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SUN CABLE AUSTRALIA-ASIA PowerLink

Chapter 15 – Matter of National Environmental Significance

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15.1 Introduction

There are nine MNES protected under the *EPBC Act*, which is administered by DCCEEW. The Project was determined a controlled action on 30 November 2020, and the decision on assessment approach was made on 21 January 2021. The Project is being assessed using an accredited assessment approach under the *EP Act* at the level of an EIS. The original EIS TOR included the Cwth assessment requirements following the accredited assessment approach. The MNES which triggered the Project's status as a Controlled Action under the *EPBC Act* are:

- Listed threatened species and communities
- Listed marine and/or migratory species
- Cwth Marine Area.

This chapter addresses the information requirements for assessing whether the Project is likely to have a significant impact upon these MNES, considering:

- The project refinements which have been made since the Draft EIS was prepared (refer to Chapter 2)
- Information from additional field and technical studies that has been obtained since the Draft EIS was prepared
- Submission and Direction matters which relate to MNES.

In doing so, this chapter refers to relevant areas of the Project's assessment which are, for the most part, already contained within Chapter 4, Chapter 5, Chapter 8 and Chapter 9.

The purpose of this chapter is to demonstrate that the Proponent has fully considered all relevant impacts to MNES, and that there are strategies in place to ensure impacts are avoided or mitigated to ALARP. This chapter provides details of the:

- MNES known or likely to occur within the Project's zone of influence
- Potential impacts to MNES from the Project's construction and operation activities, including consideration of cumulative impacts where relevant
- Mitigation and management measures that will be implemented to address those potential impacts. Conclusions in relation to whether the Project will have a significant impact on MNES, and whether there are any residual impacts that need to be offset and/or managed.

15.2 Information Sources

Since the Draft EIS was lodged, the following reports were prepared which were used to inform the assessment of MNES:

- Environmental Design Criteria and Standards (Appendix 2.1)
- Constraints Planning and Field Development Procedure (Appendix 4.1)
- Supplementary Ecology Report – Part 1 - Threatened Species (Appendix 5.1)
- Supplementary Ecology Report – Part 2 – Ecological Assessment (Appendix 5.2)

- Weed Management Plan (Appendix 5.3)
- OHTL Vegetation Management Framework (Appendix 5.4)
- Memorandum – Riparian Vegetation Assessment (Appendix 5.5)
- Marine Cable Burial Risk Assessment (CONFIDENTIAL) (Appendix 8.1)
- Guardian Geomatics Interim Report (CONFIDENTIAL) (Appendix 8.2)
- Sediment Sampling and Analysis Plan Implementation Report (Appendix 8.3)
- Sediment Sampling and Analysis Plan (CONFIDENTIAL) (Appendix 8.4)
- Memorandum - Benthic Video Footage Analysis (Appendix 9.1)
- Land Based Electrode Technical Report (Appendix 12.1)
- EPBC Checklist (Appendix 15.1).

15.3 Project Refinements since Draft EIS

The following project refinements included in the SEIS have included additional footprint/impacts which could affect MNES, and which have been considered in this chapter:

- Solar Precinct Ancillary Infrastructure (located beyond the previous footprint in the Draft EIS, including the Powell Creek Electrode Site and HVDC Electrode Line Corridor) (see Figure 2-1)
- Preferred OHTL Corridor (note: the temporary clearance corridor during construction remains as previously assessed at 22 m, which includes a permanently cleared Access Track of 6 m during operations (see Appendix 2.2)
- DCS Electrode (see Figure 2-11)
- Subsea Cable System – Route B (Figure 8-1)
- Subsea Cable System – removal of sand waves during construction/operations and potential spoil disposal grounds (Figure 8-3).

15.4 Existing Environment and Values

15.4.1 Terrestrial Environment

Since the Draft EIS was submitted, a number of field studies, modelling or other technical investigations have been carried out, which have enhanced the Proponents understanding of the existing terrestrial environment for the Project, including in project refinement areas.

Notable studies for MNES threatened species and communities include:

- Aerial and ground surveys for listed threatened species (October 2022), including: Greater Bilby (*Macrotis lagotis*), Yellow-spotted Monitor (*Varanus panoptes*), Gouldian Finch (*Chloebia gouldiae*) and the Grey Falcon (*Falco hypoleucos*) – Powell Creek Ancillary Infrastructure / Powell Creek Electrode Site
- Darwin Cycad field surveys – DCS Electrode Site
- Gouldian Finch Habitat Modelling and Field Surveys – OHTL Corridor and Powell Creek Ancillary Infrastructure
- Riparian habitat GIS modelling – OHTL Corridor

An updated detailed description of the existing terrestrial environment is available in Section 5.4 in Chapter 5 and in supporting technical appendices. A summary is provided below.

The Powell Creek Electrode Site occurs on a gently sloping sandplain that supports an open Acacia shrubland over. The site also supports fire-impacted trees including *Eucalyptus victrix* and *Corymbia opaca* (currently part of the shrub layer as they have been reduced to mallee form from repeat fire events). The presence of species such as *M. viridiflora* and *E. victrix* indicates that the sandplain becomes periodically wet, or there is an underlying clay layer that retains moisture to support these species.

Six land types have been described and are intersected by various Solar Precinct Ancillary Infrastructure components. Sandstone hills dominate the landscape and contains the most components with a mixed eucalypt low open woodland-shrubland over hummock grasses. Bioregional data shows that the footprint intersects three vegetation communities: Eucalyptus / Lysiphyllum low open woodlands; Corymbia / Hakea low open woodlands; and Triodia low open hummock grasslands – within the Eucalypt open woodlands major vegetation grouping (DCCEEW, 2020).

The DCS Electrode and HVDC Electrode Line Corridor are located in the Darwin Coastal bioregion, which is characterised by gently undulating plains on laterised sandstones and siltstones, with extensive and diverse floodplain associated with the lower reaches of the many large river systems. The dominant inland vegetation type is tall open forest dominated by *Eucalyptus tetrodonta* and *Eucalyptus miniata*. Within the bioregion and Gunn Point area, there are also substantial areas of mangroves, rainforest, and other riparian vegetation fringing the rivers. Environmental values identified at the DCS Electrode site include large hollow-bearing trees and threatened fauna habitat. These could provide roosting and/or breeding habitat for a range of mammals and birds – including such threatened species as Black-footed Tree-rat, Northern Brushtail Possum, Bare-rumped Sheathtail Bat and Masked Owl. At the time of the field visit in July 2022, all creeks had flowing water, indicating the drainages may retain water throughout the dry season.

The OHTL Corridor preferred route at Katherine is within the Daly Basin bioregion which is characterised by gently undulating plains and scattered low plateau remnants, with loamy and sandy red earths on sandstones, siltstones and limestones. The dominant vegetation is *Eucalyptus tetrodonta* and *Eucalyptus miniata* open forest with perennial and annual grassy understories. There is also intersection with two native vegetation communities – Tropical Eucalypt Woodlands/Grasslands and Eucalypt Open Forests – and cleared, non-native vegetation areas. The following environmental values were identified: natural land features; watercourses; riparian vegetation; rainforest; large hollow-bearing trees; threatened fauna records; and threatened fauna habitat. The OHTL Corridor preferred route at Katherine crosses an unnamed level two stream, south of the Katherine River between KP 454 and 455. Sinkholes are common in the area, with one known sinkhole between KP 461 and 462. The northern section intersects an area of rocky outcrops from KP 462 to 464. These outcrops could potentially provide habitat for species with preference for this landscape feature: e.g., Northern Quolls, possums, rock wallabies or bats.

The preferred route of the OHTL Corridor at Adelaide River begins at approximately KP 620 and extends east of the township predominantly through pastoral and rural land. The OHTL re-enters the railway corridor west of Lake Bennett at approximately KP 690 covering an estimated 400 ha in a 30 to 60 m wide corridor. This section of the OHTL Corridor occurs within the Adelaide River catchment and intersects major water courses – Adelaide River and Howley Creek – as they drain north. Some watercourses in the area only flow after heavy rainfall events – although they may maintain some permanent spring-fed waterholes. Other watercourses retain water year-round. Springs are known to occur within the region however, none are intersected by this section of the OHTL Corridor. Desktop data shows this section intersects with 11 native vegetation communities that fall under six broad community categories; tropical Eucalypt woodlands / grasslands cover the largest area within the OHTL Corridor at 320 ha.

15.4.2 Marine Environment

Since the Draft EIS was submitted, targeted marine surveys were carried out to provide additional data in project refinement areas and were used to inform the assessment presented in this SEIS.

Notable studies for MNES marine commonwealth matters include:

- Marine benthic community studies and underwater video surveys (Appendix 9.1)
- Marine sediment quality sampling along the Subsea Cable System – Route B alignment, in sand wave dredging areas, and in potential spoil disposal grounds (see Appendix 8.1, Appendix 8.2, Appendix 8.3 and Appendix 8.4).

An updated detailed description of the existing marine environment is available in Section 9.2.2.1 and 9.4 in Chapter 9 and in supporting technical appendices. A summary is provided below.

A geophysical survey and geotechnical sampling program were undertaken in August 2022 to provide survey data for the project refinement of the Subsea Cable System, which the Proponent had not previously surveyed. The survey included:

- Sandwaves within the 600 m wide Subsea Cable System survey corridor where sand wave removal is proposed and at four potential spoil disposal grounds, which were surveyed out to 80 km (see Chapter 8 for detail).
- Ground-truthing of modelled benthic communities and habitat for approximately 30 km of the Subsea Cable System, commencing at Murrumujuk. This survey targeted 30 sites which were identified, via desktop, as high likelihood habitat for hard coral, seagrass or macroalgae, and video footage was collected to confirm presence or absence of benthic communities at modelled habitats.

Within the newly surveyed direct Project footprint area (i.e., sand wave dredging locations and potential spoil disposal grounds), four of the survey sites were characterized as bare sediment, with no epifauna identified. Some isolated patches of soft coral and macroalgae were identified, along with hydroids, anemones, teleost fish, an octopus, crinoids (attached and unattached), sea urchin, bryozoans, ascidian, giant sea tulip, sponges (multiple species) and starfish. Appendix 9.1 provides the results of the underwater camera surveys undertaken in these locations (also see Section 9.4.1 in Chapter 9).

In general, field results did not support the modelled benthic communities and habitat for the region (provided in Galaiduk et al. 2019 and Siwabessy et al., 2020) (Figure 6 from report). Surveys took place within Shoal Bay and Beagle Gulf and of the 30 sites surveyed, only four were confirmed as comprising the predicted, modelled benthic habitat:

- Hard coral was modelled as highly probably at 18 sites, but only identified at one site
- Macroalgae was modelled as highly probable at five sites. Macroalgae was identified at two of those five sites, and at another six sites which were modelled as hard coral – eight sites in total
- Seagrass was modelled as highly probable at seven sites. Seagrass was not identified at any site, although a ‘possible’ seagrass sp. was observed at one location.

The benthic communities and epifauna that were identified were sparse and isolated to individual organisms. For example, coral and macroalgae were present, however there were no coral reefs or macroalgae bed. Similarly, although large areas of the survey region were modelled as likely seagrass habitat, no seagrass meadows were identified, and one individual plant was ‘potentially’ present at one site. Thirteen of the 30 survey sites (approximately 43 %) were bare sediment, with no visible benthic communities, habitat or epifauna.

In general, the finding of the video survey indicate that the modelled habitat over-estimated the presence of hard coral, seagrass and macroalgae within the Subsea Cable System zone of impact (direct disturbance footprint). Where macroalgae and hard coral was identified, it was very sparse, with few individual organisms identified. No significant occurrences or cover of the three sensitive receptor marine community groups of coral reefs, seagrass meadow or macroalgae beds were observed.

15.5 Impact Assessment

Chapter 5 sets out the assessment which has been undertaken for terrestrial threatened species under the *EPBC Act*. The EPBC Significant Impact Guidelines 1.1 produced by the Cwth Government (DEWHA, 2013) describe the process for determining the significance of impacts to threatened species. Section 2.3 of Appendix 5.2 sets out the process for determining which terrestrial species were assessed related to the project refinement footprint and activities which are the subject of this SEIS. The threatened species impact assessment process is summarised as follows:

- Collate species records from the latest version of the NT Atlas (DEPWS, 2019a)
- Generate EPBC PMST reports (refer to Appendices B-E of Appendix 5.2 to this SEIS)
- Assess likelihood of individual species occurring in the project based on desktop information that relates to habitat requirements, distribution, number, and dates of proximate records (obtained from NT Atlas), and the ecological information described for each search area. Likelihood ratings are defined in Table 2-3 of Appendix 5.2.

Following the desktop assessment, some habitat and species were the subject of targeted field surveys. A revised likelihood of occurrence was completed based on actual field survey results.

The following potential impacts were considered for terrestrial ecosystem values (e.g., significant vegetation which provides habitat for threatened species) within Chapter 5 as follows:

- Potential construction impacts:
  - Loss of vegetation and habitat due to land clearing
  - Loss or deterioration of significant vegetation (e.g., monsoon rainforest; riparian areas) by land clearing
  - Degradation of flora and vegetation in surrounding areas due to dust deposition
  - Introduction and spread of weeds
  - Changes in fire regimes
  - Direct fauna mortality by collision with construction vehicles
  - Habitat degradation and fragmentation
  - Changes to fauna behaviour due to noise, light, and waste management
- Potential operational impacts:
  - Introduction and spread of weeds
  - Direct fauna mortality caused by the perceived ‘lake effect’ of solar fields
  - Direct fauna mortality caused by collision with OHTL and HVDC Electrode Line
  - Degradation of flora and vegetation caused by electrode operation
  - Changes to fauna behaviour due to noise, light, waste management and EMF
  - Potential impacts to threatened species.

The EPBC Significant Impact Guidelines 1.1 produced by the Cwth Government (DEWHA 2013) describes the process for determining the significance of impacts to threatened species, which consists of:

1. Defining the proposal footprint
2. Determining which threatened species are likely to be present
3. Determining the importance of the population for each threatened species that is known, or likely, to occur.
4. Determining whether proposal activities are likely to have a *significant impact* on important populations of any threatened species.

This process uses impacts to 'important populations' of threatened species as the determining factor or endpoint of whether an impact is significant or not. The guidelines define *any* occurrence of a Critically Endangered and Endangered species within the project footprint as constituting a population, and all populations as 'important'. For threatened species that are listed as Vulnerable, an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity
- Populations that are near the limit of the species' range.

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area – including (but not limited to):

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations, that occurs within a particular bioregion.

15.5.1 Terrestrial Threatened Species and Habitat

For the terrestrial Project components that are subject to refinements (refer to Chapter 2), the following number of threatened species were initially considered as part of the 'likelihood of occurrence' assessment (note step 2 considered both *EPBC Act* and *TPWC Act* listed species – refer to Chapter 5):

- Powell Creek Electrode and Ancillary Infrastructure: 32 threatened species
- DCS Electrode / HVDC Electrode Line Corridor: 17 threatened species
- OHTL Corridor preferred route at Adelaide River: 72 species
- OHTL Corridor preferred route at Katherine: 32 species.

Species included in Table 15-1 were identified based on best professional judgement and knowledge of potential species anticipated to occur in project refinement areas that require additional footprint and based on existing understanding of species' habitats already surveyed in the area. The list of species was cross-checked against species already assessed in the Draft EIS and against the NT EPA Direction terrestrial ecosystem comments.

Detailed descriptions of theses species' habitats, conservation status, and relevant threat abatement plans/actions can be found in Section 16.3.2.1 of the Draft EIS, as well as within Section 5.6.2, Section 5.6.3 and Section 5.6.6 of Chapter 5 of this SEIS. Detailed significant impact assessments for Endangered Species and Vulnerable Species are found in Section 5.6.7 and Section 5.6.8, respectively in Chapter 5.

Table 15-1 applies the following ratings:

- **High** – It is expected that this species occurs within the Project area because there is core habitat and recent (post-2000) proximate records or knowledge that the species occurs in the local area. Requires field validation to confirm presence.
- **Moderate** – Species is likely to occur within the Project area because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records within or close to the area, substantial loss of habitat within the area since previous records, species is naturally rare or occurs at a low density etc.). Requires field validation to confirm presence.
- **Low** – Species may occur, as a vagrant, within the Project area; and/or only marginally-suitable habitat is not expected. Targeted field validation not considered necessary.
- **None** – There is strong evidence that this species will not occur within the Project area (i.e., there is no suitable habitat and/or the species is considered to be regionally extinct). Field validation not considered necessary.

Species deemed to have a moderate or high likelihood of occurrence were carried forward for a significance assessment. In addition, other species were included for an assessment of significance based on:

- having the potential to experience impacts due to project refinements since the Draft EIS was lodged, or
- For which a submission was received, and it was deemed appropriate to prepare a Significance Impact Assessment, or
- For which the NT EPA Direction requested that a further assessment be provided, and it was deemed appropriate to prepare a Significant Impact Assessment.

These assessments were undertaken according to the criteria contained within the EPBC Significant Impact Guidelines 1.1 (DEWHA 2013). Each Significant Impact Assessment can be found in full within Chapter 5.

Table 15-2 summarises the findings of Significant Impact Assessments undertaken for the *EPBC Act* listed species.

Table 15-1: Terrestrial Threatened Species Listed under the EPBC Act – Results of Step 2: Likelihood of Occurrence Screening

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Mammals			
Fawn Antechinus (*Antechinus bellus*)	VU	DCS – **High** – Recorded recently on camera trap	Yes
		OHTL Corridor preferred route at Adelaide River – Moderate	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Black-footed Tree-rat (Kimberley and mainland Northern Territory) (*Mesembriomys gouldii gouldii*)	EN	DCS – **High –** Recorded recently on camera trap	Yes
		OHTL Corridor preferred route at Adelaide River – **High**	Yes
		OHTL Corridor preferred route at Katherine – **High**	Yes
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*)	VU	DCS – **High** – Recorded recently on camera trap	Yes
		OHTL Corridor preferred route at Adelaide River – **High**	Yes
		OHTL Corridor preferred route at Katherine – **High**	Yes
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

[1] EN = Endangered; VU = Vulnerable

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Ghost Bat (*Macroderma gigas*)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – **Moderate**	Yes
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Northern Quoll (*Dasyurus hallucatus*)	EN	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Nabarlek (Top End subspecies) (*Petrogale concinna canescens*)	EN	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Bare-rumped Sheath-tailed Bat (*Saccolaimus saccolaimus undecylenate's*)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Greater Bilby (Macrotis lagotis)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – **High** – recent proximate records. Suitable habitat present in the Redsan land system.	**Yes**
Birds			
Partridge Pigeon (*Geophaps smithii smithii*)	VU	DCS – **High** – Recorded recently on camera trap	**Yes**
		OHTL Corridor preferred route at Adelaide River – **High**	**Yes**
		OHTL Corridor preferred route at Katherine – **High**	**Yes**
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Masked Owl (*Tyto novaehollandiae kimberli*)	VU	DCS – **High** – Recorded recently on camera trap	Yes
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	Yes
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	Yes

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Gouldian Finch (*Chloebia gouldiae*)	EN	DCS – **Low** – May occur as a vagrant – preferred breeding habitat	Yes
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – **Moderate** – N/A – no suitable habitat present	Yes
		Powell Creek Electrode and Ancillary Infrastructure – **Moderate** – Vagrant to the region. However, a recent (2021) sighting in the region. Suitable habitat present within the eastern Ancillary Infrastructure extent	No
Red Goshawk (*Erythrotriorchis radiatus*)	VU	DCS – **Low** – Suitable habitat but few records	Yes
		OHTL Corridor preferred route at Adelaide River – **High**	Yes
		OHTL Corridor preferred route at Katherine – **Moderate**	Yes
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Crested Shrike-tit (northern subspecies) (*Falcunculus frontatus whitei*)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Grey Falcon (*Falco hypoleucos*)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – **High** – recent proximate records. Suitable nesting habitat present to the east of the Ancillary Infrastructure (i.e., large trees on drainage).	Yes
Amphibian			
Howard River Toadlet (*Uperoleia daviesae*)	VU	DCS – **Low** – No suitable sandsheet heath	Yes
		OHTL Corridor preferred route at Adelaide River – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Reptile			
Plains Death Adder (*Acanthophis hawkei*)	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Fish			
Northern River Shark (*Glyphis garricki*)	EN	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Plants			
Trigger Plant (*Stylidium ensatum)*	EN	DCS – **High** – High likelihood modelled habitat	Yes
		OHTL Corridor preferred route at Adelaide River – **High**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No
Glenluckie Creek (*Helicteres macrothrix)*	EN	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **High**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

Species	*EPBC Act* Status[1]	Step 2: Likelihood of Occurrence Screening in Project Refinement Areas	Carried over for Further Assessment?
Goodenia quadrifida	VU	DCS – N/A – no suitable habitat present	No
		OHTL Corridor preferred route at Adelaide River – **Moderate**	Yes
		OHTL Corridor preferred route at Katherine – N/A – no suitable habitat present	No
		Powell Creek Electrode and Ancillary Infrastructure – N/A – no suitable habitat present	No

Table 15-2: Summary of Significance Impact Assessment Results for Terrestrial EPBC Act Listed Species

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
Mammals			
Arnhem Leaf-nosed Bat (*Hipposideros inornatus)*	EN	The Arnhem Leaf-nosed Bat is unlikely to occur within the project footprint, therefore impacts to suitable habitat will be minimised through micro-siting, and the area of suitable habitat is very small and narrow – this species is unlikely to be significantly impacted by the Project. Refer to Section 5.6.3.2 of Chapter 5.	No
Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus)*	VU	Since any occurrence of Bare-rumped Sheathtail Bat within the project footprint is not considered an important population, the footprint does not contain habitat critical to the survival of the species and other potential impacts can be avoided or mitigated, the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.4.3 of Chapter 5.	No
Black-footed Tree-rat (*Mesembriomys gouldii gouldii*)	EN	Since proportion of Black-footed Tree-rat habitat within the project footprint is very small – combined with the implementation of den habitat avoidance (micro-siting) and mitigation (pre-clearance surveys and use of a fauna spotter-catcher) measures – the impacts to this species associated with the project are unlikely to be significant. Refer to Section 5.6.3.3 of Chapter 5.	No
Fawn Antechinus (*Antechinus bellus*)	VU	Since the proportion of Fawn Antechinus habitat within the project footprint is very small and narrow – combined with the implementation of avoidance (micro-siting) and mitigation (pre-clearance surveys and use of a fauna spotter-catcher) measures – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.3.5 of Chapter 5.	No
Ghost Bat (*Macroderma gigas)*	VU	The narrow footprint and the mitigations proposed – primarily to do with timing of works – mean that impacts to this species associated with the Project are unlikely to constitute a significant impact. Refer to Section 5.6.4.7 of Chapter 5.	No
Greater Bilby (*Macrotis lagotis*)	VU	The key sources of potential impacts to the Greater Bilby from the project activities considered in the assessment are direct mortality during land clearing, and indirect impacts associated with removal of suitable (but unoccupied) habitat. The assessment concludes that a significant impact	No

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
		is unlikely because most of the suitable habit for Greater Bilby that will be lost is peripheral, of lower quality, and has not been shown to support the species (based on two surveys). In addition, mitigation measures will be put into place to avoid direct mortality of the species during construction. Section 5.6.4.8 of Chapter 5.	
Nabarlek (*Petrogale concinna canescens*)	EN	Since the Nabarlek is unlikely to occur within the project footprint, impacts to suitable habitat will be minimised through micro-siting, the area of suitable habitat is very small and narrow, the implementation of mitigation (pre-clearance surveys and use of a fauna spotter-catcher) – this species is unlikely to be significantly impacted by the Project. Refer to Section 5.6.3.10 of Chapter 5.	No
Northern Brush-tailed Phascogale (*Phascogale pirata)*	VU	Since the proportion of Northern Brush-tailed Phascogate habitat within the project footprint is very small and narrow – combined with the implementation of avoidance (micro-siting) and mitigation (pre-clearance surveys and use of a fauna spotter-catcher) measures – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.3.10 of Chapter 5.	No
Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis)*	VU	Since the proportion of Northern Brushtail Possum habitat within the project footprint is very small and narrow – combined with the implementation of avoidance (micro-siting) and mitigation (pre-clearance surveys and use of a fauna spotter-catcher) measures – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.4.13 of Chapter 5.	No
Northern Quoll (*Dasyurus hallucatus)*	EN	Critical habitat for the species will not be disturbed by project activities. This, combined with the fact that the regional proportion of Northern Quoll habitat within the project footprint is very small, and the implementation of mitigation measures (pre-clearance surveys and use of a fauna spotter-catcher) – means that the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.3.11 of Chapter 5.	No
Water Mouse *(Xeromys myoides)*	VU	There is no suitable habitat for Water Mouse within the project footprint, nor has the Water Mouse been recorded within the project footprint. As the project footprint will not impact on known populations or suitable habitat, the Water Mouse is unlikely to be significantly impacted by the Project.	No

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
		Refer to Section 5.6.4.21 of Chapter 5.	
Birds			
Crested Shrike-tit	VU	Given the large area of habitat in the region, the clearing of such a small (and narrow) proportion of it cannot be considered likely to lead to a long-term decrease in the size of the Crested Shrike-tit population because the impacts on critical habitat will be negligible. Refer to Section 5.6.4.5 of Chapter 5.	No
Gouldian Finch (*Chloebia gouldiae)*	EN	Given the large area and availability of breeding and foraging habitat in the region, the clearing of such a small (and narrow) proportion of it cannot be considered likely to lead to a long-term decrease in the size of the Gouldian Finch population because the impacts on critical habitat will be negligible. Refer to Section 5.6.3.6 of Chapter 5.	No
Grey Falcon (*Falco hypoleucos)*	VU	Since the small area of habitat that will be lost, coupled with mitigation measures to ensure breeding is not disrupted, means it is unlikely there will be a significant impact to the species. Refer to Section 5.6.4.9 of Chapter 5.	No
The Masked Owl (*Tyto novaehollandiae Kimberli)*	VU	Since the proportion of Masked Owl habitat within the project footprint is very small and narrow – combined with the implementation of avoidance (micro-siting) and mitigation (pre-clearance surveys and use of a fauna spotter-catcher) measures – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.4.11 of Chapter 5.	No
Night Parrot (*Pezoporus occidentalis*)	EN	Since it is unlikely that project activities will have a significant impact upon the Night Parrot. The species is unlikely to be within the project footprint because there is no suitable habitat due to the high fire frequency. Refer to Section 5.6.3.9 of Chapter 5.	No
Painted Honeyeater (*Grantiella picta)*	VU	Since the Painted Honeyeater is unlikely to occur within the project footprint except as vagrant – and impacts to suitable habitat will be very minimal – this species is unlikely to be significantly impacted by the Project.	No

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
		Refer to Section 5.6.4.14 of Chapter 5.	
Partridge Pigeon (eastern subspecies) *(Geophaps smithii smithii)*	VU	Since the proportion of Partridge Pigeon habitat within the footprint is very small and narrow – combined with the use of a fauna spotter-catcher during construction – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.4.15 of Chapter 5.	No
Princess Parrot (*Polytelis alexandrae*)	VU	Since it is unlikely that project activities will have a significant impact upon the Princess Parrot because the species is only likely to occur within the project footprint in passing, and there is no suitable foraging habitat present. Refer to Section 5.6.4.17 of Chapter 5.	No
Red Goshawk (*Erythrotriorchis radiatus*)	VU	Since the small area of habitat that will be lost, coupled with mitigation measures to ensure breeding is not disrupted, means it is unlikely there will be a significant impact to the species. Refer to Section 5.6.4.18 of Chapter 5.	No
White-throated Grasswren *(Amytornis woodwardia)*	VU	Since the White-throated Grasswren is unlikely to occur within the project footprint – and impacts to suitable habitat will be very minimal – this species is unlikely to be significantly impacted by the Project. Refer to Section 5.6.4.22 of Chapter 5.	No
Amphibians			
Howard River Toadlet (*Uperoleia daviesae)*	VU	Since this restricted-range species is present within the OHTL, the commitment by the Proponent to span and buffer the areas identified as suitable habitat for Howard River Toadlet will make it unlikely that the project will have a significant impact on this species. Refer to Section 5.6.4.10 of Chapter 5.	No
Reptiles			
Arnhem Land Gorges Skink (*Bellatorias obiri)*	EN	Since the Arnhem Land Gorges Skink is unlikely to occur within the Project footprint, impacts to suitable habitat will be minimised through micro-siting, and the area of suitable habitat is very small and narrow – this species is unlikely to be significantly impacted by the Project.	No

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
		Refer to Section 5.6.3.1 of Chapter 5.	
Mertens' Water Monitor (*Varanus mertensi)*	Nominated for listing	These two species have been assessed collectively because of their similar ecologies and distributions, and the fact that ingestion of Cane Toads is their primary threat. Since an important population of either species is not involved, no critical habitat will be lost, and only a small proportion of these species' habitat will be disturbed by the development of the Project, it is unlikely that there will be a significant impact to the Mitchell's Water Monitor or Mertens' Water Monitor as consequence of the Project. Refer to Section 5.6.4.12 of Chapter 5.	No
Mitchell's Water Monitor (*Varanus mitchelli*)	Nominated for listing		
Plains Death Adder (*Acanthophis hawkei*)	VU	Since the proportion of Plains Death Adder habitat within the project footprint is very small and narrow – and does not constitute critical habitat – the impacts to this species associated with the Project are unlikely to be significant. Refer to Section 5.6.4.16 of Chapter 5.	No
Plants			
Wattle (*Acacia praetermissa)*	VU	Since it is unlikely that project activities will have a significant impact upon *Acacia praetermissa* because the project footprint does not intersect with the two known localities of this range restricted species. Refer to Section 5.6.4.1 of Chapter 5.	No
Glenluckie Creek (*Helicteres macrothrix)*	EN	Since it is unlikely that project activities will have a significant impact upon *Helicteres macrothrix*. Even if this restricted-range species is present within the OHTL footprint, its occurrence will almost certainly be very localised, and therefore the Project's design can be altered to avoid or minimise impacts to it. Refer to Section 5.6.3.7 of Chapter 5.	No
Trigger plants (*Stylidium ensatum)*	EN	No *Stylidium ensatum* plants were located within the northern electrode OHTL, but 149 records were observed approximately 60 m south of the outer edge of the corridor. Refer to Section 5.6.3.12 of Chapter 5.	No

Species	*EPBC Act* Status	Summary of Assessment Findings	Significant Impact Likely?
Typhonium praetermissum	VU	By spanning important occurrences and minimising loss of plants elsewhere, it is unlikely there will be a significant impact to the species. Refer to Section 5.6.4.19 of Chapter 5.	No
Typhonium taylori	EN	Since all populations will be avoided, it is unlikely that project activities will have a significant impact upon *Typhonium taylori*. Refer to Section 5.6.3.13 of Chapter 5.	No

15.5.2 Marine and Migratory Species and Populations

To determine if the Project is likely to have a significant impact on migratory birds, a significant impact assessment against the *EPBC Act* Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on *EPBC Act* listed migratory shorebird species (Australian Government Department of Agriculture, Water and the Environment, 2015) is required. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not individually listed.

The identification of Important Habitat for migratory shorebirds is a key concept in determining the likelihood of significant impact from proposed actions. Additional Referral guidelines for 14 birds listed as migratory species under the *EPBC Act* are also available on the DCCEW website, to assist with the assessment of significant impacts on terrestrial migratory species such as Osprey, White-throated Needletail and Rufous Fantail (DoE, 2015). Important habitat for migratory shorebirds is outlined in the Industry guidelines for avoiding, assessing and mitigating impacts on *EPBC Act* listed migratory shorebird species (Australian Government Department of Agriculture, Water and the Environment, 2015) and refers to areas which are nationally or internationally important.

Wetland habitat should be considered internationally important if it regularly supports:

- 1 % of the individuals in a population of one species or subspecies of waterbird or
- A total abundance of at least 20,000 waterbirds.

Wetland habitat should be considered nationally important if it regularly supports:

- 0.1 % of the flyway population of a single species of migratory shorebird or
- 2 000 migratory shorebirds or
- 15 migratory shorebird species.

An ‘Ecologically significant proportion of the population’ refers to the proportions of each migratory species population likely to result in a significant impact if affected. This varies from species to species and as such, each species will need to be evaluated based on factors such as the species’:

- Population status
- Genetic distinctiveness
- Species specific behavioural patterns (i.e., site fidelity; dispersal rates).

For species that aggregate in flocks, 1 % of the population is considered internationally important and 0.1 % as nationally important. Populations for each of the migratory shorebird species are detailed in Hansen et al. (2016).

Given the broad definition of “environment” under the *EPBC Act*, and as it pertains to assessing impacts to the Cwth Marine Area (refer to Section 15.5.3 below), potential impacts to additional species and/or species groupings have been considered (Table 15-3). These additions are largely based on the EPA Direction and submission matters raised during the Draft EIS’s public consultation period. For example, “Cetaceans” are referred to both individually where listed and as a broad species grouping since all Cetacean sp. are subject to general protections under the *EPBC Act* (refer to Section 15.5.3 below).

As noted in Chapter 5 Section 5.6.3.14, Gunn Point Beach supports internationally-significant numbers of Great Knot (5 500), and nationally significant numbers of Bar-tailed Godwit (900), Black-tailed Godwit (700), Greater Sand Plover (700), Grey Plover (121), Lesser Sand Plover (925), Red knot (700), Ruddy Turnstone (160), Sharp-tailed Sandpiper (258), Terek Sandpiper (120) and Whimbrel (200). In addition to these species, Curlew Sandpiper have also been recorded along Gunn

Point Beach, but not in numbers exceeding their national significance or 'Important Habitat' threshold.

Potential risks to marine and migratory species or populations resulting from the Project are also considered within Chapter 8 and Chapter 9. These include:

- Potential impacts with a residual risk rating of minor, as follows:
  - Re-suspension of contaminated sediments via dredging – Route B
  - Contamination of Potential Spoil Disposal Grounds
  - Seabed disturbance from cable repairs – Route B
  - Direct loss of benthic communities and habitat due to sand wave removal
  - Direct loss or disturbance of benthic communities and habitat due to spoil disposal
  - Changes to fauna behaviours due to noise and light disturbance during sand wave removal and spoil disposal
  - Direct fauna mortality or injury due to vessel collision or spoil disposal
  - Habitat loss and degradation associated with cable repairs (operations).
- Potential impacts with a residual risk rating of moderate, as follows:
  - Sediment re-suspension in the water column caused by cable burial via mass flow-excavator and dredging - Route B / Potential Spoil Disposal Grounds
  - Habitat degradation due to elevated turbidity in marine waters due to sand wave removal and spoil disposal.

Overall, Chapter 8 and Chapter 9 found there is a low to moderate potential for impacts to occur resulting from the Project's refinements. The further review carried out in in Table 15-3 has not found the potential for significant impacts to occur to a range of EPBC protected species and other species which would be associated with the Cwth Marine Area's environment.

Table 15-3 also includes marine and migratory species which were previously considered for assessment in Chapter 16 of the Draft EIS.

Table 15-3: Marine and Migratory Species Listed under the EPBC Act – Potential Impacts

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Mammals			
Australian Humpback Dolphins (*Sousa sahulensis*)	Migratory Cetacean	• Direct loss of habitat, including foraging habitat. However, sand wave removal will only take place along isolated sections of the Subsea Cable System route, and therefore this impact is not considered to be significant. • Impacts due to water quality (e.g., indirect impacts to benthic food sources). However, suspended sediment concentrations will be only temporarily elevated for a short-term duration regionally surrounding the sand wave removal footprint. Marine mammals are expected to avoid areas of elevated suspended sediments. • Vessel strike or interaction with dredger and spoil disposal activities, and changes to fauna behaviours due to noise and light disturbance during these activities. These are not considered to generate greater impacts than already considered for the Subsea Cable System installation. • There is a very low likelihood that Potential Spoil Disposal Grounds would become contaminated and thus affect these species' habitats; sediment quality is characterized as good to very good. Arsenic is the only contaminant noted to exceed thresholds, however is within natural baseline variability and typical of marine sediment concentrations documented in the Darwin region. • Changes to fauna behaviour (e.g., deterred from some foraging habitat) due to sand wave removal and spoil disposal is possible. However, as sand wave removal will only take place along isolated sections of the Subsea Cable System route infrequently, this impact is localized, short-term, reversible and of minor magnitude. This impact is considered not significant.	No
Australian Snubfin Dolphin (*Orcaella heinsohni*)	Migratory Marine Cetacean		
Bryde's Whale (*Balaenoptera edeni*)	Migratory Marine Cetacean		
Dugong (*Dugong dugon*)	Migratory Marine		
Indo-Pacific Humpback Dolphin (*Sousa chinensis*)	Migratory Marine Cetacean		
Killer Whale (*Orcinus orca*)	Migratory Marine Cetacean		

[2] CE = Critically Endangered; EN = Endangered; VU = Vulnerable

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Pygmy Blue Whale (*Balaenoptexra musculus brevicauda*)	Cetacean	• Any potential impact of EMF on marine biota will be localized and minor and deemed not significant. Migratory seabirds and shorebirds were considered in Section 5.8 of Appendix T – Marine Ecology Report in the Draft EIS and in Chapter 5 of this SEIS.	
Sperm Whale (*Physeter macrocephalus*)	Migratory Marine Cetacean		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) (*Tursiops aduncus*)	Cetacean		
All Cetaceans otherwise not listed (broad species group)	Cetacean		
Birds			
Abbott's Booby (*Papasula abbotti*)	Marine Migratory EN	• Interaction with dredger and spoil disposal activities and any changes to fauna behaviours due to noise and light disturbance may temporarily impact species' feeding grounds at sea as fish schools disperse. Direct impacts are not anticipated for these species as these activities are short-term, localized, reversible and of minor magnitude.	No
Brown Booby (*Sula leucogaster*)	Marine Migratory		
Common Sandpiper (*Actitis hypoleucos*)	Marine Migratory		
Fork-tailed Swift (*Apus pacificus*)	Marine Migratory		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Great Frigatebird (*Fregata minor*)	Marine Migratory		
Lesser Frigatebird (*Fregata ariel*)	Marine Migratory		
Christmas Island Frigatebird (*Fregata andrewsi*)	Marine Migratory EN		
Osprey (*Pandion haliaetus*)	Marine Migratory		
Pectoral Sandpiper (*Calidris melanotos*)	Marine Migratory		
Red-footed Booby (*Sula sula*)	Marine Migratory		
Sharp-tailed Sandpiper (*Calidris acuminata*)	Marine Migratory		
Streaked Shearwater (*Calonectris leucomelas*)	Marine Migratory		
White-tailed Tropicbird (*Phaethon lepturus*)	Marine Migratory		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Crustaceans			
Crustaceans present within the Cwth Marine Area	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area	• Direct loss of habitat, including foraging habitat. However, sand wave removal will only take place along isolated sections of the Subsea Cable System route, and therefore this impact is not considered to be significant. • Impacts due to water quality (e.g., indirect impacts to benthic food sources). However, suspended sediment concentrations will only be elevated for a number of days in the region surrounding the sand wave removal footprint. • Vessel strike or interaction with dredger and spoil and changes to fauna behaviours due to noise and light disturbance during sand wave removal and spoil disposal. These are not considered to generate greater impacts than that which is already considered for the Subsea Cable System installation. • There is considered to be a low likelihood that Potential Spoil Disposal Grounds would become contaminated and thus affect these species' habitats. • Changes to fauna behaviour (e.g., deterred from some foraging habitat) due to sand wave removal and spoil disposal. As sand wave removal will only take place along isolated sections of the Subsea Cable System route, this impact is not considered to be significant. • Any potential impact of EMF on marine biota will be localized and minor.	No
Reptiles			
Estuarine Crocodile (*Crocodylus porosus*)	Migratory Marine	• Direct loss of habitat, including turtle foraging habitat. However, sand wave removal will only take place along isolated sections of the Subsea Cable System route, and therefore this impact is not considered to be significant. • Impacts due to water quality (e.g., indirect impacts to benthic food sources). However, suspended sediment concentrations will only be elevated for a number of days in the region surrounding the sand wave removal footprint.	No
Flatback Turtle (*Natator depressus*)	Migratory Marine VU		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Green Turtle (*Chelonia mydas*)	Marine Migratory VU	• Vessel strike or interaction with dredger and spoil and changes to fauna behaviours due to noise and light disturbance during sand wave removal and spoil disposal. These are not considered to generate greater impacts than that which is already considered for the Subsea Cable System installation. • There is considered to be a low likelihood that Potential Spoil Disposal Grounds would become contaminated and thus affect these species' habitats. • Changes to fauna behaviour (e.g., deterred from some foraging habitat) due to sand wave removal and spoil disposal. As sand wave removal will only take place along isolated sections of the Subsea Cable System route, this impact is not considered to be significant. • Any potential impact of EMF on marine biota will be localized and minor. Marine turtles were considered in Section 5.2 of Appendix T – Marine Ecology Report in the Draft EIS.	
Hawksbill Turtle (*Eretmochelys imbricata*)	Marine Migratory VU		
Leatherback Turtle (*Dermochelys coriacea*)	Marine Migratory EN		
Loggerhead Turtle (*Caretta caretta*)	Migratory Marine EN		
Olive Ridley Turtle (*Lepidochelys olivacea*)	Migratory Marine EN		
Sea snakes (broad species group)	–		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Fish			
Barramundi	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area	• Direct loss of habitat, including some foraging habitat. However, sand wave removal will only take place along isolated sections of the Subsea Cable System route, and therefore this impact is not considered to be significant. • Impacts due to water quality (e.g., indirect impacts to benthic food sources). However, suspended sediment concentrations will only be elevated for a number of days in the region surrounding the sand wave removal footprint. • Vessel strike or interaction with dredger and spoil and changes to fauna behaviours due to noise and light disturbance during sand wave removal and spoil disposal. These are not considered to generate greater impacts than that which is already considered for the Subsea Cable System installation. • There is considered to be a low likelihood that Potential Spoil Disposal Grounds would become contaminated and thus affect these species' habitats. • Changes to fauna behaviour (e.g., deterred from some foraging habitat) due to sand wave removal and spoil disposal. As sand wave removal will only take place along isolated sections of the Subsea Cable System route, this impact is not considered to be significant. • Any potential impact of EMF on marine biota will be localized and minor. Draft EIS Appendix P – Terrestrial Ecology Report – OHTL and Murrumujuk (Appendix A)	No
Bluenose salmon	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area		
Dwarf Sawfish (*Pristis clavate*)	Migratory VU		
Elasmobranch species (broad species group)	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Freshwater or Largetooth Sawfish (*Pristis pristis*)	Migratory VU		
Giant Manta Ray (*Manta birostris*)	Migratory Marine		
Golden Trevally	Not *EPBC Act* listed		
Green Sawfish (*Pristis zijsron*)	Migratory VU		
Longfin Mako (*Isurus paucus*)	Migratory		
Narrow Sawfish (*Anoxypristis cuspidate*)	Migratory		
Northern Mulloway (*Argyrosomus japonicus*)	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area		
Oceanic Whitetip Shark (*Carcharhinus longimanus*)	Migratory		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
Queenfish	Not *EPBC Act* listed. Considered under the definition of "environment" for the Cwth Marine Area		
Reef Manta Ray (*Manta alfredi*)	Migratory		
Shortfin Mako (*Isurus oxyrinchus*)	Migratory		
Whale Shark (*Rhincodon typus*)	Migratory VU		
Migratory Shorebirds			
Bar-tailed Godwit (northern subspecies) (*Limosa lapponica menzbieri*)	Marine Migratory EN	Section 5.6.9.14 presents an assessment of whether the Project is likely to have a significant impact on the threatened migratory shorebirds recorded on Gunn Point Beach. For all of these species, their use of the habitat potentially impacted by the Project's activities is very similar. Consequently, they are assessed collectively against the criteria contained within the EPBC Significant Impact Guidelines 1.1 (DEWHA, 2013). The status of the species varies between Critically Endangered and Vulnerable to Marine/Migratory only under the *EPBC Act*. For maximum rigour, all species are assessed under the criteria for Critically Endangered species. Based on the outcomes of the Significant Impact Assessment, it is unlikely that the Project's activities will significantly impact critically endangered or endangered migratory shorebird species because of the small disturbance area, short-term duration of proposed works, the proposed scheduling of these works outside of the peak migratory shorebird season (Austral spring/summer), and the fact that disturbance area does not constitute Important Habitat. Refer to Section 5.6.9.14 of Chapter 5.	No
Bar-tailed Godwit (western Alaskan subspecies) (*Limosa lapponica baueri*)	Marine Migratory VU		
Curlew Sandpiper (*Calidris ferruginea*)	Marine Migratory		

Species	*EPBC Act* Status[2]	Potential for Impacts due to Project Refinements	Significant Impact Likely?
	CE		
Far Eastern Curlew (*Numenius madagascariensis*)	Marine Migratory CE		
Great Knot (*Calidris tenuirostris*)	Marine Migratory CE		
Greater Sand Plover (*Charadrius leschenaultii*)	Marine Migratory VU		
Lesser Sand Plover (*Charadrius mongolus*)	Marine Migratory EN		
Red Knot (*Calidris canutus*)	Marine Migratory EN		

CE = Critically Endangered

EN = Endangered

VU = Vulnerable

15.5.2.1 Significant Impact Assessment – Migratory-listed birds

Migratory birds will be impacted not only by the project refinements on the shore and within the ocean, but throughout the entire Project footprint. One holistic significant impact assessment has been undertaken for all migratory shorebird species due to their similar habitat requirements, habitat use and migration patterns. Some of these species were also assessed in Section 15.5.2. Migratory listed species with a moderate or higher likelihood of occurrence within the Project's Cable Transition Facilities area include:

- Grey Plover (Pluvialis squatarola)
- Pacific Golden Plover (*Pluvialis fulva*)
- Oriental Plover (*Charadrius veredus*)
- Whimbrel (Numenius phaeopus)
- Black-tailed godwit (*Limosa limosa*)
- Ruddy Turnstone (*Arenaria interpres*)
- Sanderling (*Calidris alba*)
- Grey-tailed Tattler (*Tringa brevipes*)
- Terek Sandpiper (*Xenius cinereus*)
- Caspian tern (Hydroprogne caspia)
- Common Greenshank (*Tringa nebularia*)
- Common Sandpiper (*Actitis hypoleucos*)
- Eastern osprey (*Pandion haliaetus*)
- Glossy ibis (Plegadis falcinellus)
- Little curlew (*Numenius minutus*)
- Marsh sandpiper (*Tringa stagnatilis*)
- Red-necked stint (*Calidris ruficollis*)
- Sharp-tailed sandpiper (*Calidris acuminata*)
- Wood sandpiper (*Tringa glareola*).

Based on habitat quality, type and variability, and previous records in available databases in the vicinity of the Cable Transition Facilities and Solar Precinct, the following species are considered unlikely to occur at any AAPowerlink areas, or the surrounding region in numbers which would constitute an ecologically significant proportion of their respective populations:

- Oriental Plover
- Caspian tern
- Common Sandpiper
- Eastern osprey
- Glossy ibis
- Wood sandpiper.

For this reason, these species have not been included in the Significant Impact Assessment.

All considerations for the species described and assessed in Chapter 5 Section 5.6.7.14 are applicable to the migratory shorebird species covered below in Table 15-4, which assesses project specific impacts to migratory listed species using the significant impact criteria outlined in the Cwth's Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DoE, 2013). This assessment focuses on the Cable Transition Facilities and Solar Precinct Project components, as per Chapter 5 Section 5.6.3.14, as it is these Project components which have been assessed as having potential to impact migratory-listed species.

Table 15-4: Significant Impact Assessment – Other Migratory-listed Birds

Criterion	Summary of mitigation measures and significant impact assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of Important Habitat for a migratory species	***Cable Transition Facilities – Unlikely*** Important Habitat for the migratory shorebird species considered herein is unlikely to be subject to long-term substantial modification, destruction or alteration following completion of the proposed works within the Cable Transition Facilities area. Habitat for listed migratory shorebird species is limited to Gunn Point Beach and intertidal zone. The Cable Transition Facilities include the Underground Cable Corridor, the Land Sea Joint Station, and the Shore Crossing Site. Specific to the Gunn Point Beach shoreline, the Subsea Cable System will be installed through Gunn Point Beach and into Shoal Bay. This will include the excavation of two trenches, one for each cable system, and consist of an approximate construction corridor footprint width of 63 m. The preferred configuration is a Bipole with Metallic Return, which involves three cables laid parallel: Positive pole (Pole 1), Negative pole (Pole 2) and a Metallic return. Lateral spacing between the cables in each trench will be approximately 4 m, within an approximate trench width of 13.5 m. Based on this specification, and a beach width of up to 300 m (relative to tidal state), the total construction footprint is approximately 1.9 ha, within the identified shoreline crossing site of 25 ha as shown on Figure 2-3. While there may be some disturbance related impacts from construction activities at the shoreline crossing location) i.e., aversion to the use of intertidal foraging area), no direct impacts to migratory shorebird species or their habitats are likely to occur outside of the 1.9 ha construction footprint. It is envisaged that all construction works within the shoreline crossing location can be scheduled and completed during the Austral winter season (end of May through to end of August), when the vast majority of migratory shorebirds are transiting to or from, or in their northern hemisphere breeding sites. This will minimise potential disturbance-related impacts arising from construction activities in the vicinity of the shoreline crossing location, noting that a small percentage (up to 30 %) of the summer population of some migratory shorebird species remain in Australia and do not migrate. Spoil from trench excavation will be stockpiled along the length of each trench alignment and be reinstated on top of each cable system once installed. No fill from external sources will be used to reinstate excavated trenches in order to expedite the recovery of extant benthic and intertidal macroinvertebrates. Following the installation of the Subsea Cable System and reinstatement of excavated trench spoil, natural restoration of existing conditions is expected to occur relatively quickly, especially in those areas subject to routine tidal inundation. While it is anticipated that there will be an intertidal and beach infauna ecosystem recovery timeframe associated with excavation and reinstatement of the shoreline crossing site, areas subject to these actions are expected to be restored to pre-construction conditions largely via natural processes. Given the area of Gunn Point Beach and extent of the intertidal zone, the distributions of invertebrate species present are likely to be present across the entire beach front and intertidal zone. Any potential impacts to benthic and intertidal invertebrates arising from EMF and thermal radiation emissions from AAPowerlink cable infrastructure will be hyper-localized and restricted to an area

Criterion	Summary of mitigation measures and significant impact assessment
	immediately adjacent to each cable, which in the context of the extent of the broader Gunn Point Beach is negligible. Subsequently, the indirect impacts of EMF and thermal radiation to invertebrate abundance and diversity within such an localized geospatial area, relative to the rest of Gunn Point Beach, are considered highly unlikely to result in a measurable reduction of available foraging resources for migratory shorebirds. ***Solar Precinct - Unlikely*** The Solar Precinct is located within an area devoid of migratory shorebird habitat and will not affect ephemeral (seasonal) habitats present at the nearby Lake Woods Important Bird Area. While substantial modifications are expected to occur at the Solar Precinct site, these proposed changes will not impact any Important Habitat areas for listed migratory bird species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of Important Habitat for the migratory species	***Cable Transition Facilities - Unlikely*** It is unlikely that the Project will exacerbate invasive species beyond current levels. Pest and invasive species management will be undertaken for identified key weed and pest species at risk of spread through Project activities. Control efforts will be increased in areas particularly sensitive to invasion, e.g. in areas neighbouring the Lake Woods IBA. ***Solar Precinct – Unlikely*** Given the location and habitat types present at the Solar Precinct, any potential resultative increases in pest and invasive animals and/or plants are highly unlikely to impact any Important Habitat for migratory shorebird species.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	***Cable Transition Facilities – Unlikely*** While there will be modification, temporary disturbance and reduction in the available foraging habitat to migratory shorebirds to a small section of Gunn Point Beach and intertidal areas during the construction phase, these are expected to be short term only. All extant and regular visiting populations of the listed migratory shorebird species are considered highly unlikely to decline as a result of AAPowerlink construction works and subsequent operation. ***Solar Precinct - Possible*** Each of the migratory shorebird species assessed herein breeds outside of Australia, some in the far northern reaches of the East Asian-Australasian Flyway, and therefore only foraging, migratory and roosting behaviours are relevant in this context. These include long-distance migratory shorebirds: • **Black-tailed godwit** • **Curlew sandpiper** • **Little curlew** • **Marsh sandpiper** • **Red-necked stint** • **Sharp-tailed sandpiper.** • **Solar Precinct - Possible** Based on the geographic location of the Solar Precinct, impacts to migratory birds are unlikely to occur as a result of loss of habitat, however are more likely to arise due to interactions (e.g., collision) with infrastructure such as photo-voltaic panels, buildings and other associated infrastructure while birds are migrating. Section 5.5.4.2 of the Draft EIS discusses the LEH – the hypothesis that bird

Criterion	Summary of mitigation measures and significant impact assessment
	species mistake photovoltaic panel arrays for water features on which the birds can land, usually at night. Such collisions often do not result in direct fatality, but some species of birds, such as cormorants, are unable to become airborne again because they are adapted to take off from water, not dry land. Such an issue is unlikely to affect migratory shorebirds, which can alight from land effectively, but may impact individuals that have expended all energy reserves and mistakenly landed in an environment which provides them with no foraging resources. Australia hosts a substantial number of regular seasonal migratory bird species (almost 10 % total bird species recorded in Australia), as well as other non-migratory waterbird species which undertake long-distance nomadic movements across the country in response to variations in habitat conditions – particularly rainfall and widespread flooding and inundation in arid and semi-arid zones. Migratory shorebird species are likely to overfly Lake Woods and the Solar Precinct on a routine and predictable basis, especially during northward and potentially southward migration. The Birdlife Australia Birdata database provides a list of waterbird and shorebird species that are likely to be passing through the region during migration periods. Oriental Plover, Little Curlew, Black-tailed Godwit, Sharp-tailed Sandpiper, Swinhoe's Snipe, Common Sandpiper, Common Greenshank, Wood Sandpiper, Marsh Sandpiper, Australian Pratincole and Oriental Pratincole have all been recorded in the region previously, and would be expected to utilise suitable wetland habitat at the nearby Lake Woods when available. Satellite and geotracker telemetry data from species which have been studied using such technology, such as Grey Plover, Bar-tailed Godwit, Ruddy Turnstone, Little Curlew, Eastern Curlew, Red Knot, Great Knot, Oriental Pratincole and Whimbrel will demonstrate that most of these species pass through (or over) central Australian regions on route to their breeding grounds in the northern hemisphere. Such studies identify that despite the Solar Precinct's geographic location and surrounding habitat types, it is indeed within the broader East-Asian Australasian Flyway (EAAF) and likely to be seasonally traversed by a suite of waterbird and migratory shorebird species. Based on the location of the Solar Precinct, in a largely arid environment and in proximity to Lake Woods, there is unlikely to be suitable wetland habitat present on a routine and predictable basis. Instead, habitat conditions, particularly at Lake Woods, are likely to be suitable only in response to rainfall and subsequent flooding. Under such conditions, there is likely to be widespread ephemeral wetland habitat availability in the region and resultative waterbird and shorebird distributions will also be widespread taking advantage of suitable habitat conditions. With widespread standing water across the landscape, the LEH and collision risk with AAPowerlink Solar Precinct solar array panels is expected to be reduced. However, it is the opposite conditions which are likely to be more of a concern given the geographic context, surrounding habitat types and wetland habitat availability. While there may resultantly be a substantial increase in waterbird and shorebird abundances in the landscape, the availability of habitat means that there should be less attraction to the Solar Precinct due to the LEH, when compared to dry years in which the Solar Precinct will stand out and appear more attractive to tired migratory birds passing overhead during peak migration periods. Based on available literature and a distinct lack of collision mortality research associated with Solar Energy Facilities in Australia, especially for projects of this scale, there remains a large degree of uncertainty regarding the prevalence and frequency of avian impacts due to interference such as collisions. Under extreme cases, each year during migration periods, the Solar Precinct may attract flocks of migratory-listed shorebird species due to the LEH, and lead to mortality or injury of individuals through collisions with infrastructure. Given the unlikely chance of such a scenario eventuating, such impacts are expected to be rare, and highly unlikely to lead to the disruption of an ecologically significant proportion of a migratory species population. To identify whether this impact manifests at the Solar Precinct and to gauge its significance, the Proponent will undertake

Criterion	Summary of mitigation measures and significant impact assessment
	monitoring of bird utilisation and fatalities within the Solar Precinct as part of the CEMP. Bird mitigation measures within the CEMP will detail appropriate protocols for maintenance, mitigation measures, and identify adaptive management actions to respond to any emerging issues.

Table 15-5 presents a list of the actions identified in *EPBC Act* Policy Statement 3.21 – Industry guidelines for Avoiding, Assessing and Mitigating Impacts on *EPBC Act* Listed Migratory Shorebird Species (DOE, 2015) that may constitute a significant impact on migratory shorebirds, and uses that list to show that the activities associated with this Project's activities will not surpass any of those thresholds, and hence will not result in a significant impact to migratory shorebirds.

Table 15-5: Thresholds of significant impacts on migratory shorebirds

Significant Impact	Comment
Loss of habitat.	The project refinements set out in Chapter 2 of this SEIS do not propose any additional loss of habitat for these species which would result in impacts above and beyond what is already considered in the Draft EIS. These impacts are not considered to have the potential to be significant.
Degradation of habitat leading to a substantial reduction in migratory shorebird numbers.	The project refinements set out in Chapter 2 of this SEIS do not create the potential for significant impacts to marine environmental quality conditions that could degrade the habitat of shorebird habitats within Shoal Bay.
Increased disturbance leading to a substantial reduction in migratory shorebird numbers.	The project refinements set out in Chapter 2 of this SEIS do not create the potential for additional disturbance of migratory shorebird activity in the vicinity of Gunn Point Beach.
Direct mortality of birds leading to a substantial reduction in migratory shorebird numbers.	Neither construction nor operation of the Project involves actions that are likely to cause direct mortality of shorebirds.

15.5.3 Cwth Marine Area

A description of the Cwth Marine Area traversed by the Subsea Cable System is available in Section 16.5.1 of the Draft EIS. Further information about the existing environment of the Continental Shelf which overlaps the Indonesian EEZ is provided in Section 3.3, Section 3.4.2, Section 3.6.1.2, Section 3.7.3 and Section 4.5.1.2 of Appendix S to the Draft EIS. Appendix T to the Draft EIS also provides further information about this section of the Cwth Marine Area which will be traversed by the Project's Subsea Cable System.

The Cwth Marine Area is protected under Section 24 of the *EPBC Act*. It extends from the edge of the NT's Coastal Waters as defined under the *Coastal Waters (Northern Territory Powers) Act 1980* (Cwth) and includes the AEEZ and the area of ocean over the Australian Continental Shelf, which overlaps with part of the Indonesian EEZ.

Section 23 of the *EPBC Act* provides that a person may not take an action in a Cwth Marine Area that has, will or is likely to have a significant impact on the "environment." The term "environment" is broadly defined in Section 528 of the *EPBC Act* and includes a specific reference to the related term "ecosystems." Table 15-3 in Section 15.5.2 above has therefore included general considerations of some species groups beyond those individual species which are specifically listed under the *EPBC Act*.

A proportion of the Cwth marine area relevant to the Subsea Cable System footprint is within the OSMP – a 72,000 km^2 protected area spanning the eastern and western extents of the North and North-west Marine Regions, respectively (refer to Figure 16-2 in Chapter 16 of the Draft EIS).

The OSMP is part of the National Reserve System of Marine Protected Areas and was proclaimed in 2012. The Subsea Cable System transects the OSMP for approximately 300 km to avoid Defence training areas. In addition to the benthic habitats of the outer shelf and the shelf slope – which are not relevant to the Subsea Cable System footprint – the OSMP is characterised by a chain of biohermic banks/shoals and atolls along the shelf edge rising from the continental slope, and by several platform reefs rising from the seafloor of the outer shelf. The OSMP comprises four different IUCN protected area management zones (categories). The Subsea Cable System transects approximately 84 km of the Special Purpose zone and 220 km of the Multiple Use zone (both IUCN VI), which allows vessel transiting and recreational fishing, but no commercial fishing, tourism, or mining, unless with approval.

Listed marine and migratory marine species within the Cwth Marine Area are protected under the *EPBC Act*. The Subsea Cable System traverses a large area of marine habitat, and therefore intersects with suitable habitat for many significant marine and/or marine migratory species, as well as cetacean species. Table 15-3 provides a list of marine species which the Project may interact with.

Cetaceans are specifically protected under Division 3 of Part 13 of the *EPBC Act* which establishes the Australian Whale Sanctuary. The Australian Whale Sanctuary tends to coincide with the extent of the AEEZ.

Subdivision C to Division 3, Part 13 of the *EPBC Act* makes it an offence to harm cetaceans (i.e., whales, dolphins and porpoises), and similar offences apply to migratory and marine species under the *EPBC Act*. It is generally an offence to interfere with a cetacean in the Australian Whale Sanctuary, and interactions with cetaceans that may affect them (e.g., unintentionally harassing a cetacean), is to be reported to DCCEEW.

Given that proposed activities within the Cwth Marine Area environment occur within a very localised footprint – and over a short time frame in any one location – the likelihood that most of these species will be affected is very low. To narrow down which significant species are at most risk of being negatively impacted by proposal activities, Appendix T Marine Ecology Report of the Draft EIS identified for which marine species there is important habitat – i.e., critical for feeding, nesting, breeding and/or migrating – within the proposal footprint. However, Table 15-3 in Section 15.5.2 above took a broader approach and has considered species groups by type where appropriate, despite certainty about the presence of some species being low within the area of the Cwth Marine Area which the Project will traverse.

15.5.4 Impact Assessment

Potential impacts to the Cwth Marine Area associated with installation and maintenance of the Subsea Cable System remain unchanged from the assessment presented within the Draft EIS (refer to Section 16.5.2 of the Draft EIS).

Chapter 8 and Chapter 9 provide further detail on the potential impacts to the Cwth Marine Area (including both marine environmental quality and marine ecosystems) due to the proposed removal of sand waves during both the construction and operational phases of the Project. This matter was considered in the Draft EIS. Nevertheless, further details are now available (refer to Chapter 2, Chapter 8 and Chapter 9). The potential risks to the marine environmental quality and marine ecosystems within the Cwth Marine Area, as considered within Chapter 8 and Chapter 9, include:

- Potential impacts with a residual risk rating of minor, as follows:
  - Re-suspension of contaminated sediments via dredging – Route B

  - Contamination of Potential Spoil Disposal Grounds
  - Seabed disturbance from cable repairs – Route B
  - Direct loss of benthic communities and habitat due to sand wave removal
  - Direct loss or disturbance of benthic communities and habitat due to spoil disposal
  - Changes to fauna behaviours due to noise and light disturbance during sand wave removal and spoil disposal
  - Direct fauna mortality or injury due to vessel collision or spoil disposal
  - Habitat loss and degradation associated with cable repairs.
- Potential impacts with a residual risk rating of moderate, as follows:
  - Sediment re-suspension in the water column caused by cable burial via mass flow-excavator and dredging - Route B / Potential Spoil Disposal Grounds
  - Habitat degradation due to elevated turbidity in marine waters due to sand wave removal and spoil disposal.

Overall, the assessments carried out in Chapter 8 and Chapter 9 have concluded that there is low-moderate residual risk for impacts to these aspects of the Cwth Marine Area.

The EPBC Significant Impact Guidelines 1.1 (DEWHA 2013) describe the process for determining the significance of impacts to the Cwth Marine Area. This assessment was undertaken in Section 16.5.2 of the Draft EIS and has been revisited in consideration of the additional potential impacts that have now been assessed.

Table 15-6 presents the circumstances under which an action is likely to have a significant impact on the environment in a Cwth Marine Area. For all situations, the conclusion is that it is unlikely that the proposed action will have a significant impact. That is, the conclusion remains the same as previously reached in Chapter 16 of the Draft EIS.

Table 15-6: Significant impact assessment for the Cwth Marine Area

An action is likely to have a significant impact on a Cwth Marine Area if there is a real chance or possibility that the action will:	**Assessment**
Result in a known or potential pest species becoming established in the Cwth Marine Area.	Unlikely. All vessels used during construction, as well as during pre-construction sand wave removal and operational sand wave removal will comply with relevant national guidelines to minimise risks of bio-fouling and avoid the introduction of marine pests into Australian waters. This is discussed in Chapter 10 of the Draft EIS. As already described in Chapter 16 of the Draft EIS, where required, permits will be obtained, and appropriate management systems, record-keeping practices and notification procedures will be followed, as per the relevant legislation. No additional mitigation measures are therefore required.
Modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem	Unlikely. As discussed in detail in Chapter 10 of the Draft EIS as well as Chapter 9 of this SEIS, benthic habitat will be directly impacted within the disturbance footprint of

An action is likely to have a significant impact on a Cwth Marine Area if there is a real chance or possibility that the action will:	**Assessment**
functioning or integrity in a Cwth Marine Area results.	each cable and also during pre-construction and operational sand wave removal. Significant benthic habitat (seagrass, macroalgae, and hard coral habitat) is unlikely to be impacted as field surveys found high value habitats were over-estimated. Recovery after disturbance may take years for some habitat (e.g., coral), but seagrass and seaweed will recover quickly. Impacts to benthic habitat will be more likely, and more pronounced, in the nearshore marine environment (i.e., outside of the Cwth Marine Area). Suspended sediment concentrations will be elevated for a number of days in the region surrounding the sand wave removal footprint. However, this will only affect isolated segments of the Subsea Cable System alignment. Benthic habitats rely on light penetration, and so benthic habitat is likely to be impacted by decreased light penetration for a number of days along these isolated segments of the alignment. Used to natural fluctuation in turbidity, most values should recover quickly (within days /weeks) and fully. Some – such as hard corals – may take longer but should still recover fully. This impact will be very limited in time and space in deep offshore waters (see Appendix R Marine Modelling report and Appendix S Marine Environmental Quality of the Draft EIS, as well as Chapter 8 and Chapter 9 of this SEIS).
Have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.	Unlikely. As discussed in detail in Chapter 10 within the Draft EIS, the fact that all impacts associated with proposal activities are spatially and/or temporally restricted, means that no population of a listed marine species and occurring within the Cwth Marine Area are likely to be significantly impacted upon. This remains the same for sand wave removal activities.
Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity, or human health.	Unlikely. As discussed in detail in Chapter 8 and its Appendices, there are a few pathways for water quality to be impacted by the proposed sand wave removal activities. However, these impacts would be minor, temporary and localised, and therefore do not represent a substantial change.
Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity, or human health may be adversely affected.	Unlikely. Construction and operations of the Subsea Cable System does not require the use of any such chemicals, and neither does the proposed removal of sand waves. The sediments have naturally higher levels of arsenic; however arsenic is unlikely to be mobilised into the water column during dredging and disposal because of the offshore environment key conditions (i.e., pH and redox potential) required for mobilisation are unlikely to occur.

An action is likely to have a significant impact on a Cwth Marine Area if there is a real chance or possibility that the action will:	Assessment
Have a substantial adverse impact on heritage values of the Cwth Marine Area, including damage or destruction of an historic shipwreck.	Unlikely. The proposed Subsea Cable area of influence does not intersect any known heritage values, and nor does the proposed sand wave removal activities.

15.6 Avoidance, Mitigation, and Monitoring

Impact mitigation was undertaken in accordance with the environmental decision-making hierarchy consistent with Section 26 of the *EP Act*. The decision-making hierarchy sets the following priorities when addressing impacts which have been considered in developing the avoidance, mitigation, monitoring, and reporting commitments set out within Chapter 5, Chapter 8 and Chapter 9 of this SEIS as they relate to MNES:

1. Avoid – ensure that actions are designed to avoid adverse impacts on the environment
2. Mitigate – identify management options to mitigate adverse impacts on the environment to the greatest extent practicable
3. Offset – if appropriate, provide for environmental offsets for residual adverse impacts on the environment that cannot be avoided or mitigated.

15.7 Residual Impact

Comprehensive significant impact assessments are presented in Section 5.6.3 and Section 5.6.4 for more than 40 threatened species. The conclusion is that development of the Project will not have a significant impact on any threatened species with the appropriate implementation of mitigation measures that are expected to be effective. Moreover, impacts to sensitive or significant vegetation will be avoided except when it is not possible to do so at a few river crossings (as discussed in Section 5.5.3.2). The residual impact to threatened species and significant vegetation is considered minor.

Most of the residual impacts for marine ecosystems had a rating of ‘minor’, showing no change to the residual impact conclusions reached in the Draft EIS. A moderate residual impact was determined for habitat degradation from turbidity created by sand wave removal and spoil disposal, however the certainty was determined to be moderate as the areas that have been surveyed showed a lack of habitat and the area of influence will be confirmed through an adaptive management process. Any identified uncertainties are addressed with monitoring and mitigation measures. All residual impacts are considered not significant.

15.8 Cumulative Impact Assessment

Due to the low level of residual impact to terrestrial and marine ecosystems (as well as to the Cwth Marine Area) associated with the project refinements, and combined with no change in assessment conclusion ratings for the Draft EIS, there is limited potential for new cumulative impacts not previously considered to occur. Through the EIA process, the cumulative impacts from the Project Refinements are consistent with those described in the Draft EIS.

Chapter 5, Chapter 8 and Chapter 9 consider these matters in more detail.

15.9 Conclusion

With the commitments and measures in place to protect MNES as set out within Chapter 5, Chapter 8 and Chapter 9, it is considered that the Project does not have the potential to generate significant impacts to MNES protected under the *EPBC Act*.

15.10 Submission Response

During the Draft EIS Public Submissions period, DCCEEW commented about the MNES assessment process as follows:

The Department notes that options for changes and additions to the project components (i.e., Overhead Transmission (OHT) Railway route deviations, addition of ground electrodes, subsea cable system route, and alternative pre-sweeping) have been identified; however, the findings presented in the draft EIS do not cover these changes or additions as the assessment is still ongoing. The Department notes that future changes to the project design must include a significant impact assessment on MNES and recommends presenting this assessment's results in the Supplementary EIS. If appropriate, consider submitting a variation under the EPBC Act.

15.10.1 Response

This SEIS has assessed the changes referred to in accordance with the *EP Act* and the *EPBC Act*. Project refinements which are specifically the subject of this SEIS are detailed in Chapter 2.

15.11 NT EPA Direction Responses

15.11.1 Management Plans - Comment 39

The TOR includes matters that were required to be addressed in the EIS including safeguards, avoidance, mitigation, management and offset measures.

Appendix B of the TOR includes matters to be addressed under the EPBC Regulations. Section 4.01 (d) requires an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing.

Throughout the draft EIS various commitments are made to provide avoidance/mitigation/ management/offset measures in management plans. Hence, DCCEEW's submission to the NT EPA requires 11 sub- plans to be included in the CEMP and respective OEMP to be provided in the Supplement to the draft EIS.

The adequacy assessment of the above management measures is important in the assessment to determine the acceptability of the project's impacts to the whole of the environment, including EPBC Act threatened, migratory species and their habitat.

15.11.2 Information Required in the Supplement

The Supplement to the draft EIS must include safeguards, avoidance, mitigation, management and offset measures for the proposed action. The information can be provided in the body of the Supplement or in appended management plans as indicated in the draft EIS. The measures must be expressed as clear commitments.

15.11.3 Response

Chapter 17 contains a consolidated summary of updated management measures that the Proponent commits to as part of this SEIS. Detailed management plans will be developed for the Project prior to Construction as additional information related to construction means and methods becomes

available, and Project design matures. Refer to Section 17.2.2 for terrestrial environmental quality measures, Section 17.2.3 for terrestrial ecosystem measures, Section 17.2.6 for marine environmental quality measures, and Section 17.2.7 for marine ecosystem measures for further details on proposed mitigation measures.

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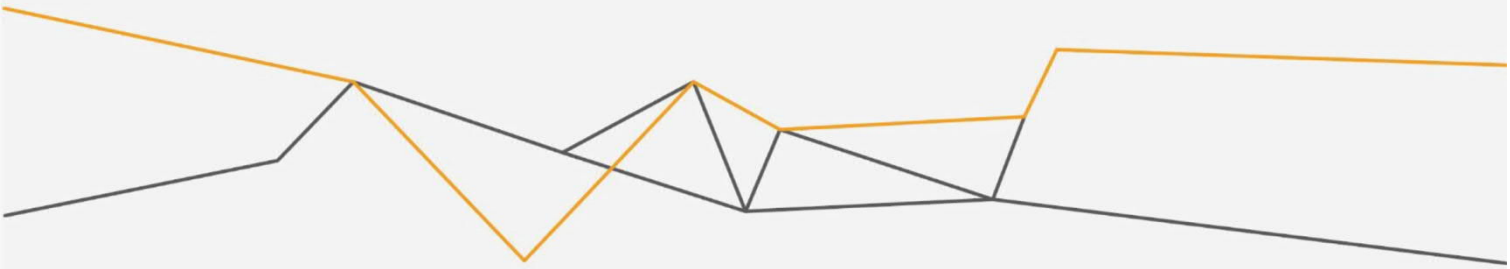

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