



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9535/1
Permit Holder:	Department of Biodiversity, Conservation and Attractions
Duration of Permit:	From 07 April 2022 to 07 April 2027

The permit holder is authorised to clear *native vegetation* subject to the following conditions of this permit.

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear *native vegetation* for the purpose of geotechnical investigations associated with the design of a bridge.

2. Land on which clearing is to be done

Lot 511 on Deposited Plan 422685, Karratha

3. Clearing authorised

The permit holder must not clear more than 0.01 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

PART II – MANAGEMENT CONDITIONS

4. Avoid, minimise, and reduce impacts and extent of clearing

In determining the *native vegetation* authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending order of preference:

- (a) avoid the clearing of *native vegetation*;
- (b) minimise the amount of *native vegetation* to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

5. Weed management

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of introduction and spread of *weeds*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no known *weed*-affected soil, *mulch*, *fill*, or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

6. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner in a single direction towards adjacent *native vegetation* to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

7. Fauna management

The permit holder must conduct clearing activities during the daylight hours to avoid the possibility of injury to fauna.

8. Revegetation and Rehabilitation – retention of vegetative material and topsoil

The permit holder shall:

- a) Retain the vegetative material and topsoil removed by *clearing* authorised under this permit and stockpile the vegetative material and topsoil in an area that has already been cleared.
- b) At an optimal time within 12 months following completion of geotechnical investigations, *revegetate* and *rehabilitate* areas not required for future scheduled and approved development, by:
 - i. re-shaping the surface of the land so that it is consistent with the surrounding five metres of land;
 - ii. ripping the ground on the contours to remove soil compaction;
 - iii. laying the vegetative material and topsoil retained under condition 8(a) on the cleared areas; and
 - iv. undertake *weed* control activities on an ‘as needed’ basis to reduce weed cover within the cleared areas to no greater than the weed cover within the adjacent *native* mangrove vegetation.

PART III - RECORD KEEPING AND REPORTING

9. Records that must be kept

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	<ul style="list-style-type: none"> (a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (c) the date and times that the area was cleared; (d) the direction of clearing; (e) the size of the area cleared (in hectares); (f) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 4; and (g) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> in accordance with condition 5.
2.	In relation to <i>revegetation</i> and <i>rehabilitation</i> of areas pursuant to condition 8 of this permit:	<ul style="list-style-type: none"> (a) the location of any areas <i>revegetated</i> and <i>rehabilitated</i>, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees; (b) a description of the <i>revegetation</i> and <i>rehabilitation</i> activities undertaken; (c) the date that the area was <i>revegetated</i> and <i>rehabilitated</i>; (d) the size of the area <i>revegetated</i> and <i>rehabilitated</i> (in hectares); (e) any <i>weed</i> control activities undertaken within the area <i>revegetated</i> and <i>rehabilitated</i>.

10. Reporting

The permit holder must provide to the *CEO* the records required under condition 9 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
fill	means material used to increase the ground level, or to fill a depression.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
rehabilitate/ed/ion	rehabilitate/ed/ion means actively managing an area containing native vegetation in order to improve the ecological function of that area.
revegetate/ed/ion	revegetate/ed/ion means the re-establishment of a cover of local provenance native vegetation in an area using methods such as natural regeneration, direct seeding and/or planting, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area
weeds	means any plant – (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i> ; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS



Mathew Gannaway

MANAGER

NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

14 March 2022

Schedule 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).



Figure 1: Map of the boundary of the area within which clearing may occur



Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9535/1
Permit type:	Purpose permit
Applicant name:	Department of Biodiversity, Conservation and Attractions (DBCA)
Application received:	21 December 2021
Application area:	0.01 hectares within a clearing footprint of 0.12 hectares
Purpose of clearing:	Geotechnical Investigations associated with the design of a bridge
Method of clearing:	Cleared by Chainsaw/cut off at the base of the trunk
Property:	Lot 511 on Deposited Plan 422685
Location (LGA area/s):	City of Karratha
Localities (suburb/s):	Karratha

1.2. Description of clearing activities

The vegetation proposed to be cleared is contained within a single contiguous area (see Figure 1, Section 1.5).

The vegetation proposed to be cleared consists of the vegetation unit AmRsCa which is described as *Avicennia marina* subsp. *marina* low closed forest with *Ceriops australis* (landward) and *Rhizophora stylosa* and *Bruguiera exaristata* (seaward) in an Excellent condition (Trudgen, 1991) (RPS, 2020). The application area is mapped within a mangrove inland coastal flat.

The proposed clearing is to enable geotechnical investigations that will inform the detailed design of a bridge that will form part of the Murujuga National Park access road. The access road bridge is proposed to enable visitor access into Murujuga National Park and enable the Murujuga Aboriginal Corporations Tourism Precinct (DBCA, 2021).

1.3. Decision on application

Decision:	Granted
Decision date:	14 March 2022
Decision area:	0.01 hectares of native vegetation within a 0.12 hectares footprint as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 14 days and two submissions were received. Consideration of matters raised in the public submissions are summarised in Appendix B.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix C), relevant datasets (see Appendix G.1), the findings of a flora and vegetation survey (see Appendix F), the clearing principles set out in Schedule 5 of the EP Act (see Appendix D) and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration that this projects forms part of the larger Murujuga Tourism Program which aims to build a world class living knowledge centre, that commemorates and educates the importance of the country Australia and the Aboriginal culture. The development will further facilitate improved management of the Murujunga National Park, conservation of the rock art and controlled access to sites of significance (RPS,2020).

The assessment identified that the proposed clearing will result in:

- removal of ecologically important mangrove vegetation;
- may injure fauna that may be present at the time of the clearing activities;
- the potential introduction and spread of weeds into adjacent mangrove vegetation, which could impact on the quality of the adjacent vegetation and its habitat values; and
- clearing of riparian vegetation.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing is unlikely to have long-term adverse impacts on environmental values and can be minimised and managed to unlikely lead to an unacceptable risk to environmental values. The applicant has suitably demonstrated avoidance and minimisation measures in finalising the location of the clearing which will result in the least environmental impact.

The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid, minimise to reduce the impacts and extent of clearing, in particular avoid clearing of riparian vegetation;
- take hygiene steps to minimise the risk of the introduction and spread of weeds;
- undertake slow, progressive one directional clearing during the day light hours to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity;
- rehabilitate the cleared area by returning vegetative material and topsoil removed during the clearing activity.

1.5. Site map



Figure 1 Map of the application area

The area crosshatched yellow indicates the area authorised to be cleared under the granted clearing permit.

2 Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Rights in Water and Irrigation Act 1914* (RiWI Act)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

Due to the nature of the clearing required, DBCA has advised that alternative options to avoid and minimise the need for clearing has been considered however, no other technical options exist to accurately determine the necessary information to adequately inform a detailed design of a structural bridge. Therefore, DBCA has advised that geotechnical investigation was the most adequate option to inform the design of the bridge (DBCA, 2021).

DBCA has considered two separate road alignment options during 2017 and 2021. Through the four years of investigation into the project, the road alignment option from 2017 was deemed to cause a larger environmental impact compared to the road alignment option in 2021 (DBCA, 2022a). DBCA has submitted a clearing permit application proposing to clear mangrove vegetation within the road alignment option from 2021. Location of the road alignment options are illustrated in Appendix F. The following comparisons were determined (DBCA, 2022a):

- “The current alignment (2021) option allows for the proposed bridge to be elevated above the storm surge level resulting in the road being useable in all weather conditions, facilitating emergency access into the park and will also allow for the Mangroves to potentially recolonise under the bridge.
- The 2017 alignment will require significant amounts of fill.
- The 2017 alignment will result in impacts to priority four flora taxa.
- The 2017 alignment presents greater risks of impact to aboriginal heritage during construction.
- The 2017 alignment relies on single carriageway to traverse the mangroves which is not supported by Main Roads.
- The 2017 alignment will have a substantially greater impact to mangrove vegetation.
- The 2017 alignment would have disturbed a further 0.125 hectares of mangal habitat and 0.1 hectares of samphire/mudflat areas.”

DBCA will be clearing the mangrove vegetation by cutting the mangrove vegetation at the base of the trunk by a chainsaw to avoid direct removal of the mangroves (DBCA, 2021).

By exploring alternative options, DBCA was able to avoid clearing of an additional 0.125 hectares of mangal habitat, 0.1 hectares of samphire/mudflat areas and priority four flora species.

To mitigate the loss of mangrove vegetation within the application area, DBCA propose to revegetate the areas cleared for geotechnical investigations with mangrove vegetation.

The Delegated Officer was satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix C) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix D) identified that the impacts of the proposed clearing present a risk to biological values (fauna and mangrove vegetation), and land and water resources. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values - Clearing Principles (a and b)

Assessment

The application area is located within the Roebourne subregion of the interim Biogeographic Regionalisation for Australia (IBRA) Pilbara Bioregion (GIS Database). The Roebourne subregion is characterised by quaternary alluvial and older colluvial coastal and subcoastal plains, supporting a grass savannah of mixed bunch and hammock grasses, and dwarf shrub steppe of *Acacia stellaticeps* or *Acacia pyrifolia* and *Acacia inaequilatera* (Nadine. A et al, 2010).

The vegetation within the application area is broadly described as vegetation association 117 which is described as Hummock grassland Triodia species. The Flora and Vegetation survey (RPS, 2020) indicate that the vegetation within the proposed clearing area consists of the vegetation unit AmRsCa which is described as *Avicennia marina* subsp. *marina* low closed forest with *Ceriops australis* (landward) and *Rhizophora stylosa* and *Bruguiera exaristata* (seaward) (RPS, 2020). This vegetation community was categorised by RPS (2020) as “other conservation significant vegetation” and the condition of the vegetation within the application area is mapped as Excellent (Trudgen, 1991).

Vegetation unit AmRsCa represents Mangrove forest. Although not listed as Priority Ecological Communities (PECs) by DBCA, mangroves are considered ecologically important ecosystems that provide important feeding and breeding habitat for birds, fish and crustaceans, a buffer from storms and cyclones, as well as reducing erosion and maintaining water quality (DAWE, 2020). The proposed removal of 0.01 hectares in the context of the remaining mangrove habitat in the local area will not significantly impact the ecological function of the mangrove.

Ecological Community

No Threatened Ecological Communities (TEC) were identified within the application area or in close proximity (GIS Database). The closest conservation significant ecological community identified within the local area is the Priority one PEC Burrup Peninsula rock pool which is located 2.6 kilometres from the application area. The Burrup Peninsula rock pool PEC is described as calcareous tufa deposits with interesting aquatic snails.

Flora

Seventeen records of Priority flora were identified during the desktop assessment. The survey by RPS Australia West Pty Ltd did not identify any threatened or priority flora species within the application area nor it is identified as potentially occurring within the application area. Several weed species were located throughout the survey area (RPS, 2020). Weeds have the potential to out-compete native flora and reduce the biodiversity of an area. Potential impacts to biodiversity as a result of the introduction and spread of weeds may be minimised by the implementation of a weed management condition on the clearing permit.

Fauna

The desktop assessment identified 57 conservation significant fauna species within the 50-kilometre radius of the application area, including 15 threatened species, 32 species protected under international agreements, two other specially protected species and eight Priority species. The conservation significant fauna species include 40 birds, ten mammals (three marine and seven terrestrial) and seven reptiles (two marine and five terrestrial). Majority of these identified species are migratory or marine animals and are unlikely to be residents within the proposed application area.

According to the analysis of a likelihood of occurrence, the mangrove vegetation within the proposed application area has a likelihood to provide suitable habitat for the following species:

- *Hydromys chrysogaster* (Water-rat, Rakali)
- *Liasis olivaceus barroni* (Pilbara Olive Python)
- *Mormopterus cobourgiensis* (North-Western Free-Tailed Bat)

Class: Bird

Numerous shorebird species (26) protected under International Agreement (particularly the Families: Calidris, Charadriidae, Numenius and Tringa) have been recorded within the local area. The majority of the birds from these families are trans-equatorial migratory shorebirds (including Priority and Threatened species) that breed in northern latitudes. The small islands surrounding the main land support breeding seabirds that were identified within the local area and it is unlikely these species will utilise the application area as a breeding ground. However, the assessment concluded that eight migratory bird species and one other specially protected bird species were likely to occur over the application area given the presence of mangrove vegetation.

- *Cuculus optatus* (Oriental Cuckoo)
- *Falco peregrinus* (Peregrine Falcon)
- *Fregata ariel* (Lesser Frigatebird)
- *Gelochelidon nilotica* (Gull-billed Tern)
- *Hydroprogne caspia* (Caspian Tern)
- *Pandion cristatus* (Osprey, Eastern Osprey)
- *Plegadis falcinellus* (Glossy Ibis)
- *Sterna hirundo* (Common Tern)
- *Sternula albifrons* (Little Tern)

The *Falco peregrinus* (Peregrine Falcon) and the *Pandion cristatus* (Eastern Osprey) may regularly overfly the application area. According to the Australian Museum, the Peregrine Falcon 'is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas'. It requires abundant prey and secure nest sites and prefers coastal and inland cliffs or open woodlands near water and may even be found nesting on high city buildings. This species is widespread and highly mobile and is found in various habitats (Australian Museum, 2019). The Peregrine falcon is also known to associate with mangrove vegetation and may utilise the habitat present as foraging habitat (Global Raptor Information Network, 2022) but, the species is unlikely to entirely depend on the application area. Similarly, the Eastern Osprey forages over the open ocean. The Osprey is diverse, being found in many coastal and lake areas of the world. In Australia, it is found on the north and east coast from Broome to the south coast of New South Wales. Ospreys are found on the coast and in terrestrial wetlands of tropical and temperate Australia and offshore islands, occasionally ranging inland along rivers, though mainly in the north of the country (Birdlife Australia, n.d). The breeding habitat for both the species are associated with large rivers and requires rocky ledges, cliffs or tall trees and the species preferred breeding habitat is absent over the application area. The proposed clearing will not have a significant impact on the Peregrine Falcon and the Eastern Osprey.

Fregata ariel (Lesser Frigatebird) is found in the northern seas, particularly in blue-water seas and breeds on tropical islands in the Indian Ocean and has a wide range distribution along the coastline (DAWE, n.d). The small, proposed clearing is unlikely to have a significant impact on this species.

Sterna hirundo (Common Tern) is known to inhabit sheltered seas including estuaries and near coastal saltwork and sewage ponds and sometimes in mangroves and is considered a vagrant or accidental in Australia. This species does not breed in Australia (DAWE, n.d). Common Tern have a likelihood to occur over the application area, however it is unlikely the proposed clearing will result in a significant impact on this species.

Cuculus optatus (Oriental Cuckoo) is associated with forest, woodland, monsoon forests, Melaleuca swamps and mangroves, usually wet or in riparian areas. Although mangrove vegetation is suitable habitat for this species, the Oriental Cuckoo is not known to breed in Australia and the application area does not fall within the mapped distribution for this species (DAWE, n.d). It is, therefore, unlikely that the proposed clearing will impact the Oriental Cuckoo.

Plegadis falcinellus (Glossy ibis) inhabits freshwater marshes at the edges of lakes, rivers and swamps and breed in trees or shrubs near water bodies. Glossy Ibis forages in shallow water and mud for aquatic invertebrates, snails, mussels, crabs and crayfish. This species is generally located east of the Kimberley in Western Australia and Eyre Peninsula in South Australia and is also known to be inconsistently distributed in the rest of Western Australia. The Glossy Ibis breeds at limited number of locations and the proposed application area does not fall within a known breeding location (DAWE, n.d).

Gelochelidon nilotica (Gull-billed tern) inhabits freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. There is no breeding habitat in Australia (DAWE, n.d) and the proposed clearing is unlikely to impact the Gull-billed Tern.

Hydroprogne caspia (Caspian Tern) inhabits coastal embayments, with sandy or muddy margins and shelter. This species also inhabits near-coastal or terrestrial wetlands and forage in sheltered shallow water or tidal channels over mudbanks, on fish, eggs or young of other birds, aquatic invertebrates and worms. Caspian Tern's breeding sites in Western Australia are limited and it is rarely the Kimberley region will support breeding of this species. The application

area does not fall within the mapped distribution for this species. It is therefore unlikely that the proposed clearing will have a significant impact on the Caspian Tern.

Sternula albifrons (Little Tern) inhabit sheltered coastal environments but may include harbours, inlets and rivers and forage on small fish crustaceans, insects, worms and molluscs. The Little Tern has a large global range and is widespread in Australia. Breeding sites are widely distributed from north-western Australia, around the northern and eastern Australia coasts to south-eastern Australia. Little Tern usually roosts on sandpits, banks and bars with sheltered estuaries or coastal environments (DAWE, n.d). Although the Little Tern may occur over the application area, given the above, it is unlikely the proposed clearing will have a significant impact on this species.

Class: Mammal

Of the mammals of conservation significance recorded within the local area, the likelihood of occurrence of the Water-rat (*Hydromys chrysogaster*) and North-Western Free-Tailed Bat (*Mormopterus cobourgiensis*) over the proposed application area is likely.

The proposed application area is likely to provide suitable habitat for the Water-rat as it is an aquatic species known to occur predominately near permanent fresh water. This species inhabits various permanent freshwater aquatic habitats and nest in bankside hollow logs but can utilise artificial nests. The Water-rat is predominantly carnivorous, feeding on fish, crustacea, small birds, mammals, frogs and reptiles. Intact riparian vegetation and associated bank stability is critical to their survival and the species is known to be most active during sunset (Australian Museum, 2019). The nearest record is approximately 4.98 kilometres from the proposed application area. Water-rat is a mobile species and is able to move into the adjacent mangrove vegetation. Given the above and implementation of conditions, the proposed clearing is unlikely to result in a significant impact to the conservation of the Water-rat.

The North-Western Free-Tailed Bat Inhabit mangroves, eucalypt or melaleuca woodland or other coastal habitat. This species is found at coastal regions, up to one hundred kilometres inland. They are known to occupy tree hollows of the mangrove species *Avicennia marina*, and no other types of roost site are known (Atlas of Living Australia, n.d). It is unlikely the application area will support this species given no *Avicennia marina* with roost hollows have been identified within the application area.

The remaining terrestrial mammals of conservation significance do not occur in mangrove habitat and the marine mammals identified from the desktop assessment, generally occur in the open water, outside of the application area.

Class: Reptile

The desktop assessment has identified four threatened and three priority reptile fauna species within the 50-kilometre radius local area. *Chelonia mydas* (Green Turtle) and *Natator depressus* (Flatback Turtle) are known from the local area and these species are more likely to occur in the open water and nest on sandy beaches. Flatback Turtle and the Green Turtle are known to breed in the islands surrounding the mainland such as Delambre, Rosemary and Legendre islands (DAWE, n.d). It is unlikely these species will occur over the application area.

The application area does not provide suitable habitat for the *Ctenotus angusticeps* (Airlie Island Ctenotus, Northwestern coastal Ctenotus), *Lerista neviniae* (Nevin's slider), *Lerista quadrivincula* (Four-lined slider) and the *Notoscincus butleri* (Lined soil-crevice Skink). The nearest record for each of these species are over 20 kilometres from the application area. The proposed clearing will not impact these species.

From the reptile species identified within the local area, the reptile most likely to occur over the application area is the *Liasis olivaceus barroni* (Pilbara Olive Python). It is likely that the Pilbara Python may be a transient visitor within the application area while foraging or dispersing. However, the application area does not have the core habitat for this species described as rocky areas with boulders (DAWE, n.d). Suitable core habitat for this species is available in the wider region therefore, it is unlikely the application area is significant habitat for this species. Given the mobile nature of the Pilbara Python, it is able to move into the adjacent native vegetation, if present during clearing activities.

Conclusion

Based on the above assessment, the proposed clearing is a small area of 0.01 hectares of clearing and the species likely to occur over the application area are highly mobile or avian species, which are able to move into adjacent native vegetation if present during the clearing activities. Therefore, the proposal is highly unlikely to have an adverse impact on fauna of conservation significance at a regional scale and at a local scale.

It is important that machinery operators involved in the clearing process are advised to be alert for fauna when clearing the native vegetation within the application area and to take steps to avoid impacts to fauna, where practical. Conducting the clearing in a slow progressive manner from one direction towards the adjacent vegetation will allow any fauna present to move into the adjacent native vegetation ahead of the clearing activity. Restricting the proposed clearing to daylight hours will further avoid potential injuries to fauna species.

Weeds have the potential to out-compete native flora and vegetation and reduce the biodiversity of an area. Potential impacts to biodiversity as a result of the introduction and spread of weeds may be minimised by the implementation of a weed management condition.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- Slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity will minimise impact to individuals.
- Restricting clearing activities to daylight.
- Taking steps to minimise the risk of the introduction and spread of weeds.

3.2.2. Land and water resources - Clearing Principles (f)

Assessment

The Application area is mapped within the mangrove coastal flat and comprise of the vegetation type AmRsCa which is identified as mangrove vegetation. There is a minor watercourse within the proposed clearing envelop and the proposed clearing will include removal of riparian vegetation associated with the watercourse.

Clearing of mangrove vegetation in general result in the following impacts (EPA, 2001).

- Reducing the geographic distribution, ecological function and productivity of mangroves in the region.
- Reducing the biodiversity of mangroves, habitats and dependent habitat.
- Causing a significant loss of individual mangroves and disturbance to habitat or life support systems and dependent habitats in areas along the Pilbara coastline.

To minimise and avoid the above impacts to mangrove vegetation as a result of clearing, the Environmental Protection Authority (EPA) have developed a guideline “*EPA Guidance statement No: 1 “Protection of Tropical Arid Zone Mangroves along the Pilbara coastline”*” (EPA, 2001). This document specifically addresses the protection of tropical arid zone mangroves, habitats and dependent habitats along the coastline from Cape Keraudren at the southern end of the Eighty Mile Beach to Exmouth Gulf (EPA, 2021). Four distinct guidelines are prepared to manage the Pilbara Coastline addressing the minimum requirements for environmental management.

The four types of management areas are:

- Guideline one: Regionally significant mangroves - Outside designated industrial areas and associated port areas.
- Guideline two: Other mangrove areas - Outside designated industrial areas and associated port areas.
- Guideline three: Regionally significant mangroves - Inside designated industrial areas and associated port areas.
- Guideline four: Other mangrove areas - Inside designated industrial areas and associated port areas.

Proposed clearing area is not located within a Mangrove Management Boundary and according to the EPA guidelines, the application area falls within the ‘Guideline four’ (see Appendix F). It is expected that proposals which falls within the guideline four management area are likely to be capable of being made environmentally acceptable. Impacts should be kept to a minimum practicable level (EPA, 2021).

“The EPA’s operational objective for Guideline four areas is that the impacts of development on mangrove habitat and ecological function of the mangroves in these areas should be reduced to the minimum practical level (EPA, 2001). Proposals within areas subject to Guideline four will not be subject to a presumption against finding the proposal environmentally acceptable provided that”:

- *“A high priority is placed on protecting tropical arid zone mangroves, habitat and dependent habitats”.*
- *“Any development being planned and designed to keep impacts on mangroves, habitats and dependent habitats to a minimum practical level.”*

Furthermore, EPA guideline in relation to mangrove clearing states that if the proposed clearing area is less than 0.1-hectares, mangrove replacing strategies are not expected to occur. However, if the applicant proposes to undertake replacement of mangroves, applicant is not discouraged to proceed with rehabilitation of the mangroves (EPA, 2021).

Based on the above information (application area being located within the Guideline four management area) and the small extent of the proposed clearing (0.01 hectares) along with the commitment from DBCA to revegetate the cleared area (DBCA, 2021), it is unlikely the proposed clearing will result in a significant residual impact to mangrove vegetation growing in association with the minor, non-perennial watercourse.

Conclusion

Given the ecological importance of mangrove vegetation and the clearance of riparian vegetation, the applicant is encouraged to rehabilitate the proposed clearing area. DBCA is further encouraged to avoid and minimise the clearing of riparian vegetation within the 0.12 hectare clearing envelope.

Condition

To address clearing of riparian mangrove habitat, and potential weed encroachment, the following management measures will be required as conditions on the permit:

- Revegetate the cleared area (areas cleared for geotechnical investigation) by returning vegetative material and topsoil removed.
- Implement weed management measures to mitigate impacts to adjacent vegetation.
- Avoid and minimise the need for clearing of riparian vegetation.

3.2.3. Land and water resources - Clearing Principles (g and i)

Assessment

The application area falls within the Granitic Land system and land degradation risk for water erosion and salinity over the Granitic Land system is known to be low (DPIRD, 2019). The current surface water hydrology will continue to be maintained. The proposed clearing is unlikely to increase the incidence of flooding or erosion along the minor watercourse due to the small extent of clearing area over the application envelope with adequate surrounding mangrove vegetation and the method of proposed clearing (cutting off the vegetation at the base of the trunk avoiding direct removal).

Groundwater salinity level (Total Dissolved Solids) is mapped as 1,000 to 3,000 milligrams per litre (that is, fresh to brackish) (DWER-026) and is unlikely to increase in the surrounding area of the application due to small scale of clearing in the local context.

There is a minor watercourse within the proposed clearing envelope. The application area falls within a proclaimed Pilbara Groundwater (DWER-034) and Surface water areas (DWER-037) and are subject to licencing requirements under the *Rights in Water and Irrigation Act 1917* (RiWI Act). DBCA will not be abstracting groundwater and does not require a groundwater licence. A bed and banks permit is not required as the proposed disturbance occurs within a tidal creek system and tidal areas are not considered to be proclaimed under the RiWI Act (DWER, 2022).

Advice received from the DWER Northwest Planning Region, in regard to the likelihood of impact of proposed clearing on Surface water and Groundwater includes the following (DWER, 2022).

- *“Disturbance to riparian vegetation should be avoided to maintain foreshore stability (where possible).*
- *Constructing any unavoidable creek crossings on relatively straight sections of the watercourse not on meander bends.*
- *Rehabilitating disturbed areas as soon as practical after the campaign where practicable.”*

Given the small-scale clearing on the straightest section of the watercourse and the applicant's commitment to rehabilitate the proposed clearing, DBCA is mostly compliant with the advice provided by the DWER Northwest Planning Advice team. A condition to avoid and minimise the need for clearing of riparian vegetation where practicable will be conditioned on the permit. DBCA is encouraged to implement appropriate standard environmental management methodologies in line with the DWER water quality protection notes and guidelines during the undertaking of the clearing (DWER, 2022).

Acid sulphate soils (ASS) risk mapping indicates the soils of the application area have a 'High to Moderate' risk of causing environmental damage, if those soils are disturbed. The High to Moderate risk rating suggests there is a high to moderate risk of ASS occurring within three metres of the natural soil surface and could be disturbed by earthworks and dewatering (DPIRD-011).

DBCA states that a total of seven tests for Field pH (pHF) and Field oxidised pH (pHFOX) were conducted to assess potential for Acid Sulfate and the results do not indicate a high potential for Acid Sulfate soil within the application area (Appendix F). Furthermore, the applicant will not be undertaking dewatering or drainage works and the total excavation is less than 100 cubic meters (DBCA, 2022b). The proposed clearing will not involve abstracting groundwater for the purpose of clearing and groundwater will not be intercepted. The risk of an increase in soil acidity

due to the clearing activity is considered low. However, the applicant is encouraged to refer to DWER's ASS guidelines for information to assist with the management of ground and/or groundwater disturbing works.

Conclusion

Given the above, the extent and nature of the proposed clearing and undertaking works in accordance with the DWER Guidelines and Water Quality Protection Notes, the proposed clearing is unlikely to impact on the water quality of water resources and cause an appreciable impact to land degradation.

Condition

To address the concern for foreshore stability, the following management measure will be required as a condition on the permit:

- Avoid, minimise, and reduce impacts and extent of clearing riparian vegetation as much as practicable.

3.3. Relevant planning instruments and other matters

The City of Karratha advised DWER that local government approvals are not required, and that the proposed clearing is consistent with the City's Local Planning Scheme. The City did not have any objections to the proposed clearing (City of Karratha, 2022).

The proposed application area occurs within the proclaimed Pilbara Groundwater and Surface water areas (DWER-034, DWER-037) and are subject to licencing requirements under the RiWI Act. DBCA is not obligated to apply for a 5C licence or a 26D licence as the proposed activities will not involve abstracting groundwater for construction or other purposes (DWER, 2022). Although the application area consists of a minor watercourse, DBCA is not required to apply for a bed and banks permit as the disturbance occurs within a tidal creek system and tidal areas are not considered to be proclaimed under the RiWI Act (DWER, 2022).

Applicant has advised that the Murujuga National Park Access Road bridge will enable visitor access into Murujuga National Park and enable the Murujuga Aboriginal Corporations Tourism Precinct. The full project elements of Murujuga National Park access bridge will be referred to the EPA in early 2022. The proposed geotechnical investigation works are associated with informing a detailed design of a bridge that will form part of the Murujuga National Park Access Road (DBCA, 2021).

No registered Aboriginal sites of significance have been mapped within the application area (DPLH-001). It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

End

Appendix A. Additional information provided by applicant

Information	Description
<p>Detailed Flora and Vegetation assessment was prepared by RPS Australia West Pty Ltd on behalf of Murujuga Aboriginal Corporation (RPS, 2020).</p>	<p>The survey area envelope was 119.15 hectares. The objectives of the survey were to:</p> <ul style="list-style-type: none"> • Identify the flora and vegetation within the survey area. • Identify the presence and extent of conservation significant flora and ecological communities. • Describe the flora and vegetation values present within the survey area. • Include maps of location and extent of conservation significant flora and vegetation. <p>The survey was conducted over two phases. One was during the dry season and the other was during the post-wet season.</p> <p>Excerpts from the survey which are relevant to the application area are included within Appendix F.</p>
<p>The occurrence of Acid Sulfate Soil in application area (DBCA, 2022b).</p>	<p>Details regarding the potential of Acid Sulfate Soils on the soft surficial soils within and surrounding the application area was submitted to DWER. High potential for Acid Sulfate soil was not identified within the application area.</p>
<p>Consideration of alternative locations for the application area which includes implementation of avoidance and minimisation strategies by DBCA (DBCA, 2022a).</p>	<p>Following the two public submissions received in relation to clearing within mangrove vegetation and the lack of details provided to DWER within their original application around exploring alternative locations for the access road, DBCA was invited to provide comments regarding this matter. DBCA prepared a detail response to DWER addressing the reason for selecting the proposed application area. Their response is included in Section 3.1 of this report.</p>

Appendix B. Details of public submissions

Submission 1: Summary of comments	Consideration of comment
<p>The proposed development route cuts directly through mangroves and avoidance and mitigation measures are not adequately addressed for the application. The current access track located to the east of the mangroves could provide a more ecologically sensitive, practical, and cost-effective option (Submission, 2022a).</p>	<p>The concern was raised with the applicant (DBCA) and the following response was received.</p> <p><i>"It's important to note that whilst there is a pre-existing track, to formalise this into a road that meets the required standards would require significant development of the surrounding landscape. A large volume of fill and batter would be required on the road edge that heavily impacts the Mangal area. To pursue the option to build on the current track would result in a further 1,250m² of disturbance to Mangal habitat and impact on 1000m² of Samphire/mudflat areas that can otherwise be entirely avoided."</i> (DBCA, 2022a).</p> <p>An illustration of the two road alignments is included in Appendix F.</p>
<p>The proposal is not consistent with EPA Advice: <i>Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline (2001)</i>. The location of the proposal is contained within Area 13 represented on Figure six of the EPA Advice and is listed under Final Guidance number one "Mangroves outside designated industrial and associated port areas" as 'Mangrove areas of very high conservation value' (Submission, 2022a).</p>	<p>The application area does not fall within Area 13 represented on Figure six of the '<i>Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline (2001)</i>' guideline.</p> <p>The area covered by the proposed application area falls within Guideline four. The objective of the guideline four areas is that the "impacts of development on mangrove habitat and ecological function of the mangroves in these areas should be reduced to the minimum practical level" (EPA, 2001).</p>
Submission 2: Summary of comments	Consideration of comment
<p>Consideration of better avoidance and minimisation measures should be applied. Alternative locations to undertake the proposed work are recommended to be investigated (Submission, 2022b).</p>	<p>An alternative route which closely align with the recommended alignment of Public Submission two was considered in 2017. However, with four years of investigation, this option was deemed unsuitable for the reasons listed on Section 3.1 of the decision report.</p> <p>To pursue with the 2017 alignment would result in a further 0.12 hectares of disturbance to Mangal habitat and impact on 0.1 hectares of Samphire/mudflat areas that can otherwise be entirely avoided (DBCA, 2022a).</p>
<p>Concern regarding what basis did DBCA arrive at the current proposed location for mangrove clearing (Submission, 2022b).</p>	<p>Addressed in Section 3.1 of the decision report. Applicant has stated that <i>"the planning team is confident that the proposed alignment presents the least impact on all environmental and heritage elements and still delivers the project aims"</i>.</p>
<p>The detailed plans for Murujuga Aboriginal Corporations (MAC) Tourism Precinct have not been published or made available for public consultation either through EPA or DWER (Submission, 2022b).</p>	<p>Although at a later date, this project will form part of the MAC Tourism Precinct, Clearing Permit Application (CPS 9535/1) is a stand-alone project to undertake geotechnical investigations to inform a detailed design of an access bridge.</p>

Appendix C. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to DWER at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D.

C.1. Site characteristics

Characteristic	Details
Local context	<p>The area proposed to be cleared is part of a 0.12 hectare footprint of native vegetation in the extensive land use zone of Western Australia.</p> <p>The application area is located within the Pilbra IBRA Bioregion, (PIL) of Thackway and Cresswell (1995) and the Roebourne Sub-region (PIL04) within City of Karratha. The application area is located directly east of Withnell Bay.</p> <p>Aerial imagery indicates the local area (50-kilometre radius from the centre of the area proposed to be cleared) retains over 90 per cent of the original native vegetation cover.</p>
Ecological linkage	No formal ecological linkages are mapped or considered to exist within the application area.
Conservation areas	The Application area is not within a conservation covenant, regional park or DBCA areas of interest (DBCA-102, DBCA-026). The closest conservation area is the Murujuga National Park located approximately 280 metres to the east of the application area and is on DBCA legislated Lands.
Vegetation description	<p>Vegetation survey (RPS, 2020) indicates the vegetation within the proposed clearing area consists of the vegetation unit AmRsCa which is described as <i>Avicennia marina</i> subsp. <i>marina</i> low closed forest with <i>Ceriops australis</i> (landward) and <i>Rhizophora stylosa</i> and <i>Bruguiera exaristata</i> (seaward).</p> <p>The full survey descriptions and maps are available in Appendix F.</p> <p>The mapped vegetation type within a broader scale:</p> <ul style="list-style-type: none"> Beard vegetation association 117, which is described as Hummock grassland <i>Triodia</i> species (Shepherd et al., 2001). <p>The mapped vegetation type retains approximately 94 per cent of the original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>Vegetation survey (RPS, 2020) indicate the vegetation within the proposed clearing area is in an Excellent (Trudgen, 1997) condition.</p> <p>The full Trudgen (1991) condition rating scale is provided in Appendix E. The survey descriptions and representative mapping are available in Appendix F.</p>
Climate and landform	<p>The application area is located in the semi-desert tropical Pilbara region. The climate is described as almost bi-seasonal, with short, hot, wet summers from December to March. Long, dry winters from May to November and transitional periods in between. Significant rainfall events are associated with summer thunderstorms or tropical cyclones from November to April. Average annual evaporation ranges from 3,200 millimetres to 3,600 millimetres (RPS, 2020).</p> <p>Landform mapped in this area is noted as erosional surfaces; hill tracts and domes on granitic rocks with rough crests, associated rocky hill slopes, restricted lower stony plains; narrow, widely spaced tributary drainage floors and channels (DPIRD, 2019).</p>
Soil description	Application area is located on the Burrup which is mapped as the Granitic system (286Gr) described as rugged, granitic hills supporting shrubby hard and soft spinifex grasslands (DPIRD, 2019).

Characteristic	Details
	The survey area is characterised by fine to medium-grained granophyre and is underlain by gabbro (RPS, 2020).
Land degradation risk	<p>Surface water erosion is dependent upon weather, in response to large cyclonic or rainfall events. The Granitic land system is not susceptible to erosion (DPIRD, 2019).</p> <p>A review of the Acid Sulfate Soil (ASS) risk mapping indicates that the application area falls within a 'High to Moderate' risk of containing ASS.</p>
Waterbodies	<p>The applications area falls within the Coastal hydrographic catchment and the Port Hedlands Coast basin.</p> <p>The desktop assessment and aerial imagery indicate that one natural, minor non-perennial watercourse intercepts horizontally across the proposed application area.</p> <p>No internationally (Ramsar) or nationally important wetlands are located within a 50-kilometre radius of the application area.</p>
Hydrogeography	<p>The area proposed to be cleared is within the proclaimed Pilbara Groundwater and Surface water areas under the RiWI Act (DWER-034, DWER-037).</p> <p>The application area does not occur within a Public Drinking Water Source Areas (DWER-034) or an area subject to the <i>Country Areas Water Supply Act 1947</i>.</p> <p>Groundwater salinity level (Total Dissolved Solids) is mapped as 1,000-3,000 milligrams per litre (Fresh to Brackish) (DWER-026).</p>
Flora	<p>Seventeen conservation significant flora species were recorded within the 50-kilometre radius local area. Nearest record is a priority four <i>Rhynchosia bungarensis</i>, mapped 0.65 kilometres from the application area. The local area did not identify any threatened flora species. The flora analysis table C.3 below provides an analysis of the flora species identified within the local area during the desktop assessment.</p> <p>No conservation significant flora taxa have been recorded within the application area during a broader scale targeted flora survey (RPS, 2020).</p>
Ecological communities	No Threatened or Priority Ecological Communities were recorded within the application area. The closest conservation significant ecological community is the Priority one Burrup Peninsula rock pool communities located approximately 2.5 kilometres, northeast of the application area.
Fauna	<p>Fifty-seven conservation significant fauna species in total were recorded within a 50-kilometre radius of the application area, including 15 Threatened species, 32 species protected under international agreements, two other specially protected species and eight Priority species. The conservation significant fauna species include 40 birds, ten mammals (three marine and seven terrestrial) and seven reptiles (two marine and five terrestrial). No records of conservation significant fauna species were identified during the survey (RPS, 2020).</p> <p>The closest record is the endangered Northern quoll (<i>Dasyurus hallucatus</i>) identified 0.19 kilometres from the application area. The fauna table C.4. below provides an analysis of the fauna species identified within the local area.</p>

C.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
IBRA bioregion*					
Pilbara	17,808,657.04	17,731,764.88	99.57	1,801,714.98	10.12
Vegetation complex					
Beard vegetation association 117 *	82,705.78	78,096.64	94.43	17,600.29	21.28

*Government of Western Australia (2019)

C.3. Flora analysis table

Seventeen Priority taxa and no threatened taxa were recorded within the 50-kilometre local area. The survey conducted by RPS group identified five Priority flora species as listed on the table below. The Priority three species (*Gymnanthera cunninghamii*) was recorded during the survey but was not recorded on the broad scale mapping. No Threatened flora listed under the BC Act or the EPBC Act were recorded within the survey area. None of the priority flora identified during the survey falls within the application area (RPS, 2020).

Species name	Conservation status	Distance of closest record to application area (km)	Number of known records (total)	Did the survey identify the presence of the species within application area? Y/N	Did the survey identify the presence of the species within the survey area? Y/N
<i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095)	P3	38.04	1	N	N
<i>Atriplex lindleyi</i> subsp. <i>conduplicata</i>	P3	40.16	1	N	N
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	19.81	3	N	N
<i>Eragrostis surreyana</i>	P3	2.57	3	N	Y
<i>Glycine falcata</i>	P3	49.22	1	N	N
<i>Gomphrena axillaris</i>	P1	22.40	1	N	N
<i>Gomphrena cucullata</i>	P3	35.78	2	N	N
<i>Gomphrena leptophylla</i>	P3	39.20	1	N	N
<i>Goodenia pallida</i>	P1	42.51	1	N	N
<i>Rhynchosia bungarensis</i>	P4	0.65	29	N	Y
<i>Solanum albotellatum</i>	P3	49.22	1	N	N
<i>Stackhousia clementii</i>	P3	5.13	4	N	N
<i>Tephrosia rosea</i> var. Port Hedland (A.S. George 1114)	P1	31.75	9	N	N
<i>Terminalia supranitifolia</i>	P3	4.42	34	N	Y
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	17.81	2	N	N
<i>Trianthema</i> sp. Python Pool (G.R. Guerin & M.E. Trudgen GG 1023)	P2	41.43	1	N	N
<i>Vigna triodiophila</i>	P3	1.04	11	N	Y

C.4. Fauna analysis table

With consideration for the site characteristics set out above and relevant datasets (see Appendix G.1), and biological survey information, impacts to the following conservation significant fauna required further consideration.

Scientific name	Common name	Conservation status	Category	Mangrove habitat suitable (Y/N)	Distance of closest record to application area (km)	Number of known records (total)	Year of most recent record
BIRDS							
<i>Actitis hypoleucos</i>	Common Sandpiper	MI	shorebird	N	4.78	48	2016
<i>Apus pacificus</i>	Fork-tailed Swift, Pacific Swift	MI	swift	N	19.02	4	2011
<i>Arenaria interpres</i>	Ruddy turnstone	MI	shorebird	N	6.75	29	2014
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	MI	shorebird	N	17.41	27	2015
<i>Calidris alba</i>	sanderling	MI	shorebird	N	17.53	5	2014
<i>Calidris canutus</i>	Red knot	EN	shorebird	N	17.53	7	2013
<i>Calidris ferruginea</i>	curlew sandpiper	CR	shorebird	N	14.13	11	2014
<i>Calidris ruficollis</i>	Red-necked stint	MI	Shorebird	N	6.75	15	2014
<i>Calidris subminuta</i>	Long-toed Stint	MI	Shorebird	N	17.53	10	2014
<i>Calidris tenuirostris</i>	Great knot	CR	Tern	N	17.53	6	2013
<i>Charadrius leschenaultii</i>	Greater sand plover, large sand plover	VU	Shorebird	N	2.26	18	2014
<i>Charadrius mongolus</i>	Lesser Sand Plover	EN	Shorebird	N	17.53	4	2014
<i>Charadrius veredus</i>	oriental plover	MI	Shorebird	N	17.53	2	2012
<i>Chlidonias leucopterus</i>	White-winged black tern, white-winged tern	MI	Shorebird	N	17.53	5	2013
<i>Cuculus optatus</i>	Oriental cuckoo	MI	Shorebird	Y	43.40	1	1977
<i>Falco peregrinus</i>	peregrine falcon	OS	Raptor	N	2.10	8	2011
<i>Fregata ariel</i>	Lesser frigatebird	MI	Frigatebird	Y	23.15	1	1979
<i>Gallinago stenura</i>	Pin-tailed snipe	MI	Wetlands	N	39.34	2	1979
<i>Gelochelidon nilotica</i>	Gull-billed tern	MI	Tern	Y	4.78	12	2011
<i>Glareola maldivarum</i>	Oriental pratincole	MI	Grassland	N	18.54	11	2016
<i>Hydroprogne caspia</i>	Caspian Tern	MI	Tern	Y	6.06	39	2015
<i>Limicola falcinellus</i>	Broad-billed sandpiper	MI	shorebird	N	17.53	3	2014
<i>Limosa lapponica</i>	Bar-tailed godwit	MI	Shorebird	N	5.65	24	2014
<i>Limosa limosa</i>	Black-tailed godwit	MI	Shorebird	N	28.86	1	2011
<i>Numenius madagascariensis</i>	Eastern curlew	CR	Shorebird	N	17.35	20	2015
<i>Numenius minutus</i>	Little curlew, little whimbrel	MI	Shorebird	N	15.28	10	2015
<i>Numenius phaeopus</i>	Whimbrel	MI	Shorebird	N	0.25	34	2015
<i>Oceanites oceanicus</i>	Wilson's storm-petrel	MI	petrel/skua/albatross	N	19.18	2	0
<i>Pandion cristatus</i>	Osprey, eastern osprey	MI	raptor	Y	0.25	67	2016
<i>Plegadis falcinellus</i>	Glossy ibis	MI	Wetlands	Y	17.53	3	2013
<i>Pluvialis fulva</i>	Pacific golden plover	MI	Shorebird	Y	13.67	5	2013
<i>Pluvialis squatarola</i>	Grey plover	MI	Shorebird	N	17.53	10	2014
<i>Sterna hirundo</i>	Common tern	MI	Tern	Y	39.02	2	2011
<i>Sternula albifrons</i>	Little tern	MI	Tern	Y	17.53	4	2014
<i>Thalasseus bergii</i>	Crested tern	MI	Tern	Y	1.36	31	2017
<i>Tringa brevipes</i>	Grey-tailed tattler	P4	Shorebird	N	0.25	32	2014
<i>Tringa glareola</i>	Wood sandpiper	MI	Shorebird	N	17.53	30	2016

Scientific name	Common name	Conservation status	Category	Mangrove habitat suitable (Y/N)	Distance of closest record to application area (km)	Number of known records (total)	Year of most recent record
<i>Tringa nebularia</i>	Common greenshank, greenshank	MI	Shorebird	N	2.69	36	2016
<i>Tringa stagnatilis</i>	Marsh sandpiper, little greenshank	MI	Shorebird	N	17.53	26	2015
<i>Xenus cinereus</i>	Terek sandpiper	MI	Shorebird	N	18.02	2	2011
MAMMAL							
<i>Dasyurus hallucatus</i>	Northern quoll	EN	Terrestrial	N	0.19	82	2018
<i>Dugong dugon</i>	Dugong	OS	Marine	N	37.11	3	2000
<i>Hydromys chrysogaster</i>	Water-rat, rakali	P4	Marine	Y	4.98	1	1997
<i>Lagostrophus fasciatus fasciatus</i>	banded hare-wallaby, mernine	VU	Terrestrial	N	41.89	1	1909
<i>Leggadina lakedownensis</i>	Northern short-tailed mouse, Lakeland Downs mouse, kerakenga	P4	Terrestrial	N	23.32	16	2011
<i>Macroderma gigas</i>	Ghost bat	VU	Terrestrial	N	2.10	9	2018
<i>Megaptera novaeangliae</i>	humpback whale	CD	Marine	N	0.73	1	1999
<i>Mormopterus cobourgianus</i>	north-western free-tailed bat	P1	Terrestrial	Y	2.10	8	2009
<i>Pseudomys chapmani</i>	Western pebble-mound mouse, ngadji	P4	Terrestrial	N	4.98	9	2015
<i>Rhinonictis aurantia</i> (Pilbara)	Pilbara leaf-nosed bat	VU	Terrestrial	N	37.11	2	1985
REPTILE							
<i>Chelonia mydas</i>	Green turtle	VU	Marine	N	1.33	7	2011
<i>Ctenopus angusticeps</i>	Airlie Island Ctenopus, Northwestern coastal Ctenopus	P3	Terrestrial	N	22.22	6	2012
<i>Lerista neviniae</i>	Nevin's slider	EN	Terrestrial	N	26.13	74	2018
<i>Lerista quadrivincula</i>	Four-lined slider (Karratha)	P1	Terrestrial	N	49.07	3	1980
<i>Liasis olivaceus barroni</i>	Pilbara olive python	VU	Terrestrial	Y	1.33	21	2019
<i>Natator depressus</i>	flatback turtle	VU	Marine	N	1.33	13	2010
<i>Notoscincus butleri</i>	Lined soil-crevice skink (Dampier)	P4	Terrestrial	N	21.36	51	2015

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority. OS: Other Specially Protected

Appendix D. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared contains mangrove vegetation which is considered as ecologically important vegetation. It is likely the application area may be utilised by 12 species listed as conservation significant. However, noting the size, context of the proposed clearing and the abundance of adjacent vegetation, it is unlikely fauna species or the mangrove habitat will be significantly impacted.</p>	May be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (b):</u> <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.”</i></p> <p><u>Assessment:</u></p> <p>A likelihood of occurrence assessment was conducted and determined that three conservation significant fauna species were likely to occur over the application area. Eight migratory bird species and one Other specially protected bird species were also considered likely to utilise the application area during migration. Given the scale and the available native vegetation surrounding the application area, it is unlikely the proposed clearing will result in a significant residual impact to conservation significant fauna.</p>	May be at variance	Yes <i>Refer to Section 3.2.1 above.</i>
<p><u>Principle (c):</u> <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p><u>Assessment:</u></p> <p>No threatened flora has been identified within 50-kilometre radius of the application area. The flora and vegetation survey did not identify any Threatened flora over the survey area nor over the application area, and Threatened flora species are not likely to occur (RPS, 2020).</p>	Not at variance	No
<p><u>Principle (d):</u> <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.”</i></p> <p><u>Assessment:</u></p> <p>No Threatened Ecological Communities (TEC) have been mapped within 50-kilometres of the application area. The area proposed to be cleared does not contain species that can indicate a TEC.</p>	Not at variance	No
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u> The extent of the mapped vegetation type and native vegetation in the local area is consistent with the national objectives and targets for biodiversity conservation in Australia which has a target to prevent the clearance of ecological communities with an extent below 30 per cent of that present prior to year 1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). Greater than 90 percent remnant native vegetation is recorded within the local</p>	Not at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
area and the region including the mapped vegetation type. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.		
<p><u>Principle (h):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.”</i></p> <p><u>Assessment:</u></p> <p>The application area does not intersect with any DBCA managed lands. The Murujuga National Park is located approximately 250 metres to the east of application area. Given the scale of proposed clearing and the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of adjacent or nearby formal conservation areas.</p>	Not at variance	No
Environmental value: land and water resources		
<p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>A non-perennial, minor river is mapped intersecting across the proposed application area and the proposed clearing is likely to intersect native vegetation growing in, or in association with, an environment associated with a watercourse.</p>	At variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils are not known to be highly susceptible to erosion and salinity over the application area (DPIRD, 2019). Overall, the proposed vegetation will be cleared by a chainsaw and be cut off at the base of the trunk to clear to enable for the investigations. Noting the size of the application area and the method of clearing, the proposed clearing area is not likely to have an appreciable impact on land degradation.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.3, above.</i>
<p><u>Principle (i):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.”</i></p> <p><u>Assessment:</u></p> <p>The application area is located within the Pilbara Surface Water Area proclaimed under the RiWI Act, and the Pilbara Groundwater Area proclaimed under the RiWI Act (DWER-037, DWER-034).</p> <p>Given the mapped watercourse intersecting the small proposed application area is minor and non-perennial, the removal of vegetation within the watercourse for the purpose of geotechnical investigations is unlikely to cause deterioration in the quality of surface or underground water.</p> <p>Acid sulfate soils (ASS) risk mapping indicated that the soils of the application area have a high to moderate risk of causing environmental damage if those soils are disturbed.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.3, above.</i>
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p>	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
<p>The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding.</p> <p>Given the small extent of the clearing area and the application area not being located within an area subject to flooding and inundation, the proposed clearing is unlikely to cause, or exacerbate, the incidence of or intensity of flooding.</p>		

Appendix E. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation's ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

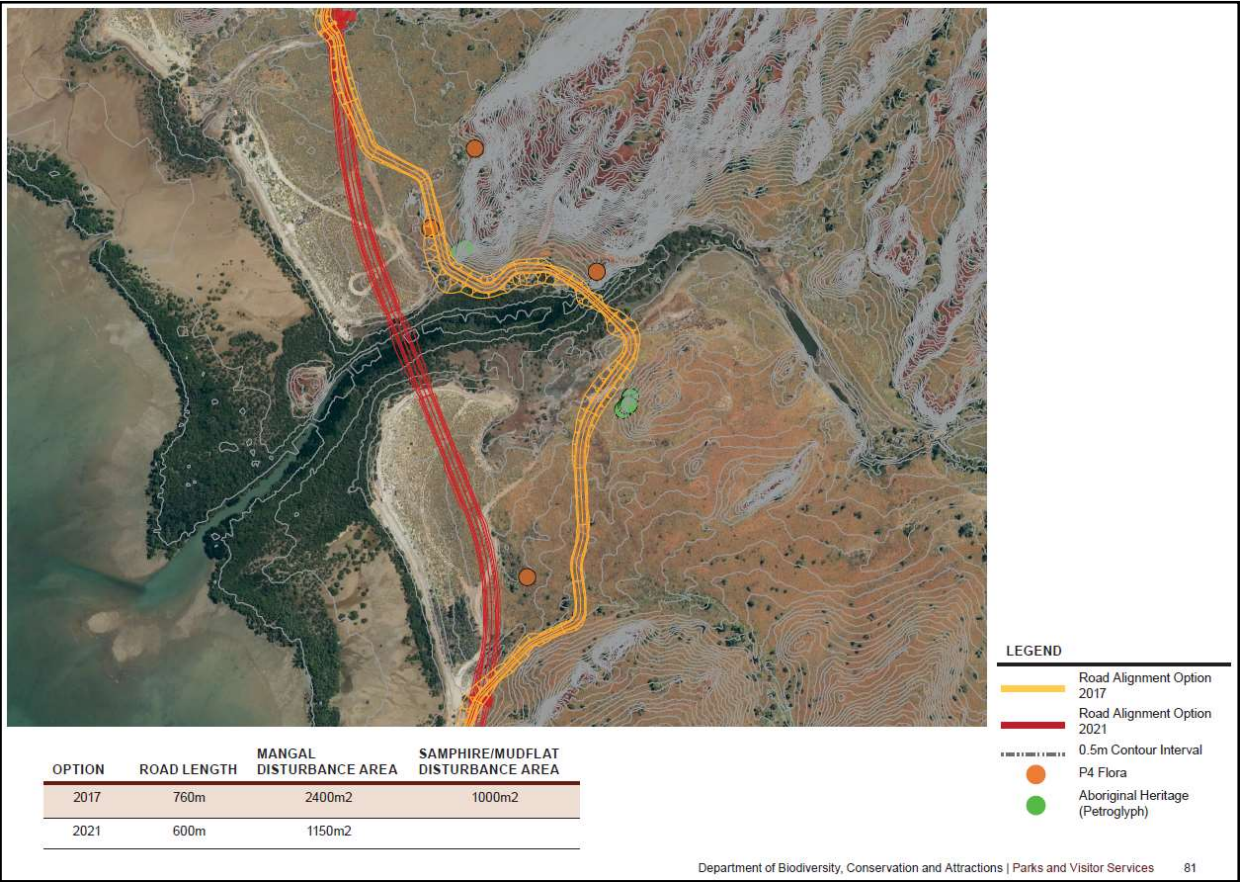
Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from "Trudgen, M.E. (1991) *Vegetation condition scale* in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth".

Measuring vegetation condition for the Eremaean and Northern Botanical Provinces (Trudgen, 1991)

Condition	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix F. Biological survey information excerpts and additional information (DBCA 2022a; RPS, 2020)

Alignment Options considered by DBCA



Results of Acid Sulfate Soil

Excerpts from Flora and Vegetation Assessment (RPS, 2020)



Plate 25: AmRsCa vegetation unit

ThTt - *Tecticornia halocnemoides* subsp. *tenuis* and *Trianthema turgidifolia* low shrubland (with *Tecticornia indica* subsp. *leiostachya*, *Frankenia pauciflora* and *Surreya diandra*) over *Sporobolus virginicus* low sparse tussock grassland to isolated tussock grasses

This unit (Plate 24) occurred on the supratidal creeklines draining into, and the flats fringing the mangal. Vegetation condition was Excellent.

Associated species include: *Dactyloctenium radulans*, *Dysphania kalpari*, *Dysphania plantaginella*, *Eragrostis falcata*, *Frankenia pauciflora*, *Muellerolimon salicorniaceum*, *Neobassia astrocarpa*, *Sporobolus virginicus*, *Surreya diandra*, *Swainsona pterostylis*, *Tecticornia halocnemoides*, *Tecticornia indica* subsp. *leiostachya* and *Trianthema turgidifolia*.

No conservation significant flora species or weed species were recorded in this unit



Figure B
Regional land uses and context

Job Number: L18113 (01)
Doc Number: 002
Date: 20/03/22
Scale: NTS @ A3
Created By: JLS
Source: RPS Group, 2018





Figure H-2

Conservation significant flora recorded for the survey



Job Number: L18118-001
Doc Number: 008
Date: 20.07.20
Scale: 1:5,000 @ A3
Created by: M.A.
Source: Orthophoto - Landgate, 2020





Figure J-2

RPS vegetation unit mapping

documents\2017\04\0001\18118-001\Murujuga\documents\04\0001\18118-001_04_010_FigJ-4 RPS-vegetation units_200120.mxd



LEGEND

- Murujuga Tourism Project flora survey area
- Vegetation condition**
- Excellent
- Degraded
- Completely Degraded

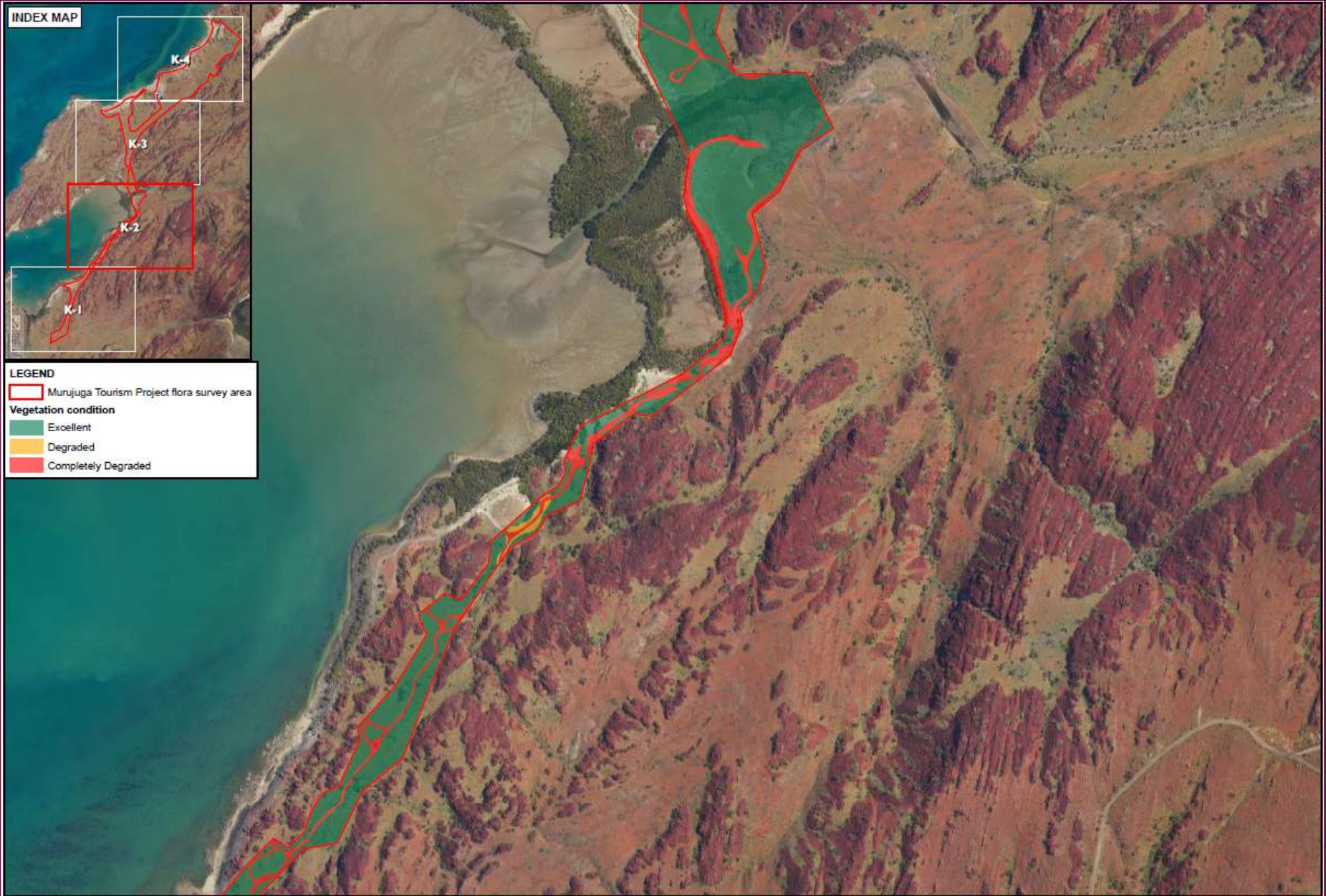


Figure K-2
RPS vegetation condition mapping



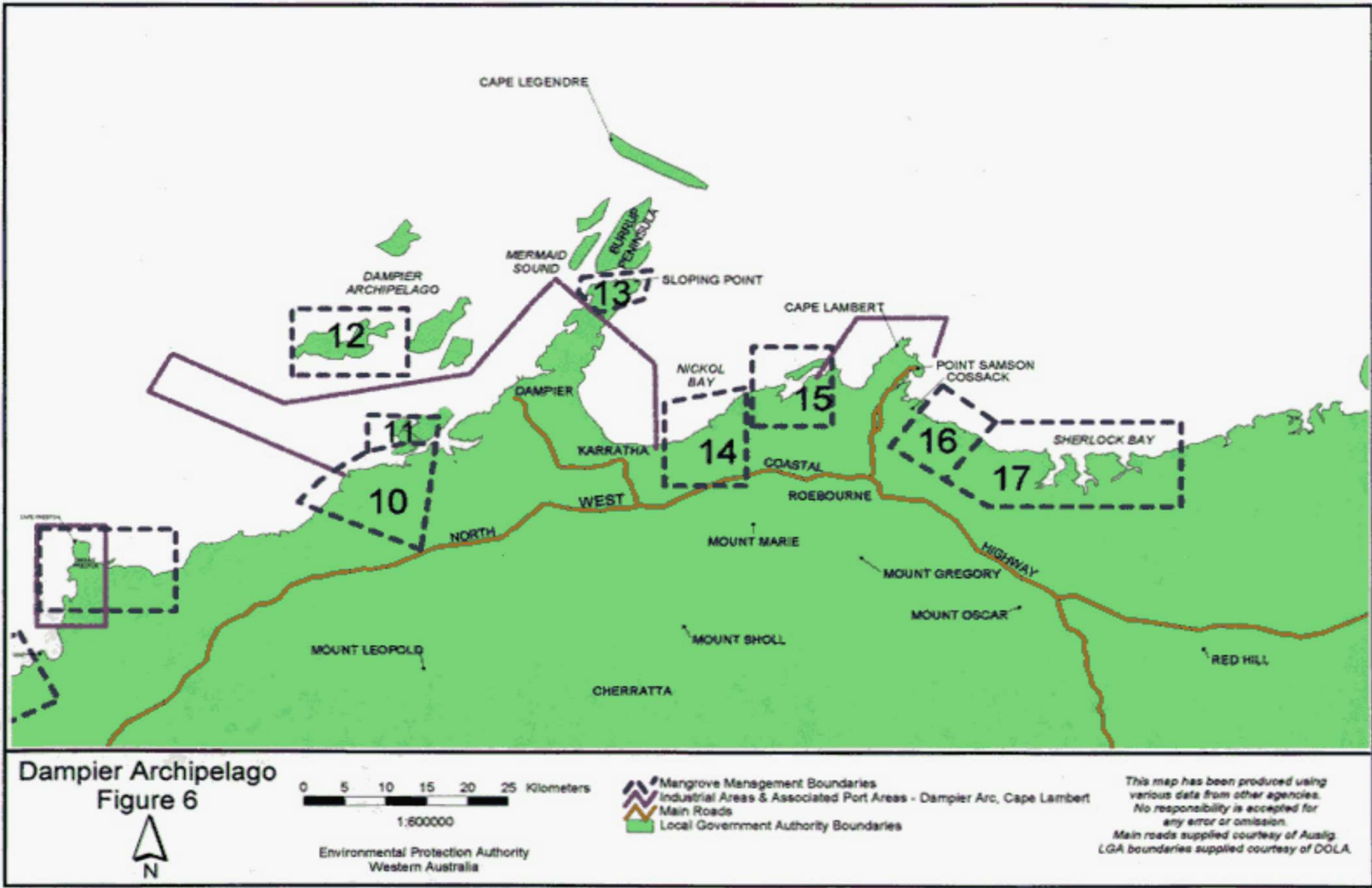
Job Number: L19119-201
Doc Number: 011
Date: 20.07.20
Scale: 1:5,000 @ A3
Created by: MA
Source: Orthophoto - Landgate, 2020
rps



Figure L-2

Conservation significant ecological communities recorded for the survey

Document Path: G:\Work\Jobs\18118 - Murujuga Technical Studies\Figures L18118-001\L18118-001_G_012_Fig.L-4 Significant eco communities survey_200120.mxd



Appendix G. Sources of information

G.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

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