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Gorgon Gas Development and Jansz Feed Gas Pipeline Terrestrial and Subterranean Baseline State and Environmental Impact Report - Addendum

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Executive Summary

This Addendum has been prepared to update the approved Terrestrial and Subterranean Baseline State and Environmental Impact Report (TSBSEIR) (Ref. 1) so it adequately covers the disturbance footprint associated with an extension of the Gorgon Gas Development terrestrial component of the shore crossing (shore crossing extension site), consistent with the requirements for review/update of the TSBSEIR detailed in Section 8 of that document and under Condition 36.2(ii) of Ministerial Statement No. 800 (MS 800; Ref. 2), Condition 21(2) of Ministerial Statement No. 769 (MS 769; Ref. 3) and Condition 25 of EPBC Reference: 2003/1294 and 2008/4178.

This Addendum fulfils the requirements of Condition 6.1 of MS 800, Condition 6.1 of MS 769, and Condition 5.1 of EPBC Reference: 2003/1294 (Ref. 4) and 2008/4178 (Ref. 5) for the shore crossing extension site. It updates and/or supplements material previously provided in the Draft and Final Environmental Impact Statement/Environmental Review and Management Programme (EIS/ERMP) for the Gorgon Gas Development (Ref. 6; Ref. 7), the Assessment on Referral Information (ARI) (Ref. 8), the Public Environmental Review (Ref. 9) and the Environmental Assessment for the Gorgon Gas Development Additional Construction, Laydown and Operations Support Area (Additional Support Area) (Ref. 10).

The significant ecological elements within the shore crossing extension site, the extent of boundary effects of the area referred to as the Terrestrial Disturbance Footprint (TDF), and the ecological elements at risk of impact from activities on the shore crossing extension site, are described in this Addendum.

The shore crossing extension site generally supports a subset of the ecological elements previously described for the Gorgon Gas Development and the stressors to these ecological elements associated with activities for the terrestrial facilities of the Gorgon Gas Development. Taking these into account during the development of this Addendum did not result in a change to the assessed risks for the Gorgon Gas Development presented in the Draft EIS/ERMP (Ref. 6) as reviewed in the TSBSEIR (Ref. 1).

1 Introduction

1.1 Proponent

Chevron Australia Pty Ltd (CAPL) is the proponent and the person taking the action for the Gorgon Gas Development on behalf of these companies (collectively known as the Gorgon Joint Venturers):

- Chevron Australia Pty Ltd
- Shell Development (Australia) Pty Ltd
- Mobil Australia Resources Company Pty Limited
- Osaka Gas Gorgon Pty Ltd
- Tokyo Gas Gorgon Pty Ltd
- JERA Gorgon Pty Ltd.

1.2 Project

CAPL is developing the gas reserves of the Greater Gorgon Area via the Gorgon Gas Development and Jansz Feed Gas Pipeline (Gorgon Gas Development), as described in Section 1.2 of the Terrestrial and Subterranean Baseline State and Environmental Impact Report (TSBSEIR)(Ref. 1). The development includes Feed Gas Pipeline Systems (FGPS) that extend subsea from the offshore gas fields to Barrow Island, through a shore crossing at North Whites Beach on the west coast, and then continue below ground across Barrow Island to the Gas Treatment Plant (GTP) on the east coast. The FGPS comprise feed gas trunklines, MEG and utility pipelines as well as electro-hydraulic umbilicals that contain electrical cables and control lines that provide for remote operation of the offshore infrastructure from the onshore Central Control Room.

To maintain the operating efficiency of the offshore gas gathering systems, CAPL is installing two additional subsea umbilical(s) to connect the offshore fields to the GTP. The additional control (fibre-optic) and electrical (up to ~132 kV AC) umbilical(s) will be installed adjacent to (south of) the existing subsea FGPS that extend from the offshore fields to the shore crossing site at North Whites Beach. The shore crossing for the additional umbilicals will use the same technique used for the shore crossing of the existing FGPS, comprising horizontal directional drilling (HDD) at North Whites Beach, to minimise impacts to the beach, intertidal and nearshore marine environments.

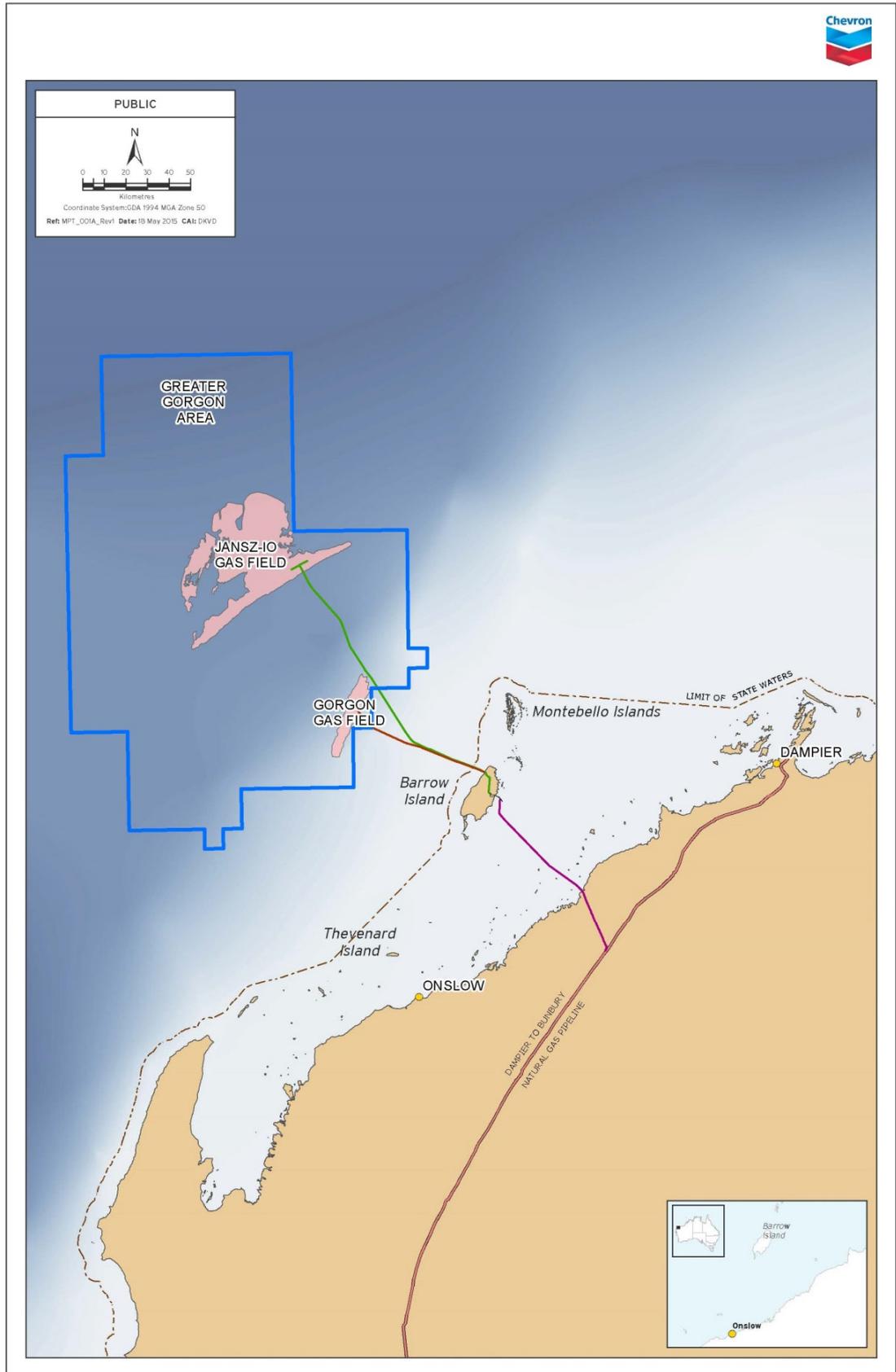


Figure 1-1: Location of Barrow Island and the Greater Gorgon Area

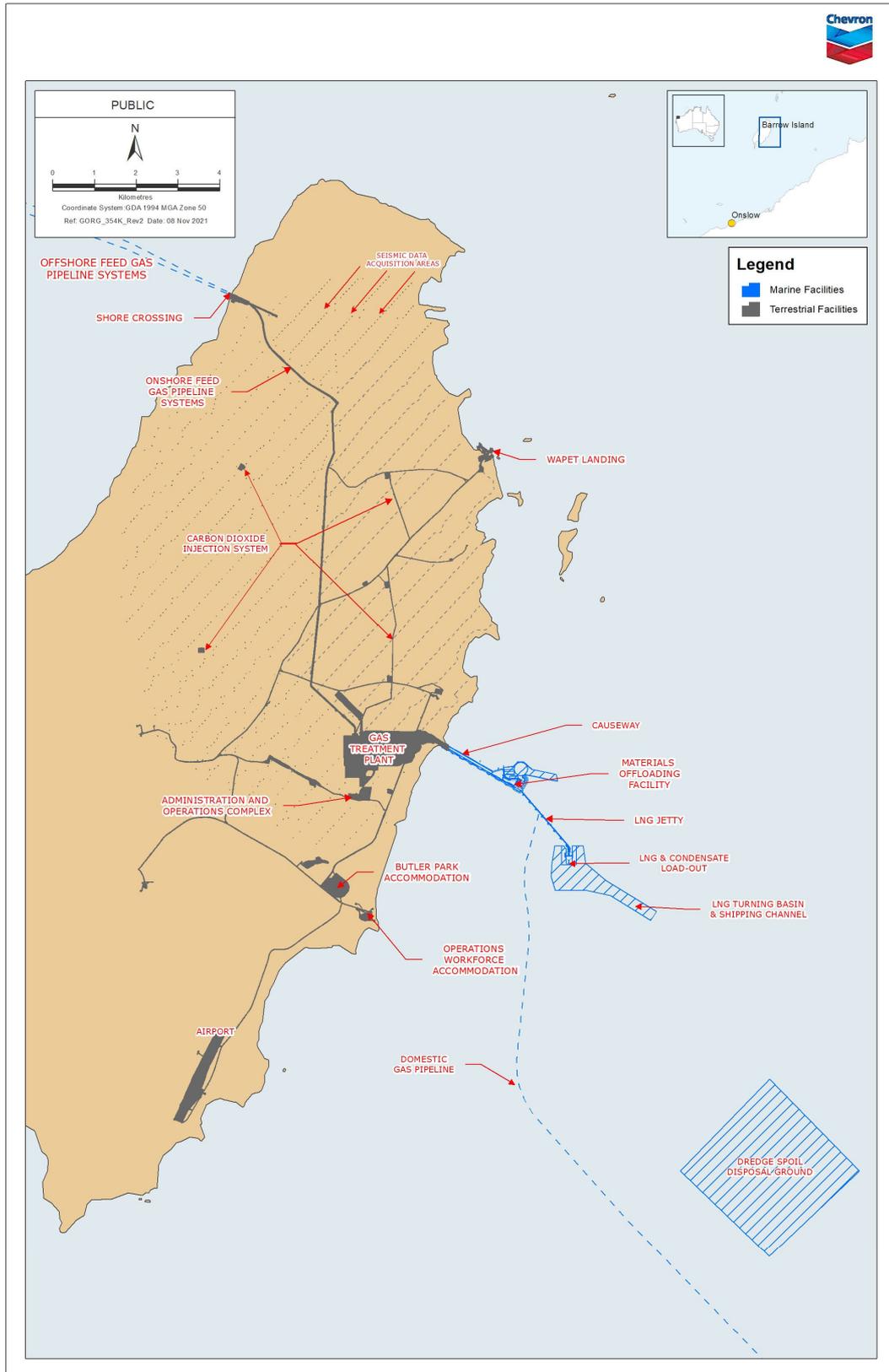


Figure 1-2: Gorgon Gas Development Facilities on Barrow Island

1.3 Environmental Approvals

Table 1-1 summarises the State (WA) and Commonwealth (Cth) approvals for the components of the Gorgon Gas Development.

These approvals, and projects approved under these approvals, have been and may continue to be amended (or replaced) from time to time.

Table 1-1: State and Commonwealth Approvals

Project Approval Stage	State	Commonwealth
Jansz Feed Gas Pipeline	Ministerial Statement (MS) 769 (Ref. 3) 28 May 2008	EPBC Reference: 2005/2184 (Ref. 11). 22 March 2006
Initial Gorgon Gas Development (2 LNG trains)	Initial Gorgon Gas Development comprising two LNG trains – MS 748 (Ref. 12). This was superseded by MS 800. 6 September 2007	Initial Gorgon Gas Development comprising two LNG trains – EPBC Reference: 2003/1294 (Ref. 4). 3 October 2007
Revised and Expanded Gorgon Gas Development (3 LNG trains)	MS 800 (Ref. 2) provides approval for both the initial Gorgon Gas Development and the Revised and Expanded Gorgon Gas Development (comprising three LNG trains). This statement supersedes MS 748. 10 August 2009	The Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 5]) was approved, and the conditions for the initial Gorgon Gas Development (EPBC Reference: 2003/1294 [Ref. 4]) were varied. 26 August 2009
Dredging Amendment	MS 865 (Ref. 8) provides approval to establish a restart mechanism in the event of a Project-attributable coral health management trigger. This statement is an amendment to Conditions 18, 20, and 21 of MS 800. 8 June 2011	Not applicable
Additional Support Area	MS 965 (Ref. 14) applies the conditions of MS 800 to an Additional Support Area. 2 April 2014	The conditions for the initial Gorgon Gas Development (EPBC Reference: 2003/1294 [Ref. 4]), and for the Revised and Expanded Gorgon Gas Development (EPBC Reference: 2008/4178 [Ref. 5]) were varied. 15 April 2014
Gorgon Gas Development Fourth Train Expansion	MS 1002 (Ref. 15) applies the conditions of MS 800 to the Fourth Train Expansion, and has additional conditions. 30 April 2015	EPBC Reference: 2011/5942 (Ref. 16). 12 May 2016

1.4 Scope and Purpose of this Addendum

This Addendum has been prepared to update the approved TSBSEIR (Ref. 1) so it adequately covers the disturbance footprint associated with the shore crossing for the additional umbilicals, consistent with the requirements for review/update of the TSBSEIR detailed in Section 8 of that document. This Addendum to revise the approved TSBSEIR satisfies the requirements of Condition 36.2(ii) of MS 800, Condition 21(2) of MS 769 and Condition 25 of EPBC Reference: 2003/1294 and 2008/4178 as applicable to the TSBSEIR (Ref. 1).

The scope of this Addendum covers the area of direct disturbance and of potential boundary effects in the area referred to as the Terrestrial Disturbance Footprint (TDF), that extends outside the footprint described in the TSBSEIR (Ref. 1).

Following approval, this Addendum will be considered to be approved as part of the TSBSEIR (Ref. 1), but will be maintained as a stand-alone document. Where relevant, amendments made to the TSBSEIR will also be considered to be amendments to this Addendum. Any matters or requirements in the Addendum that are taken from the TSBSEIR (rather than MS 800, MS 769 or EPBC Reference: 2003/1294 and 2008/4178) may be amended from time to time in accordance with amendments to the TSBSEIR.

1.4.1 Objectives

As stated in Condition 6.4 of MS 800 and MS 769, the objectives of this Addendum are to, for the shore crossing extension site:

- define and map the pre-development baseline state for the ecological elements within the areas that are expected to, or may be, at risk of Material or Serious Environmental Harm due to any works associated with the terrestrial facilities listed in Condition 6.3
- define and map the ecological elements within the Terrestrial Disturbance Footprint
- define and map the ecological elements which are at risk of Material or Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 6.3 (MS 769 only)
- define and map the ecological elements of reference sites to be used as part of Condition 8, which are not at risk of Material or Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 6.3

As stated in Condition 5.3 of EPBC Reference: 2003/1294 and 2008/4178, the objectives of this Addendum are to, for the shore crossing extension site:

- define and map the pre-development baseline state for the ecological elements within the areas that are expected to, or may be, at risk of Material or Serious Environmental Harm due to any works associated with the terrestrial facilities listed in Condition 5.2
- define and map the ecological elements within the Terrestrial Disturbance Footprint
- define and map the ecological elements of reference sites to be used as part of the Terrestrial and Subterranean Environment Monitoring Program Condition, which are not at risk of Material or Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 5.2.

In addition, the Addendum will provide information to support fulfilment of Condition 3.2.1 of EPBC Reference: 2003/1294 and 2008/4178, which requires:

- a description of the EPBC listed species and their habitat likely to be impacted by the components of the action which are the subject of that plan, report, program or system (however described).

1.4.2 Contents of this Addendum

Table 1-2 identifies where content in this Addendum and/or other Gorgon Gas Development Environmental Management Plans addresses relevant specific requirements of MS 800, MS 769, and EPBC Reference: 2003/1294 and 2008/4178.

Table 1-2: Condition Requirements Addressed in this Addendum

Ministerial Document	Condition No.	Condition Requirement	Section in this Report
MS 800 and MS 769	6.4 i	Define and map the pre-development baseline state for the ecological elements within the areas that are expected to, or may be at risk of Material or Serious Environmental Harm due to any works associated with the terrestrial facilities listed in Condition 6.3 of MS 800 and MS 769.	Section 3 TSBSEIR Sections 3, 4 and 5, and Maps 1–12
MS 800 and MS 769	6.4 ii	Define and map the ecological elements within the Terrestrial Disturbance Footprint.	Section 3 TSBSEIR Sections 3, 4, 5 and 6, and Maps 1–12
MS 800 and MS 769	6.4 iii (800) and 6.4 iv (769)	Define and map the ecological elements of reference sites to be used as part of Condition 8, which are not at risk of Material or Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 6.3 of MS 800 and MS 769.	Section 3 TSBSEIR Section 4 and Map 13
MS 769	6.4 iii	Define and map the ecological elements which are at risk of Material and Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 6.3 of MS 769	Section 3 TSBSEIR Section 4 and Map 13
MS 800 and MS 769	6.5 i	A review of the results of the qualitative ecological risk assessments of the likelihood and consequence of Proposal impacts on the ecological elements identified in Condition 6.1 of MS 800 and MS 769.	Section 4.4 TSBSEIR Section 6.6
MS 800 and MS 769	6.5 ii	Details of the methodology that was used to survey, collect and collate the baseline data and information for all ecological elements identified in Condition 6.1 of MS 800 and MS 769.	Section 3 TSBSEIR Sections 4 and 5
MS 800 and MS 769	6.5 iii	A description and map of the ecological elements within the Terrestrial Disturbance Footprint.	Section 3 Figure 3-1, Figure 3-2, Figure 3-3 TSBSEIR Sections 3, 4, 5 and 6, and Maps 1–12
MS 800 and MS 769	6.5 iv	A description and map of the ecological elements which are at risk of Material or Serious Environmental Harm outside the Terrestrial Disturbance Footprint due to construction and operation of the terrestrial facilities listed in Condition 6.3 of MS 800 and MS 769.	Section 3 TSBSEIR Sections 3, 4, 6.4, and Maps 1–12

Ministerial Document	Condition No.	Condition Requirement	Section in this Report
MS 800 and MS 769	6.5 v	A review of the results to include existing areas of disturbance, including clearing, existing non-indigenous species (including weeds) and disturbed landscapes.	Section 3 TSBSEIR Section 4
MS 800 and MS 769	6.5 vi	Spatially accurate (i.e. rectified and geographically referenced) maps showing the baseline data and information for the ecological elements identified in Condition 6.1 of MS 800 and MS 769.	Section 3 TSBSEIR Section 4 and Maps 1–124
MS 800 and MS 769	6.5 vii	Discussion of the data on the baseline biological, physical and chemical variables including any significant relationships, for the ecological elements identified in Condition 6.1 of MS 800 and MS 769.	Section 3 TSBSEIR Sections 4, 4.6, 3.1.4
MS 800 and MS 769	6.5 viii	Significant ecological elements to be protected – e.g. Declared Rare Flora (DRF), threatened ecological communities, Threatened Species under the Commonwealth EPBC Act, habitats of rare fauna.	Section 3 TSBSEIR Sections 4, 3.1.2
MS 800	6.5 ix	An analysis of, and procedures to address data and information gaps associated with the baseline data for the areas identified in Condition 6.5.iv for the ecological elements identified in Condition 6.1 of MS 800.	TSBSEIR Sections 4.11, 5.9
MS 769	6.5 ix	An analysis of, and procedures to address reasonable data and information gaps associate with the baseline data for the areas identified in iv. above (Condition 6.5 iv) for the ecological elements identified in Condition 6.1 and associated relationships.	TSBSEIR Sections 4.11, 5.9
MS 800 and MS 769	6.5 x	A description and map of the ecological elements of reference sites in locations which are not at risk of Material or Serious Environmental harm due to construction and operation of the terrestrial facilities listed in Condition 6.3 of MS 800 and MS 769.	Section 4.3 TSBSEIR Section 4, 6 and Map 13 Additional maps of locations appear in the Terrestrial and Subterranean Environment Monitoring Program (required under Condition 8.4.vii of MS 800)
MS 800 and MS 769	6.6 (800) and 6 (769)	The Proponent shall not cause or allow Material or Serious Environmental Harm outside the Terrestrial Disturbance Footprint.	Section 4.2.3.2
EPBC Refs: 2003/1294 and 2008/4178	3.2.1	A description of the EPBC listed species and their habitat likely to be impacted by the components of the action which are the subject of that plan.	Sections 3.1.3, 3.4.2.1, 3.4.2.3, 3.5
EPBC Refs: 2003/1294 and 2008/4178	3.2.2	an assessment of the risk to these species from the components of the action the subject of that plan, relevant to that plan	TSBSEIR Appendix 12

Ministerial Document	Condition No.	Condition Requirement	Section in this Report
EPBC Refs: 2003/1294 and 2008/4178	3.2.3	Details of the management measures proposed in relation to these species if it is a requirement of the condition requiring that plan.	Terrestrial and Subterranean Environment Protection Plan (Ref. 18)
EPBC Refs: 2003/1294 and 2008/4178	3.2.4	Details of monitoring proposed for that species if it is a requirement of the condition requiring that plan.	Terrestrial and Subterranean Environment Monitoring Program (Ref. 17)
EPBC Refs: 2003/1294 and 2008/4178	3.2.5	Performance standards in relation to that species if it is a requirement of the condition requiring that plan	Terrestrial and Subterranean Environment Protection Plan (Ref. 18)
EPBC Refs: 2003/1294 and 2008/4178	3.2.6	Management triggers in relation to that species if it is a requirement of the condition requiring that plan.	Terrestrial and Subterranean Environment Monitoring Program (Ref. 17)
EPBC Refs: 2003/1294 and 2008/4178	3.2.7	Protocols for reporting impacts on the species to the Department.	Terrestrial and Subterranean Environment Monitoring Program (Ref. 17)
EPBC Reference: 2003/1294 and 2008/4178	5.3i	Define and map the pre-development baseline state for the ecological elements within the areas that are expected to be, or may be, at risk of Material or Serious Environmental Harm due to any works associated with the terrestrial facilities listed in Condition 5.2.	Section 3 TSBSEIR Sections 3, 4 and 5, and Maps 1–12
EPBC Reference: 2003/1294 and 2008/4178	5.3ii	Define and map the ecological elements within the Terrestrial Disturbance Footprint.	Section 3 Figure 3-1, Figure 3-2, Figure 3-3 TSBSEIR Sections 3, 4, 5 and 6, and Maps 1–12
EPBC Reference: 2003/1294 and 2008/4178	5.3iii	Define and map the ecological elements of reference sites to be used as part of the Terrestrial and Subterranean Environment Monitoring Program Condition, which are not at risk of Material or Serious Environmental Harm due to construction or operation of the terrestrial facilities listed in Condition 5.2.	Section 3 TSBSEIR Section 4 and Map 13
EPBC Reference: 2003/1294 and 2008/4178	5.4i	A review of the results of the qualitative ecological risk assessments of the likelihood and consequence of action impacts on the ecological elements identified in Condition 5.1;	Section 4.4 TSBSEIR Section 6.6
EPBC Reference: 2003/1294 and 2008/4178	5.4ii	Details of the methodology that was used to survey, collect and collate the baseline data and information for all ecological elements identified in Condition 5.1	Section 3 TSBSEIR Sections 4 and 5

Ministerial Document	Condition No.	Condition Requirement	Section in this Report
EPBC Reference: 2003/1294 and 2008/4178	5.4iii	A description and map of the ecological elements within the Terrestrial Disturbance Footprint	Section 3 TSBSEIR Sections 3, 4, 5 and 6, and Maps 1–12
EPBC Reference: 2003/1294 and 2008/4178	5.4iv	A description and map of the ecological elements which are at risk of Material or Serious Environmental Harm outside the Terrestrial Disturbance Footprint due to construction and operation of the terrestrial facilities listed in Condition 5.2	Section 3 TSBSEIR Sections 3, 4, 6.4, and Maps 1–12
EPBC Reference: 2003/1294 and 2008/4178	5.4v	A review of the results to include existing areas of disturbance, including clearing, existing non-indigenous species (including weeds) and disturbed landscapes	Section 3 TSBSEIR Section 4
EPBC Reference: 2003/1294 and 2008/4178	5.4vi	Spatially accurate (i.e. rectified and geographically referenced) maps showing the baseline data and information for the ecological elements identified in Condition 5.1	Section 3 TSBSEIR Section 4 and Maps 1–124
EPBC Reference: 2003/1294 and 2008/4178	5.4vii	Discussion of the data on the baseline biological, physical and chemical variables including any significant relationships, for the ecological elements identified in Condition 5.1	Section 3 TSBSEIR Sections 4, 4.6, 3.1.4
EPBC Reference: 2003/1294 and 2008/4178	5.4viii	Significant ecological elements to be protected – e.g. EPBC Act listed species and their habitats	Section 3 TSBSEIR Sections 4, 3.1.2
EPBC Reference: 2003/1294 and 2008/4178	5.4ix	An analysis of, and procedures to, address data and information gaps associated with the baseline data for the areas identified in Condition 5.4.iv for the ecological elements identified in Condition 5.1	TSBSEIR Sections 4.11, 5.9
EPBC Reference: 2003/1294 and 2008/4178	5.4x	A description and map of the ecological elements of reference sites in locations which are not at risk of Material or Serious Environmental harm due to construction and operation of the terrestrial facilities listed in Condition 5.2	Section 4.3 TSBSEIR Section 4, 6 and Map 13 Additional maps of locations appear in the Terrestrial and Subterranean Environment Monitoring Program (required under Condition 8.4vii of MS 800)

Any matter specified in this Addendum is relevant to the Gorgon Gas Development only if that matter relates to the specific activities or facilities associated with that particular development.

2 Relevant Facilities and Activities

The terrestrial facilities, activities and associated stressors for the Gorgon Gas Development are detailed in Sections 2.1, 2.2 and 2.3 of the TSBSEIR (Ref. 1), respectively.

This Addendum applies to the *Onshore Feed Gas Pipeline System and terrestrial component of the shore crossing*, as defined in Condition 6.3 of MS 800 and MS 769, and Condition 5.2 of EPBC Reference: 2003/1294 and 2008/4178, and more specifically to activities (and associated disturbance) in the terrestrial shore crossing site for installation and operation of the additional umbilicals that extend outside the footprint previously described in the TSBSEIR (Figure 2-1).

These activities comprise a subset of the construction and operations activities described for the Gorgon Gas Development, as summarised in Table 2-1. More specific details are contained in various Gorgon Gas Development approval and assessment documents, which are issued from time to time.

Table 2-1: Planned Activities Associated with the Gorgon Gas Development

Construction and Operation on Barrow Island
<ul style="list-style-type: none">• clearing and earthworks• burning of vegetation• abrasive blasting• concrete batching• waste generation, storage and disposal• drilling (including HDD) and blasting• operation of machinery, plant and equipment• Feed Gas Pipeline Systems installation, operation, inspection, maintenance/repairs and site reinstatement• pipeline pressure testing, flooding and gauging• vehicle movements• winning and crushing of material• chemical and fuel transportation, storage, use and disposal• land use change• operation of GTP.

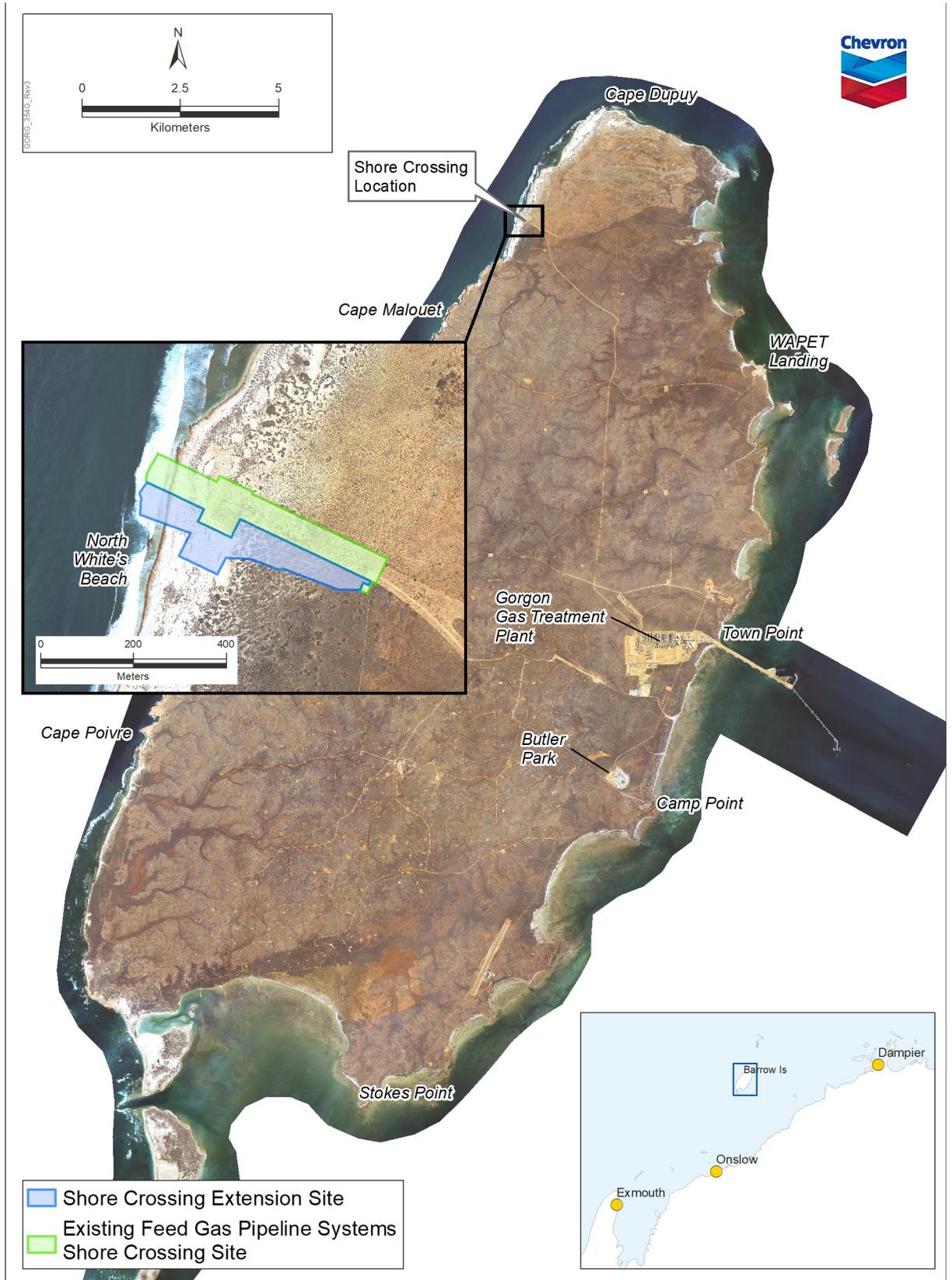


Figure 2-1: Location of Shore Crossing Extension Site on Barrow Island

3 Baseline State of Ecological Elements

3.1 Introduction

This Addendum provides the pre-development baseline state of ecological elements within that part of the terrestrial shore crossing site for the additional umbilicals on Barrow Island that extends outside the existing project footprint described in the TSBSEIR (Ref. 1).

3.1.1 Ecological Elements

The following sections of this Addendum address the ecological elements stated in Condition 6.1 of MS 800 and MS 769 and Condition 5.1 of EPBC Reference: 2003/1294 and 2008/4178, which are:

- flora
- vegetation
- fauna (including subterranean fauna and short-range endemics [SREs])
- habitat
- ecological communities
- groundwater
- surface water landforms
- physical landforms.

Note that MS 769 refers to 'other significant landforms' rather than physical landforms, and 'flora' is not included in EPBC Reference: 2003/1294 and 2008/4178.

3.1.2 Significant Ecological Elements

Section 3.1.1 and 3.1.2 of the TSBSEIR (Ref. 1) describes the process used to determine why certain ecological elements on Barrow Island warrant attention and should be considered as significant ecological elements to be protected in areas in the vicinity of the Gorgon Gas Development Footprint.

Consistent with the TSBSEIR, the focus in this Addendum is on those ecological elements that have been identified as significant, which are those:

- listed as threatened in Western Australian and Commonwealth legislation or formal lists
- restricted in distribution within Barrow Island
- critical to ecological processes on Barrow Island
- vulnerable to disturbance (neither resistant nor resilient to disturbance and very slow to recover/self-regenerate after disturbance ceases)
- disproportionately located in the Gorgon Gas Development Footprint.

3.1.3 Matters of National Environmental Significance

The terrestrial and subterranean matters of NES relevant to the Gorgon Gas Development are reviewed in Section 3.1.3 of the TSBSEIR (Ref. 1), and listed in associated inventories. The shore crossing extension site does not contain any additional or different matters of NES or their habitat.

As required by Condition 3.2.1 of EPBC Reference: 2003/1294 and 2008/4178, a description of the EPBC Act listed species likely to be impacted by activities in the shore crossing extension site are included in Table 3-1.

Table 3-1: EPBC Species Abundance and Habitat/Distribution on Barrow Island

	Species	Abundance on Barrow Island	Habitat / Distribution on Barrow Island	Species or Habitat Potentially Impacted ¹	Baseline Information in this Addendum
Land Birds	White-winged Fairy-wren (Barrow Island)	High	Widespread across vegetation communities	Yes – Noise	Sections 3.4.2.3.1 and 3.4.2.3.4. Table 3-8
	Sacred Kingfisher	Low	Restricted to mangroves / heavily vegetated creek lines	No	Sections 3.4.2.3.1 and 3.4.2.3.4. Table 3-8
	Tree Martin	Rare	Coastal areas (but not actual beaches) with some extension into claypan areas	No	Sections 3.4.2.3.1 and 3.4.2.3.4. Table 3-8
	Wood Swallow	High	Widespread	No	Sections 3.4.2.3.1 and 3.4.2.3.4. Table 3-8
Littoral Birds	Australian Pelican, Eastern Reef, Nankeen Night Heron, Black-tailed Godwit, Whimbrel, Eastern Curlew, Common Greenshank, Terek Sandpiper, Common Sandpiper, Grey-tailed Tattler, Ruddy Turnstone, Great Knot, Red Knot, Sanderling Calidris, Red-necked Stint, Sharp-tailed Sandpiper, Curlew Sandpiper, Pacific Golden Plover, Grey Plover, Lesser Sand Plover, Greater Sand Plover, Silver Gull, Gull-billed Tern, Caspian Tern, Lesser Crested Tern, Crested Tern, Roseate Tern, Common Tern, Little Tern, Fairy Tern, White-winged Black Tern	High	Concentrated on Barrow Island around Bandicoot Bay on south coast	No	Sections 3.4.2.3.1 and 3.4.2.3.2. Table 3-7
	Bar-tailed Godwit Lesser Noddy	Low	Concentrated on Barrow Island around	No	Sections 3.4.2.3.1 and 3.4.2.3.2.

	Species	Abundance on Barrow Island	Habitat / Distribution on Barrow Island	Species or Habitat Potentially Impacted ¹	Baseline Information in this Addendum
			Bandicoot Bay on south coast		Table 3-7
Raptors (Birds of Prey)	Spotted Harrier Brahminy Kite Osprey White-bellied Sea-eagle Australian Kestrel	Low	Widespread around the coastal margin of the island	Yes – Vehicles, vessel or building rigging	Sections 3.4.2.3.1, 3.4.2.3.3 and 3.4.2.3.4. Table 3-8
Sea Birds	Wedge Tailed Shearwater Bridled Tern	High	Breeding colony on Double Island	No	Sections 3.4.2.3.1 and 3.4.2.3.3.
Medium-sized Mammals	Boodie Golden Bandicoot Spectacled Hare-wallaby Barrow Island Euro	High	Widespread across landforms and vegetation communities	Yes – Vehicles, entrapment in trenches	Section 3.4.2.1 Table 3–6
	Black-flanked Rock-wallaby	Low	Restricted to the deeply incised valleys on the west coast of Barrow Island	No	
Fish	Barrow Cave Gudgeon ²	Unknown	Subterranean aquifer	No	Sections 3.4.2.5
	Blind Eel	Unknown	Subterranean aquifer	No	Section 3.4.2.5

Notes:

1. Refer to Section 4.2
2. Pending EPBC classification. See note regarding taxonomic revision in Section 3.4.2.5

The extreme northern extent of the Southern Giant-Petrel (*Macronectes giganteus*), which is common in the Southern Ocean, may include Barrow Island but there are no records of this species on Barrow Island. This species is therefore not considered in this Addendum.

Similarly, the EPBC protected matters database indicates that the Hamelin Ctenotus (*Ctenotus zasticus*) may occur on Barrow Island, but this species has not been recorded on Barrow Island (Ref. 79) and its habitat (mallee vegetation, consisting of a *Eucalyptus* overstorey with an understorey of hummock grassland on red sandplains [Ref. 79]) is not present in the shore crossing extension site. Therefore, this species is not considered in this Addendum

3.1.4 Ecological Relationships

Section 3.1.4 of the TSBSEIR (Ref. 1) describes the relationships between the ecological elements defined in Condition 6.1 of MS 800 and MS 769, and Condition 5.1 of EPBC Reference: 2003/1294 and 2008/4178. The shore crossing extension site does not contain any additional or different relationships.

The significant and direct relationships between ecological elements are discussed and characterised in the subsequent sections of this Addendum.

3.2 Flora

3.2.1 Methodology

3.2.1.1 Barrow Island Surveys and Targeted Surveys for the Gorgon Gas Development

There is substantial information on the flora of Barrow Island, with at least 110 reports and publications on the flora and vegetation of Barrow Island published prior to the commencement of construction for the Gorgon Gas Development (Ref. 23). The flora surveys and associated flora inventories for Barrow Island, including targeted surveys for the Gorgon Gas Development, are described in Section 4.1.1 of the TSBSEIR (Ref. 1). Flora within the shore crossing extension site has also been recorded during annual vegetation monitoring surveys at North Whites Beach since 2009 and a targeted botanical survey conducted over the shore crossing extension site in June and November 2021 (refer Section 3.3).

3.2.1.2 Definition of Significant Flora

Flora is considered significant on Barrow Island (Ref. 1) if it is:

- listed as Threatened or as Priority Flora by DBCA
- restricted or poorly known on Barrow Island
- characterised by low regeneration rates after disturbance
- at the southern, western, or northern limit of its known distributions.

3.2.2 Results

The flora of the shore crossing extension site is dominated by *Spinifex longifolius* on the incipient and foredunes, and *Acacia coriacea* on the crests and swales of the back dunes, typical of coastal dune areas on Barrow Island. All the plant taxa recorded from the site also occur elsewhere on Barrow Island and the mainland.

No Threatened flora species, as listed under the *Biodiversity Conservation Act 2016* (WA) (BC Act) (Ref. 30) or under the EPBC Act (Ref. 31), have been recorded on Barrow Island.

Priority species have been collected on Barrow Island. Priority flora is a non-legislative category aimed to manage those plant taxa listed by DBCA on the basis that they are known from only a few collections, or a few sites, but which have not been adequately surveyed. Such flora may be threatened, but cannot be considered for listing as Threatened flora until such survey work has been undertaken.

There are no Priority 1 or 2 Flora species as listed by DBCA within the shore crossing extension site; the closest recording of a Priority 1 or 2 Flora species is ~1.15 km outside the HDD site. The Priority 3 species, *Corchorus congener*, is widely distributed across Barrow Island and on the mainland and is not considered as conservation-significant flora on Barrow Island (Ref. 29). Although not recorded during monitoring to date on the site, it is known to occur in the vicinity and may be present.

A large community of *Erythrina vespertilio*, which is considered a restricted species of flora on Barrow Island (Ref. 29), has been repeatedly recorded (Ref. 24; Ref. 27; Ref. 28; Ref. 32, Ref. 33) to the north, north east of the shore

crossing extension site (Figure 3-1) and confirmed to have survived a natural wildfire in this area that occurred in 2013 (Ref. 33). Vegetation survey over the area in June and November 2021 (Ref. 33) recorded a total of 697 live *Erythrina* plants, including six individuals at two positions just within the eastern boundary of the shore crossing extension site (Figure 3-1). This species is also known to occur in at least three other locations on Barrow Island (Ref. 32) and is widespread across northern Australia, collected from Shark Bay to the Northern Territory border south of Halls Creek on the mainland (WA Herbarium cited in Ref. 1). None of the other 40 species of significance identified on Barrow Island (Ref. 29) has been recorded in the site.

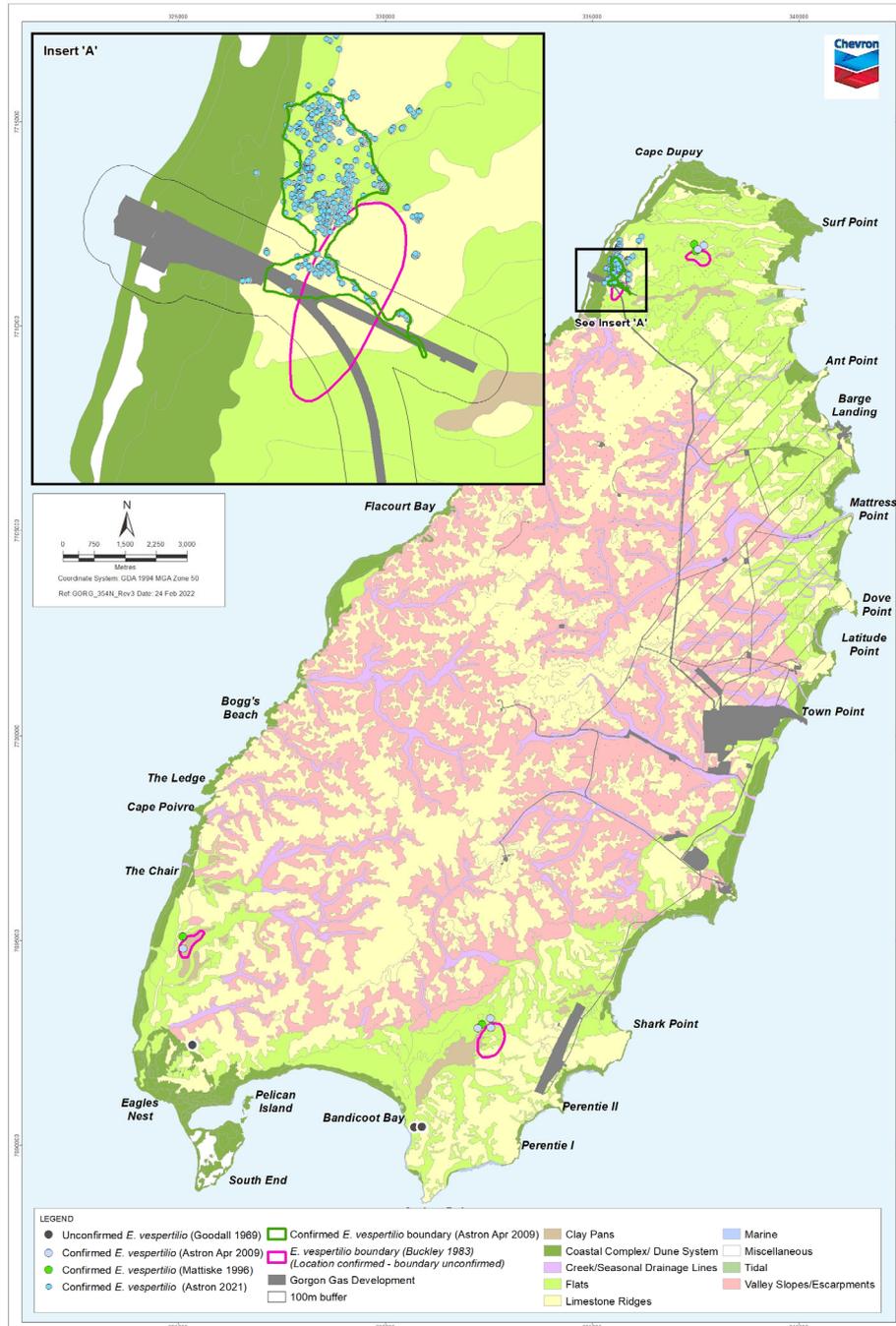


Figure 3-1: Distribution of *Erythrina vesperilio* at North Whites Beach

3.3 Vegetation

3.3.1 Methodology

3.3.1.1 Barrow Island Surveys and Targeted Surveys for the Gorgon Gas Development

There is substantial information on the vegetation of Barrow Island, with at least 110 reports and publications on the flora and vegetation of Barrow Island published prior to the commencement of construction for the Gorgon Gas Development (Ref. 23).

Detail of the various scales and classifications applied to vegetation surveys on Barrow Island, including targeted surveys undertaken for the Gorgon Gas Development, are described in Section 4.2.1 of the TSBSEIR (Ref. 1). Table 3-2 summarises the terminology used for vegetation units on Barrow Island, equivalent National Vegetation Information System (NVIS) descriptions and the extent of Barrow Island to which they have been applied.

Table 3-2: NVIS Descriptions for Mapped Vegetation Units

NVIS Description	Survey	Portion of Barrow Island Mapped	Mapping Scale	Units in Original Surveys	Example of Code for Unit
-	Mattiske (Ref. 26)	100%	1:25 000	Habitats	C
Broad Floristic Formation	Buckley (Ref. 24)	100%	1:20 000	Large scale vegetation unit	-
Formation	Mattiske (Ref. 26)	100%	1:25 000	Community	C1
Subformation	Astron Environmental Services (Ref. 29)	11%	1:5000	Not named	C1a
Association	CAPL (Ref. 6), Astron Environmental Services (Ref. 29)	11%	1:5000	Association	C1a2

Vegetation at North Whites Beach, including within the shore crossing extension site, has been mapped at Formation (Ref. 26) and Association (Ref. 29) levels, as shown in Map 4 of the TSBSEIR (Ref. 1).

Vegetation associations within the shore crossing extension site at North Whites Beach have subsequently been monitored annually since 2009 with the boundaries of vegetation associations confirmed by a targeted survey conducted over the area by Astron Environmental Services in June and November 2021 (Ref. 33).

3.3.1.2 Definition of Significant Vegetation

The significant vegetation units on Barrow Island (Ref. 1) consist of:

- formations restricted on Barrow Island to less than 90 ha
- formations vulnerable to degradation (neither resistant nor resilient to disturbance and very slow to recover/self-regenerate after disturbance ceases)
- subformations defined by, and typically containing greater than 2% cover of, a plant taxon that is restricted to an area on Barrow Island

- subformations isolated in atypical landscape positions by geological processes.

Applying these criteria results in the following formations being identified as significant:

- stands of *Erythrina vespertilio*, *Eucalyptus xerothermica* and *Ficus virens* var. *virens*, which are restricted, mapped by Mattiske (Ref. 26) as F4, L8 and L2 respectively
- restricted plant communities, tidal (T1 and T2), marine areas (M1), claypans (S1 and S2), creekbeds (D1, D2 and D3) mapped by Mattiske (Ref. 26)
- restricted hummock grasslands of *Triodia angusta* with emergent *Acacia synchronicia*, mapped by Mattiske (Ref. 26) as F2. There are a range of short-lived and annual plant species in this formation, which has the highest levels of recorded species richness, with in excess of 100 species recorded in 100 m²
- coastal dunes, mapped by Mattiske (Ref. 26) as C1, C2, C3, C4, C6 and C7, which are vulnerable to erosion.

In addition, formations F3 and L10 are identified as significant as they have an extent of 37 ha and 48 ha respectively. Associations that form part of significant subformations are also considered significant.

3.3.2 Results

The vegetation formations (Ref. 26) that occur within the shore crossing extension site are presented in Table 3-3. Four vegetation formations have been mapped in the area—C1, C2, C3, and L9. The site also includes areas of bare sand. At formation level, the vegetation of the shore crossing extension site is dominated by C2 (Open Scrub of *Acacia coriacea* – *Rhagodia* subsp. *obovata* – *Olearia dampieri* subsp. *dampieri* on elevated dunes on fringes of island), which comprises approximately 1.2 ha (~41%) of the shore crossing extension area, and C3 (Hummock Grassland of *Triodia pungens* with dense shrubs including *Acacia bivenosa* on back-slopes of foredunes), which comprises approximately 0.45 ha (~15%) of the site. The shore crossing extension site covers less than 0.25% of the mapped distribution of each of these vegetation formations across Barrow Island.

Based on the more restricted mapping using the vegetation association level classifications developed by Astron Environmental Services (Ref. 29), four vegetation associations (Table 3-4 and Figure 3-2) are present within the site. The dominant associations within the shore crossing extension site are C1c1 (approximately 37 %) and C4a1 (approximately 36 %). All of these associations occur in adjacent areas outside of the shore crossing extension site, in the Barrow Island nature reserve.

Table 3-3: Vegetation Formations within the Shore Crossing Extension Site

Vegetation Formation		Area (ha) mapped on Barrow Island ⁽¹⁾	Area (ha) within the Shore Crossing Extension Site
C1	Low open shrubland to shrubland of <i>Acacia coriacea</i> subsp. <i>coriacea</i> with <i>Threlkeldia diffusa</i> over hummock	257.41	0.26

Vegetation Formation		Area (ha) mapped on Barrow Island ⁽¹⁾	Area (ha) within the Shore Crossing Extension Site
	grassland to closed hummock grassland of <i>Triodia epactia</i> .		
C2	Shrubland of <i>Acacia coriacea</i> subsp. <i>coriacea</i> over low shrubland to shrubland of <i>Olearia dampieri</i> subsp. <i>dampieri</i> , <i>Stylobasium spathulatum</i> and <i>Acacia bivenosa</i> over hummock grassland of <i>Triodia epactia</i> over low scattered <i>Threlkeldia diffusa</i> herbs.	535.21	1.20
C3	Low shrubland of <i>Acacia coriacea</i> subsp. <i>coriacea</i> with <i>Rhagodia preissii</i> subsp. <i>Obovate</i> over very open herbs of <i>Threlkeldia diffusa</i> over grassland to hummock grassland of <i>Triodia epactia</i> and <i>Spinifex longifolius</i> .	413.98	0.45
L9	Open shrubland of <i>Acacia coriacea</i> subsp. <i>coriacea</i> over low open shrubland of <i>Olearia dampieri</i> subsp. <i>dampieri</i> and <i>Acacia bivenosa</i> with occasional <i>Stylobasium spathulatum</i> over hummock grassland of <i>Triodia epactia</i> (on dunes) over scattered <i>Heliotropium glanduliferum</i> and <i>Diplopeltis eriocarpa</i> (on back dunes and on red/brown sandy flats).	1747.30	0.21

Source:

1. Areas in parenthesis denote area known on Barrow Island prior to Gorgon Gas Development vegetation clearing.
2. Currently, Chevron Australia has mapped 2733 ha of vegetation on Barrow Island, which is approximately 11% of the total area of Barrow Island (23 567 ha). Therefore, it is likely that vegetation associations have a greater extent on Barrow Island and actual proportions of specific vegetation associations that may be cleared are less than presented.

Table 3-4: Vegetation Associations within the Shore Crossing Extension Site

Vegetation Association		Area (ha) mapped to date on Barrow Island ^(1, 2)	Area (ha) within the Shore Crossing Extension Site
C1c1 ⁽³⁾	<i>Spinifex longifolius</i> tussock grassland over <i>Threlkeldia diffusa</i> very open herbland with <i>Rhagodia preissii</i> subsp. <i>obovata</i> and <i>Frankenia pauciflora</i> var. <i>pauciflora</i> scattered low shrubs..	8.24 (8.98)	1.00
C4a1 ⁽³⁾	<i>Acacia coriacea</i> subsp. <i>coriacea</i> shrubland to open shrubland over <i>Threlkeldia diffusa</i> low shrubland over <i>Triodia epactia</i> hummock grassland to closed hummock grassland.	8.96 (10.29)	0.98
C4a3	<i>Acacia coriacea</i> subsp. <i>coriacea</i> shrubland to open heath over <i>Rhagodia preissii</i> subsp. <i>obovata</i> and <i>Olearia</i> sp. Kennedy Ranges (G. Byrne 66) low open shrubland over <i>Triodia epactia</i> hummock grassland to closed hummock grassland. Sometimes with <i>Threlkeldia diffusa</i> scattered shrubs and <i>Spinifex longifolius</i> tussock grasses..	5.21 (5.64)	0.46
C4a4	<i>Acacia coriacea</i> subsp. <i>coriacea</i> tall open shrubland to tall open heath over <i>A. bivenosa</i> shrubland to open heath over <i>Triodia epactia</i> hummock grassland to closed hummock grassland.	7.24 (7.38)	0.25

Notes:

1. Areas in parenthesis denote area known on Barrow Island prior to Gorgon Gas Development vegetation clearing.
2. Currently, Chevron Australia has mapped ~2733 ha of vegetation on Barrow Island, which is ~ 11% of the total area of Barrow Island (23 567 ha). Therefore, it is likely that vegetation associations have a greater extent on Barrow Island and actual proportions of specific vegetation associations that may be cleared are less than presented.
3. Conservation-significant vegetation: Vegetation restricted in areal coverage on Barrow Island, based on total land area of Barrow Island (Ref. 29).

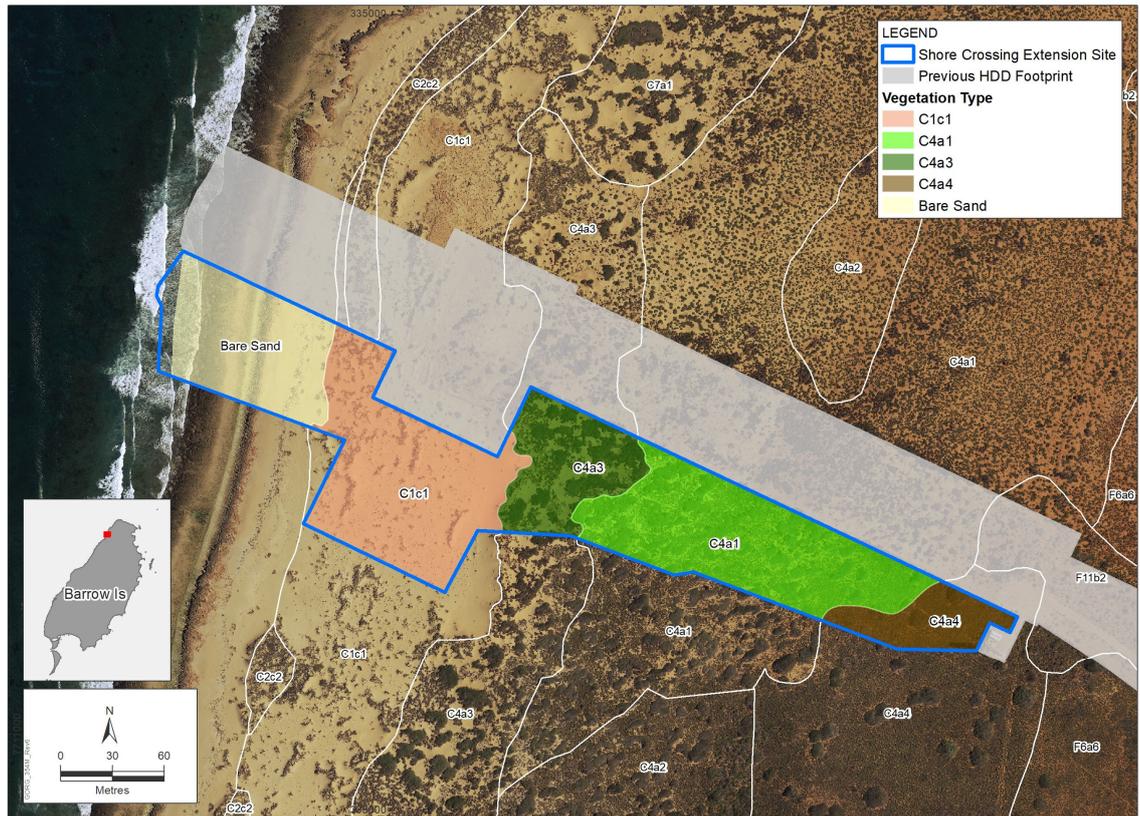


Figure 3-2: Vegetation Associations on the Shore Crossing Extension Site

3.3.2.1 Gorgon Gas Development Clearing

The *Barrow Island Act 2003* (WA) defines the total area and breakdown (distribution) of uncleared land on Barrow Island that can be used for gas processing purposes. Under section 9 of the *Barrow Island Act 2003* (WA), no more than 332 ha in total of uncleared land on Barrow Island can be the subject of a lease, licence, or easement for gas processing purposes.

The TSBSEIR (Section 4.2.2.1, Ref. 1) describes the extent of vegetation formations on Barrow Island in which previous (oilfield) disturbance had occurred and the extent of any construction-related clearing expected for the Gorgon Gas Development at the time the TSBSEIR was developed, which included 32 ha of land for the Additional Support Area. The land tenure boundaries for the Gorgon Gas Development have since changed, including the extension for the shore crossing which is the subject of this Addendum. Table 3-5 outlines the extent of vegetation clearing currently proposed for the Gorgon Gas Development, inclusive of these changes to the shore crossing site.

Table 3-5: Approximate Extent of Vegetation Formations that will be Cleared in the Gorgon Gas Development Footprint on Barrow Island

Formation ¹	Total Extent ¹ (ha)	GTP	CO ₂ Injection System	Associated Terrestrial Infrastructure	Areas impacted for seismic data acquisition	Onshore Feed Gas Pipeline System	Terrestrial component of the Shore Crossing	Total Extent to be Cleared ² (ha)	Total % to be Cleared ²
C1	257.41						0.53	0.53	0.20%
C2	535.21	0.23	0.17	0.02	0.31		3.05	3.78	0.71%
C3	413.98			0.31	0.59		0.87	1.77	0.43%
C4	69.63							0	0.00%
C5	205.45	1.08		0.37				1.45	0.71%
C6	14.19							0	0.00%
C7	38.18							0	0.00%
D1	37.12			0.15	0.13			0.28	0.75%
D2	1096.68	19.74	2.56	4.8	1.65	2.02		30.77	2.81%
D3	0.64							0	0.00%
F1	1567.19	26.64	3.21	25.03	1.47			56.35	3.60%
F2	9.01							0	0.00%
F3	36.87							0	0.00%
F4	42.23							0	0.00%
F5	1374.32			0.26	1.23	1.16	0.77	3.42	0.25%
F6	137.47							0	0.00%
F7	856.25		0.39		2.74	2.46		5.59	0.65%
F8	NA							0	0.00%
L1	2727.84		0.59	0.4	0.31	1.34		2.64	0.10%
L2	19.60							0	0.00%
L3	2782.50	2.47	5.93	1.7	3.47	5.46		19.03	0.68%
L4	322.73		0.76		0.63	1.03		2.42	0.75%
L5	105.68			0.01	0.1			0.11	0.10%
L6	93.67			0.27	0.03	2.94		3.24	3.46%
L7	1583.41	55.96	2.5	9.42	1.98	7.51		77.37	4.89%
L8	8.83							0	0.00%
L9	1747.30		0.42	7.18	1.34	0.95	2.62	12.51	0.72%
L10	47.51							0	0.00%

Formation ¹	Total Extent ¹ (ha)	GTP	CO ₂ Injection System	Associated Terrestrial Infrastructure	Areas impacted for seismic data acquisition	Onshore Feed Gas Pipeline System	Terrestrial component of the Shore Crossing	Total Extent to be Cleared ² (ha)	Total % to be Cleared ²
M1	23.86							0	0.00%
S1	192.22							0	0.00%
S2	0.91							0	0.00%
T1	12.20				0.01			0.01	0.08%
T2	3.64							0	0.00%
V1	6822.93	61.21	11.57	21.52	5.14	13.59		113.03	1.66%
V2	144.57			0.29				0.29	0.20%
V3	NA							0	0.00%
Unvegetated/ Disturbed	121.51			0.19			1.25	1.44	1.19%
Total	23452.75	167.33	28.1	71.92	21.13	38.46	9.08	336.02	1.43%

Notes:

- Based on mapping of Mattiske (Ref. 26)*
- Based on tenure and mapped vegetation unit boundaries which may overestimate actual area of vegetation clearing*

Significant Ecological Elements are shaded in grey.

While Table 3-5 provides an indication of the extent of previous and forecasted clearing, a more precise delineation of cleared areas for the Gorgon Gas Development is provided via the Vegetation Clearing and Audit Common User Procedure (Ref. 34).

3.4 Fauna

3.4.1 Methodology

3.4.1.1 Barrow Island Surveys and Targeted Surveys for the Gorgon Gas Development

There is substantial information on the fauna of Barrow Island. An Annotated Bibliography of the Natural History of Barrow Island 1622–2004 (Ref. 23) identified 41 reports and publications on the invertebrate fauna of Barrow Island, and 217 reports and publications on the vertebrate fauna of Barrow Island.

The pre-development fauna surveys and associated species inventories for Barrow Island, including targeted surveys for the Gorgon Gas Development, are described in Section 4.3 of the TSBSEIR (Ref. 1). Monitoring of significant fauna has subsequently occurred annually or biannually within and/or in the vicinity of the shore crossing extension site as part of the Terrestrial and Subterranean Environmental Monitoring Program (TSEMP; Ref. 17) and the Short Range Endemics and Subterranean Fauna Monitoring Plan (SRESFMP; Ref. 54). A

survey of Boodie activity which included the area within 2 km of the shore crossing extension site was undertaken in 2019 (Ref. 35).

3.4.1.2 Definition of Significant Fauna

The fauna assemblages of Barrow Island are significant because the Island has not been colonised by non-indigenous terrestrial mammals that could alter ecological processes, and because direct interactions with humans have been strictly controlled.

Specific fauna species are considered significant (Ref. 1) if they are:

- listed under the EPBC Act (Cth)
- listed under the BC Act (WA)
- listed as Priority species by DBCA
- short-range endemics (SREs)
- top-level predators on the Island and therefore critical to ecological processes.

Fauna inventories and species of significance for Barrow Island are listed in Section 4.3 and Appendices 4-8 and 12 of the TSBSEIR (Ref. 1).

3.4.2 Results

3.4.2.1 Mammals

The mammals of Barrow Island are well documented and there are voucher specimens lodged with the Western Australian Museum for all mammal species recorded on Barrow Island. Only one additional mammal has been recorded on Barrow Island since 1974, and none since 1988, indicating that the inventory of mammals on Barrow Island is comprehensive.

Five of the 13 species of resident terrestrial mammals on Barrow Island are listed as threatened under the BC Act (WA) or the EPBC Act (Cth), with an additional one listed as Conservation Dependent under the BC Act (Table 3–6). The six species of resident terrestrial mammals on Barrow Island identified as significant (Ref. 1) are:

- Water-rat (*Hydromys chrysogaster*)
- Black-flanked Rock-wallaby (*Petrogale lateralis lateralis*)
- Barrow Island Euro (*Osphranter robustus isabellinus*)
- Spectacled Hare-wallaby (*Lagorchestes conspicillatus conspicillatus*)
- Barrow Island Golden Bandicoot (*Isodon auratus barrowensis*)
- Boodie (*Bettongia lesueur*).

Apart from the Black-flanked Rock-wallaby, which is thought to be restricted to the rocky cliff habitat that occurs further south on the west coast of Barrow Island, all known terrestrial mammals of Barrow Island may occur on or in the vicinity of the shore crossing extension site.

There are no fauna habitats unique to the shore crossing extension site; therefore, it is considered highly unlikely that unusual concentrations of mammals should be present or that any mammals would be reliant on the site for survival.

Table 3–6: Significant Mammals on Barrow Island

Common Name	Scientific Name	Conservation Status	Comments
Burrowing Bettong / Boodie	<i>Bettongia lesueur lesueur</i>	Vulnerable ¹ Specially Protected ³	Widely distributed on Barrow Island; tracks indicate foraging occurs at North Whites Beach, however, there are no Burrowing Bettong warrens located within 250 m of the HDD site (Ref. 35).
Barrow Island Golden Bandicoot	<i>Isoodon auratus barrowensis</i>	Vulnerable ^{1,2}	Widespread and abundant throughout their range on Barrow Island. They are the most abundant mammal on the island with an estimated pre-development population of 60 000 to 80 000 (Ref. 1).
Spectacled Hare-wallaby	<i>Lagorchestes conspicillatus conspicillatus</i>	Vulnerable ^{1,2}	Widely distributed on Barrow Island generally inhabiting the tall, dense <i>Triodia angusta</i> grasslands of drainage systems. They also forage at night in other areas such as <i>Melaleuca</i> spp. and <i>Triodia</i> spp. on limestone hilltops and may be present on or in the vicinity of the HDD site.
Barrow Island Euro	<i>Osphranter robustus isabellinus</i>	Vulnerable ^{1,2}	Widely distributed on Barrow Island and may be present within the HDD area although the site has limited structural habitat that could provide shelter for the Barrow Island Euro.
Black-flanked Rock-wallaby	<i>Petrogale lateralis lateralis</i>	Endangered ^{1,2}	Largely confined to limestone outcrops on the west of the island; however, their range does not extend as far north as North Whites Beach.
Water Rat	<i>Hydromys chrysogaster</i>	Priority 4 ⁴	Generally inhabit rocky crevices and forage on adjacent sandy beaches and intertidal areas. Tracks have been observed on beaches on the west coast of Barrow Island therefore Water Rats may be present within the HDD site.

Notes:

- 1: Listed Threatened category under the EPBC Act (Cth)
- 2: Listed Threatened category under the BC Act (WA)
- 3: Specially Protected (Conservation Dependent) under the BC Act (WA)
- 4: DBCA Priority Fauna listing

3.4.2.2 Reptiles and Amphibians

Species accumulation curves suggest that the majority of the reptile species on Barrow Island have been documented, with only three additional reptiles recorded since 1977 (Ref. 1).

There are no listed Threatened species of herpetofauna recorded on Barrow Island. Of the significant species of terrestrial reptile identified for Barrow Island (Ref. 1), only the Perentie (*Varanus giganteus*) and Leopard Skink (*Ctenotus pantherinus acripes*) are expected to be present in the shore crossing extension site. The blind (subterranean) snakes known from Barrow Island are dependent on air filled karst, which is considered unlikely to be present at the coastal shore crossing location (Ref. 6).

The Leopard Skink appears to be restricted to Barrow Island where it is reported to be 'abundant and widespread' (Ref. 37; Ref. 38). The species was recorded by Smith (Ref. 39) as inhabiting the 80% of the Island occupied by rocky areas of *Triodia* steppe, but it has also been captured in a wide range of habitats on Barrow Island (Ref. 6; Ref. 38).

The Perentie is ecologically significant on Barrow Island as it is an abundant top-level predator. It is the largest Australian lizard and a dominant predator with few natural enemies (Ref. 40). Perenties occur over a large part of the interior of Australia. On Barrow Island, it is common island -wide with tracking studies indicating some movement to coastal areas in the summer months when it feeds off turtle eggs and hatchlings (Ref. 38).

There is no indication that any habitats within the Gorgon Gas Development footprint, including the shore crossing area at North Whites Beach, have particular importance to these significant reptile species or would support higher herpetofauna diversity than elsewhere on the Island (Ref. 6).

3.4.2.3 Avifauna

3.4.2.3.1 Overview

Birds regularly travel between the Pilbara mainland and the offshore islands within the Montebello/Lowendal/Barrow Island groups. Consequently, many of the birds on Barrow Island represent migrants or vagrants rather than resident populations.

The number of bird species that have been recorded on Barrow Island varies both seasonally and annually. The pre-development avifauna of Barrow Island and their conservation status are listed in Appendix 5 of the TSBSEIR (Ref. 1). Of the 119 bird species recorded on Barrow Island, 68 are protected under the EPBC Act (39 species are listed under the JAMBA, CAMBA or ROKAMBA migratory treaties, 54 are listed as marine species under the Act, and one species is listed under the Bonn Convention for Migratory Species). Of these 68 protected species, 47 are residents or regular migrants to the Island. The remainder are vagrants from the nearby mainland. Only one resident terrestrial bird species on Barrow Island, the White-winged Fairy-wren (Barrow Island) (*Malurus leucopterus edouardi*), is listed as threatened under the BC Act and EPBC Act.

The avifauna of Barrow Island includes littoral birds, sea birds and landbirds. As the shore crossing extension site is in a coastal location, many if not all of the species recorded from Barrow Island may occur, at least on occasion, on or in the vicinity of the site.

3.4.2.3.2 Littoral Birds

Littoral birds are widely distributed around Barrow Island, in particular on mudflats and rocky intertidal pavements (Ref. 48). The highest abundances of littoral avifauna on Barrow Island (over two-thirds of records of most species) are associated with the extensive tidal mudflats in the south and south-east of the Island (Ref. 49).

Surveys around the entire coastline of Barrow Island recorded only a small portion of the Island's littoral avifauna within the 'North West' region of Barrow Island that encompasses North Whites Beach (Ref. 1) and hence the shore crossing extension site location. The percentage of individuals of the EPBC Act listed littoral birds considered residents or regular migrants to Barrow Island that were recorded in that region (Ref. 48) is provided in Table 3-7.

Table 3-7: Proportion of EPBC Act Listed Resident/Regular Migrant Littoral Birds around North Whites Beach

	Percentage of Individuals Observed in the North West Region of Barrow Island	Total Number of Individuals Observed on Barrow Island
Australian Pelican	4	228
Eastern Reef Egret	2	776
Bar-tailed Godwit	3	9653
Whimbrel	4	979
Common Sandpiper	2	395
Grey-tailed Tattler	5	26607
Ruddy Turnstone	9	17885
Sanderling	5	983
Red-necked Stint	1	65188
Pacific Golden Plover	8	247
Grey Plover	4	1550
Greater Sand Plover	2	9569
Silver Gull	12	8133
Lesser Crested Tern	2	2028
Crested Tern	4	10292
Roseate Tern	6	8902
Common Tern	1	6544
Little Tern	1	239
Fairy Tern	1	7926

3.4.2.3.3 Sea Birds

Consistent with Section 4.3.4.3 of the TSBSEIR (Ref. 1), sea birds such as Ospreys, Sea Eagles and Kites that build nests and/or forage onshore Barrow Island are discussed in the following (landbirds) section of this Addendum. The shore crossing extension site is considered to have no particular value to birds classified as 'offshore' sea birds in the TSBSEIR (Ref. 1). The nearest known nesting locations for Wedge-tailed Shearwaters and Bridled Terns is on Double Island, off the east coast of Barrow Island.

3.4.2.3.4 Landbirds

The abundance and distribution of landbirds are well documented on Barrow Island, with no additional bird species recorded for the Island since 1963 (Ref. 1). The relative abundance and habitat preferences for the species that had Barrow Island populations estimated by Pruett-Jones and O'Donnell (Ref. 42) are listed in Table 3-8.

The most common landbirds on Barrow Island are the Spinifexbird, White-winged Fairy-wren (Barrow Island), Singing Honeyeater, White-breasted Wood Swallow and the Welcome Swallow (Ref. 1). Of these, the White-winged Fairy-wren

(Barrow Island) and the Welcome Swallow are considered significant species on Barrow Island (Ref. 1).

The Welcome Swallow is Australia's most widespread swallow, occurring in a wide range of habitats (Ref. 73). On Barrow Island it is commonly seen in proximity to infrastructure, often building nests under roof eaves (Ref. 52). There is no infrastructure on the shore crossing extension site and the EPBC protected matters database does not indicate this species is likely to be present within the area, but it may occur.

The White-winged Fairy-wren (Barrow Island) is restricted to Barrow Island and is listed as Vulnerable under the BC Act (WA) and EPBC Act (Cth). Although it is abundant in most habitats on Barrow Island, especially those with complex vegetation structure, it is most commonly associated with *Melaleuca cardiophylla* shrublands. Vegetation within the shore crossing extension site may provide habitat for the White-winged Fairy-wren (Barrow Island) which is known to nest across Barrow Island (Ref. 42); however, melaleuca has not been recorded during vegetation monitoring on the site (Ref. 43; 44; 45; 46; 47) and monitoring of the White-winged Fairy-wren (Barrow Island) under the TSEMP (Ref. 17) has not identified nesting on the shore crossing extension site.

Table 3-8: Summary of Landbird Habitat Preferences on Barrow Island

Species	Habitat Preferences and Comments for Barrow Island (Pruett-Jones and O'Donnell Ref. 42)
Spotted Harrier	Uncommon, scattered along coast
Brahminy Kite	Rare, scattered along coast but occasionally seen inland
Osprey	Regularly spaced along coast, nesting pairs observed using artificial structures
White-bellied Sea-eagle	Along coast, anecdotal information indicates that it hunts in inland areas
Australian Kestrel	Rare, occasionally seen inland and reported to be on coast
Bar-shouldered Dove	Common on Barrow Island in central limestone ridges in valleys, less so on flats and in coastal areas. Known to nest on limestone ledges, caves, in mangroves and Acacia species along coast.
Black-eared Cuckoo	Irregular migrant. Rare but scattered throughout Island, associated with emergent shrubs and trees.
Horsfield's Bronze Cuckoo	Regular migrant. Uncommon but scattered throughout Island, associated with emergent shrubs and trees
Sacred Kingfisher	Likely regular migrant. Rare and only seen along creeks and drainage lines. Sedgwick (Ref. 41) noted preference for mangroves.
Welcome Swallow	Common and widespread, and more common in disturbed areas
Tree Martin	Rare. Sedgwick (Ref. 41) noted preference for coastal areas (but not actual beaches) with some extension into claypan areas.
Spinifexbird	Most abundant bird on Barrow Island and in habitats with spinifex
White-winged Fairy-wren (Barrow Island)	Abundant in most habitats on Barrow Island, especially those with complex vegetation structure
Singing Honeyeater	Abundant in habitats on Barrow Island with dense vegetation or with emergent shrubs and trees
Zebra Finch	Regular migrant. Common on claypans, uncommon elsewhere.
White-breasted Woodswallow	Common and most abundant where vegetation is dense or there are emergent shrubs and trees

3.4.2.4 Terrestrial Invertebrates

In excess of 1900 species from 26 orders of terrestrial invertebrates have been collected on Barrow Island. None are listed as requiring special protection under the EPBC Act, BC Act or DBCA lists but the following species identified as SREs on Barrow Island are considered significant (Ref. 1):

- mygalomorph (trapdoor) spiders
- pseudoscorpions *Synsphronus* sp. nov. 'barrow', *Angarypus heatwolei*, *Austrohorus* sp. 1, *Xenolpium* sp. 1 and *Xenolpium* sp. 2
- scorpion *Urodacus* sp. nov. 'barrow'
- land snails *Rhagada* sp. 1 and sp. 2, *Quistrachia barrowensis*, *Pupoides contrarius* and *P. beltianus*.

With the exception of *Idiommata* sp., surveys have proven that these species are widespread on Barrow Island and therefore some or all may occur on the shore crossing extension site. Seasonal factors appear to have a greater influence on invertebrate assemblages than geography, vegetation complexes or soil types on Barrow Island (Ref. 53) and it is highly unlikely the relatively small site would contain unique invertebrate assemblages.

3.4.2.5 Subterranean Fauna

Nineteen troglifauna and 63 stygofauna species are known from Barrow Island (Ref. 55). Two of these species are listed as threatened under the EPBC Act¹ and a further ten as threatened species under the BC Act (Table 3-9). Most of the troglifauna and stygofauna species that have been well-collected, that have a taxonomic frame of reference, and for which genetic or morphological work has been completed, have demonstrated a wider distribution on Barrow Island (Ref. 57; Ref. 59).

Two stygal vertebrates have been recorded on Barrow Island—the Barrow Cave Gudgeon (*Milyeringa justitia*) and a blind eel (*Ophisternon* sp.). The Barrow Cave Gudgeon (*Milyeringa justitia*) was previously reported as the Blind Gudgeon (*Milyeringa veritas*), which is known extensively from Cape Range on the mainland, but was reclassified in 2013 (Ref. 58). The Barrow Cave Gudgeon is a Threatened species under the BC Act. Larson *et al.* (Ref. 58) reports (citing Ref. 61) that habitat suitable to support the Barrow Cave Gudgeon may extend over approximately 7,800 ha (approx. 35%) of Barrow Island, with records primarily from the central parts of the Island where the freshwater aquifer is thickest (Ref. 55).

The blind eel (*Ophisternon* sp.) has not been identified to species level but, given the wide range of *Ophisternon candidum* in stygal ecosystems in the Pilbara, the single blind eel found on Barrow Island is taken to be *Ophisternon candidum* for the purposes of conservation status (Ref. 56). *Ophisternon candidum* is listed as Vulnerable under the EPBC Act and the BC Act.

The Subterranean Blind Snake (*Anilius longissimus*) is listed by DBCA as a Priority 2 species and is likely to be endemic and restricted to Barrow Island since it is known from only one specimen collected on Barrow Island.

¹ The sightless Gudgeon found on Barrow Island has previously been reported as *M. veritas* but has been reclassified as *M. justitia* (Ref. 58). At the time of writing, this taxonomic revision had yet to be adopted under the EPBC Act. However, for the purposes of this report *M. justitia* has been included as a matter of NES consistent with *M. veritas*, which is listed as Vulnerable under the EPBC Act.

The Blind Snake and Blind Eel have to date only been recovered through sub-surface petroleum activities with both known only from locations distant (>2 km) from the shore crossing extension site.

Considering the general pattern of broader distributions for many subterranean taxa on Barrow Island, and the apparent connectivity in habitats, it is possible species recorded to have wide distributions on Barrow Island may occur within the shore crossing extension site. However, the site is not expected to be significant for subterranean fauna because the coast and hinterlands are typically sandy with minimal karst development, and there is a high likelihood that any fractures and cavities present at North Whites Beach would be sand-filled (Ref. 6). The freshwater lens is typically absent within 200 m – 500 m of the coast (Ref. 65).

Table 3-9: Protected Subterranean Fauna on Barrow Island

Common Name	Scientific Name	BC Act Listing	EPBC Act Listing
Barrow Island bogidomma amphipod	<i>Bogidomma australis</i>	Vulnerable	-
Barrow Island liagoceradocus amphipod	<i>Liagoceradocus subthalassicus</i>	Vulnerable	-
	<i>Nedsia fragilis</i>	Vulnerable	-
	<i>Nedsia humphreysi</i>	Vulnerable	-
	<i>Nedsia hurlberti</i>	Vulnerable	-
	<i>Nedsia sculptilis/macroscolptilis</i>	Vulnerable	-
	<i>Nedsia straskraba</i>	Vulnerable	-
	<i>Nedsia urifimbriata</i>	Vulnerable	-
Chevron's freshwater amphipod (Barrow Island)	<i>Nedsia chevronia</i>	Priority 2 ¹	-
Spear-beaked cave shrimp	<i>Stygocaris stylifera</i>	Priority 4 ¹	-
Barrow Cave Gudgeon	<i>Milyeringa justitia</i>	Vulnerable	Vulnerable
Blind Eel	<i>Ophisternon sp.</i>	Vulnerable ²	Vulnerable ²
Blind Snake	<i>Anilius longissimus</i>	Priority 2 ^{1,3}	-
Barrow Island draculoides	<i>Draculoides bramstokeri</i>	Vulnerable	-
Barrow Island millipede	<i>Speleostrophus nesiotus</i>	Vulnerable	-

1 DBCA Current Threatened and Priority Fauna Ranking.

2 The record of the stygal eel, *Ophisternon sp.*, has not been identified to species level. Given the wide range of *Ophisternon candidum* in stygal ecosystems in the Pilbara, the Blind Eel is taken to be *O. candidum* for the purposes of conservation status.

3 Previously/also described as *Ramphotyphlops longissimus*

3.5 Habitat

3.5.1 Overview

The background and rationale for identifying the ecological element of 'habitat' and its relative significance is detailed in Section 4.4.1 of the TSBSEIR (Ref. 1). The habitats identified as being significant on Barrow Island (Ref. 1) are:

- Boodie warrens – habitat for Boodies, which are fauna of high conservation significance
- termite mounds that support high species richness
- nests of raptors (birds of prey), which are not represented on the Island in high numbers and which provide habitat for fauna of high conservation significance.

Figure 3-3 shows the mapped locations of significant habitats in the vicinity of the shore crossing extension site.

3.5.2 Boodie Warrens

3.5.2.1 Methodology

Boodie warrens across Barrow Island were surveyed within fifty 1 km² blocks across Barrow Island by Short *et al.* (Ref. 36). Transects totalling 131 km (spaced 50 m apart in an east–west direction) were surveyed for Boodie warrens in the vicinity of the Gorgon Gas Development Footprint, including the onshore feed gas pipeline, for the EIS/ERMP assessment process (Ref. 6). Several additional surveys have been completed for subsequent elements of the Gorgon Gas Development (eg Ref. 60) and for monitoring of Boodie populations under the TSEMP. A targeted survey of Boodie activity concentrated on the area within 2 km of the pipeline ROW and the shore crossing extension site was completed in 2019, incorporating 144 km of foot traverses and 900 total trap nights (Ref. 35).

3.5.2.2 Results

Boodie warrens are generally located on well-drained sites (often on or near the crests of ridges), usually located in cap rock, and often associated with the fig *Ficus platypoda*. Cap rock most likely provides structural stability as well as insulation for the burrows (Ref. 1).

No Boodie warrens have been recorded on or immediately adjacent to the shore crossing extension site (Figure 3-3).

3.5.3 Termite Mounds

3.5.3.1 Methodology

Termite mounds have been mapped by CAPL within 500 m of the Gorgon Gas Development Footprint based on the interpretation of high-resolution georeferenced aerial photo imagery.

3.5.3.2 Results

The distribution of termite mounds identified in 2020 aerial imagery for the North Whites Beach area is shown in Figure 3-3.

There are no termite mounds present on the shore crossing extension site.

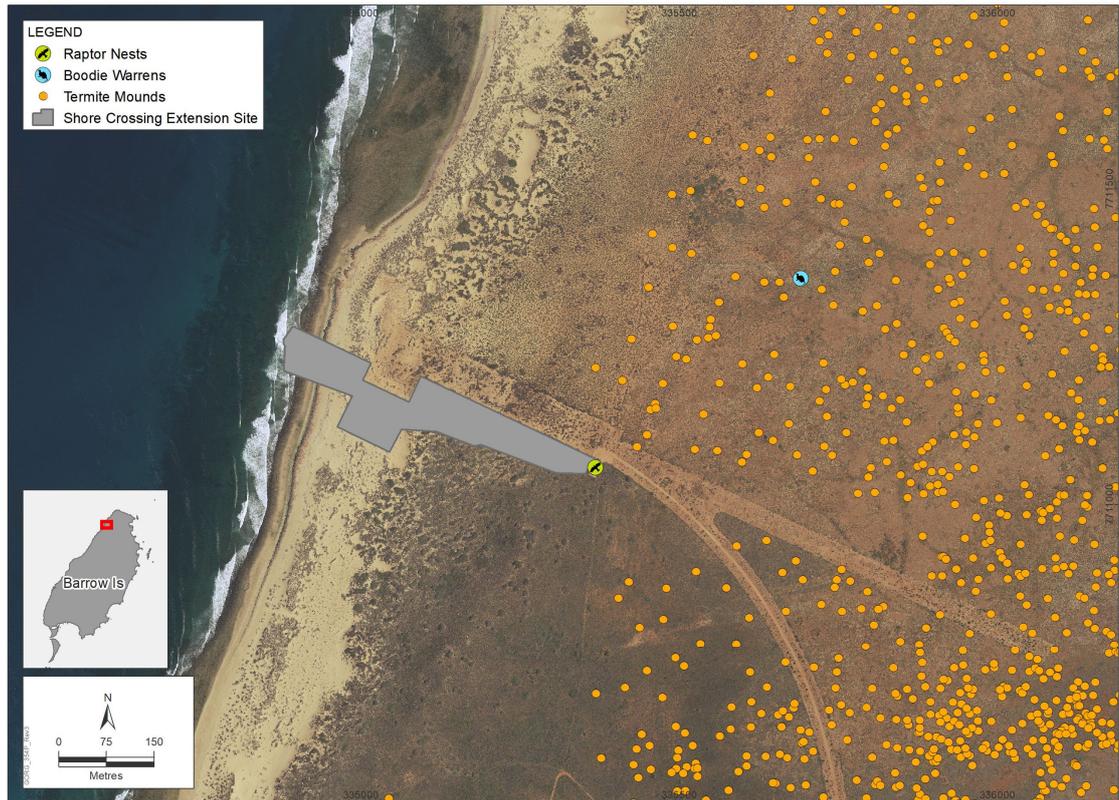


Figure 3-3: Significant Habitats at North Whites Beach

3.5.4 Raptor Nests

3.5.4.1 Methodology

Raptor nests have been mapped by CAPL on the basis of expert knowledge of the Island, global positioning system (GPS) coordinates supplied by field staff and the results of targeted monitoring undertaken for the TSEMP.

3.5.4.2 Results

There are no raptor nests on the shore crossing extension site. The only raptor nests recorded within 2 km of the Gorgon Gas Development Footprint are two Osprey nests. One of these is on the communications tower located on the previous shore crossing site (Figure 3-3).

3.6 Ecological Communities

3.6.1 Overview

The background and rationale for identifying the ecological element of 'ecological communities' and its relative significance is detailed in Section 4.5.1 of the TSBSEIR (Ref. 1).

Ecological communities are considered significant on Barrow Island if they are:

- listed under the BC Act or EPBC Act; or
- listed by DBCA as a Priority Ecological Community (PEC).

No ecological communities listed under the BC Act or EPBC Act are recorded or are known to occur on Barrow Island. The two Priority 1 PECs listed by DBCA that occur on Barrow Island are:

- Barrow Island Subterranean Fauna: Barrow Island stygofauna and troglifauna
- Barrow Island Creekline Vegetation: General cover of *Triodia angusta* with shrubs principally *Hakea suberea*, *Petalostylis labicheoides*, *Acacia bivenosa* and *Gossypium robinsonii*. Mangrove thickets (*Avicennia marina*) at the creek mouths.

Both these PECs are listed by DBCA as Priority 1 ecological communities. By definition, this means that DBCA has identified them as meeting the following overall description:

poorly-known with apparently few, small occurrences, all or most of which are not actively managed for conservation (e.g. active mineral leases) and for which current threats exist; or if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, appear to be under immediate threat from known threatening processes across their range.

These PECs are further discussed below. The creeklines and mangroves are discussed separately (Sections 3.6.3 and 3.6.4 respectively) as this more accurately reflects their distinctly different natures, and in recognition that they are separate ecological communities. The shore crossing extension site is not considered to support any of these PECs.

There is also a Priority 3 ecological community that occurs on Barrow Island:

- Coastal dune soft spinifex grassland: Tussock grassland of *Whiteochloa airoides* occurs on the landward side of fore dunes, hind dunes or remnant dunes with white or pinkish white medium sands with marine fragments. There may be occasional *Spinifex longifolius* tussock or *Triodia epactia* hummock grasses and scattered low shrubs of *Olearia* sp. Kennedy Range (*Scaevola spinescens*, *S. cunninghamii*, *Trianthema turgidifolia* and *Corchorus* species (*C. walcottii*, *C. laniflorus*).

This PEC has also been recorded on Thevenard Island and its distribution on Barrow Island does not overlap or occur in the vicinity of the Gorgon Gas Development footprint, with the nearest recorded location approximately 6.5 km away near Flacourt Bay (Ref. 33). It is not discussed further in this Addendum.

3.6.2 Subterranean Fauna

3.6.2.1 Methodology

Subterranean fauna has been studied on Barrow Island since 1991. Surveys during the 1990s decade were conducted by the Western Australian Museum and focused largely on cave fauna. Sampling of bores for subterranean fauna was undertaken in 2002, 2003, and in a 19-month four-phase survey, spanning from 2004 to 2006 (refer to Section 4.3.6.2 of the TSBSEIR). Surveys have been conducted in accordance with the SRESFMP (Ref. 54) since 2009 and sampling was also undertaken as part of targeted studies for the Additional Support Area (Ref. 66).

3.6.2.2 Results

The shore crossing extension site is located on the coast, within and immediately behind the sandy beach and dunes at North Whites Beach. While the site potentially overlies a very small portion of the subterranean fauna habitat of Barrow Island (and thereby the PEC), the proximity to the ocean and nature of the coastal geology suggests the shore crossing extension site is unlikely to support subterranean fauna.

The coast and hinterlands are typically sandy with minimal karst development, and there is a high likelihood that any fractures and cavities present at North Whites Beach would be sand-filled (Ref. 6). The freshwater lens important to the diverse stygofauna assemblage of Barrow Island (Ref. 55) is typically absent within 200 m – 500 m of the coast (Ref. 65).

3.6.3 Creeklines

3.6.3.1 Methodology

As outlined in Section 4.5.3 of the TSBSEIR (Ref. 1), the creeklines of Barrow Island have been mapped along with assessment of their level of historical disturbance to identify the PEC, since the PEC does not include creeklines that have been previously disturbed (Ref. 68).

3.6.3.2 Results

There are no creeklines on or in the vicinity of the shore crossing extension site, the nearest occurring approximately 4.5 km away (Ref. 33). Map 8 in the TSBSEIR (Ref. 1) delineates the location and extent of creeklines on Barrow Island.

3.6.4 Mangroves

3.6.4.1 Methodology

Mangroves have been mapped on Barrow Island by CAPL based on interpretation of aerial photography at a scale greater than 1:5000 and are maintained in the GIS.

3.6.4.2 Results

On Barrow Island, mangroves occur in localised pockets in more protected portions of the southern and eastern coastlines. There are no mangroves on the west coast of Barrow Island where the shore crossing extension site is situated.

3.7 Groundwater

3.7.1 Methodology

3.7.1.1 Barrow Island Studies

A number of desktop reviews and geotechnical investigations have been conducted on the hydrogeology and groundwater resources of Barrow Island. Fifteen hydrogeological studies were completed on Barrow Island between 1995 and 2003 by CAPL (Ref. 70). A detailed assessment of the hydrogeology and groundwater of Barrow Island was undertaken by Groundwater Consulting Services in 2005 (Ref. 65).

3.7.1.2 Definition of Significant Groundwater

Significant groundwater is identified so that potential impacts on taxa and features can be identified. On Barrow Island, the entire shallow relatively fresh groundwater aquifer is considered significant (Ref. 1). This aquifer provides habitat for significant subterranean fauna (stygofauna). Groundwater Dependent Ecosystems (GDEs) may occur where root depths are within one to two metres of watertables, with a decreasing likelihood of groundwater dependency of terrestrial vegetation with increasing groundwater depth (Ref. 69).

3.7.2 Results

The shallow unconfined aquifer (watertable) of Barrow Island forms a shallow fresher groundwater mound (up to 0.6 m high) as a lens floating upon denser, more saline seawater (Ref. 65). The watertable is typically between 9 m and 53 m below ground level in the Tertiary limestone (Ref. 71). The freshwater lens extends across the Island to within 200 to 500 m of the coast (Ref. 65) where tidal influences prevent the formation of a stable low salinity lens (Ref. 67).

The shore crossing extension site is located on the coast, outside the mapped extent of the Tertiary limestone and within the geological unit 'Coastal sands' (refer Map 10 of Ref. 1). It extends inland less than 520 m from the low water mark. Consequently, no significant groundwater resource is expected to be present.

3.8 Surface Water Landforms

3.8.1 Methodology

3.8.1.1 Barrow Island Studies

Claypans and major drainage lines have been mapped across Barrow Island by Mattiske (Ref. 26) at scales between 1:10 000 and 1:25 000. The topography of Barrow Island has been mapped and characterised by CAPL using a Digital Terrain Model (DTM) that was modelled using Airborne Laser Scanning (ALS) data acquired in 2005 from a fixed-wing aircraft with a horizontal accuracy of less than 0.40 m and a vertical accuracy of 0.067 m.

Seeps have been mapped on the basis of expert knowledge of the Island by CAPL through the use of aerial photography. Golder Associates' (Ref. 72) Assessment of Erosion Protection Measures [on] Barrow Island incorporated observations from an inspection of the entire length of the Onshore Feed Gas Pipeline System in November 2007.

3.8.1.2 Definition of Significant Surface Water Landforms

Surface water landforms are important on Barrow Island due to the scarcity of water in this semiarid environment. Surface water features are considered to be significant on Barrow Island (Ref. 1) if they are:

- wetlands listed under the EPBC Act
- catchments listed under the Country Areas Water Supply Act 1947 (WA)
- expressions of groundwater (permanent and ephemeral seeps)
- areas where standing water typically accumulates for more than a few days after rainfall (claypans)

- areas identified as typically having flowing water after rainfall (some major drainage lines).

3.8.2 Results

There are no significant surface water landforms on the shore crossing extension site.

There are no wetlands listed under the EPBC Act (Cth) or catchments listed under the *Country Areas Water Supply Act 1947* (WA) on Barrow Island. No drainage lines or areas of permanent surface water occur near the site. The nearest ephemeral freshwater seep is located approximately 400 m south of the North Whites Beach shore crossing location.

3.9 Physical Landforms

3.9.1 Overview

Section 4.8.1 of the TSBSEIR (Ref. 1) describes the rationale for identifying significant landforms on Barrow Island. The landforms identified as significant (Ref. 1) are:

- coastal foredunes
- fossil beds
- cliffs and gorges
- caves, rock shelters and sinkholes.

The methodology applied to delineate the distribution of each of these significant landforms is described in Sections 4.8.2 to 4.8.5 of the TSBSEIR (Ref. 1). The location of these landforms on Barrow Island are shown in Map 11 of the TSBSEIR (Ref. 1), with an inventory of Barrow Island's fossil sites provided in Appendix 9 of the TSBSEIR (Ref. 1).

3.9.2 Results

The shore crossing extension site is comprised entirely of coastal dunes and no cliffs, gorges, caves, sinkholes or rock shelters are present. There are no significant fossil sites recorded on the shore crossing extension site.

Approximately two-thirds of Barrow Island's coastline is occupied by the exposed frontal slopes of coastal foredunes, which cover approximately 790 ha and extend up to 1.4 km inland. Approximately 2 ha of coastal dunes are in the shore crossing extension site, which equates to ~0.25% of coastal dunes on Barrow Island.

4 Terrestrial Disturbance Footprint

4.1 Introduction

Section 6 of the TSBSEIR (Ref. 1) describes and discusses the Terrestrial Disturbance Footprint (TDF) that will apply during construction and operations of the Gorgon Gas Development, and the ecological elements deemed to be significant and at risk on Barrow Island.

The TDF includes the Gorgon Gas Development Footprint and a zone beyond this that contains the area disturbed by the construction or operations activities associated with the terrestrial facilities. Different TDFs have been determined for construction and operations activities vs seismic activities, reflecting the different extent of boundary effects involved.

4.1.1 Methodology for Defining TDF

The process by which the TDF is determined is summarised in Section 6.1.2 of the TSBSEIR (Ref. 1). Use of the shore crossing extension site that is the subject of this Addendum involves a subset of the same activities, stressors and receptors previously considered for defining the construction and operations activities TDF.

The TDF is measured out from the boundary of the Gorgon Gas Development Footprint (Ref. 1). The amended Gorgon Gas Development Footprint, incorporating the shore crossing extension site and the reduction in the Additional Support Area, is shown on Figure 1-2.

4.1.2 Dimensions of the TDF

The rationale for determining the dimensions of the TDF in relation to stressors and their potential effects on ecological elements is summarised in Section 6.2 of the TSBSEIR (Ref. 1).

The three construction and operations-related TDFs defined in terms of area where Gorgon Gas Development activities on the shore crossing extension site may potentially impact (Table 4-1) are:

- A TDF of 100 m, reflecting an area within which potential impacts from planned stressors may manifest on non-mobile ecological elements (e.g. plants, surface water landforms).
- A TDF of 200 m, reflecting an area within which potential impacts to groundwater may manifest.
- A TDF of 1000 m, reflecting an area within which potential impacts to mobile ecological elements (e.g. fauna) may manifest.

Table 4-1: Dimensions of TDF

Activities	Horizontal Dimension ¹ (outside Gorgon Gas Development and Jansz Feed Gas Pipeline footprints)	Vertical Above-ground Dimension (above top of infrastructure)	Vertical Below-ground Dimension (below earthworks and excavations)
Construction and operations	<ul style="list-style-type: none"> • 100 m (non-mobile elements; e.g. plants) • 200 m (groundwater) • 1000 m (mobile elements; e.g. fauna) 	100 m	1 m

¹ Distance is from the external periphery of footprint

4.2 Significant Ecological Elements and Areas at Risk

4.2.1 Overview

Applying the risk concepts of Woodman Environmental Consulting (Ref. 75), impacts are of regional significance when there is an impact to a local population of a species, and that population is significant to the overall/regional conservation of the species (e.g. the number of individuals in a local population is a significant portion of the total number of individuals of the species in the world).

As distribution, fragmentation, and abundance have been considered in determining the significance of elements, the elements of most concern in impact assessment should be the subset of these significant elements. The fauna of Barrow Island includes a number of migratory and vagrant species. Vagrant species are not considered to be at risk from the Gorgon Gas Development. The risk to migratory species is assessed on the same basis as resident species on Barrow Island.

Species that do not hold habitat on Barrow Island (e.g. seabirds occupying offshore islands) will not have a TDF related to them; however, these are recognised as taxa that may be at risk by the Gorgon Gas Development and are recognised as significant and requiring monitoring.

Species or features that are at risk:

- have restricted or uneven distribution on Barrow Island and are potentially disproportionately over-represented in the Gorgon Gas Development TDF and/or
- are vulnerable to a stressor, the scale of which may be disproportionate or not determined by the extent of land clearing (e.g. noise, light, vehicle strikes) on Barrow Island.

Clearing and earthworks is only a significant stressor if ecological elements are restricted in distribution, and therefore this stressor is considered in terms of the distribution of ecological elements. Other stressors are considered in terms of the vulnerability of the ecological elements.

4.2.2 Ecological Elements Impacted Due to Localised Distribution

For distribution to be the reason that an element is considered at risk, the element should occur in the Gorgon Gas Development TDF. The occurrence of significant ecological elements in the TDF on Barrow Island is summarised in Table 6-8 of the TSBSEIR (Ref. 1).

The change to the Gorgon Gas Development footprint addressed by this Addendum, and associated change to the Gorgon Gas Development TDF, results in minor changes to the extent of some ecological elements that occur within the TDF, as summarised in Table 6-8 of the TSBSEIR (Ref. 1). Specifically:

- A reduction in the number of termite mounds (significant habitat) in the TDF
- An increase in the extent of coastal dune (significant landform) in the TDF of ~4 ha (ie <0.5 % of its distribution)

These changes do not alter the conclusions regarding ecological elements that may be at risk of impact from the GGD, including from activities on the shore crossing extension site, described in the TSBSEIR (Ref. 1). The information on ecological elements provided in this Addendum indicates that no significant ecological elements are at risk of impacts from activities on the shore crossing extension site due to distribution.

4.2.3 Vulnerability of Ecological Elements

4.2.3.1 Ecological Elements that are Vulnerable

The significant ecological elements on Barrow Island that may be at risk from the Gorgon Gas Development due to vulnerability are summarised in Table 6-9 of the TSBSEIR (Ref. 1). The information on ecological elements provided in this Addendum indicates that a subset of these may be at risk of impacts from activities on the shore crossing extension site, namely:

- White-winged Fairy-wren (Barrow Island) may be at risk due to its vulnerability to noise
- highly mobile terrestrial animals are more likely to be disproportionately impacted by physical interactions (vehicle strikes and trenches); populations of larger mammals and large reptiles (Perentie) are more affected by roads than populations of small mammals (Ref. 76) and roadkill rates are generally higher for large animals with large home ranges (e.g. Klocker *et al.* [Ref. 77])
- raptors may be impacted by vehicle traffic disproportionately as a result of attraction to infrastructure for roosting, and potential inclusion of basking reptiles, roadkill, and carrion on roads as a component of their diet
- *Melaleuca cardiophylla* is considered more vulnerable to impacts as it has been identified as potentially having low regeneration rates (Ref. 26)
- coastal foredunes, and associated vegetation, from wind erosion

4.2.3.2 Ecological Elements that are Not at Risk

CAPL believes that under planned activities, the stressors will not manifest outside the TDF due to management measures outlined in the Environment Management Plans required under MS 800, MS 769, and EPBC Reference: 2003/1294 and 2008/4178.

In accordance with Condition 6.6 of MS 800, CAPL does not predict there will be ecological elements that, under planned activities, will be at risk outside the TDF under the EPBC Act (Cth), or Material or Serious Environmental Harm under the EP Act (WA). Therefore, these are not further described or mapped in this Addendum beyond those described and mapped in Section 3 and in the TSBSEIR (Ref. 1).

4.3 Reference Sites

The terrestrial monitoring locations for at risk sites and reference sites are identified and discussed in the TSEMP (Ref. 17).

4.4 Review of Risk Assessment

Sections 6.6.1 and 7 of the TSBSEIR (Ref. 1) describe the review of the results of the qualitative ecological risk assessments of the likelihood and consequence of Gorgon Gas Development impacts on ecological elements on Barrow Island,

satisfying the requirements of Condition 6.5i of MS 800 and MS 769 and Condition 5.4 i of EPBC Reference: 2003/1294 and 2008/4178.

Assessment of the risks associated with activities on the shore crossing extension site has concluded that they do not introduce any significant additional or different impacts (Ref. 80) and the residual risks from the Gorgon Gas Development are unchanged from those described in the TSBSEIR (Ref. 1).

5 Review of this Addendum

CAPL is committed to conducting activities in an environmentally responsible manner and aims to implement best practice environmental management as part of a program of continuous improvement. This commitment to continuous improvement means that CAPL will review the TSBSEIR (Ref. 1) and/or this Addendum as required (e.g. in response to any Project scope changes that come online and have not been previously covered).

If the TSBSEIR (inclusive of this Addendum) no longer meets the aims, objectives or requirements of the TSBSEIR, if works are not appropriately covered by the TSBSEIR, or measures are identified to improve the TSBSEIR, CAPL may submit an amendment or addendum to the TSBSEIR to the Minister for approval under Condition 36.2 of MS 800, Condition 21 of MS 769 and Condition 2-3 of MS 965. The State Minister for Environment may also direct CAPL to revise the TSBSEIR under Condition 36.2 of MS 800.

6 Acronyms and Abbreviations

Table 6-1 defines the acronyms and abbreviations used in this document.

These align with the terms, definitions, and abbreviations defined in Schedule 2 of the Western Australian Gorgon Gas Development and Jansz Feed Gas Pipeline MS 800 and MS 769 respectively and the Commonwealth Gorgon Gas Development and Jansz Feed Gas Pipeline Ministerial Approvals (EPBC Reference: 2003/1294, 2008/4178, and 2005/2184).

Table 6-1: Acronyms and Abbreviations

Acronym/Abbreviation	Definition
°C	Degrees Celsius
Abiotic	Non-living chemical and physical factors in the environment.
ABU	Australian Business Unit
Additional Support Area	Gorgon Gas Development Additional Construction, Laydown, and Operations Support Area
Aeolian	Deposited or formed by wind, such as dunes.
AHD	The Australian Height Datum (AHD) is a geodetic datum for altitude measurement in Australia; it is the agreed sea level.
ALS	Airborne Laser Scanning
API	Assessment on Proponent Information
ARI	Assessment on Referral Information (for the proposed Jansz Feed Gas Pipeline dated September 2007) as amended or supplemented from time to time
AS/NZS	Australian Standard/New Zealand Standard
ASBU	Australasia Strategic Business Unit
At Risk	Being at risk of Material Environmental Harm or Serious Environmental Harm and/or, for the purposes of the EPBC Act relevant listed threatened species, threatened ecological communities and listed migratory species, at risk of Material Environmental Harm or Serious Environmental Harm.
Avifauna	Birds of a particular region
BC Act	Western Australian <i>Biodiversity Conservation Act 2016</i>
Biotic	Of or relating to living organisms
BTEX	Benzene, toluene, ethylbenzene, and xylene—primary toxins of soils and groundwater associated with petroleum products.
CAMBA	China–Australia Migratory Bird Agreement
CAPL	Chevron Australia Pty Ltd
Carbon Dioxide (CO ₂) Injection System	The mechanical components required to be constructed to enable the injection of reservoir carbon dioxide, including but not limited to compressors, pipelines and wells.
CH ₄	Methane
cm	Centimetre
CO	Carbon monoxide
CO ₂	Carbon dioxide

Acronym/Abbreviation	Definition
Commonwealth Marine Areas	Zoned areas of waters of the sea, the seabed and the airspace above the waters of the sea, defined under section 24 of the EPBC Act (Cth).
Construction	Construction includes any Proposal-related (or action-related) construction and commissioning activities within the Terrestrial and Marine Disturbance Footprints, excluding investigatory works such as, but not limited to, geotechnical, geophysical, biological and cultural heritage surveys, baseline monitoring surveys and technology trials.
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth of Australia
DAWE	Commonwealth Department of Agriculture, Water and the Environment (formerly DotEE, DoE, DEW, DEWHA, SEWPaC, and DotE)
dB	Decibel; a unit to measure sound
DBCA	Western Australian Department of Biodiversity, Conservation, and Attractions (from 1 July 2017; formerly Department of Parks and Wildlife [Parks and Wildlife])
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DCA	Detrended Correspondence Analysis
DEC	Former Western Australian Department of Environment and Conservation, then split into Department of Environment Regulation and Department of Parks and Wildlife. Now Department of Biodiversity, Conservation, and Attractions (DBCA; from 1 July 2017) and Department of Water and Environmental Regulation (DWER; from 1 July 2017). (DEC dates: 1 Jul 2006 to 30 Jun 2013; DEC was an amalgamation of Department of the Environment and CALM)
DER	Former Western Australian Department of Environment Regulation (formerly DEC; now DWER)
DEWHA	Former Commonwealth Department of the Environment, Water, Heritage and the Arts (now DAWE)
DLN	Dry Low NO _x
DNA	Deoxyribonucleic Acid
Doline	A small to medium-sized closed depression, a few metres to a few hundred metres in diameter and depth, formed by one of several processes. Collapse doline forms when a cavity is hollowed out below the surface by dissolution of carbonate rocks and subsequently collapses. Subsidence doline is formed when thin cover of carbonate rocks collapse into an underlying dissolved cavity.
DomGas	Domestic Gas
DotE	Former Commonwealth Department of the Environment (now DAWE)
DotEE	Former Commonwealth Department of the Environment and Energy (formerly DEW, DEWHA, SEWPaC, and DotE) now DAWE
DPaW	Former Western Australian Department of Parks and Wildlife (now DBCA)
DRF	Declared Rare Flora has the meaning given by the <i>Wildlife Conservation Act 1950</i> (WA). Note: This Act is superseded by the <i>Biodiversity Conservation Act 2016</i> (WA).
DTM	Digital Terrain Model
DWER	Western Australian Department of Water and Environmental Regulation (formerly DER and Office of the Environmental Protection Authority)
Ecological Community	Refers to all the interacting organisms living together in a specific habitat.

Acronym/Abbreviation	Definition
Ecological Element	Element listed in Condition 6.1 of MS 800 and MS 769 and Condition 5.1 EPBC Act Reference 2003/1294 and 2008/4178.
EIS/ERMP	Environmental Impact Statement/Environmental Review and Management Programme (for the Proposed Gorgon Development dated September 2005) as amended or supplemented from time to time
Elliott Trap	Small aluminium traps with a pedal inside. When the animal steps on the pedal, it closes the trap door behind the animal. Elliott traps are most commonly used to capture small species such as marsupial mice.
Environmental Harm	Has the meaning given by Part 3A of the <i>Environmental Protection Act 1986</i> (WA).
EP Act	Western Australian <i>Environmental Protection Act 1986</i>
EPA	Western Australian Environmental Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPBC Reference: 2003/1294	Commonwealth Ministerial Approval (for the Gorgon Gas Development) amended or replaced from time to time
EPBC Reference: 2005/2184	Commonwealth Ministerial Approval (for the Jansz Feed Gas Pipeline) as amended or replaced from time to time.
EPBC Reference: 2008/4178	Commonwealth Ministerial Approval (for the Revised Gorgon Gas Development) as amended or replaced from time to time.
EPBC Reference: 2011/5942	Commonwealth Ministerial Approval (for the Fourth Train Expansion Proposal) as amended or replaced from time to time.
EPCM	Engineering, Procurement and Construction Management
Flyrock	Material projected outside the declared danger zone by a blast.
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GL	Gigalitre
Gorgon Gas Development	The Gorgon Gas Development as approved under MS 800 and MS 965, and EPBC References: 2003/1294 and 2008/4178 (as varied by the Commonwealth Environment Minister), as amended or replaced from time to time.
Gorgon Gas Development Footprint	Consists of the cleared areas and uncleared areas approved to be cleared on Barrow Island used for the construction and operation of the Gorgon Gas Development and Jansz Feed Gas Pipeline.
GPS	Global Positioning System
Ground Truth	To verify the correctness of remote sensing information by use of ancillary information such as field studies.
GTP	Gas Treatment Plant
H ₂ S	Hydrogen Sulfide
ha	Hectare
Habitat	The area or areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography) and the biotic factors.
Halocline	A strong, vertical salinity gradient; the (sometimes indistinct) border between layers of water that contain different amounts of salt.
HDD	Horizontal Directional Drilling

Acronym/Abbreviation	Definition
Herpetofauna	Amphibians and reptiles.
HES	Health, Environment and Safety
Infauna	Benthic fauna (animals) living in the substrate and especially in a soft sea bottom.
Invertebrate Fauna	Animals that do not have a backbone (vertebrae). Examples include, but are not limited to, spiders, scorpions, land snails, millipedes and some subterranean fauna.
ISO	International Organization for Standardization
JAMBA	Japan–Australia Migratory Bird Agreement
Jansz Feed Gas Pipeline	The Jansz Feed Gas Pipeline as approved in MS 769 and EPBC Reference: 2005/2184 as amended or replaced from time to time.
Karst	An area of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns.
kg	Kilogram
km	Kilometre
L	Litre
Littoral	A shore; the zone between high tide and low tide; of, or related to the shore, especially the seashore.
LNG	Liquefied Natural Gas
Lux	A standard for measuring light; equal to the amount of visible light per square metre incident on a surface. 1 lux = 1 lumen/square metre or 0.093 foot-candles.
m	Metre
m/s	Metres per second
m ³	Cubic metre
Macroalgae	Algae which can be seen easily, without using a microscope; includes large seaweeds.
Management Triggers	Are quantitative, or where this is demonstrated to be not practicable, qualitative matters above or below whichever relevant additional management measures must be considered.
Mangrove	Any of various tropical evergreen trees or shrubs that grow in shallow coastal water.
Marine Disturbance Footprint	The area of the seabed to be disturbed by construction or operations activities associated with the Marine Facilities listed in Condition 14.3 of MS 800, Condition 12.3 of MS 769, and Condition 11.3 of EPBC Reference: 2003/1294 and 2008/4178 (excepting that area of the seabed to be disturbed by the generation of turbidity and sedimentation from dredging and dredge spoil disposal) as set out in the Coastal and Marine Baseline State Report required under Condition 14.2 of MS 800, Condition 12.2 of MS 769, and Condition 11.2 of EPBC Reference: 2003/1294 and 2008/4178
Marine Facilities	In relation to MS 800 and EPBC Reference: 2003/1294 and 2008/4178, the Marine Facilities are the: <ul style="list-style-type: none"> • Materials Offloading Facility (MOF) • LNG Jetty • Dredge Spoil Disposal Ground • Offshore Feed Gas Pipeline System and marine component of the shore crossing

Acronym/Abbreviation	Definition
	<ul style="list-style-type: none"> Domestic Gas Pipeline <p>For the purposes of MS 800, Marine Facilities also include:</p> <ul style="list-style-type: none"> Marine upgrade of the existing WAPET landing. <p>In relation to MS 769, Marine Facilities are the Offshore Feed Gas Pipeline System and marine component of the shore crossing.</p>
Material Environmental Harm	Means Environmental Harm that is neither trivial nor negligible.
mg	Milligram
mg/L	Milligrams per litre
MGA 50, GDA94	Map Grid of Australia Zone 50 (WA); projection based on the Geocentric Datum of Australia 1994.
Migratory Species	Species listed as migratory under section 209 of the EPBC Act (Cth).
mm	Millimetre
MOF	Materials Offloading Facility
MS	(Western Australian) Ministerial Statement
MS 1002	Western Australian Ministerial Statement 1002, issued for the Gorgon Gas Development Fourth Train Expansion Proposal, as amended from time to time.
MS 865	Western Australian Ministerial Statement 865, issued to establish a restart mechanism for dredging, as amended from time to time.
MS 748	Western Australian Ministerial Statement 748 (for the Gorgon Gas Development) as amended from time to time [superseded by MS 800].
MS 769	Western Australian Ministerial Statement 769 (for the Jansz Feed Gas Pipeline) as amended or replaced from time to time.
MS 800	Western Australian Ministerial Statement 800, issued for the Revised and Expanded Gas Development, as amended from time to time. MS 800 supersedes the Gorgon Gas Development as originally approved by MS 748. The conditions of MS 800 also apply to the Additional Support Area under MS 965.
MS 965	Western Australian Ministerial Statement No. 965, issued for the Additional Support Area, as amended from time to time. MS 965 applies the conditions of MS 800 to the Additional Support Area.
MTPA	Million Tonnes Per Annum
MW	Megawatt
Native	In relation to non-indigenous species means species that are naturally occurring in a region.
NES	National Environmental Significance
NIS	Non-indigenous Species
Non-indigenous Species (NIS)	Any species of plant, animal or micro-organism not native to Barrow Island.
NO _x	Nitrogen oxides (NO and NO ₂)
NTU	Nephelometric Turbidity Unit
NVIS	National Vegetation Information System
OE	Operational Excellence
OEMS	Operational Excellence Management System

Acronym/Abbreviation	Definition
Onshore Domestic Gas Pipeline ROW	The Onshore Domestic Gas Pipeline ROW is the strip of land that runs along the onshore (intertidal) pipeline alignment that encompasses the pipelines, trenches, access tracks, stockpiles and associated features and in which the pipeline construction activities will be completed.
Operations (Gorgon Gas Development)	In relation to MS 800 and EPBC Reference: 2003/1294 and 2008/4178, for the respective LNG trains, this is the period from the date on which the Gorgon Joint Venturers issue a notice of acceptance of work under the Engineering, Procurement and Construction Management (EPCM) contract, or equivalent contract entered into in respect of that LNG train of the Gas Treatment Plant; until the date on which the Gorgon Joint Venturers commence decommissioning of that LNG train.
Operations (Jansz Feed Gas Pipeline)	In relation to MS 769, for the pipeline, this is the period from the date on which the Proponent issues a notice of acceptance of work under the Engineering, Procurement and Construction Management (EPCM) contract, or equivalent contract entered into in respect of that pipeline; until the date on which the Proponent commences decommissioning of that pipeline.
PEC	Priority Ecological Community
PER	Public Environmental Review for the Gorgon Gas Development Revised and Expanded Proposal dated September 2008, as amended or supplemented from time to time.
Performance Standards	Are matters which are developed for assessing performance, not compliance, and are quantitative targets or where that is demonstrated to be not practicable, qualitative targets, against which progress towards achievement of the objectives of conditions can be measured.
PGPA	Policy, Government and Public Affairs
pH	Measure of acidity or basicity of a solution
Pisolitic	Sedimentary rock containing spherical or subspherical concretions more than 2 mm in diameter.
Pitfall	A concealed pit prepared as a trap for animals.
PM10	The dust fraction with an aerodynamic diameter of less than 10 microns.
Practicable	Practicable means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge. For the purposes of EPBC Reference: 2003/1294 and 2008/4178, which include the term 'practicable', when considering whether the plan meets the requirements of these conditions, the Commonwealth Minister will determine what is 'practicable' having regard to local conditions and circumstances including but not limited to personnel safety, weather or geographical conditions, costs, environmental benefit and the current state of scientific and technical knowledge.
Priority Flora	Priority flora is a non-legislative category aimed to manage those plant taxa listed by DBCA on the basis that they are known from only a few collections, or a few sites, but which have not been adequately surveyed. Such flora may be rare or threatened, but cannot be considered for declaration as rare flora until such survey work has been undertaken.
QEP	Quarantine Expert Panel
Quadrat	A rectangle or square measuring area used to sample living things in a given site; can vary in size.
Red Fill	Dark reddish brown soil, rich in iron.
Revised Proposal	Proposal comprising potential changes to the Gorgon Gas Development as described in the Gorgon Gas Development Revised and Expanded Proposal PER.

Acronym/Abbreviation	Definition
RiskMan2	Chevron HES Risk Management Process
ROKAMBA	Republic of Korea–Australia Migratory Bird Agreement
Serious Environmental Harm	Environmental harm that is: <ul style="list-style-type: none"> • irreversible, of a high impact or on a wide scale; or • significant or in an area of high conservation value or special significance and is neither trivial nor negligible.
SEWPAC	Former Commonwealth Department of Sustainability, Environment, Water, Population and Communities (now DotEE) (SEWPac dates: 14 Sep 2010 to 18 Sep 2013)
Short-Range Endemics (SREs)	Taxonomic group of invertebrates that are unique to an area, found nowhere else and have naturally small distributions (i.e. <10 000 km ²).
Significant Ecological Element	Those ecological elements, as specified in MS 800, that have been identified as important ecological elements in the vicinity of the Gorgon Gas Development Footprint based on reference to Section 3.1.2, which sets out the methodology for determining them, and Section 4 which specifies them.
Significant Impact	An impact on a Matter of National Environmental Significance, relevant to EPBC Act Reference: 2003/1294, 2005/2185, and 2008/4178 that is important, notable or of consequence having regard to its context or intensity.
SO ₂	Sulfur Dioxide
SRE	Short-range Endemic
Stressor	An environmental condition or influence that stresses (i.e. causes stress for) an organism.
Stygofauna	Groundwater-dwelling aquatic fauna.
Substrate	The surface a plant or animal lives upon. The substrate can include biotic or abiotic materials. For example, encrusting algae that lives on a rock can be substrate for another animal that lives above the algae on the rock.
Subterranean Fauna	Fauna which have adapted to subterranean conditions, including stygofauna and troglifauna.
TAPL	Texaco Australia Pty Ltd
TDF	Terrestrial Disturbance Footprint
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
Terminal Tanks	The existing Barrow Island Oilfield Operator's storage tanks located just north of the Gas Treatment Plant site.
Terrestrial Disturbance Footprint (TDF)	The area to be disturbed by construction or operations activities associated with the Terrestrial Facilities listed in Condition 6.3 of MS 800, including the Additional Support Area approved by MS 965, Condition 6.3 of MS 769, and Condition 5.2 of EPBC Reference: 2003/1294 and 2008/4178, as set out in Section 4 of this Report.
Terrestrial Facilities	In relation to MS 800 and EPBC Reference: 2003/1294 and 2008/4178, the Terrestrial Facilities are the: <ul style="list-style-type: none"> • Gas Treatment Plant • Carbon Dioxide Injection System • Associated Terrestrial Infrastructure forming part of the Proposal • Areas impacted for seismic data acquisition • Onshore Feed Gas Pipeline System and terrestrial component of the Shore Crossing.

Acronym/Abbreviation	Definition
	Terrestrial Facilities also include those defined in Condition 6.3 of MS 769 (the Onshore Feed Gas pipeline system and the terrestrial component of the Shore Crossing) and Schedule 1 of MS 965 (the Additional Support Area).
Threatened Ecological Communities (TEC)	Ecological communities listed as critically endangered, endangered, or vulnerable, under section 181 of the EPBC Act (Cth).
Threatened Species	Species listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable, or conservation dependent under section 178 of the EPBC Act (Cth).
Transect	The path along which a researcher moves, counts and records observations.
Troglofauna	Obligate cave- or karst-dwelling terrestrial subterranean fauna occurring above the watertable.
UWA	University of Western Australia
Vagrant	A bird found outside its species' usual range
Vegetation	Any aquatic or terrestrial plant, whether it is dead or alive. Examples include, but are not limited to, grass, shrubs, trees, tree stumps, tree roots, logs, seeds and brush.
Vegetation Association	Comprises unique flora assemblages, or unique vegetation communities, that help to identify the association.
Vertebrate Fauna	Animals that have a backbone (vertebrae). Examples include, but are not limited to, mammals, reptiles, amphibians and birds.
Vibroseis	A method of seismic exploration. The seismic energy source (ground vibration controlled by shaking the mass of the vibroseis truck) is distributed over a time of several seconds.
VOC	Volatile Organic Compounds; organic chemical compounds that have high enough vapour pressures under normal conditions to vaporise and enter the atmosphere.
Voucher Specimen	A whole plant or animal (usually a cadaver) or a part thereof, that serves as a basis of study and is retained as a reference.
WA	Western Australia
WAPET	West Australian Petroleum Pty Ltd.
WAPET Landing	Proper name referring to the site of the barge landing existing on the east coast of Barrow Island prior to the date of MS 800.

7 References

The following documentation is either directly referenced in this document or is a recommended source of background information.

Table 7-1: References

Ref. No.	Description	Document ID
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2.	Government of Western Australia, Minister for the Environment, Youth, Donna Faragher JP MLC. 2009. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development Revised and Expanded Proposal: Barrow Island Nature Reserve (Ministerial Statement No. 800), 10 August 2009</i> . Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/1MINSTAT/00800.pdf	
3.	Government of Western Australia, Minister for the Environment, David Templeman MLA. 2008. <i>Statement that a Proposal may be Implemented – Jansz Feed Gas Pipeline: Barrow Island Nature Reserve (Ministerial Statement No. 769), 28 May 2008</i> . Perth, Western Australia. Available from: http://www.epa.wa.gov.au/sites/default/files/Ministerial_Statement/00769.pdf	
4.	Commonwealth of Australia, Minister for the Environment and Water Resources, Malcolm Turnbull. 2007. <i>Approval – Gorgon Gas Development (EPBC Reference: 2003/1294), 3 October 2007</i> . Canberra, Australian Capital Territory.	
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10.	Chevron Australia. 2013. <i>Gorgon Gas Development, Additional Construction Laydown and Operations Support Area. Environmental Review</i> . Chevron Australia, Perth, Western Australia.	G1-NT-REPX0006111
11.	Commonwealth of Australia, Assistant Secretary Environmental Assessment Branch, Anne-Marie Delahunt. 2006. <i>Decision to Approve the taking of an Action – Jansz Feed Gas Pipeline (EPBC Reference: 2005/2184), 22 March 2006</i> . Canberra, Australian Capital Territory.	

Ref. No.	Description	Document ID
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13.	Government of Western Australia, Minister for the Environment, Water, Bill Marmion MLA. 2011. <i>Statement to Amend Conditions Applying to the Gorgon Gas Development Revised and Expanded Proposal Barrow Island Nature Reserve (Ministerial Statement No. 865) 7 June 2011</i> . Perth, Western Australia.	
14.	Government of Western Australia, Minister for the Environment; Heritage. Albert P. Jacob JP MLA. 2014. <i>Statement that a Proposal may be Implemented – Gorgon Gas Development Additional Construction Laydown and Operations Support Area (Ministerial Statement 965)</i> . Perth, Western Australia.	
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