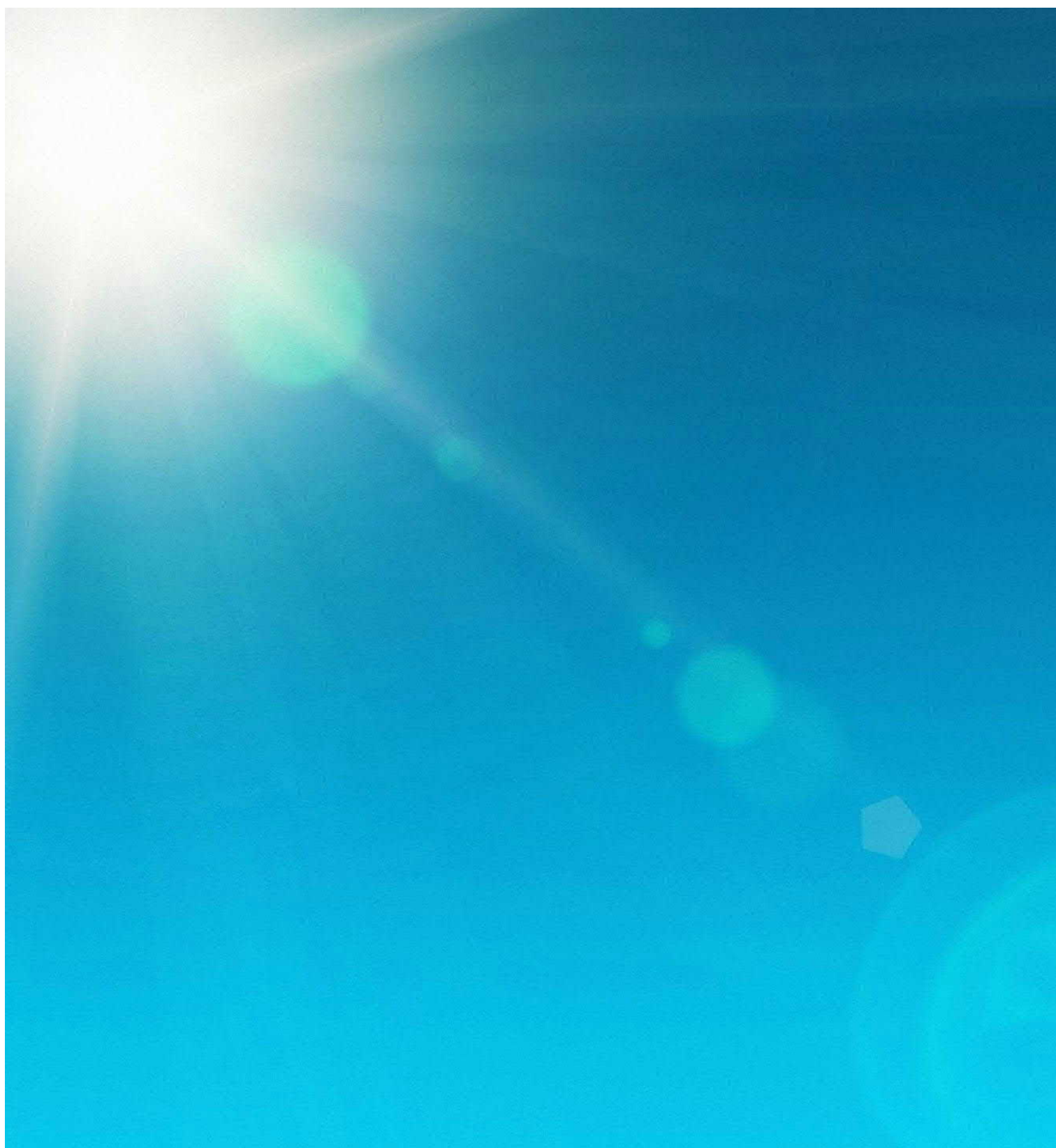


March 2022

EIS Executive Summary

Australia-Asia PowerLink Environmental Impact Statement

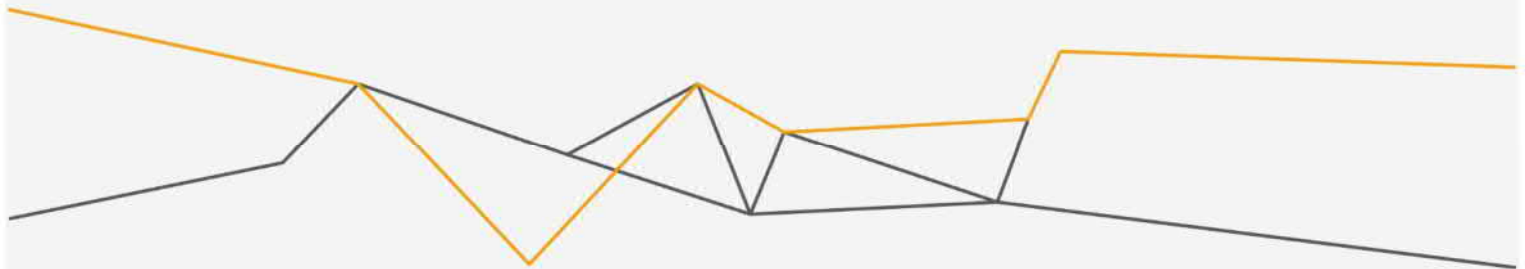


EIS Executive Summary

Document ID: 208897

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Revision	Date	Purpose	Reviewed by	Approved by
0	24/03/2022	Draft EIS Submission	Joe Sheridan	Mark Branson



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1 Introduction

This document provides a summary of the Australia-Asia PowerLink (AAPowerLink) draft Environmental Impact Statement (EIS) prepared by the Proponent¹, AAPowerLink Australia Assets Pty Ltd, a wholly-owned subsidiary of Sun Cable Pty Ltd (Sun Cable). The EIS has been prepared to address the requirements for environmental assessment and determination under both the *Environment Protection Act 2019* (Northern Territory) (*EP Act*) and *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (*EPBC Act*). AAPowerLink is set to be the world's largest solar energy infrastructure project, integrating a 17-20 GW solar farm and battery storage facility in the Barkly region of the Northern Territory (NT), with a 5,000 km transmission system of high voltage overhead powerlines and subsea cables, to supply Darwin, Singapore and Asian markets with reliable and competitively priced renewable electricity. The draft EIS provides an assessment of the potential environmental and social impacts and benefits associated with constructing and operating the AAPowerLink.

2 Environmental approvals process

In October 2021, Sun Cable submitted a proponent-initiated EIS referral for the AAPowerLink to the Northern Territory Environment Protection Authority (NT EPA) for consideration under the *EP Act*. The proposal was also referred for assessment under the Commonwealth *EPBC Act*. The AAPowerLink is being assessed under an accredited assessment process, which means the NT EPA will assess the EIS on behalf of both the NT and Australian Governments.

Final Terms of Reference (ToR) for the EIS were issued by the NT EPA in January 2021, following public consultation on the referral. The ToR were amended in October 2021 to account for changes to some components of the proposal, following the significant variation process. Table 1 summarises the key environmental assessment milestones and dates.

The draft EIS prepared by Sun Cable responds to the ToR. A tabulated reference table of the ToR with cross-references to the relevant sections of the draft EIS is appended to the EIS at Appendix A.

In addition to the overarching NT and Commonwealth environmental approvals, permits and consents are also required under several pieces of subordinate legislation. Sun Cable and its partners and contractors involved in project delivery will be required to comply with the laws of the NT and Commonwealth. The AAPowerLink components located in Indonesian waters and in Singapore, will be subject to environmental assessment and approval under the statutory framework of those countries.

Table 1. Indicative environmental assessment milestones and timeline for AAPowerLink

Assessment milestones	Proposed/completion date
Acceptance of proponent-initiated EIS referral	16 October 2020
Referral consultation period including draft Terms of Reference	27 November 2020
Decision on accepted referral	12 January 2021
Terms of Reference approved	19 January 2021
Notice of Significant Variation submitted	5 August 2021

¹ The Proponent for the proposed project is AAPowerlink Australia Assets Pty Ltd (ACN 653 396 948), the entity owning the Australian assets of the AAPowerLink and is a wholly-owned subsidiary of Sun Cable Pty Ltd (ACN 623 991 006). The Proponent's trading name is 'Sun Cable', which henceforth is used in this draft EIS to refer to the Proponent for the proposal.

Assessment milestones	Proposed/completion date
Acceptance of notice	11 August 2021
Consultation period including amendments to TOR	13 August 2021 to 24 September 2021
Decision on accepted notice	5 October 2021
Terms of Reference approved	5 October 2021
Draft EIS submitted to the NT EPA	March 2022
Public and government authority consultation period	Up to 60 days after EIS submission
Direction to prepare Supplement issued	25 days after consultation period
Supplement submitted	TBC
Public and government authority consultation period	15 days after supplement submitted
Assessment report provided to Minister	45 days after consultation period
NT Minister's approval decision	30 days after receiving Assessment Report

3 Proposal overview

The AAPowerLink proposal comprises the following six key components:

- Powell Creek Solar Precinct in the Barkly Region of the NT where electricity will be generated, stored, and transmitted
- Overhead Transmission Line to transmit electricity over 788 km from the Solar Precinct to Darwin
- Darwin Converter Site including Voltage Source Converters, energy storage and network connection to supply electricity to the Darwin region located at Murrumujuk approximately 31 km north-east of Darwin
- Cable Transition Facilities at Gunn Point Beach to transition power cables between land and sea
- Subsea Cable System to transfer electricity over 4,200 km from Darwin to Singapore
- Singapore Converter Station to receive electricity and supply the Singapore electrical network.

The draft EIS addresses only those components located on Australian soil and the Subsea Cable System with NT coastal waters and the Commonwealth marine area. The location of proposal components is shown on Figures 1 to 4. A summary of key infrastructure components and locations is provided below. Chapter 2 of the EIS provides detailed descriptions of the components discussed below and the activities associated with construction, operation and decommissioning.

3.1 Solar Precinct

The Solar Precinct is located at Powell Creek Station, approximately 70 km south-west of Elliott and 30 km west of the Stuart Highway, adjacent to the Alice-Springs-Darwin railway line (Figure 1). The Solar Precinct will occupy approximately 12,000 ha of land, with an additional 269 ha for two access roads to the Stuart Highway, and an airstrip. The Solar Precinct will have a peak generation capacity of approximately 17-20 GW, and will comprise multiple large-scale solar and storage fields of modular photovoltaic (PV) solar arrays and battery storage. Key components include solar arrays, medium and high voltage transmission lines for internal reticulation, distributed Battery Energy Storage System (BESS), Voltage Source Converters (VSCs) and associated electrical infrastructure including, but not limited to, transformers, inverters and a switch yard. Supporting infrastructure includes access roads, an Intermodal Logistics Facility which will include a dedicated rail logistics yard including several parallel rail sidings which are approximately 2.5 km in length, airstrip, service

and utilities, accommodation camp, and ancillary infrastructure (e.g. temporary borrow pits, potential landfill, security and communications infrastructure, water and wastewater treatment infrastructure).

The Solar Precinct is planned to be constructed and commissioned over a period of approximately 2.5 - 4 years commencing in early 2024. Construction will require a workforce of approximately 1,000 personnel, who will be accommodated onsite, and will involve site establishment, land clearing, and installation of electrical infrastructure. Ongoing operational activities will include monitoring and maintenance to maintain system performance and is anticipated to employ approximately 200 personnel. The components may need to be replaced or repowered with the solar panels having an optimal design life of approximately 40 years and the batteries approximately 15 years. Sun Cable will investigate recycling opportunities or repurpose infrastructure such as solar arrays to minimise waste associated with the proposal.

3.2 Overhead Transmission Line

A new High Voltage Direct Current (HVDC) Overhead Transmission Line (OHTL) will be constructed over 788 km to transmit electricity from the Solar Precinct to the Darwin Converter Site (Figure 2). The OHTL will have a rated capacity of approximately 6.4 GW operating at a voltage of 525 – 600 kV, subject to detailed engineering. From the Solar Precinct the route follows an existing Railway Corridor for a distance of 722 km, after which the route enters an NT Government designated Utilities Corridor for the final 66 km to the Darwin Converter Site located at Murrumujuk, Gunn Point.

Key components include steel poles (which will vary in size and type depending on site conditions, and required spans between poles etc.), HVDC conductors (powerlines), services corridor and a metallic earth return (MER) or ground electrode at each converter location. The construction footprint (i.e. cleared footprint) will be an OHTL corridor of up to 22 m wide, and pads around each pole up to 100 m x 60 m. Following construction, the majority of the footprint will be reinstated except for an access corridor approximately 6 m wide and a 12 m x 6 m pad around each pole retained for maintenance activities.

Construction of the OHTL is planned to commence in early 2024 and be completed over a period of 2-3 years. Construction will require a workforce of approximately 460 people. Personnel will be accommodated in temporary construction camps located at locations along the OHTL and commercial accommodation in towns along the route where available (e.g. Katherine, Pine Creek, Adelaide River). Operational activities will include maintenance inspections and repairs and will be managed by personnel travelling from Darwin or other centres to undertake works.

3.3 Darwin Converter Site

The Darwin Converter Site is proposed to be located at Murrumujuk, Gunn Point, 31 km north-east of Darwin (Figure 3). The site is 124 ha, of which approximate 55 ha is proposed to be developed. The Darwin Converter Site is the terminal location for the OHTL and will convert electricity from HVDC to High Voltage Alternating Current (HVAC) to enable connection to the Darwin electricity system before being converted back to HVDC for transmission to Singapore. Approximately 800 MW will be made available for the local Darwin market; the majority of the power supply will be converted back to HVDC for transmission to Singapore via the Subsea Cable System.

Key components include up to four VSCs to convert power between HVDC and HVAC, a BESS, an Operations and Maintenance Facility (e.g. offices, car park, warehousing, communications and utilities infrastructure) and ancillary infrastructure including drainage and internal access roads.

Construction is planned to commence in early 2024 and will require a workforce of approximately 230 personnel (including personnel required for the Cable Transition Facilities). Construction is expected to take approximately 2.5 years for both the Darwin Converter Site and Cable Transition Facilities. Operational and maintenance activities will require approximately 150 personnel. Both the construction and operational workforce will be transported from Darwin or surrounds from a designated park and ride facility; no onsite accommodation will be provided.

3.4 Cable Transition Facilities

The Cable Transition Facilities transfer power from onshore to offshore, and comprise the Underground Cable Corridor, Land Sea Joint Station and Shore Crossing Site (Figure 3). The combined footprint is 19 ha, and extends from the Darwin Converter Site to the southern end of Gunn Point Beach.

The Underground Cable Corridor is approximately 2.7 km long and 70 m wide and will run parallel to the south of Murrumujuk Drive. Within this corridor trenching will be undertaken for burial of HVDC cables. The corridor will be partially cleared for cable installation, and reinstated once construction is complete. No operational activities will be undertaken within the corridor, except for reinstatement monitoring and management (e.g. weed management).

The Land Sea Joint station will be a fenced 1.5 ha area located approximately 300 m inland from the beach, within which the onshore and offshore cables will be connected. Six bays (one per cable) will be excavated to dimensions of 20 m x 5 m. Temporary construction infrastructure will be located within the site, and once construction is completed the land surrounding the bays will be reinstated. No operational activities will be undertaken, except for reinstatement monitoring and management.

The Shore Crossing Site is located immediately to the south of the current Gunn Point Beach access track, where a temporary construction corridor approximately 500 m wide and 500 m long will be established for burial of cables in the beach and intertidal area. The entire footprint will be reinstated following construction and there will be no restriction on public access or use of the beach following construction (which will take approximately one month).

3.5 Subsea Cable System

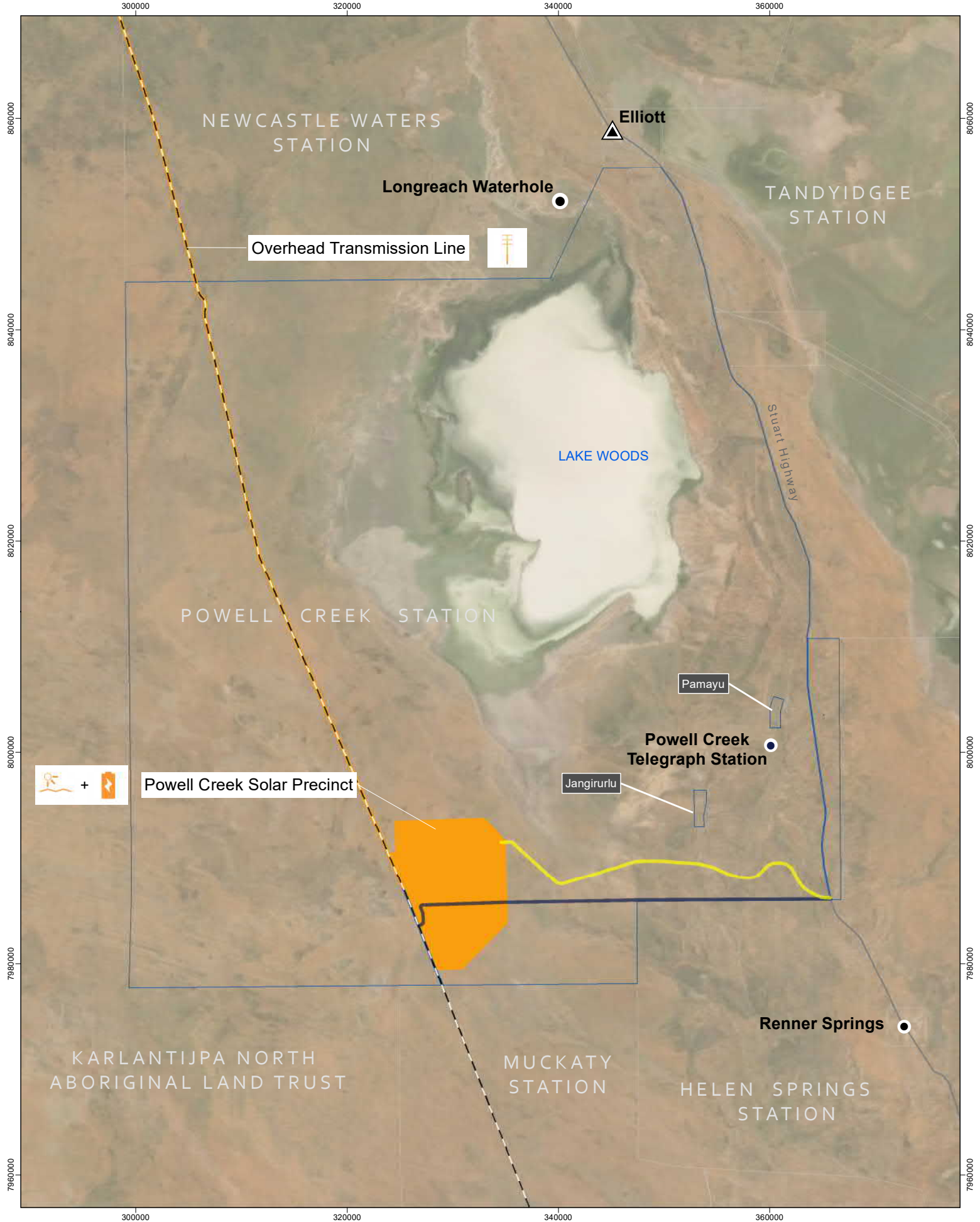
A High Voltage Direct Current (HVDC) Subsea Cable System will be installed to transfer electricity over approximately 4,200 km from Darwin to Singapore. The scope for this EIS is only the components within NT and Commonwealth waters, as described below:

1. **Nearshore:** Northern Territory coastal waters, which consist of the waters from Lowest Astronomic Tide (LAT) outwards by 3 nautical miles (5.55 km) and includes the Beagle Gulf. Potential impacts in this area are assessed under the *NT Environment Protection Act 2019 (EP Act)*.
2. **Offshore:** Commonwealth marine area, which extends from the boundary of the NT coastal waters to the edge of the continental shelf and includes the Australian Exclusive Economic Zone (AEEZ). Potential impacts in this area are assessed under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

The length of the Subsea Cable System to the limit of the Commonwealth marine area is approximately 895 km (Figure 4). Two route options are under consideration in the nearshore area; both have been assessed in the EIS. The routes cross existing live cables and pipelines, and crossings will be constructed in accordance with best practice and under formal agreement with asset owners.

Up to six cables will be laid over the life of the proposal (3 initially and other 3 to be installed at a later date subject to future energy demands). The cables will either be laid on the seafloor or trenched into the seabed generally to a depth between 0.3 – 1 m (in certain circumstances it may be necessary to bury to 3 m depth), or protected with armouring as required, subject to various hazards and sea floor conditions along the route. The actual disturbance footprint of each cable will be up to 12 m wide, and cables will be spaced 50-200 m apart.

Construction will require a workforce of up to 60 personnel and will require pre-installation work (survey, pre-sweeping, boulder clearance, UXO clearing, route clearance and pre-grapnel), cable laying, cable jointing, burial and post lay survey. Works will be undertaken with specialist vessels, such as a cable lay vessel and cable lay barge, and are expected to take approximately two months per cable (within Australian waters). Once installed, routine surveys and inspections of the cable may be undertaken to monitor cable burial depth and integrity of cable protection. If the cable is damaged (e.g. by anchoring) the damaged portion of cable will be brought to the surface and repaired or replaced, and reburied using similar methods to the initial cable installation activities.



Legend

- Town
- Stuart Highway
- Alice Springs to Darwin Railway
- All weather access road (unsealed)
- Main access road (sealed)
- Powell Creek Station
- Cadastre
- AAPowerLink Infrastructure

Figure 1: Powell Creek Solar Precinct

Project: **Australia-Asia PowerLink**

Scale: 1:450,000 Datum: GDA2020

Coordinate System: MGA 53 A4

Reference #: AAPL_GNR_CTA_GEN_MAP_0119

Date: 28/03/2022 Figure: 1 of 1 Revision: A

SUN CABLE

Source: NTG data - Cadastre and conservation areas, Australian Government data - Railway and roads

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Legend

- Town
- Highway
- Alice Springs to Darwin Railway
- AAPowerLink Infrastructure
- Powell Creek Station

Note: There are 2 separate options for the Subsea Cable Corridor transitioning from Sun Cable's Cable Transition Facility

Source: NTG data - Parks and reserves. Australian Government data - Railway, roads, coastal waters and marine parks

Figure 2: Overhead Transmission Line (OHTL)

Project: **Australia-Asia PowerLink**

Scale: 1:3,000,000 Datum: GDA2020

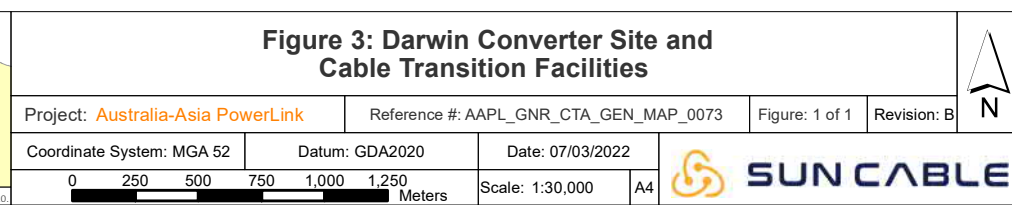
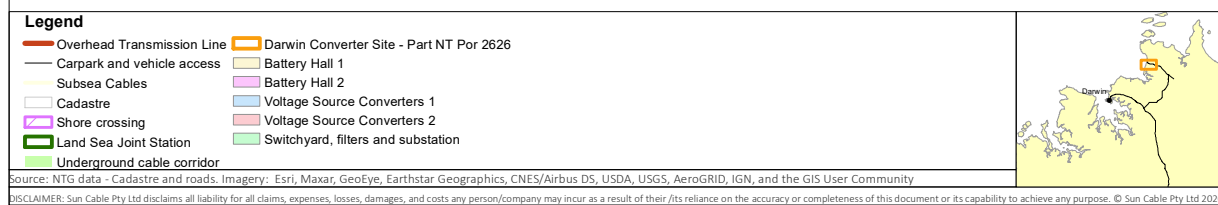
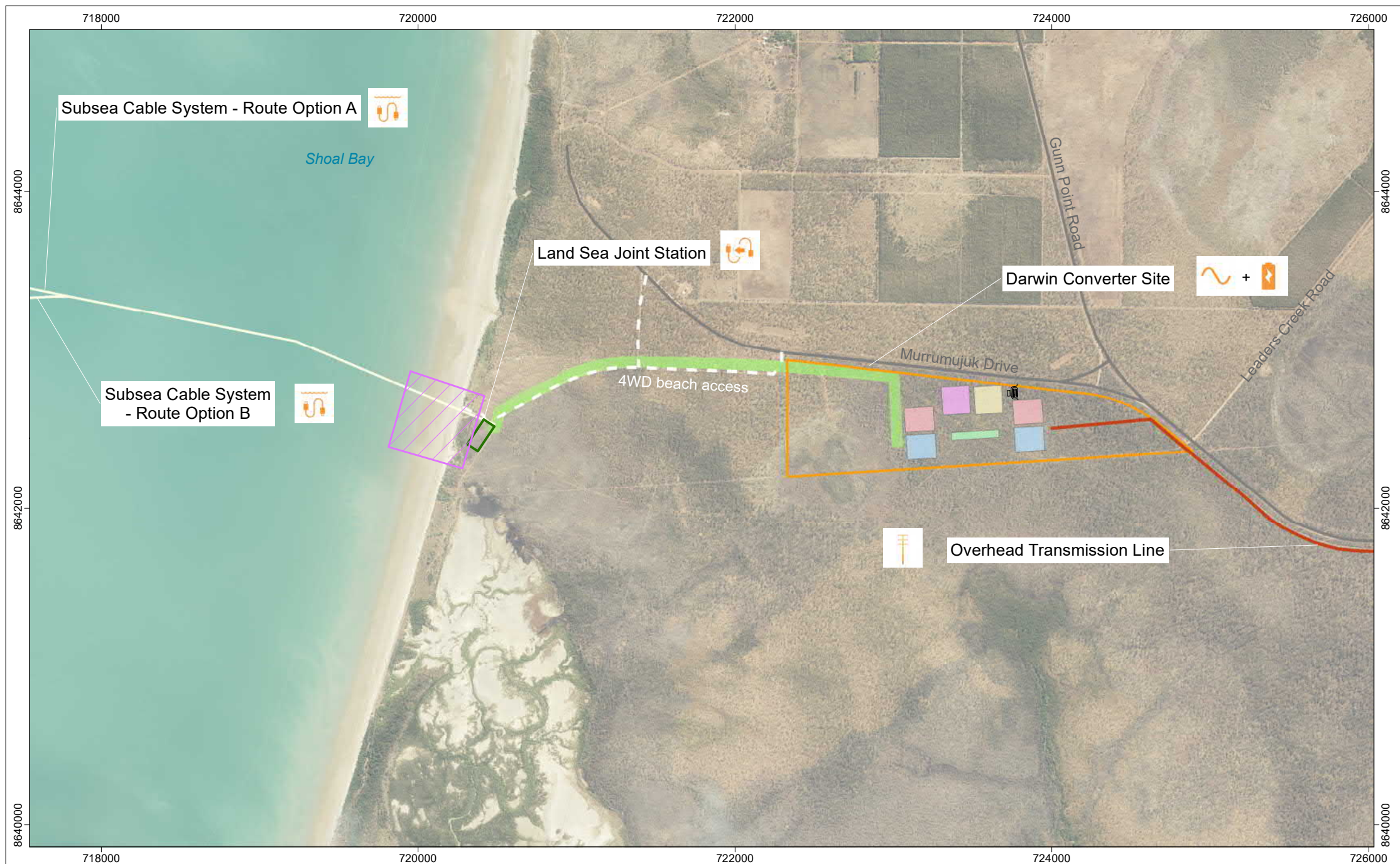
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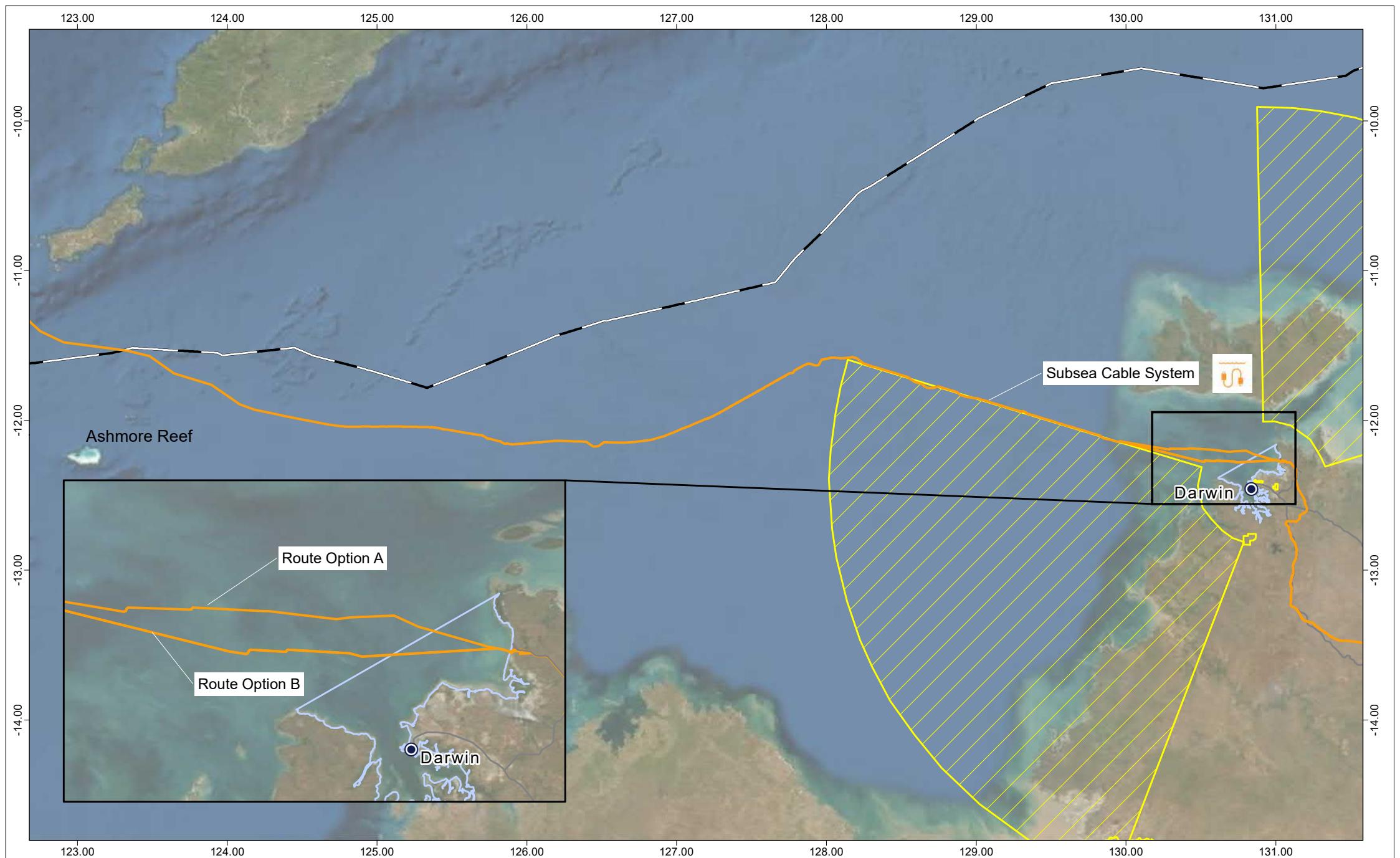
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Date: 07/03/2022 Figure: 1 of 1 Revision: A

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Subsea Cable System



Darwin

Route Option A

Route Option B

Darwin

Legend

- Australia-Asia Powerlink Infrastructure
- Australian EEZ boundary
- Defence training area
- Darwin harbour boundary

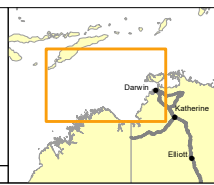


Figure 4: Subsea Cable System

Project: Australia-Asia PowerLink		Reference #: AAPL_GNR_CTA_GEN_MAP_0077		Figure: 1 of 1	Revision: B
Coordinate System: -		Datum: WGS 1984		Date: 08/03/2022	
0 50 100 150 Kilometers		Scale: 1:3,500,000		A4	 SUN CABLE

Source: NTG data - Cadastre and roads. Imagery: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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3.6 Proposal lifespan, closure and intended future use

The operational phase of the proposal is 70 years. The transmission infrastructure is designed to have a lifespan of 70 years, whereas the solar and battery components may need to be replaced or repowered after approximately 40 and 15 years respectively. Sun Cable proposes to develop a component recycling industry to manage the replacement and decommissioning aspects of the project.

At the end of the project life, a Decommissioning and Rehabilitation Plan will be developed in consultation with the pastoral leaseholders, Traditional Owners and relevant government agencies, prior to commencement of these activities. The plan will address the procedures for decommissioning based on the following objectives:

- The objective of site rehabilitation post-operations is to return the sites to a self-sustaining, free draining stable landform
- The Solar Precinct will be fully decommissioned and rehabilitated post-operations with the intention of returning it to a pastoral land use
- The Railway Corridor will be rehabilitated to its pre-existing land use once the overhead transmission infrastructure is removed. The NTG utilities corridor will also be re-habilitated to its pre-existing land use. Alternatively, the infrastructure may be transferred to the NT Government for ongoing use / upgrades for the purpose of supporting electricity transmission across the NT, subject to the negotiations with the relevant parties
- Sites in Murrumujuk will be rehabilitated in accordance with the relevant master plans in place at the time, including where practical, efforts to return vegetation to the sites
- Underground cables and the Subsea Cable System will be decommissioned and subject to a final rehabilitation and decommissioning plan to be approved by the relevant authorities.

3.7 Site selection and alternatives considered

An extensive site selection process was undertaken for all proposal components, as detailed in Chapter 2 of the EIS. Key considerations are summarised below.

Solar Precinct

The location of the Solar Precinct was selected based on being an area of high solar irradiance and low cloud cover, open expanse of relatively flat land, suitability of ground conditions, soil type and hydrology, and also accessibility (proximity to the Stuart Highway and Adelaide to Darwin Railway Line).

Four site options were assessed for the Solar Precinct, and options were discussed with landowners and native title holders. The Northern Land Council and Traditional Owners were consulted during the site selection process. The ultimate proposed location of the Solar Precinct has been selected based on consensus with landowners and Traditional Owners; interference with pastoral activities will be minimised, ecological surveys indicated few significant ecological values, there are no watercourses within the footprint and immediate surrounds, the area is not subject to inundation, and there is good access to the railway line and Stuart Highway.

Overhead Transmission Line

The Railway Corridor has been identified as the preferred location for the majority of the OHTL route as it is an existing developed corridor with reasonable access, minimising the amount of clearing required for the OHTL. Several route deviations may be required to avoid route obstacles, for example near Katherine, Pine Creek and Adelaide River. These alternative route alignments are under investigation. The northern end of the OHTL, will divert away from the Railway Corridor near Livingstone (approximately 45 km south of Darwin) and enter a NT Government designated Utilities Corridor identified in the NTG's Litchfield Sub-Regional Land Use Plan (LSLUP). The OHTL will terminate at the AAPowerLink Darwin Converter Site, located at Murrumujuk.

Design options for the OHTL infrastructure were also considered, including a comparison of Steel Monopole (Bi-pole with two sets of 525 kV HVDC conductors and one metallic earth return) and Double Symmetric Monopole (2 x pairs of 525 kV HVDC conductors) options. An electrode for the Solar Precinct and Darwin Converter Sites is being considered as an alternative to installing a Metallic Earth Return wire along the whole ~800 km length of the OHTL (refer Chapter 2 Section for details). The ground electrode option is being considered because it has potential to significantly reduce capital expenditure, with reducing tower heights which improves visual amenity, and reducing the size of the pole foundations. Approximately 2,500 structures be installed along the OHTL, and a micro-siting process will be implemented to ensure that the pole and tower structures are placed in locations which aim to minimise impacts.

Darwin Converter Site and Cable Transition Facilities

The Darwin Converter Site location at Murrumujuk was selected following a thorough planning and consultation process undertaken with key NT Government agencies and other stakeholders. The original proposed location for the Darwin Converter Site was at Middle Arm, adjacent to the Weddell Power Station. However, the revised location was selected to avoid potential constraints with future development plans at Middle Arm and in Darwin Harbour. The location at Murrumujuk is land designated for future development under the Litchfield Sub-Regional Land Use Plan (LSLUP), and has suitable topography and soil conditions and is in proximity to the coastline.

Subsea Cable System

A range of route alternatives, design options and installation methods have been evaluated by Sun Cable in consultation with stakeholders including NT Government agencies, Commonwealth Government departments including Defence and Parks Australia, Darwin Harbourmaster, shipping authorities, Aboriginal Land Councils, gas pipeline operators and other interested parties.

The nearshore portion of the Subsea Cable System was originally within Darwin Harbour, when the proposed location of the Darwin Converter Site was Middle Arm. One consideration in moving the Darwin Converter Site was sub-sea congestion due to existing and planned infrastructure in Middle Arm and the inner Darwin Harbour with the potential to compromise the AAPowerLink Subsea Cable System. The alternate route, in outer Shoal Bay, generally avoids other infrastructure with only a few points along the route where existing pipeline and cables will be crossed.

The Subsea Cable System route selection has been informed by geophysical survey and geotechnical sampling, as well as bathymetry, seabed features, geology and sediment characteristics. Two routes are currently being investigated for the nearshore component, with final route selection to occur following completion of detailed surveys.

4 Sensitive receptors and land uses

The location of populated places, areas of interest and potentially sensitive land uses proximate to the AAPowerLink are identified and described in Chapter 2 Section 2.2.4 of the EIS and are shown on Figure 5, Figure 6, Figure 7, and Figure 8. The EIS identifies and assesses impacts to these receptors and land uses, and other environmental, social and cultural values.



Legend

- AAPowerLink infrastructure
- OHTL Kilometre Points
- Towns
- Railway
- Roads
- Homesteads
- Aboriginal communities

- Powell Creek Station
- Lake Woods
- Major Drainage
- Minor Drainage

Sites of Conservation Significance

- Lake Woods

Source: Sun Cable, EcOz, NTG (NR Maps)

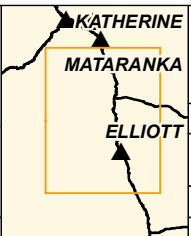


Figure 5: Location of sensitive receptors proximate to AAPowerLink (Map 1 of 4)

Project: **Australia-Asia PowerLink**

Scale: 1:1,500,000

Coordinate System: GDA2020

Reference: M-Files ID 200050

Date: 07/03/2022

Revision: 0

0 15 30 45 Kilometres

A4

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Legend

- AAPowerLink infrastructure
- OHTL Kilometre Points
- Towns
- Homesteads
- Aboriginal communities
- Major Drainage
- Minor Drainage
- Railway
- Roads
- Sea Dragon aquaculture facility
- NT Parks and reserves
- Sites of Conservation Significance
- Shoal Bay

Figure 7: Location of sensitive receptors proximate to AAPowerLink (Map 3 of 4)

Project: **Australia-Asia PowerLink**

Reference: M-Files ID 200050

Date: 08/03/2022

Revision: 0

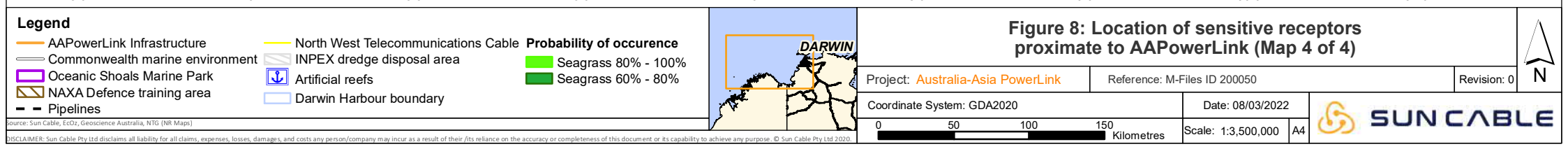
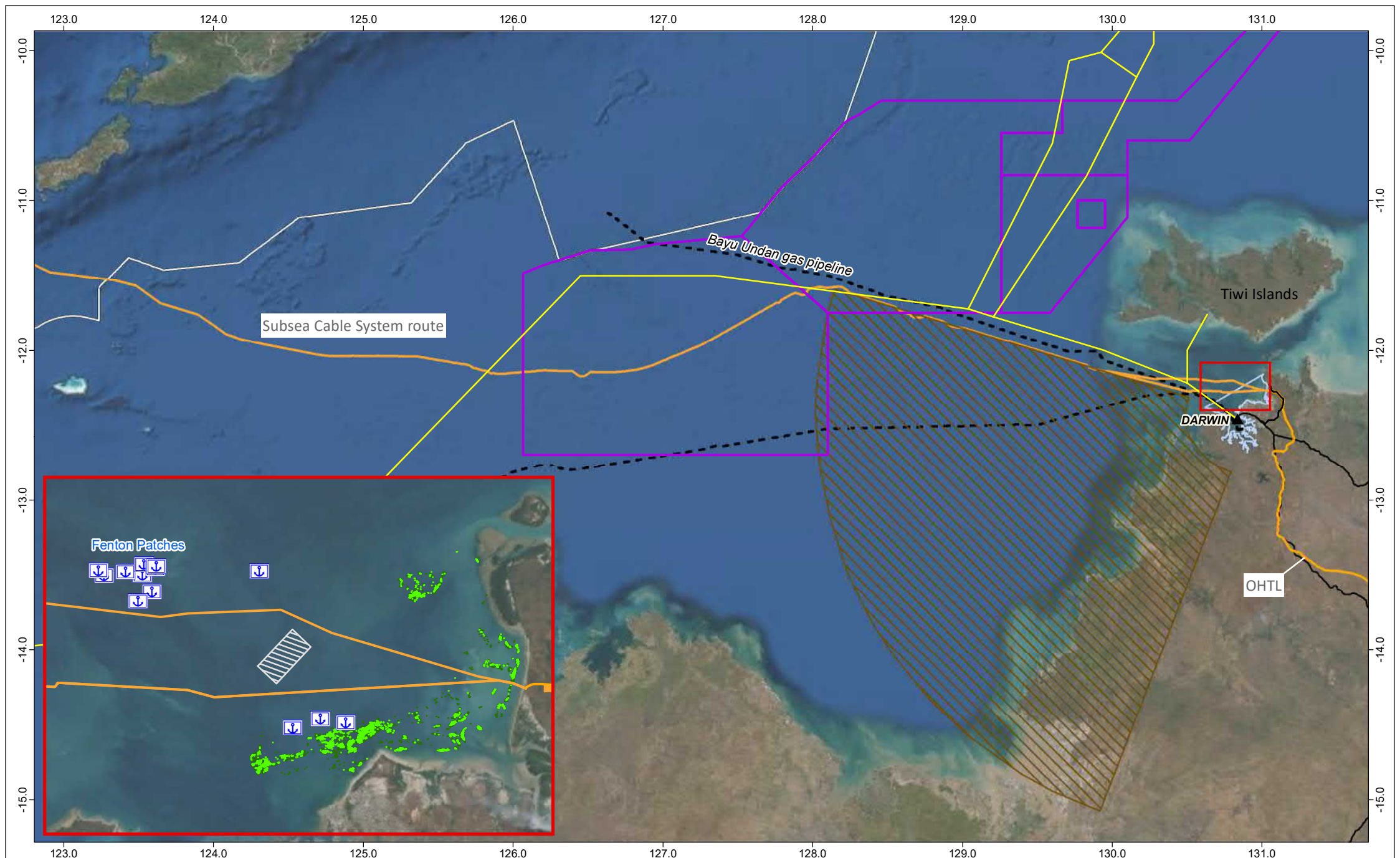
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Coordinate System: GDA2020

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Source: Sun Cable, EcoZ, NTG (NR Maps)

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5 Stakeholder engagement undertaken

The referral submitted to the NT EPA, and the 'notice of significant variation', were subject to public consultation, and comments from submissions were incorporated into the TOR. Additionally, Sun Cable have conducted stakeholder engagement to inform the EIS by highlighting concerns and potential benefits to the affected communities in line with the NT EPA *Stakeholder Engagement and Consultation Guidance for Proponents* (updated January 2021) and the core values of the *International Association of Public Participation* (IAP2). A Consultation Report is appended to the EIS (Appendix F) which details consultation undertaken to date.

Sun Cable has prioritised Northern Land Council (NLC) organised meetings with Native Title Holders and neighbouring estate groups ahead of public consultation. Dedicated consultation with Traditional Owners and Native Title Holders has included:

- An estimated 33 days in the field with paid cultural monitors for ecological surveys and the cultural heritage surveys on Powell Creek, Gunn Point and the Litchfield utilities corridor
- Sun Cable meetings with the Northern Land Council (NLC), Central Land Council (CLC), Tiwi Land Council (TLC), Larrakia representative bodies and individuals and families with ties to affected areas
- Dedicated meetings by the Northern Land Council (NLC) to inform Indigenous Land Use Agreement (ILUA) negotiations
- A site visit for Traditional Owners organised by the NLC and Sun Cable in April 2021 to discuss the final location and boundaries of the Solar Precinct footprint
- A briefing of the Mantiupwi Clan Estate in Darwin and on the Tiwi Islands to discuss Tiwi cultural connections to the Gunn Point Peninsula and the subsea cable route
- Lodgement of the AAPowerLink Project Authority Certificates with the Aboriginal Areas Protection Authority (AAPA) after extensive consultation and review (additional sacred sites clearances will be conducted by the NLC to satisfy ILUA requirements)
- Ongoing meetings by Sun Cable's Aboriginal Affairs team with families and individuals.

More broadly, stakeholder engagement activities have included:

- Briefings and meetings with key stakeholder groups and industry
- Workshops with NT Government departments
- Working with the NT Industry Capability Network
- Informant interviews with specific stakeholders
- Public information sessions (12 sessions in shopping centres and public places Greater Darwin Region, Katherine, Tennant Creek, Elliott and Marlinja)
- Attendance at conferences
- Facts and media releases, all available via Sun Cable's website.

Issues raised during consultation and how they have been addressed are detailed in Chapter 3 of the EIS (refer Section 3.3). Sun Cable are committed to ongoing stakeholder engagement both in the process of negotiating land use agreements and regulatory approvals, and more broadly to ensure the environmental and social impacts and benefits are well managed.

There is an opportunity for all stakeholders to provide comment on the draft EIS through the formal processes under both the *EP Act* and *EPBC Act*. Chapter 1 of the EIS provides Information on how to engage with these processes. Chapter 17 of the EIS provides details of Sun Cable's Environmental Management System, including approach to engaging stakeholders.

6 Technical studies undertaken

Technical studies have been undertaken to inform the EIA process undertaken for the AAPowerLink. These are summarised in Table 2 and appended to the EIS where relevant.

Table 2. Technical studies undertaken for the AAPowerLink environmental impact assessment process

Environmental factor		Technical study	Details	Reference
Terrestrial environmental quality		Preliminary geotechnical investigation of Solar Precinct	Soil sampling and geotechnical assessment to inform project design	Douglas Partners 2020
		Land Type Report	Ground-truthed land types for Solar Precinct, based on field survey	EcOz Appendix O Sub-Appendix A
		Erosion Hazard Assessment	Erosion hazard assessment across proposal footprint in accordance with IECA Guidelines.	EcOz Appendix M
Terrestrial ecosystems		Terrestrial Ecology Report - Solar Precinct	Documents results of field survey - land type ground-truthing, and targeted Greater Bilby Survey within Solar Precinct	EcOz Appendix O
		Terrestrial Ecology Report – OHTL and Murrumujuk	Documents results of field survey - land unit ground-truthing, identification of potential threatened species habitat and significant vegetation within OHTL Utilities Corridor, Darwin Converter Site and Cable Transition Facilities	EcOz Appendix P
Hydrological processes		Flood Modelling Report	Surface water hydrology investigation and static flood modelling prepared for the Solar Precinct	SWES 2022 Appendix N
Marine environmental quality and Marine ecosystems		Marine Modelling Report	Targeted numerical sediment transport modelling study to assess area of influence from sediment re-suspension due to jet trenching	Metoccean Solutions Pty Ltd, 2021a Appendix R
		Marine Environmental Quality Report	Desktop review of regional oceanographic conditions and baseline marine water quality in the region	Metoccean Solutions Pty Ltd, 2021b Appendix S
		Marine Ecology Report	Assessment of marine condition, habitat and marine fauna, including threatened and migratory species, relevant to the proposal footprint	EcOz Appendix T

Environmental factor	Technical study	Details	Reference
Air quality	Air Quality Impact Assessment	Atmospheric dispersion modelling to assess likely area of influence for air emissions of particulate matter from land clearing and nitrogen oxide from fuel combustion as a result of proposal activities.	Air Environment Pty Ltd 2022 Appendix U
Atmospheric processes	Carbon Study and GHG Abatement Plan	Atmospheric processes study and Greenhouse Gas Abatement Plan	Xodus 2022 Appendix H
Community and economy	Stakeholder Consultation Report	Details stakeholder consultation undertaken to date and issues raised	True North 2022a Appendix F
	Economic Assessment	Estimates economic impacts of the proposal on the NT and Australian economy using Computable General Equilibrium modelling	PricewaterhouseCoopers 2022 Appendix G
	Social Impact Assessment	Social impact assessment for potential positive and negative impacts from the proposal	True North 2022b Appendix I
	Traffic Impact Statement	Identifies potential impacts of the proposal on the NT road transport network, suggests reasonable mitigation measures where relevant and identifies requirement for further detailed assessments.	Byrne 2022 Appendix K
Culture and heritage	Heritage Impact Assessment – Solar Precinct	Documents findings of desktop searches and archaeological field surveys within Solar Precinct	EarthSea 2022a Appendix V
	Heritage Impact Assessment – OHTL KP722 to Murrumujuk	Documents findings of desktop searches and archaeological field surveys within OHTL Utilities Corridor, Darwin Converter Site and Cable Transition Facilities	EarthSea 2022b Appendix W
	Heritage Impact Assessment – Subsea Cable System	Documents findings of desktop searches within Subsea Cable System footprint	EarthSea 2022c Appendix X
Human health	Noise Technical Memo	Quantifies likely noise emissions from project activities and identifies sensitive receptors within area of influence	Sun Cable 2022 Appendix L
	Also informed by Traffic Impact Assessment and Air Quality Impact Assessment referenced above		

7 Environmental impact assessment process

The draft EIS documents the key findings and outcomes of the environmental impact assessment (EIA) process undertaken for the AAPowerLink. The EIA process was undertaken by qualified and experienced impact assessment professionals in collaboration with Sun Cable, and with advice and input from a range of technical specialists. The EIS team qualifications and experience are appended to the EIS (Appendix D).

The EIA process identified and assessed potential impacts to 12 environmental factors protected under the *EP Act* and three Matters of National Environmental Significance (MNES) protected under the *EPBC Act*. These are listed in Table 3 and Table 4.

Table 3. NT EPA environmental factors and objectives relevant to the AAPowerLink proposal.

Theme	Factor	Objective	EIS chapter
LAND	Terrestrial environmental quality	Protect the quality and integrity of land and soils so that environmental values are supported and maintained.	4
	Terrestrial ecosystems	Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.	5
WATER	Hydrological processes	Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.	6
	Inland water environmental quality	Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.	7
	Aquatic ecosystems	Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.	8
SEA	Marine environmental quality	Protect the quality and productivity of water, sediment and biota so that environmental values are maintained.	9
	Marine ecosystems	Protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.	10
AIR	Air quality	Protect air quality and minimise emissions and their impact so that environmental values are maintained.	11
	Atmospheric processes	Minimise greenhouse gas emissions so as to contribute to the NT Government's target of achieving net zero greenhouse gas emissions by 2050.	12
PEOPLE & COMMUNITY	Community and economy	Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians	13
	Culture and heritage	Protect sacred sites, culture and heritage.	14
	Human health	Protect the health of the Northern Territory population.	15

Table 4. Matters of National Environmental Significance relevant to AAPowerLink proposal

MNES	EPBC Act Section	EIS Chapter
Listed threatened species and communities	18 & 18A	16
Listed marine and/or migratory species	20 & 20A	
Commonwealth marine environment – from the edge of territorial waters to the edge of the continental shelf	23 & 24A	

The EIA framework used for the AAPowerLink is detailed in Chapter 3 of the EIS. The process is summarised in Table 5. Social impacts and opportunities were assessed separately as part of a stand-alone Social Impact Assessment (SIA) process and the complete SIA report is appended to the EIS (Appendix I).

Table 5. Key steps in the environmental impact assessment process adopted for the AAPowerLink EIS

KEY STEPS IN THE ENVIRONMENTAL IMPACT ASSESSMENT APPROACH ADOPTED FOR THE AAPOWERLINK	
Step 1	Characterise environmental values/sensitive receptors: The spatial boundaries for the EIA were established initially by defining a ‘direct disturbance footprint’ and ‘area of influence’ for each environmental factor, which was then refined through the EIA process. Accepted field baseline survey methods and guidelines were used where relevant. Stakeholder consultation described in Chapter 1 was also used to identify environmental values and sensitive receptors.
Step 2	Identify and assess potential impacts: Potential impacts assessed in the EIS were identified with reference to the EIS TOR issued by the NT EPA, issues raised by stakeholders and professional judgement of the EIS team based on their knowledge and understanding of the AAPowerLink components and potential interactions with the receiving environment. Impacts were assessed using predictive models and/or professional judgement of cause-effect relationships, with the level of assessment determined by the degree of risk posed to environmental values.
Step 3	Apply impact avoidance and mitigation measures: Impact avoidance and mitigation measures were determined by applying the hierarchies for environmental decision-making and waste management set out in Division 2 of the <i>EP Act</i> .
Step 4	Assess residual impacts: After considering the implementation of avoidance and mitigation measures, potential residual impacts were assessed. For each potential impact identified in Step 2 the ‘likelihood’ and ‘intensity’ (defined by scale, duration and magnitude) of residual impacts were rated by the EIS.
Step 5	Evaluate significance of residual impacts: The significance of residual impacts was then evaluated taking into consideration the sensitivity, value and quality of the receiving environment (environmental context). For impacts that were rated as having a low level of certainty, the precautionary principle was adopted, and a higher residual impact rating assigned. Residual impact ratings of Minor, Moderate or Major were assigned and indicate whether the residual impact is likely to be significant based on the findings of the EIA. The residual impact ratings adopted in the assessment are provided in Table 6 Significance of impacts to listed threatened and migratory species was undertaken with reference to the <i>EPBC Significant Impact Guidelines 1.1</i> (DEWHA 2013) and <i>EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species</i> (DOE 2015).

Table 6. Residual impact ratings adopted for the AAPowerLink EIA

Ratings and Description
Minor: A minor residual impact is unlikely to be significant. A minor impact generally has two or more of the following characteristics: Scale: Limited/Localised Magnitude: Negligible/Minor Duration: Short-term/ Medium-term/Reversible. OR There are no sensitive receptors or land uses present, and the environment does not contain any aspects that are valuable or otherwise important or unique (i.e. Very Low/Low rating), and there is moderate to high degree of certainty about the likelihood and intensity of the impact, and the effectiveness of proposed mitigation measures.
Moderate: A moderate residual impact has potential to be significant. The significance depends on the acceptability of the impacts and the effectiveness of mitigation measures. A moderate impact generally has two or more of the following characteristics: Scale: Localised/Regional Magnitude: Moderate Duration: Medium-term/Long-term AND/OR There are sensitive receptors or land uses present, or environmental aspects that are valuable or otherwise important or unique (i.e. Medium-High value rating), and there is a low degree of certainty about the impact, and the effectiveness of proposed mitigation measures.
Major: A major residual impact is likely to be significant. The level of acceptability will depend on offsets or benefits compensating for the impact. Impact generally has two or more of the following characteristics: Scale: Regional/ Widespread Magnitude: Moderate/Major Duration: Long-term/Permanent AND There are sensitive receptors or land uses present, or environmental aspects that are valuable or otherwise important or unique (i.e. Medium-High value rating).

Cumulative impacts were considered by assessing residual impacts of the AAPowerLink together with residual impacts from other past, present existing and reasonably foreseeable future developments. The assessment also considered facilitated or induced development activities, which could result from further actions made possible by the AAPowerLink. The developments and activities considered as part of the Cumulative Impact Assessment (CIA) are detailed in Chapter 3 of the EIS (refer Section 3.5). Cumulative impacts relevant to each environmental factor are discussed in the relevant Chapters of the EIS.

The EIS documents the findings of the impact assessment undertaken covering construction and operation of the following AAPowerLink components as described in Chapter 2.

- Solar Precinct
- OHTL
- Darwin Converter Site
- Cable Transition Facilities
- Subsea Cable System (Route Options A & B).

Through the AAPowerLink planning and design process, some options for changes and additions to the proposal components have been identified to address technical constraints and to manage capital expenditure. The following components are currently under further consideration with final site selection to be confirmed:

- **OHTL route deviations** are being considered at Katherine, Pine Creek and Adelaide River to avoid route constraints as described in Chapter 2 of the EIS. Alternative routes through these areas will aim to avoid land use conflicts and further minimise the impacts to the community where possible
- **Addition of ground electrodes** for the Solar Precinct and Darwin Converter Site is being considered as an alternative to installing a Metallic Earth Return wire along the whole ~800 km length of the OHTL (refer Chapter 2 Section for details). The ground electrode option is being considered because it has potential to significantly reduce capital expenditure, with reducing tower heights which improves visual amenity, and reducing the size of the pole foundations.
- **Subsea Cable System Route options A & B** are being considered, with the preferred option to be selected following geophysical survey work scheduled in early 2022. The survey work will inform selection of a route that avoids or minimises impacts to environmentally sensitive areas and any identified heritage features. The EIA process has considered impacts associated with both route options.
- **Alternative pre-sweeping methods** are under consideration to establish a flat work surface for cable laying and burial along the Subsea Cable System route. This is described in detail in Chapter 2. The preferred method along each section of the subsea cable route will be informed by the geophysical survey work referred to above, which in turn will determine whether Sun Cable need to seek approval for offsite spoil disposal locations.

Work was underway to further assess and finalise these options at the time of writing. Therefore, the EIA findings presented in the EIS do not cover these changes or additions. The relevant sections of Chapter 2 Proposal Description provide details of the approach that will be undertaken to further evaluate the options, including avoiding and mitigating environmental impacts, which are described further in Chapter 17 Environmental Management. The outcomes of this work will be presented in the Supplementary EIS.

8 Key findings and outcomes

The key findings and outcomes of the impact assessment process are summarised below for each of the 12 environmental factors and MNES.

8.1 Terrestrial environmental quality (EIS Chapter 4)

The NT EPA's objective for Terrestrial environmental quality is:

'Protect the quality and integrity of land and soils so that environmental values are supported and maintained.'

The impact assessment undertaken for the Terrestrial environmental quality factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The land and soils present in the AAPowerLink footprint and surrounding areas were determined from targeted field surveys and review of available land systems and land unit mapping, which is appended to the EIS (see Appendix O Sub-Appendix A Land Type Report and Appendix P). The presence/absence of environmental values that are supported and maintained by land and soils was determined from stakeholder engagement activities described in Chapter 1 of the EIS and review of land use mapping information available on NR Maps.

Erosion hazard and risk associated with the land and soil types encountered in the proposal footprint was assessed based on the *Best Practice Erosion and Sediment Control Guidelines* (International Erosion Control

Association 2008). An Erosion Hazard Assessment report is appended to the EIS (Appendix M). Erosion hazard is generally highest during construction when large areas of soil will be disturbed, but is significantly lower during operations as most of the footprint will be covered in hardstand or infrastructure, or reinstated.

8.1.1 Environmental values

The land and soils present in the AAPowerLink footprint and surrounding areas are described in Chapter 4 of the EIS.

Within the Solar Precinct, soils are generally sand, sandy-loam to loamy sand. Some alluvial land types and soils are traversed by the access roads. Erosivity, or erosion hazard, is generally low, however as 12,000 ha of soil will be disturbed (i.e. a large footprint) the potential for erosion and soil loss is considered extreme.

The OHTL traverses 788 km and so crosses a number of landforms and soil types; lateritic plains and rises are dominant, with desert sandplains, sandstone and granite hills and alluvial floodplains also intersected. Landform classes such as sandstone hills, sandstone plains and rises, coastal floodplains and limestone plains and rises, which are more common in the Pine Creek, Adelaide River and Darwin regions, present the highest erosion risk due to soil loss class. There is a high probability of PASS (as mapped by CSIRO (2013)) along the Adelaide River, Burrell Creek, Edith River and Katherine River, and within the Adelaide River floodplains.

The Darwin Converter Site is located on undulating upland plains with coarse unconsolidated sands and gravelly soils. There is a high erosion risk due to the climate (high intensity rainfall events occur) and presence of dispersive soils. The Cable Transition Facilities traverse level to gently undulating plains, well-drained kandosol soils, before reaching rises in the west with well-drained rudosols and kandosols. Sand dunes and beach sands are intersected at the Land Sea Joint Station and Shore Crossing Site. Erosion hazard is high during rain events, and extreme at the western end due to high slopes (5-15 %). There is a high probability of PASS in the beach and intertidal zone (as mapped by Hill and Edmeades 2008), where the Shore Crossing Site will disturb soils.

8.1.2 Residual impacts

The EIA undertaken for the Terrestrial environmental quality factor identified and assessed impacts to land and soils that could occur during construction and/or operations of the AAPowerLink. Residual impacts are summarised in Table 7 below.

Table 7. Residual impact ratings for impacts to Terrestrial environmental quality

Impacts	Residual Impact Rating
Construction	
Erosion and topsoil migration	Minor
Soil contamination	Minor
Disturbance of Acid Sulfate Soils	Minor
Operations	
Erosion and topsoil migration	Minor
Soil contamination	Minor
Disturbance of Acid Sulfate Soils	Minor

The impact assessment undertaken for the Terrestrial environmental quality factor (refer Chapter 4) concludes the AAPowerLink proposal will have a minor level of residual impact to land and soils associated with erosion and minor spills of fuels or hazardous chemicals, which will be greatest during construction and will reduce over time as disturbed areas are reinstated and stabilised. All impacts to land and soils were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

The impact assessment process considered the inherent connection between land and soils impacts assessed under the Terrestrial environmental quality factor, and the quality of surface water and groundwater available for use by the environment and people, which was assessed under Inland water environmental quality factor.

The findings of the impact assessment undertaken for the Terrestrial environmental quality factor indicate that the AAPowerLink is unlikely to have unacceptable impacts to land and soils, or associated values (surrounding land use and water quality). Therefore, it is concluded that the NT EPA's objective for Terrestrial environmental quality will be met.

8.2 Terrestrial ecosystems (EIS Chapter 5)

The NT EPA's objective for Terrestrial ecosystems is:

'Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.'

The impact assessment undertaken for the Terrestrial ecosystems factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The environmental values present within and surrounding the proposal footprint were identified by:

- Field survey of the Solar Precinct proposal footprint and access roads, and targeted survey for the Greater Bilby, undertaken in late 2020. The survey report is appended to the EIS (Appendix O).
- Field survey of the OHTL Utilities Corridor (KP722 to end) and Murrumujuk facilities (Darwin Converter Site and Cable Transition Facilities) undertaken in 2021. The field survey ground-truthed land units, and identified potential significant vegetation and threatened species habitat, with further targeted threatened species surveys undertaken in early 2022. The survey report is appended to the EIS (Appendix P).
- Desktop spatial data and high-resolution aerial imagery provided by the NT Government for the OHTL corridor was examined to identify potential values in those areas that are yet to be surveyed. Desktop analysis was undertaken on a range of spatial datasets – predominantly from NT Government – and aerial imagery to identify likely ecological values and potential for threatened species within the proposal footprint. Further surveys to address information gaps were underway at the time of EIS submission.

8.2.1 Environmental values

The terrestrial habitats and threatened species that are known or likely to occur within and surrounding the AAPowerLink footprint are described in Chapter 5 Section 5.3 of the EIS. The AAPowerLink infrastructure traverses several bioregion covering a wide range of land units and habitat, from the semi-arid habitat of the Solar Precinct to the tropical savannah and open woodlands of the Top End, around Darwin. The assessment of ecological values described habitat values, significant vegetation² and significant areas³, and land condition throughout the proposal footprint, briefly summarised below.

Solar Precinct

The Solar Precinct is within the Redsan land system – desert sandplains – and is predominantly flat to gently undulating loamy plain with patchy shrubland of Acacia species. Land condition is generally good with no weeds or erosion observed and low pastoral grazing pressure. Photographs of the dominant land types present are provided in Figure 9.

None of the land types within the Solar Precinct support significant vegetation types. Drainage depressions and alluvial flats are present – but although they are run-on drainage features, they are not considered to be wetlands because they have loamy rather than clayey soils, and inundation events are only expected to be episodic and short-lived. Moreover, there are no drainage lines or watercourses within the Solar Precinct, but

² Significant vegetation is defined in the NT *Land Clearing Guidelines* (DENR 2019), which are rainforest, vine thicket, closed forest or riparian vegetation, mangroves, monsoon vine forest, sandsheet heath and vegetation containing large trees with hollows suitable for fauna.

³ Significant areas are parks and reserves protected under NT or Commonwealth legislation, and Sites of Conservation Significance (SOCS) identified by the NT Government as important sites for biodiversity conservation

the access road corridors intersect ephemeral creeks and tributaries that support riparian vegetation at some locations.

The Lake Woods Site of Conservation Significance (SOCS) is a significant ecological feature in the region, but as it is over 10 km north of the Solar Precinct it is outside the area that will be affected by the AAPowerLink activities.



Figure 9. Photographs of dominant land types in the Solar Precinct footprint

Overhead Transmission Line

The OHTL is a long narrow corridor (~788 kilometres x 22 m wide) that traverses many bioregions and so crosses a variety of habitat and landforms. The southern half of the OHTL located in the Railway Corridor predominantly traverses lateritic plains and rises, and desert sandplains. The northern half of the OHTL predominantly traverses lateritic plains and rises, and sandstone plains and rises, as well as some drainage landforms which are more common in the Utilities Corridor. Eucalyptus and Corymbia savanna woodlands are dominant within and surrounding the footprint.

Significant vegetation within or proximate to the OHTL includes wetlands, riparian vegetation along watercourses, dry rainforest and monsoon rainforest, sinkholes (only two, near Katherine), sandsheet heath, and several large hollow-bearing trees. Direct impacts to these habitats will be minimised by when siting poles and construction pads.

The land condition of the Railway Corridor is reflective of historic impacts from clearing for the Adelaide to Darwin Railway line, and 16 weed species have been recorded along the Railway Corridor. The Utilities Corridor is largely remnant vegetation, with some quarrying, rural residential development and roads proximate to the corridor. Three weed species were recorded in the Utilities Corridor, and it is expected that weeds will occur within the Railway Corridor which is yet to be surveyed.

The OHTL traverse the edge of several reserves and SOCS; Manton Dam Recreation Area, the Yinberrie Hills SOCS, Black Jungle Conservation Reserve, Shoal Bay Coastal Reserve, Shoal Bay SOCS, Howard sand plains SOCS and Adelaide River coastal floodplain SOCS.

Darwin Converter Site and Cable Transition Facilities

There are ten land units that intersect the footprints of the Darwin Converter Site and Cable Transition Facilities at Murrumujuk – consisting of plains, rises, swamps, drainage systems and marine landforms. The most widespread land units were associated with Eucalypt open to mid woodlands. Photographs of the dominant land types present are provided in Figure 10 and Figure 11.



Figure 10. Photographs of the dominant land types within the Darwin Converter Site and Cable Transition Facilities footprints



Figure 11. Photographs of the coastal habitats relevant to the Land Sea Joint Station and Shore Crossing

The only significant vegetation identified is a seasonal swamp 150 m south-west of the Darwin Converter Site, comprised of two distinct *Melaleuca* communities (Figure 12). Some small patches of monsoon forest are located within the coastal land units proximate to the Cable Transition Facilities, but not directly in the footprint. Land condition is generally good as the area is relatively undeveloped; few weeds or areas of erosion were observed during field surveys, but the area is prone to frequent fires.

The Underground Cable Corridor and Land Sea Joint Station components of the Cable Transition Facilities footprint overlap with the buffer zone of the Shoal Bay SOCS, and the Land Sea Joint Station also lie ~350 m to the north of Tree Point Conservation Area.



Figure 12. Photograph of the seasonal swamp proximate to the Darwin Converter Site

8.2.2 Threatened species

The EIA assessed potential impacts to species listed as Vulnerable, Endangered or Critically Endangered listed under the *Territory Parks and Wildlife Conservation Act (TPWC Act)*, and the *EPBC Act*. The potential for significant impacts to threatened species was determined in accordance with the *EPBC Significant Impact Guidelines 1.1* (DEWHA 2013), which defines a ‘significant impact’ as that which occurs to an important population.

Solar Precinct

Within the Solar Precinct, only one species - Greater Bilby (*Macrotis lagotis*) – was considered to have a ‘high’ likelihood of occurrence. Intensive and targeted surveys were undertaken in November 2020 and no Greater Bilby burrows or evidence of previous occupation was identified. As such it is unlikely the Solar Precinct contains core habitat or supports a persistent or regular occurrence of the species. Along the access roads, the Grey Falcon (*Falco hypoleucos*) and Yellow-spotted Monitor (*Varanus panoptes*) are likely to occur associated with watercourses and riparian vegetation, but both species are mobile and not restricted to particular habitat, and so are unlikely to be significantly impacted by the construction of narrow (10 m) wide access road.

Overhead Transmission Line

Restricted range species or those with localised core habitat which are known or have potential to occur in the OHTL corridor or surrounding areas are presented in Table 8. Most of these species are unlikely to occur in the footprint, given the narrow corridor. Sun Cable has embarked on targeted threatened species surveys to confirm presence/absence of each species and to inform micro-siting of poles avoidance of features such as isolated patches of threatened plants, significant vegetation or active nests.

Table 8. Threatened species known or likely to occur in OHTL corridor or surrounding areas

Species	Status		Location	
	Cwlth	NT	Railway Corridor	Utilities Corridor
FAUNA				
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	VU	VU	x	-
Northern Leaf-nosed Bat (<i>Hipposideros stenotis</i>)	-	VU	x	-
Bare-rumped Sheath-tail Bat (<i>Saccolaimus saccolaimus nudicluniatus</i>)	VU	-	x	x
Ghost Bat (<i>Macroderma gigas</i>)	VU	-	x	-
Mertens' Water Monitor (<i>Varanus mertensi</i>)	-	VU	x	x
Mitchell's Water Monitor (<i>Varanus mitchelli</i>)	-	VU	x	-
Pale Field-rat (<i>Rattus tunneyi</i>)	-	VU	x	-
Gouldian Finch (<i>Erythrura gouldiae</i>)	EN	VU	x	-
Greater Bilby (<i>Macrotis lagotis</i>)	VU	VU	x	-
FLORA				
<i>Typhonium praetermissum</i>	-	VU	x	x
<i>Stylidium ensatum</i>	EN	EN	x	x
Howard River Toadlet (<i>Uperoleia daviesae</i>)	VU	VU	-	x
<i>Cleome insolata</i>	-	VU	-	x
<i>Utricularia dunstaniae</i>	-	VU	-	x
Darwin Cycad (<i>Cycas armstrongii</i>)	-	VU	x	x
Darwin Palm (<i>Ptychosperma macarthurii</i>)	-	EN	-	x
<i>Helicteres macrothrix</i>	EN	EN	x	-

Darwin Converter Site and Cable Transition Facilities

Based on fieldwork and desktop assessment, there are 11 threatened species with a reasonable likelihood of occurring within the footprints – 8 of which are migratory shorebirds. It is unlikely that proposal activities will have a significant impact on the migratory shorebirds present within Shoal Bay, as a small section of the beach and intertidal zone will be disturbed for cable burial for up to one month, following which the area will be reinstated with no ongoing works or activities, and no restriction on access. The other three species are:

- Yellow-spotted Monitor (*Varanus panoptes*) – This species is listed as Vulnerable and has been recently detected at six sites across the Gunn Point Peninsula, including at a site 800 m north of the Land Sea Joint Station. As it is a habitat generalist, it is unlikely to be affected by the AAPowerLink activities.
- Darwin Cycad (*Cycas armstrongii*) – This species is listed as Vulnerable and is present in high-density stands at the Darwin Converter Site, and throughout northern Gunn Point in general.
- *Typhonium praetermissum* (plant) – This species is listed as Vulnerable and is present at the Darwin Converter Site and in surrounding areas.

8.2.3 Residual impacts

The EIA undertaken for the Terrestrial ecosystems factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 9 below.

Table 9. Residual impact ratings for impacts to Terrestrial ecosystems

Impacts	Residual Impact Rating
Construction	
Loss of vegetation and habitat	Minor
Loss or deterioration of significant vegetation	Minor
Degradation of flora and vegetation in surrounding areas	Minor
Introduction and spread of weeds	Moderate
Changes in fire regimes	Minor
Direct fauna mortality	Minor
Habitat degradation and fragmentation	Minor
Changes to fauna behaviour	Minor
Impacts to threatened species	Moderate
Operations	
Introduction and spread of weeds	Moderate
Direct fauna mortality caused by the perceived 'lake effect' of solar fields	Minor
Direct fauna mortality caused by collision with Overhead Transmission Line	Minor
Degradation of flora and vegetation in surrounding areas caused by shading	Minor
Changes to fauna behaviour due to noise, light, and waste management.	Minor

The impact assessment undertaken for the Terrestrial ecosystems factor concludes the AAPowerLink proposal will have residual impacts associated with the introduction and spread of weeds and impacts to threatened plant species that occur within the direct disturbance footprint at the Darwin Converter Site and in the OHTL corridor. Other impacts to Terrestrial ecosystems were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

To manage the identified residual impacts, a Weed Management Plan has been submitted with the EIS (Appendix Q) and Sun Cable has also embarked on targeted threatened species surveys to address identified knowledge gaps and uncertainties with respect to the occurrence of threatened species. The Weed Management Plan provides an approach to managing weed risks that aligns with accepted practice in the NT. Sun Cable has committed to micro-siting of the OHTL infrastructure to avoid known occurrences of threatened species where possible to do so within the parcels of land provided by the NT Government. These measures are expected to be effective in minimising residual impacts to Terrestrial ecosystems to as low as reasonably practicable.

The impact assessment under the Terrestrial ecosystems factor considered the interaction with the Hydrological processes and Inland water environmental quality factors and concluded that level of residual impact predicted under those factors means Terrestrial ecosystems values are unlikely to be affected changes to hydrological regimes or water quality. The importance of Terrestrial ecosystems to the community and to Aboriginal culture was taken into consideration under the Community and economy factor, where the Social

Impact Assessment (SIA) assessed impacts to healthy country and to cultural identity, associated with actual or perceived incremental loss of biodiversity values associated with large scale land clearing, and development on the Gunn Point Peninsula.

The findings of the impact assessment undertaken for the Terrestrial ecosystems factor indicate that the AAPowerLink will impact terrestrial habitats and fauna, including some threatened species, and there is potential for cumulative impacts to associated with future development on the Gunn Point Peninsula and in the greater Darwin region. The magnitude of impacts associated with the AAPowerLink is not predicted to affect ecological integrity or functioning; however, there could be some loss of biodiversity values associated with impacts to range-restricted threatened species.

Notwithstanding targeted threatened species surveys were still underway at the time of EIS submission, the preliminary assessment indicates development of the AAPowerLink Darwin Converter Site will result in the loss of a portion of an important sub-population of the range-restricted threatened plant species *Typhonium praetermissum*, which is listed as Vulnerable under the *NT Parks and Wildlife Conservation Act*. Adopting the precautionary principle, the impact of the AAPowerLink to threatened species biodiversity values, and any requirement for offsets, will be re-assessed considering the results of further field surveys before making any final conclusions in relation to meeting the NT EPA's objective for Terrestrial ecosystems.

8.3 Hydrological processes (EIS Chapter 6)

The NT EPA's objective for Hydrological processes is:

'Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.'

The impact assessment undertaken for the Hydrological processes factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The EIA was informed by, were identified by:

- Review of existing studies and information available in relation to the water resources present within and proximate to the proposal footprint.
- Surface water hydrology investigation and static flood modelling prepared for the Solar Precinct site. The report is appended to the EIS (Appendix N).
- Field observations made by the ecology survey team at watercourses crossed by the Solar Precinct access roads, the section of the OHTL in the Utilities Corridor, and the seasonal swamp south-west of the Darwin Converter Site.

8.3.1 Environmental values

Existing surface water and groundwater hydrological conditions, including supported values and beneficial uses of watercourses and groundwater aquifers, present within and surrounding the proposal footprint are described in Chapter 6 Section 6.3 of the EIS.

Surface water

There are no watercourses within the Solar Precinct. Several minor ephemeral drainage lines and areas of alluvial floodplain are crossed by the access roads, which flow or hold water after rainfall events, generally associated with the wet season in the north of the NT. Static flood modelling presented in the *Flood Modelling Report* (Appendix N) indicates that the majority of the Solar Precinct is outside of mapped flood extents. Even the most extreme modelled event of 0.01% AEP (i.e. 1-in-1,000 year flood event) covers only 4.3 % of the north-eastern corner of the Solar Precinct footprint). The most significant surface water feature is Lake Woods, which is an ephemeral lake, and a SOCS. The boundary of the SOCS is located 10 km north of the Solar Precinct and development of Solar Precinct is unlikely to impact on hydrology in the lake due to its very large catchment.

The OHTL traverses 788 km and crosses 154 watercourses and drainage lines; four of which are major perennial watercourses (Katherine River, Edith River, Fergusson River and Adelaide River). 24 watercourses of stream order 3 or 4 are also crossed, including the King River, Cullen River, Saunders Creek, Margaret River, Howley Creek, Bridge Creek, Burrell Creek and Elizabeth River. Most are ephemeral at the OHTL crossing location. The other watercourses crossed are minor drainage lines of stream order 1 or 2, which flow after rainfall events and/or during the wet season. The northern portion of the OHTL, particularly in the Utilities Corridor from KP 722, crosses a number of seasonal wetlands, including swamps and sandsheet heath. The OHTL will span watercourses and wetlands and avoid disturbance of beds and banks of major watercourses to minimise potential impacts to surface water features.

There are no watercourses within the direct disturbance footprint of the Darwin Converter Site and Cable Transition Facilities. A seasonal swamp is located 150 m south-west of the Darwin Converter Site and is considered within the area of influence. The seasonal swamp discharges, via a minor unnamed drainage line, toward the Tree Point Conservation Area, which is outside of the proposals area of influence.

Groundwater

The Solar Precinct footprint overlies the Montijinni Limestone aquifer, which forms part of the Cambrian Limestone Aquifer (CLA) which extends over 320,000 km². The CLA is a regional scale aquifer, with significant water resources, and groundwater underlying the Solar Precinct is deep (between 36 and 60 mbgl).

The OHTL crosses several aquifers, however activities associated with the OHTL are unlikely to impact groundwater and so these aquifers are not described in detail.

The Darwin Converter Site overlies the Koolpinyah Dolostone Aquifer within the Howard Groundwater System, which is confined in the northern portion of Gunn Point, including at the Darwin Converter Site location.

Beneficial uses

Beneficial uses are declared for a number of areas relevant to the proposal footprint, as detailed in Section 6.3 of Chapter 6.

Groundwater extraction is proposed to supply construction and operational activities. Bores will likely be drilled at the Solar Precinct and Darwin Converter Site, while the minor volumes of water required to supply construction along the OHTL will be sourced from existing bores under agreement with the landholder and in accordance with any relevant Water Extraction Licence conditions. The Solar Precinct is within the Daly Roper Beetaloo Water Control District (WCD), and the Darwin Converter Site is within the Darwin Rural WCD, and as such Water Extraction Licences and Bore Work Permits will be required to be sought under the *Water Act*.

8.3.2 Residual impacts

The impact assessment undertaken for the Hydrological processes factor identified and assessed impacts that could occur to surface water and groundwater regimes during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 10 below.

Table 10. Residual impact ratings for impacts to Hydrological processes

Impacts	Residual Impact Rating
Construction	
Alteration to surface water flows in water courses or wetlands	Moderate
Changes to ground water levels caused by groundwater extraction	Moderate
Operations	
Alteration to surface water flows in water courses or wetlands	Moderate
Changes to ground water levels caused by groundwater extraction	Minor
Changes to groundwater levels caused by reduced recharge	Minor

The impact assessment undertaken for the Hydrological processes factor (see Chapter 6) concludes the AAPowerLink could have a residual impacts associated with alteration of the hydrological regime of the seasonal swamp located immediately south-west of the Darwin Converter Site, and localised drawdown of groundwater around construction water bores at the Solar Precinct. Other impacts to Hydrological processes associated with minor alteration of overland flows and minor volumes of groundwater extraction proposed along the OHTL and at the Darwin Converter Site, were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

The residual impacts to Hydrological processes mainly relate to the precautionary principle being adopted in the assessment because stormwater management system design details and construction bore locations are yet to be finalised. To manage these impacts Sun Cable has committed to stormwater discharges being similar to pre-development conditions and also to engaging a suitably qualified hydrogeologist to determine bore locations and sustainable rates of extraction. These measures are expected to be effective in minimising residual impacts Hydrological process to as low as reasonably practicable.

The importance of Hydrological processes to maintaining biodiversity and cultural values was considered in the impact assessment undertaken for the Terrestrial ecosystems factor, Aquatic ecosystems factor, and Culture and heritage factor. It was concluded that changes to the hydrological regime of the seasonal swamp near the Darwin Converter Site could have a localised impact on aquatic habitat, and this impact has been assessed under the Aquatic ecosystems factor and considered under the Culture and heritage factor due to the swamp being identified as having Aboriginal significance. The Culture and heritage factor also considers cultural impacts in the Solar Precinct footprint associated with the loss of drainage depressions (locally referred to as ngulya) and narrow zones of disturbance where the access roads cross watercourses, that whilst not important hydrological features are identified as having Aboriginal cultural significance.

The findings of the impact assessment undertaken for the Hydrological processes factor indicate that the AAPowerLink is unlikely to have unacceptable impact to the hydrological regimes of surface water or groundwater. Therefore, it is concluded that the NT EPA's objective for the Hydrological processes factor will be met.

8.4 Inland water environmental quality (EIS Chapter 7)

The NT EPA's objective for Inland water environmental quality is:

'Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.'

The impact assessment undertaken for the Inland water environmental quality factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by a review of existing studies and information available in relation to the water quality of watercourses and groundwater aquifers present within/underlying, and proximate to the proposal footprint, and observations made during the ecology field surveys undertaken at the Solar Precinct, along the 66 km section of the OHTL located in the Utilities Corridor and at the Darwin Converter Site.

8.4.1 Environmental values

Existing surface water and groundwater quality of watercourses and aquifers within the direct disturbance footprint and area of influence (downstream areas which could be indirectly impacted) was described in Chapter 7 Section 7.3 of the EIS. Environmental values supported by water quality were also identified.

In general, water quality is good across the proposal footprint. Water quality in ephemeral watercourses (i.e. those that flow after rainfall and/or during the wet season) is generally reflective of natural rainfall during periods of flow, and deteriorates as watercourses cease to flow (water pools and evaporates, resulting in the concentration total solids, nutrients, minerals and metals, reflected as an increase in electrical conductivity and turbidity). Watercourses tend to be naturally turbid following rainfall. Some watercourses (e.g. Katherine and Edith Rivers) are impacted by residential, industrial and mining land uses, which is reflected in the water quality (e.g. elevated metals in the Edith River downstream of Mt Todd mine), and agricultural land uses can also result in increased nutrients in watercourses.

Groundwater quality in the Cambrian Limestone Aquifer (CLA) where it underlies the Solar Precinct is generally good, and reflective of rainfall influenced by evapotranspiration and also the geology of the aquifers (e.g. dissolution of carbonates). Groundwater quality in the Koolpinyah Dolostone Aquifer (which underlies the Darwin Converter Site and Gunn Point in general) is of varying quality, and is saline impacted in some areas proximate to the coast and to the north.

8.4.2 Residual impacts

The impact assessment undertaken for the Inland water environmental quality factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 11 below.

Table 11. Residual impact ratings for impacts to Inland water environmental quality

Impacts	Residual Impact Rating
Construction	
Increased turbidity in watercourses caused by soil disturbance and erosion	Moderate
Contamination by release of fuels and hazardous chemicals	Minor
Contamination from waste storage and disposal areas	Minor
Contamination by wastewater from camps and ablutions	Minor
Operations	
Increased turbidity in watercourses caused by soil disturbance and erosion	Moderate
Contamination by release of fuels and hazardous chemicals	Minor
Contamination from waste storage and disposal areas	Minor
Contamination by wastewater from camps and ablutions	Minor

The impact assessment undertaken for the Inland water environmental quality factor concludes the AAPowerLink proposal could have a residual impact to water quality in the seasonal swamp located immediately south-west of the Darwin Converter Site associated with increases in turbidity caused by erosion impacts predicted under the Terrestrial environmental quality factor. Other impacts to Inland water environmental quality associated with short-term increased turbidity at watercourse crossings along the Solar Precinct access roads and OHTL, or contamination by waste, wastewater or spills/leaks of fuels and hazardous chemicals, were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

The residual impact to Inland water quality mainly relates to the precautionary principle being adopted in the assessment because a large portion of the swamp's catchment will be disturbed, and the erosion and sediment control measures and stormwater management system design details are yet to be finalised. Sun Cable has committed to adopting *Best Practice Erosion and Sediment Control Guidelines* (IECA, 2008) and to stormwater discharges being similar to pre-development conditions. These measures are expected to be effective in minimising residual impacts of the proposal to Inland water environmental quality as low as reasonably practicable.

The importance of good water quality to maintaining ecological health was considered under the Terrestrial ecosystems and Aquatic ecosystems factors, which assessed potential impacts to riparian vegetation at watercourse crossings and impacts to aquatic habitats associated with residual water quality impacts. The importance of good water quality to protecting amenity and human health was considered under Community and economy and Human health factors, which considered impacts to consumptive or recreational uses of water.

The findings of the impact assessment undertaken for the Inland water environmental quality factor indicate that the AAPowerLink is unlikely to have unacceptable impact to the quality of surface water or groundwater, or associated ecological health, land uses, amenity or human health. Therefore, it is concluded that the NT EPA's objective for the Inland water environmental quality factor will be met.

8.5 Aquatic ecosystems (EIS Chapter 8)

The NT EPA's objective for Aquatic ecosystems is:

'Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.'

The impact assessment undertaken for the Aquatic ecosystems factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

Aquatic ecosystems are those which depend on water flows or periods of sustained or periodic inundation or waterlogging for their ecological integrity (AETG 2012). For this EIS, aquatic ecosystems include all freshwater habitats and species that live in freshwater environments (i.e., fish).

The impact assessment was informed by a review of existing studies and information available in relation to the aquatic ecosystems present in surface water bodies and groundwater dependent ecosystems (GDE's) within and proximate to the proposal footprint, and observations made during the ecology field surveys undertaken at the Solar Precinct, along the 66 km section of the OHTL located in the Utilities Corridor and at the Darwin Converter Site.

8.5.1 Environmental values

Aquatic ecosystems within watercourses, wetlands and GDE's within the direct disturbance footprint and area of influence (downstream areas which could be indirectly impacted) were identified, and their condition and value summarised in Chapter 8 Section 8.3 of the EIS.

There are no aquatic ecosystems present within the Solar Precinct footprint, primarily because there are no surface watercourses present. The access roads linking the Solar Precinct to the Stuart Highway cross ephemeral alluvial floodplains, several watercourses and an isolated patch of black soil plain, which would provide aquatic ecosystem values during periods of flow or inundation. A number of GDE's (springs) are located in the watercourses crossed by the access roads, but none are within the area of influence of the AAPowerLink. Lake Woods is a large ephemeral lake of international conservation significance, but is located approximately 10 km north of the Solar Precinct and outside the area of influence.

The OHTL corridor intersects 154 watercourses, including four major perennial rivers (the Katherine, Edith, Fergusson, and Adelaide Rivers) and numerous creeks and minor ephemeral drainage lines. Seasonal wetland habitats are also crossed, mostly in the northern portion of the OHTL.

The Darwin Converter Site and Cable Transition Facilities footprints at Murrumujuk (Gunn Point) do not contain any defined watercourses or aquatic habitats within the direct disturbance footprint. There is a seasonal swamp immediately south-west of the Darwin Converter Site footprint that will receive runoff from the footprint, which then drains, via a minor drainage line, towards the floodplains and coastal creeks within the Tree Point Conservation Area. The seasonal swamp does provide aquatic habitat during periods of inundation, but it dries out each dry season.

8.5.2 Residual impacts

The impact assessment undertaken for the Aquatic ecosystems factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 12.

Table 12. Residual impact ratings for impacts to Aquatic ecosystems

Impacts	Residual Impact Rating
Construction	
Direct loss of aquatic habitat	Minor
Reduction in aquatic habitat value due to water quality impacts	Moderate
Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Moderate
Reduction in aquatic habitat value due to dust	Minor
Operations	
Direct loss of aquatic habitat	None
Reduction in aquatic habitat value due to water quality impacts	Minor
Reduction in aquatic habitat value due to altered hydrology or groundwater extraction	Minor-Moderate
Reduction in aquatic habitat value due to dust	Minor
Heat island effect on Lake Woods	None

The impact assessment undertaken for the Aquatic ecosystems factor concludes the AAPowerLink proposal could have a residual impact to aquatic habitats associated with the seasonal swamp located immediately south-west of the Darwin Converter Site due to impacts predicted under the Hydrological processes and Inland water environmental quality factors (see above). Other impacts to Aquatic ecosystems associated with direct habitat loss and indirect impacts from dust deposition, were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

As previously stated, the precautionary principle has been adopted in the assessment considering the uncertainty that exists in relation to the prediction of impacts, and the resilience of the aquatic ecosystem, which is adapted to large variations in water levels that occur naturally in the ecosystem. The mitigation measures proposed in the EIS are likely to be effective in ensuring there is no unacceptable impact to Hydrological processes and Inland water environmental quality; and Sun Cable has made a commitment to ongoing monitoring and adaptive management to address the uncertainty that exists with respect to the resilience of the aquatic ecosystem swamp. These measures are expected to be effective in minimising residual impacts of the proposal to Aquatic ecosystems to as low as reasonably practicable.

The cultural importance of aquatic ecosystem associated with the seasonal swamp at the Darwin Converter Site, and watercourses traversed by the Solar Precinct access roads and OHTL corridor was considered under the Culture and heritage factor.

The findings of the impact assessment undertaken for the Aquatic ecosystems factor indicate that the AAPowerLink could have a localised impact on the aquatic ecosystem associated with the seasonal swamp but is unlikely to impact aquatic ecosystem biodiversity, ecosystem function or ecological integrity more broadly at any location across the proposal footprint. Therefore, it is concluded that NT EPA's objective for the Aquatic ecosystems factor will be met.

8.6 Marine environmental quality (EIS Chapter 9)

The NT EPA's objective for Marine environmental quality is:

'Protect the quality and productivity of water, sediment and biota so that environmental values are maintained'

The impact assessment undertaken for the Marine environmental quality factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by a number of technical studies, as summarised below:

- A targeted numerical sediment transport modelling study (Metocean Solutions Pty Ltd, 2021a, see Appendix R).
- The regional oceanographic conditions and baseline marine water quality in the region were described in a desktop review undertaken by Metocean Solutions Pty Ltd (2021b) (see Appendix S).
- A targeted geophysical and geotechnical survey described the seabed environment along part of the Subsea Cable System corridor from 125 km west of the shoreline at Murrumujuk, to the edge of the AEEZ, including a buffer of 500 m to either side of the centreline (Guardian Geomatics 2021) (see Appendix Z).
- A *Marine Ecology Report* (Appendix T) describes bathymetry and the benthic environment.

8.6.1 Environmental values

The environmental values within the direct disturbance footprint and area of influence are described in Chapter 9 Section 9.3 of the EIS, including oceanic processes, seabed characteristics (shoreline sediments, bathymetry, geomorphology, seabed sediment characteristics and presence of PASS in the intertidal zone), and water quality based on available water quality data for the nearshore and offshore areas.

The intertidal zone adjacent to the Cable Transition Facilities slopes at approximately 1:50 in the intertidal zone and 1:700 from the low water mark toward Beagle Gulf (Water Technology 2017). The bathymetry gradually slopes down, through the Beagle Gulf and towards the continental shelf. The downward slope is interrupted by the carbonate bank and terrace system of the Van Diemen Rise, the carbonate bank and terrace system of the Sahul Shelf, and the Pinnacles of the Bonaparte Basin, which are the three key ecological features intersected by the Subsea Cable System corridor.

The seabed sediments of nearshore parts of the Subsea Cable System corridor in Shoal Bay are generally muddy sands with varying amounts of gravel. In the offshore region, seabed sediments were characterised by particle size distributions of samples collected during the Guardian Geomatics survey, and the analysis suggests that muddy sands with varying amounts of gravel dominate the seabed. In general, the shoreline crossing at Murrumujuk consists of coarse sandy beach, and there is a high probability of PASS in the intertidal zone.

Water quality is generally very good to excellent in Shoal Bay, as reported in Darwin Harbour Report Cards from 2009 – 2019. Turbidity varies significantly due to factors such as tides, wave and wind, and water in the nearshore portion of the Subsea Cable System is naturally turbid, particularly during the wet season. Turbidity is generally low (i.e. water is clear) in the offshore area, except at the seabed, which is reported to be more turbid than the rest of the water column, driven by tidal and seasonal physical drivers.

There are declared beneficial uses for the Shoal Bay and the Vernon Islands region, and Darwin Harbour and its marine reaches, and the Subsea Cable System corridor traverses the Shoal Bay Site of Conservation Significance. Offshore, the Subsea Cable System corridor runs through the Oceanic Shoals Marine Park (OSMP) which is located approximately 250 km offshore. The Subsea Cable System traverses two zones; Multiple Use Zone (IUCN VI) and Special Purpose Zone (Trawl) (IUCN VI), within which activities associated with the AAPowerLink (e.g. laying subsea cables) are permitted subject to obtaining authorisation from Parks Australia.

8.6.2 Residual impacts

The impact assessment undertaken for the Marine environmental quality factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 13 below.

Table 13. Residual impact ratings for impacts to Marine environmental quality

Impacts	Residual Impact Rating
Construction	
Increased turbidity in marine waters caused by cable laying activities	Moderate
Sediment mobilisation from Shore Crossing Site impacting water quality	Minor
Disturbance of PASS at Shore Crossing Site impacting water quality	Minor
Spills of hazardous substances impacting water quality	Minor
Operations	
Increased turbidity in marine waters caused by cable repair activities	Minor
Localised temperature increase around operating cables	Minor

The impact assessment undertaken for the Marine environmental quality factor concludes that the AAPowerLink will have residual impacts to marine water quality in the nearshore areas of Shoal Bay associated with installation of the Subsea Cable System, which will result in elevated turbidity in the marine waters for approximately one month during cable laying and installation activities. Other impacts to marine water and sediment quality associated with disturbance of sediments in the deeper offshore areas, disturbance of sediments and Potential Acid Sulfate Soils (PASS) at the Shore Crossing Site, or spills of fuels or hazardous chemicals, were assessed as minor as there is a high level of certainty that unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

To manage the identified residual impacts to Marine environmental quality Sun Cable has committed to undertaking a cable route selection survey and ensuring the Subsea Cable System route avoids important marine habitats identified under the Marine ecosystems factor, as far as practicable, and selecting cable burial methods to suit the local seabed conditions. These measures, along with the short duration of the construction activities, are expected to be effective in minimising residual impacts to Marine water environmental quality to as low as reasonably practicable.

The impact assessment under the Marine environmental quality factor considered the potential for land-based impacts predicted under the Terrestrial Environmental Quality at the Shore Crossing Site (i.e. disturbance and runoff of sediments, PASS and spills), to cause impacts to marine water quality. The importance of good marine water quality to protecting marine habitats and fauna was considered under the Marine ecosystems factor, which assessed the level of resilience of the marine ecosystem to the residual water quality impacts predicted under the Marine environmental quality factor. The importance of good water quality for maintaining beneficial uses such as recreational and commercial fishing were considered under the Community and

economy factor, which concluded these uses will not be affected by the short-term impacts to marine water quality associated with the AAPowerLink cable laying and burial activities.

The findings of the impact assessment undertaken for the Marine environmental quality factor indicate that the AAPowerLink will have a short-term impact to Marine environmental quality (water quality); however, the short duration is expected to ensure there is no unacceptable impact to marine habitats, biota or other beneficial uses of the marine waters. Therefore, it is concluded that the NT EPA's objective for the Marine environmental quality factor will be met.

8.7 Marine ecosystems (EIS Chapter 10)

The NT EPA's objective for Marine ecosystems is:

'Protect marine habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.'

The impact assessment undertaken for the Marine ecosystems factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by a review of existing studies and information available in relation to marine ecology, geophysical and geotechnical field surveys undertaken within the Subsea Cable System corridor and site inspections at the Cable Transition Facilities footprint. Background information is detailed in the *Marine Ecology Report* (Appendix T), and the *Cable Route Survey Report* (Guardian Geomatics, 2020) (Appendix Z) provides information on the seabed characteristics and habitat present within the offshore parts of the Subsea Cable System corridor.

8.7.1 Environmental values

Marine ecosystems within the direct disturbance footprint and area of influence are described in Chapter 10 Section 10.3 of the EIS. Within the nearshore environment, areas of high value benthic habitat are likely (based on predictive modelling presented by Siwabessy et. al. 2020) to occur within the direct disturbance footprint and area of influence. The Subsea Cable System corridor routes will potentially disturb between approximately 5 % and 8 % of benthic habitat communities mapped as likely to occur within Shoal Bay.

In the offshore region, the marine landscape becomes a mostly featureless shelf, except for the three key ecological features of the shoals of the Van Diemen Rise and Sahul Shelf, and pinnacles of the Bonaparte Basin.

The Subsea Cable System traverses the Shoal Bay Site of Conservation Significance and the Oceanic Shoals Marine Park. The Subsea Cable System also traverses a large area of marine habitat, and therefore intersects with suitable habitat for many marine fauna species. Species which may be present within the direct disturbance footprint and area of influence are summarised in Chapter 10 and detailed in the *Marine Ecology Report* (Appendix T). Threatened or migratory species which may occur, or which utilise benthic habitat, within the area of influence include turtles (Loggerhead, Flatback and Olive-Ridley), Dugongs, Sea snakes, elasmobranchs, Estuarine Crocodiles, Pygmy Blue Whale, and Whale Shark.

8.7.2 Residual impacts

The impact assessment undertaken for the Marine ecosystems factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 14.

Table 14. Residual impact ratings for impacts to Marine ecosystems

Impact	Residual Impact Rating
Construction	
Direct disturbance or loss of benthic habitats	Minor
Habitat degradation due to elevated turbidity	Minor
Changes to fauna behaviours due to noise or light	Minor
Habitat and fauna impact due to spills	Minor
Introduction of marine pests	Minor
Direct fauna mortality/collisions with vessels	Minor
Operations	
Habitat loss and degradation from cable repairs	Minor
Changes to fauna behaviour due to EMF or heat	Minor

The impact assessment for the Marine ecosystems factor concludes that the AAPowerLink will have a minor residual impact to marine habitats and fauna, associated with direct disturbance of benthic habitats in the Subsea Cable System corridor, and the short-term marine water quality impacts as predicted under the Marine environmental quality factor. Impacts to marine fauna associated with noise or light emissions, interaction with vessels, spills or fuels or hazardous chemicals or emissions of heat or Electromagnetic Fields (EMP) from the operating cables, were also assessed as minor as there is a high level of certainty that the unacceptable impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

To ensure there is no unacceptable impact to marine ecosystems, as indicated above, Sun Cable has committed to undertaking a cable route selection survey and ensuring the Subsea Cable System route avoids important marine habitats, as far as practicable. Notwithstanding the surveys and final route selection were still underway at the time of EIS submission, the assessment of the two route options under consideration indicates there is unlikely to be unacceptable impacts to important marine habitats either from direct disturbance or due to water quality impacts. This conclusion is drawn on the basis that irrespective of the final route, the area of direct seabed disturbance is narrow and water quality impacts will be experienced for a short duration.

The impact assessment considered the importance of marine ecosystems to the community and to Aboriginal culture under the Community and economy factor. The SIA assessed impacts to healthy country (including recreational and commercial fishing) and cultural identity, associated with impacts to marine habitats and fauna. The assessment identified potential for social and cultural impacts that are linked to community concerns about impacts to the marine ecosystems of Darwin Harbour associated with a range of development pressures.

The findings of the impact assessment undertaken for the Marine ecosystems factor indicate that the AAPowerLink proposal is unlikely to have unacceptable impact to marine habitats, biodiversity, ecological integrity, or ecological functioning. Therefore, it is concluded that the NT EPA's objective for the Marine ecosystems factor will be met.

8.8 Air quality (EIS Chapter 11)

The NT EPA's objective for Air quality is:

'Protect air quality and minimise emissions and their impact so that environmental values are maintained.'

The impact assessment undertaken for the Air quality factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by the *Air Quality Impact Assessment* appended to the EIS (Appendix U). The assessment was based on regional meteorology developed using the TAPM prognostic meteorological model and atmospheric dispersion modelling using the AUSPLUME model. Ambient air quality impact assessment criteria for the AAPowerLink assessment were determined using the more stringent of the relevant *National Environment Protection (Ambient Air Quality) Measure* standards and the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2016).

8.8.1 Environmental values

The AAPowerLink *Air Quality Impact Assessment* (Appendix U) predicted changes in air quality associated with emissions of particulate matter (PM₁₀, PM_{2.5}, Total Suspended Particles (TSP)) from site ground preparation, infrastructure construction and heavy diesel non-road construction equipment, and nitrogen oxide (NO_x) emissions from heavy diesel non-road construction equipment. Background air quality within the proposal footprint and surrounding areas was determined from the only three long-term regional air quality monitoring stations in the NT, which are in the Darwin suburbs of Palmerston, Stokes Hill and Winnellie. The main air pollutant in the Top End, where the AAPowerLink Darwin Converter Site and OHTL are proposed to be located, is smoke open burning during the dry season, with a significant increase in PM₁₀ and PM_{2.5} in the dry season. In central NT, where the AAPowerLink Solar Precinct and OHTL are proposed to be located, wind-blown dust is also a source of air pollution. Other pollutants including Carbon Monoxide (CO), Nitrogen Oxides (NO_x, NO and NO₂) and Sulfur Dioxide (SO₂) are at very low levels compared to other cities in Australia.

Most of the AAPowerLink footprint is in remote areas visited by few people and with no permanent residences that would be sensitive to air emissions. Along the OHTL there are several locations where there are buildings and houses proximate to the corridor that may be used as residences or visited periodically by people. The area around the Darwin Converter Site and Cable Transition Facilities is frequented by people partaking in recreational activities on the nearby Gunn Point Beach, but there are no residences within 5 km of proposal activities.

8.8.2 Residual impacts

The impact assessment undertaken for the Air quality factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 15.

Table 15. Residual impact ratings for impacts to Air Quality

Impacts	Residual Impact Rating
Construction	
Emissions of PM or NO ₂ that could affect human health	Minor
Emissions of particulate matter (TSP and deposited dust) that could affect amenity	Minor
Operations	
Emissions of NO ₂ from diesel exhaust	Minor
Emissions of particulate matter (dust)	Minor

The impact assessment for the Air quality factor concludes that the AAPowerLink proposal will have minor residual impacts to air quality associated with emissions of particulate matter (dust) and nitrogen dioxide diesel exhaust emissions during the construction phase, with no residual impacts predicted during operations. Atmospheric dispersion modelling predicted that emissions could exceed relevant air quality assessment criteria for protection of human health and amenity at distances between 307-943 m from the construction work fronts, with this distance increasing to 1,079 m at the Solar Precinct and 3,593 m at the Darwin Converter Site when the naturally high background concentrations of particulate matter occur during the dry season associated with native vegetation burning and dust storms. As most of the footprint is in remote areas, and the nature of exposure to air emissions is transient over the construction phase, there are few locations where people are likely to be affected by the construction air emissions. The impacts were assessed as minor as there is a high level of certainty that unacceptable nuisance or human health impacts can be avoided or mitigated by adopting routine measures as described in the EIS.

The impact assessment considered the potential for interaction between Air quality and the Human health factor by assessing pollutants that can cause health impacts (i.e. PM_{2.5}, PM₁₀ and NO₂). Potential for interaction between Air quality and the Community and economy factor was considered by assessing pollutants that can cause nuisance impacts to people and communities (i.e. Total Suspended Particulates and deposited dust). The potential for depositional dust to impact on terrestrial and aquatic habitats and fauna, was considered under the Terrestrial ecosystems and Aquatic ecosystems factors.

The findings of the impact assessment undertaken for the Air quality factor indicate that the air emissions associated with the AAPowerLink will intermittently exceed air quality criteria over the construction phase but are unlikely to cause unacceptable impacts to human health, ecosystem health or amenity. Therefore, it is concluded that the NT EPA's objective for the Air quality factor will be met.

8.9 Atmospheric processes (EIS Chapter 12)

The NT EPA's objective for Atmospheric processes is:

'Minimise greenhouse gas emissions so as to contribute to the NT Government's target of achieving net zero greenhouse gas emissions by 2050.'

The impact assessment undertaken for the Atmospheric processes factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by the Xodus' 2022 Carbon Emissions Study and Greenhouse Gas Abatement Plan (GGAP) (Appendix H), which addresses the requirements for an atmospheric processes study under the ToR and also a GGAP under the NT Government GHG Emissions Management for New and Expanding Large Emitters' Policy (2021) (the Large Emitters Policy).

8.9.1 Environmental values

A desktop review of the current NT energy mix, including proportion of renewables in use, and sources of GHG emissions was conducted by Xodus (2022) to characterize the baseline condition. A total of 41,083 gigawatt hours (GWh) was used in NT in 2019. Less than 1% of that energy was generated by renewable sources, while 65.6% of the energy was generated by gas-fuelled generation, and 33.6% generated by oil-fuelled generation. The two largest energy users were the electricity sector (supply to the electricity grid) and the mining and industry sectors. Approximately 20.7 million tonnes of carbon dioxide equivalent (CO₂e) were reported as NT emissions in 2019, of which approximately 6.7% was associated with public electricity generation.

The boundary of the GHG emissions estimate includes Scope 1 and 2 emissions associated with the proposal, within Australian and NT jurisdiction, as well as Scope 3 emissions from travel, waste, and wastewater associated with construction and operations. GHG emissions avoided by the provision of solar power replacing fossil fuel combustion are also included within the scope of this estimate. Out of scope GHG emissions are those generated from activities outside of Australia, such as those embodied in imported goods, construction and operation activities outside of Australia, and specifically, emissions avoided in Singapore.

8.9.2 Residual impacts

The impact assessment undertaken for the Atmospheric processes factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 16 below.

Table 16. Residual impact ratings for impacts to Atmospheric processes

Impacts	Residual Impact Rating
Construction	
GHG emissions from combustion of fuel from vessels, plant and equipment for earthworks, air and land travel, logistics and power generation	Minor
GHG emissions from land clearing and land use change	Minor
GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Minor
Operations	
GHG emissions from the decomposition of organic debris and loss of soil carbon during operation	Minor
Positive Impact	Major (positive)
Overall reduction in GHG emissions from generation of renewable energy	

The impact assessment for the Atmospheric processes factor concludes that the AAPowerLink proposal will have a major positive impact on reducing GHG emissions associated with power generation in the NT and Singapore. The AAPowerLink *Carbon Emissions Study & GHG Abatement Plan* (Appendix H) predicts there will be short to medium term residual impacts associated with construction phase GHG emissions produced from fuel combustion (vessels, logistic, plant and equipment, travel and power generation), vegetation clearing and soil carbon loss. Sun Cable has committed to GHG mitigation measures to reduce construction emissions to as low as reasonably practicable, and there is a high level of certainty that the emissions will be offset by the renewable electricity produced in the first four years of operation. The AAPowerLink will become increasingly carbon positive over its operational life. The proposed mitigation measures are expected to be effective in minimising GHG emissions to as low as reasonably practicable over the construction phase, such that the positive impact will be achieved as early as possible.

The positive contribution of GHG emissions reductions to economic development and growth, was considered under the Community and economy factor, where the SIA assessed impact to economies and jobs and concluded that the AAPowerLink has potential for transformational positive impacts to the NT economy.

The findings of the impact assessment undertaken for the Atmospheric processes factor indicate that the AAPowerLink will contribute significantly to the NT Government's target of achieving net zero GHG emissions by 2050, and the Territory's ability to adapt to a changing climate. Therefore, it is concluded that the NT EPA's objective for the Atmospheric processes factor will be met.

8.10 Community and economy (EIS Chapter 13)

The NT EPA's objective for Community and economy is:

'Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians.'

The impact assessment undertaken for the Community and economy factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The assessment of impacts to community and economy was informed by the *Social Impact Assessment* (SIA), *Preliminary Social Impact Management Plan* (SIMP) and *Stakeholder Consultation Report* (Appendices I, J and F respectively), an *Economic Impact Assessment* (Appendix G), *Local Workforce Strategy* (attached to SIA in Appendix I) and *Industry Capability Network (NT) Report* (Appendix Y).

8.10.1 Social and economic values

The socio-economic context of the regions within which AAPowerLink infrastructure will be located was summarised in Chapter 13 of the EIS. The demographics, including population data, employment statistics and education statistics were summarised for NT towns and regions which may be impacted by the proposal, including the Barkly Region (including Tennant Creek, Elliott (Kulumindini) and Powell Creek), Greater Darwin, Katherine and Alice Springs. Baseline data is presented in the SIA (Appendix I) and summarised in Chapter 13 for the social area of influence, with a particular emphasis on priority issues likely to be sensitive to change processes invoked by AAPowerLink activities, such as pressure on the affordability and availability of housing, demographic composition, key economic sectors and workforce participation.

8.10.2 Residual impacts

Chapter 13 presents a risk and opportunity assessment (i.e. potential negative and positive impacts) for aspects relevant to the Community and economy factor, and as identified through consultation and the SIA. Potential impacts were assessed for the following categories:

- People and communities
- Social infrastructure and services
- Economies and jobs
- Cultural identity
- Healthy country
- Living environment
- Strong voice.

Potentially transformational positive impacts identified were:

- More sustainable regional economies by boosting manufacturing, industry, population growth and household consumption; the social and economic benefits to the NT from access to affordable, reliable power.
- Aboriginal jobs and legacy skills development.
- Contribution to reducing Territory and global GHG emissions.

The highest rated potential negative impacts identified were:

- Reduced quality, affordability and availability of public and private accommodation due to a large direct workforce, and indirect population growth associated with induced economic development activity.
- Loss of cultural heritage due to damage or reduced access, including fears and anxieties of damage to sites or custodians' responsibilities.
- Cumulative impacts of industrial development in the Barkly region, Gunn Point and Darwin Harbour. This impact is rated as high due to community concern about impacts associated with a range of development pressures, not just the AAPowerLink.

The impact assessment for the Community and economy factor concludes that the AAPowerLink proposal has potential to bring significant social and economic benefits to the NT (and Singapore) by reducing power generation emissions and ultimately achieving net zero GHG targets. The scale of the proposal also means there are significant opportunities associated with direct and indirect employment and facilitated economic development activity associated with having access to low emissions, renewable electricity that is in high demand across the world. There is a high level of certainty that the AAPowerLink will provide significant social and economic opportunities, but less certain (based on past experiences of development in regional and remote NT) is the extent to which those opportunities can be realised for local communities. The community's acceptance of the AAPowerLink proposal, and Sun Cable's social licence, will depend on the extent to which benefits are realised for local communities and businesses, and the level of trade-off associated with the residual negative impacts to environmental, social and cultural values.

Sun Cable have made commitments to maximising the benefits of the AAPowerLink to the NT, and specifically to the Barkly region where the Solar Precinct is located. The *Social Impact Management Plan* (SIMP, Appendix J) submitted with the EIS establishes a framework for minimising social impacts, and maximising opportunities to the NT, including reporting to the NT Government and community against commitments made. These

measures are expected to be effective in minimising residual impacts to as low as reasonably practicable, and benefits are realised for the NT community wherever possible.

The inherent links between the Community and economy factor, and all other factors, were considered through the SIA. The assessment of impacts under the Culture and heritage factor, informed the SIA's consideration of impacts to cultural identity. The SIA considered how the proposal could impact people's value and use of land and seas, sometimes described as ecosystem services, based on the residual impacts predicted under the Terrestrial ecosystems factor, Hydrological processes factor, Inland water quality factor, Aquatic ecosystems factor, Marine environmental quality factor, Marine ecosystems factor. The assessment of impacts under the Air quality factor and Human health factor, informed the SIA's consideration of impacts to the living environment, which covers community amenity, and impacts to social infrastructure and services.

The findings of the impact assessment undertaken for the Community and economy factor indicate the AAPowerLink will provide significant opportunity for enhancement of communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians. The SIMP provides a framework for ensuring benefits are realised and there are no unacceptable impacts. Therefore, it is concluded that the NT EPA's objective for the Community and economy factor will be met.

8.11 Culture and heritage (EIS Chapter 14)

The NT EPA's objective for Culture and heritage is:

'Protect sacred sites, culture and heritage.'

The impact assessment undertaken for the Culture and heritage factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by the *AAPowerLink Heritage Impact Assessment (HIA) Reports* (Earthsea, 2022a, b, c) (Appendix V, Appendix W, Appendix X) and the SIA referenced above. These sources describe knowledge shared by Traditional Owners or their representatives, Native Title Holders and other community members during field surveys, site visits, meetings and/or interviews. They also report the findings of field surveys undertaken, under the guidance of Aboriginal representatives to identify archaeological resources and areas of cultural heritage significance within the AAPowerLink footprint.

The HIA accessed a range of information sources to identify and assess sites of significance, including cultural knowledge shared by Aboriginal people, NT Heritage Register Database, NT Archaeological Site Database, Aboriginal Sacred Sites Register (NT), National Heritage Database (Commonwealth), Commonwealth Heritage List, Native Title Register as well as published and unpublished literature and reports. The SIA drew on records of consultation with Aboriginal people undertaken by the NLC and Sun Cable's Aboriginal Affairs team with families and individuals, as well as the consultation undertaken as part of the HIA described above.

8.11.1 Cultural and heritage values

Cultural and heritage values are described in Chapter 4 Section 14.3 of the EIS.

The AAPowerLink proposal footprint lies across the traditional lands of many Aboriginal groups as summarised below:

- Native Title is held by six estate groups over the Powell Creek Pastoral Lease where the Solar Precinct site is located
- The OHTL traverses numerous Native Title or Aboriginal Land determined under *the Aboriginal Land Rights Act* as follows:
 - o Karlantijpa North Aboriginal Land Trust
 - o Murrarji Aboriginal Land Trust
 - o Buchanan Downs Pastoral Lease
 - o Hidden Valley Pastoral Lease
 - o Town of Katherine #2
 - o Pine Creek Township
 - o Finnis River Aboriginal Land Trust
- The Wulna people of the Adelaide River floodplains maintain traditional connections to land traversed by some northern and western parts of the OHTL (Utilities Corridor).
- The land where the AAPowerLink Darwin Converter Site and Cable Transition Facilities and OHTL (Utilities Corridor) are proposed to be located is the traditional land of the Larrakia people, and the Larrakia people have strong connections across their country.
- The Tiwi people maintain important customary ties to country at Murrumujuk and many Tiwi families, particularly those living in the Greater Darwin Area, continue to use the Gunn Point Peninsula for hunting and recreational purposes.

Sun Cable is working with the NLC to negotiate voluntary Indigenous Land Use Agreements (ILUA) and to seek consent from Traditional Owners and custodians and in 2020 Sun entered into an agreement with the NLC for the purpose of such negotiation. Sun Cable has also entered into a costs agreement for the purpose of supporting the NLC to conduct consultation and engagement to seek free, prior and informed consent for the AAPowerLink proposal. There is still extensive consultation to be done with Aboriginal people to establish the agreements needed for the AAPowerLink to proceed, and additional information is likely to come from these consultations that will inform AAPowerLink planning and operations.

Representatives from Aboriginal groups were involved in the AAPowerLink HIA surveys, who were nominated by the NLC or Tiwi Land Council in consultation with Traditional Owners. Consultation undertaken to date is summarised in Section 4.

There is evidence of traditional use of the land by Aboriginal people across the AAPowerLink footprint, in the form of Aboriginal archaeological sites and objects. Archaeological field surveys were undertaken at the Solar Precinct, along 66 km of the Overhead Transmission Line (OHTL) from KP 722 through to Murrumujuk, Darwin Converter Site and Cable Transmission Facilities. The outcomes of the heritage surveys are summarised in Table 17 below, and are detailed in Section 14.3 of Chapter 14.

Table 17. Results of AAPowerLink archaeological field surveys undertaken to date

Component	Archaeological (places) ⁴	sites	Culturally significant landscape features ⁵	Cultural Heritage Risk Areas ⁶	Historic heritage features (non-Aboriginal)
Solar Precinct	11		13	38	1
OHTL Railway Corridor	Not yet surveyed				
OHTL Utilities Corridor (KP722 – end)	14		2	28	18
Darwin Converter Site	0		1	1	0
Cable Transition Facilities	3		1	4	0
Subsea Cable System	Not yet surveyed				
TOTAL	28		17		19

NT and Commonwealth heritage register searches were undertaken and identified 13 records of declared heritage places proximate to the current railway corridor which is to house the OHTL; including the Powell Creek Telegraph station, Springvale Homestead Heritage Sites, Fergusson River North Australia Railway Bridge and Boiler, the Grove Hill Hotel and the Adelaide River Railway Siding and Railway Bridge (refer to Chapter 14 Section 14.3.4 for the full list, and descriptions of each site). The NT Archaeological Database records 27 archaeological and historic sites within and in close proximity to the proposed OHTL alignment, and two archaeological sites within the AAPowerLink Cable Transition Facilities footprint at Murrumujuk (Shoal Bay 1 and Shoal Bay 3, shell scatter and isolated artefacts). There are no records for any other AAPowerLink proposal components.

The section of the OHTL located in the Railway Corridor (approximately 722 km) and the Subsea Cable System route are yet to be surveyed and so heritage information for these components was compiled from desktop review of existing sources of information. For all proposal components, Sacred Sites will be assessed in full by the Aboriginal Areas Protection Authority (AAPA) through the Authority Certificate process that is underway pursuant to the *Aboriginal Sacred Sites Act*.

⁴ Isolated artefacts were also recorded during field surveys (25 at the Solar Precinct and 11 along the OHTL), all of which have a low level of archaeological and cultural significance and are not included in the table.

⁵ Landscape features of cultural significance to the Traditional Owners were recorded during the surveys, which included three watercourses and related drainage features and a geological feature.

⁶ Cultural Heritage Risk Areas are classified as potential risk areas on the basis that they have not been subject to sufficient investigations to confidently identify all archaeological features or were not included in the sampling strategy but have subsequently been identified as areas which have a higher potential for containing archaeological features. Areas yet to be defined will be surveyed prior to commencement of works and site protection measures included Cultural Heritage Management Plans.

8.11.2 Residual impacts

The impact assessment undertaken for the Culture and heritage factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 18 below.

Table 18. Residual impact ratings for impacts to Culture and heritage

Impacts	Residual Impact Rating
Construction	
Direct impact to heritage features	Moderate
Indirect impacts to cultural heritage features	Minor
Impacts to undetected heritage features	Minor
Operations	
Direct or indirect impact to heritage features associated with operations and maintenance activities	Moderate

The impact assessment for the Culture and heritage factor concludes that the AAPowerLink proposal could have residual impacts associated with direct impact to heritage features when the land is cleared for development of the infrastructure. The *Heritage Impact Assessment Reports* (Appendix V and W) recorded numerous sites of Aboriginal and/or archaeological significance, and it is expected that sacred sites clearances and surveys of the remaining unsurveyed parts of the proposal footprint, will identify more.

To manage residual impacts to heritage, site-specific mitigation measures for all sites are to be determined in consultation with site custodians, AAPA and Heritage Branch, and will be documented in a Cultural Heritage Management Plan (CHMP). Sun Cable has committed to consulting with Traditional Owners through the ILUA negotiation and AAPA Authority Certificate processes. As these processes are well-established under NT law, they are expected to ensure there are no unacceptable impacts to heritage features.

The importance of the environment and heritage to Aboriginal people is considered under the Community and economy factor, where the SIA assessed impacts to cultural identity associated with damage or reduced access to sacred sites, and to health country and the living environment associated with environmental impacts.

The findings of the impact assessment undertaken for the Community and economy factor indicate the AAPowerLink proposal will impact sacred sites, culture and heritage; however, sites will be protected in accordance with the requirements of NT law and commitments made under ILUA's. Therefore, the NT EPA's objective for the Culture and heritage factor will be met.

8.12 Human health (EIS Chapter 15)

The NT EPA's objective for Human health is:

'Protect the health of the Northern Territory population.'

The impact assessment undertaken for the Human health factor assessed the extent to which this objective can be met by the AAPowerLink proposal.

The impact assessment was informed by information presented in previous chapters, including Inland Water Environmental Quality (Chapter 7), Air Quality (Chapter 12), and Community and Economy (Chapter 13). A *Noise Technical Memo* (Appendix L) quantified the potential area of influence for noise emissions from construction and operational activities and identified sensitive receptors within the area of influence. The *Air Quality Impact Assessment* (Appendix U) modelled likely areas of influence for air emissions from construction and operational activities and this modelling was used to identify sensitive receptors within the area of influence. Existing literature was also referenced where available.

8.12.1 Human health values

The assessment of human health impacts considered impacts to sensitive receptors; locations where people are regularly present, such as homes, workplaces, schools, care facilities and recreation sites, and therefore are sensitive to exposure to emissions or contaminants. Sensitive receptors within specific areas of influence have been identified when assessing potential human health impacts, including:

- Electromagnetic fields (EMF) – Community receptors and workers in close proximity to OHTL.
- Biting Insects – Community receptors and workers that could experience an increase in biting insects as a result of proposal components and activities.
- Communicable Disease – Workers, and community receptors in close proximity to construction camps or areas where workers may interact with community residents, visitors, and businesses.
- Air Quality – Community receptors within modelled area of influence from AAPowerLink construction air emissions (generally 500-950 m from construction activities).
- Noise – Community receptors (residents, businesses, and users of community amenities) within the assessed area of influence from AAPowerLink construction noise emissions.

The majority of the proposal footprint is in remote locations which are sparsely populated, which reduces potential human health impacts on sensitive receptors. There are no sensitive receptors surrounding the Solar Precinct; the closest residential areas are the Aboriginal family outstations at Jangirulu (17 km to the east) and Powell Creek outstation (25 km north-east) which are occasionally used for hunting.

The first 465 km of the OHTL corridor from the Solar Precinct, north to near Katherine, traverses remote areas where there are no permanent residences or buildings within 1 km of the corridor. Between Katherine and Darwin, the OHTL corridor traverses close to several rural dwellings, buildings and land holdings, where people are likely to live and/or work, and also will traverse close to the townships of Katherine and Pine Creek, and through Adelaide River⁷. The closest sensitive receptors are the Adelaide River township, some small rural blocks between KP 675 and KP 681, and residences in the Darwin rural area between KP 723 to KP 788, some of which are within 200 m of the OHTL corridor.

⁷ Note diversions are currently being considered to divert the OHTL around towns and therefore increase the distance between proposal activities and sensitive receptors.

There are no residences or other dwellings close to the Darwin Converter Site or Cable Transition Facilities; the closest residences are located approximately 6 km south at the Tree Point Community. However, Gunn Point Beach is a popular recreational area and culturally important area for Indigenous people including the Larrakia and Tiwi as discussed in Section 8.11, and the beach and surrounds is considered a sensitive receptor for that reason.

8.12.2 Residual impacts

The impact assessment undertaken for the Culture and heritage factor identified and assessed impacts that could occur during construction and/or operations of the AAPowerLink. The residual impacts are summarised in Table 19 below.

Table 19. Residual impact ratings for impacts to human health

Impacts	Residual Impact Rating
Construction	
Exposure to EMF	None
Increase in biting insects	None-Minor
Increase in communicable disease	Moderate
Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	None-Minor
Exposure to noise emissions	Minor
Operations	
Exposure to EMF	None
Increase in biting insects	None
Increase in communicable disease	None
Exposure to air emissions of particulate matter (PM10, PM2.5) and Nitrogen Oxide (NOx)	Minor
Exposure to noise emissions	Minor

The impact assessment undertaken for the Human health factor (Chapter 15) concludes the AAPowerLink could have residual impacts to Human health associated with increased incidence of COVID-19 outbreaks associated with a large transient workforce that is drawn from across the NT, Australian and overseas. Sun Cable has committed to compliance with all Federal, Territory, and local requirements set out for COVID 19 health measures, and these measures are likely to be effective in ensuring impacts are as low as reasonably practicable. Other impacts to Human health associated with air emissions and noise emissions, and exposure to biting insects were assessed as minor as there is a high level of certainty that unacceptable human health impacts can be avoided or mitigated by the measures proposed in the EIS. There will be no residual impacts to Human health associated with low level exposure to EMF, as would be experienced proximate to the AAPowerLink infrastructure.

The impact assessment considered the potential for residual impacts predicted under the Air quality factor to interact with the Human health factor. While the magnitude of predicted impacts associated with air and noise emissions is such that impacts to Human health are unlikely, the potential for those emissions to impact welfare and amenity were considered under the Community and economy factor. The induced impacts to health services associated with impacts to Human health were also assessed under the Community and economy factor, where the SIA assessed potential impacts on social infrastructure and services. The findings of the impact assessment indicate that the AAPowerLink is unlikely to cause unacceptable impacts to the

health of the NT population, or health services, and therefore the NT EPA's objective for the Human health factor is likely to be met.

8.13 MNES (EIS Chapter 16)

Impacts to the Matters of National Environmental Significance (MNES) are assessed in Chapter 16, and a summary of the impact assessment is provided below. There are nine Matters of National Environmental Significance (MNES) protected under the EPBC Act, three of which require assessment for this proposal:

- Listed threatened species and communities
- Listed marine and/or migratory species
- Commonwealth marine areas.

The threatened, migratory and marine species listed under the *EPBC Act* that have the potential to be impacted upon by AAPowerLink proposal activities were primarily identified using the Protected Matters Search Tool (PMST). The species' likelihood of occurrence was assessed based on desktop and field studies to identify species with a high likelihood of occurring within the proposal footprint, and therefore potentially being impacted. The impact assessment was informed by desktop research and field surveys of the Solar Precinct, OHTL Utilities Corridor and Murrumujuk area, as detailed in Section 8.2.

The impact assessment for MNES was undertaken in accordance with the *EPBC Significant Impact Guidelines 1.1* produced by the Commonwealth Government (DEWHA 2013). The findings of the impact assessment for each protected matter are summarised below.

8.13.1 Threatened species

EPBC listed terrestrial threatened species which are likely to occur within the proposal footprint and have potential to be impacted by construction or operational activities associated with the AAPowerLink are listed in Table 20. Ecological surveys undertaken across the Solar Precinct and Darwin Converter site footprint did not detect the presence of listed threatened species or communities.

Notwithstanding surveys covering the remainder of the footprint (i.e. the OHTL corridor) were in progress at the time of EIS submission, that footprint is very localised (i.e. 22m wide corridor of clearing) and substantive disturbance will only occur over a short time frame in any one location during construction, therefore the likelihood of significant impacts to threatened species is very low.

Table 20. EPBC Act listed terrestrial threatened species with the potential to be impacted by the proposal

Species	Status	Location			
		Solar Precinct	Railway	Utilities	Darwin Converter Site
FAUNA					
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	VU	-	x	-	-
Grey Falcon (<i>Falco hypoleucos</i>)	VU	x	-	-	-
Gouldian Finch (<i>Erythrura gouldiae</i>)	EN	-	x	-	-
Bare-rumped Sheathtail Bat (<i>Saccolaimus saccolaimus nudiclunatus</i>)	VU	-	x	x	-
Ghost Bat (<i>Macroderma gigas</i>)	VU	x	x	-	-
Greater Bilby (<i>Macrotis lagotis</i>)	VU	-	x	-	-
Howard River Toadlet (<i>Uperoleia daviesae</i>)	VU	-	-	x	-
Shorebirds (see Table 16-4 of Chapter 16)	VU/CE	-	-	-	x
FLORA					
<i>Stylidium ensatum</i>	EN	-	x	x	-
<i>Helicteres macrothrix</i>	EN	-	x	-	-

8.13.2 Listed migratory and marine species

The Subsea Cable System traverses a large area of marine habitat, and therefore intersects with suitable habitat for many threatened marine species. To narrow down which threatened species are at most risk of being negatively impacted by proposal activities, the *Marine Ecology Report* (Appendix T) determined for which species there is important habitat – i.e., critical for feeding, nesting, breeding and/or migrating – within the proposal footprint; see Table 21. Detailed descriptions of habitat are provided in Table 16-7 of Chapter 16.

Table 21. EPBC Act listed marine threatened species with the potential to be impacted by the proposal

Species	Status	Location	
		Nearshore	Offshore
Flatback Turtle (<i>Natator depressus</i>)	VU	x	x
Loggerhead Turtle (<i>Caretta caretta</i>)	EN	-	x
Olive-Ridley Turtle (<i>Lepidochelys olivacea</i>)	EN	-	x
Freshwater or Largetooth Sawfish (<i>Pristis pristis</i>)	VU	x	-
Green Sawfish (<i>Pristis zijsron</i>)	VU	x	-
Dwarf Sawfish (<i>Pristis clavate</i>)	VU	x	-
Pygmy Blue Whale (<i>Balaenoptera musculus brevicauda</i>)	EN	-	x
Whale Shark (<i>Rhincodon typus</i>)	VU	-	x

There are no terrestrial migratory species records within the Solar Precinct footprint, nor does it support habitat typically utilised by migratory species that can occur in central Australia. The Solar Precinct footprint is located in relatively close proximity to Lake Woods, which is an area known to support migratory species, including populations that are considered to be internationally significant. However, the usual extent of Lake Woods is over 10 km away, and is not considered within the proposals area of influence.

The migratory species relevant to the OHTL and Darwin Converter Site footprints are all similar in that the footprints neither contain important habitat for them, nor are ecologically-significant proportions of populations likely to be present within them. Construction of the Cable Transition Facilities will impact upon Gunn Point Beach. There are 18 migratory shorebird species known from the Gunn Point Beach area – eight of which are also threatened species. However, it is unlikely that proposal activities will have a significant impact on the migratory shorebirds as construction in the beach and intertidal zone will occur in a small footprint, and over one to two months, after which the area will be reinstated with no restriction on access.

The PMST Report for the Subsea Cable System (provided in Appendix T) identified 25 listed migratory marine species which may occur within the proposal's marine footprint. These include migratory bird and wetland bird species, as well as whales, manta rays, dolphins, dugong, sawfish and the Estuarine Crocodile; see Table 16-9 in Chapter 16.

8.13.3 Commonwealth marine area

Protected under section 24 of the *EPBC Act*, the Commonwealth marine area is the area of sea extending from the NT coastal water limits to the edge of the Continental Shelf, as shown on Figure 4. The Subsea Cable System transects the Oceanic Shoals Marine Park (OSMP) for approximately 300 km. The area crossed by the proposal is zoned Special Purpose Zone (Trawl) Multiple Use Zone (both IUCN VI), both of which allow, subject to authorisation, erection of structures including submarine cables and dredging.

The Subsea Cable System traverses a large area of marine habitat, and therefore intersects with suitable habitat for many significant marine species. To narrow down which significant species are at most risk of being negatively impacted by proposal activities, the *Marine Ecology Report* (Appendix T) identified for which marine species there is important habitat for – i.e. critical for feeding, nesting, breeding and/or migrating – within the proposal footprint.

8.13.4 Significant impact assessments

Significant impact assessments were undertaken in accordance with the *EPBC Significant Impact Guidelines 1.1* (DEWHA 2013). Significant impact assessments were undertaken for restricted range species for which an important population could be impacted by AAPowerLink activities. The findings of the significant impact assessments are summarised below; refer to Chapter 16 for detail.

- It is **unlikely** that the AAPowerLink will have a significant impact upon the **Greater Bilby**, however the significant impact assessment will be updated for the Supplementary EIS to include the results of the targeted survey in the southern portion of the OHTL Railway Corridor (currently unsurveyed due to access constraints). The assessment uses the preliminary aerial survey results and desktop, and is based on the assumption that some habitat within the proposal footprint contains Greater Bilby, but so does immediately adjacent habitat that is outside the footprint – in other words, any occurrences of the species are not confined to the proposal footprint. Because the OHTL footprint is so narrow, only small areas of foraging habitat will be disturbed – therefore, the focus on the significant impact assessment is on disturbances to burrows used for day-time refuge and breeding.

- It is **unlikely** that the AAPowerLink will have a significant impact upon the **Howard River Toadlet**, however the significant impact assessment will be updated for the Supplementary EIS to include the results of the targeted survey in the OHTL corridor. It is assumed that sandsheet habitat within the proposal footprint contains Howard River Toadlet, but so does immediately adjacent habitat that is outside the footprint – in other words, any occurrences of the species are not confined to the proposal footprint. Even if this restricted-range species is present within the OHTL footprint, its occurrence will almost certainly be very localised and therefore the proposal's design can be altered to avoid or minimise impacts to it.
- It is **unlikely** that proposal activities will have a significant impact upon *Heliciteres macrothrix*. Even if this restricted-range species is present within the OHTL footprint, its occurrence will almost certainly be very localised, and therefore the proposal's design can be altered to avoid or minimise impacts to it.
- Table 16-8 of Chapter 16 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 proposal's activities will not surpass any of those thresholds, and hence will **not result in a significant impact to migratory shorebirds**.
- For all situations assessed, it is concluded that it is **unlikely** that the proposed action will have a significant impact on the **Commonwealth marine area**.

The conclusion is that it is unlikely that the construction and operation of the AAPowerLink will have a significant impact on any MNES. The impact assessment has considered the Conservation Advice available of each EPBC-listed species that is likely to be impacted and concludes that the proposal is consistent with any Threat Abatement Plans, Bioregional Plans or Recovery Plans.

9 Environmental management (EIS Chapter 17)

Sun Cable is committed to applying the environmental decision-making hierarchy. Consistent with section 26 of the *EP Act* this involves applying the following approaches in order of priority:

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.

The environmental management framework that will be adopted for the construction and operation of the AAPowerLink is detailed in Chapter 17 Environmental Management. The framework comprises a Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) that sit within an overarching Environmental Management System (EMS).

For each of the impacts to environmental factors identified through the EIA, the actions taken to avoid environmental impacts (through site selection and design) and actions proposed to minimise impacts during construction, operation and decommissioning of the proposal are summarised in the relevant chapter. The proposed controls are routine for land development and industrial operations and, assuming proper implementation and adaptive management, there is a high level of certainty that the measures will be effective.

The EIA process did not identify any significant impacts that require offsets; however, it is noted that some targeted threatened species surveys were still underway at the time of EIS submission. The preliminary assessments of potential impacts to threatened species indicate that the AAPowerLink will remove a portion (~6.8%) of the known extent of an important sub-population of the threatened species *Typhonium praetermissum*. However, it is likely that this portion is smaller as there is adjacent suitable habitat that has not been surveyed. The requirement for offsets for *Typhonium praetermissum* or any other threatened species will be re-assessed in the Supplementary EIS in light of the results of the field surveys that were underway at the time the EIS was submitted.

10 Cumulative impacts

The impact assessment undertaken for each environmental factor considered cumulative impacts to the factor associated with the residual impacts from the AAPowerLink proposal, existing impacts from other developments and land uses, and impacts associated with reasonably foreseeable developments. Chapter 3 of the EIS describes the 'other developments' considered in the assessment and the cumulative impacts are discussed in each EIS chapter.

The outcomes of the cumulative impact assessment undertaken for each factor indicate there is limited potential for cumulative impacts to occur at the time the AAPowerLink is constructed because most of the proposal footprint lies across areas with low levels of existing development, and therefore low levels environmental disturbance and impact. Further, the impact assessment undertaken for each factor predicts only minor to moderate residual impacts associated with the AAPowerLink, and these are mostly short to medium term impacts associated with construction activities. On this basis, considering the cumulative impacts from the AAPowerLink and other existing developments and land uses, does not alter the predicted outcome for each environmental factor as described above.

There is potential for cumulative impacts associated with the AAPowerLink and reasonably foreseeable development activities in the Barkly region associated with the Barkly Regional Deal, onshore gas development in the Beetaloo Basin, agriculture and various mining projects. Cumulative impacts from these activities and the AAPowerLink residual impacts are most likely to affect the Community and economy factor and Culture and heritage factor. These impacts would be most pronounced if the construction phases of various projects overlap with the AAPowerLink construction phase when there will be an influx of workers and contractors into regional communities increasing demand for accommodation, and large volumes of traffic on the road.

There is potential for cumulative impacts associated with reasonably foreseeable development activities in the Darwin region, and specifically at Murrumujuk, Gunn Point Peninsula where the Darwin Converter Site will be built alongside the proposed Project Sea Dragon hatchery, and the area is also earmarked as a priority development zone and for development of a Renewable Energy Hub. Cumulative impacts from these activities and the AAPowerLink residual impacts are most likely to affect the Terrestrial ecosystems, Community and economy and Culture and heritage factors. In relation to the Terrestrial ecosystems factor there is potential for cumulative impacts to an important sub-population of the threatened plant species *Typhonium praetermissum* from the combined land clearing associated with the AAPowerLink and Project Sea Dragon hatchery. In relation to Community and economy and Culture and heritage, there is potential for cumulative impacts to occur as incremental development over time alters the nature of the Gunn Point Peninsula such that the areas recreational, cultural and heritage values are lost or degraded.

Sun Cable has committed to undertaking further targeted surveys and assessment of the *Typhonium praetermissum* sub-population, and to managing impacts to social and cultural values through a SIMP and CHMP. It is assumed that similar requirements would need to be met by future developments. The NT Government regulatory processes provide for consideration of cumulative impacts in decision-making.

Finally, the renewable energy generated by the AAPowerLink has potential to drive economic development in the NT, by providing a significant source of low-cost electricity. The type and scale of development that could occur is difficult to predict, but it is reasonably foreseeable that mining and manufacturing-based industries could be made more feasible by having access to this resource. For example, having a supply of renewable electricity has potential to drive development of the Middle Arm Sustainable Development Precinct proposed by the NT Government, to occur over a shorter timeframe than might otherwise occur. These developments are outside of Sun Cable's control; however, have been identified in the EIS to inform future government and regulatory decision-making.

11 Conclusions

The outcomes of the impact assessment process documented in the EIS for each of the NT EPA's environmental factors, indicate the proposal will have several potentially transformational positive impacts to the NT, and a range of minor to moderate residual impacts.

Potentially transformational positive impacts identified were:

- More sustainable regional economies by boosting manufacturing, industry, population growth and household consumption
- Social and economic benefits to the NT from access to affordable, reliable power
- Contribution to reducing Territory GHG emissions by approximately 10% and towards Territory's objective of becoming a \$40B economy by 2030
- Support the Territory's objective of being powered by 50% renewable electricity by 2030
- Provision of 1750 construction jobs and 350 operational jobs
- Aboriginal jobs and skills development

Sun Cable has appended a *Preliminary Social Impact Management Plan* to the EIS (Appendix J) that provides a framework for maximising opportunities to the NT, including reporting to the NT Government and community against commitments made.

The highest rated residual negative impacts identified were:

- Introduction and spread of weeds due to land clearing and disturbance. To manage this impact a *Weed Management Plan* has been submitted with the EIS (Appendix Q).
- Potential impacts to threatened species at the Darwin Converter Site, and possibly in the OHTL corridor depending on the outcomes of surveys underway at the time of EIS submission. To manage this impact targeted survey work was underway at the time of EIS submission.
- Potential impacts to the seasonal swamp south-west of the Darwin Converter Site, which is a locally important habitat and has value to Aboriginal people. To manage this impact Sun Cable has committed to stormwater discharges being similar to pre-development conditions.
- Changes to groundwater levels due to groundwater extraction at the Solar Precinct (during construction only). To manage this impact Sun Cable has committed to engaging a suitably qualified hydrogeologist to determine bore locations and sustainable rates of extraction.
- Short-term increased turbidity in shallow, nearshore marine waters of Shoal Bay due to cable laying activities, but with no predicted impact to marine ecosystems.
- Direct or indirect impacts to heritage features, including fears and anxieties of damage to sites or custodians' responsibilities. To manage this impact Sun Cable has committed to preparing a Cultural Heritage Management Plan (CHMP) and consulting with Traditional Owners through the ILUA negotiation and AAPA Authority Certificate processes.
- Reduced quality, affordability and availability of public and private accommodation due to a large direct workforce, and indirect population growth associated with induced economic development activity. To manage this impact strategies are detailed in the Social Impact Management Plan (Appendix J).
- Cumulative impacts of industrial development in the Barkly region, Gunn Point and Darwin Harbour. This impact is rated as high due to community concern about impacts associated with a range of

development pressures, not just the AAPowerLink. The NT Government and NT EPA will need to consider cumulative impacts in future decision-making.

Many of the negative residual impacts identified in the EIS are a result of the application of the precautionary principle to the assessment where there was uncertainty due to knowledge and information gaps, or where the site selection and design in its early stages. As indicated, Sun Cable has committed to a range of further surveys and assessments through the EIS, and it is expected that these works will reduce the number of residual impacts and ensure that all impacts are as low as reasonably practicable. Subject to the findings of these further assessments it is concluded that the proposal will bring significant community, economy and greenhouse gas abatement benefits, and can be implemented without causing unacceptable environmental, social or cultural impacts.



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