MARDIE SALT PROJECT

SECTION 38 REFERRAL – SUPPORTING INFORMATION

17 APRIL 2018

PREPARED FOR BCI MINERALS LIMITED
BY PRESTON CONSULTING PTY LTD

Document prepared for:

BCI MINERALS LIMITED

Contact Person: Michael Klvac –Director
Email: Michael.klvac@bciminerals.com.au
Phone: (08) 6311 3400
Street Address: Level 1, 15 Rheola Street, West Perth WA 6005
Postal Address: GPO Box 2811, Perth WA 6872

Document developed by:

PRESTON CONSULTING PTY LTD

Contact Person Phil Scott – Director
Email: pscott@prestonconsulting.com.au
Website: www.prestonconsulting.com.au
Phone: +61 8 9221 0011
Fax: +61 8 9221 4783
Street Address: Level 3, 201 Adelaide Terrace, East Perth WA 6004
Postal Address: PO Box 3093, East Perth WA 6892

CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Appendix 1: Assessment of Mangal and Algal Communities for the Mardie Solar Salt Project (Stantec, 2018)
Appendix 2: Snapshot survey of the Benthic Habitats and Communities at the Proposed Bitterns Pipeline and Outfall Infrastructure Options (O2 Marine, 2018)
Appendix 3: Shorebird, Marine Turtle and other conservation significant fauna survey (Phoenix, 2017b)
Appendix 4: Environmental desktop review and reconnaissance site visit for the Mardie Salt Project (Phoenix, 2017a)
Appendix 5: Mardie Salt Project preliminary flora and vegetation and terrestrial fauna assessment (Phoenix, 2018)
Appendix 6: Marine Turtle Survey of Mardie Salt Project Area (Pendoley Environmental Pty Ltd, 2018)

PART A: PROPOSAL DESCRIPTION

SHORT SUMMARY OF THE PROPOSAL

Table 1: Summary of the proposal

Proposal Title	Mardie Salt Project
Proponent Name	Mardie Minerals Pty Ltd
Short Description	Mardie Minerals Pty Ltd is seeking to develop a greenfields high-volume salt and Sulphate of Potash project at Mardie, approximately 80 kilometres (km) south west of Karratha, in the Pilbara region of Western Australia (WA). The proposal will utilise seawater and evaporation to produce a concentrated salt product and other associated products. The proposal includes the development of seawater intake, concentrator and crystalliser ponds, processing plant, bitterns disposal pipeline and outfall, administration buildings, drainage channels and sea walls, access / haul roads, desalination plant, borrow pits, freshwater supply bores and pipelines, and associated infrastructure (power supply, communications, workshop, laydown, sewage treatment plant, landfill facility etc.).

PROPOSAL DESCRIPTION

Mardie Minerals Pty Ltd (Mardie Minerals) is seeking to develop the Mardie Salt Project (the proposal), a greenfields high-volume salt project in the Pilbara region of Western Australia (Figure 1). Mardie Minerals is a wholly-owned subsidiary of BCI Minerals Limited.

The proposal is a solar salt project that utilises seawater and evaporation to produce a concentrated salt product. A production rate of 3 - 3.5 Million tonnes per annum (Mtpa) and 50,000 tonnes per annum of Sulphate of Potash (SoP) is being targeted, sourced from a 180 Giga-litre per annum (GLpa) seawater intake. To meet this production, the following infrastructure will be developed:

- Seawater intake, pump station and pipeline;
- 8 concentrator ponds totalling approximately 9,000 Hectare (ha);
- Drainage channels and sea walls;
- 34 crystalliser ponds totalling approximately 1,200 ha;
- Bitterns disposal pipeline and outfall;
- Processing Plant;
- Administration buildings;
- Accommodation village,
- Access / haul road;
- Desalination plant for fresh water production, with brine discharged to the evaporation ponds;
- Contingency freshwater supply bores and pipelines; and
- Associated infrastructure such as power supply (expected power usage of 22 GW/hr per annum), communications, workshop, laydown, landfill facility, sewage treatment plant etc.

The proposal will produce salt products according to the following process:

- Seawater will be pumped to unlined evaporation ponds via an inlet pipe located offshore (location to be determined);

- A series of evaporation and crystallisation ponds will produce a Sodium Chloride (NaCl) salt product, as well as a K_2SO_4 by-product; and
- The only waste product will be bitterns (approximately 3.6 GLpa).

DISTURBANCE

The proposal will be developed within three separate development envelopes. The boundaries of these development envelopes are shown in Figure 2 and described in Table 2.

Table 2: Location and proposed extent of physical and operational elements

Element	Location	Proposed Extent
Physical Elements		
1. **Ponds Development Envelope** – evaporation and crystalliser ponds, Processing Plant, desalination plant, administration, accommodation camp, associated works (access roads, laydown, etc.)	Figure 2	Disturbance of no more than 9,200 ha within the 15,002 ha Ponds Development Envelope.
2. **Marine Development Envelope** – seawater intake and pipeline, bitterns pipeline, outfall diffuser and mixing zone	Figure 2	Disturbance of no more than 40 ha within the 280 ha Marine Development Envelope.
3. **Terrestrial Infrastructure Development Envelope –** access / haul road, quarry, laydown, groundwater source bores, additional infrastructure	Figure 2	Disturbance of no more than 165 ha within the 338 ha Terrestrial Infrastructure Development Envelope.
Operational Elements		
Bitterns discharge	Figure 2	Discharge of up to 3.6 GLpa of bitterns within a dedicated offshore mixing zone.
Desalination Plant discharge	Figure 2	Discharge to evaporation ponds only.
Groundwater abstraction	Figure 2	Abstraction of no more than 2 GL/yr.

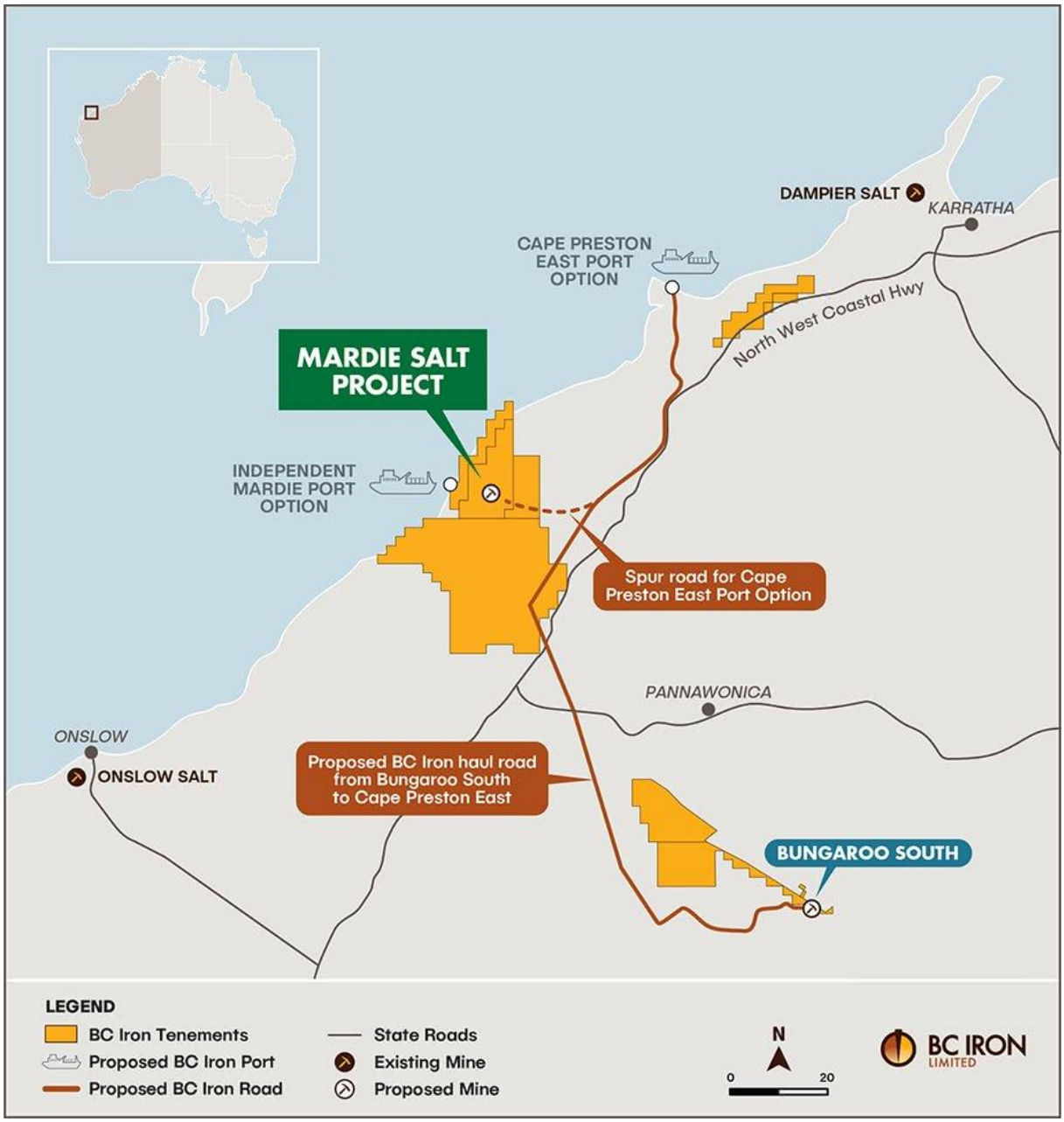
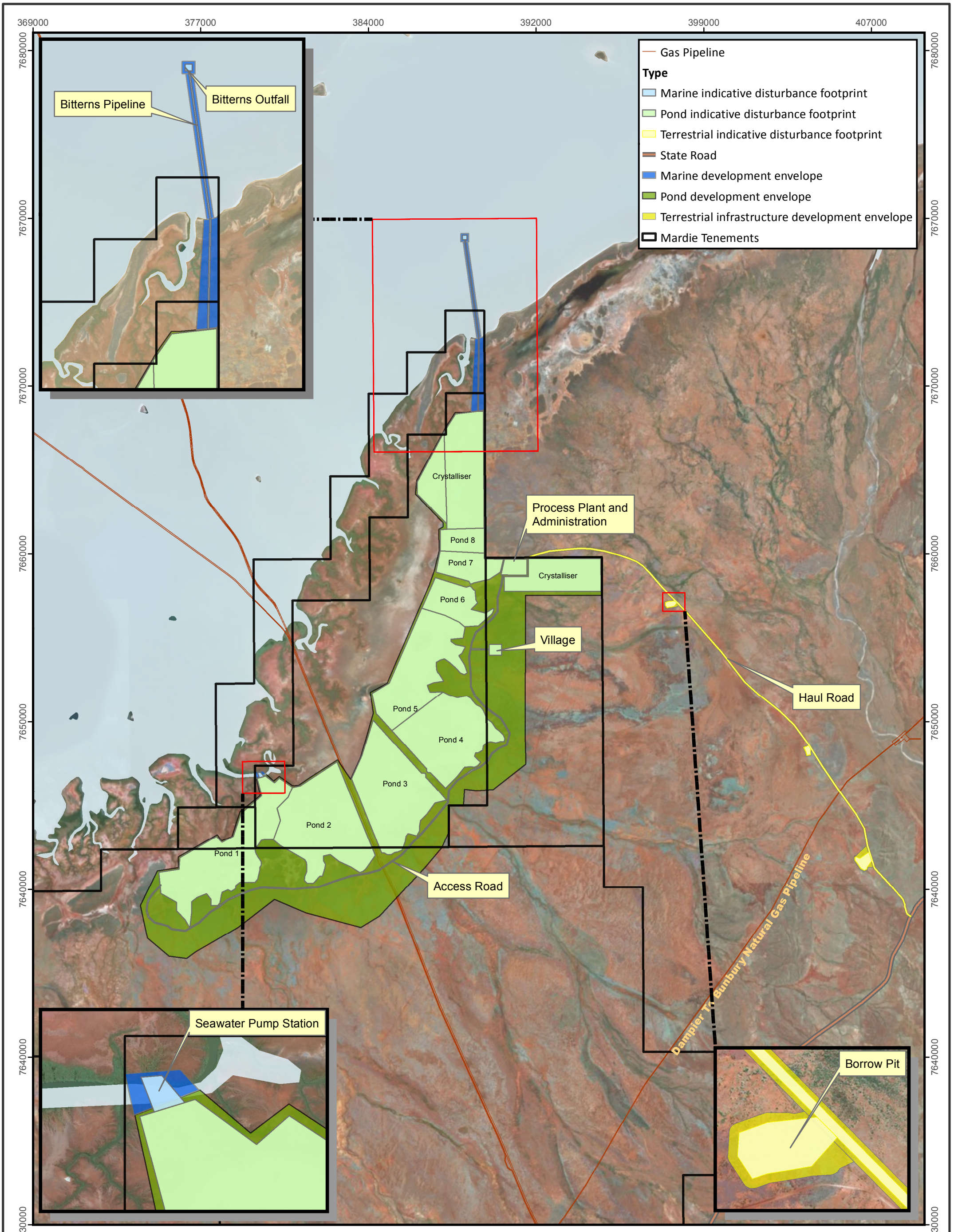


Figure 1: Location of the proposal



Mardie Salt Project
Development Envelope and
Indicative Disturbance Footprint

BCI MINERALS LIMITED

Date: 19/03/2018

Figure 2: Proposed Development Envelopes and indicative project layout

PART B: ENVIRONMENTAL IMPACTS

The *Statement of Environmental Principles, Factors and Objectives* (Environmental Protection Authority (EPA), 2016) provides a list of potential Key Environmental Factors to consider for environmental impact assessment. Table 3 lists the preliminary Key Environmental Factors that have been identified as requiring assessment from initial baseline surveys, project planning and consultation processes. Table 3 also identifies the relevant baseline environmental information for the receiving environment, proposal activities, mitigation measures, impacts and underlying assumptions. Information provided in Table 3 has been sourced from reference materials as listed.

A significant amount of baseline environmental surveys have been conducted during the planning phase, which has enabled Mardie Minerals to incorporate avoidance and mitigation measures into the project design. This is reflected in the development envelopes being configured to exclude the majority of higher value habitat areas such as mangrove, samphire and algal mat habitat. Where impacts are unavoidable, areas intersecting higher value habitat have been minimised.

Table 3: Potential environmental impacts on preliminary Key Environmental Factors

Benthic Communities and Habitat	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objective:** To maintain the structure, function, diversity, distribution and viability of benthic communities and habitats at local and regional scale. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives 2016 (EPA, 2016a) Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Benthic Communities and Habitats (EPA, 2016b). **Relevant EPA Technical Guidance** Protection of Benthic Communities and Habitats (EPA, 2016d). Protecting the Quality of WA's Marine Environment (EPA, 2016e). **Application of policies and guidance** This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above. Relevant guidance has been utilised in the development of the initial project design to minimise impacts on this factor (i.e. moving ponds away from mangrove and algal mat habitat).
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with the Department of the Environment and Energy (DotEE), EPA Services and the Department of Biodiversity, Conservation and Attractions (DBCA) and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, O2 Marine, Phoenix, Pendoley Environmental, RPS and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	Detailed sub-tidal and intertidal benthic communities and habitat surveys are yet to be conducted, however based on initial surveys conducted by Stantec (2018; Appendix 1) and O2 Marine (2018; Appendix 2) the following benthic communities and habitat characteristics are expected: • Sub-tidal Benthic Primary Producer Habitat (BPPH) such as coral or seagrass may occur in the area however the final Marine Development Envelope will be designed to avoid any significant areas;

	• The final bitterns outfall and mixing zone will be located within an area relatively free of BPPH; • Mangrove habitat is likely to extend along the majority of the coastline west of the development envelopes, with a small portion occurring within the Marine Development Envelope and the Ponds Development Envelope; and • Samphire and algal mat habitat generally occurs to the east of the mangrove habitat, with a portion occurring within the Ponds Development Envelope. Three mangal species have been identified within the study area, *Rhizophora stylosa, Avicennia marina*, *Ceriops Australia*, are categorised as 'Least Concern' under the 2008 IUCN Red List (Stantec, 2018).

Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Direct disturbance of sub-tidal benthic communities and habitat to construct the intake and outfall and associated pipelines;
	• Direct disturbance of intertidal benthic communities and habitat to construct the ponds, intake and outfall pipelines;
	• Indirect impacts to benthic communities and habitat health as a result of:
	  ○ Bitterns disposal;
	  ○ Increased sedimentation during construction;
	  ○ Alterations to surface water regimes;
	  ○ Unintentional leaks or spillages of hypersaline brine; and
	  ○ Hydrocarbon or chemical spills.

Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Revise design and subsequent development envelope boundaries to minimise direct impacts to mangrove and algal mat habitats; • Locate bitterns outfall in area free of significant BPPH; • Locate and design bitterns outfall such that the mixing zone is minimised; • Operate and monitor bitterns outfall in compliance with Part V *Environmental Protection Act 1986* (EP Act) Licence; • Locate ponds in areas of bare clay pans where practicable; • Minimise earthworks by utilising natural inundations where available; • Provide surface water corridors to allow the larger ephemeral creeks to flow to the marine environment; • Ensure design does not significantly impede tidal flow regimes; and • Implement industry-standard controls for sedimentation and hydrocarbon / chemical storage and handling.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	Impacts to sub-tidal benthic communities and habitat are not expected to be significant as the proposed mitigation measures will ensure that significant BPPH will be avoided and impacts on sparse BPPH will be minimal. Where sparse BPPH is found throughout the survey areas then the proposal may not be able to avoid some direct disturbance however it will be limited to a small percentage of this BPPH. Direct impacts to mangrove habitats are expected to be a small percentage (1%) of the extent mapped during the initial surveys. This mapping will be updated in the future and Local Assessment Units (LAUs) will allow further EIA. It is expected that the percentage of mangrove disturbance may vary within each LAU however the regional impact is expected to remain around 1%. Direct impacts to algal mat habitats are expected to be less than 12% of the extent mapped during the initial surveys (Stantec, 2018). This mapping and preliminary LAUs will be updated in the ERD. It is expected that the percentage of algal mat disturbance may vary within each LAU. Indirect impacts on benthic communities and habitat via changes in surface water and tidal flows are expected to be able to be minimised via design and management. Detailed inundation and surface water studies will reported in the ERD to inform this assessment.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	The following assumptions have been made when conducting the impact assessment provided above: • Initial intertidal habitat surveys reflect the mapping during the detailed assessments. The figures provided may change once the detailed surveys are completed. These changes are not expected to be extensive however as the initial surveys are expected to be relatively accurate.

Marine Environmental Quality	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objective:** To maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives 2016 (EPA, 2016a). Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Marine Environmental Quality (EPA, 2016g). **Relevant EPA Technical Guidance** Technical Guidance – Environmental Impact Assessment of Marine Dredging Proposals (EPA, 2016c). Technical Guidance – Protection of Benthic Communities and Habitats (EPA, 2016d). Technical Guidance – Protecting the Quality of Western Australia's Marine Environment (EPA, 2016e). **Application of policies and guidance** This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above. Relevant guidance has been utilised in the development of the initial project design to minimise impacts on this factor (i.e. designing the outfall to promote mixing).
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, O2 Marine, Phoenix, RPS and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	Marine waters in the vicinity of the proposal have currently been given a 'maximum' level of protection under the *Pilbara Coastal Water Quality Consultation Outcomes* (Department of Environment, 2006). No approved discharge locations are in the vicinity. Background water quality data is currently being obtained and will become available during the studies phase of the proposal.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Localised increased salinity due to the disposal of 3.6 GLpa of bitterns; • Increased sedimentation of surface water flows during construction; • Unintentional leaks or spillages of hypersaline brine; • Unintentional leaks or spillages of small quantities of hydrocarbons; and • Disturbance of acid sulphate soils (although unlikely to be present within excavation depths).
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Bitterns discharge to be located at a suitable depth contour, designed and monitored such that mixing is maximised and a high level of ecological protection is maintained at the edge of the mixing zone; • Operate and monitor bitterns outfall in compliance with Part V EP Act Licence; • Identify and manage any acid sulphate soils if present; • Minimise earthworks by utilising natural inundations where available; • Design ponds to minimise the risk of leaks; • Maintain adequate freeboard in ponds to minimise the risk of overflow; and • Implement industry-standard controls for sedimentation and hydrocarbon storage and handling.

Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	Disposal of bitterns is the only planned discharge to marine waters. This will have a localised impact on water quality however mixing will be promoted via discharge design and depths. Similar methods for bitterns disposal are employed in numerous locations across WA (and at much larger volumes) and are adequately managed under Part V of the EP Act. This discharge is therefore not expected to have a significant impact on marine environmental quality in the area. Sedimentation, brine or hydrocarbon spill impacts may occur, however the impacts would be localised and short-term. With the implementation of controls these potential impacts are expected to be able to be managed such that a significant impact on marine environmental quality does not occur.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	No specific assumptions have been made in this assessment.
Marine Fauna	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objective:** To maintain the diversity, geographic distribution and viability of fauna at the species and population levels. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives 2016 (EPA, 2016a). Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline - Marine Fauna (EPA, 2016h). **Relevant EPA Technical Guidance** Protection of Benthic Communities and Habitats (EPA, 2016d). Protecting the Quality of Western Australia's Marine Environment (EPA, 2016e). Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts (EPA, 2010b). **Application of policies and guidance** This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above. Relevant guidance has been utilised in the development of the initial project design to minimise impacts on this factor (i.e. avoiding turtle nesting beach and mangrove habitat).
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, O2 Marine, Phoenix and Pendoley Environmental regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises direct impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	• Initial surveys conducted by Pendoley (2018; Appendix 6) have identified that marine turtles utilise the adjacent coastline. A large number of adult turtles (most identified as Green Turtles (*Chelonia mydas*) were observed, particularly along the entrance to the main creek near the northern boundary of the Ponds Development Envelope and further up the creek. Evidence of Hawksbill Turtle (*Eretmochelys imbricata*) and Flatback Turtle (*Natator depressus*) nesting was found to the west of this creek. While small numbers of turtle tracks were seen, they represent one of the very few confirmed mainland turtle rookeries for flatback and hawksbill turtles between Onslow and Dampier; • A migratory shorebird survey was also conducted by Phoenix (2017b; Appendix 3) which identified numerous species, with the majority occurring in the mangrove habitat to the west (outside of) of the development envelopes; and

	• Mangrove habitat was identified as being of most significance to marine fauna from surveys completed to-date. Future benthic habitat surveys may also identify significant habitat such as coral or seagrass communities.

Proposal activities – Describe the proposal activities that have the potential to impact the environment.	• Direct disturbance of sub-tidal marine fauna habitat to construct the intake and outfall and associated pipelines;
	• Direct disturbance of intertidal marine fauna habitat to construct the ponds, intake and outfall pipelines;
	• Direct disturbance of a narrow portion (<5 m) of a turtle nesting beach in order to construct the bitterns outfall pipeline;
	• Light spill from operations result in alterations to turtle and hatchling behaviour;
	• Minor pile driving may be required for intake or outfall construction, which may result in short-term impacts to marine mammal or turtle behaviour;
	• Marine fauna may be drawn into the intake pipeline, however this is not expected as screens will be fitted;
	• Indirect impacts to marine fauna habitat health as a result of:
	  ○ Disposal of bitterns;
	  ○ Increased sedimentation during construction;
	  ○ Alterations to surface water regimes;
	  ○ Unintentional leaks or spillages of hypersaline brine; and
	  ○ Hydrocarbon spills.

Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Revise design and subsequent development envelope boundaries to minimise direct impacts to mangrove and other significant marine fauna habitats; • Locate bitterns outfall in area free of BPPH if available; • Locate and design bitterns outfall such that the mixing zone is minimised; • Operate and monitor bitterns outfall in compliance with Part V EP Act Licence; • Install screens on intake pipeline; • Install bitterns pipeline across turtle nesting beach outside of nesting season; • Implement light spill controls as per the recommendations of EPA (2010b) to minimise impacts to the turtle nesting beach to the north of the proposal and offshore islands; • Minimise earthworks by utilising natural inundations where available; • Provide surface water corridors to allow the larger ephemeral creeks to flow to the marine environment; • Ensure design does not significant impede tidal flow regimes; and • Implement industry-standard controls for sedimentation and hydrocarbon storage and handling.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	Impacts to sub-tidal marine fauna habitat are not expected to be significant as the disturbance envelope largely avoids interaction with marine fauna habitat. In addition, the proposed mitigation measures will ensure that significant BPPH is avoided and impacts on sparse BPPH will be minimal. In the case where sparse BPPH is found throughout the survey areas then the proposal may not be able to avoid some direct disturbance however it would only impact a small percentage of this BPPH. Direct impacts to mangrove habitats are expected to be a small percentage (1%) of the extent mapped during the initial surveys. This mapping will be updated and the development of appropriate LAUs will allow further EIA. It is expected that the percentage of mangrove disturbance may vary within each LAU. The proposal does not require significant lighting to operate. A light spill survey will be conducted and with the implementation of lighting controls there is not expected to be significant light spill impacts on the turtle beach or any offshore islands. Indirect impacts are expected to be able to be minimised via design and management. Detailed inundation and surface water studies will be reported in the ERD.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	The following assumptions have been made when conducting the impact assessment provided above: • Initial intertidal habitat surveys reflect the mapping during the detailed assessments. The figures provided may change once the detailed surveys are completed. These changes are not expected to extensive however as the initial surveys are expected to be relatively accurate; and

	• Little to no pile driving will be required to install the intake and outfall and associated pipelines. This assumption will be verified as the proposal progresses through the design stage.
Terrestrial Flora and Vegetation	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**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 2016 (EPA, 2016a). Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline - Flora and Vegetation (EPA, 2016i). **Relevant EPA Technical Guidance** Technical Guidance – Flora and Vegetation Surveys for EIA (EPA, 2016j). **Application of policies and guidance** Flora and vegetation surveys will be conducted in accordance with the EPA technical guidance identified above. Key EPA documents and Factor Guidelines for flora and vegetation have been used during the refinement of the proposal design to identify, avoid and minimise disturbance of features of environmental significance.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with several environmental consultants including Preston Consulting, Phoenix and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which provides flexibility to minimise direct impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	• No State-listed threatened flora recorded. One Threatened species, listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) [Priority 3 under the *Wildlife Conservation Act 1950* (WC Act)], *Eleocharis papillosa*, was identified as potentially occurring within the project area (Phoenix, 2017a; Appendix 4) however no suitable habitat for this species occurred in the survey area. *Eleocharis papillosa* occurs in temporary wetlands, predominantly freshwater and semi-saline swamps, which do not occur in the study area; • 14 Priority Flora were identified as possibly occurring within the Development Envelopes, including four P1 species and two P2 species. No Priority Flora have been previously recorded in the Development Envelopes (Phoenix, 2018; Appendix 5); • Five Weeds of National Significance were identified as potentially occurring within the project area; • No Threatened Ecological Communities were recorded or identified as potentially occurring within the Development Envelopes; • One vegetation type recorded along the proposed haul road and eastern portion of the Development Envelopes, Low mixed grassland, *Eragrostis* spp., may align with the Priority 3 Horseflat Land System of the Roebourne Plains Ecological Community; • All vegetation associations are extensively represented in the Roebourne and Chichester subregions and have over 89% remaining according to the Government of Western Australia (2016) and therefore the status of Least Concern; and • Vegetation in the study area was recorded to vary from 'Completely Degraded' to 'Excellent' condition (Phoenix, 2018). A number of sites were recorded to be in 'Poor' condition as they were heavily grazed, dissected by livestock tracks and had either upper shrub strata or low grass strata dominated by aggressive weeds.

Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Direct disturbance of flora and vegetation; • Potential disturbance of conservation significant flora (if present); • Disturbance of a small portion of the Horseflat Land System of the Roebourne Plains Priority 3 Ecological Community (if present); • Indirect impacts as a result of changes to the surface water regime; • Salinity may reduce rehabilitation success of the pond areas at closure; • Introduction or spread of weeds; • Reduction in vegetation health as a result of unintentional leaks or overflow of concentrated brine; and • Reduction in health of Groundwater Dependant Vegetation (if present) as a result of the abstraction of groundwater (if required).

Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Minimise clearing:
	  ○ The ponds are predominantly located on clay pans which are mostly devoid of vegetation;
	  ○ Utilise existing access tracks and disturbance where practicable e.g. haul road and CPE;
	  ○ Utilise natural inundations to minimise excavations and other earthworks;
	• Provide flexibility in development envelopes to allow the avoidance of any conservation significant flora and vegetation if identified during future surveys;
	• Implement Ground Disturbance Permit system;
	• Maintain existing surface water flow regimes on the two main surface water flow corridors;
	• Identify and manage any acid sulphate soils if present;
	• Design ponds to minimise the risk of leaks;
	• Maintain adequate freeboard in ponds to minimise the risk of overflow; and
	• Implement industry-standard controls for sedimentation and hydrocarbon storage and handling.

Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	• The disturbance of general terrestrial vegetation is not expected to be significant due to the largely uncleared landscape and relative widespread distribution of communities; • If conservation significant flora and vegetation are identified during future surveys then they will be avoided where practicable, therefore impacts are expected to be limited; • There may be localised indirect impacts to downstream creekline vegetation associated with alterations to surface water flows through minor tributaries that will be blocked off by the ponds, however impacts will be limited to a small area between the ponds and the coast; and • Unintentional indirect impacts on vegetation are expected to be rare and if they occur the impacts will be short-term and restricted in size.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	It has been assumed that there is a low likelihood that conservation significant flora and / or vegetation will be recorded within the Terrestrial Infrastructure Development Envelope that could not be avoided.
Terrestrial Environmental Quality	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**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 2016 (EPA, 2016a). Environmental Impact Assessment (EIA) (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Terrestrial Environment Quality (EPA, 2016k).

	Relevant EPA Technical Guidance N/A. **Application of policies and guidance** This Section 38 Referral has been prepared by utilising the advice contained within the 'Key EPA Documents' listed above. Relevant guidance has been utilised in the development of the initial project design to minimise impacts on this factor.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, Phoenix and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	Vegetation in the study area was recorded to vary from 'Completely Degraded' to 'Excellent' condition (Phoenix, 2018; Appendix 5). A number of sites were recorded to be in 'Poor' condition as they were heavily grazed, dissected by livestock tracks and had either upper shrub strata or low grass strata dominated by aggressive weeds.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	Potential impacts to this factor include: • Erosion associated with vegetation clearing and changes to surface water regimes; • Potential leaks or overflow of brine from evaporation ponds or pipelines; • Seepage from ponds resulting in elevated salinity in underlying and surrounding soils; • Salinity reducing the likelihood of rehabilitation success of the pond areas at closure; • Disturbance of acid sulphate soils; • Loss of sediment to the surrounding terrestrial environment during construction; and • Hydrocarbon spillage risks.
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Design ponds to minimise the risk of leaks; • Maintain adequate freeboard in ponds to minimise the risk of overflow; • Identify and manage any acid sulphate soils if present; • Minimise earthworks by utilising natural inundations where available; • Implement industry-standard controls for sedimentation and hydrocarbon storage and handling; and • Comply with Part V EP Act Licence issued under Category 14 – Solar Salt Manufacturing.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	Potential impacts are expected to be localised and short-term. With the implementation of controls these potential impacts are expected to be able to be managed such that a significant impact on terrestrial environmental quality does not occur.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	No specific assumptions have been made in this assessment.
Terrestrial Fauna	
EPA Policy and guidance – What have you considered and how	**EPA Objective:** To maintain representation, diversity, viability and ecological function at the species, population and assemblage level. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives 2016 (EPA, 2016a).

have you applied them in relation to this factor?	EIA (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline - Terrestrial Fauna (EPA, 2016l). **Relevant EPA Technical Guidance** Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA, 2010). Technical Guidance – Terrestrial fauna surveys (EPA, 2004). Technical Guidance - Sampling of short range endemic invertebrate fauna (EPA, 2009). **Application of Policies and Guidance** Terrestrial fauna surveys will be conducted in accordance with the guidance identified above. Key EPA documents and Factor Guidelines for terrestrial fauna have been used during the refinement of the proposal design to minimise disturbance of significant fauna habitat, and determining mitigation strategies for the proposal.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with several environmental consultants including Preston Consulting and Phoenix regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which provides flexibility to minimise direct and indirect impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	• A total of 33 fauna species of conservation significance have been recorded, or suitable habitat recorded (Phoenix, 2018; Appendix 5), including four reptiles (three marine turtles), 28 birds (all migratory birds) and one mammal; • Five bird species were recorded greater than 0.1% of the East-Asian-Australasian Flyway (EAAF) population, although almost all records were outside the Development Envelope (Phoenix, 2018); • One species was recorded greater than 1% of the EAAF population, although all records were outside the Development Envelope (Phoenix, 2018); • Seven Threatened shorebirds were recorded by Phoenix (2017b; Appendix 3) however these were all located outside of the Development Envelope; • Distribution data suggests that the algal mat and salt flats area (proposed ponds area) are of least importance to migratory shorebirds of the area in terms of abundance and richness (Phoenix, 2017b); • Night Parrot (*Pezoporus occidentalis*) (Critically Endangered – WC Act) is not expected to be present and has not been detected from 12 audio recording sites; and • Short-range endemic (SRE) fauna are likely to occur within the study area (Phoenix, 2017a; Appendix 4)

Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Direct disturbance of general fauna and SRE habitat;
	• Potential disturbance of conservation significant fauna habitat (if present);
	• Disturbance of mangrove habitat utilised by migratory shorebirds;
	• Indirect impacts to terrestrial fauna habitat health as a result of:
	  ○ Increased sedimentation during construction;
	  ○ Alterations to surface water regimes;
	  ○ Leaks or spillages of hypersaline brine; and
	  ○ Introduction or spread of weeds and feral fauna.

Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Conduct further surveys to confirm the presence or absence of conservation significant fauna or their habitat, including the completion of a Night Parrot survey; • Conduct further surveys to confirm the presence or absence of SREs; • Provide flexibility in development envelopes to allow the avoidance of any conservation significant fauna habitat; • Revise design and subsequent development envelope boundaries to minimise direct impacts to mangrove habitats; • Avoid and/or minimise disturbance of any significant fauna habitat if identified;

	• Provide surface water corridors to allow the larger ephemeral creeks to flow to the marine environment;
	• Ensure design does not significant impede tidal flow regimes;
	• Implement industry-standard controls for sedimentation and hydrocarbon storage and handling;
	• Minimise clearing of fauna habitat:
	  ○ Utilise existing access tracks and disturbance where practicable;
	  ○ Utilise natural inundations to minimise excavations and other earthworks;
	• Implement 'Ground Disturbance Permit system;
	• Identify and manage any acid sulphate soils if present;
	• Enforce machinery hygiene and waste management practices to minimise risk of supporting feral animals and weeds;
	• Design ponds to minimise the risk of leaks;
	• Maintain adequate freeboard in ponds to minimise the risk of overflow; and
	• Implement industry-standard controls for sedimentation and hydrocarbon storage and handling.

Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	The disturbance of general fauna habitat is not expected to be significant due to the largely uncleared landscape and relatively widespread distribution of the communities Impacts to conservation significant fauna habitat are not expected to be significant as the majority of mangrove habitat in the area will not be disturbed and therefore will be maintained for use by migratory shorebirds. If SREs are determined to be present within the ponds area then a portion of its habitat is likely to be disturbed. Further studies will be completed to allow an estimation of the portion of the habitat that will remain and the subsequent impact on SRE species. Indirect impacts are expected to be able to be managed to a low level of impact by using design and management controls.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	The assessment above is based on initial terrestrial fauna surveys and therefore it may be considered to be conservative.
Hydrological Processes / Coastal Processes	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objective (Hydrological Processes):** To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected. **EPA Objective (Coastal Processes):** To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives (EPA, 2016a). EIA (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Hydrological Processes (EPA, 2016m). Environmental Factor Guideline – Coastal Processes (EPA, 2016n). **Application of Policies and Guidance** Key EPA documents and Factor Guidelines for hydrological and coastal processes have been used during the refinement of the proposal design to minimise impacts to this factor, and determining mitigation strategies for the proposal.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, RPS and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises direct and indirect impacts to this factor.

Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	The proposal is situated between the Robe River in the south and Fortescue River in the north. The Fortescue River in the West Pilbara has a catchment area of 20,000 km^2 and is a major drainage system of the region. A number of smaller ephemeral watercourses (Six Mile Creek, Seven Mile Creek) drain from the Hamersley Ranges into the tidal flats within the study area (Williams, 1968). Their hydrological regime is likely characterised by seasonal rainfall events. There appear to be few, if any, permanent water bodies.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Alteration of tidal regimes; • Alteration or blockage of ephemeral creekline surface water regimes; • Abstraction of groundwater as a contingency water supply; • Alteration of groundwater levels or flows as a result of increased seepage beneath ponds; and • Reduction in surface water flows due to the capture of rainfall within the ponds.
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Undertake detailed hydrological and inundation modelling to inform drainage design and ensure the proposal does not significant impede tidal flow regimes; • Avoid blockages of tidal creeks; • Maintain surface water corridors to allow the larger ephemeral creeks to flow to the marine environment; • Provide engineered drainage as required to prevent erosion or flooding; • Abstract groundwater (if required) in accordance with 5C Licence; and • Construct ponds on areas of low permeability where practicable.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	The design of the proposal has been revised to move the ponds further inland, which results in a reduced potential impact to tidal flow regimes. General tidal flows through intertidal areas are unlikely to be significantly impacted. Further studies will be completed to determine the likely impact on inundation regimes resulting from more extreme events such as cyclone storm surges and king tides. The findings of these studies may result in other minor design modifications to ensure that the intertidal system is maintained. The proposal will maintain two main ephemeral creeks with defined corridors between ponds. There are several small ephemeral drainage lines that will be cut off by the ponds. These will be diverted to the maintained corridors where appropriate, but some residual impacts will occur. Groundwater levels and flows beneath the ponds are not expected to be significantly impacted as general flow is expected to be towards the ocean. Some mounding may occur, however any additional seepage is expected to flow along this similar path towards the ocean. Abstraction of groundwater for fresh water supply is expected to be a contingency only (desalination will be the preferred source). It is expected that a 5C Licence issued under the *Rights in Water and Irrigation Act 1914* will be sufficient in ensuring this abstraction does not significantly impact this factor.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	• The hydrological and coastal processes in the area surrounding the proposal are relatively complex, with interactions between tidal and stormwater flows. Additional hydrological and inundation studies will be conducted to inform this assessment; and • Groundwater supply bore locations have not yet been identified and it has been assumed that sustainable abstraction will be able to occur from these bores when developed.
Inland Waters Environmental Quality	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objective**: To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives (EPA, 2016a). EIA (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Inland Waters Environmental Quality (EPA, 2016n).

	Application of Policies and Guidance Key EPA documents and Factor Guidelines for Inland Waters Environmental Quality have been used during the refinement of the proposal design to minimise impacts to this factor, and determining mitigation strategies for the proposal.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held pre-referral meetings with DotEE, EPA Services and DBCA and their comments have been incorporated into this Section 38 Referral where applicable. Mardie Minerals has also consulted with environmental consultants including Preston Consulting, RPS and Stantec regarding the potential impacts on this factor. The outcomes of this consultation has led to the current design of the proposal, which minimises direct and indirect impacts to this factor.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	A number of smaller ephemeral watercourses (Six Mile Creek, Seven Mile Creek) drain from the Hamersley Ranges into the tidal flats within the study area (Williams, 1968). Their hydrological regime is likely characterised by seasonal rainfall events. There appear to be few, if any, permanent water bodies. Baseline groundwater quality has not yet been surveyed, however based on other studies in the region, groundwater salinity is expected to be higher (hypersaline) closer to the coast.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	Seepage from ponds resulting in elevated salinity in underlying groundwater. Other potential impacts to this factor are limited to indirect impacts, including: • Potential leaks or overflow of brine from evaporation ponds or pipelines; • Acidification of surface or groundwater as a result of the disturbance of acid sulphate soils (if present); • Loss of sediment to surface water systems during construction; and • Hydrocarbon spillage risks.
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Locate ponds on land with low permeability where available; • Design ponds to minimise the risk of leaks; • Maintain adequate freeboard in ponds to minimise the risk of overflow; • Identify and manage any acid sulphate soils if present; • Minimise earthworks by utilising natural inundations where available; • Implement industry-standard controls for sedimentation and hydrocarbon storage and handling; and • Comply with Part V EP Act Licence issued under Category 14 – Solar Salt Manufacturing.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	The seepage of brine from the ponds into the underlying groundwater is not expected to result in a significant impact as this groundwater is expected to be hypersaline, shallow and generally flow towards the ocean. No users of this groundwater were identified and no vegetation is expected to be reliant on this groundwater for survival. Indirect impacts may occur on some occasions, however potential impacts would be localised and short-term. With the implementation of controls these potential impacts are expected to be able to be managed such that a significant impact on inland waters environmental quality does not occur.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	• A Part V EP Act Licence will be issued under Category 14 – Solar Salt Manufacturing which will regulate potential impacts from the process; and • Groundwater beneath the ponds is saline and reports to the ocean.
Air Quality	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objectives**: To maintain air quality and minimise emissions so that environmental values are protected. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives (EPA, 2016a). EIA (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines**

	Environmental Factor Guideline - Air Quality (EPA, 2016o). **Application of Policies and Guidance** This factor has been included due to the greenhouse gas emissions expected from the proposal. The Environmental Factor Guideline - Air Quality (EPA, 2016o) has been utilised during the assessment.
Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Mardie Minerals has held a pre-referral meeting with EPA Services where it was stated that this factor be included in the Section 38 Referral to allow an assessment of greenhouse gas emissions.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	The proposal is in a remote location and lies more than 40 km from the closest significant greenhouse / air pollutant source – the Sino Iron Project power station. As such only low levels of air pollutants are expected in the local air shed. Elevated dust emissions during high-wind events are likely to be the current primary influence on air quality.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Greenhouse gases emitted by earthmoving equipment, vehicles, pumps, Processing Plant, generators and other powered equipment; and • Dust emissions, predominantly during construction.
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Ensure all vehicles and equipment are serviced and maintained regularly; • If suitable, select equipment with lower greenhouse gas emissions when purchasing or hiring equipment; • Utilise natural gas as a fuel supply for the Processing Plant in preference to diesel if suitable; • Optimise haulage planning to reduce emissions per kilometre; • Utilise equipment that is appropriately sized for the task; • Monitor fuel and energy usage; and • Supress dust as required, particularly during earthmoving activities.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	The proposal will result in greenhouse gas emission, however they are not expected to be significant as the process is not energy-intensive (it predominantly relies on evaporation) and does not require the operation of significant equipment during operations. An estimate of CO_2-e per tonne of product will be determined once project planning and subsequent studies have been completed.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	No specific assumptions were utilised in this assessment.
Social Surroundings	
EPA Policy and guidance – What have you considered and how have you applied them in relation to this factor?	**EPA Objectives**: To protect social surroundings from significant harm. **Key EPA Documents** Statement of Environmental Principles, Factors and Objectives (EPA, 2016a). EIA (Part IV Divisions 1 and 2) Administrative Procedures 2016. EIA (Part IV Divisions 1 and 2) Procedures Manual 2016. **Relevant EPA Factor Guidelines** Environmental Factor Guideline – Social Surroundings (EPA, 2016p). **Other Relevant Guidance** N/A. **Application of Policies and Guidance** The Environmental Factor Guideline - Social Surroundings (EPA, 2016p) has been utilised during the assessment.

Consultation – Outline the outcomes of consultation in relation to the potential environmental impacts.	Extensive consultation with Guruma Kurma Marthadunera (KM) and Yaburara Marthadunera (YM) claim groups have been conducted in 2017 with initial onsite heritage surveys conducted.
Receiving environment - Describe the current condition of the receiving environment in relation to this factor.	There are no currently utilised existing residences or camping sites in close proximity to the proposal, however some historic places have been identified.
Proposal activities – Describe the proposal activities that have the potential to impact the environment**.**	• Restrictions in recreational uses of the area; • Potential unavoidable disturbance of Aboriginal heritage sites (surveys yet to be completed); and • Disturbance of areas utilised by YM or KM for bush tucker or medicine.
Mitigation - Describe the measures proposed to manage and mitigate the potential environmental impacts.	• Community consultation to occur to determine if there are any recreational areas that can be retained; • Initial onsite Aboriginal heritage surveys have been conducted. Further surveys will be conducted and significant sites avoided if practicable; • Approval will be sought under Section 18 of the *Aboriginal Heritage Act 1972* if significant sites cannot be avoided; • Bush tucker and medicine information will be incorporated into flora and vegetation survey plans to allow avoidance and minimisation of impacts; and • Continued consultation with the YM or KM regarding the minimisation of impacts to traditional uses of the area.
Impacts - Assess the impacts of the proposal and review the residual impacts against the EPA objective.	Impacts to current recreational uses of the area are expected to be minimal as the area is difficult to access and is not extensively used. Consultation with YM or KM has identified areas that should be retained if possible and these areas have been incorporated as constraints into the design. Given the size of the disturbance there may be some Aboriginal heritage sites that will require disturbance. Impacts to bush medicine plants are unlikely to be significant as most disturbance is on salt flats, and of the terrestrial vegetation impacted, there is similar vegetation remaining around the Proposal. Impacts to bush tucker will be considered in consultation with the YM and KM.
Assumptions - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	Aboriginal heritage surveys have not been completed and as such the assessment has taken a conservative assumption that some sites will occur and will need to be disturbed. Current community consultation has not identified any recreational uses of the area, however this consultation is not yet complete.

Note that as per EPA guidance only consultation outcomes directly relevant to the Key Factors is included in the above table. Mardie Minerals has consulted widely on the Project general activities, impacts and design. A full consultation register will be provided in the Environmental Review Document.

Mardie Minerals has assessed the remaining Key Environmental Factors listed in EPA (2016) and provide the following comments:

- 'Landforms' is not expected to be a Key Environmental Factor for the proposal as the pond walls are relatively low (3 – 4 m) and will utilise existing land slopes on the east side. No unique landforms occur within the Development Envelope; and
- 'Subterranean Fauna' is not expected to be a Key Environmental Factor for the proposal due to the following:
    - The groundwater beneath the ponds is hypersaline and therefore unlikely to support stygofauna populations;
    - The regional groundwater systems are not renowned for their porosity of potential stygofauna habitat;

- Groundwater abstraction is limited to freshwater which is to be predominantly provided by a small desalination plant that utilises seawater as water supply (groundwater use will only be a backup); and
- No significant excavations are proposed that would impact troglofauna.

APPENDICES

Appendix 1: Assessment of Mangal and Algal Communities for the Mardie Solar Salt Project (Stantec, 2018)

Appendix 2: Snapshot survey of the Benthic Habitats and Communities at the Proposed Bitterns Pipeline and Outfall Infrastructure Options (O2 Marine, 2018)

Appendix 3: Shorebird, Marine Turtle and other conservation significant fauna survey (Phoenix, 2017b)

Appendix 4: Environmental desktop review and reconnaissance site visit for the Mardie Salt Project (Phoenix, 2017a)

Appendix 5: Mardie Salt Project preliminary flora and vegetation and terrestrial fauna assessment (Phoenix, 2018)

Appendix 6: Marine Turtle Survey of Mardie Salt Project Area (Pendoley Environmental Pty Ltd, 2018)

GLOSSARY

Term	Definition
Mardie Minerals	Mardie Minerals Pty Ltd
BPPH	Benthic Primary Producer Habitat
DBCA	Department of Biodiversity, Conservation and Attraction
DotEE	Department of the Environment and Energy
EAAF	East-Asian-Australasian Flyway
EIA	Environmental Impact Assessment
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
GLpa	Giga-litre per annum
Km	Kilometres
LAU	Local Assessment Units
Mtpa	Million tonnes per annum
NaCl	Sodium Chloride
Phoenix	Phoenix Environmental Sciences
The proposal	Mardie Salt Project
WA	Western Australia
WC Act	*Wildlife Conservation Act 1950*

REFERENCES

Department of Environment (2006). *Pilbara Coastal Water Quality Consultation Outcomes — Environmental Values and Environmental Quality Objectives*, Department of Environment, Government of Western Australia, Marine Series Report No. 1.

Environmental Protection Authority (2004). *Technical Guidance – Terrestrial fauna surveys.* Perth, WA. June 2004.

Environmental Protection Authority (2009). *Technical Guidance - Sampling of short range endemic invertebrate fauna*. Perth, WA. May 2009.

Environmental Protection Authority (2010). *Technical Guidance – Sampling methods for terrestrial vertebrate fauna*. Perth, WA. September 2010.

Environmental Protection Authority (2010). *Environmental Assessment Guideline for Protecting Marine Turtles from Light Impacts* Perth, WA. November 2010.

Environmental Protection Authority (2016a). *Statement of Environmental Principles, Factors and Objectives.* Perth, WA. December 2016.

Environmental Protection Authority (2016b). *Environmental Factor Guideline – Benthic Communities and Habitats*. Perth, WA. December 2016.

Environmental Protection Authority (2016c). *Technical Guidance – Environmental Impact Assessment of Marine Dredging proposals*. Perth WA. December 2016.

Environmental Protection Authority (2016d). *Technical Guidance – Protection of Benthic Communities and Habitats*. Perth, WA. December 2016.

Environmental Protection Authority (2016e). *Technical Guidance – Protecting the Quality of Western Australia's Marine Environment*. Perth, WA. December 2016.

Environmental Protection Authority (2016f). *Environmental Factor Guideline - Coastal Processes*. Perth, WA. December 2016.

Environmental Protection Authority (2016g). *Environmental Factor Guideline – Marine Environmental Quality*. Perth, WA, December 2016.

Environmental Protection Authority (2016h). *Environmental Factor Guideline - Marine Fauna*. Perth, WA, December 2016.

Environmental Protection Authority (2016i). *Environmental Factor Guideline - Flora and Vegetation*. Perth, WA, December 2016.

Environmental Protection Authority (2016j). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*. Perth, WA. December 2016.

Environmental Protection Authority (2016k). *Environmental Factor Guideline - Terrestrial Environment Quality*. Perth, WA, December 2016.

Environmental Protection Authority (2016l). *Environmental Factor Guideline - Terrestrial Fauna*. Perth, WA, December 2016.

Environmental Protection Authority (2016m). *Environmental Factor Guideline - Hydrological Processes.* Perth, WA, December 2016.

Environmental Protection Authority (2016n). *Environmental Factor Guideline - Inland Waters Environmental Quality.* Perth, WA, December 2016.

Environmental Protection Authority (2016o). *Environmental Factor Guideline - Environmental Factor Guideline - Air Quality.* Perth, WA, December 2016.

Environmental Protection Authority (2016p). *Environmental Factor Guideline - Environmental Factor Guideline - Social Surroundings.* Perth, WA, December 2016.

Government of Western Australia. (2016). *2016 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report).* Current as of October 2016. Department of Parks and Wildlife, Perth. Available from: https://www2.landgate.wa.gov.au/web/guest/downloader [Accessed 14 March 2018]

O2 Marine (2018). *BCI Minerals – Mardie Salt Project. Snapshot Survey of the Benthic Habitats and Communities at the Proposed Bitterns Pipeline and Outfall Infrastructure Options.* Technical Memorandum prepared for BCI Minerals, March 2018.

Pendoley Environmental Pty Ltd (2018). *Marine Turtle Survey of Mardie Salt Project Area*. Report prepared for Phoenix Environmental Sciences, January 2018.

Phoenix Environmental Sciences (2017a). *Environmental desktop review and reconnaissance site visit for the Mardie Salt Project*. Prepared for BC Iron Ltd, September 2017.

Phoenix Environmental Sciences (2017b). *Shorebird, Marine Turtle and other conservation significant fauna survey.* Memorandum report prepared for BC Iron Ltd, December 2017.

Phoenix Environmental Sciences (2018). *Mardie Salt Project preliminary flora and vegetation and terrestrial fauna assessment.* Memorandum report prepared for BCI Minerals, March 2018.

Stantec Australia Pty Ltd (2018). *Assessment of Mangal and Algal Communities for the Mardie Solar Salt Project*. Report prepared for BCI Minerals, February 2018.

Williams, I. R. (1968). *Yarraloola, Western Australia. Sheet SF50-6 International Index. 1:25,000* Geological Series–Explanatory Notes. Geological Survey of Western Australia, Perth, WA.