatbelt, wetlands show varying degrees of salinity and degradation. As such, fresher wetlands and those not impacted by secondary salinisation are of particular ecological significance. The brackish sites sampled in the current study were found to support relatively rich aquatic invertebrate assemblage compared to hypersaline sites, as well as frogs, waterbirds and fish.
- This study represents the first comprehensive aquatic ecosystem survey undertaken of the lakes and wetlands within and surrounding the Caravel Copper Project. Results from this survey provide an assessment of the current ecological values and health of aquatic systems within this Study Area.
- A detailed *Baseline Short-range Endemic survey* (Alacran, 2022) was also undertaken for the mine site portion of the Proposal.
- The short-range endemic (SRE) field survey yielded a total of 292 samples from SRE target groups, representing 46 SRE category taxa. Of these, 22 were potential SREs owing to geographical data deficiency, 24 were potential SRE owing to taxonomic data deficiencies. None of the SRE category taxa sampled were named species.
- Further studies are being conducted with the field component completed in October 2022. It is anticipated that these studies and associated reporting will be concluded by Q1 2023. Preliminary results from the September field visit suggest that the majority of the Proposal landscape is highly disturbed and therefore of low

value as SRE habitat however some isolated patches (such as a granite outcrop located within the southern portion of the Dasher pit and a laterite outcrop east of this site) may support SRE. Further studies will be undertaken to determine this.

EPA policy and guidance

EPA Objective: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

Key EPA Documents

Statement of Environmental Principles, Factors and Objectives (EPA, 2021a);
Statutory Guidelines for MCPs (DMIRS, 2020);
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2021b);
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2021c); and
Instructions on how to prepare EP Act Part IV Environmental Management Plans (EPA, 2021d).

Relevant EPA Factor Guidelines

Environmental Factor Guideline - Terrestrial Fauna (EPA, 2016e).

Relevant EPA Technical Guidance

Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020b); and
Technical Guidance – Sampling of short range endemic invertebrate fauna (EPA, 2016f).

Application of Policies and Guidance

This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above.
Terrestrial fauna surveys have been and will be conducted in accordance with the guidance identified above.
Key EPA documents and Factor Guidelines for terrestrial fauna will be used during the refinement of the Proposal design to minimise disturbance of significant fauna habitat and determining mitigation strategies for the Proposal.

Description of environmental impacts

- Vegetation clearing resulting in direct disturbance of native vegetation within an 8,541 ha MSDE, and disturbance within the bore field and pipeline corridor, including potential fauna habitat.
- Of the 42 significant vertebrate fauna that potentially occur, only Carnaby's Cockatoo is considered likely to utilise habitat within the MSDE. Direct impact due to clearing of breeding and foraging habitat may occur. If surveys identify breeding or foraging habitat within the Proposal footprint, Caravel will modify the DE to avoid these, to the extent practicable, and will include offsets (as required) to mitigate any significant residual impact from the Proposal.
- Vehicle traffic and earthmoving activities may result in death or injury to fauna from vehicle strike.
- Clearing of land resulting in favourable conditions for predatory fauna and subsequently, increased predation or competition from introduced fauna.
- Vehicle traffic and earthmoving equipment may introduce or spread weeds.

- Alterations to surface water and groundwater regimes may result in indirect impacts to the health of downstream GDV or direct impacts to aquatic fauna.
- Excavations occurring during construction and operations may have a direct impact to aquatic fauna.
- Mining activities may result in indirect impacts such as hydrocarbon spills.
- Construction and operation activities may generate dust, light or noise emissions resulting in impacts to habitat vegetation health or alterations to fauna behaviours (including feeding or breeding behaviours).

Environmental Values Impact Assessments:

Offset explanation

Application of the mitigation hierarchy

Caravel has mitigated the potential impacts to terrestrial fauna according to the mitigation hierarchy; avoid, minimise, rehabilitate, offset. The following measures are proposed to manage and mitigate the potential environmental impacts:

- The MSDE will be developed to the minimum extent required to ensure safe and adequate construction and operation and will, as much as possible, maximise the usage of previously disturbed areas.
- Provide flexibility within the development envelopes to allow the avoidance of any significant flora/habitat.
- Koodjee Nature Reserve and Lake Ninan Nature Reserve have been excluded from the Proposal footprint so as to eliminate direct impacts to fauna habitat within the Reserves.
- Modifying the Proposal MSDE so as to exclude Carnaby's Cockatoo breeding or foraging habitat as much as possible, and potentially undertaking revegetation programs to improve the vegetation condition of existing TECs within the MSDE.
- Modifying the Proposal MSDE so as to exclude the two brackish sites found to provide habitat for the western minnow and avoiding impacting the sites where aquatic invertebrate fauna with potential conservation significance where recorded.
- A Fauna Habitat Management Plan (FHMP) that addresses the restoration of Carnaby's Cockatoo habitat will be developed and implemented.
- Planting native vegetation windrows along several roadside boundaries of the mine site and road realignment development envelope so as to improve visual amenity and provide fauna connectivity corridors.
- Vegetation clearing will be managed through internal ground disturbance procedures/ground disturbance permit system.

- Progressive clearing and rehabilitation will be undertaken.
- Water or dust suppressants will be applied to disturbed areas, mining areas and product transfer/storage areas as required to minimise dust generation.
- Emergency and fire response capabilities will be maintained to respond to fire outbreaks where possible.
- Implementation of industry standard measures to minimise the risk and impact of hydrocarbon spills.
- Weed hygiene and management measures/procedures will be implemented to prevent spread and introduction of weeds as a result of construction and operation.
- Maintain existing surface water flow regimes as much as possible with the installation and maintenance of surface water/drainage infrastructure across the Proposal site.
- Groundwater abstraction at bore fields will target sustainable yield thereby ensuring that aquifers are not overdrawn to below pre-European disturbance levels (as defined by groundwater studies described below) in vegetated areas eliminating potential impacts to GDV and aquatic fauna.
- Compliance with future approvals including a Ministerial Statement, Works Approval(s) and Mining Proposal.
- Implementation of a MCP under the *Mining Act 1978*.
- Inclusion of offsets (as required) to mitigate any significant residual impact from the Proposal, including offsets to be established for any residual impact to Carnaby's Cockatoo habitat trees that will be impacted by the Proposal

Assessment and significance of residual impacts

The impact to fauna habitat is not expected to be significant given the largely disturbed crop farmland upon which the majority of the Proposal is located, avoidance of important habitat to the extent possible (particularly brackish ponds known to support the western minnow and Carnaby's Cockatoo breeding or foraging habitat), the implementation of revegetation programs, the removal of the Koodjee and Lake Ninan Nature Reserves from the development footprint and the inclusion of offsets (as required) to mitigate residual impacts of the Proposal.

The faunal assemblage of the MSDE, pipeline corridor and borefield is likely to be depauperate due to widespread habitat loss and fragmentation, and the impacts of salinity.

There may be localised indirect impacts resulting from the introduction or spread of weeds, generation of dust or hydrocarbon spills however, through the implementation of mitigation measures described above, these incidents are expected to be rare and controlled and therefore not result in a significant impact.

Given the widespread, significant impacts of secondary salinisation in the Wheatbelt region, abstraction of groundwater associated with the Proposal is anticipated to have a positive impact in bore field areas over time as lowering of the water table may halt salt

production at the ground surface and allow fresh water to infiltrate the soil, contributing to dilution of the salt in the groundwater.

Likely environmental outcomes

The development envelopes will be developed to the minimum extent required to ensure safe and adequate construction and operation and will, as much as possible, maximise the usage of previously disturbed areas.

It is expected that the disturbance of important fauna habitat can be avoided by removing the Koodjee and Lake Ninan Nature Reserves from the disturbance footprint. The Proposal may impact important habitat with the development of the pipeline; however the extent will not be understood until additional surveys are undertaken. The pipeline corridor will utilise mostly previously disturbed farm cropland and vegetation disturbance will be minimised as much as possible therefore impacts are not likely to be significant. The pipeline will also be buried, and the development corridor progressively rehabilitated as the pipeline is constructed. This will ensure any impacts will be temporary.

To the extent possible, Caravel will modify the development envelopes to exclude areas identified as habitat for the western minnow and Carnaby's Cockatoo breeding or foraging habitat.

Native vegetation will be planted in windrows along several roadside boundaries of the mine site and road realignment development envelope to improve visual amenity and provide fauna connectivity corridors.

Where possible, disturbed vegetation will be progressively rehabilitated.

The Proposal can be implemented while being consistent with the EP Act principles and achieving the EPA's objective to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

5 Offsets

5.1 Offset's objective

The EPA's environmental objective for proposals that may require Environmental Offsets is to counterbalance any significant residual environmental impacts and/or uncertainty through the application of the offsets.

5.2 Significant Residual Impacts

5.3 Offsets policy and guidance

Will be addressed in the ERD

5.4 Consideration of the Environmental Offsets Principles

1. **Environmental offsets will only be considered after avoidance and mitigation options have been pursued.**

   Will be addressed in the ERD

2. **Environmental offsets are not appropriate for all projects.**

   Will be addressed in the ERD

3. **Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.**

   Will be addressed in the ERD

4. **Environmental offsets will be based on sound environmental information and knowledge.**

   Will be addressed in the ERD

5. **Environmental offsets will be applied within a framework of adaptive management.**

   Will be addressed in the ERD

6. **Environmental offsets will be focused on longer term strategic outcomes.**

   Will be addressed in the ERD

5.5 Use of the Pilbara Environmental Offsets Fund (yes/no)

No

5.6 Offsets Summary

Will be addressed in the ERD

6 Objectives and Principles of the EP Act

6.1 Legislation Objectives

Will be addressed in the ERD

6.2 Consideration of the Principles of the EP Act

1. **The precautionary principle**

   Will be addressed in the ERD

2. **The principle of intergenerational equity**

   Will be addressed in the ERD

3. **Principles relating to improved valuation, pricing, and incentive mechanisms**

   Will be addressed in the ERD

4. **The principle of the conservation of biological diversity and ecological integrity**

   Will be addressed in the ERD

5. **The principle of waste minimisation**

   Will be addressed in the ERD

7 Conclusions

7.1 Holistic impact assessment

The Proposal lies within an area known to provide critical breeding habitat for the Carnaby's Cockatoo (Endangered; BC Act and EPBC Act) and TECs/PECs. Threatened and significant flora species may also be found within the Proposal DEs.
Given the above, Caravel has incorporated extensive avoidance and minimisation measures into the Proposal design and operational processes, the key measures being:

- The final footprint will, as much as possible, maximise the usage of previously disturbed areas;
- Flexibility within the development envelope to allow for, as much as possible, the avoidance of any significant flora;
- The exclusion of Koodjee Nature Reserve from the Proposal footprint so as to eliminate disturbance to threatened flora species within the nature reserve; and
- Inclusion of offsets (as required) to mitigate any significant residual impact from the Proposal.

There are some potential impacts that require management and monitoring to ensure that the impacts are not significant. Many of these potential impacts are adequately regulated under other legislation:

- Mine process plant emissions will be regulated under Part V of the EP Act;
- Mine pit design, and general environmental management will be regulated through a Mining Proposal assessed under the *Mining Act 1978*; and
- Closure and rehabilitation will be regulated through a MCP assessed under the *Mining Act 1978*.
- Abstraction of groundwater will be regulated through the *Rights in Water and Irrigation Act 1914*.

There are some potential impacts however that are expected to require limits or conditions in the Ministerial Statement, including:

- Limits on total permanent and temporary disturbance within the development envelope;
- A limit on groundwater abstraction volumes;
- The implementation of Flora and Vegetation Management Plan to ensure that impacts to flora and vegetation are minimised as far as practicable;
- The implementation of a Fauna Habitat Management Plan to ensure that impacts on terrestrial fauna habitats (in particular Carnaby's Cockatoo breeding and foraging habitat) are strictly monitored and managed to provide the best possible habitat quality during rehabilitation; and
- The implementation of a GHG Management Plan to enable the Proposal to achieve its objectives of Net Zero GHG emissions by 2050.

During EIA, Caravel will consider and assess all potential direct and indirect impacts from the Proposal to relevant, interconnected key environmental factors. The mitigation hierarchy (avoid, minimise, rehabilitate, and offset) will be applied to the Proposal to address each

potential impact. The significance of the impacts will be assessed once the mitigation hierarchy has been applied, significant residual impacts will be addressed through management (the preparation and implementation of Environmental Management Plans) or counterbalanced with offsets.

7.2 Cumulative environmental impact assessment

In preparation of the EIA, Caravel will include a cumulative impact assessment to assess the Proposal's contribution to impacts on relevant environmental values. The activities, boundaries and values relevant for the cumulative impact assessment in relation to each relevant Key Environmental factor are summarised in Table 8.

Table 8: Cumulative Impact Assessment

Activities	Environmental values	Relevant factors	Boundaries
Clearing of native vegetation	Native vegetation	Flora and Vegetation	Cumulative impacts on native vegetation will be assessed by reviewing the remaining extent of each affected pre-European vegetation association, and broader IBRA sub-regions. In addition, the remaining native vegetation extents within various buffers from the Proposal boundary (10 km, 15 km, and 20 km) will be reviewed
	State-wide Pre-European extent	Flora and Vegetation	
	Priority flora and Significant flora habitat	Flora and Vegetation	
	Significant fauna habitat	Terrestrial Fauna	
	Carnaby's Black Cockatoo Breeding and Foraging Habitat	Terrestrial Fauna	As above, plus a review of impacts from other proposals and historic clearing within a 12 km radius of the Proposal boundaries (likely maximum local range of breeding Carnaby's Cockatoo)
Abstraction of groundwater from the unnamed aquifer and Gillingarra Paleochannel	The unnamed aquifers	Inland Waters	A review of impacts from other proposals within the unnamed aquifers will be conducted.
Mining (excavation, ore handling, processing and export) and power production from the combustion of fossil fuels	Amenity (Dust, Noise and Light)	Social Surroundings	If the Proposal is likely to result in air pollution, noise, or light pollution above background levels at the nearest sensitive receptors then an assessment will be conducted to determine what other air pollution, noise or light impacts could be affecting that receptor. The Proposal's contribution to those cumulative impacts will then be assessed.
	GHG	GHG	GHG emissions will be reviewed against the cumulative emissions within WA to determine the contribution made by the Proposal.

Caravel has performed a high-level review of the past, present, and reasonably foreseeable future activities in proximity to the Proposal. There are no known proposed/likely significant proposals within 20 km of the Proposal boundaries.

7.3 Conclusion

Will be addressed in the ERD

8 Supporting documents

Attachments

- Attachment 1 Supporting Document.pdf
- Attachment 2 Interim Flora and Vegetation Assessment.pdf
- Attachment 3 Proposal Content Document.pdf
- Attachment 4 Construction GHG Emissions.xlsx
- Attachment 5 Interim Threatened and Priority Ecological Communities Report.pdf
- Attachment 6 Hydrogeological Assessment.pdf
- Attachment 7 Hydrological (Surface Water) Assessment.pdf
- Attachment 8 Aquatic Ecosystem Assessment.pdf
- Attachment 9 Aboriginal heritage survey.pdf
- Attachment 10 Contaminated Sites Desk Study.pdf
- Attachment 11 Soil and Waste Characterisation Desk Study.pdf
- Attachment 12 Detailed Vertebrate Fauna Survey.pdf
- Attachment 13 Baseline Short-range Endemic Survey.pdf
- Development Envelope 221205.zip
- Disturbance Footprint 221205.zip
- Inidicative Reservoir.zip

Relevant maps