Alcatel Submarine Networks

Indigo Central

Environmental Impact Assessment

December 2017

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Abbreviations

ACMA	Australian Communication and Media Authority
AQIS	Australian Quarantine and Inspection Service
ASN	Alcatel Submarine Networks
BIAs	Biologically Important Areas
BMH	Beach manhole
CE	Critically Endangered
CLS	Crown Land Services
CRS	Cable route study
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Double Armoured
DoEE	Department of Environment and Energy
DWER	Department of Water and Environmental Regulation
EA	Environmental Assessment
EAXA	Eastern Australian Exercise Area
EEZ	Exclusive Economic Zone
En	Endangered
EPA	Environment Protection Authority
EPBC	Environment Protection Biodiversity and Conservation
IUCN	International Union for Conservation of Nature
KEF	Key Ecological Feature
LAT	Lowest Astronomical Tide
LW	Light Weight
LWP	Light Weight Protected
Mig	Migratory
NES	National Environmental Significance
NSW	New South Wales
OEH	Office of Environment and Heritage
OOS	Out of service
PMST	Protected Matters Search Tool

POP	Pop out point
PZ	Protection Zone
QLD	Queensland
RCC	Randwick City Council
ROV	Remotely operated vehicle
SA	Single Armoured
SEPP	State Environmental Planning Policy
SSPZ	Southern Sydney Protection Zone
TAS	Tasmania
TEC	Threatened Ecological Communities
V	Vulnerable
VFA	Victorian Fisheries Authority
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council
WD	Water depth

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1. Introduction

1.1 Background

Alcatel Submarine Networks (ASN) has been contracted to supply and install a submarine fibre optic cable from Perth to Sydney. This cable system, Indigo Central, will be owned and managed by a telecoms consortium consisting of AARNet, Google, Singtel and SubPartners. GHD has been engaged by ASN to undertake the Environmental Assessment (EA) for the proposed works and to seek relevant approvals and permits for the segment of cable in Australian waters.

The fibre optic submarine cable is intended (once installed) to provide high speed domestic internet connectivity and reliability. The cable will connect with existing infrastructure in both Perth and Sydney. Both landing locations have in place existing beach manhole (BMH) infrastructure with subterranean cable conduit spanning from the BMH under the surf zone to an offshore submarine pop out point (POP). In Perth the POP is located within the Perth submarine cable Protection Zone (Perth PZ) offshore of Floreat Beach. In Sydney the POP is located within the Southern Sydney Protection Zone (SSPZ) offshore of Coogee Beach.

To determine an appropriate cable route and to inform potential environmental impacts, a geophysical and geotechnical marine survey of the seabed between Perth and Sydney along an indicative alignment has been completed. That marine survey was undertaken in accordance with Environment Protection Biodiversity and Conservation (EPBC) decision 2017/7996. The data from the survey informed selection of a preferred cable route, and has been used to inform this EA in support of seeking permits for cable installation.

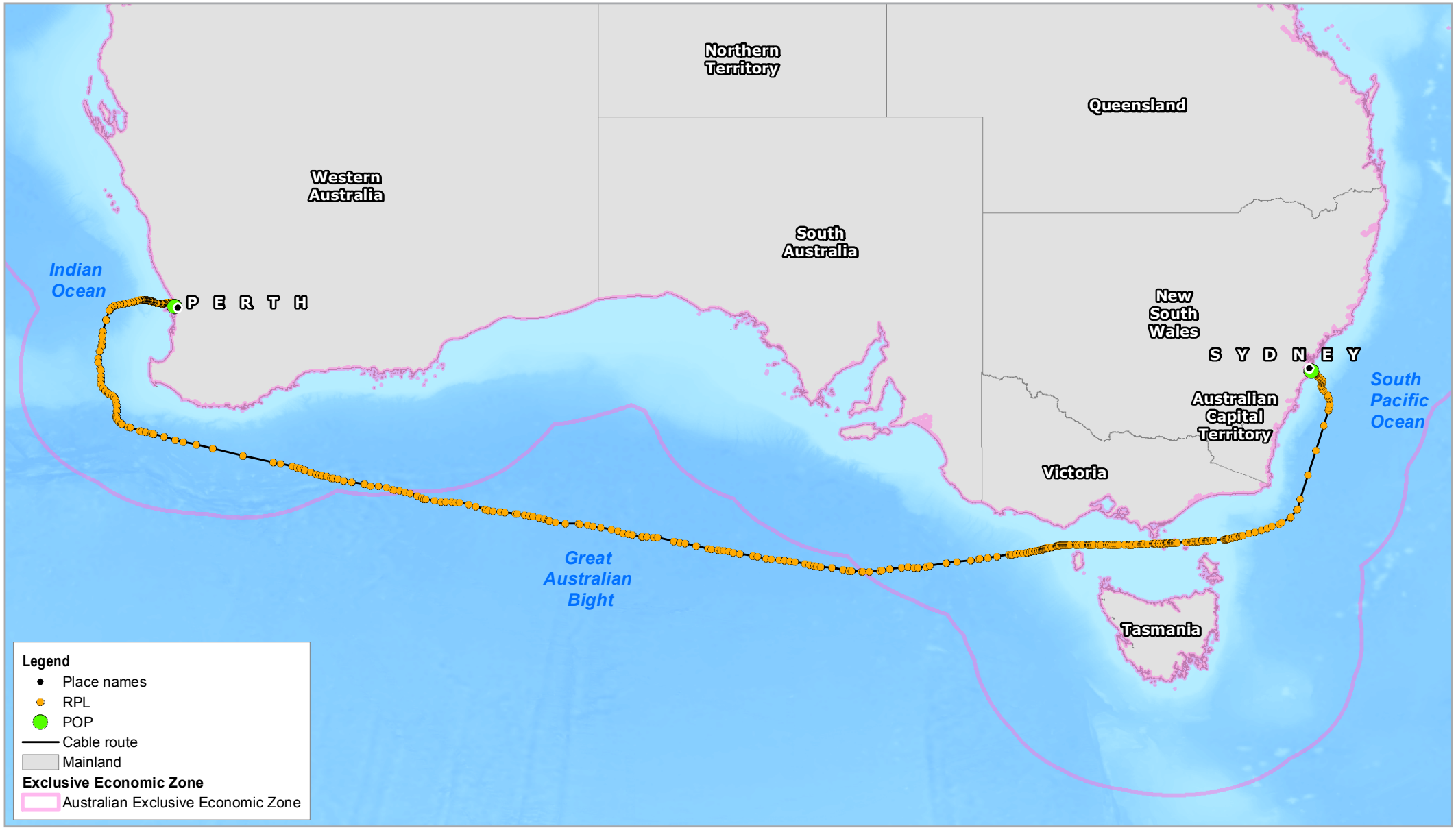
1.2 Environmental Assessment and Scope Limitations

The cable will traverse from the existing submarine cable POP in the Perth PZ (as designated by the Australian Communication and Media Authority (ACMA) through State waters of Western Australia (WA) into Australian waters. It will exit Australian waters off south-western Australia entering International waters. It will re-enter Australian waters off South Australia and then travel through the Exclusive Economic Zone (EEZ), briefly traversing Tasmanian State waters before moving from the EEZ into State waters of NSW to connect in the POP off Sydney located in the SSPZ. The proposed installation cable route for the Indigo Central is provided in Figure 1-1.

Australian waters are defined by the maritime boundaries of the EEZ which is the area extending 200 nautical miles (nm) offshore from the territorial sea baseline, being approximately the Lowest Astronomical Tide (LAT).

The scope of works for the EA and project approvals address the installation of the cable from:

- The existing cable conduit infrastructure at the Perth PZ POP to the edge of the EEZ in the west; this is referred to for ease of reference during the assessment as the Perth EEZ section of the cable.
- The existing cable conduit infrastructure at the SSPZ POP to the edge of the EEZ in the east; this is referred to for ease of reference during the assessment as the Sydney EEZ section of the cable.



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ALCATEL SUBMARINE NETWORKS

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INDIGO Central
Environmental Impact Assessment

Project No. **21-26628**
Revision No. **1**
Date **14/12/2017**

Proposed Indigo Central cable

FIGURE 1-1

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Data source: DNRM - Place names (2017). GHD - POP, RPL, Cable route (28 - Nov2017). GA: Mainland, Bathymetry (2009), EEZ (2017). Created by: xlee

In order to undertake this study GHD has used the cable route study (CRS) provided by ASN on the presumption that it is accurate (ASN 2017) and sufficient for this EA. GHD has also relied upon project description information provided by ASN (2017). In addition to this, GHD were also kept informed of the progress of the marine survey. GHD has, therefore, completed this EA using the route maps and proposed installation methods provided by ASN.

Herein the 'proposed action' is, therefore, considered to be installation and operation of a submarine cable from the SSPZ POP to the Perth PZ POP.

1.3 Proponent

The proponent for the proposed works is SubPartners Pty Ltd, who will act on behalf of the Indigo Consortium for the Indigo Central cable system, and are the company that hold the carrier licence as per the requirements of the Commonwealth *Telecommunications Act 1997*.

Proponent: SubPartners Pty Ltd

Contact Name: Lee Harper, Chief Network Architect

Phone: +61 730 885 922

Email: lee.harper@subpartners.net

1.4 Environmental Assessment Approach

The approach for this EA was developed based on the relevant policies and regulations in New South Wales (NSW), Tasmania (TAS) and WA, as well as with reference to relevant Commonwealth legislation. The development intends to comply wholly with all relevant NSW, TAS, WA and Commonwealth legislation. This EA has been developed in support of identification of such requirements and to support seeking of relevant permits.

This EA was completed using a combined approach of desktop review of relevant primary and secondary information sources, site visits and consultations to determine legislative requirements and the existing environmental conditions of relevance to the proposed action. Following this, an assessment of potential environmental impacts of the proposed activities was undertaken. The following is an outline of the broad activities undertaken for the project scoping:

- Meetings with the GHD team and ASN.
- Meetings with the GHD team, ASN, Australian Communication and Media Authority (ACMA) and the Department of Environment and Energy (DoEE)
- Discussions and correspondence with WA, TAS, and NSW government agencies, and other relevant Commonwealth stakeholders.
- Desktop searches to identify or determine:
  - project's influence area;
  - baseline data in the project influence area;
  - understand the governance structure for approvals;
  - physical environment which includes bathymetry, seabed conditions, water levels, wave, wind, currents, depth of sediment mobility, water quality and noise;
  - biological environment which includes benthic habitats, marine biota, threatened and protected species; and
  - social and economic issues such as fishing, commercial shipping activities.
- Assessment of the potential to impact the environment utilising site knowledge, ASN CRS (ASN 2017) and additional literature review.

- Preparation of the EA Report (this document)

This EA has been used in support of:

- Preparation of a referral to the DoEE for assessment of the proposed action in regards to the Environment Protection Biodiversity and Conservation Act (EPBC Act).
- Preparation of relevant permit application/s to the ACMA.
- Preparation of licence application and works permit to Crown Land Services, Parks Tasmania for the submerged Crown land/sea bed within Tasmanian waters (3 nautical miles from Crocodile Rock).
- Preparation of a permit application to Parks Australia to transit through designated marine parks/reserves.

Referral and permit conditions will inform the project proponent of any action that will be required for installation and maintenance (if required) of the Indigo Central cable.

2. Description of the Proposed Works

2.1 Submarine Cable Route

An initial cable route has been designed by ASN (CRS 2017) using desktop information supported by seabed survey. The proposed route has been engineered to manage issues including seabed physiography, seabed geology, offshore activities and hazards, oceanography, landing site selection and operational permits.

The entire Indigo Central cable system is presented in Figure 1-1. As noted in Section 1, this document is concerned only with the Indigo Central cable within Australia's EEZ.

To support robust environmental assessment of the proposed route an area inclusive of 5 km either side of the proposed route has been reviewed. As such, the direct cable alignment is referred to as the cable route and the area inclusive of the 10 km buffer on the route is referred to as the cable corridor.

2.1.1 Perth Landing

The Perth landing of the Indigo Central cable is located at the eastern limit of a restricted area allocated as the Perth PZ. This zone is provided by the ACMA and is intended to offer protection to submarine cables as there are heavy penalties for any breaches of trawling or anchoring within the zone.

As noted in Section 1, at the Perth landing site the cable is proposed to use an existing conduit. The duct is located within the SMW3 BMH behind the protected sand dunes at Floreat Beach (31°55.5148'S, 115°45.3910'E). From the BMH, the conduit travels approximately 1 km west, entering the marine environment at 10 m water depth (WD) (31°55.4569'S, 115°44.7632'E). The proposed Perth landing route for the Indigo Central cable is presented in Figure 2-1.

Cable burial (target depth 1.0 m) is proposed from the POP to 1,000 m WD with the seabed charted as fine sand and shell. The cable is planned to pass to the south west of Centaur Reef and north east of Freemantle Port limits. The route then adjusts north passing to the west of Marmion Reef in WDs of approximately 20 m. On the approach to Three Mile Reef, the route follows the restricted area in a westerly direction remaining north of the in-service SEAMEWE 3 and the proposed ASC1 Cables. The WD progressively increases until the cable route exits the PZ at WDs of approximately 700 m. Within the PZ, the route avoids crossing the proposed Indigo West cable by maintaining a parallel course with appropriate separation. Shortly after exiting the Perth PZ, the 1,000 m depth contour is reached which is the proposed end of burial.

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Perth landing

FIGURE 2-1

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Data source: DNRM - Place names (2017). GHD - POP, Cable route (28 - Nov2017), Cable Corridor (2017). GA: Mainland, Bathymetry (2009), Protection Zones (2017). Created by:xlee

2.1.2 Cable Route Perth to Sydney

Shortly after the 1,000 m contour the continental shelf is reached and the route descends steep slopes avoiding the AURA Acoustic Range before tracking south in deep water. Offshore of Cape Naturaliste, the route traverses through the South West Corner Multiple Use Zone (IUCN VI) before passing south of Cape Leeuwin and negotiating the steep shelf west of Cape Leeuwin into the Diamantina Fracture Zone passing through the South West Corner Habitat Protection Zone (IUCN IV) on route. From here, the route deviates to the east and travels across the South Australian Basin in the Southern Ocean where depths range from 4,500 to 5,600 m. The route continues in this direction until south of South East Murray Sanctuary Zone (IUCN1A) where a small adjustment supports approach to the Bass Strait western shelf. After passing south of South East Nelson Special Purpose Zone (IUCN IV), the route ascends the steep slopes of the Bass Strait shelf.

At the 1,000 m contour, cable burial begins (target depth 1.0 m) and the route enters the western limits of the Bass Strait and into waters as shallow as 50 m. The route passes south of the southern limits of South East Apollo Multiple Use Zone (IUCN VI), which lies between Cape Otway to the north and King Island to the south. The route continues east between TAS and mainland Australia where the route crosses submarine infrastructure connecting the two islands. Details of this infrastructure are presented in Table 2-1. During survey and engineering of the cable route, other infrastructure operators have been contacted to confirm route is optimised with least interference to other users.

Through this critical part of the route, the Beagle Commonwealth marine park (Multiple User Zone (IUCN VI)) is transited, as are the southern limits to the Bass Strait Traffic Separation Zone. The route continues in shallow water towards the Bass Strait exit into the Tasman Sea. Depths gradually deepen from 50 m to 200 m before the continental shelf break where the slopes increase and the route descends rapidly until reaching 1,000 m WD where cable burial ceases.

Table 2-1 Indigo Central Cable and Pipeline Crossings

Asset name	Type	Latitude	Longitude	Depth (m)
Bass Strait 2	In service cable	39°21.6536'S	145°35.1685'E	77
Yolla-Victoria	Pipeline	39°21.5358'S	145°39.2634'E	76
Bass Strait 1	In service cable	39°20.6517'S	145°59.1649'E	75
Basslink	Power cable	39°18.1030'S	146°54.4188'E	64
Victoria-Tasmania	Pipeline	39°17.5694'S	147°04.9626'E	62
Southern Cross Seg A	In service cable	34°18.2474'S	151°37.1324'E	1489
Southern Cross Seg A	In service cable	34°00.4745'S	151°23.3334'E	133

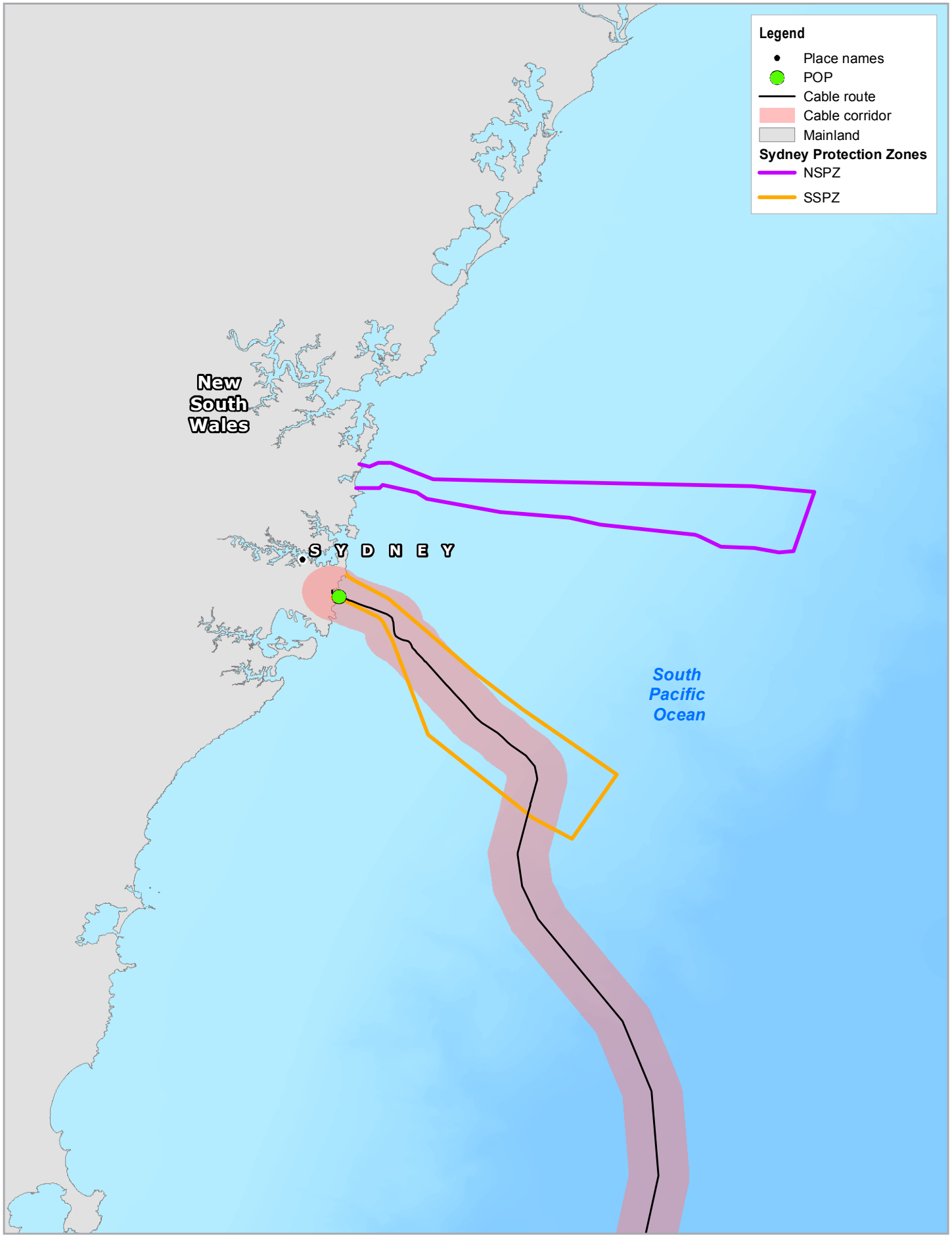
Once past the 1,000 m depth contour the slopes ease slightly as the route descends to deep water between Everard and Flinders Canyons. After entering the Tasman Sea, the route diverts north, avoiding the East Gippsland Commonwealth marine park (Multiple User Zone (IUCN VI)) to the west. The route remains in the deep waters of the Tasman Abyssal Plain following the NSW coastline towards Sydney until the route deviates west to make its approach to the continental shelf. The proposed route remains south of all in service cables negotiating the steep slopes up to the 1,500 m WD.

2.1.3 Sydney Landing

The Sydney landing of the Indigo Central cable is located at the western limit of a restricted area allocated as the SSPZ.

At the Sydney landing site the cable is proposed to use an existing conduit intended to be installed pre-cable arrival. The duct is to be located within a BMH (33°55.0984'S, 151°15.5501'E) at the northern end of Coogee Beach. From the BMH, the conduit travels approximately 2 km south-east, entering the marine environment at 30 m WD (33°55.7863'S, 151°16.3558'E). The proposed Sydney landing route for the Indigo Central cable is presented in Figure 2-2 (ASN, 2017).

Cable burial (target depth 1.0 m) is proposed from the POP to 1,000 m WD with the seabed charted as sand and shell. The cable tracks inside the southern limits of the SSPZ down the gentle slope and passing a Rock Lobster Fishery and Military Exercise Area near the Territorial Sea boundary at approximately 140 m WD. The proposed route crosses the in service Southern Cross cable twice, as per Table 2-1, and exits the SSPZ near the 1,500 m depth. As noted above, other infrastructure operators have been contacted during route planning and engineering to minimise potential impacts.



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Sydney landing

FIGURE 2-2

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Data source: GHD - POP, Cable route (28 - Nov2017), Cable Corridor (2017). GA: Mainland, Bathymetry (2009), Protection Zones (2017), DNRM - Place names (2017). Created by:xlee

2.2 Submarine Cable Type

The proposed cable is an optical fibre subsea cable, designed and incorporating materials to minimise environmental impact. The cable design can accommodate up to seven pairs of fibres, which are housed in a jelly-filled stainless steel tube, surrounded by two layers of steel wires that form a protective vault against pressure and external contact, and also provide tensile strength. This vault is then enclosed in a hermetically sealed copper tube and insulated with a layer of polyethylene to form the basic deep-sea light weight (LW) cable. The outer low-density polyethylene coating provides high voltage electrical insulation, as well as abrasion protection. Whenever possible, the raw materials selected are of the same type as those used in previous generations of coaxial and optical fibre cables, which have demonstrated more than 20 years of reliability.

The main design function of a cable is to protect the optical fibre transmission path over the entire service life of the system, including laying, burial, and recovery operations. A secondary function is that its metallic elements are used either to feed an electric current to the repeaters or to monitor on a permanent basis the status of the transmission system and to localise cable breaks. For shallow water applications, external layers of steel armour wires are added to suit route conditions and installation methods and afford greater protection to the cable from potential contact impact.

The cable design ensures that negligible strain and ultra-low pressure are applied to the fibres in normal operation. Even if the cable breaks, high strain on the fibres and seawater ingress are limited to a short length, so that the bulk of the cable will remain serviceable. These high performances are made possible by virtue of a cable structure that isolates fibres from mechanical stresses under normal operation conditions. This is achieved with a unique design in which fibres lay freely in a steel tube.

Even in the most adverse conditions such as cable recovery, cables are dimensioned so that stress applied to the fibres never reaches critical levels. Cable design prevents any fibre break that would be caused by ageing stress during the design life of the system.

For various cable types, as described in Table 2-2, maximum protection is typically provided where necessary in the shallow inshore waters through a combination of armouring and burying of the cable. Light weight cable is reserved for areas of deep seabed with calm conditions, though additional protection is recommended if the seabed is rough, steep or if significant bottom currents exist.

Table 2-2 Cable Types

Cable Type	Typical Applications	Features	Outer diameter
Light weight (LW)	Benign, sandy bottom with no abrasive surfaces. Typically in deep waters (1,000-8,000 m) where human impact is minimal.	Core cable with polyethylene insulation for electrical installation but no additional external protection.	17 mm
Light weight protected (LWP)	In water too deep for SA cable and has rocky or steep terrain or risk of moderate abrasion or attack by marine life. Typically used between 1,000-3,500 m, maximum depth of 7,000 m.	Additional protection applied to lightweight cable in form of metallic screen and outer sheath.	23 mm
Single armoured (SA)	In area where burial is specified and possible or there is a low risk to surface laid cables.	Armour wire layer (galvanised steel) applied to core cable.	28 mm

Cable Type	Typical Applications	Features	Outer diameter
	Typically used between 20-1,500 m, maximum depth of 2,000 m.		
Double armoured (DA)	Suitable for very rocky terrain or high risk of trawler damage where burial is poor or not possible. For shore ends, from the BMH or exit of conduit to seaward side of the route. Typically used between 0-200 m, maximum depth of 500 m.	Two armour wire layers (galvanised steel) applied to core cable.	37.5 mm

2.3 Cable Installation Method

2.3.1 Cable Protection at Landfalls

For the Perth landing, the cable will utilise the existing SMW3 BMH and conduit. The POP of the conduit is located approximately 1 km west of the BMH at approximately 10 m WD. It has been recommended in the Route Position List (RPL) (ASN, 2017) that a DA cable be used within the conduit for connection.

For the Sydney landing, the cable will utilise an existing BMH and conduit. The POP of the conduit is located approximately 2 km south-east of the BMH at approximately 30 m WD. To connect into this it has been recommended in the RPL (ASN, 2017) that a DA cable be used within the conduit.

2.3.2 Burial by Ploughing

The burial by ploughing method provides extra protection to the cable from potential impact damage from anchors, fishing, abrasion and theft. To achieve burial cable is fed from the installation cable ship through a large plough being pulled by the same ship. The plough pushes aside sand and lays the cable in the void, in this case at a target depth of one metre. Displaced sediments fall back in on top of the cable effecting burial. This approach will be adopted from 3 km offshore in approximately 15 m WD given draught limitations of the cable ship, and continue to the 1,000 m contour. Vessels have an average speed of 0.5 knots during ploughing operations.

If within 500 m of in-service cables or pipelines, or in shallow waters, ploughing will cease and an alternative approach for burial will be used, such as jetting, by deployment of a remotely operated vehicle (ROV) or commercial divers (in inshore areas). Jetting involves jetting seawater into the sediments immediately beneath the cable to 'liquefy them' allowing the cable to fall through under its natural weight such that it is buried.

The feasibility of achieving full burial depth depends on the nature of the seabed, shallow geology, presence of rocky patches, sandwaves, or steep slopes. Survey data collected to inform route alignment will be interrogated to also inform site conditions and burial potential. If full burial is not possible, a shallow burial may provide sufficient protection and will be considered.

2.3.3 Placement of Cable directly on Seabed

The placement of cable directly on the seabed is typically proposed for deep water and where contact impact is low risk. For Indigo Central, this approach will be adopted in WDs of more than 1,000 m offshore between Perth and Sydney. Surface cable laying will be conducted at an average vessel speed of 4 knots.

2.4 Schedule, Operations, Maintenance

A typical design life for the submarine cable, repeaters and the system as a whole, is 25 years. Aside from external damage to the cable, there is rarely necessity to access the cable. Generally, maintenance works are confined to land based activities. In the case of damage from an external source (such as fishing trawlers or ship anchors), there may be reason to retrieve the cable from the sea floor. Recovery generally entails the use of a specialist cable ship for:

- Location of the cable and, if a repair is required, identification of the faulted section
- Retrieval of the cable with specially designed grapnels deployed from the repair vessel (or with the assistance of a ROV where other cables are located nearby)
- Lifting to the surface for removal of the damaged section and repair.

Repair would, therefore, require a number of grapnel deployments across (perpendicular to) the cable route. This would result in disturbance of the seabed within the footprint of the grapnel run. The need for this within Australian waters is, however, considered highly unlikely given that PZs and burial provide increased level of protections from contact damage risk within shallow water environments.

2.4.1 Duration of Works

Duration of works is heavily dependent on a number of contributing factors including rate of cable placement, weather, and oceanographic factors. The chosen method, seabed material, and number of directional changes may effect rate of placement. At this stage, it is estimated that the works will take four months to complete.

2.4.2 Installation Schedule

The cable installation is tentatively scheduled for August 2018; however, is dependent upon the weather, permits, and the following key factors resulting from the findings of the survey

- Oceanographic factors
- Bathymetry / substrate
- WD
- Cable placement method and in turn rate of placement of the cable.

3. Legislation and Associated Stakeholder Engagement

3.1 Legislation Relevant to the Installation of the Indigo Central Cable

The notification and approvals that are required for the installation of the cable have been identified to fall under the following three jurisdictions:

1. Commonwealth government agencies
2. NSW, WA, and TAS State Government agencies
3. Local Government - Randwick City Council (RCC) (NSW)

The legislation instruments for these jurisdictions outlined below are key for the approval process.

3.2 Commonwealth Legislation and Bodies

3.2.1 *Telecommunications Act 1997*– Schedule 3A

Installation of fibre optic submarine cables fall under the Commonwealth *Telecommunications Act 1997* (the Act). This Act regulates the service provision to consumers by telecommunications carriers. Under Schedule 3A of the Act, and in accordance with the ACMA, deployment of submarine cables requires an EA to be undertaken and that all required approvals/notifications for the project are obtained.

Schedule 3A to the Act regulates the installation of submarine cables that are to be connected within Australia. Carriers, who intend to install submarine cables in certain Australian waters, must apply for a permit to do so from the ACMA.

As existing infrastructure is to be used for connecting the cable landing into BMHs at both Perth and Sydney, assessment and permitting for BMHs are not required for this project.

3.2.2 Environment Protection and Biodiversity Conservation Act 1999

This EA falls under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) administered by the Commonwealth DoEE.

This legislation protects matters of National Environmental Significance (Protected Matters) (MNES), inclusive of Commonwealth marine areas and Commonwealth listed threatened and migratory species (including matters within State jurisdictions). The EPBC Act also covers matters under the *Native Title Act 1993* and *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

This EA forms part of the EPBC Act Referral approval process.

3.2.3 Historic Shipwrecks Act 1976

Maritime archaeology of cultural significance is protected under the *Commonwealth Historic Shipwrecks Act 1976*. This Act is administered by the DoEE, and protects historic wrecks and relics in Commonwealth waters, extending from below mean low water mark (MLWM) to the edge of the continental shelf. Each of the States and the Northern Territory have complementary legislation (WA *Maritime Archaeology Act 1973;* NSW *Heritage Act 1977;* Tasmanian *Historic Cultural Heritage Act 1995*).

Under Section 13 of the Act it is an offence to damage, interfere, remove or destroy any historic shipwreck or associated artefacts. A permit, with conditions, may be issued under special circumstances for activities which would otherwise be prohibited under Section 13. However, it is proposed that the cable route would avoid all shipwrecks. Accordingly, the need for a permit under the *Historic Shipwreck Act 1976* is not anticipated.

3.2.4 Australian Heritage Council – Register of the National Estate

Under the *Telecommunications Act 1997* ACMA must, when determining the potential impact of the proposed installation of the submarine cable, have regard to whether the facility is to be installed "at" or "near" an area included in the Register of the National Estate (within the meaning of the *Australian Heritage Council Act 2003*).

As a part of this EA a review of the Register was undertaken to identify if the proposed works may be sufficiently "at" or "near" any listed heritage area. However, due to the actual location of the cable route and the proposed cable placement methods in the nearshore zone, it is considered unlikely that the proposed works will adversely impact any National Estate areas, if any are found to be "at" or "near" the proposed works. However, the environmental implications (if any) of the proposed works on any National Estate areas are assessed in this EA.

3.2.5 Department of Defence

It is a requirement under the *Defence Force Regulations 1952* that prior to accessing military training areas for cable installation and maintenance activities, vessel operators have an obligation to contact the Department of Defence. No specific training zones have been identified to conflict with the proposed route. To provide information for this EA, the Department of Defence (Defence) was consulted regarding the project. The cable will cross through the Eastern Australian Exercise Area (EAXA), in which weapons are fired and may come to rest on the seabed in close proximity to the cable. Defence have advised that given this the project is to conduct all activities at its own risk. Further communications and recommendations from Defence are detailed in Appendix C.

3.3 NSW State Legislation, Department and Bodies

3.3.1 NSW *Coastal Protection Act 1979*

The NSW *Coastal Protection Act 1979* makes provisions relating to the use and occupation of the coastal region of NSW (i.e. out to 3 nm) in order to preserve and protect these areas whilst encouraging sustainable use of the areas. This is a State Act administered by the Office of Environment and Heritage (OEH).

Under this Act, the proposed cable installation is deemed exempt development in coastal waters, which has been formally agreed with OEH, meaning no further approvals are required. Please refer to Appendix C for a full breakdown of the relevant subclauses.

3.3.2 NSW State Environmental Planning Policy Infrastructure 2007

Telecommunication facilities are covered under the NSW State Environmental Planning Policy (SEPP) Infrastructure 2007; it is understood that no development applications are required by the State. SEPPs are administered by the NSW Department of Planning and Environment under the Environmental Planning and Assessment (EP&A) Act and are intended to facilitate streamlining of planning and permitting processes.

The SEPP defines all of the installations (cable within coastal waters, the cable from POP to coastal zone) as Exempt Development, i.e. no further State approvals are required. Please refer to Appendix C for a full breakdown of the relevant subclauses.

3.4 Western Australian State Legislation, Department and Bodies

3.4.1 *Environmental Protection Act 1986*

The Environment Protection Authority (EPA), as part of the Department of Water and Environmental Regulation (DWER), has statutory obligations under the *Environmental Protection Act 1986* to regulate environmental impact assessments, initiate measures to protect the environment from environmental harm and pollution and to provide advice to the Minister on environmental matters generally.

The DWER's key role is to advise on and implement strategies for a healthy environment for the benefit of all current and future Western Australians. DWER achieve this by efficiently, effectively and objectively delivering:

- Service 1. Environmental Regulation – by performing environmental regulation functions of approvals, monitoring, compliance and enforcement; and
- Service 2. Environmental Sustainability and Climate Change - by advising on and implementing Government's environmental policies and programs.

In the event that native vegetation (including aquatic vegetation) would be cleared as part of the proposed works, a clearing permit would be required. As the project is wholly marine this is not expected. The EPA section are, however, still assessing the project. Any required permits/actions will be resolved or attained prior to installation activities.

3.4.2 Heritage of Western Australia Act 1990

The Heritage Council of WA manages the State Register of Heritage Plucent

laces and administers the *Heritage of Western Australia Act 1990.* The Heritage Council is part of the Department of Planning, Lands and Heritage.

3.4.3 Aboriginal Heritage Act 1972

The *Aboriginal Heritage Act 1972* was introduced in WA to protect Aboriginal heritage. The Department of Planning, Lands and Heritage maintains a Register of Aboriginal Sites as a record of places and objects of significance to which the Act applies. The Minister for Indigenous Affairs is responsible for the administration of the Act.

3.4.4 Land Administration Act 1997

An approval for the installation of a submarine cable for the land below high water mark to the State's 3 nm limit may be required under the *Land Administration Act 1997.* Furthermore, the Department of Planning, Lands and Heritage may be a determining authority as land owner under the *Land Administration Act 1997.* In addition, the proponent may need to establish a tenure arrangement and licence agreement for the occupation of any Crown land under the *Land Administration Act 1997*. This is still under determination.

3.4.5 Department of Primary Industries and Regional Development

The Department of Fisheries (now part of the Department of Primary Industries and Regional Development) primary responsibility is to conserve, develop and manage the fish and aquatic resources of WA to ensure there are 'fish for the future'. The Department of Fisheries assists the Minister for Fisheries in the administration of legislation under five Western Australian State Acts of Parliament:

- *Fish Resources Management Act 1994*;

- *Pearling Act 1990*;
- *Fisheries Adjustment Schemes Act 1987*;
- *Fishing and Related Industries Compensation (Marine Reserves) Act 1997*; and
- *Fishing Industry Promotion Training and Management Levy Act 1994*.

3.4.6 Department of Mines, Industry, Regulation and Safety

The Department of Mines, Industry, Regulation and Safety assesses mineral and petroleum exploration and development applications made within WA. In addition, the Department assesses and audits petroleum activities in Commonwealth areas offshore from WA.

3.4.7 Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions protects and conserves the State's natural environment on behalf of the people of WA under the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*.

Its key responsibilities include conserving biodiversity and managing the State's national parks, marine parks and other reserves, which cover a total area of more than 27 million hectares. WA has 100 national parks and 13 marine parks with a diverse array of landscapes and seascapes, from coral reefs and tall forests to deep gorges and open plains of wildflowers. The department is also responsible for fire preparedness and pest animal and weed control over 89 million hectares of unallocated Crown land and unmanaged reserves.

3.4.8 RecFishWest

RecFishWest is the recognised peak recreational fishing body in WA and is involved in the process whenever decisions which affect the fisheries industries, or access to the fishing grounds, are being made.

3.4.9 Western Australian Fishing Industry Council (WAFIC)

The WAFIC is the peak industry body representing the commercial fishing, pearling and aquaculture industries.

3.4.10 Port of Fremantle

The project will continue to engage with the Port of Fremantle as the project evolves, in particular prior to the construction phases of cable lay/installation. In addition, the project will ensure that the Port of Fremantle receives the relevant charts once the cable has been installed.

3.5 Tasmanian State Legislation, Department and Bodies

Liaison with Crown Land Services (CLS) of Tasmania Parks and Wildlife Services, confirms the State Waters surrounding Crocodile Rock are defined as Crown Land. The cable will traverse through these waters. This will require a Works Application to permit the cable installation, and a Licence Application for the use of the submerged Crown Land on which the cable will rest. Information developed under this EA will inform permit application and assessment.

3.6 Stakeholder Engagement

A complete list of State and Commonwealth regulatory stakeholders that have been consulted in regards to installation of the proposed cable is presented in Table 3-1. A brief description of

the relevance of the legislative trigger for consultation is also provided, whilst a detailed assessment of relevant issues is provided in Appendix C.

Engaging with relevant stakeholders is a key component of any large scale infrastructure project. The proposed cable is landing within the SSPZ and Perth PZ, and will be protected under the *Telecommunications Act 1997.* As such, the SEPP Infrastructure 2007 defines this type of project as Exempt Development and the list of relevant stakeholders for NSW becomes streamlined. Review of requirements for WA indicate they are aligned with those of NSW, although a broader range of stakeholders is required to be consulted with. Across both jurisdictions consultation with stakeholders is primarily restricted to notifications to align with the recommendations in the *Telecommunications Code of Practice 1997*.

Irrespective of jurisdictional requirements, a stakeholder engagement program across a range of agencies was still undertaken where any perceived conflicts (regarding offshore activities) with the cable may have arisen. This was completed to inform this EA and future permit applications. It is understood that the proponent will continue with the relevant engagement throughout the project life cycle – this is particularly important with regard to Fisheries during the cable installation. A summary of the consultations undertaken to date can be found below in Table 3-1.

Table 3-1 Stakeholder Engagement Summary

Location	Stakeholder	Responsibility	Nature of Contact	Outcome
NSW	Randwick City Council	Manager of potential BMH usage - Crown Reserves in Coogee	Letter/email /phone and future letter	Land Access Activity Notice to be submitted one month prior to installation activities.
	Office of Environment and Heritage NSW	Administrator of the Coastal Protection Act 1979	Letter/email /phone	Formal response received confirming that the installation activities are exempt from Ministerial concurrence.
	Department of Primary Industries (Fisheries)	Responsible for notification of local stakeholders	Letter/email /phone	Consultation appreciated, all relevant stakeholders were contacted, GHD advised to contact AFMA directly (see below). Recommended avoiding installation during peak fishing period (January). To be contacted two months prior to installation to allow for planning.
	Port of Sydney	Responsibility of Port Limits	Phone and future letter	No permits required, but would appreciate a notice one month prior to activities.
WA	Department of Primary Industries and Regional Development	Administer of fisheries Legislations governing the fisheries resources of the State	Letter/email /phone	Formal response stated no objections as long as biosecurity obligations are met and further consultation occurs with WAFIC and RecFishWest.
	Department of Biodiversity, Conservation and Attractions	Administers the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*.	Letter/email /phone	Formal response received stating no approval or permit required for installation activities.

Location	Stakeholder	Responsibility	Nature of Contact	Outcome
	Department of Water and Environmental Regulation	Administers the *Environmental Protection Act 1986*	Letter/email /phone	Project information was distributed widely within the Department, no concerns were raised within the Department of Water. The EPA section are still assessing the Project. Any required permits/actions will be resolved or attained prior to installation activities.
	Department of Planning, Lands and Heritage	Administers the *Land Administration Act 1997 and the Aboriginal Heritage Act 1972*	Letter/email /phone	Formal response received stating no approval or permit required for Heritage. Department of Planning have provided a formal response that it may require a Development Application and discussion with the Land Use Management Division. Any required permits/actions will be resolved or attained prior to installation activities.
	WA State Heritage Office	Administers the *Heritage of Western Australia Act 1990*	Letter/email /phone	No concerns were raised, consultation considered closed out.
	Port of Fremantle	Responsibility of Port Limits	Phone and future letter	No permits required, but would appreciate a notice one month prior to activities.
	Department of Mines, Industry, Regulation and Safety	Administers *Offshore Minerals Act 2003*	Phone	Department have checked the location of the cable against their database; no further contact required, they will advise if they need more information.
	RecFishWest	Peak recreational fishing body	Letter/email /phone	No concerns in regards to the project, consultation closed out.
	WAFIC	Peak commercial fishing body	Phone and future letter	No concerns in regards to the project, consultation closed out.
SA	Primary Industries & Regions	Administer of fisheries Legislations governing the fisheries resources of the State Various NSW Fishermen were informed by DPI Fisheries via a public consultation flyer.	Letter/email /phone/ consultation flyer	No permits required as not traversing State waters. Request further notice two months pre-installation to plan safe actions with stakeholders (e.g. fishers)
VIC	Fisheries Authority	Administer of fisheries Legislations governing the fisheries resources of the State Various NSW Fishermen were informed by DPI Fisheries via a public consultation flyer.	Letter/email /phone/ consultation flyer	Seafood Industry VIC and VR Fish were consulted as recommended by VFA. No further feedback received, consultation considered closed out.

Location	Stakeholder	Responsibility	Nature of Contact	Outcome
TAS	Department of Primary Industries, Parks, Water, and Environment	Administer fisheries Legislations governing the fisheries resources of the State Various NSW Fishermen were informed by DPI Fisheries via a public consultation flyer.	Letter/email /phone/ consultation flyer	No permits required. Request further notice two months pre-installation to plan safe actions with stakeholders (e.g. fishers).
	Crown Land Services, Parks Tasmania	Administer coastal waters and the seabed within 3 nautical miles of Tasmanian Crown Land.	Email/phone	The crossing of Crown Land near Crocodile Rock will require two applications: 1) **License Application** for the submerged Crown land/sea bed within Tasmanian waters (3 nautical miles from Crocodile Rock) 2) **Works Application** – detailing the work and clearly identifying the Crown land to be used. Submissions currently underway.
Common-wealth	Australian Fisheries Management Authority	Australian Government agency responsible for the efficient management and sustainable use of Commonwealth fish resources	Letter/email /phone/ consultation flyer	No concerns in regards to the project, but recommended consulting Commonwealth Fisheries Association and Seafood Industry Australia (refer below). Consultation closed out.
	Common-wealth Fisheries Association	Peak commercial fishing body	Letter/email /phone	Consultation closed out, no concerns in regards to the project.
	Seafood Industry Australia	Peak commercial fishing body	Letter/email /phone	Consultation closed out, no concerns in regards to the project.
	Australian Communi-cation and Media Authority	Administrator of the *Telecommunications Act 1997 (Commonwealth)*	Email/phone/meeting	Two applications (Perth PZ and SSPZ) to install a submarine cable in Australian waters to be submitted to ACMA.
	Department of Environment	Administrator of the *EPBC Act*	Email/phone/meeting	EPBC referral to be submitted to DoE for assessment under the EPBC Act.
	Department of Defence	Administrator of military training areas	Email/phone	An official notification shall be submitted a minimum of 14 days before activities begin. Additionally, AUSCOAST (or similar) are to be sent warnings, which are to be promulgated through AMSA prior to the commencement of activities.

4. Environmental Impact Assessment and Recommendations

The following tables summarise the detailed assessments of the known and likely environment where the cable is proposed to be installed (details provided in Appendix A, Appendix B, and Appendix C) and an ecological risk assessment (Appendix D) of the potential hazards relating to the cable installation.

Summaries include descriptions of the natural and physical resources, the qualities and characteristics of locations, places and areas, and the heritage value of places that may be affected by the proposed cable corridor through WA State and Commonwealth waters. The assessment considers the nearshore and offshore habitats traversed by the cable route from Perth to the exit of the Australian EEZ, and the portion of the route from the EEZ re-entrance point to Sydney.

Activities associated with the cable- related installation have been assessed to identify potential impacts on the biological environment, and the level of risk associated with that potential impact. The assessment was used to determine the type of available management controls that may be implemented. Those measures are noted against potential risks in following tables.

4.1 Physical Environment

The following tables (Table 4-1 to Table 4-9) consider the potential impacts that installation and maintenance of the cable may have on the existing physical environment, management controls to minimise these potential impacts, and the predicted outcomes. The potential impacts of the cable on the physical environment are expected to be negligible, except where noted below.

Table 4-1 Bathymetry

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
WD variance can lead to constraints during the placement and maintenance of a cable. Thus, work methods need to be adapted to the local depth.	Offshore of the POPs off Perth and Sydney, the cable would be laid and buried using a range of techniques (surface lay, plough, jetting, diver assisted where required).	The bathymetry along the cable route is not expected to be affected by the placement and maintenance of the cable due to its small footprint and size.

Table 4-2 Seabed Conditions

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
The entire cable route will encounter a range of sediment types and features; this may lead to some localised re-routing during installation or use of alternate (than planned) installation techniques.	Marine route survey and subsequent cable engineering and installation methods are used to minimise issues relating to the sediment types and features.	The proposed cable route has been informed by detailed survey and selected to avoid hard ground as best as possible. Cable type and installation method has been selected according to expected substrates.
See above.	Where hard ground is encountered, the armour of the cable will be increased and additional slack will be deployed to minimise risks of cable strum (vibration). The depth of the soft seabed material over firmer strata will be confirmed following analysis of geotechnical samples taken during the marine survey. This will assist with refining the proposed construction methodology, particularly with regard to burial depth options.	At this stage, slack is allocated according to the contours of the seabed. Although strong currents during storm events may have the potential to affect the seabed morphology, this is generally expected to only be minimal beyond the depth of closure off Perth and Sydney.

Table 4-3 Water Level Variation

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
Storms and sea state conditions have the potential to affect installation of cables.	The cable laying action will monitor weather patterns and storm events in order to minimise the potential impact on the cable installation. Cable ship can operate in most sea conditions. Should a cyclone be imminent cable laying will cease; cable end on sea floor will be weighted and marked such that the vessel can move to safe waters. It will reconnect with the exposed cable end when safe to do so.	The proposed cable installation is not expected to affect this element of the physical environment. Controls are expected to manage risk of potential impacts.
Near Coogee and Floreat beaches, tidal variations are small compared to the depth changes in nearshore waters. Tidal variations are gradual and not expected to put cable tension under stress.	The proposed nearshore installation includes the use of an existing conduit. The water level variation is expected to have little impact on the cable or cable operations. Vessel draft will be considered with regard to tidal movements to avoid seabed impacts/grounding risk. Alternative installation methods will be considered if water levels are insufficient for safe vessel operation.	The proposed cable installation is not expected to affect this element of the physical environment. Controls are expected to manage risk of potential impacts.

Table 4-4 Wave Climate

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
The NSW coast is subject to a moderate wave climate predominantly from the south to south-east with an average offshore significant wave height of about 1.5 m.	Nearshore waves should not affect the cable as the cable would only emerge near the seabed in about 30 m WD. At this depth, the effect of wave driven currents under ambient conditions is minimal. Generally, wave heights and periods should not pose a problem during installation; the dominant risk to the inshore area is large swells during storm events. It is preferable that the cable work be undertaken in periods of stable weather.	The placement and maintenance of the cable is not expected to be affected by the wave climate offshore and along the coast of Sydney. Further, the small footprint and depth of deployment of the cable is not significant enough to affect wave processes and wave propagation.
The WA coast is subject to a moderate wave climate typically from the south to south-west with an average offshore significant wave height	Nearshore waves should not affect the cable as the cable would only emerge near the seabed in about 10 m WD. At this depth, the effect of wave driven currents under ambient conditions is minimal,	The placement and maintenance of the cable is not expected to be affected by the wave climate offshore and along the coast of Perth. Further, the small footprint and depth of deployment of the

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
of about 2.2 m. The inshore cable route is somewhat sheltered by Rottnest Island.	although of greater effect than Sydney due to the relatively shallow depth. Generally, wave heights and periods should not pose a problem during installation; the dominant risk to the inshore area is large swells during storm events. It is preferable that the cable work be undertaken in periods of stable weather.	cable is not significant enough to affect wave processes and wave propagation.
Under extreme storm wave events, large waves will create strong currents near the seabed, especially in the nearshore area, which have the potential to mobilise sediment.	It is understood that the installation measures proposed will prevent any potential movement of the cable under extreme wave conditions in the nearshore. Measures to protect the cable from bed shear stress in nearshore environs will include burial in soft sediments.	See above.
The cable route through the Southern Ocean, including through the Bass Strait, is subject to large south-westerly swells.	It is recommended works be undertaken during summer with careful planning based on available weather forecasts in order to avoid potential storm events	See above.
Waves may affect cable placement and maintenance activities.	Cable laying vessels are engineered to operate under most sea conditions, including storm conditions. Cyclones or other severe events would be the exception. As such, significant periods of suitable sea conditions are expected to coincide with the planned installation for the work to be safely carried out. It is preferable that the cable work be undertaken during summer or spring (NSW), or summer or autumn (WA, Southern Ocean) to avoid potential severe storm events. Planning of the action has taken this into consideration.	See above.

Table 4-5 Winds

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
Strong winds may occur during storm events. Such winds can affect cable placement and maintenance activities and there is potential that periods of gale force wind conditions may prevent the placement or maintenance of the cable.	This would be an infrequent and unlikely occurrence given vessels are engineered to operate in significant sea conditions. Schedule planning around suitable weather conditions will be used to manage this risk.	The placement and maintenance of the cable is not expected to be affected by local wind patterns.

Table 4-6 Currents

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
Wind-induced and tidal currents in the study area are relatively small and construction mitigation measures will be considered in order to limit potential cable movement and cable suspension/tension in areas of irregular terrains.	Nearshore currents should not affect the cable as it would emerge onto the seabed from the POP at about 30 m (Sydney) and 10 m (Perth). Given the relatively shallow depth off Perth, installation will be planned for periods of ambient weather conditions.	The placement and maintenance of the cable is not expected to be affected by the current patterns inshore as cable will pass through the POP conduit. It will then be buried to mitigate risk of currents influencing cable placement/movement. The cable footprint offshore is small and not anticipated to be significant enough to affect current processes.
Large-scale currents including the Leeuwin Current and currents within the Bass Strait should pose little to no risk to the cable installation and laid cable, as any currents over 0.5 m/s that occur in this area are short lived and infrequent. The East Australian Current poses a higher (yet still manageable) risk due to higher current speeds and localised eddies that can be generated near the coast.	Cable alignment, use of armouring, need for burial has been determined for the project to manage risk of cable displacement/disturbance post installation. Where the cable is laid directly on the seabed bed shear stresses and large scale currents are rare and not considered likely to affect the cable.	See above.
There is potential that strong currents could cause the cable to become suspended on features above the seabed during placement.	To minimise this risk, a marine survey along the proposed route has been undertaken to establish the existence of any features that could possibly lead to suspension of the cable above the seabed. These areas are to be avoided where possible; alignment has been selected to minimise installation risk. Additional armouring to support direct installation (tension/weight) of the cable on	See above.

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
	the prescribed alignment will be applied where required.	

Table 4-7 Sediment Mobility during Storms

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
Erosion of beach profile off Sydney due to cable installation causing undermining during storms.	The POP will be located beyond the depth where storm erosion is significant.	No impact expected.
Erosion of beach profile off Perth due to cable installation causing undermining during storms.	The POP will be located within the zone where storm erosion can affect the bed level. Installation should be undertaken at a time of ambient conditions. Burial will mitigate this risk. It is not expected that the cable will be exposed beyond the POP.	No impact expected.

Table 4-8 Noise

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
Noise pollution due to cable installation activities.	The activities associated with the placement of the cable offshore will generate airborne noise consistent with (or less than) standard shipping noise. This should not cause an unacceptable noise impact on the nearest residents given the POP is approximately 1 km offshore of Perth and 2 km offshore of Sydney.	It is good practice to notify local residents of construction works as part of the general notification procedures to stakeholders and should be undertaken by installation contractor when works dates are known. No impact is expected.

Table 4-9 Natural Hazards

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
There is a very small likelihood of a significant tsunami occurring on the NSW or WA coastlines. This could affect cable installation, including vessel safety. (Potential of erosion or cable movement is addressed above.)	Review available warning systems, including the Bureau of Meteorology. Do not commence installation activities if weather risks imminent. Cease installation any activities underway and move vessel to safety. (Mark dropped cable for recollection later.)	Marine warnings will be monitored and marine safety guidelines will be adhered to.

Physical Environment Element	Available Management Controls	Predicted Environmental Outcome
There is a small likelihood of a significant cyclone affecting the NSW or WA coastlines. This could affect cable installation, including vessel safety. (Potential of erosion or cable movement is addressed above.)	Review available warning systems, including the Bureau of Meteorology. Do not commence installation activities if weather risks imminent. Cease installation any activities underway and move vessel to safety. (Mark dropped cable for recollection later.)	Marine warnings will be monitored and marine safety guidelines will be adhered to.
Geological features: Earthquakes and faults.	The cable route has been developed to avoid any known significant natural geological hazards. These are, therefore, not expected to affect the cable.	Should an earthquake at distance from the cable occur during installation this would carry tsunami or severe storm disturbance. Marine warnings will be monitored and marine safety guidelines will be adhered to.

4.2 Marine Ecology

Table 4-10 Nearshore Shallow Water Benthic Habitat (Mainland EEZ)

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
Shallow water benthic habitat within the PZ, to the POPs (<10 m WD at Perth, <30 m WD at Sydney)	Rocky reef Macroalgal beds	Potential impacts to shallow benthic habitats include disturbance from an unplanned translocation of an invasive pest species.	Impacts to ecologically sensitive areas in shallow waters will be avoided, as HDD will not be required due to use of an existing conduit. Adherence to Australian Quarantine and Inspection Service (AQIS) guidelines on quarantine and ballast water exchange. Adherence to International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008) and follow the "National Biofouling Management Guidance for Non-Trading Vessels".	Any potential disturbance to nearshore benthic habitat is expected to be localised and minor with the prescribed management measures in place.
Nearshore water benthic habitat along cable route within the PZ and out to depth of burial (up to 200 m WD)	Rocky reef Macroalgal beds Largely soft sandy sediments and associated infauna and epibenthos	Physical disturbance from ploughing activities for cable burial. Physical disturbance from water jetting activities for cable burial. Physical disturbance from an unplanned dropped object to the sea floor. Disturbance from an unplanned translocation of an invasive pest species.	Cable burial activities to be restricted to the cable route. Sea-fastening of vessel objects. Appropriate on-board lifting techniques. Appropriate maintenance to vessel and machinery. Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from Ships) Act 1983, International Convention of the SOLAS 1974 and the Navigation Act 2012. Adherence to AQIS guidelines on quarantine and ballast water exchange. Adherence to International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008).	Any potential disturbance to nearshore benthic habitat is expected to be localised, restricted to the ploughing or water jetting period and minor with the prescribed management measures in place. Recovery of disturbed habitat will be over a short duration with recruitment from nearby habitat.
Shallow water benthic habitats in the region and adjacent shorelines	Rocky reefs Macroalgal communities Soft sediments and associated infauna and epibenthos	Potential impacts from the activities to shallow water benthic habitats and adjacent shorelines in the region include:	Sea-fastening of vessel objects. Appropriate on-board lifting techniques. Appropriate maintenance to vessel and machinery. Valid and current SOPEP and SMPEP. Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from	Cable installation activities are not expected to release pollutants that impact on nearshore habitats in the region with the

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
	Coral reefs Seagrass beds	Chemical and physical impacts through unplanned release of hydrocarbons, environmentally hazardous chemicals, wastes/pollutants or objects dropped into the marine environment.	Ships) Act 1983, International Convention of the SOLAS 1974 and the Navigation Act 2012. Adherence to navigational safety requirements, including use of lighting for night operations, to manage risk of collision or accidental spills. Notification to Australian Government agencies (AHO, AMSA).	prescribed management measures in place.

Table 4-11 Offshore Deep Water Benthic Habitat (Perth EEZ and Sydney EEZ)

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
Deep water benthic habitat along cable route (WD >200 m)	Largely soft sandy sediments and associated infauna and epibenthos Key Ecological Features (Ancient coastline at 90-120 m depth, Commonwealth marine environment within and adjacent to the west coast inshore lagoons, Perth Canyon and adjacent shelf break, and other west coast canyons, demersal slope and associated fish communities, western rock lobster habitat, west Tasmanian canyons, canyons on the	Potential impacts to deep water benthic habitats include: Physical disturbance from ploughing and water jet burial Physical disturbance from direct cable. placement on seabed Physical disturbance from an unplanned dropped object to the sea floor. Unplanned translocation of an invasive pest species.	Ecologically sensitive areas will be identified through the site survey and avoided if possible. Cable burial and laying activities to be restricted to the cable route. Sea-fastening of vessel objects. Appropriate on-board lifting techniques. Appropriate maintenance to vessel and machinery. Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from Ships) Act 1983, International Convention of the SOLAS 1974 and the Navigation Act 2012. Adherence AQIS guidelines on quarantine and ballast water exchange. Adherence to International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008) and follow the “National Biofouling Management Guidance for Non-Trading Vessels”.	Any potential disturbance to offshore deep water benthic habitat is expected to be localised, with recovery of disturbed habitat occurring over a short duration with recruitment from nearby habitat.

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
	eastern continental slope) Cable passes through the Beagle marine park, and proposed Commonwealth Marine Reserves: Perth Canyon Marine Park, South West Corner Marine Park			
Deep water benthic habitats in the region	Largely soft sandy sediments and associated infauna and epibenthos Proposed Commonwealth Marine Reserves: Apollo marine park, East Gippsland marine park, Two Rocks marine park	Potential impacts to deep water benthic habitats in the region include: Chemical and physical impacts through unplanned release of hydrocarbons, environmentally hazardous chemicals, wastes/pollutants or objects dropped into the marine environment. Unplanned translocation of an invasive pest species.	Appropriate maintenance to vessel and machinery. Valid and current SOPEP and SMPEP Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from Ships) Act 1983, International Convention of the SOLAS 1974 and the Navigation Act 2012. Adherence to navigational safety requirements, including use of lighting for night operations, to manage risk of collision or accidental spills. Notification to Australian Government agencies (AHO, AMSA).	Cable installation activities are not expected to release pollutants that impact any regional deep water habitats with the prescribed management measures in place.

Table 4-12 Terrestrial and Marine Fauna

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
Terrestrial fauna	Mammals Birds	Land work is not required, however there is a potential for migratory species (birds) to occur in, or fly over the corridor as transient visitors. Potential impacts from the activities to birds could include behavioural displacement impacts from cable-related activities, e.g. light, noise or vibrations.	Vessels and other construction equipment are maintained in accordance with manufacturer specifications. Light spill is minimised through use of directional lighting where safety permits. Waste controls are in place to avoid attracting pest species that could affect native fauna.	Impacts to terrestrial fauna are not expected to occur with the prescribed management measures in place.
Marine fauna	Marine mammals Marine reptiles Marine birds Fish	Potential impacts from the cable activities to marine fauna include: Physiological and or behavioural displacement impacts from light, noise or vibration related impacts. Chemical and physical impacts to fauna through an unplanned release of hydrocarbons, environmentally hazardous chemicals, wastes or other pollutants to the marine environment. Physiological and or behavioural impacts from vessel interaction or from interaction with cable during installation (e.g. entanglement).	Ecologically sensitive areas will be identified through the site survey and avoided if possible. Sea-fastening of vessel objects. Appropriate on-board lifting techniques. Appropriate maintenance to vessel and machinery. Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from Ships) Act 1983, International Convention of the SOLAS 1974 and the Navigation Act 2012. Adherence to AQIS guidelines on quarantine and ballast water exchange. Adherence to International Convention on the Control of Harmful Antifouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008) and follow the “National Biofouling Management Guidance for Non-Trading Vessels”. Use of directional lighting and light shields. Vessel deck lighting switched off unless required under navigation or safety standards (AMSA Marine Orders).	Impacts to marine fauna are expected to be minimal and relate principally to installation activities. If any occur, they are expected to be temporary in nature relating to displacement from habitat. Any temporary impacts are expected to revert following cessation of activity. Cable installation moves through the landscape and will, therefore, be of short duration in any one location. With the prescribed management measures in place permanent or significant impacts to

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
		Physiological impacts from unplanned introduction of invasive pest or disease.	Activities that generate underwater noise (ploughing, jetting) could be timed to pose the least threat to migratory mammals. Installation activities to avoid migratory windows as far as practical to avoid vessel/cable interactions. Operations of vessels will be commensurate with Part 8 of the EPBC Regulations (Interacting with Cetaceans and Whale Watching). The interaction of all vessels with cetaceans, pinnipeds and whale sharks will be consistent with Part 8 of the EPBC Regulations (2000). The Australian Guidelines for Whale and Dolphin Watching (Commonwealth of Australia, 2017) for sea-faring activities will be implemented across the entire project. This includes the implementation of the following guidelines: Caution zone (300 m either side of whales and 150 m either side of dolphins) – vessels must operate at no wake speed in this zone. Caution zone must not be entered when calf (whale or dolphin) is present No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod, or follow directly behind If there is a need to stop, reduce speed gradually. Do not encourage bow riding.	marine fauna are not expected.

Table 4-13 Biological/Natural Impacts on Marine Cables

Biological Element	Existing Environment Summary	Biological Risk Assessment Summary	Available Management Controls	Predicted Environmental Outcome with Controls
Marine fauna	Not applicable	Marine fauna have been recorded, in rare instances, damaging submarine cables and other oceanographic equipment through biting (Edbert, 2003). This would invoke need for cable repair. Biological induced corrosion (biofouling) has a possibility of occurring on the installed cable. This could damage the cable (unexpected) or encourage other actions (e.g. fish attraction bringing fishing behaviours) that may damage the cable evoking need for repair. In the event that cable repair activities are to be undertaken, such activities would directly impact on the existing habitat established on and adjacent to the cable. Impacts would be consistent with those described for cable installation.	Any exposed area of cable is susceptible to marine organism biofouling, as such burying of the cable in shallower water to minimise risk of epiphytic growth and armouring of the cable in deeper waters is recommended. Occurrences of cable damage from marine fauna in deeper waters has been recorded in the slopes of continental shelves, as such, avoiding areas of steep elevation changes, as well as burying and armouring the cable in relevant habitats is recommended. Unplanned cable recovery activities to be undertaken with minimum impact. Selection of grapnel sizes is to be based on smallest available to achieve required outcome.	Localised impact to established habitat on and adjacent to cable, in the event of cable maintenance/retrieval/repair of any cable section. Recovery of disturbed seabed habitat area expected over short time duration via recruitment from adjacent habitats.

5. Key Recommendations

The environmental impact assessment undertaken herein for the Indigo Central Cable has identified the following key environmental management measures for the proposed works. In implementing these measures, the proposed project is unlikely to have any significant environmental or social impact. Relevant supporting information, including detailed descriptions of the existing environment and impact assessment that have informed this assessment, are appended to this document.

Table 5-1 Key Recommendations

Key Recommendations
It is recommended that the cable work be undertaken with careful planning based on available weather forecast as well as cetacean migration periods where possible (refer Appendix B).
Close to the shoreline, as good practice, it is recommended that the residents are notified of construction works as part of the general notification procedures to stakeholders.
Use of directional lighting and light shields should be implemented where safe to do so (refer Appendix D for lighting impact assessment). Lighting management will, however, need to adhere to navigation or safety standards (AMSA Marine Orders).
Ensure sea-fastening of vessel objects to avoid risk of unplanned disturbance to the seabed from dropped objects (refer Appendix D for assessment of potential impacts associated with dropped objects).
Ensure appropriate on-board lifting techniques to avoid risk of unplanned disturbance to the seabed from dropped objects.
Ensure appropriate maintenance to vessel and machinery to avoid risk of unplanned release of contaminants or pollutants (including noise).
Ensure Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP) are current and valid (refer Appendix D for assessment of potential impacts associated with unplanned activities including oil spills)
Adherence to MARPOL, Marine Orders and Protection of the Sea (Prevention of Pollution from Ships) Act 1983, International Convention of the Safety of Life at Sea (SOLAS) 1974 and the Navigation Act 2012.
Ensure the contractor has environmental management practices in place which meets the recommendations of this EA.
Adhere to AQIS guidelines on quarantine and ballast water exchange to avoid accidental introduction of marine pest species (refer Appendix D for assessment of potential impacts relating to invasive marine pests).
Adhere to International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (IMO, 2001; ratified on 17 September 2008) and follow the “National Biofouling Management Guidance for Non-Trading Vessels”.
Interaction of all vessels with cetaceans, pinnipeds and whale sharks will be consistent with Part 8 of the Environment Protection and Biodiversity Conservation (EPBC) Regulations (2000) (refer to Appendix B for a description of megafauna likely to occur in the cable corridor, and Appendix D for assessment of potential impacts to these fauna).

Key Recommendations
The Australian Guidelines for Whale and Dolphin Watching (Commonwealth of Australia, 2017) for sea-faring activities will be implemented across the entire project.
Any exposed area of the cable is susceptible to marine organism biofouling. As such, burying and armouring the cable are recommended where possible in shallow waters where biofouling is common.
Crossing notifications or crossing agreements should be with known cable and/or pipeline crossing parties; out of service status will be confirmed for crossing of any such cables.
Ensure vessel operators notify Department of Defence and Australian Hydrographic Service before entering military training areas.

Appendices

Appendix A – Physical Environment

Appendix B – Marine Ecology

Appendix C – Other Existing Environmental Considerations

Appendix D – Environmental Risk Assessment

Appendix E – PMST Reports

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