PERDAMAN INDUSTRIES

CHEMICALS & FERTILISERS

Threatened Species Management Plan

Perdaman Urea Project

Burrup Peninsula, Western Australia

CW1055600

Prepared for Proponent:

Perdaman Chemicals and Fertilisers Pty Ltd.

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Date: 19 March 2020

Assessment No:

2184 (WA)

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Summary

Proposal Title	Perdaman Urea Project
Proponent name	Perdaman Chemicals and Fertilisers Pty Ltd.
Assessment Number	2184 (WA) & 2018/8383 (Commonwealth)
Purpose of the TSMP	Biological surveys and a desktop assessment identified a total of 27 threatened fauna species "known to occur" or considered "likely to occur" within a 10km buffer of the Project area. This included 16 terrestrial fauna species and 11 aquatic fauna species. One threatened fauna species, the Ghost Bat (*Macroderma gigas*) was recorded within the Project area (APM, 2019). The purpose of this TSMP is to provide a framework which describes how the project will address, manage, monitor and mitigate impacts on Threatened Species. This plan supplements the CW1055600-EN-PL-001 Project Environmental Management Plan (PEMP) and Sub-Plans: CW1055600-EN-PL-006 Fauna Management Plan and CW1055600-EN-Pl-007 Flora Management Plan.
Key environmental factors and objectives	The key environmental factors and objectives relevant to the Project include: ▪ Coastal processes - To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected. ▪ Marine environmental quality - To maintain the quality of water, sediment and biota so that environmental values are protected. ▪ Marine fauna - To protect marine fauna so that biological diversity and ecological integrity are maintained. ▪ Flora and vegetation - To protect flora and vegetation so that biological diversity and ecological integrity are maintained. ▪ Terrestrial fauna - To protect terrestrial fauna so that biological diversity and ecological integrity are maintained. Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements. ▪ Inland waters - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Condition clauses	To be determined.
Key provisions in the plan	The TSMP's key provisions are included in *Section 8 Mitigation and Management Measures.* This section details the outcome and management based actions, that will be applied for the life of the Project against each of the potential impacts.

Foreword

This Threatened Species Management Plan (TSMP) is a sub-plan of the overarching Project Environmental Management Plan (PEMP) for the Perdaman Urea Project. An overview of the structure of the PEMP and sub-plans is illustrated in Figure 0-1.

This plan shall be reviewed and updated as necessary throughout the construction, operation and decommissioning phases of the project. The review process is detailed in *Section 15 Review and Continual Improvement* of the PEMP.

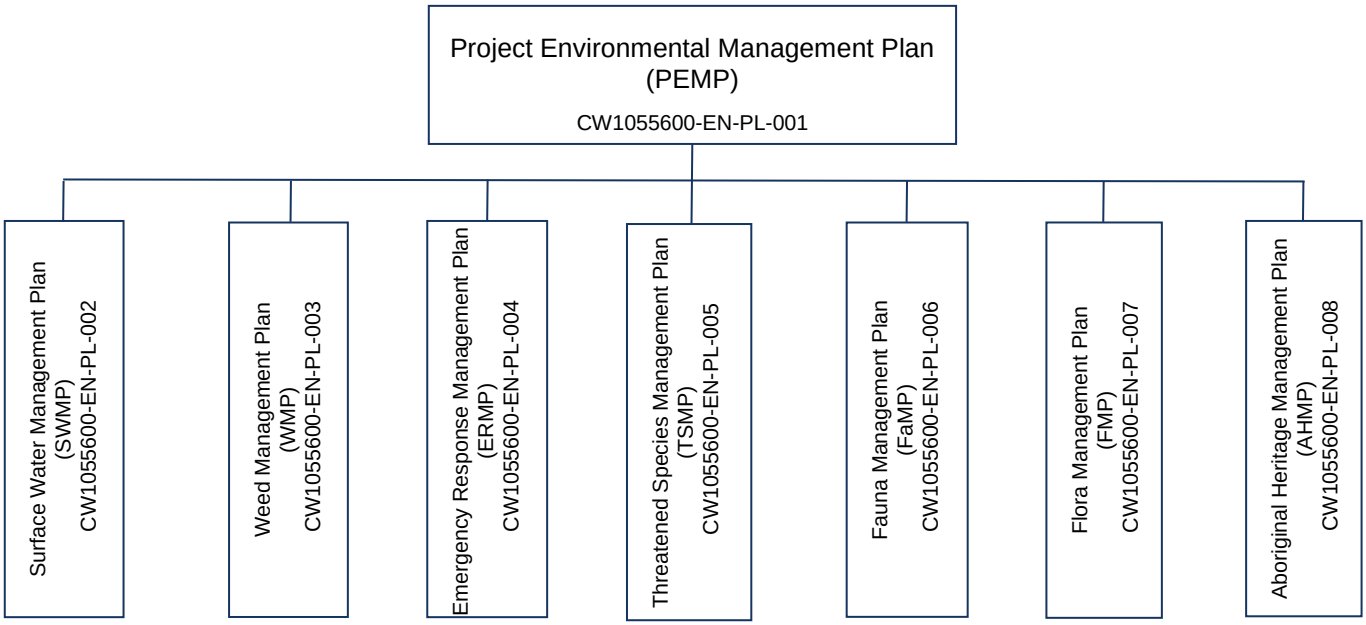

Figure 0-1: Structure of the Project Environmental Management Plan and supporting sub-plans.

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1 Introduction

Perdaman Chemicals and Fertilisers Pty Ltd (Perdaman) proposes to establish a state-of-the-art urea production plant within the Burrup Strategic Industrial Area (BSIA). The site is situated approximately 8 km from Dampier and 20 km north-west of Karratha on the north-west coast of Western Australia.

The key elements of this proposal include the design, engineering, construction and operation of the main urea production facility, administration, maintenance and storage infrastructure, conveyor and port storage and shiploading facilities (the Project).

The Project's construction and operational activities have the potential to impact listed threatened species under sections 18 and 18A of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Biological surveys and a desktop assessment identified a total of 27 threatened fauna species "*known to occur*" or considered "*likely to occur*" within a 10km buffer of the Project area. This included 16 terrestrial fauna species and 11 aquatic fauna species.

The main potential threatened species impacts on the Project include the loss of fauna habitat as a result of vegetation clearing, injury or death caused by vehicle strike, introduced predators, anthropogenic activities (such as lighting, noise and vibration) and entrapment or accidental poisoning at the project site.

A suite of strategies will be implemented throughout the construction and operational phases of the Project to minimise or abate these impacts. This includes minimising ground disturbance, avoiding where possible, potential threatened species habitat. Where clearing is required, inspections and removal of native fauna such as the olive python, prior to clearing will be undertaken. During rehabilitation works, threatened species fauna habitat for nesting, breeding or foraging will be established. Strict traffic speed limits will be enforced to avoid collision with fauna. Waste will be stored and disposed of in a way that does not attract vermin or native fauna. Light pollution impacts around the Port area will be managed to avoid impact on marine turtles. To protect bats, no barbed wire will be used on security fences, and markers will be used to highlight the barrier. Feral animal monitoring and control will be undertaken throughout the life of the project to protect native fauna.

These strategies establish the key environmental management measures which form the Project's legal requirements. Considering the management and mitigation measures outlined in this Threatened Species Management Plan (TFMP), impacts on terrestrial fauna and constituent habitats are likely to be minimal and affect habitat that is either widespread in the locality and the region, and/or has been previously disturbed.

It is expected that the Project will have a negligible impact on the abundance, species diversity, geographic distribution and productivity of terrestrial fauna.

1.1 Purpose

Biological surveys and a desktop assessment identified a total of 27 threatened fauna species "known to occur" or considered "likely to occur" within a 10km buffer of the Project area. This included 16 terrestrial fauna species and 11 aquatic fauna species. One threatened fauna species, the Ghost Bat (*Macroderma gigas*) was recorded within the Project area (APM, 2019).

The purpose of this TSMP is to provide a framework which describes how the project will address, manage, monitor and mitigate impacts on Threatened Species. This plan supplements the CW1055600-EN-PL-001 Project Environmental Management Plan (PEMP) and Sub-Plans: CW1055600-EN-PL-006 Fauna Management Plan and CW1055600-EN-Pl-007 Flora Management Plan.

1.1 Scope

The scope of the TSMP addresses both construction and operational activities for the life of the Project that could impact EPBC listed threatened species. It includes all Project areas including:

- Site C process plant and storage sheds;
- Site F administration, maintenance and storage buildings;
- Stormwater and brine holding ponds;
- Access roads within the project footprint;

- The causeway crossing the supra-tidal flat between sites C and F;
- The conveyor route to the west of site C and its route through the existing East West Service Corridor (EWSC); and
- Landside areas of the Port including storage, transfer and ship loading areas.

1.2 Key Environmental Factors

Perdaman has identified six key environmental factors relevant to threatened species. The potential impacts of the Project that relate to each of these factors are detailed in Table 1-1 below.

Table 1-1 Project environmental factors and potential impacts

Environmental Factor	Potential Impacts
Coastal processes	A causeway interconnecting Sites C and F has the potential to impact on tidal movements. Depending on design, this could affect groundwater salinity, hydrodynamics and sediment deposition which in turn could result in impacts to intertidal and supra-tidal habitat.
Marine Environmental Quality	Direct impact on marine water quality from the discharge of the Water Corporation outfall, which will contain the brine return from the urea plant. Impact from air emissions that deposit in the marine environment. Additional stormwater runoff from hardstand areas causing erosion and deposition of sediments reaching King Bay via the Supra-tidal flats.
Marine Fauna	Direct and cumulative impact from lighting spill. Accidental product discharge during ship loading. Underwater noise during construction.
Flora and Vegetation	Clearing of native vegetation. Impact on significant flora species. Dust deposition. Hydrological changes. Waste management. Altered fire regimes.
Terrestrial Fauna	Direct disturbance from noise, vibration, light and other anthropogenic activities. Indirect and cumulative impact through removal of breeding, nesting and foraging habitats and the introduction of predators. Habitat disturbance and fragmentation of fauna habitats as a result of construction. Fauna entrapment, injury or death during construction and operations. Inadvertent injury and/or mortality as a result of vehicle strikes from increased traffic during construction and operations. Injury and/or mortality as a result of increased waste material during construction and operations.
Inland waters	Alteration of surface drainage and water flow pathways, including surface, ground and tidal water flow to supra-tidal vegetation. A decrease in infiltration from rainfall and surface to groundwater within the Project site. Impact on surface and groundwater quality as a result of construction activities. Erosion of surface features and formation of features such as rills and gullies. Increase of surface water runoff volumes from hardstand surfaces. Degradation of water quality from elevated levels of suspended solids or contaminants in surface water runoff. Indirect impact on the mangrove communities of King Bay as a result of water quality changes.

2 Legislation, Commitments and Other Legal Obligations

2.1 Regulatory Obligations

Legislation relevant to threatened species management on the Project includes, but is not limited to:

- Biodiversity Conservation Act 2016
- Biosecurity Act 2015
- Environment Protection and Biodiversity Conservation Act 1999
- Environmental Protection Act 1996
- Environmental Protection Regulations 1987
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004
- Environmental Protection (Noise) Regulations 1997
- Environmental Protection (Unauthorised Discharge) Regulations 1997

In addition to the aforementioned legislation, this management plan will be developed and regularly reviewed to comply with the commitments and legal obligations arising from the Project's statutory approvals.

2.2 Policy and Guidance

The following policies and guidance have been considered when developing this TSMP:

- EPA (2018) Statement of Environmental Principles, Factors and Objectives
- EPA (2018) Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual
- EPA (2016) Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016
- EPA (2016) Environmental Factor Guideline: *Terrestrial Fauna*
- EPA (2016) Technical Guidance: *Terrestrial Fauna Survey*
- EPA (2016) Technical Guidance: Sampling Methods for Terrestrial Vertebrate Fauna
- EPA (2016) Technical Guidance: Sampling of short range endemic invertebrate fauna
- Commonwealth of Australia (1996) The National Strategy for the Conservation of Australia's Biological Diversity
- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005
- Department of the Environment (2015) Wildlife Conservation Plan for Migratory Shorebirds
- DoEE (2017) Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species
- DEWHA (2009) Significant impact guidelines for 36 migratory shorebirds species (EPBC Act Policy Statement 3.21
- DEWHA (2010) Survey Guidelines for Australia's Threatened Bats
- DEWHA (2010) Survey Guidelines for Australia's Threatened Birds
- DEWHA (2011) Survey Guidelines for Australia's Threatened Reptiles
- Government of Western Australia (2014) *Environmental Offsets Guidelines*
- Government of Western Australia (2011) *Environmental Offsets Policy*
- Threatened Species Scientific Committee (2016). Conservation Advice *Calidris canutus* Red knot. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/855-conservationadvice-05052016.pdf.

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- Department of the Environment (2015). Conservation Advice Numenius madagascariensis eastern curlew. Canberra: Department of the Environment. Available from: httpWwww.environment.gov.au/biodversity/threatened/species/pubs/847conservation-advice.pdf.

2.3 Project Approvals

The Project must comply with all of the conditions included in its granted approvals. Perdaman will be responsible for ensuring all statutory approvals required for activities or infrastructure specific to Project needs are attained in a timely manner.

Table 3-1 below includes indicative licenses and approvals potentially required for the Project, which may apply or contain conditions specifically related to the management of threatened species. This list is provided as a guide only, and is subject to change throughout the life of the Project.

A detailed approval register will be maintained by Perdaman to monitor the implementation and progress of conditions, and the achievement, renewal and surrender of all licenses throughout the life of the Project.

Table 2-1 Project statutory approvals and agreements.

Approval / Agreement	Purpose	Agency / Jurisdiction
EP Act 1986 - Part IV Approval - Ministerial Statement	EPA assessment of strategic proposal.	EPA
Environmental Protection and Biodiversity Conservation Act 1999 – s.18 & 18A listed threatened species.	Meeting Commonwealth requirements for threatened species.	DOEE
Biodiversity Conservation Act 2016 - Fauna Taking (Relocation) Licence	Fauna relocation associated with trenching operations.	DBCA

2.4 Fauna Taking (Relocation) License

In compliance with the Biodiversity Conservation Act 2016, Perdaman will have on site an appropriately qualified individual that holds a Fauna Taking (Relocation) Licence to take or disturb fauna for the purpose of relocating.

This includes during normal plant operations and Project construction. Relocation of fauna may be required as part of any clearing or grubbing works, and where fauna could enter a work area / trench and need to be safely removed and relocated to a suitable location outside the Project's battery limits.

2.5 Ground Disturbance Permits

A Ground Disturbance Permit (GDP) is a permit issued by Perdaman for enabling works within defined battery limits, which have the potential to impact native vegetation, fauna, heritage or other environmentally sensitive values.

The GDP provides the Project personnel responsible for managing the ground disturbing activities with a summary of the key approval commitments and obligations obtained by or issued to Perdaman by regulators, tenure holders and other third parties.

Activities covered in the GDP include but are not limited to clearing and grubbing, grading open ground, movement of plant, equipment and vehicles and any other activity which will disturb or damage soil, waterways, habitat and, or vegetation.

A GDP could be issued through a standalone process or included in an overall approval to work procedure developed for the Project.

It is the responsibility of all project Personnel to ensure they submit to Perdaman an application form requesting a GDP at least two weeks prior to requiring access to the area being the subject of the GDP.

3 Roles and Responsibilities

All personnel undertaking Project activities have the following responsibilities as they relate to threatened species management and the Project's broader environmental requirements:

- Attending a Project Environmental Induction prior to commencing any work on site.
- Ensuring they are aware of the Project's environmental requirements as stipulated in the most current version of the TSMP and CW1055600-EN-PL-001 Project Environmental Management Plan (PEMP) and supporting documents.
- Reporting any environmental hazards, incidents, near misses and community complaints to their Supervisor.

Role specific environmental management responsibilities have also been assigned to relevant Perdaman personnel including the Project Director, Project Manager, Environment and Heritage Manager, the Environment Coordinator, Construction Manager and Operations Manager. The specific responsibilities for each of these roles are included in the PEMP.

In addition to these Perdaman personnel, Contractors engaged by Perdaman will provide adequate, tertiary qualified (in environmental management or similar qualification) and experienced site-based personnel to coordinate the management of environmental issues relevant to their scope of works.

4 Project Overview

4.1 Project site and activities

Perdaman plans to construct and operate a state-of-the-art urea plant with a production capacity of approximately 2 million tonnes per annum (Mtpa) on the Burrup Peninsula in the North West of Australia (Figure 2-1) (the Project).

The Project infrastructure including the main production facility (urea plant), administration, maintenance and storage infrastructure, conveyor and port storage and shiploading facilities are situated within the BSIA. The estate's close proximity to gas, port and other key infrastructure makes it an ideal location for the Project.

The BSIA is located in close proximity to the Murujuga National Park which covers an area of 4,913ha on the Burrup Peninsula. The area is considered to host the largest concentration of ancient rock art in the world. As such, the Project will apply effective management strategies that minimise or abate, actual or potential impacts on the environment, heritage and cultural values of the region.

The Project involves piping natural gas from the nearby Woodside operated LNG facility to the project site under a long term commercial off-take agreement. Natural gas is converted to urea and the final granulated product is transported by conveyor to the Dampier Port by closed conveyor along the East West Service route, where new facilities will include an enclosed stockpile shed and ship loading facilities.

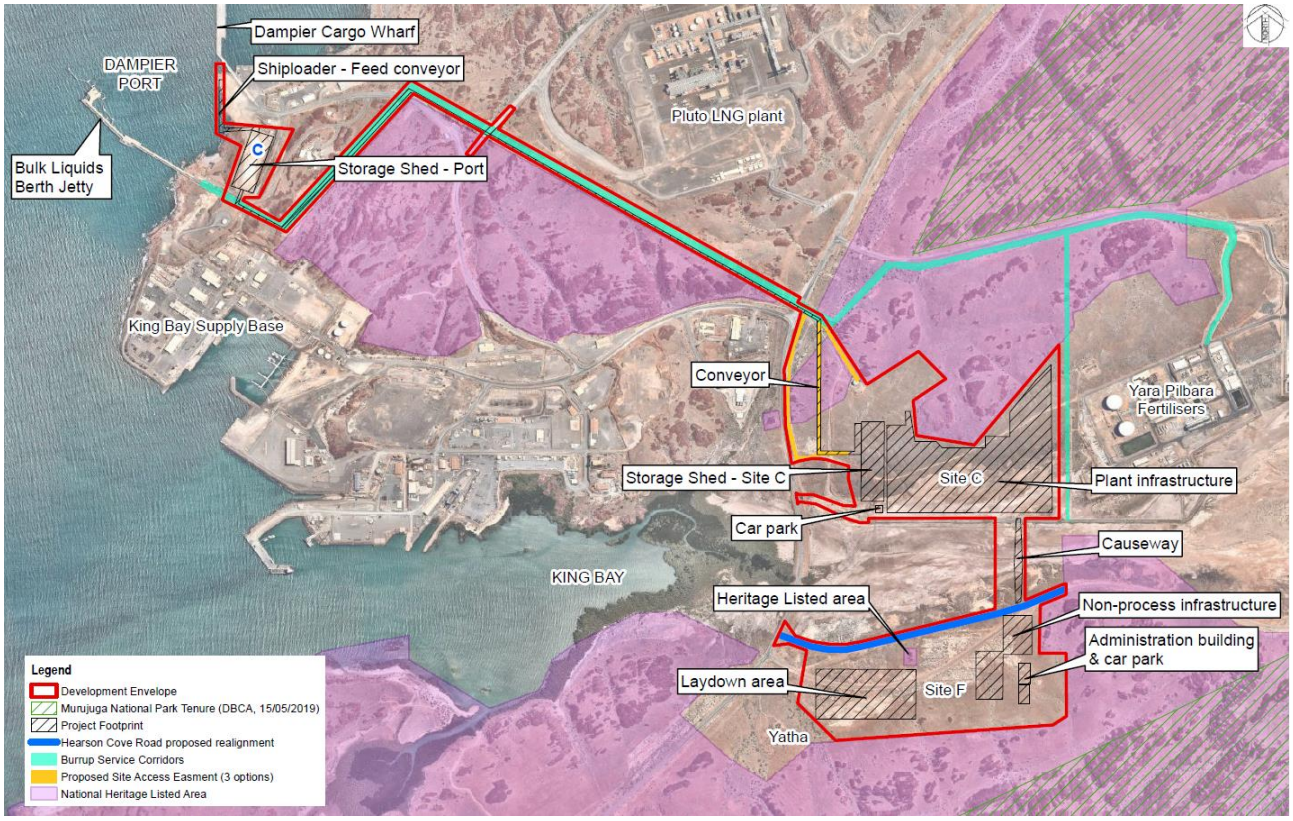

Figure 4-1 Development envelope and indicative infrastructure.

Proven Urea production technology underpins each of the key stages of this project. The technologies being applied to the plant are equivalent to the industry best for the specific applications and successfully operate elsewhere in the world. The processing plant can be broadly considered in four sections, or Blocks, namely:

- Gas Block
- Product Block
- Utility Block
- Infrastructure and Logistics

Each of the Process Blocks is made up of a number of process units or physical sections of the plant. The major process sections are illustrated in Figure 4-2.

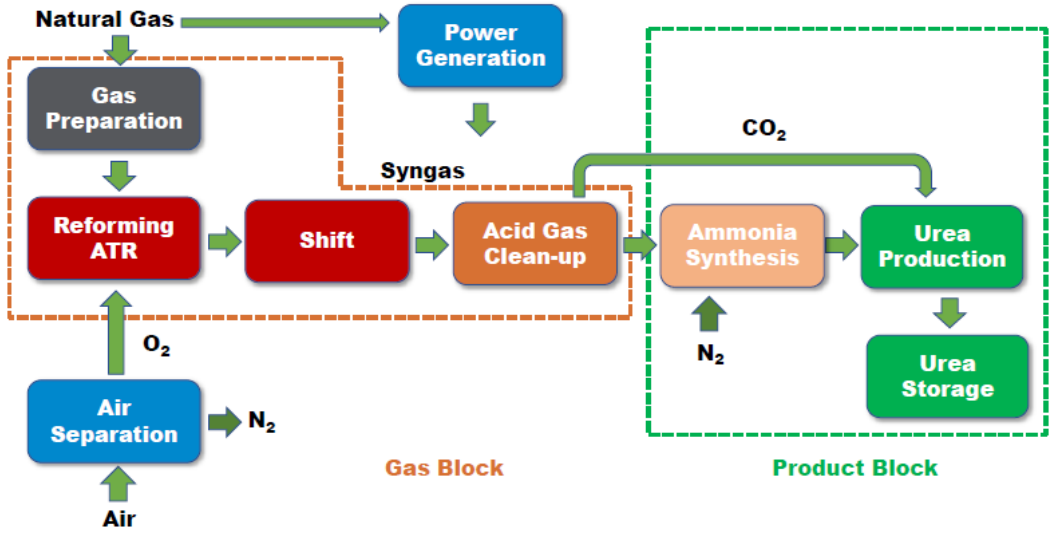

Figure 4-2 Process Block Diagram

4.2 Matters relating to the EPBC Act – Threatened Species

This TSMP focuses on the potential impacts the Project may have on listed threatened species under sections 18 and 18A of the EPBC Act.

During flora and fauna surveys (APM, 2019) one threatened fauna species, the Ghost Bat (*Macroderma gigas*) was recorded within the Project area.

Habitat requirements and an assessment of the likelihood of occurrence for fauna species listed as threatened under the EPBC Act were identified through a desktop assessment. This included identification of 16 terrestrial fauna species and 11 aquatic fauna species or species habitat which are known to, are likely to or may occur within a 10km buffer of the Project area.

Of these, the threatened fauna species "*known to occur*" or considered "*likely to occur*" in the project area are considered Matters of National Environmental Significance (MNES) that could be impacted by the Project. The five terrestrial species or species habitat listed in Table 4-1 that *"may occur",* are not likely to be impacted by the project and hence are not considered as threatened species within this TSMP.

Table 4-1 and Table 4-2 list these threatened terrestrial and aquatic fauna species within the 10km buffer of the Project site. They also provide a brief discussion of each species habitat requirements and their assessment summary. Section 6 below provides further detail of each fauna habitat type within the Project area.

Table 4-1 Threatened terrestrial fauna species identified within 10km buffer of project area.

Species	Common Name	EPBC Act Status #	Habitat requirements	Assessment summary
Species or species habitat 'known' to occur within area				
Calidris canutus	Red Knot	E	In close proximity to coastal waters such as mudflats and sandflats in estuaries. Also known to occur in salt ponds and salt lakes near the coast.	This species has been recorded in the Dampier region (DBCA, 2018) and less recently on the Burrup Peninsula (Worley Astron, 2006). The species is known to follow tide edges when foraging, and can be seen with many other shore birds, such as the Red-necked Stint, which was recorded on site, within the samphire habitat. Given the proximity to Hearson Cove, and the presence of open flats within the Project Area, this species may use the area for both foraging and roosting. This species was not recorded on either of APM's surveys. The likelihood of the species occurrence in the Project area is **moderate**.
Calidris ferruginea	Curlew Sandpiper	CR	Known to occupy drying near-coastal freshwater lakes and swamps. Predominantly occurring in the shallows of estuaries and attracted to near-coastal water bodies, such as salt ponds, salt lakes, sewage ponds, beaches and freshwater swamps and lakes.	This species has been recorded in the Dampier region (DBCA, 2018) and historically on the Burrup (Worley Astron, 2006). This species may use the Project area during the wet season, though records suggest that the species prefers undisturbed islands and islets. The likelihood of the species occurrence in the Project area is **moderate**.
Calidris tenuirostris	Great Knot	CR	Often seen in large flocks of hundreds to thousands of birds. Forages over inter-tidal flats. Will reside in sheltered coastal mudflats of estuaries, lagoons and mangrove swamps. Sometimes uses salt lakes but rarely inland waters.	This species has been historically recorded on the Burrup Peninsula (Worley Astron, 2006). It was not recorded during either of APM's (2019) surveys. The samphire /mudflat habitat exist in the Project area is likely fairly open for this species and it does not that contain the mangrove swamps it prefers. The likelihood of the species occurrence in the Project area is **low**.
Charadrius leschenaultii	Greater Sand Plover	V	Resides in large mixed-species flocks on coastal, intertidal mudflats and sandbanks of sheltered bays. Less common on coastal salt marshes and brackish or freshwater wetlands.	This species has been recorded northeast of Rosemary Island on an islet called Lady Nora within the Dampier archipelago and Hearson Cove. This species is a regular migrant between August and May and is most common in northern Australia. The species is not expected to be reliant on the Project area habitats given it prefers sheltered bays and intertidal mudflats. The likelihood of the species occurrence in the Project area is **moderate**.
Charadrius mongolus	Lesser Sand Plover	E	Inhabits intertidal sandflats and mudflats, beaches and sandbars and reef flats.	This species has been historically recorded on Dolphin Island in the Dampier region. This species sometimes overwinters in northern Australia. It is abundant in Queensland, and uncommon elsewhere in Australia. This species is not expected to rely on habitats present in the Project area, especially as this species does not breed in Australia.

Species	Common Name	EPBC Act Status #	Habitat requirements	Assessment summary
				The likelihood of the species occurrence in the Project area is **low**.
Dasyurus hallucatus	Northern Quoll	E	Inhabits rocky outcrops and mezzo formations in areas with Eucalyptus woodlands.	This species has been previously recorded on Dolphin Island in the Dampier region and on the Burrup Peninsula in various locations, including a sighting at the port area of King Bay warehouse. The likelihood of the species occurrence in the Project area is **moderate**.
Liasis olivaceus barroni	Olive Python (Pilbara subspecies)	V	Occurs in a range of habitats from savannah woodlands to monsoonal forests. Typically, in areas of rocky hills, outcrops and ranges.	This species has been historically recorded on Dolphin Island in the Dampier region and in King Bay, Hearson Cove and in many locations around the Karratha Gas Plant and Pluto LNG facility, particularly where artificial water sources occur (open water pit) It is often recorded around the built environment and highly disturbed areas. APM did not record the species on either of the surveys. *The likelihood of the species occurrence in the Project area is **high**.*
Limosa lapponica baueri	Bar-tailed Godwit (baueri)	V	This species forages over coastal dunes. Has been observed amongst sand and mud flats in estuarine and beach areas, as well as near-coastal salt ponds and salt lakes.	This species has been recorded in the Dampier region on Dolphin Island and Hearson Cove (DBCA, 2018). This species may forage over the salt ponds and mud flats present in the Project area. The likelihood of the species occurrence in the Project area is **moderate**.
Numenius madagascariensis	Eastern Curlew	CR	Predominately found in estuarine systems, saltmarshes, tidal mudflats and mangroves. Can be found in brackish or freshwater lakes.	This species has been recorded at Nickol Bay (east coast of Burrup) (DBCA, 2018). This species is a common migrant to the north, northeast and southeast of Australia. The likelihood of the species occurrence in the Project area is **moderate**.
Sternula nereis nereis	Australian Fairy Tern	V	Habitat includes sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches and also inland salt ponds and lakes and wetlands near the coast. However, it favours sand spits of islets in river-mouth channels, where they can forage on the seaward side of reefs and islands. Breeding known to occur within the wider 10km buffer area.	This species has been recorded on Egret Island on the Dampier archipelago (DBCA, 2018). This species would be more inclined to use the sheltered and undisturbed bays within the islands and islets of the archipelago. The likelihood of the species occurrence in the Project area is **low**.
Species or species habitat 'likely' to occur within area				
Macroderma gigas	Ghost Bat	V	Inhabits arid spinifex hillsides, open savannah woodland, tall open forest etc. They roost in sandstone or limestone caves or under boulder piles and abandoned mines. They prefer to roost deep in the cave system and in a relatively open space in the cavity. This has to do with humidity and temperature in the microclimate that caves produce.	This species has been recorded on the Burrup Peninsula about 4 km northeast of the Project Area (DBCA, 2018) and more recently by APM during the post-wet season survey. This species was once distributed over the entire north of Australia but is now restricted to pockets within tropical areas. This is partly due to the introduction of the Cane Toad, but also loss and disturbance of roost sites and loss of foraging habitat

Species	Common Name	EPBC Act Status [#]	Habitat requirements	Assessment summary
			Females roost with young preferentially in the large open cavity far from the cave entrance.	through inappropriate management and dramatic land-use change (DENR, 2016). *The species has been **recorded** in the Project area.*
Species or species habitat which 'may' occur within area				
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CR		
Macronectes giganteus	Southern Giant-Petrel	E		
Pezoporus occidentalis	Night Parrot	E		
Rhinonicteris aurantia (Pilbara form)	Pilbara Leaf-nosed Bat	V		
Rostratula australis	Australian Painted Snipe	E		

Table 4-2 Threatened aquatic fauna species identified within 10km buffer.

Species	Common Name	EPBC Act Status [#]	Type of Presence
Species or species habitat 'known' to occur within area			
Caretta caretta	Loggerhead Turtle	E	Foraging, feeding or related behaviour known to occur within area
Megaptera novaeangliae	Humpback Whale	V	Species or species habitat known to occur within area
Chelonia mydas	Green Turtle	V	Breeding known to occur within area
Eretmochelys imbricata	Hawksbill Turtle	V	Breeding known to occur within area
Natator depressus	Flatback Turtle	V	Breeding known to occur within area
Pristis clavata	Dwarf Sawfish, Queensland Sawfish	V	Species or species habitat known to occur within area
Species or species habitat 'likely' to occur within area			
Aipysurus apraefrontalis	Short-nosed Seasnake	CR	Species or species habitat likely to occur within area
Balaenoptera musculus	Blue Whale	E	Species or species habitat likely to occur within area
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle	E	Breeding likely to occur within area
Carcharias Taurus (west coast population)	Grey Nurse Shark (west coast population)	V	Species or species habitat likely to occur within area
Pristis zijsron	Green Sawfish, Dindagubba, Narrowsnout Sawfish	V	Breeding likely to occur within area

5 Study and Survey Findings

As part of the Project's environmental assessment process, Animal Plant Mineral (APM) was engaged to undertake:

- Desktop fauna studies of the Study Area; and
- Multi-season and terrestrial vertebrate fauna surveys of the Study Area.

The post-wet season field surveys followed the passage of Cyclone Veronica which crossed Karratha in March 2019. The Karratha Aero weather station (BOM station 00408310, 10 km to the south of the Survey Area) recorded 70 mm of rainfall associated with the passage of the cyclone. This rainfall created sufficient post-wet season survey conditions.

Two fauna surveys were conducted at the Project Area; an initial level 1 fauna survey prior to the wet season of 2018 / 2019 and a level 2 survey conducted immediately after that wet season. A full bird census, camera trapping, spotlight surveys, and bat surveys were carried out in both surveys, while a full terrestrial fauna trapping survey was conducted in the post-wet season survey. Four broad fauna habitats are present within the Project Area; rocky outcrops, hummock grasslands on mid-slopes, drainage lines, and samphire shrublands and supra-tidal flats.

The Protected Matters Search Tool identified a total of 58 migratory EPBC Act listed species in a 10 km search radius from the Project area:

- Migratory Marine Birds - 8
- Migratory Marine Species - 19
- Migratory Terrestrial Species – 3
- Migratory Wetlands Species – 28

The full report for this survey, Perdaman Urea Project – Pre and Post-wet season Biological Survey (APM, 2019) is included in Attachment A.

5.1 Terrestrial Fauna

The Ghost Bat (*Macroderma gigas*) was recorded using acoustic bat detectors on two occasions during the post wet season survey. It is listed as Vulnerable under both Commonwealth and State legislation. However, no roost sites were identified during the surveys, indicating that the bats roost nearby (possibly at Murujuga National Park to the south), and forage over the Project Area. The drainage line in the south-west of the Project Area provides suitable foraging habitat for this species. Disturbance of this area will be avoided where possible. One of the recommendations of the confidential heritage survey report to JTSI covering the Project, which was endorsed by Murujuga Aboriginal Corporation (MAC) and the Circle of Elders, is to excise the ceremonial site (the "Yatha") in the south-west corner of Site F from Perdaman's Development Envelope. Perdaman has subsequently agreed to this recommendation, which in turn has provided further protection of drainage line habitat in this area. The realignment of Hearson Cove Road to the north of Site F has also protected this area.

Rocky outcrops present at the northern and southern fringes of the Project Area (Figure 5-1) were searched for the Northern Quoll (*Dasyurus hallucatus*) and the Pilbara Olive Python (*Lialis olivaceus barroni*). While neither of these species was recorded during the survey, both are highly cryptic, and may occur within the Project Area. Disturbance of rocky outcrops should therefore be minimised.

5.2 Marine Fauna

Pendoley Environmental were engaged to undertake a Marine Fauna Desktop Assessment (Pendoley, 2019) to identify potentially impacted marine fauna, quantify the likely direct, indirect and cumulative impacts and advise on appropriate mitigations (Attachment B).

Marine turtles are protected under the EPBC Act and the Western Australian Wildlife Conservation Act 1950. Of the seven marine turtle species found globally, the following five are EPBC Act listed threatened species which are known or likely to occur in the Project area.

- Green turtle (Chelonia mydas)
- Hawksbill turtle (Eretmochelys imbricate)

- Leatherback turtle (Dermochelys coriacea)
- Flatback turtle (Natator depressus)
- Loggerhead turtle (Caretta caretta)

A survey undertaken by Pendoley Environmental in 2006 determined that Holden Beach located approximately 1.5km northeast of the Project's Port area, did not support a major green or flatback sea turtle nesting rookery, though evidence of flatback turtles was recorded.

Light spill and other direct interference of the coastal rocky habitat is not expected to have any impact on protected sea turtles, given that there is such a low level of nesting activity within the bay north of this site, and that the bay present just southwest appears to be of poor habitat quality and too small to be of value to turtles. It is unlikely either flatback or green turtles are, or have been, using the bay adjacent to the Project area for nesting.

Potential impacts, on other listed threatened marine fauna known or likely to occur within the area (Table 4-2), including humpback whale, dwarf sawfish, short-nosed seasnake, blue whale, green sawfish and grey nurse shark, will be limited to those associated with onshore activities, such as spills and sediment in runoff.

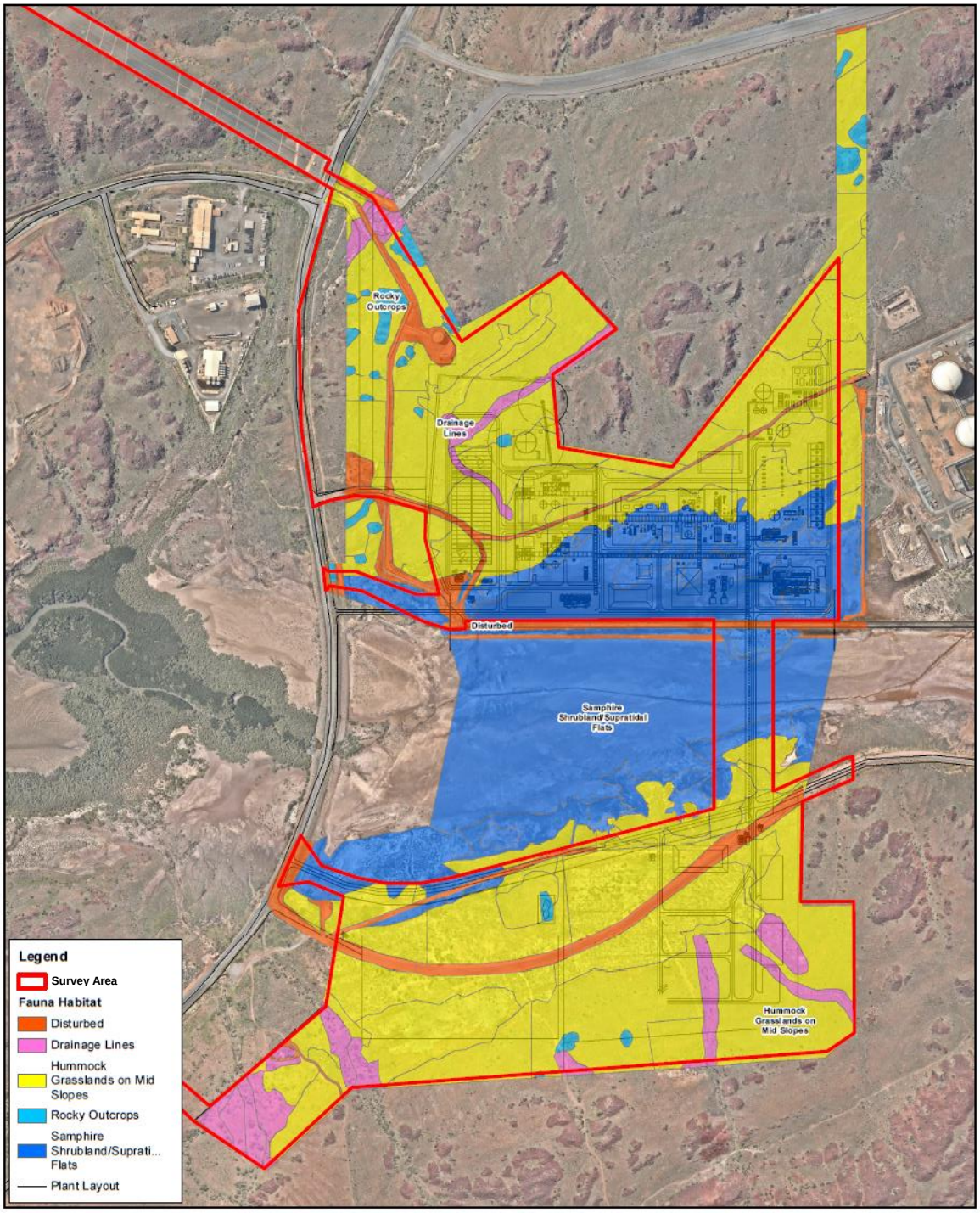

Figure 5-1 Fauna habitats and plant layout.

5.3 Avifauna / Migratory Birds

A range of migratory shorebirds and waders were observed during the fauna survey including the Red-capped Plover (*Charadrius ruficapillus*), Grey-tailed Tattler (*Tringa brevipes*), and the Common Greenshank (*Tringa nebularia).* However, no threatened bird species were recorded during the survey.

Supra-tidal flats within the Project Area and mangrove vegetation surrounding King Bay to the west provide locally important habitat for a range of species, especially waders and shorebirds. The Project, however, will avoid direct disturbance of this habitat type. In addition, the vehicle access that crosses the supra-tidal flats will be designed with culverts to avoid alteration of surface water flows, mitigating potential indirect impacts to downstream habitats.

A desktop assessment identified 32 migratory bird species known to, or likely to occur within the project area 10km buffer. Of these, five are listed threatened species, including:

- Curlew Sandpiper *(Calidris ferruginea)*
- Great Knot *(Calidris tenuirostris)*
- Greater Sand Plover *(Charadrius leschenaultia)*
- Lesser Sand Plover *(Charadrius mongolus)*
- Eastern Curlew *(Numenius madagascariensis)*

Two other species, the Bar-tailed Godwit (Baueri) (Limosa lapponica bauera) and Northern Siberian Bar-tailed Godwit *(Limosa lapponica menzbieri)* are also listed threatened species, however are not considered to be migratory.

The waters of the Dampier Archipelago may provide foraging habitat during nonbreeding periods or for juvenile birds yet to reach sexual maturation. The proximity of the sites to beaches and mangroves suggests that migratory sea birds and shorebirds may also be seasonally present within the Project area, or in the adjacent areas. The Burrup Road, a busy road providing access to the many processing facilities and Port, is situated immediately to the west of the supra-tidal flats. As a result, this area is already subject to noise disturbance from traffic, and the avifauna species observed during the fauna surveys, are present despite this disturbance. While further disturbance to this area should be minimised, it is unlikely to present a significant increase to that already created by the Burrup Road.

Many, but not all of the migratory bird species are expected to utilise the Project area at some time during their periodic visits. However, based on survey work to date the Project area is not likely to be used by large numbers of any of these species. This is primarily to do with the small size of the habitats and the level of local disturbance. Moreover, there are other larger and less disturbed areas of habitat available nearby, such as the Murujuga National Park protected area.

6 Fauna Habitat

6.1 Rocky Outcrops

Characteristic of the Burrup Peninsula, the formation of Proterozoic igneous rock outcrops (Gidley Granophyre) within the Project Area, weathered over time and resistant to extensive erosion, produce aggregates of split boulder screes. These formations create good cover for reptiles in the pockets for adequate shade and protection, and also caves for bats and other small terrestrial mammals. This habitat type is also suitable to the Pilbara Olive Python (*Liasis olivaceus barroni*), and though not recorded during the APM survey, it is highly likely this species may occur in the area due to the availability of suitable habitat.

Weathering has also created exposed granophyre bedrock, providing extensive plains of small-sized rocks, dominating the topsoil layer. While this may represent appropriate habitat for the Western pebble-mound mouse (*Pseudomys chapmani*), the species was not recorded in the Project Area and is likely now locally extinct, as it is currently only patchily distributed in the central and southern Pilbara. The outcrops within the Project Area are small and isolated, and likely to be less important than the larger outcrops to the south, which provide greater connectivity and opportunity for secure and productive habitat.

The Project Area may be occupied by the Rothschild's rock wallaby (*Petrogale rothschildi*), though records suggest the species exists on the islands of the Dampier Archipelago at low densities, and any populations south of Withnell Bay are now rare or completely absent. At sites in the northern parts of the Burrup Peninsula, rock wallaby recovered in response to fox baiting operations. The sub-species could use the rocky outcrops and creek lines nearby that contain diverse grasses and shrubs for foraging, though the species is not likely to be present as it requires deep caves for shelter during the heat of the day, and most of the rock piles are not significant enough to provide this. It is more likely the species would utilise rock piles on islands interspersed by areas of spinifex and soft grasses around beaches which are undisturbed by humans and enables them to venture short distances from their shelter sites to forage.

Evidence of Echidnas (*Tachyglossus aculeatus*) (scats found atop rockpiles) were located at the Project Area in reasonable quantities suggesting a persisting population on the Burrup Peninsula. The Finlayson's Cave Bat (*Vespadelus finlaysoni*) was recorded within this habitat type north west of the Project Area, close to the boundary. It was also recorded at the south eastern boundary of the Project Area, suggesting it was likely roosting somewhere in the extensive rocky outcrops adjacent the site, that spread east to south east and using the hummock grasslands for foraging. Similarly, the Little Broad-nosed Bat (*Scotorepens greyii*) was recorded in the same sites, which is unusual for this species, as it is not a cave-dweller. It is likely a reflection of the survey season, as the creek beds are dry and during this time, the species would switch to foraging within the grasslands, instead of the tree-lined and water-filled drainage lines you would expect during the wet.

6.2 Hummock Grasslands on Mid-Slopes

The Project Area and wider Burrup Peninsula contain coastal and subcoastal plains with mixed savannah hummock and tussock grasslands, and scattered shrubs of *Acacia pyrifolia* and *Acacia inaequilatera*. Upland areas are dominated by Triodia hummock-forming grasses which are present in the Project Area. A range of bird species are likely to use this grassy habitat for both foraging and nesting, especially given the proximity of the grassland to the ephemeral drainage lines. These include the Star Finch *(Neochmia subclarascens)*, Swamp Quail (*Coturnix ypsilophora*), Painted Finch (*Emblema pictum*), and Crimson Chat (*Epthianura tricolor*).

This habitat type will also provide foraging habitat for grazers; primarily Euros (*Osphranter robustus*), but also potentially Rothschild's rock wallaby, especially given that the species feeds on both native and non-native grasses (e.g. Buffel), which are present in this habitat type.

Small rodents such as the Delicate Mouse (*Pseudomys delicatulus*) which has not suffered dramatic range declines like most of Australia's native rodents, may occur in the Project Area as the expanse of this habitat type would provide grass seeds that make up majority of the species diet. The Sandy Inland Mouse (*Pseudomys hermannsburgensis*) may also occur, as the species resides within hummock and tussock grasslands creating shallow burrows or using pre-existing burrows and foraging close to cover. The species population fluctuates greatly in response to rainfall. Similarly, varanids (e.g. Short-tailed Monitor, *Varanus brevicauda*), elapids (e.g. Western Brown Snake, *Pseudonaja mengdeni*) and dragons (e.g. Military Dragon, *Ctenophorus isolepis*) are likely to use this habitat, as it provides both cover from predators and suitable substrate for excavating their burrows.

Evidence of Echidna (*T. aculeatus*) was recorded in this habitat type, as well as wild dog/dingo (*Canis* sp.) and feral cat (*Felis catus*) scats. The Northern freetail bat (*Chaerephon jobensis*) was recorded in this habitat type on only one of the trap nights and on one recorder only.

6.3 Samphire Shrublands and Salt Plains

The Burrup Peninsula contains marine alluvial flats and river deltas that support Samphire and mangal ecosystems (mangroves). Although not extensive in a regional context, the intertidal flats around the Burrup contain a variety of marine waders, and these flats are locally significant. The mangrove community is not forecast for disturbance based on the current site layout.

Such areas are important for migratory shorebirds and those that rely on seasonal water availability or opportunistic foraging, such as predatory birds like the Peregrine Falcon, (*Falco peregrinus)*, Eastern Osprey, (*Pandion cristatus)*, and Wedge-tailed Eagle (*Aquila audax)*.

Fauna diversity and density is likely to be low during the dry and pre-wet seasons as there is a lack of canopy cover of this habitat type in the Project Area. This habitat will become increasingly important at times of inundation during high tide when waders and shorebirds use the area for feeding, roosting and potentially nesting (e.g. Red-capped Plover, (*Charadrius ruficapillus*)).

The supra-tidal flats between King Bay and Hearson's Cove, including those within the Project area, contain mangal systems that could support a diverse range of fauna. This includes birds that may use the rich organic marine sediment to forage and potentially nest including Brahminy Kite, (*Haliastur indus))* and Mangrove Golden Whistler, (*Pachycephala melanura*).

Mammals such as the Water-Rat *(Hydromys chrysogaster)* could also reside and forage at low tide among the extensive mangal system. This includes the mouth of King Bay which flows into the tidal flats and smaller mangrove habitat just outside the Project area.

The Northern Coastal Free-tailed Bat (*Ozimops cobourgianus*) is a user of mangroves for roosting, particularly those in adjacent forest and along large waterways. This species was recorded six times on three separate nights according to the bat analysis. It was recorded on 3 of the 4 bat detectors placed around site.

When the area is not inundated, the most common fauna to use the area is the Euro (*O. robustus*). Frequent evidence of this species was found across the flats (tracks and scats).

6.4 Drainage Lines

Rapid weathering of the geology of the area has formed deeply incised narrow valleys amongst the exposed bedrock. These channels trend southwest to northeast and east to west throughout the Burrup Peninsula. The drainage channel present in the Project Area in the southwest corner is quite significant.

The Eucalyptus communities within and beside the watercourses contain large, tall trees that may provide hollows suitable for birds such as the Galah (*Cacatua roseicapilla*) and Little Corella (*Cacatua sanguinea*). Similarly, this habitat provides general roosting, nesting, perching and foraging habitat for the Red-browed Pardalote (*Pardalotus rubricatus*), Red-backed Kingfisher (*Todiramphus pyrrhopygius*) and Black-faced Woodswallow (*Artamus cinereus*). If trees are large enough and have many hollows, some bats such as the Northern freetail bat (*Chaerephon jobensis*), Beccari's freetail bat (*Mormopterus beccarii*), Yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) and Common sheathtail (*Taphozous georgianus*) may seek refuge within this habitat. C*. jobensis* and *T. georgianus* were both recorded during the pre-wet season survey. *T. georgianus* was recorded on all 4 of the bat detectors, on each trap night.

6.5 Rocky Outcrops and Dunes

Additional to the main Project areas at Site C and Site F, a parcel of land, adjacent to the coast and within the PPA area is planned to be developed. The development area will include a shiploader which will be established on a wharf jetty which will be built by PPA. A conveyor will connect this area to a port storage shed which will be located on an existing hardstand area.

The coastal area meets scattered rocky outcrops which adjoin a large outcrop extending to about 100 m north to south (most of this landmass residing outside the development area). The outcropping shifts into red sandy loam dunes with scattered hummock grasses. Further inland, the proposed Urea shed will be placed upon pre-existing hardstand area. The existing Burrup East West Services Corridor (EWSC) will contain another conveyor which will transfer urea from Perdaman's plant (Site C) to the Port storage shed.

This habitat type is likely to support a diversity of reptiles. According to NatureMap, there are several records of the spotted dtella *(Gehyra punctata)* and Tree dtella (Gehyra variegata) geckoes from the rocky outcrop just adjacent the coast. The area could support the Pilbara Olive Python, which has been sighted numerous times near the Pluto LNG Park and Karratha Gas Plant. The area to be developed is extremely small in comparison to the wider developed area of the Burrup Industrial Estate that still contains a significant amount of undisturbed habitat similar to that forecast for impact. Some of the species expected to utilise the Rocky Outcrops habitat type in the major development area are likely to occur in this area too.

The main species that could utilise the coastal rocky shore is the Water Rat (*Hydromys Chrysogaster*) which feed on marine invertebrates, crustaceans and turtle eggs. However, they tend to occupy sheltered areas of estuaries containing mangroves and may forage further into coastal/intertidal areas and would not utilise coastal rocky shores solely as a protective habitat. It is unlikely the Water Rat would be utilising the area for feeding due to surrounding development and limited shelter from predators.

Though unlikely, it is plausible that Northern Quoll could be found in this area. There are records of this species in the King Bay Supply Base just south of the Project area and about 2 km northeast in the rocky outcrops south of the Woodside Southern Expansion Lease Yard. This suggests the species may be inhabiting around and within these developed areas for foraging.

Suitable habitat may be directly impacted; however, the impact on fauna would be minimal given the expansive suitable habitat still available in the undeveloped areas.

7 Assessment of Potential Impacts

7.1 Reduction and / or fragmentation of fauna habitat

To enable the construction and operation of the Project's permanent infrastructure, native vegetation and habitat within the Project footprint will need to be removed. The construction phase of the Project will include the disturbance of approximately 69 ha, which includes native vegetation, salt plains and heavily impacted areas (roads and vehicle tracks), with a snap-back, post-rehabilitation for operational purposes, of up to 47.8 ha.

Table 7-1 provides the estimated area of ground disturbance in each respective project location and the approximate area to be rehabilitated at the conclusion of the construction phase. These amounts are for total disturbance area, including existing vegetation and heavily impacted /degraded areas. A breakdown of the proposed clearing amounts that impact relevant threatened species vegetation types is discussed in Section 4 above.

Table 7-1 Approximate ground disturbance and rehabilitation area of the Project.

Project Location	Estimated Area (ha)		
	Construction Disturbance	Rehabilitation after construction	Operational footprint
Site C	34	-	34
Site F	30 [1.]	21	9
Causeway	1.5	0.2	1.3
Conveyor	1 [2.]	-	1
Roads	2 [3.]	-	2
Port storage / shiploader	0.5	-	0.5

1. Approximately half of the Site F disturbance area was previously disturbed and used as laydown area which has since been partially rehabilitated.
2. The majority of the conveyor will be located within the EWSC which is a bituminised corridor. The area of disturbance in Table 7-1 refers to the section of conveyor, immediately to the west of Site C, prior to it connecting to the EWSC.
3. The area of disturbance for roads includes construction of new access roads to Site C. It does not include the proposed repositioning of Hearson Cove Road to its gazetted location which is to be constructed by others.

7.2 Vehicle Strike

Impacts with moving vehicles can cause injury or death of native fauna. The establishment of new roads and introduction of additional vehicles, particularly during the construction phase, have the potential to adversely impact on fauna. Dusk and dawn periods when some fauna is more active are times when these interactions could be more prevalent.

7.3 Increase in introduced fauna

The introduction of pest species has the potential to increase competition for limited food resources or impact neighbouring roosting sites from endemic species. The importation of modular units has the potential to carry pest species from outside the region.

Similarly, some feral species such as mice, rats, dogs, cats and foxes could be attracted to the facility if food scraps are not managed or disposed of appropriately. The attraction of feral predators such as foxes (Vulpes vulpes) and cats (Felis catus) could result in predation of native species.

While the population of Cane Toads (*Rhinella marina*) is continuing to spread, to date, they have not yet been recorded on the Burrup Peninsula. The potential for lethal toxic ingestion of Cane Toad toxin, though not likely at this time, needs to be considered for the life of Project.

7.4 Light Pollution

Artificial light emanating from the site could attract fauna and alter foraging patterns, increase predation risks, disrupt biological clocks and disrupt dispersal movements impacting breeding and roosting regimes.

Potential sources of light pollution associated with the Project would be the afterhours security lighting and night time lighting needed in key operational areas.

7.5 Noise and vibration

Noise and vibration acts as a general stressor, masks acoustic signals, and can disturb ecosystem balance.

Noise emissions during the construction phase such as large mobile plant movements and blasting associated with earthworks could have a potential impact on fauna. Similarly, during the Project's operational phase, noise emissions from plant, conveyor and loading facilities could impact terrestrial and marine fauna.

7.6 Fauna entrapment and poisoning

During the construction phase open pits and trenches will be established and kept open temporarily. During this time, fauna can become trapped and if not removed quickly have the potential to die due to exposure during hot daytime temperatures.

The collision of ghost bats into wire fences is a key threat for this species.

Stormwater and brine storage ponds could attract fauna, particularly birds. The use of chemical larvicides or adulticides to control mosquitoes has the potential to adversely impact these species.

7.7 Changes to water quality at MUBRL outfall

Exceedances of the Water Corporation's water quality licence limits could result in wastewater discharge to the MUBRL impacting marine environmental quality at the outfall point.

7.8 Surface water quality

Degradation of water quality from elevated levels of suspended solids or contaminants in surface water runoff from sites C and F, entering the intra-tidal flat, could have an indirect impact on the mangrove communities of King Bay. Similarly the Project could impact marine environmental quality via runoff collected from the hardstand surfaces, conveyor, and product storage shed within the Port area.

The Project's air emissions have the potential to impact marine environmental quality.

8 Mitigation and Management Measures

Table 8-1 provides detail of the Project's mitigation measures against the potential impacts discussed in Section 7 and to which threatened species they may apply.

Table 8-1 Mitigation measures of potential impacts to threatened species.

Potential Impacts	Mitigation Measures	Impacted threatened species
Objective: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.		
Reduction and / or fragmentation of fauna habitat Clearing of vegetation can lead to direct loss or fragmentation of fauna habitat.	**Avoid** The original processing facility layout was forecast to impact 21.3 ha of the tidal flats and Samphire Shrubland/Saltplains habitat. Following design optimization, proposed clearing of this habitat type has been significantly reduced. Limit clearing to that which is absolutely necessary. Avoid clearing of rocky/boulder habitat that may contain micro-habitat suitable for refuge for some small terrestrial mammal species, including the Pilbara Olive Python. Impact on the creekline in the south-west of Site F, which is likely to be used by the Ghost Bat for foraging, will be avoided: location of the construction fenceline has been modified accordingly. **Minimise** The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Do not disturb rock piles between the months of early November to late April where practicable as this is a time of inactivity for the Pilbara Olive Python and a period where individuals are slow to move and unable to avoid impact from land clearing. Maintain denning habitat by avoiding disturbance to rock piles on the upper slopes of the valleys. Bury concrete or steel structures of a suitable size to a suitable depth where practicable in the rock batters used to elevate and stabilize the plant to create potential day time or maternity roosts. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer. Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the ‘area to perimeter’ ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation. Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site. Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. **Rehabilitate** Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna. Construction of the processing facility on the slopes of Site C and F will require significant cut and fill to bring levels up. The scheduling for materials dumped to fill could be manipulated to ensure large boulders are grouped as conglomerates around the periphery of the retaining batters. These large boulders should then, by virtue of their position in the batter slopes, offer potential cave and crevice habitat for the Pilbara Olive Python, contributing to the availability of secure refuge in the local area.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew Australian Fairy Wren Ghost Bat
Vehicle strike Impacts with moving vehicles can cause injury or death of native fauna.	**Minimise** Vehicle speeds will be managed on site (including entry and exit points) by enforcing speed limits in construction areas to reduce the potential for vehicle strikes. All employees will be required to record and report any native fauna strikes. Roadkill will be removed at least 10 m into surrounding vegetation, when safe to do so, by designated personnel to avoid further strikes of fauna feeding on carcasses. Site induction to emphasise that all native fauna has right-of-way, where possible and safe to do so. Personnel will be inducted regarding the key risk times for vehicle strike to fauna (e.g. dusk and dawn). Where possible, all non-essential movement will be scheduled to take place during the day. Site inductions to introduce personnel to local conservation significant fauna, and signage displayed in crib rooms and notice boards, to ensure all personnel can identify all larger conservation significant species.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew Australian Fairy Wren Ghost Bat
Increase in introduced fauna Food waste and increased water availability within the Project Area could potentially increase introduced fauna numbers. Cane Toad populations may in future migrate into the Burrup Peninsula.	**Avoid** No domestic animals will be allowed on site. **Minimise** Predator control (wild dogs (*Canis lupus familiaris)*, feral cats (*Felis catus)*, red foxes (*Vulpes Vulpes)*) has been identified as an absolute priority to minimise the impact of the Project. Initiate a feral fauna trapping and euthanisation program to reduce the number of feral fauna around the site. Introduce and implement hygiene procedures which result in the reduction of food waste around the processing facility to ensure that feral predators are not attracted to the facility. Develop and implement an introduced predator control program.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew

Potential Impacts	Mitigation Measures	Impacted threatened species
	Liaise with PPA and YACMAC Rangers and participate in existing and/or planned catchment wide pest animal management programs (i.e. Feral Cat control). Develop a Cane Toad Monitoring Program Develop a Cane Toad Control Program for potential future implementation.	Australian Fairy Wren Ghost Bat
Lighting Artificial light can alter foraging patterns, increase predation risk, disrupt biological clocks, and disrupt of dispersal movements.	**Minimise** Lighting will be designed in accordance with *AS 4282-1997: Control of Obtrusive Effects of Outdoor Lighting Guidelines*. Lighting will be used only for required operational areas, all light sources will be aimed towards specific work areas requiring light for safe construction and/or operation, with a low vertical angle, and light shields will be placed on large equipment to minimise light spill over. Where possible, lighting will be the minimum wattage, whilst not compromising safety or OH&S requirements.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew Australian Fairy Wren Ghost Bat Green Turtle Hawksbill Turtle Flatback Turtle Leatherback Turtle / Leathery Turtle
Noise and vibration Noise and vibration acts as a general stressor, masks acoustic signals, and can disturb ecosystem balance.	**Minimise** Noise emissions will comply with *Environmental Protection (Noise) Regulations 1997*. Maintain equipment such that all noise emitting equipment is fully serviceable and working to the correct specifications. Where possible, all non-essential movement will be scheduled to take place during the day.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew Australian Fairy Wren Ghost bat
Fauna entrapment and poisoning Fauna may be trapped in artificial water bodies and excavations leading to injury and/ or death.	**Minimise** Horizontal wire strands or barb wire fences will not be used on site during or following construction. If the site must be fenced for security, barbed/razor wire should be placed at the base of the fence on the ground and the fence itself must be cyclone mesh. Fauna egress will be installed on all excavations, even if temporary. All excavations will be checked for trapped fauna within three hours of sunrise if left open overnight. All fauna should be removed by qualified personnel. All excavations that must be left open for more than 12 hours must have gentle ramped egress that all fauna are capable of using. Where practicable avoid the use of larvicides and adulticides for chemical control of mosquitoes in on-site storage ponds. Should larvicide or adulticide be applied, Perdaman shall develop a management plan to ensure the protection of native fauna.	Red Knot Curlew Sandpiper Great Knot Greater Sand Plover Lesser Sand Plover Northern Quoll Olive Python (Pilbara subspecies) Bar-tailed Godwit (baueri) Eastern Curlew Australian Fairy Wren Ghost Bat
Changes to water quality Wastewater discharge to the MUBRL has the potential to impact on marine environmental quality.	**Avoid** The objective is to ensure that the seawater blow down discharge to MUBRL, in combination with other future industrial discharges to the MUBRL, will not compromise the ability of the Water Corporation to meet the requirements of Ministerial Statement 594 and the ANZECC and ARMCANZ (2000) species protection level water quality guidelines within the 0.01 km2 mixing zone as recommended in the EPA Report 1044. In principle there are three balances to consider: ▪ Water – which contains site seawater, storm water, potable and grey water, process water and various condensates, including condensed air moisture. ▪ Salts – deriving (mainly) from seawater, but also some from dosing chemical additions – effectively as TDS (and measured as conductivity). ▪ Thermal – managing the average blowdown return temperature. The Project can extract water from the seawater provided the concentrated salts of the blowdown comply with the ANZECC guidelines.	Humpback Whale Green Turtle Hawksbill Turtle Flatback Turtle Dwarf Sawfish / Queensland Sawfish Short-nosed Seasnake Blue Whale Leatherback Turtle / Leathery Turtle Grey Nurse Shark (west coast population)

Potential Impacts	Mitigation Measures	Impacted threatened species
	▪ Most of the seawater use (ca. 95%) is via the site circulating seawater cooling system. This circulates seawater removing process heat with seawater cooling tower, with roughly a 1.4 cycle of concentration (CoC). ▪ Essentially pure water evaporates (cooling), and the salts in the circulating seawater are concentrated. ▪ There are virtually no additional salts added – there is a modest (small) sulfuric acid and hypochlorite dosing for pH control and bio growth inhibition. ▪ There is no addition of heavy metals, as the process is based on clean natural gas. For seawater all the heat exchangers are constructed of titanium to reduce corrosion. ▪ In extreme cases some biocide may be added to control bio growth, but not during normal operation. Following this and measurement, sodium metabisulphite would be added and mixed to the blowdown water to decompose the residual biocide. ▪ The expected drift loss is expected to be <0.001% of the circulating flow. This drift loss is at the same salinity of the cooling tower circulation flow. ▪ There is a continuous blowdown which is operated to the specified conditions set by the Water Corporation, in order to meet the ANZECC and ARMCANZ (2000) species protection level water quality guidelines. This is summarized as below (Water Corp Technical Compliance Advice bulletin Ref. PM20992155 (22 Feb 2019)) and provided in **Error! Reference source not found.**. **Minimise** The Brine evaporation pond is required for operational flexibility: ▪ Such as if/when the brine return is offspec (i.e. will not be accepted by Water Corporation with respect to not meeting the ANZECC specifications); ▪ Operating flexibility to deal with saline streams in excess of 55,300 mg/l TDS; ▪ Site stormwater overflow; ▪ Collection of contaminated chemical sewer streams other than Amine section; ▪ During normal operation the pond is expected to be dry – the site evaporation rate is high, and minimal salt containing streams should be added; ▪ During start-up, high salt (>55,300 TDS) brine is expected from the Desalination Plant. This could be diluted and returned to the MUBRL, however temporary storage in the brine pond allows minimisation of seawater usage. Further, there could be ammonia water streams; ▪ Once the main plant is operating and MUBRL blowdown established, the Brine pond water will be fully analysed and should this be acceptable, blended back into the blowdown stream as a small addition, ensuring outfall compliance is not compromised. This disposal is considered feasible as under normal operating circumstances the water should basically contain high saline seawater and possible traces of ammonia – both these components are acceptable to the MUBRL ocean outfall mixing zone provide the mixed stream complies with the criteria – i.e. ensure TDS is <55,300mg/l and the ammonia does not exceed 1,700 mg/m3 of blowdown; ▪ In the unlikely event that the Brine pond water with blending is still outside the ANZECC specification, the water will be evaporated, and the residual salt collected to an approved disposal site; ▪ The Brine pond specifically will not receive organic (grey water) nor MDEA nor oil containing wastewater; and ▪ The Brine pond has transfer pumps and reticulation to receive and pump out water.	Green Sawfish / Dindagubba / Narrowsnout Sawfish
Water Quality Degradation of water quality from elevated levels of suspended solids or contaminants in surface water runoff. Indirect impact on the mangrove communities of King Bay as a result of water quality changes. Impacts on marine environmental quality from runoff collected from the hardstand surfaces, conveyor, and product storage shed within the Dampier Port area Impacts on marine environmental quality from Project air emissions.	**Avoid** The design scope for the fully enclosed conveying and ship loading system eliminates of the risk of loss of urea product as fugitive dust emissions or spills with the consequential loss of valuable product and potential environment impacts of degradation of water quality in the terrestrial and marine environments. **Minimise** Best available technology design has been incorporated to reduce and minimize Project air emissions. This in turn minimizes any potential impacts on marine environmental quality from Proposal air emissions. An Operational Environmental Management Plant (OEMP) is required to be prepared and submitted for review prior to any operational activities taking place on PPA's lands. It is a standard requirement of PPA's Commercial Agreements with tenants. An OEMP is a practical and site-specific plan of management measures which is designed to manage risks and minimise environmental impacts from PPA's tenant's normal activities. It will also identify what measures will be in place or are actioned to manage any incidents and emergencies that may arise during normal operations. As such, the foundation of any OEMP is an operational environmental risk assessment. An OEMP is a dynamic document, which should be maintained and audited periodically to ensure it reflects current environment risks and management measures from site activities and operations ***<u>During Construction</u>*** ***Drainage, Erosion and Sediment Pollution Controls*** The following controls shall be installed prior to commencement of construction to prevent contamination of surface water and receiving environments. *<u>Drainage Controls</u>* ▪ Existing drainage lines will be protected and any diversion of these lines should be kept to a minimum. ▪ Flow management across the site will prevent the concentration and diversion of waters onto steep or erosion prone slopes. ▪ Any diversion of drainage lines will be directed to slopes that are not prone to erosion. ▪ External water flows entering the Project's battery limits will be diverted around the construction footprint, using drainage structures such as catch drains and bunds. ▪ Temporary drainage structures will be designed to reduce run-off velocities by using wider inverts, flat bottomed drains rather than V-shaped drains, check dams (or similar), silt fencing and revegetation of completed areas. ▪ All drainage lines likely to receive run-off from disturbed areas, such as those downstream of worksites, will be fitted with geotextile silt fences. Rock checks should also be used in drains to slow flows and provide a lining to prevent scouring of underlying surfaces. Sediment basins will be added to drainage lines as necessary. Basins shall be designed relative to the catchment and likely flow levels for higher rainfall events.	Humpback Whale Green Turtle Hawksbill Turtle Flatback Turtle Dwarf Sawfish / Queensland Sawfish Short-nosed Seasnake Blue Whale Leatherback Turtle / Leathery Turtle Grey Nurse Shark (west coast population) Green Sawfish / Dindagubba / Narrowsnout Sawfish

Potential Impacts	Mitigation Measures	Impacted threatened species

- Where silt fences are installed for sediment control, they must be constructed with a centre section lower than the ground levels at the end of the silt fence to avoid outflanking during heavy rainfall events.
- Silt and sediment fences shall be maintained until the areas above them have been adequately stabilised to minimise the erosion risk such that the controls can be removed.
- All stormwater proposed for discharge will first be contained in an appropriately lined sediment basin, to all sediment to settle out.
- Any discharge to the MUBRL must comply with the conditions, including water quality standards of the license or approval that applies to the discharge.
- Construction activities will be scheduled to avoid periods of heavy rainfall, strong winds or peak water flow.

Erosion and Sediment Pollution Controls

Sediment controls are designed to prevent the transportation of sediment and other pollutants from worksites to waterways. They will be installed across the Project sites in areas where land is disturbed. In order to minimise the land exposure and potential risk of erosion, all land disturbances should be confined to a minimum practical working area and within the vicinity of the identified work areas.

Where possible, existing vegetation surrounding the construction site will be used as a buffer zone to help filter surface runoff and should not be disturbed unless necessary for the purpose of construction.

To ensure that silt from batters, cut-off drains, table drains and road works is retained on site and replaced as soon as practicable, sediment controls will be installed downstream of any disturbed land such as worksites, prior to that work being undertaken.

Run-off controls will be developed and maintained to the following standards:

- Controls will be designed to take predicted flows, based on 140436-000-41EG-0001 Standard Specification Geographic, Climatic and Wind / Seismic Data.
- Exposed ground will have control measures that minimise the level of erosion.
- Drains will be installed across the site to divert clean surface water to stable areas and away from parts of the site where soil is exposed.
- Installation of sediment traps and basins with a riser pipe or flexible pipe and spillway to avoid adverse flood risk to adjoining properties. These systems shall allow for the gradual discharge of the clearest water during a storm event as detailed in 6.1.3.
- Geotextile silt fences shall be installed in surface water flow areas to minimise the sediment discharge from the site (refer to Attachment C).
- Should hay bales be used for sediment control, they will be made of straw sourced from cereal crops and be free of weed seeds.
- If any areas of localised erosion develop, they will be remediated as soon as practicable to prevent further erosion or sediment deposition in offsite areas.
- Regularly inspect stormwater drainage and sediment control structures to ensure hydraulic integrity and erosion and pollution control effectiveness. If the control structures are obstructed or have their capacity reduced by 30% or more through the accumulation of silt, litter, vegetation and other debris, they shall be cleared, with silt returned to a stabilised part of the project.
- Sediment control structures at waterway crossings will be developed during the detailed design process before any such work takes place.
- Throughout construction, rehabilitation of disturbed areas will be progressively undertaken, or as soon as practicable, following completion of specific works.

Post- Construction

The following principals shall be applied:

- The granular urea product is much harder than prilled urea, therefore creating less fines and dust when handled and transported which minimizes the urea fines and dust that could be accidentally released during conveying and ship loading activities.
- Spill contingency and emergency response plans and procedures that align with the appropriate PPA plans and procedures, will be developed and implemented to address environmental risks and potential impacts specifically related to the operational phase
- The stormwater pond includes an oil skimmer for removal of oil traces. These are sent to the Oily water collection pit/processing.
- Water quality monitoring (analysis) of collected water before allocation of use will be undertaken. It is expected that the quality of the stormwater will be (much) better than seawater (a much lower salt content), and as such can be re-used to reduce seawater make-up in the circulating cooling system.
- Collected stormwater is pumped to the seawater cooling tower circulating basin. The make-up seawater it is replacing is up to 3,000 m^3/h.
- For paved areas of the urea processing plant, there will be stormwater collection pits (epoxy coated concrete pit) where the first 15mm of stormwater can be collected. Stormwater collected will be treated by steam stripping or other means to bring ammonia (Total Kjeldahl Nitrogen) in water within limit.

Ongoing Monitoring

Regular inspections and audits will be undertaken to ensure the environmental protection outcomes of the Project are achieved. Inspection and maintenance activities will follow the Monitoring and Compliance requirements outlined in the PEMP and will include:

- Review of Erosion and Sediment Control Plans and validate that the proposed erosion and sediment controls have been implemented and, where relevant, revised to accommodate the changing environment.
- Inspections to observe and record any scouring, erosion and sediment transfer particularly beyond the Project footprint.
- Cleaning of sedimentation basins when the accumulated sediment has reduced the basin capacity by more than 30%, as indicated by depth pegs.
- Cleaning of all drains to remove silt, vegetation (where capacity is reduced) and litter.
- Weekly inspection of access roads and hardstand areas to identify erosion damage in need of maintenance. Remediation is to occur within one month or earlier if heavy rains are likely.
- Discharge from any oily water separator shall be monitored to ensure it contains less than 5ppm Total Recoverable Hydrocarbons (TRH) and is in compliance with Project approval conditions before it can be used for dust suppression or discharged into the environment. Written approval from the Contractor's Environment Manager must be obtained prior to reuse or discharge to the environment.

Contingency measures include:

- Where erosion or sediment deposition occurs, rehabilitation corrective actions shall be implemented as soon as practicable.

Potential Impacts	Mitigation Measures	Impacted threatened species
	▪ Where sedimentation occurs the source of the sediment should be determined to identify likely erosion in up gradient areas. The sediment should be removed and deposited, if possible as part of erosion controls. ▪ Where erosion is identified and requires rehabilitation the impacted area shall be filled, compacted and contoured to merge with the surrounding landscape.	

9 Assessment of Significant Impacts against Guidelines

As part of the Project's environmental assessment process, Perdaman has reviewed the significant impacts on threatened species against the relevant regulatory Significant Impact Guidelines including:

- Significant Impact Guidelines.
- Threat Abatement Plans and
- Threatened Species Recovery Plans

Table 7-3 below provides a list of these guidelines, discussion of this assessment and how the Project's proposed mitigations meet these requirements.

Table 9-1 Assessment of the Project's significant impacts against the guidelines.

Guidance	Objective	Identified consistency
Matters of National Environmental Significance - Significant Impact Guidelines 1.1	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: ▪ substantially modify, destroy or isolate an area of important habitat for a migratory species ▪ result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or ▪ seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species.	**Addressed in:** ERD, Section 6.8.1 "The proximity of the sites to beaches and mangroves suggests that migratory sea birds and shorebirds may also be seasonally present within the Project Development Envelope, or in the adjacent areas. The Burrup Road, a busy road providing access to the many processing facilities and Port, is situated immediately to the west of the supra-tidal flats. As a result, this area is already subject to noise disturbance from traffic, and the species observed during the Flora and Fauna Surveys, are present despite this disturbance. While further disturbance to this area should be minimised, it is unlikely to present a significant increase to that already created by the Burrup Road." **Addressed in**: ERD, Section 4.6.6 – Table 4-14: (Mitigation of Potential Impacts to Terrestrial Fauna). Potential Impact: "Food waste and increased water availability within the Project Area could potentially increase introduced fauna numbers." **Addressed in:** ERD, Section 6.8.3 Potential impacts to marine migratory species: **"**The Project will result in increase of 1 or 2 shipping vessel movements per week for the export of urea. However, the Port of Dampier and Port Hedland are two of the world's largest bulk export ports with 10,521 vessel movements were recorded in the Port of Dampier for the 2018-19 period (Pilbara Ports Authority, 2019). This small increase in shipping numbers would be overshadowed by the typical variability in shipping numbers associated with existing and future proposed industries. It is therefore considered that the incremental risk to marine fauna associated with shipping movements is unlikely to be significant." **Addressed in:** Section 6.8.4 "Artificial light has the potential to directly impact migratory species, including birds and turtles, and can result in detrimental changes in behaviour. The additional artificial light from the Proposal could increase the light glow from the Burrup industrial estate. Oil spills can heavily impact on turtles because of their need to surface to breathe or to leave the water to breed. Subsequently, coastal dwelling birds feeding on fish are also at high risk from hydrocarbon spills. However, strict management policies, plans and procedures by PPA to manage contamination risks associated with all current and future Port related business and operational activities within the port are precinct currently in place. As noted in Table 4-5, an Operational Environmental Management Plant (OEMP) is required to be prepared and submitted to PPA for review prior to any operational activities taking place on PPA's lands. It is a standard requirement of PPA's Commercial Agreements with tenants. The proponent is committed to conduct all its activities within the port precinct both during the construction and operational phases wholly in compliance with the applicable approved PPA management policies, plans and procedures. Therefore, it is expected that these risks can be managed effectively during construction and operational activities.

Guidance	Objective	Identified consistency
		Product discharge to the marine environment during ship loading is unlikely to occur as the ship loader will be equipped with a telescopic chute and shroud. Only personnel properly trained and qualified will be able to operate the ship loader and PPA procedural requirements will be adhered to. As noted above, the proponent is committed to conduct all its activities within the port precinct during both the construction and operational phases wholly in compliance with the applicable approved PPA management policies, plans and procedures. Therefore, it is expected that these risks can be managed effectively during construction and operational activities. Turtles are at most risk from impacts during nesting, hatchling emergence and at-sea dispersal. Low level turtle nesting is expected at proximity of the Proposal Development Envelope, and given the proposed mitigation measures being implemented to reduce light emissions, potential impacts are unlikely to result in population-level effects. Many, but not all of the migratory bird species are expected to utilise the Project area at some time during their periodic visits. However, based on survey work to date the Project area is not likely to be used by large numbers of any of these species. This is primarily to do with the small size of the habitats and the level of local disturbance. Moreover, there are other larger and less disturbed areas of habitat available nearby, such as the Murujuga National Park protected area." Mitigation Measures: *Avoid* The original processing facility layout was forecast to impact 21.3 ha of the tidal flats and Samphire Shrubland/Saltplains habitat. Following design optimization, proposed clearing of this habitat type has been significantly reduced. Limit clearing to that which is absolutely necessary. *Minimise* The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer. Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the 'area to perimeter' ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation.

Guidance	Objective	Identified consistency
		Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site. Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. "Predator control (wild dogs *Canis lupus familiaris*, feral cats *Felis catus*, red foxes *Vulpes vulpes*) has been identified as an absolute priority to minimise the impact of the Project. Initiate a feral fauna trapping and euthanisation program to reduce the number of feral fauna around the site. Introduce and implement hygiene procedures which result in the reduction of food waste around the processing facility to ensure that feral predators are not attracted to the facility. Develop and implement an introduced predator control program. Develop a Cane Toad Control program for potential future implementation. Lighting will be designed in accordance with *AS 4282-1997: Control of Obtrusive Effects of Outdoor Lighting Guidelines*. Lighting will be used only for required operational areas, all light sources will be aimed towards specific work areas requiring light for safe construction and/or operation, with a low vertical angle, and light shields will be placed on large equipment to minimise light spill over. Where possible, lighting will be the minimum wattage, whilst not compromising safety or OH&S requirements. PPA Procedures, emergency plans and OEMP will be followed at all time during port-side operations. *Rehabilitate* Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna."
Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (DOEE, 2017)	▪ Prioritise key species, ecological communities, ecosystems and locations across Australia for strategic feral pig management ▪ Encourage the integration of feral pig management into land management activities at regional, state	The WA Department of primary Industries and Regional Development's Western Australian Feral Pig Strategy 2020-2025 identifies feral pigs as absent or unknown in the City of Karratha region (including the Burrup Peninsula). Mitigation measures: *Minimise* Introduce and implement hygiene procedures which result in the reduction of food waste around the processing facility to ensure that feral predators are not attracted to the facility. Develop and implement an introduced predator control program.

Guidance	Objective	Identified consistency
	and territory, and national levels ▪ Encourage further scientific research into feral pig impacts on nationally threatened species and ecological communities, and feral pig ecology and control ▪ Record and monitor feral pig control programs, so their effectiveness can be evaluated ▪ Build capacity for feral pig management and raise feral pig awareness amongst landholders and land managers, and ▪ Improve public awareness about feral pigs and the environmental damage and problems they cause, and the need for the feral pig control.	
Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (DOEE, 2018).	▪ Contribute to long-term prevention of the incidence of marine debris. ▪ Understand the scale of impacts from marine plastic and microplastic on key species, ecological communities and locations. ▪ Remove existing marine debris. ▪ Monitor the quantities, origins, types and hazardous chemical contaminants of marine debris, and assess the	**Partially Addressed:** ERD, Section 8 – Table 8-1 **"**All reasonable and practicable measures will be undertaken during the construction and operation phases of the Project to minimise the generation of waste." **Partially Addressed:** CW1055600-EN-PL-001 Environmental Management Plan, Section 8.12. "The objective of waste management on the Project is to minimise generation of solid and liquid wastes and maximise opportunities to reuse or recycle material in preference to disposal. The *Waste Management Protocol* (WaMP) included in Appendix 14 addresses the Project's key responsibilities including the stockpiling and storage of wastes, reuse and recycling, management of controlled wastes, and wastewater." Mitigation measures: *Minimise*

Guidance	Objective	Identified consistency
	effectiveness of management arrangements for reducing marine debris. ▪ Increase public understanding of the causes and impacts of harmful marine debris, including microplastic and hazardous chemical contaminants, to bring about behaviour change.	To minimise and manage the creation of solid and liquid wastes, a waste management plan shall be prepared for the Project. Solid waste storage areas will be provided on site. All waste shall be segregated to maximise reuse and recycling. Bins and skips (with lids) will be labelled and maintained so as to hold the intended waste stream securely. Ensure that facilities used for the receiving of waste from the site are appropriately licensed to accept the classified waste type. Solid wastes shall be removed off site by an appropriately licensed contractor. The project site will be kept clean and tidy at all times and litter and waste will be deposited into appropriate litter or recycling bins and the Project's nominated waste collection areas
Threat abatement plan for predation by the European red fox DEWHA, 2008)	1. Prevent foxes occupying new areas in Australia and eradicate foxes from high-conservation-value 'islands' 2. Promote the maintenance and recovery of native species and ecological communities that are affected by fox predation	**Partially addressed**: ERD, Section 4.6.6 – Table 4-14: (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Food waste and increased water availability within the Project Area could potentially increase introduced fauna numbers." Mitigation Measures: "Predator control (wild dogs *Canis lupus familiaris*, feral cats *Felis catus*, red foxes *Vulpes vulpes*) has been identified as an absolute priority to minimise the impact of the Project. Initiate a feral fauna trapping and euthanisation program to reduce the number of feral fauna around the site. Introduce and implement hygiene procedures which result in the reduction of food waste around the processing facility to ensure that feral predators are not attracted to the facility. Develop and implement an introduced predator control program."
Marine Bioregional Plan for the North-west Marine Region (DSEWPac, 2012)	▪ Supporting strategic, consistent and informed decision-making under Commonwealth environment legislation in relation to Commonwealth marine areas. ▪ Supporting efficient administration of the EPBC Act to promote the conservation and ecologically sustainable use of the marine	**Addressed in:** ERD, Section 6.9 The Marine bioregional plan for the North-west Marine Region (DSEWPaC, 2012) identifies the conservation values of the Commonwealth waters from the Western Australia – Northern Territory border to Kalbarri, south of Shark Bay. None of the thirteen key ecological features identified in the North-west Marine Region is located within or at proximity of the Proposal Development Envelope. The National Conservation Values Atlas (DoEE, 2015) maps the waters directly adjacent to Dampier Port as a Biologically Important Area (BIA) for some marine turtle species protected under the EPBC Act. The following turtle species have BIAs (internesting) identified at proximity of the Dampier Port: Flatback Turtle – *Natator depressus;* Green Turtle - *Chelonia mydas;* Hawksbill Turtle – *Eretmochelys imbricate;* Loggerhead Turtle – *Caretta caretta.* No protected places, heritage places and historic shipwrecks occur within or at proximity of the Proposal Development Envelope.

Guidance	Objective	Identified consistency
	environment and its resources. ▪ Providing a framework for strategic intervention and investment by government to meet its policy objectives and statutory responsibilities.	
Conservation Advice *Calidris canutus* Red knot (TSSC, 2016a).	Conservation and Management Actions (habitat) • Protect important habitat in Australia. • Maintain and improve protection of roosting and feeding sites in Australia. • Incorporate requirements for red knot into coastal planning and management. • Manage disturbance at important sites which are subject to anthropogenic disturbance when red knot are present – e.g. discourage or prohibit vehicle access, horse riding and dogs on beaches, implement temporary site closures.	**Addressed:** ERD, Section 4.6.5 (p.87). "Given the low numbers (one individual) of the associated Red-necked Stint recorded during the APM surveys, it is highly unlikely that the Project is going to significantly impact populations of Red Knot. The loss of wading/tidal flat habitat as a result of construction of the Urea processing facility is inconsequential given the expanses of other more suitable habitat nearby. Moreover, the loss of available habitat for this species has been dramatically reduced due to a redesign of the Project layout (i.e. causeway) to reduce clearing of tidal flat areas. The outcomes of the pre-wet season biological survey report (APM, 2018), identifying habitat fragmentation as the greatest potential impact of the Project, was the catalyst for the redesign and optimisation of the Project layout." ERD, Section 4.6.6 – Table 4-14 (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Reduction and/or fragmentation of fauna habitat (Clearing of vegetation can lead to direct loss or fragmentation of fauna habitat)." Mitigation Measures: *"Avoid* The original processing facility layout was forecast to impact 21.3 ha of the tidal flats and Samphire Shrubland/Saltplains habitat. Following design optimization, proposed clearing of this habitat type has been significantly reduced. Limit clearing to that which is absolutely necessary. *Minimise* The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer.

Guidance	Objective	Identified consistency
		Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the 'area to perimeter' ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation. Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site. Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. *Rehabilitate* Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna."
Conservation Advice *Macroderma gigas* ghost bat (TSSC, 2016b).	1. Protect roost sites from mining, human disturbance and collapse.	**Addressed**: Biological Survey Report, Section 5.2.6.2 (pp.94-95). "No suitable roosting caves were located within the Study Area during APM surveys, although Ghost Bats were detected on two occasions on the south side of the Study Area in close proximity to rocky outcrops. The creekline in the southwest of the Study Area contained large trees and is in close proximity to the rocky outcrops of Murujuga National Park, where roosting habitat may be present. Given the provision of tall trees as vantage points and the proximity to potential roosting habitat, this creekline is considered important Ghost Bat habitat." **Addressed**: ERD, Section 4.6 (p.89) and Section 6.3.4 (p.151). "There are likely no roosts within the Project area for the Ghost Bat, and the reduction of clearing impacts to tidal flat and samphire habitat within the Project Area as a result of design optimisation, does not represent a significant impact to foraging habitat for this species."
	2. Replace the top strands of barbed wire in fences near roost sites with single-strand wire.	**Addressed**: ERD, Section 4.6 (p.89). "Ghost Bats typically fly low to the ground, around fence height, and are prone to collisions with wire fences… Planning prior to construction will require the consideration of wire fencing for security vs the potential for impact on local individuals." **Addressed**: ERD, Section 6.3.5 (p.152). "No barbed wire will be used on any fences during the construction or operation phases of the Project."

Guidance	Objective	Identified consistency
Approved Conservation Advice for *Liasis olivaceus barroni* (Olive Python – Pilbara subspecies) (DEWHA, 2008a).	1. Habitat Loss, Disturbance, and Modification • Ensure road widening, maintenance activities, and gas infrastructure development (or development activities) in areas where the Olive Python (Pilbara subspecies) occurs do not adversely impact on known populations. • Manage any changes to hydrology which may result in changes to the water table levels, increased run-off, sedimentation or pollution.	**Addressed:** ERD, Section 4.6.6 – Table 4-14 (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Reduction and/or fragmentation of fauna habitat (Clearing of vegetation can lead to direct loss or fragmentation of fauna habitat)." Mitigation Measures: Extensively addressed in the table. Specifically: "*Avoid* Limit clearing to that which is absolutely necessary. Avoid clearing of rocky/boulder habitat that may contain micro-habitat suitable for refuge for some terrestrial mammal species, including the Pilbara Olive Python. *Minimise* The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Do not disturb rock piles between the months of early November to late April where practicable as this is a time of inactivity for the Pilbara Olive Python and a period where individuals are slow to move and unable to avoid impact from land clearing. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer. Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the 'area to perimeter' ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation. Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site. Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. *Rehabilitate*

Guidance	Objective	Identified consistency
		Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna. Construction of the processing facility on the slopes of Site C and F will require significant cut and fill to bring levels up. The scheduling for materials dumped to fill could be manipulated to ensure large boulders are grouped as conglomerates around the periphery of the retaining batters. These large boulders should then, by virtue of their position in the batter slopes, offer potential cave and crevice habitat for the Pilbara Olive Python, contributing to the availability of secure refuge in the local area."
	2. Animal Predation or Competition • Implement Threat Abatement Plan for the control and eradication of foxes and cats in the local region.	**Addressed**: See response for "Threat abatement plan for predation by the European red fox (DEWHA, 2008a)" and "Threat abatement plan for predation by feral cats (DoE, 2015)."
	3. Conservation Information • Use road signage to raise awareness of the Olive Python (Pilbara subspecies) with road users on or near roads	**Addressed:** ERD, Section 4.6.6 – Table 4-14 (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Vehicle strike (Impacts with moving vehicles can cause injury or death of native fauna)." Mitigation Measures: "Vehicle speeds will be managed on site (including entry and exit points) by enforcing speed limits in construction areas to reduce the potential for vehicle strikes. All employees will be required to record and report any native fauna strikes. Roadkill will be removed at least 10 m into surrounding vegetation, when safe to do so, by designated personnel to avoid further strikes of fauna feeding on carcasses. Site induction to emphasise that all native fauna has right-of-way, where possible and safe to do so. Personnel will be inducted regarding the key risk times for vehicle strike to fauna (e.g. dusk and dawn). Where possible, all non-essential movement will be scheduled to take place during the day. Site inductions to introduce personnel to local conservation significant fauna, and signage displayed in crib rooms and notice boards, to ensure all personnel can identify all larger conservation significant species."
Threat abatement plan for predation by feral cats (DoE, 2015).	Effectively control feral cats in different landscapes.	**Addressed**: ERD, Section 4.6.6 – Table 4-14: (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Food waste and increased water availability within the Project Area could potentially increase introduced fauna numbers."

Guidance	Objective	Identified consistency
		Mitigation Measures: "Predator control (wild dogs *Canis lupus familiaris*, feral cats *Felis catus*, red foxes *Vulpes vulpes*) has been identified as an absolute priority to minimise the impact of the Project. Initiate a feral fauna trapping and euthanisation program to reduce the number of feral fauna around the site. Introduce and implement hygiene procedures which result in the reduction of food waste around the processing facility to ensure that feral predators are not attracted to the facility. Develop and implement an introduced predator control program."
Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*) (TSSC, 2005).	1. Inappropriate fire regimes.	**Addressed**: The Proponent will avoid igniting bushfires (thereby avoiding altering the current fire regime to the best of their ability). ERD, Section 4.5.6, Table 4-11 (Mitigation of Potential Impacts to Flora and Vegetation) (p.76). Potential Impact: Loss of Vegetation and/or Flora from Fire. Mitigation Measures: "Manage fire to reduce frequency and intensity around the Project area and the local area. Staff will be trained in the use of fire extinguishers. Spot fire control measures will be devised. All vehicles will be fitted with fire extinguishers. A Hot Work Permit system will be devised and implemented. Cigarette disposal units will be designated in approved smoking areas on site. Employees will not be permitted to smoke in vehicles within the Project Area. Vehicles will be required to remain on established tracks and roads only and will be instructed in avoiding leaving vehicles idling over vegetation, regrowth or dry grass, in the summer months."
	2. Predation following fire	**Addressed:** See response for "Threat abatement plan for predation by the European red fox (DEWHA, 2008a)" and "Threat abatement plan for predation by feral cats (DoE, 2015)". The Proponent will control populations of feral Cats and Foxes, which will, in turn, limit predation of Northern Quolls following fire.
	3. Lethal toxic ingestion of Cane Toad toxin.	While the population is continuing to spread, to date, the Cane Toad has yet to be recorded on the Burrup Peninsula. Therefore, potential ingestion of this species has not been addressed in the ERD.
National Recovery Plan for the Northern Quoll *Dasyurus*	1. Halt northern quoll declines in areas not yet colonised by cane toads.	The Proponent is aware that the Proposal will lead to fragmentation of Quoll habitat. See ERD, Section 4.6 (pp.88-89):

Guidance	Objective	Identified consistency
hallucatus (Hill and Ward, 2010).		"The cumulative construction of the fertilizer, nitrate and urea plants do present a significant barrier for this species, however, careful consideration of the layout of the proposed urea Project can play a role in greatly reducing the extent of the impact… consideration of the potential to fragment populations of terrestrial fauna has resulted in the redesign of the Project layout, significantly reducing broad extents of habitat loss and the creation of barriers preventing exchange of individuals between sub-populations. **Addressed:** ERD, Section 4.6.6 – Table 4-14 (Mitigation of Potential Impacts to Terrestrial Fauna) (p.91). Potential Impact: "Reduction and/or fragmentation of fauna habitat (Clearing of vegetation can lead to direct loss or fragmentation of fauna habitat)." (Relevant) Mitigation Measures: *"Avoid* The original processing facility layout was forecast to impact 21.3 ha of the tidal flats and Samphire Shrubland/Saltplains habitat. Following design optimization, proposed clearing of this habitat type has been significantly reduced. Limit clearing to that which is absolutely necessary. Avoid clearing of rocky/boulder habitat that may contain micro-habitat suitable for refuge for some small terrestrial mammal species, including the Pilbara Olive Python. *Minimise* The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Maintain denning habitat by avoiding disturbance to rock piles on the upper slopes of the valleys. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer. Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the 'area to perimeter' ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation. Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site.

Guidance	Objective	Identified consistency
		Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. *Rehabilitate* Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna. Construction of the processing facility on the slopes of Site C and F will require significant cut and fill to bring levels up. The scheduling for materials dumped to fill could be manipulated to ensure large boulders are grouped as conglomerates around the periphery of the retaining batters. These large boulders should then, by virtue of their position in the batter slopes, offer potential cave and crevice habitat for the Pilbara Olive Python, contributing to the availability of secure refuge in the local area." Other factors that may lead to declines in Quoll populations as a result of the Proposal include predation by feral predators (**Addressed:** see below – Objective 2), inappropriate fire regimes (**Addressed:** see above – "Commonwealth Listing Advice on Northern Quoll", Objective 2), and vehicle strike mortalities (**Addressed:** see above – "Approved Conservation Advice for *Liasis olivaceus barroni*", Objective 3).
	2. Reduce the impact of feral predators on northern quolls.	**Addressed:** See response for "Threat abatement plan for predation by the European red fox (DEWHA, 2008a)" and "Threat abatement plan for predation by feral cats (DoE, 2015)". The Proponent will implement control programs for feral predators, including feral Cats and Foxes.
Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPC, 2011)	Reduce the impacts of cane toads on populations of priority native species and ecological communities.	While the population is continuing to spread, to date, the Cane Toad has yet to be recorded on the Burrup Peninsula. Therefore, potential impacts of this species have not been addressed in the ERD.
Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses (DSEWPC, 2012).	Implement coordinated, cost-effective on-ground management strategies in high-priority areas.	The five species for which this guidance exists (gamba grass (*Andropogon gayanus*), para grass (*Urochloa mutica*), olive hymenachne (*Hymenachne amplexicaulis*), perennial mission grass (*Cenchrus polystachios* syn. *Pennisetum polystachion*) and annual mission grass (*Cenchrus pedicellatus* syn. *Pennisetum pedicellatum*)) were not recorded in the Project area (Biological Survey Report, Section 4.2.8, p.70). However, weeds/introduced flora, in general, have been addressed. **Addressed:** ERD, Section 4.5.4 (p.72) "Introduction and/or spread of weeds: The introduction and/or spread of these species have the potential to occur when moving vegetative material and topsoil (containing seed) from one site to another. There is also the potential that movement of vehicles in the Project area could increase weeds abundance, which could indirectly impact flora and vegetation. Without suitable management, these species can be aggressive (particularly buffel grass) and have the potential to further degrade the quality of vegetation within the site and surrounding area."

Guidance	Objective	Identified consistency
		ERD, Section 4.5.5 (p.74) "The current number of weed species at the site is comparable to other sites around the industrial estate and nearby conservation areas. The Burrup Peninsula is a small and relatively uniform landscape with a high degree of connectivity between sites (i.e. roads and access tracks) which has enabled the spread of weeds within the region. Management of weeds is largely inhibited by the level of industrial activity and the high number of stakeholders utilising the area." Table 4-11 (Mitigation of Potential Impacts to Flora and Vegetation), p.76. Potential Impact: "Degradation of Vegetation as a Result of Ingress of Weeds (Clearing and/ or movement of vehicles containing weed seeds throughout Project Area could result in increased weed abundance)." Mitigation Measures: *"Avoid* Any imported fill material/soil will be obtained from weed free sources to prevent further spread of weeds. Prior the importation of any fill material to the Project site, a written verification from the supplier will be obtain certifying that the material is weed free and meets the criteria of clean fill as defined in the DWER Landfill Waste Classification and Waste Definition 1996 (as amended 2018). *Minimise* To prevent the spread and/or distribution of weeds within the Project Area and to surrounding areas a Weed Management Plan will be prepared prior to the commencement of construction. This plan will outline weed hygiene and management procedures to be undertaken during construction and operations, particularly in referring to controlling the spread of *Cenchrus ciliaris* (Buffel Grass). Active management of edge effects will be employed which may involve weeding to ensure no creep of disturbance responsive weed species into remaining vegetation. Appropriate eradication of problematic species will be employed within construction and operation areas, so that weed control measures do not adversely affect adjacent native vegetation. Clean entry procedures will be enforced for all vehicles, equipment and personnel entering the Project past public carparks. Vehicles will be required to go through a site entry check and wash down. All employees and contractors will be inducted and trained in wash down procedures. All vehicles and equipment are restricted to designated roads and other paved areas to prevent excessive disturbance and dispersal of weed species. Ongoing weed monitoring will occur within the project site and along the site boundary for new infestations during and following construction activities. Weed risk areas will be identified on weed maps and through the Ground Disturbance Permit (GDP) process and shall be treated as avoidance sites wherever possible."

Guidance	Objective	Identified consistency
Conservation Advice Curlew sandpiper Calidris ferruginea (DoE, 2015)	▪ Achieve a stable or increasing population. ▪ Maintain and enhance important habitat. ▪ Disturbance at key roosting and feeding sites reduced. ▪ Raise awareness of curlew sandpiper within the local community.	**Addressed in:** ERD, Section 6.7.4.1 "This species has been recorded in the Dampier region (DBCA, 2018) and historically on the Burrup area (Worley Astron, 2006). This species may use the Project area during the wet season. The records suggest that the species prefers undisturbed islands and islets and therefore, likelihood of the species occurrence in the Project area is moderate. Significant impact to the species or the habitat is not anticipated." **Addressed in:** CW1055600-EN-PL-005 Threatened Species management Plan, Table 7.2 Mitigation measures of potential impacts to threatened species Mitigation Measures: *"Avoid* The original processing facility layout was forecast to impact 21.3 ha of the tidal flats and Samphire Shrubland / Saltplains habitat. Following design optimization, proposed clearing of this habitat type has been significantly reduced. Limit clearing to that which is absolutely necessary. *Minimise* The entire project layout has been redesigned to minimise habitat fragmentation. The tidal flat area is no longer being reclaimed and raised to a level to support construction. Instead, the processing plant will be located on Site C and Site F will contain administrative buildings and a designated laydown area for construction. The two sites will be joined across the tidal flats by a small causeway enabling access between the two sites. The causeway will contain large culverts to maintain hydrological and tidal flows and also allow fauna to freely move through the structure. Develop and implement a GDP system prior to the commencement of construction. Prior to any clearing, a GDP is required to be approved by the site Environmental Officer. Preferential clearing will occur for well represented habitat types over other habitat types that do not cover significant portions of the site. Land clearing to commence no more than six months prior to commencement of construction. Clearing will be planned to maximise the 'area to perimeter' ratio of remnant vegetation. Clearing of vegetation will be kept to a minimum necessary for safe and efficient construction and operation. Land clearing will be undertaken progressively and incrementally during construction, in order to minimise the pressure on the carrying capacity of native vegetation surrounding the site. Plan clearing to retain vegetation where possible, such as around carparks and infrastructure, and landscaped areas. *Rehabilitate*

Guidance	Objective	Identified consistency
		Following construction, ensure that any disturbed habitats (laydown areas) are returned to their pre-disturbance state to reduce the overall impact of habitat loss. Attempt to reinstate valuable microhabitat elements to the landscape to encourage use of the periphery of the site by this conservation-dependent fauna.”

10 Risk of potential impacts

Potential impacts to the Olive Python and the Ghost Bat were assessed against the significant impact criteria for vulnerable species and potential impacts to the Northern Quoll were assessed against the significant impact criteria for endangered species of the *Significant impact guideline* (DoE, 2013).

Spotlight surveys were conducted during both APM surveys in rocky outcrop areas in an effort to record the Pilbara Olive Python (*L. olivaceus barroni*) however this species was not recorded by APM. The lack of detection and proximity with well-developed and extensive rocky outcrops suggest this species is infrequent if present.

Introduced predators represent the main threats to the Pilbara. Increased development can also alter the availability of prey and increase the potential for road deaths from vehicles associated with construction and, or operational activities.

Despite the survey efforts, Northern Quolls (*D. hallucatus*) were not recorded during APM surveys. This species was previously recorded in close proximity to the Project area. Given the low density of mainland populations of this species, and its cryptic nature, the lack of detections during APM surveys may not indicate the absence of this species from the area. However, the lack of detections does indicate that this species is rare in Project area habitats.

The Project layout is forecast to impact 4.29 ha of rocky outcrop habitat which has the potential to be used by the Northern Quoll and the Pilbara Olive Python. The rocky outcrop habitat represents only 4% of the total Project area. There is 2811 ha of this same habitat vested for conservation in the Murujuga National Park (57% of the total area of the national park). Therefore, the disturbance to rocky outcrop habitat within the Project area is minimal as it represents 1:655 of what is available to fauna in the Conservation Zone.

Although the Ghost Bat (*Macroderma gigas*) was recorded twice during APM Level 2 survey, no suitable roosting caves were located within the biological survey area during APM surveys. The rocky outcrops and creeklines along the southern boundary of the Project area should be considered suitable Ghost Bat foraging habitat. However, construction of the processing plant should not preclude foraging and may actually increase foraging opportunities, with night time lighting certain to draw a high number of invertebrates to the site. Ghost Bats typically fly low to the ground, around fence height, and are prone to collisions with wire fences. Important drainage line habitat located in the south-west corner of the project area has been subsequently avoided by excising this area from the project development envelope. Further avoidance of this habitat has been provided by selecting the northern Hearson Cove Road re-alignment.

There are no proposed impacts to key ecological features or protected places of the Commonwealth Marine Areas CMA). Hence, it is not likely that the Project will have a significant impact on the environment in the CMA.

The assessment of potential impacts on Matters of National Environmental Significance (MNES), including threatened species, demonstrates that the Project will not represent a significant risk to these MNES. The surveys and studies undertaken provide sufficient information to form the basis of the impact assessment. The implementation of the mitigation measures described above will ensure any identified environmental impact is avoided or appropriately mitigated such that they are not significant.

The mitigation measures discussed within this TSMP will be implemented to manage the residual impacts associated with the Project.

11 Training and Awareness

All Project personnel shall be aware of and competent to implement the environmental requirements of the TSMP when performing their individual tasks. A competent person is a person who is qualified, because of knowledge, training and experience, to organise the work and its performance.

11.1 Project Inductions

Prior to commencing any work on site, all personnel working on the Project will undertake an environmental induction which will include the Project's aspects, impacts and mitigations for the protection of threatened species. The environmental induction developed by Perdaman, will be delivered to personnel by the Environmental Representative, or delegated person, and shall include, but not be limited to the following:

- Project approvals and associated conditions;
- Key legal obligations;
- Regulatory penalties and impacts of non-compliance;
- Process for authorising ground disturbance via the GDP process;
- Land access restrictions;
- Aboriginal heritage sites and cultural awareness;
- Dust management;
- Identification of weeds, management measures and reporting requirements;
- Protection of fauna, identification of threatened fauna species and reporting requirements (sightings and injuries);
- Identification of feral fauna species and reporting requirements;
- Water management and water use efficiency;
- Fire risk management and response;
- Erosion systems and management;
- Hazardous materials storage and use;
- Spill management including use of spill kits;
- Waste management;
- Asbestos materials management;
- Emissions management;
- Incident and hazard reporting;
- Any special requirements relevant to specific work locations eg: Port related aspects and impacts.

11.2 Training Records

Training records shall be maintained on site and include the following as a minimum:

- Records of training attendance eg: induction training, toolbox meetings;
- Copies of training materials;
- Competency assessments (where relevant);
- Training matrix.

12 Communication

12.1 Internal and External Communication

Regular updates of environmental issues and related matters will be communicated to all Project personnel. This communication will include the induction process, through regular team meetings and tool box talks, and via written communications including emails and newsletters disseminated electronically or in hard copy.

All external communications will be managed by the Project Director. No other Project personnel or Contractors are to provide comment or information to external organisations or individuals without the consent of the Project Director.

12.2 External Incident Notification

Only the Environment and Heritage Manager, in consultation with the Project Director, is authorised to notify external regulatory agencies of any Project related environmental incidents.

This communication will be in accordance with individual agencies' reporting and notification requirements.

13 Non-Conformance and Incident Management

13.1 Environmental Incident Response

An environmental incident on the Project, that could impact threatened species, is any situation where a gas, liquid or solid emission release occurs that does, or could, pose a threat to environmental values, or be a breach of a Project approval or regulatory requirement. As a guide, this could include:

- Spill to open ground, waterway or marine system of a known or potentially contaminating liquid or solid material.
- Clearing or grubbing vegetation outside an approved area.
- Release of gas or vapours to atmosphere.
- Injury or death of fauna.
- Introducing weed contaminated soil or vegetation into uninfected areas.
- Erosion or deposition of sediment outside the Project's battery limits.
- Any uncontrolled fire.
- Uncovering naturally occurring hazardous or contaminating materials such as acid sulphate soils.
- Excessive dust generation.
- Excessive noise emissions.
- Wastes not being stored, managed or disposed of appropriately.

The immediate response to all incidents is to make the area safe and undertake measures to prevent further environmental harm.

The process outlined in Figure 10-1 below will be followed by all Project personnel if an environmental incident occurs.

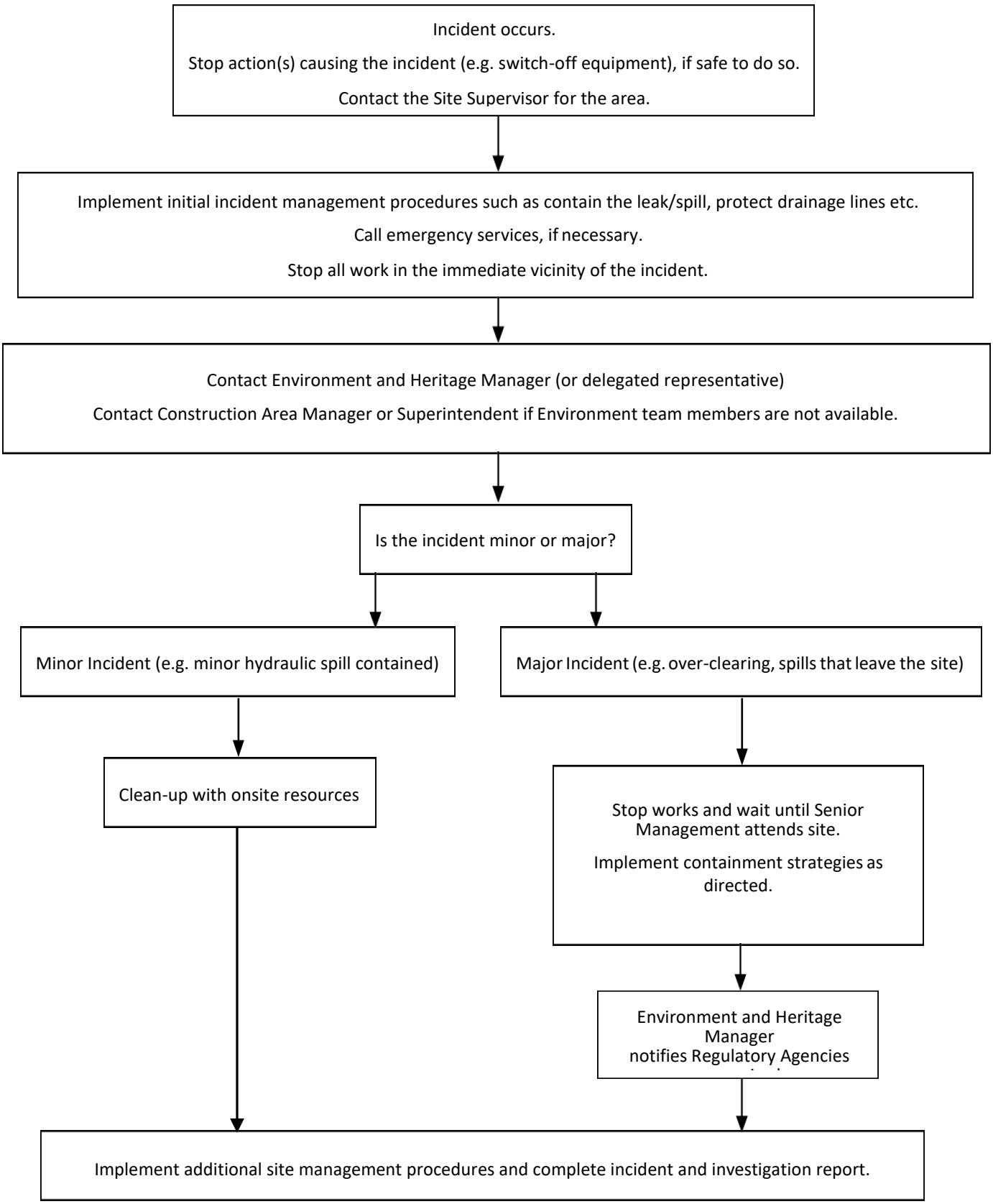

Figure 13-1 Flow Chart for Environmental Incident Response

13.2 Incident Reporting and Investigation

When an environmental incident occurs, regardless of its scale or nature, the Environment and Heritage Manager (or their representative) is to be notified of the incident as soon as possible.

The Environment and Heritage Manager will inform the Project Director of the incident, and actions taken to mitigate impact to the environment. Reporting to the Project Director must occur within 24 hours. The incident and response will be recorded in Perdaman's incident reporting system, within 24 hours of occurrence.

For externally reportable and / or high potential incidents, root cause(s) must be established using the Incident Cause Analysis Methodology (ICAM). The final incident investigation report must be submitted within 14 days, or as stipulated by the Project Director, depending on the level of investigation required.

In the event that an environmental incident results in the offsite discharge of contaminants to the environment, the Environment and Heritage Manager, in consultation with the Project Director, will contact the appropriate regulatory agencies.

All high-potential environmental releases must be reported to the Perdaman Chairman within 24 hours of occurrence, or sooner if practicable.

The site supervisor responsible for the area in which the incident occurred is to complete an incident report form and provide it to the Environment and Heritage Manager as soon as practicable after the incident.

Depending on the nature of the incident, reporting and notification of incidents may need to be provided to external agencies or Regulators.

All incidents will be investigated at a level commensurate with the actual or potential consequence. Incidents with an actual consequence of high and above, including those that breach regulations, licence or approval conditions will include the relevant Construction or Operations Manager in the incident's investigation.

13.3 Non-Conformance Management

Non-conformances may be identified from a number of sources, including but not limited to incident investigations, audits, inspections, monitoring programs and management reviews. Corrective actions will be systematically implemented and reviewed to ensure they adequately resolve the issue and minimise the risk of reoccurrence of the incident.

A corrective action register shall be maintained on site by Perdaman and shall record all corrective actions identified and implemented, including review of corrective actions and close out details. The close out details shall include the date closed and the name of the person verifying completion of the required action.

Corrective actions where the initial risk level is high or extreme must be prioritised and closed in a timely manner.

Where relevant, corrective actions identified may be included in periodic revision of the PEMP.

13.4 Emergency Management

The Project's CW1055600-EN-PL-004 Emergency Response Management Plan shall be implemented, addressing health, safety and environmental issues. The plan will include methods for managing major environmental incidents, including but not limited to, large scale release of hazardous materials or gases, fire, cyclone and flood events.

14 Monitoring and Reporting

Perdaman shall conduct regular inspections and audits of the Project's work sites and undertake monitoring of specific environmental aspects and impacts.

All non-conformances identified will be managed through the Project's non-conformance management process outlined in Section 12.3.

14.1 Environmental Inspections

Perdaman shall undertake weekly environmental inspections of all Project work areas and activities of their Project Personnel.

These inspections will be specific to the work area and include relevant environmental aspects such as, but not limited to:

- Hazardous materials storage and handling;
- Dust and other emissions management;
- Refuelling activities;
- Land clearing and rehabilitation;
- Groundwater usage;
- Trench management;
- Noise management;
- Stormwater management including sediment basins and ponds;
- Spills, leaks and contaminated ground;
- Topsoil management;
- Waste management (liquid and solid); and
- Environmental incidents and corrective action close out;

14.2 Environmental Audits

Perdaman shall conduct environmental audits of individual construction work packages and operational areas via an integrated audit schedule. This will be undertaken to ensure all Project activities and environmental management processes conform with the planned arrangements and whether the PEMP and supporting sub-plans have been properly implemented. The key requirements to be reviewed may include:

- Performance against licensing and approvals conditions, project targets, objectives and policy statements;
- Adequacy of resources and training; and
- Complaints and non-conformance management.

The audit schedule will be developed in consultation with relevant internal stakeholders and Contractors. Results of all audits will be communicated and discussed at management review meetings.

14.3 Compliance

The requirements stated in this document are considered a minimum standard and compliance is mandatory.

The aforementioned audit, inspection and monitoring regime conducted by Perdaman will monitor compliance with these requirements.

The Project's suite of licenses and approvals will contain conditions that must be satisfied prior to the commencement and throughout Project construction, commissioning and operation. Non-compliance with these conditions could result in fines and penalties being levied against individuals and companies.

Perdaman shall maintain a legal obligation register and implement systems to monitor and ensure compliance with these requirements.

14.4 Environmental Reporting

Perdaman is responsible for the preparation of overall Project related environmental reports including compiling data from monitoring programs.

Perdaman will compile monitoring data and relevant environmental information on a monthly basis. Reporting to external stakeholders and regulators will be in strict accordance with the Project's approval conditions.

15 Review and Continual Improvement

Ongoing monitoring of this TSMP and its commitments will ensure environmental risks associated with threatened species are identified, monitored and addressed in a timely manner. This includes monitoring the key characteristics of all Project activities that may have significant environmental impacts, such as operational controls, conformance with objectives and periodic evaluation of compliance with legislation and regulations.

Findings of monitoring and measurement processes will be reviewed periodically and reported through monthly reports and a management review twice a year. The monthly reports will provide information to satisfy approval conditions while the management review will be a self-evaluation audit of conformity to Perdaman's corporate environmental management system requirements.

Regular environmental inspections conducted by Perdaman's Environmental Representatives will provide assurance that all personnel and operating processes are continually addressing environmental issues through a process of continual improvement.

Additional monitoring may be required to understand potential exceedances or non-conformances, such as, but not limited to, excessive noise levels at sensitive receivers, weed establishment on site and discharge water quality.

This plan will be reviewed:

- At least annually throughout the life of the Project.
- As a result of significant incidents that have directly impacted threatened species.
- When performance improvements are identified for the protection of threatened species.
- When changes to operational processes pose a risk to threatened species.

16 Definitions

Contractor

The Contractor on the Project is any individual or party engaged directly or indirectly by Perdaman, that is not an employee of Perdaman, to carry out the Project.

Environmental Representative

The Environmental Representative includes Perdaman's Environment and Heritage Manager, the Environmental Coordinator or their delegated representative.

May

Indicates that the Subcontractor is permitted to do something or the Contractor reserves the right to do something according to the text.

Operational Environmental Management Plan

An Operational Environmental Management Plan (OEMP) is a plan specifically developed for port related activities and is developed specifically for Pilbara Port Authority requirements. This plan will be developed, reviewed and approved prior to the commencement of Port construction activities.

Perdaman

Perdaman Chemicals and Fertilisers Pty Ltd is the proponent of the Project.

Project Personnel

Project Personnel includes all persons working on the Project directly employed by Perdaman, or its Contractors.

Project Work Sites

The Project work sites include Area C, Area F, the causeway linking these two areas, the conveyor corridor to the Port and the Port storage and loading infrastructure. It can also include any other Project relevant location under operational control of Perdaman.

Should

Indicates a recommendation.

Will

Indicates that a statement is mandatory.

Works

Works includes all work which Perdaman and or its Contractors are required to perform to comply with its obligations under their relevant scope of works pertaining to the Project.

17 Abbreviations

Abbreviation	Description
AHD	Australian Height Datum
APM	Animal Plant Mineral Pty Ltd.
BSIA	Burrup Strategic Industrial Area
CWEC	Critical Weather Event Committee
DBCA	Department of Biodiversity, Conservation and Attractions
DOEE	Department of Environment and Energy
EIRP	Emergency Incident Response Plan
EPA	Environmental Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act
ERMP	Emergency Response Management Plan
EWSC	East West Service Corridor
GDP	Ground Disturbance Permit
ha	Hectares
ICAM	Incident Cause Analysis Method
LNG	Liquified Natural Gas
MAC	Murujuga Aboriginal Corporation
MNES	Matters of National Environmental Significance
Mtpa	Million tonnes per annum
OEMP	Operational Environmental Management Plan (PPA specific)
PEMP	Project Environmental Management Plan
PPA	Pilbara Ports Authority
PPE	Personal protective equipment

18 Reference Documents

Document Number	Document Title
CW1055600-EN-PL-001	Perdaman Project Destiny Environmental Management Plan
APM, 2019	Perdaman Urea Project – Pre and Post-wet Season Biological Survey
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19 Codes and Standards

Document Number	Document Title

20 Project Delivery Applicability

☐	Proposals	☒	EPC	☒	Construction
☐	Studies	☒	Project Management	☒	Commissioning
☒	Preliminary Engineering	☒	Technical Services	☐	Site Services
☒	FEED	☒	Procurement	☒	Ops and Maintenance
☒	Detailed Design	☒	Construction Management	☐	

Attachment A. Pre and Post-wet Season Biological Survey

Refer to Environmental Review Document Appendix B

Attachment B. Marine Fauna Desktop Assessment

Refer to Environmental Review Document Appendix C