



## CLEARING PERMIT

*Granted under section 51E of the Environmental Protection Act 1986*

<b>Purpose Permit number:</b>	CPS 9103/1
<b>Permit Holder:</b>	Minderoo Foundation Pty Ltd
<b>Duration of Permit:</b>	From 19 February 2021 to 19 February 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 an access track, pipeline easement, bore extraction pads and associated construction activities, associated with the Ningaloo Marine Research Centre.

#### **2. Land on which clearing is to be done**

Lot 300 on Deposited Plan 408720, Exmouth  
Lot 303 on Deposited Plan 408720, Exmouth  
Lot 1020 on Deposited Plan 216750, Exmouth  
Lot 1403 on Deposited Plan 192085, Exmouth  
Lot 1404 on Deposited Plan 192085, Exmouth

#### **3. Clearing authorised**

The permit holder must not clear more than 1.48 hectares of native vegetation within the area cross-hatched yellow in Figure 1 of Schedule 1.

#### **4. Period during which clearing is authorised**

The permit holder must not clear any native vegetation after 19 February 2026.

## **PART II – MANAGEMENT CONDITIONS**

### **5. 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.

### **6. 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.

### **7. Revegetation and rehabilitation – retention of vegetative material and topsoil**

The permit holder must:

- (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) within 3 months following clearing authorised under this permit, revegetate and rehabilitate the areas that are no longer required for the purpose for which they were cleared under this Permit by:
  - (i) re-shaping the surface of the land so that it is consistent with the surrounding five metres of uncleared land;
  - (ii) ripping the ground on the contour to remove soil compaction;
  - (iii) laying the vegetative material and topsoil retained under condition 7(a) on the cleared area; 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 surrounding five metres of uncleared land.

## **PART III - RECORD KEEPING AND REPORTING**

### **8. 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"> <li>(a) the species composition, structure, and density of the cleared area;</li> <li>(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;</li> <li>(c) the date that the area was cleared;</li> <li>(d) the size of the area cleared (in hectares);</li> <li>(e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 5;</li> <li>(f) actions taken to minimise the risk of the introduction and spread of weeds in accordance with condition 6;</li> </ul>
2.	In relation to revegetation and rehabilitation pursuant to condition 7.	<ul style="list-style-type: none"> <li>(a) the size of the area revegetated and rehabilitated;</li> <li>(b) the date(s) on which the area revegetation and rehabilitation was undertaken;</li> <li>(c) the boundaries of the area revegetated and rehabilitated (recorded digitally as a shapefile);</li> <li>(d) the species composition, structure, and density of the area revegetated and rehabilitated; and</li> <li>(e) weed control activities undertaken within the area revegetated and rehabilitated.</li> </ul>

## 9. Reporting

The permit holder must provide to the *CEO* the records required under condition 8 of this permit when requested by the *CEO*.

## DEFINITIONS

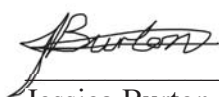
In this permit, the terms in Table have the meanings defined.

**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.
fill	means material used to increase the ground level, or to fill a depression.
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 / rehabilitated / rehabilitation	means actively managing an area containing native vegetation in order to improve the ecological function of that area.
revegetate / vegetated / revegetation	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.

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## END OF CONDITIONS



Jessica Burton  
A/MANAGER  
NATIVE VEGETATION REGULATION

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

27 January 2021

# 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

<b>Permit number:</b>	CPS 9103/1
<b>Permit type:</b>	Purpose permit
<b>Applicant name:</b>	Minderoo Foundation Pty Ltd
<b>Application received:</b>	10 November 2020
<b>Application area:</b>	1.48 hectares of native vegetation
<b>Purpose of clearing:</b>	Constructing an access track, pipeline easement and bore extraction pads associated with the Ningaloo Marine Research Centre
<b>Method of clearing:</b>	Mechanical
<b>Property:</b>	Lot 300 on Deposited Plan 408720 Lot 303 on Deposited Plan 408720 Lot 1020 on Deposited Plan 216750 Lot 1403 on Deposited Plan 192085 Lot 1404 on Deposited Plan 192085
<b>Location (LGA area/s):</b>	Shire of Exmouth
<b>Localities (suburb/s):</b>	Exmouth

### 1.2. Description of clearing activities

The vegetation proposed to be cleared is contained within a single contiguous clearing footprint of 1.74 hectares, consisting of a 10 metre wide, approximately 1.64 kilometre corridor (see Figure 1, Section 1.5). A total of 5.5 metres of this corridor is proposed to be cleared for the pipeline easement and an associated access track. The remaining 4.5 metres is an additional area to allow construction works within the easement, which will be rehabilitated following bore development and pipeline construction (MBS Environmental, 2020). Along the eastern portion of this corridor are three 25 metre by 25 metre areas in which two abstraction bore pads and an infiltration area will be constructed (MBS Environmental, 2020).

### 1.3. Decision on application

<b>Decision:</b>	Granted
<b>Decision date:</b>	27 January 2021
<b>Decision area:</b>	1.48 hectares of native vegetation within a 1.74 hectare 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 21 days and no submissions were received.

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In making this decision, the Delegated Officer had regard for the site characteristics (see 0Appendix A), relevant datasets (see Appendix E) and the findings of flora surveys (see Appendix D), the clearing principles set out in Schedule 5 of the EP Act (see 0), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3).

The assessment identified that the proposed clearing:

- may impact potential habitat for the Ningaloo worm lizard and Splendid blind snake (North West Cape), however these impacts are not likely to be significant;
- is not likely to impact values of the Cape Range Sub-terranean Waterways wetland system, including subterranean threatened and priority fauna species associated with this wetland;
- may impact priority flora species potentially present within the application area, however these impacts are not likely to be significant.

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 lead to significant impacts on flora, fauna or wetlands. The applicant has suitably demonstrated avoidance and minimisation measures.

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

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds; and
- retain topsoil and vegetative material from cleared areas, and re-lay this material on temporarily cleared areas following the completion of the clearing activities to minimise the impacts on clearing on flora.

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### 1.5. Site map



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Figure 1. Map of the application area. The area crosshatched yellow indicates the area authorised to be cleared under the granted clearing permit.



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## 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)

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)

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## 3 Detailed assessment of application

### 3.1. Avoidance and mitigation measures

The applicant advised they had applied the following avoidance and mitigation measures when proposing the application area:

- The pipeline easement was modified during the planning stage to result in a 1.15 ha reduction in the area proposed to be cleared;
- The pipeline easement was located within existing cleared areas where possible (e.g. tracks and previously developed areas) or alongside existing roads;
- Bore pad locations were chosen within areas of sparse vegetation, where possible, and working with the contractor to minimise the width of the construction corridor;
- A 4.5 metre width of the construction corridor, proposed to be cleared to allow construction works within the pipeline easement, will be rehabilitated following bore development and pipeline construction (MBS Environmental, 2020). A condition will be placed on the permit to require this is undertaken (refer to Section 3.2.2).

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 A) 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 on biological values (fauna and flora) and water resources required further consideration. 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 (fauna) - Clearing Principles (b)

**Assessment:** Given the mapped soil and vegetation types, the application area may provide suitable habitat for one priority listed terrestrial fauna species: *Aprasia rostrata* (Ningaloo worm lizard), which occupies sandy habitats such as white sand dunes on the coast and red *Triodia*-covered sand dunes inland (Maryan et al, 2013). Furthermore, although the priority listed *Anilius splendidus* (Splendid blind snake (North West Cape)) is only known from two records and little is known about its habitat preferences, given that it was found in an area with a similar vegetation

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type to the application area, it is considered possible that the application area may also provide suitable habitat for this species.

Although these two species have relatively small known ranges, given the extent of similar vegetation within the local area, these species are unlikely to be solely dependent on habitats within the survey area. Furthermore, given the extent and the linear nature of the clearing, it is considered that the proposed clearing would be unlikely to have significant impacts upon these species or individuals of these species.

The following subterranean threatened and priority fauna species have been recorded within the local area:

- *Bamazomus subsolanus* (Eastern Cape Range bamazomus) (T);
- *Bamazomus vespertinus* (Western Cape Range bamazomus) (T);
- *Draculoides brooksi* (Northern Cape Range draculoides) (T);
- *Draculoides julianneae* (Western Cape Range draculoides) (T);
- *Indohya damocles* (Cameron's Cave pseudoscorpion) (T);
- *Milyeringa veritas* (Cave gudgeon, blind gudgeon) (T);
- *Nocticola flabella* (Cape Range blind cockroach, Cape Range delicate cockroach) (P4);
- *Ophisternon candidum* (Blind cave eel) (T);
- *Stygiocaris lancifera* (Lance-beaked cave shrimp) (T);
- *Stygiocaris stylifera* (Spear-beaked cave shrimp) (P4);
- *Stygiochiropus isolatus* (a stygiochiropus millipede (Cape Range)) (T);
- *Stygiochiropus peculiaris* (Cameron's Cave millipede) (T); and
- *Stygiochiropus sympatricus* (a stygiochiropus millipede (Cape Range)) (T).

These species are known to be associated with the Cape Range Sub-terranean Waterways wetland system mapped within the application area. DBCA have advised that experts from the WA Museum cannot advise on the presence of karst systems, aquifers, or sub-terranean fauna under the proposed clearing application area due to the absence of geological information or sub-terranean fauna survey, although DBCA have noted that two of the above species, the cave gudgeon or blind gudgeon and the blind cave eel, have been identified within 500m of the proposed clearing site, which is considered to be very close within the landscape context and increases the possibility that they may be present within the clearing footprint (DBCA, 2020).

Given that the above species are subterranean, vegetation within the application area is not considered to directly provide habitat for these species, thus the proposed clearing would only be expected to impact on these species from indirect impacts of the clearing to water quality or cave habitat. It is considered that the proposed clearing is unlikely to have significant impacts upon water quality or other karst features, should they be present beneath the application area (refer to Section 3.2.2 for further discussion). As such, it is considered that the proposed clearing is unlikely to have significant impacts on any of the above subterranean fauna species, should they be present beneath the application area.

It is noted that two of the above fauna species, Camerons Cave Millipede and Camerons Cave Pseudoscorpion, as well as a unique assemblage of other fauna species, are endemic to Camerons Cave and the threatened ecological community Camerons Cave Troglotic Community (Department of Environment and Conservation, 2012). The Camerons Cave Troglotic Community is reliant on the humid conditions in Camerons Cave, which are created through contact with the water table and specific surface conditions (Department of Environment and Conservation, 2012). Given that Cameron's Cave is approximately 2 kilometres south of the application area, the proposed clearing is considered unlikely to significantly impact groundwater quality values within Cameron's Cave and therefore fauna species from the Camerons Cave Troglotic Community (DWER, 2020a).

Conclusion: Based on the above assessment, the proposed clearing is not likely to significantly impact conservation significant fauna species.

Conditions: No fauna management conditions required.

### **3.2.2. Biological values (flora) - Clearing Principle (a)**

Assessment: Given the mapped soil and vegetation types and topography and advice provided by DBCA (2020), the following species may occur within the application area:

- *Acacia ryaniana* (P2)
- *Corchorus congener* (P3)
- *Tephrosia* sp. North West Cape (P2)

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A targeted flora survey, targeting only *Corchorus congener*, *Brachychiton obtusilobus* and *Eremophila youngii* subsp. *lepidota*, did not record the targeted species within the application area (Focused Vision Consulting, 2020b). DBCA have advised that *Acacia ryaniana* and *Corchorus congener* are well represented outside of the application area, and therefore should these species be present within the application area, the proposed clearing would not significantly impact the conservation status of these species (DBCA, 2020).

It is noted that although limited information is available regarding the habitat of *Tephrosia* sp. North West Cape, other records of this species have been within rocky limestone soils or red-brown soils over shallow limestone (Western Australian Herbarium, 1998-), including the record closest (1.6 kilometres) to the application area, and that no visible limestone was noted to be present within the red/orange pindan soils and white sand dune soils within the application area (DBCA, 2020). Furthermore, the presence of significant buffel grass in vegetation along the roadside (DBCA, 2020a) is considered to further reduce the likelihood of this species occurring. Although the presence of this species within the application area cannot be entirely ruled out, the application area is therefore not considered likely to support large numbers of individuals of this species and therefore the proposed clearing is considered unlikely to significantly impact the conservation status of this species.

The applicant has committed to revegetating the 4.5 metre wide portion of the proposed clearing area to be temporarily cleared to facilitate pipeline construction following clearing, which will mitigate any potential impact to habitat for priority flora species.

Conclusion: Based on the above assessment, the proposed clearing is not likely to significantly impact conservation significant flora species.

Conditions: The permit holder will be required to retain topsoil and vegetative material from within the 4.5 metre wide portion of temporary clearing, and re-lay this material following the completion of the clearing activities.

### **3.2.3. Land and water resources - Clearing Principles (d), (f) and (i)**

These species are known to be associated with the Cape Range Sub-terranean Waterways wetland system mapped within the application area. It is known that some of the extensive inland sink-holes within this wetland system are connected to the ocean and experience tidal movement (DBCA, 2020), indicating that channels connecting inland karst features and the ocean have the potential to be present beneath the application area. DBCA have advised that experts from the WA Museum cannot advise on the presence of karst systems or aquifers under the proposed clearing application area due to the absence of geological information. In the absence of information regarding presence of cave entrances and karst features beneath the application area, it is unknown whether the proposed clearing would result in any impacts on the Cape Range Subterranean Waterways. However, wetland impacts are not considered to be likely to be significant for the following reasons:

- DBCA (2020) have advised that, given the proposed clearing area (1.48 hectares) is very small compared to the estimated area of the mapped wetland (175,000 hectares) and that vegetation within the application area has been impacted from previous road construction and off-road vehicular traffic, the proposed clearing is unlikely to pose significant threat to water quality entering the groundwater and therefore water in any underlying cave features;
- Although no specific information is available on the presence of cave entrances within the application area, photographs of the application area indicate that they are unlikely to be present, further reducing the risk of impacts to water quality;
- The vegetation to be cleared is likely to comprise only reasonably shallow rooted species and therefore the proposed clearing is also considered unlikely to otherwise impact any underlying karst features, should they be present.

Department of Environment and Conservation and the Conservation Commission of Western Australia (2010) have identified growth of buffel grass to be a potential contributor to the addition of nutrients to the Cape Range Subterranean Waterways. Although the extent of clearing is small and impacts of weeds are not expected to be significant, weed management conditions placed on this permit will minimise any impacts from buffel grass or other weeds.

As discussed in Section 3.2.1, given the distance to Cameron's Cave, the proposed clearing is considered unlikely to significantly impact groundwater values within Cameron's Cave, and therefore unlikely to impact the Cameron's Cave Threatened Ecological Community (DWER, 2020a).

Conclusion: Based on the above assessment, the proposed clearing is not likely to significantly impact land and water resources.

Conditions: Weed management condition.

### 3.3. Relevant planning instruments and other matters

Other relevant authorisations required for the proposed land use include:

- Development approval under the *Planning and Development Act 2005* (issued by the Shire of Exmouth);
- Granting of easements to the Shire of Exmouth for the purpose of the supply of seawater, distribution of energy and vehicle access (issued by the Department of Planning, Lands and Heritage (DPLH)); and
- Licence to abstract water under the *Rights in Water and Irrigation Act 1914*.

A Development Approval was granted for the pipeline easement on 19 January 2020 (Shire of Exmouth, 2021b). The Shire of Exmouth did not have any objections to the proposed clearing (Shire of Exmouth, 2020a, 2020b, 2021c).

DPLH have advised that they are supportive of the proposed clearing, and that they plan to grant the relevant easements to the Shire of Exmouth (DPLH, 2021a). It is understood that this will occur following the pipeline construction.

land at Lot 1404 on Plan 192085, has been classified under the Contaminated Sites Act 2003 (the CS Act) as possibly contaminated – investigation required on 30 August 2017 and a memorial (reference number N912639) was placed on the certificate of title. Lot 300 on Plan 408720, Lot 303 on Plan 408720, Lot 1020 on Plan 216750 and Lot 1403 on Plan 192085 are not currently classified under the CS Act (DWER, 2020b). The classification for Lot 1404 was based on the historical use of the site as an uncontrolled landfill and the identification of buried waste materials, which appeared to indicate the presence of weathered asbestos containing material (ACM) within the buried waste. A recent preliminary site investigation (PSI) for Lot 1404 identified large quantities of stockpiled waste materials and scattered waste materials across portions of the site. The findings of the PSI did not indicate that the lateral extent of waste materials would intercept the location of the proposed easement and pipeline, however the sampling was limited to the surface of the site and there is a potential for subsurface wastes to extend further than the spatial extent observed on the surface. The PSI also indicated that the surficial waste mass on Lot 1404 appears to extend northwards across the lot boundary and onto a portion of Lot 303 (although it does not appear to extend in the vicinity of the proposed pipeline and easement).

Based on available information, there is no objection to the proposed clearing activities on the above-mentioned lots (DWER, 2020b). However, if the surficial and buried waste mass extends to the proposed area of development, there may be risks to human health associated with the potential disturbance of landfill material, including ACM, during clearing activities.

A license to abstract groundwater has been granted to the Minderoo Foundation Pty Ltd for the proposed development (DWER, 2020c).

DBCA (2020) have noted that the excavation of a trench for the laying of a pipeline carries with it significant potential impact to the morphology and hydrological function of any sub-surface karst systems, aquifers and sub-terranean fauna that may be present as part of the Cape Range Subterranean Waterways mapped beneath the application area. It is known that some of the extensive inland sink-holes are connected to the ocean and experience tidal movement (DBCA, 2020). As it is currently unknown whether sub-surface wetland features are present beneath the application area, it would need to be assessed whether such a marine connection underlies the clearing application area and whether this has potential to be impacted by the intended excavation works (DBCA, 2020). DBCA (2020) have noted that a geological survey for the footprint area of the clearing application would enable an assessment of the likelihood of presence of subterranean waterways and if a geological survey indicates the presence of subterranean waterways, then a subterranean fauna survey would be required to determine the presence/absence of threatened species. DBCA (2020) have advised that risk minimisation practices to manage the possibility of hydrocarbon leakage, contamination and other chemicals into the groundwater or near shore environment that may be associated with clearing and end use construction should be taken.

No Aboriginal Sites of Significance have been mapped within the application area. 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. Site characteristics

### A.1. Site characteristics

Characteristic	Details
Local context	<p>The area in which clearing is proposed is part of an expansive tract of native vegetation associated with the Exmouth coastline in the extensive land use zone of Western Australia. The western portion of the clearing footprint is immediately adjacent to a visitors centre and Truscott Crescent on one side and native vegetation on the other side, and the eastern portion is surrounded by native vegetation.</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	The proposed clearing area forms part of a local ecological linkage along the Exmouth coastline.
Conservation areas	The eastern portion of the application area lies within an unmanaged reserve for the purpose of foreshore protection. The application area is 5.4 km south of Bundegi Coastal Reserve and 7.3 km north east of Cape Range National Park.
Vegetation description	<p>Desktop vegetation mapping conducted over portions of the application area (Focused Vision Consulting, 2020a) mapped the following vegetation units within the application area:</p> <ul style="list-style-type: none"> <li>• Cleared;</li> <li>• AES - <i>Acacia</i> spp., <i>Exocarpos</i> sp. and <i>Scaevola</i> spp. open Shrubland over <i>Enchylaena</i> sp. and <i>Rhagodia</i> sp. Low Sparse Chenopod Shrubland</li> <li>• ARG - <i>Acacia</i> spp. and <i>Rhagodia</i> spp. Open Shrubland over Tussock Grassland (see Figure D-1, Appendix D).</li> </ul> <p>It is noted that the vegetation mapping conducted by (Focused Vision Consulting, 2020a) does not include vegetation within the portion of the easement alongside Truscott Crescent south of Lot 303 on Plan 408720, and the west-east portion of the easement in the southern portion of the application area. Photographs provided by the applicant (Minderoo Foundation Pty Ltd, 2020b) and aerial imagery indicate that this vegetation consists of <i>Acacia</i> spp. and other shrubs, of varying density, over tussock grassland.</p> <p>This is consistent with the mapped vegetation type:</p> <ul style="list-style-type: none"> <li>• Beard 633, which is described as Hummock grasslands, shrub steppe; waterwood over soft spinifex (Shepherd et al, 2001)</li> </ul> <p>This mapped vegetation type retains approximately 89 per cent of its original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>A vegetation survey conducted over portions of the application area (Focused Vision Consulting, 2020a) mapped vegetation within the application area as being in Completely Degraded or Good (Trudgen, 1991) condition, described as:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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 (see map in Figure D-2, Appendix D).</li> </ul> <p>Photographs provided by the applicant (Minderoo Foundation Pty Ltd, 2020b) indicate that vegetation within the portion of the easement alongside Truscott Crescent south of Lot 303 on Plan 408720, and the west-east portion of the easement in the southern</p>

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Characteristic	Details
	<p>portion of the application area, is in Poor to Good (Trudgen, 1991) condition, described as:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul> <p>The full Trudgen (1991) condition rating scale is provided in Appendix C.            DBCA (2020) noted that there is a significant understorey of buffel grass along the roadside within the application area.</p>
Climate	<p>Rainfall: 300 mm</p> <p>Evapotranspiration: 300 mm</p>
Topography	Approximately 10 m AHD across the application area
Soil description	<p>The soil is mapped as:</p> <ul style="list-style-type: none"> <li>• Western portion: 204Ra, described as Dissected limestone plateaux, hills and ridges with gorges and steep stony slopes supporting hard spinifex, sparse shrubs and eucalypts</li> <li>• Eastern portion: 204Le, described as Sandy outwash plains marginal to the Cape Range, supporting mainly soft spinifex hummock grasslands with scattered acacia shrubs. (DPIRD, 2019).</li> </ul> <p>Information provided from DBCA (2020) indicates that, consistent with the mapped soil types, the application area is comprised of red/orange pindan soil on coastal plain through to white sand dunes, however that no rocky/limestone areas are likely to be present.</p>
Land degradation risk	<p>Both 204Ra and 204Le soil types have a low risk of subsurface acidification (&lt;3% of the map unit has a high susceptibility) (Schoknecht, 2004).</p> <p>Neither soil type is particularly susceptible to erosion resulting from clearing (Payne et al. 1987).</p>
Surface waterbodies	<p>The application area does not intersect any surface waterbodies. The Exmouth Gulf is located approximately 50 m east of the application area. The nearest watercourse to the application area, located approximately 400 m northwest, is a minor non-perennial watercourse.</p> <p>The application area lies within the Pilbara Surface Water Area proclaimed under the RIWI Act.</p>
Hydrogeography	<p>The application area lies within an area of the Cape Range Subterranean Waterways, a subterranean wetland listed in the Directory of Important Wetlands in Australia. This system is described as subterranean waterways and crevicular system in karstic limestone and coastal limestones, accessible through anchialine pools, wells, bores and caves (Department of Agriculture, Water and the Environment, 2020). Water within the subterranean waterways is supplied from groundwater on a seawater wedge.</p> <p>The application area lies within the Gascoyne Groundwater Are proclaimed under the RIWI Act.</p> <p>Mapped groundwater salinity: 500 -1000 mg/L TDS</p> <p>Mapped hydrogeology: Sedimentary Rocks - Extensive And Deep Aquifers, limestone lithology</p>
Flora	There are records of 23 priority flora and no threatened flora within the local area (50 km).
Ecological communities	There are records of one threatened ecological community, Camerons Cave Troglitic Community, within the local area, approximately 2.8 km southwest of the application area.

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Characteristic	Details
Fauna	There are records of 97 fauna of conservation significance within the local area (50 km), including three extinct species, 37 threatened species, 15 priority species, two conservation dependant species, 37 species under international agreement and three other specially protected species. The closest record, approximately 10 m from the application area, is <i>Pandion cristatus</i> (osprey).

## A.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*					
Carnarvon	8,382,890.35	8,360,801.46	99.74	1,020,434.08	12.17
Vegetation complex					
Beard vegetation association 663	29,068.26	25,866.32	88.98	7,414.33	25.51

\*Government of Western Australia (2019a)

## A.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix 0), and biological survey information, impacts to the following conservation significant flora required further consideration.

Species name	Conservation status	Suitable habitat features ?	Suitable vegetation type?	Suitable soil type?	Distance of closest record to application area (km)	Number of known records in local area	Are surveys adequate to identify?
<i>Acacia ryaniana</i>	P2	Y	Y	Y	13.8	5	N
<i>Acanthocarpus rupestris</i>	P2	N	Y	Y	6.0	9	N
<i>Brachychiton obtusilobus</i>	P4	N	Y	Y	1.5	14	N
<i>Calandrinia</i> sp. Cape Range (F. Obbens FO 10/18)	P2	N	Y	Y	11.0	4	N
<i>Corchorus congener</i>	P3	Y	Y	Y	0.8	12	N
<i>Crinum flaccidum</i>	P2	N	Y	Y	38.6	5	N
<i>Cucumis</i> sp. Barrow Island (D.W. Goodall 1264)	P2	N	Y	Y	10.0	2	N
<i>Daviesia pleurophylla</i>	P2	N	Y	Y	6.0	11	N
<i>Eremophila forrestii</i> subsp. <i>capensis</i>	P3	N	Y	Y	11.1	18	N
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4	N	Y	Y	0.8	1	N
<i>Grevillea calcicola</i>	P3	N	Y	Y	11.1	21	N
<i>Gymnanthera cunninghamii</i>	P3	N	Y	Y	18.4	1	N
<i>Harnieria kempeana</i> subsp. <i>rhadinophylla</i>	P2	N	Y	Y	10.2	8	N
<i>Phyllanthus fuernrohrii</i>	P3	N	Y	Y	11.1	5	N

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Species name	Conservation status	Suitable habitat features?	Suitable vegetation type?	Suitable soil type?	Distance of closest record to application area (km)	Number of known records in local area	Are surveys adequate to identify?
<i>Stackhousia umbellata</i>	P3	N	Y	Y	10.2	20	N
<i>Tephrosia sp. North West Cape (G. Marsh 81)</i>	P2	Y	Y	Y	1.6	3	N
<i>Tinospora esiangkara</i>	P2	N	Y	Y	6.6	10	N

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

#### A.4. Fauna analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix 0), and biological survey information, impacts to the following conservation significant fauna required further consideration.

Species name	Conservation status	Suitable habitat features?	Distance of closest record to application area (km)	Most recent record in local area	Number of known records in local area	Are surveys adequate to identify?
<i>Anilius splendidus</i> (Splendid blind snake (North West Cape))	P2	Possible – limited knowledge of habitat	22.1	1995	2	N/A
<i>Aprasia rostrata</i> (Ningaloo worm lizard)	P3	Y	7.5	2008	3	N/A
<i>Bamazomus subsolanus</i> (Eastern Cape Range bamazomus)	EN	If subterranean waterways/ caves present	7.6	2008	55	N/A
<i>Bamazomus vespertinus</i> (Western Cape Range bamazomus)	EN	If subterranean waterways/ caves present	21.4	2008	38	N/A
<i>Draculoides brooksi</i> (Northern Cape Range draculoides)	EN	If subterranean waterways/ caves present	1.5	2008	47	N/A
<i>Draculoides julianneae</i> (Western Cape Range draculoides)	EN	If subterranean waterways/ caves present	13.2	2004	57	N/A
<i>Indohya damocles</i> (Cameron's Cave pseudoscorpion)	CR	If subterranean waterways/ caves present	3.0	1995	27	N/A
<i>Milyeringa veritas</i> (Cave gudgeon, blind gudgeon)	VU	If subterranean waterways/ caves present	0.5	2018	107	N/A
<i>Nocticola flabella</i> (Cape Range blind cockroach, Cape Range delicate cockroach)	P4	If subterranean waterways/ caves present	22.0	1988	8	N/A
<i>Ophisternon candidum</i> (Blind cave eel)	VU	If subterranean waterways/ caves present	0.4	2009	29	N/A
<i>Stygiocaris lancifera</i> (Lance-beaked cave shrimp)	VU	If subterranean waterways/ caves present	4.6	2018	12	N/A
<i>Stygiocaris stylifera</i> (Spear-beaked cave shrimp)	P4	If subterranean waterways/ caves present	1.3	1996	5	N/A
<i>Stygiochiropus isolatus</i> (a stygiochiropus millipede (Cape Range))	VU	If subterranean waterways/ caves present	3.1	2015	6	N/A



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Species name	Conservation status	Suitable habitat features?	Distance of closest record to application area (km)	Most recent record in local area	Number of known records in local area	Are surveys adequate to identify?
<i>Stygiochiropus peculiaris</i> (Cameron's Cave millipede)	CR	If subterranean waterways/ caves present	2.9	1994	15	N/A
<i>Stygiochiropus sympatricus</i> (a stygiochiropus millipede (Cape Range))	VU	If subterranean waterways/ caves present	13.2	1991	3	N/A

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## Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
<b>Environmental value: biological values</b>		
<p><b>Principle (a):</b> "Native vegetation should not be cleared if it comprises a high level of biodiversity."</p> <p><b>Assessment:</b> The area proposed to be cleared may contain regionally significant flora, fauna and habitats.</p>	May be at variance	Yes <i>Refer to Sections 3.2.1, 3.2.2 and 3.2.3 above.</i>
<p><b>Principle (b):</b> "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."</p> <p><b>Assessment:</b> The area proposed to be cleared is not likely to contain significant habitat for conservation significant fauna.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><b>Principle (c):</b> "Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."</p> <p><b>Assessment:</b> The area proposed to be cleared is unlikely to contain habitat for threatened flora species listed under the BC Act.</p>	Not likely to be at variance	No
<p><b>Principle (d):</b> "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."</p> <p><b>Assessment:</b> The area proposed to be cleared is not likely to contain flora or fauna species indicative of a threatened ecological community or necessary for the maintenance of nearby threatened ecological communities.</p>	Not likely to be at variance	Yes <i>Refer to Sections 3.2.1 and 3.2.3</i>
<b>Environmental value: significant remnant vegetation and conservation areas</b>		
<p><b>Principle (e):</b> "Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."</p> <p><b>Assessment:</b> Extents of the mapped vegetation type and native vegetation in the local area are consistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.</p>	Not likely to be at variance#	No
<p><b>Principle (h):</b> "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."</p>	Not likely to be at variance#	No

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Assessment against the clearing principles	Variance level	Is further consideration required?
<p><b>Assessment:</b> Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.</p>		
<b>Environmental value: land and water resources</b>		
<p><b>Principle (f):</b> <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><b>Assessment:</b> The proposed clearing is within the mapped boundary of the Directory of Important Wetlands in Australia wetland ‘Cape Range Subterranean Waterways’.</p>	At variance#	Yes <i>Refer to Section 3.2.3, above.</i>
<p><b>Principle (g):</b> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><b>Assessment:</b> Given the mapped soil type and the extent and linear nature of the application area, the proposed clearing is not likely to have an appreciable impact on land degradation.</p>	Not likely to be at variance#	No
<p><b>Principle (i):</b> <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><b>Assessment:</b> Given the extent of the clearing and that the Cape Range Subterranean Waterways’ is subterranean, the proposed clearing is unlikely to impact water quality within the wetland system. Given the distance to nearby surface water receptors, the proposed clearing is unlikely to impact surface water quality.</p>	Not likely to be at variance#	Yes <i>Refer to Section 3.2.3, above.</i>
<p><b>Principle (j):</b> <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><b>Assessment:</b> Given the mapped soil types within the clearing area, distance to nearby surface waterbodies and the topography and extent of the clearing area, the proposed clearing is unlikely to contribute to increased incidence or intensity of flooding or waterlogging.</p>	Not likely to be at variance#	No

### Appendix C. 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 (1991).

#### 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.

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Condition	Description
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.

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**Appendix D. Biological survey information excerpts and photographs of the vegetation**



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Figure D-1 – Vegetation associations mapped within a portion of the application area (Focused Vision Consulting, 2020a)

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Figure D-2 – Vegetation condition mapped within a portion of the application area (Focused Vision Consulting, 2020a)

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Figure D-3 – Photograph of vegetation adjacent to Truscott Crescent in southern portion of application area in Good condition, consisting of shrubs over tussock grassland (Minderoo Foundation Pty Ltd, 2020b).



Figure D-3 – Photograph of vegetation adjacent to Truscott Crescent in southern portion of application area in Poor condition, comprised largely of grassland (Minderoo Foundation Pty Ltd, 2020b).



Figure D-4 – Photograph of vegetation at southern bore pad in Good condition, with *Acacia* spp. and other shrub species over tussock grassland (Minderoo Foundation Pty Ltd, 2020b).

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Figure D-4 – Photograph of vegetation at northern bore pad in Good condition, with shrubs over tussock grassland (Minderoo Foundation Pty Ltd, 2020b).

## Appendix E. Sources of information

### E.1. GIS databases

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

- 10 Metre Contours (DPIRD-073)
- 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

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- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil landscape land quality - Subsurface Acidification Risk (DPIRD-011)
- 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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