Title of Proposal - INDIGO Central Submarine Telecommunications Cable

Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

1.1 Project Industry Type

Telecommunications

1.2 Provide a detailed description of the proposed action, including all proposed activities.

Project Overview
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. The fibre optic submarine cable is intended (once installed) to provide high speed domestic internet connectivity and reliability.
The cable will traverse from an existing submarine cable pop out point (POP) in an existing submarine cable protection zone (PZ) through State waters of Western Australia into Australian waters. It will exit Australian waters off south-western Australia and enter International waters. It will travel through International waters to the far south of the Australian coastline before it re-enters Australian waters off South Australia. The cable will then travel through Australian waters, briefly traversing Tasmanian State waters before heading north and into State waters of New South Wales to connect into an existing POP within the Southern Sydney PZ (SSPZ). The cable route has a maximum width of 10 m, with the area of actual seabed disturbance comprising a smaller portion of this area. Seabed survey and geomorphic testing has informed selection and optimisation of the cable route and methods of installation for least environmental impact.
The scope of works for this referral addresses the installation and operation of the cable from:
— The existing cable conduit infrastructure at the Perth PZ POP to the edge of the Exclusive Economic Zone (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.
— The entire project inclusive of international water crossing is referred to as the “Indigo Central cable”.
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 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. Further information regarding cable types can be found in the attached Environmental Assessment (EA) which has informed this referral (specifically section 2.2).

Cable Installation Method

Cable protection at landfalls

The Perth landing of the Indigo Central cable is located at the eastern limit of a restricted zone allocated as the Perth PZ. The Sydney landing is located at the western limit of a restricted zone allocated as the SSPZ. These zones are provided by the Australian Communications and Media Authority (ACMA). Activities within the zones are restricted to offer protection to submarine cables. In both locations the cable will connect into existing POP and BMH infrastructure.

Burial

To support protection of the cable in shallow waters it will be buried (target depth 1.0 m). This is proposed in all areas with a water depth (WD) less than 1000 m, including within the Perth PZ, SSPZ and Bass Strait.

Burial by ploughing 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 ship through a large plough being towed by the same ship. The plough pushes aside sand and lays the cable in the void. Displaced sediments fall back in on top of the cable effecting burial. In Perth this approach will be adopted from 3 km offshore in approximately 15 m water depth given draught limitations of the cable ship, and continue to the 1,000 m contour. In Sydney direct burial by the cable ship will be feasible from the POP as it is in 30 m WD. Ploughing operations will be conducted at an average vessel speed of 0.5 knots.

If within 500 m of in-service cables or pipelines, or in shallow waters affecting vessel draft, 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.

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 of more than 1,000 m WD offshore of landing connections. Surface cable laying will be conducted at an average vessel speed of 4 knots.

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, repair and replacement of the cable

back to the seabed

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 protection zones and burial provide increased level of protections from contact damage risk within shallow water environments.

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 the route must take may effect rate of placement. At this stage, it is expected the works will take four months to complete.

Installation schedule

The cable installation is tentatively scheduled for August 2018; however, timing is dependent upon weather and receipt of permits.

1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.

Area	Point	Latitude	Longitude
Indigo Central	1	-33.811950674731	151.15722067616
Indigo Central	2	-34.307078907992	151.71972282193
Indigo Central	3	-34.799304760949	152.10643835328
Indigo Central	4	-35.374653343702	152.00096853039
Indigo Central	5	-36.116515032636	151.93065710328
Indigo Central	6	-36.823294976866	151.43847174904
Indigo Central	7	-37.411990954959	151.19237907193
Indigo Central	8	-38.217406272727	150.73534674904
Indigo Central	9	-38.520601810708	150.06737478039
Indigo Central	10	-38.904652939383	149.18846853039
Indigo Central	11	-39.177708629588	147.53612585328
Indigo Central	12	-39.422553952821	146.48143835328
Indigo Central	13	-39.531098134954	145.18065817616
Indigo Central	14	-39.422553952821	143.52831549904
Indigo Central	15	-39.123178605597	141.38378210328
Indigo Central	16	-38.630542999412	138.32518942616
Indigo Central	17	-38.5481039299	136.95409513972
Indigo Central	18	-38.217406272727	133.82519103549
Indigo Central	19	-38.051488891056	131.99706442616
Indigo Central	20	-37.662889106559	130.45018888972
Indigo Central	21	-37.384064138487	128.23534674905
Indigo Central	22	-37.300212735694	125.56347228549
Indigo Central	23	-37.244261225465	122.89159648083
Indigo Central	24	-36.991958895589	120.36034621261

Area	Point	Latitude	Longitude
Indigo Central	25	-36.823294976866	117.51269049905
Indigo Central	26	-36.597826008027	114.62987773083
Indigo Central	27	-35.403315843797	113.61034594439
Indigo Central	28	-33.957877006183	113.75097148083
Indigo Central	29	-33.548652608966	113.61034594439
Indigo Central	30	-32.428125730578	113.96190844439
Indigo Central	31	-32.10112312634	114.13768969439
Indigo Central	32	-32.011734748297	114.77050326727
Indigo Central	33	-31.952095523589	115.43847121261
Indigo Central	34	-31.8924175549	115.71972094439
Indigo Central	35	-31.922259103202	115.82519076727
Indigo Central	36	-33.811950674731	151.15722067616

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).

The project is wholly marine. The cable will extend from an existing submarine POP within the Perth PZ at around 10 m water depth. It will pass around Cape Leeuwin at the south-west of Australia, before heading in a south-easterly direction. The cable then leaves the EEZ approximately 430 km south of Esperance, in a water depth of 5708 m.

The cable re-enters the EEZ approximately 460 km south of Kangaroo Island, in a water depth of 5195 m. From there the cable traverses Bass Strait, and travels around Cape Howe at the south-east of Australia, before connecting to an existing POP within the SSPZ in a water depth of 30 m.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

Total cable length 5640 km. Disturbance up to 10 m of seabed along alignment. Disturbance footprint is up to a maximum of 57 km2

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title. Not applicable - the project is wholly in the marine environment

1.8 Primary Jurisdiction.

New South Wales

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

No

1.10 Is the proposed action subject to local government planning approval?

No

1.11 Provide an estimated start and estimated end date for the proposed action.

Start date 08/2018

End date 11/2018

1.12 Provide details of the context, planning framework and State and/or Local government requirements.

Introduction

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

-Commonwealth government agencies;

-NSW, WA, and TAS State Government agencies

-Local Government - Randwick City Council (RCC) (NSW).

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

Commonwealth Legislation and Bodies

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 facilities are to be used for this project, the low impact installation of a BMH (also described in Schedule 3A of the Act) are not required and hence not addressed in this assessment.

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 Department of Environment and Energy (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 Environmental Assessment forms part of the EPBC Act Referral approval process.

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 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.

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.

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, 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 the EA appended to this referral.

NSW State Legislation, Department and Bodies

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 the appended EA for a full breakdown of the relevant subclauses.

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 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 the appended EA for a full breakdown of the relevant subclauses.

Western Australian State Legislation, Department and Bodies

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.

The EPA is assessing the project. Any permits or actions which need to be obtained or resolved will be completed prior to commencement of cable installation works.

Heritage of Western Australia Act 1990

The Heritage Council of Western Australia manages the State Register of Heritage Places and administers the Heritage of Western Australia Act 1990. The Heritage Council is part of the Department of Planning, Lands and Heritage.

Aboriginal Heritage Act 1972

The Aboriginal Heritage Act 1972 was introduced in Western Australia 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.

Land Administration Act 1997

An approval for the installation of a submarine cable for the land below MWM 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 and will be resolved prior to any action commencing.

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 Western Australia 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.

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 Western Australia. In addition, the Department assesses and audits petroleum activities in Commonwealth areas offshore from Western Australia.

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.

RecFishWest

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

Western Australian Fishing Industry Council (WAFIC)

The Western Australian Fishing Industry Council WAFIC is the peak industry body representing the commercial fishing, pearling and aquaculture industries.

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.

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.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.

A complete list of State and Commonwealth regulatory stakeholders that have been consulted in regards to installation of the proposed cable is presented in attached Table 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 of the attached Environmental Assessment.

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 the attachedTable and Appendix C of Indigo Central EA Report.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.

The potential for impact assessment under both Commonwealth and state legislation has been discussed with the Department of the Environment and Energy and relevant state/local government agencies. The results of these discussions are provided Section 1.12 of this form. Based on the assessment completed to inform this referral, Environmental Impact Assessment under Commonwealth or State legislation is not considered to be required for this project.

To support this referral, and the application to ACMA to install the submarine cable, an EA was undertaken in December 2017 (GHD, 2017). Relevant sections of the EA have been appended to this referral to provide, where relevant, information in support of the referral assessment. A summary of the Environmental Assessment approach is provided following.

Environmental Assessment Approach

The approach for this assessment was developed based on the relevant policies and regulations in New South Wales (NSW), Tasmania (TAS) and Western Australia (WA), as well

as with reference to relevant Commonwealth legislation. The development intends to comply wholly with all relevant legislation.

This assessment 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.

Using the online Protected Matters Search Tool (PMST), a search of the EPBC Act Protected Matters Database was undertaken of the cable corridor, including a 10 km buffer area (hereafter referred to as the cable corridor). In order to undertake a thorough assessment of likelihood of occurrence, the output of the PMST has been supplemented by searches of other available databases, relevant publications by State and Commonwealth agencies (i.e. referral guidelines, recovery plans, impact guidelines), and a review of aerial imagery. A detailed description of the assessment methodology, results and impact assessment is provided in the attached EA report (GHD, 2017). A summary of the potential impacts on matters of national environmental significance (MNES) is provided in this EPBC Act referral.

The methods to be used during the project for cable placement that have the potential to harm the environment will be:

-Cable burial by ploughing or jetting up to 1000 m water depth

-Direct placement on the seabed

-Vessels will be required to support the project activities, including the connection of the cable with the POPs. The risks to the environment from these activities are:

-Disturbance of seabed within the path of cable laying

-Noise and lighting pollution from vessel platforms

-Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities

-Atmospheric emissions from activities and

-Interference with other users of the area affected by cable laying

Other impacts from unplanned events may also arise from the project activities. The risks to the environment from these activities are:

-Pest introduction and proliferation

-Accidental release of solid waste

-Impacts to the seabed from dropped objects

-Marine fauna collisions

-Hydrocarbon, chemicals and other liquid waste

-Damaged fuel tank associated with vessel collision and

-Seabed disturbance associated with cable maintenance activities (during operations)

1.15 Is this action part of a staged development (or a component of a larger project)?

No

1.16 Is the proposed action related to other actions or proposals in the region?

Yes

1.16.1 Identify the nature/scope and location of the related action (Including under the relevant legislation).

In support of determining an appropriate cable alignment and to inform potential environmental impacts a marine survey of the seabed environment between Perth and Sydney along an indicative alignment has been completed. That work was undertaken in accordance with EPBC decision 2017/7996. Data from that has informed determination of a preferred cable route and supported the EA.

Separate to the proposed action is the proposed Indigo West submarine telecommunication cable (Indigo West). Potential impacts from Indigo West are being assessed in parallel to Indigo Central by similar proponents. That project will also be referred in parallel to the DoEE for review. These projects are, however, independent of each other, as such we are seeking two independent Referrals.

Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?

No

2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
The cable route does not intersect any	Impacts may be realised as a result of planned

Species	Impact
Threatened Ecological Communities (TECs) within the Perth EEZ. The 10 km buffer used on the Protected Matters Search Tool (PMST) search does include the TEC Banksia Woodlands of the Swan Coastal Plain ecological community, however this project is entirely marine and there is no overlap with terrestrial ecosystems. Hence, no indirect or direct impacts are expected to occur. Fifty-five listed threatened species were identified by the Protected Matters search as matters having the potential to occur within the Perth EEZ cable corridor. A likelihood of occurrence assessment was conducted to determine the likelihood of these species, or habitat for these species, occurring within the cable corridor. This was undertaken for each species identified in the Protected Matters search. Exclusively terrestrial species (2 mammals, 3 birds, 8 plants) have been omitted from the further consideration. The species of relevance to assessment therefore included: — Six marine mammals — Four marine reptiles — Three sharks — 29 birds Of these only the following threatened species were considered likely to occur in the Perth EEZ cable corridor: — Four marine mammals: • Blue whale (Balaenoptera musculus) • Fin whale (Balaenoptera physalus) • Humpback whale (Megaptera novaeangliae) • Southern right whale (Eubalaena australis) — One shark: • Great white shark (Carcharodon carcharias) — Nine birds: • Antipodean albatross (Diomedea antipodensis) • Blue petrel (Halobaena caerulea) • Indian yellow-nosed albatross (Thalassarche carteri) • Northern giant petrel (Macronectes halli) • Northern royal albatross (Diomedea sanfordi) • Soft-plumaged petrel (Pterodroma mollis) • Southern giant-petrel, southern giant petrel (Macronectes giganteus) • Southern royal albatross (Diomedea epomophora) • White-capped albatross (Thalassarche cauta steadi) For these marine mammals, shark and birds, the likelihood of occurrence largely relates to known migration pathways overlapping with the cable corridor and/or neighbouring feeding grounds and	activities, or occur as a result of an unplanned event. The methods to be used during the project for cable placement which has the potential to harm the environment will be: • Burial by ploughing or jetting; and • Direct placement on the seabed. Vessels will be required to support the cable laying. The risks to the environment (including listed species) from these activities are: • Collision with marine fauna from vessel movements; • Disturbance of seabed within the path of cable laying; • Noise and lighting pollution from vessel platforms; • Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities; and • Release of emissions from activities. Potential impacts to listed species are considered in detail in the supporting documentation (refer Appendix D - Environmental Risk Assessments and Significant Impact Assessment tables). Management measures that will be implemented to reduce or eliminate the risks associated with the project are detailed in Appendix D, and Section 4 of this referral.

Species	Impact
biologically important areas (BIA's). The cable laying area is a narrow and moving area, therefore, the interactions with the project would be limited on a temporal basis. The majority of these species are transient. Risk of impacting these species has, however, been considered with regard to the significant impact criteria (refer Section 4 and 5). Further information regarding likelihood of occurrence assessment for each of the listed threatened species identified by the PMST is included in the supporting documentation (refer Appendix B - Marine Ecology).	
The cable route does not intersect any Threatened Ecological Communities (TECs) within the Sydney EEZ. Six TECs were identified within the Protected Matters search 10 km buffer area of the Sydney EEZ. These consist of: • Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion • Coastal Upland Swamps in the Sydney Basin Bioregion • Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion • Eastern Suburbs Banksia Scrub of the Sydney Region • Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion • Western Sydney Dry Rainforest and Moist Woodland on Shale All of these TEC's, with the exception of the Western Sydney Dry Rainforest, are listed as 'endangered' under the EPBC Act. The Western Sydney Dry Rainforest and Moist Woodland on Shale is listed as 'critically endangered'. The characteristics of each of these TECs was reviewed to inform this assessment. As this project is wholly marine it does not directly overlap with the five terrestrial TECs. The Posidonia australis seagrass meadows of the Manning-Hawesbury ecoregion are described as occuring in shallow subtidal coastal waters in areas protected from high wave energy and in water depth less than 10 m (Threatened Species Scientific Committee, 2015c). Mapping of the Posidonia australis or other seagrass meadows does not identify any communities within the cable corridor	Impacts may be realised as a result of planned activities, or occur as a result of an unplanned event. The methods to be used during the project for cable placement which has the potential to harm the environment will be: • Burial by ploughing or jetting; and • Direct placement on the seabed. Vessels will be required to support the cable laying. The risks to the environment (including the Posidonia australis TEC) from these activities are: • Disturbance of seabed within the path of cable laying; • Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities; and • Release of emissions from activities. Potential impacts are considered in detail in the supporting documentation (refer Appendix D - Environmental Risk Assessments and Significant Impact Assessment tables). Management measures that will be implemented to reduce or eliminate the risks associated with the project are detailed in Appendix D, and Section 4 of this referral.

Species	Impact
(Department of the Environment, 2015c), with the closest mapped seagrass meadow approximately 5 km north of the cable corridor. Eighty-one listed threatened species were identified by the Protected Matters search as matters having the potential to occur within the Sydney EEZ cable corridor. A likelihood of occurrence assessment was conducted to determine the likelihood of these species, or habitat for these species, occurring within the cable corridor. This was undertaken for each species identified in the Protected Matters search. Exclusively terrestrial species (14 plants, 2 amphibians, 1 reptile, 7 mammals, 4 birds) have been omitted from the further consideration. The species of relevance to assessment therefore included: — 5 marine mammals — 5 marine reptiles — 6 fish — 37 birds. Of these only the following threatened species were considered likely to occur in the Sydney EEZ cable corridor: — Four marine mammals: • Blue whale (Balaenoptera musculus) • Fin whale (Balaenoptera physalus) • Humpback whale (Megaptera novaeangliae) • Southern right whale (Eubalaena australis) — Two reptiles: • Green turtle (Chelonia mydas) • Loggerhead turtle (Caretta caretta) — Two sharks: • Great white shark (Carcharodon carcharias) • Grey nurse shark (east coast population) (Carcharias taurus) — 22 birds: • Antipodean albatross (Diomedea antipodensis) • Black-browed albatross (Thalassarche melanophris) • Blue petrel (Halobaena caerulea) • Buller’s albatross, pacific albatross (Thalassarche bulleri) • Campbell albatross, campbell black-browed albatross (Thalassarche impavida) • Eastern curlew, far eastern curlew (Numenius madagascariensis) • Fairy prion (southern) (Pachyptila turtur subantarctica) • Gibson’s albatross (Diomedea antipodensis gibsoni) • Grey-headed albatross (Thalassarche chrysostoma) • Hooded plover (eastern) (Thinornis rubricollis rubricollis) • Kermadec petrel (western) (Pterodroma neglecta neglecta) • Lesser sand plover, Mongolian plover (Charadrius mongolus) •	Impacts may be realised as a result of planned activities, or occur as a result of an unplanned event. The methods to be used during the project for cable placement which has the potential to harm the environment will be: • Burial by ploughing or jetting; and • Direct placement on the seabed. Vessels will be required to support the cable laying. The risks to the environment (including listed species) from these activities are: • Collision with marine fauna from vessel movements; • Disturbance of seabed within the path of cable laying; • Noise and lighting pollution from vessel platforms; • Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities; and • Release of emissions from activities. Potential impacts to listed species are considered in detail in the supporting documentation (refer Appendix D - Environmental Risk Assessments and Significant Impact Assessment tables). Management measures that will be implemented to reduce or eliminate the risks associated with the project are detailed in Appendix D, and Section 4 of this referral.

Species	Impact
Northern giant petrel (Macronectes halli) • Northern royal albatross (Diomedea sanfordi) • Shy albatross, Tasmanian shy albatross (Thalassarche cauta cauta) • Soft-plumaged petrel (Pterodroma mollis) • Sooty albatross (Phoebetria fusca) • Southern giant-petrel, southern giant petrel (Macronectes giganteus) • Southern royal albatross (Diomedea epomophora) • Wandering albatross (Diomedea exulans) • White-bellied storm-petrel (Fregetta grallaria grallaria) • White-capped albatross (Thalassarche cauta steadi) For these marine mammals, sharks, reptiles and birds, the likelihood of occurrence largely relates to known migration pathways overlapping with the cable corridor and/or neighbouring feeding grounds and biologically important areas (BIA's). The cable laying area is a narrow and moving area, therefore, the interactions with the project would be limited on a temporal basis. The majority of these species are transient. Risk of impacting these species has, however, been considered with regard to the significant impact criteria (refer Section 4 and 5). Further information regarding likelihood of occurrence assessment for each of the listed threatened species identified by the PMST is included in the supporting documentation (refer Appendix B - Marine Ecology).	

2.4.2 Do you consider this impact to be significant?

No

2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?

Yes

2.5.1 Impact table

Species	Impact
Sixty-two listed migratory species were	Impacts may be realised as a result of planned

Species	Impact
identified by the Protected Matters Search as matters having the potential to occur within the Perth EEZ cable corridor. One terrestrial bird was also recorded but has been omitted as it has no life history characteristics that would result in it interacting/overlapping with the cable corridor. The listed migratory species relevant to assessment therefore include: — 11 marine mammals (of which five are also listed as threatened); — Four reptiles (of which all are also listed as threatened); — Six sharks and rays (of which two are also listed as threatened); and — 41 birds (of which 14 are also listed as threatened). As noted, 25 of these migratory species were also listed as threatened and were assessed under Section 2.4 (above). As for the listed threatened species, a likelihood of occurrence assessment was conducted for those migratory species overlapping with the Perth EEZ alignment to determine the likelihood of these species, or species' habitat, occurring within the cable corridor. Of the remaining 37 migratory species those considered likely to occur in the Perth EEZ were: — Five marine mammals: • Antarctic minke whale, dark-shoulder minke whale (Balaenoptera bonaerensis) • Bryde's whale (Balaenoptera edeni) • Killer whale (Orcinus orca) • Pygmy right whale (Caperea marginata) • Sperm whale (Physeter macrocephalus) — Two sharks: • Porbeagle (Lamna nasus) • Shortfin mako, mako shark (Isurus oxyrinchus) — Eight birds: • Bridled tern (Onychoprion anaethetus) • Caspian tern (Hydroprogne caspia) • Common noddy (Anous stolidus) • Fleshy-footed shearwater (Ardenna carneipes) • Osprey (Pandion haliaetus) • Red-necked phalarope (Phalaropus lobatus) • Roseate tern (Sterna dougallii) • Sanderling (Calidris alba) For all threatened and migratory species considered likely to occur, this rating relates to known migration pathways overlapping with the cable corridor and/or neighbouring feeding grounds and BIA's. It is also informed by the presence of suitable habitats and BIAs in the cable route for some species. However, BIA's are very	activities, or occur as a result of an unplanned event. The methods to be used during the project for cable placement which has the potential to harm the environment will be: • Burial by ploughing or jetting; and • Direct placement on the seabed. Vessels will be required to support the cable laying. The risks to the environment (including migratory species) from these activities are: • Collision with marine fauna from vessel movements; • Disturbance of seabed within the path of cable laying; • Noise and lighting pollution from vessel platforms; • Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities; and • Release of emissions from activities. Potential impacts to migratory species are considered in detail in the supporting documentation (refer Appendix D - Environmental Risk Assessments and Significant Impact Assessment tables). Management measures that will be implemented to reduce or eliminate the risks associated with the project are detailed in Appendix D, and Section 4 of this referral.

Species	Impact
large and the cable-laying route within the assessed corridor is very narrow (10 m width) and the proposed action of installation is temporary. Therefore, the interactions with the project during installation are expected to be limited on a temporal basis during migration events or restricted to waters in the vicinity of the upwelling feeding grounds. Once the cable is laid the majority of species are not expected to interact with it on the seabed. Risk of impacting these species has, however, been considered with regard to the significant impact criteria (refer Section 4 and 5). Further information regarding likelihood of occurrence assessment for each of the listed threatened species identified by the PMST is included in the supporting documentation (refer Appendix B - Marine Ecology).	
Eighty listed migratory species were identified by the Protected Matters Search as matters having the potential to occur within the Sydney EEZ cable corridor. In addition to those 80, many terrestrial birds and plants were also recorded but have been omitted given the project is wholly marine and high level review against those species identified there was no potential to overlap with them. The listed migratory species relevant to assessment therefore include: — 13 marine mammals (of which five are also listed as threatened); — Five reptiles (of which all are also listed as threatened); — Six sharks and rays (of which two are also listed as threatened); and — 56 birds (of which 15 are also listed as threatened). As noted, 27 of these migratory species were also listed as threatened and were assessed under Section 2.4 (above). As for the listed threatened species, a likelihood of occurrence assessment was conducted for those migratory species overlapping with the Sydney EEZ alignment to determine the likelihood of these species, or species' habitat, occurring within the cable corridor. Of the remaining 53 migratory species those considered likely to occur in the Perth EEZ were: — Three marine mammals: • Antarctic	Impacts may be realised as a result of planned activities, or occur as a result of an unplanned event. The methods to be used during the project for cable placement which has the potential to harm the environment will be: • Burial by ploughing or jetting; and • Direct placement on the seabed. Vessels will be required to support the cable laying. The risks to the environment (including migratory species) from these activities are: • Collision with marine fauna from vessel movements; • Disturbance of seabed within the path of cable laying; • Noise and lighting pollution from vessel platforms; • Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities; and • Release of emissions from activities. Potential impacts to migratory species are considered in detail in the supporting documentation (refer Appendix D - Environmental Risk Assessments and Significant Impact Assessment tables). Management measures that will be implemented to reduce or eliminate the risks associated with the project are detailed in Appendix D, and Section 4 of this referral.

Species	Impact
minke whale, dark-shoulder minke whale (Balaenoptera bonaerensis) • Bryde's whale (Balaenoptera edeni) • Killer whale (Orcinus orca) — One shark: • Shortfin mako, mako shark (Isurus oxyrinchus) — 12 birds: • Broad-billed sandpiper (Limicola falcinellus) • Common greenshank (Tringa nebularia) • Common noddy (Anous stolidus) • Double-banded plover (Charadrius bicinctus) • Fleshy-footed shearwater (Ardenna carneipes) • Grey-tailed tattler (Tringa brevipes) • Latham’s snipe, Japanese snipe (Gallinago hardwickii) • Osprey (Pandion haliaetus) • Ruddy turnstone (Arenaria interpres) • Sanderling (Calidris alba) • Sharp-tailed sandpiper (Calidris acuminata) • Short-tailed shearwater (Ardenna tenuirostris) For all threatened and migratory species considered likely to occur, this rating relates to known migration pathways overlapping with the cable corridor and/or neighbouring feeding grounds and BIA’s. It is also informed by the presence of suitable habitats and BIAs in the cable route for some species. However, BIA’s are very large and the cable-laying route within the assessed corridor is very narrow (10 m width) and the proposed action of installation is temporary. Therefore, the interactions with the project during installation are expected to be limited on a temporal basis during migration events or restricted to waters in the vicinity of the upwelling feeding grounds. Once the cable is laid the majority of species are not expected to interact with it on the seabed. Risk of impacting these species has, however, been considered with regard to the significant impact criteria (refer Section 4 and 5). Further information regarding likelihood of occurrence assessment for each of the listed threatened species identified by the PMST is included in the supporting documentation (refer Appendix B - Marine Ecology).	

2.5.2 Do you consider this impact to be significant?

No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

Yes

2.6.1 Is the proposed action likely to have ANY direct or indirect impact on the Commonwealth marine environment?

No

2.6.2 Describe the nature and extent of the likely impact on the whole of the environment.

The proposed action involves installation and operation of a submarine cable from Perth through state, Commonwealth and international marine waters to connect into Sydney. As such, the proposed action will cross both state and international waters in addition to Commonwealth marine areas. A brief precise of the state and international waters follows.

The cable corridor passes into state waters of Perth and NSW when it exits the EEZ and enters the 3 nm state waters limit. The cable route does not enter any state marine protected areas in WA. The closest marine protected area to the cable route is Marmion Marine Park, which is over 1.5 km from its southern and western limits.

In NSW the cable route (from shore) will commence at an existing POP in a water depth of 30 m, approximately 2 km offshore. It will therefore bypass the majority of the nearshore (intertidal) and subtidal rocky reefs, inclusive of the nearby Bronte-Coogee Aquatic Reserve, a NSW state protected area.

A full description of the cable route is provided in the attached EA. In the south-west after the cable traverses over the Naturaliste Trough it turns to the east and out of Australian waters. The cable leaves the EEZ approximately 430 km offshore in a water depth of 5708 m. From international waters the cable re-enters the EEZ approximately 460 km south of Kangaroo Island, in a water depth of 5195 m. From there the cable traverses Bass Strait, and travels around Cape Howe at the south-east of Australia, before entering NSW state waters and the SSPZ.

As the cable passes through Bass Strait it will also briefly traverse the state waters of Tasmania for approximately 8 km through passing through the waters of Crocodile Rock. The cable will not surpass the Lowest Astronomical Tide mark of the Tasmanian coastal territory.

Figure 1-1 attached in Section 1 of this referral shows the full cable alignment. Potential Commonwealth marine areas or matters to be impacted as a result of the proposed activity traversing state or international waters has informed this assessment.

2.6.3 Do you consider this impact to be significant?

No

2.7 Is the proposed action to be taken on or near Commonwealth land?

No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

No

2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

2.10 Is the proposed action a nuclear action?

No

2.11 Is the proposed action to be taken by the Commonwealth agency?

No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?

No

2.13 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

3.1 Describe the flora and fauna relevant to the project area.

Perth EEZ alignment

Nearshore habitats likely to be within the Perth EEZ alignment include:

Rocky Reef

There are extensive areas of subtidal rocky reefs in the Perth region (Perth NRM, 2015) that support a wide diversity of algae and invertebrates, which in turn provide habitat and prey for many fish (Dye, 2009). Rocky reefs are largely dominated by macroalgal beds (refer following section) but also support a wide variety of sponges, corals, echinoderms, molluscs and crustaceans, including commercially important species such as the Western Rock Lobster (Panulirus cygnus).

In the Perth region rocky subtidal reefs typically form linear structures. The Integrated Marine and Coastal Regionalisation of Australia (IMCRA v.4.0) distinguish the bioregion as the ‘Southwest Shelf Transition’ (DEWHA, 2008a). This bioregion is characterised as having shelf habitat bisected by distinctive ridges of limestone reef that supports patchy macroalgae and coral. Between the ridges may be areas of soft sandy or silty sediment that support diverse infauna, and possible areas of seagrass (Director of National Parks, 2013) (refer following sections).

These linear reefs rise 10–20 m above the sea bed, in water depths of around 10–30 m and mostly lie parallel to the shoreline (Brooke et al., 2008). Although there are numerous reefal areas the only recognised significant area of rocky reef with the Perth region occurs around Rottnest Island (Dye, 2009).

Macroalgal Beds

Subtidal rocky reefs in the Perth region are dominated by macroalgae, particularly Ecklonia radiata (kelp) (Wemberg and Goldberg, 2008) and Sargassum sp. (Phillips et al., 1997). Diverse assemblages of rhodophytes and chlorophytes make up mid-story species and subcanopy turfing algae communities are prevalent. These assemblages occur across a number of rocky reefs in the region (Wernberg and Goldberg, 2008).

Seagrasses

Seagrass beds are known to be abundant in the region (Marmion Marine Park, east Rottnest Island) (Dye, 2009) and it is likely there are some patches of seagrass within the Project area. Seagrass provides important habitat for fish and invertebrates. Seagrass species in this region are dominated by Amphibolus griffithii, Posidonia sinuosa, P.australis and Halophila ovalis, and occur over a range of densities from isolated plants to >90% cover (DAL Science and Engineering, 2004).

Coral Reefs

Corals reefs are not a recognised environmental feature of this region. However with reefs recognised at the nearby Rottnest Island, there are likely to be some hard coral individuals or small patches that may overlap with the Project area. Common coral Families within the region which could occur within the Project area include Goniastrea and Dendrophyllidae (MScience, 2012).

Soft Sediment

The majority of the inshore benthic habitat around Perth consists of unvegetated soft sediment, ranging from silt closer to the Swan River mouth to coarse sands further away (Perth NRM, 2004).

These sediments are important habitats for a variety of infauna and epibenthic invertebrates and fish, including some of commercial importance, such as blue swimmer crabs (Portunus pelagicus) and juvenile snapper (Pagrus auratus).

Despite their importance, few ecological studies of these sediments have been done in the Perth region, although they have been extensively mapped by Perth NRM in 2004 and, DAL Science and Engineering in 2004.

Fisheries Resources

The Southwest Transition Bioregion contains a mixture of temperate and sub-tropical fishery species. Several taxonomic surveys of invertebrates and fish have been undertaken over the last 40 or so years (Hyndes et al., 2003, Johnston et al., 2008). A recent survey of trawl fishing grounds in Cockburn Sound and Owen Anchorage found 216 taxa including 141 invertebrate and 75 fish taxa (Johnston et al., 2008). The diverse assemblages vary with habitat type. For example, the number of species and density of fish was found to be greater in beds of the seagrass Posidonia sinuosa than in beds of other seagrass species (Hyndes et al., 2003). Nearshore reef and seagrass assemblages are known to be important for juvenile recruitment into adult populations.

Several finfish fisheries operate in the waters of the Perth region; the west coast estuarine fisheries target nine main finfish species, including sea mullet, western sand whiting and yellow-eye mullet; the Cockburn Sound finfish fisheries target southern sea garfish and Australian herring, with smaller catches of shark, whiting and mullet; the west coast beach fishery targets mainly sea mullet, blue sprat and western sand whiting; the west coast purse seine fishery targets pilchards and sardinella; and the west coast demersal scalefish fishery targets primarily

West Australian dhufish and pink snapper (Fletcher and Head, 2006).

There are also a number of commercially and/or recreationally important marine invertebrate fishery species in the Perth region, including west coast rock lobster, roe's abalone, blue swimmer crabs, scallops, prawns, octopus and squid (Dye, 2009). The western rock lobster fishery is reportedly one of Australia's most valuable fisheries (DEWHA, 2008a) and lives inside the 50 m depth contour (DEWR, 2006).

The western demersal slope of the Central Western Province is also known to provide important habitat for fish communities with a high level of endemism. Typically demersal fish assemblages below a depth of 400 metres are dominated by relatively small benthic species such as grenadiers, dogfish and cucumber fish (Director of National Parks, 2013).

Marine and coastal fisheries species disperse through both active and passive movement within their lifetimes. Most species have a larval phase which can last from a few days to months, during which time larvae are moved by the tides and currents (passive dispersal) and recruit to new populations (Sheaves et al., 2007; Smith, 2003; Watts and Johnson, 2004). Larval dispersal also results in rapid recolonisation of disturbed habitats and supplementation of small populations that are not self-sustaining (Barber et al., 2002; Crowder et al., 2000; Gaggiotti, 1996).

Post larval phase, fish species actively move through their environment and are not dependent on passive dispersal (Roberts and Ayre, 2010). Consequently, post larval recruitment fisheries species are often able to move away from danger, disturbance or low-quality habitat(s). This active dispersal also allows organisms to colonise areas and move in search of suitable breeding or foraging resources (Kaunda-Arara and Rose, 2004).

Installation of the cable directly on, or embedded into, the seabed has the potential to disturb fisheries species occurring in the direct path of activities. It also has potential to affect habitats fishery species may be dependent upon for breeding which could influence recruitment success.

Offshore habitat of the Perth EEZ is characterised by four provincial bioregions:

Southwest IMCRA Transition

Central Western Province

Southwest Transition

Southern Province

Each of these bioregional provinces recognises biodiversity, cultural and heritage values of distinct areas; inclusive of matters protected under the EPBC Act. Further information regarding the communities and habitats which characterise each of these bioregions is provided following.

Southwest IMCRA Transition

The cable runs from the nearshore environment across the Rottnest Shelf. This area experiences nutrient-rich cold-water upwellings allowing diverse sponge communities with significant diversity and structural complexity to occur. That in turn supports deep-diving mammals and a diverse assemblage of demersal fish.

Substrates and Geomorphology

Soft sediments are likely to be the dominant benthic habitat for the vast majority of this bioregion. Sands can support a diverse range of benthic infauna, which consists predominantly of mobile burrowing species, including molluscs, crustaceans, polychaetes, sipunculids and echinoids. These, in turn, are prey species that support adult snappers and other fisheries resources (DEWHA, 2008a). Soft sediments play a key role in the cycling of nutrients in the ecosystem.

Marine Flora and Fauna

Benthic communities on the outer shelf are dominated by filter feeding sponges and bryozoans that support species of invertebrate grazers. Demersal fish communities in these areas are largely comprised of numerous species of snappers, grenadiers and whiptails (DEWR, 2006).

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Western tuna and billfish;

-Western skip jack fishery; and

-Southern bluefin tuna fishery.

Central Western Province

Substrates and Geomorphology

This bioregion is entirely within Commonwealth waters; it does not include any state waters. It largely represents the Perth abyssal plain. Perth canyon is the largest submarine canyon within Australian waters (DEWHA, 2008a) and is a biologically important area for blue whale feeding. The Perth abyssal plain includes various seafloor features including deep holes, valleys, slopes, and terraces. It is likely to include largely soft sediments with smaller areas of harder substrate.

Marine Flora and Fauna

Soft sediments in deep water are known to contain infauna that is dominated particularly by polychaete worms, peracarid crustaceans, and molluscs (Gage & Tyler 1991). Deep sea habitats are poorly understood as they are poorly studied compared to coastal areas. It is possible that on any hard substrate on seamounts or terraces, deep sea sponges and cold-water corals could be found. Seamounts are understood to be relative biodiversity ‘hotspots’ compared to the surrounding sediments and attract deep-sea fish species.

Deepwater trawls undertaken on the slopes of this province in 2005 (McEnnulty et al., 2011) showed decreasing diversity with depth, largely comprising of decapods, echinoderms and molluscs. Krill seasonally aggregate at the head of the Perth canyon and this attracts blue whales and other deep-diving whales (DEWR, 2006).

Cold–water corals (soft and hard corals) are predicted to be present in all deep waters of oceans and filter feed from passing zooplankton. Where surveys have detected these, they have been most commonly found on continental shelves, slopes and carbonate mounds. These species are considered to be extremely slow growing. Filter feeding sponges are also found largely attached to hard substrate. They are known to be detrimentally effected by increased sediment loads that reduces their ability to feed and survive. Sponge gardens support high levels of diversity of other species. For instance, in deep waters surrounding the Faroe Islands, sponge fields are associated with approximately 250 species of invertebrates (UN, 2006) for which the sponges provide shelter and nursery.

Like cold-water corals, sponge species are characterized by their large size, slow growth rates and weak cementation, which makes them fragile and vulnerable to direct physical impact (Moreau and van den Hove, 2007). There are no known seamounts that may support highly diverse coral or sponge gardens within the cable route within this bioregion.

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Western tuna and billfish fishery;

-Western skip jack fishery;

-Western deepwater trawl fishery;

-Small pelagic fishery; and

-Southern bluefin tuna fishery.

Southwest Transition

Substrates and Geomorphology

This bioregion is entirely within Commonwealth waters and covers the southern parts of the Perth abyssal plain and the Naturaliste Plateau.

Interrogation of the CSIRO marine benthic substrate database (2017) shows this bioregion to be dominated by calcareous ooze, with a banding of mud and sand around the submarine canyons extending from the Naturaliste Plateau. This Plateau is a geomorphically complex area of canyons and terraces.

There is a paucity of data and information from this bioregion, however the substrate and habitats are likely to have similarity to the deepwater environments of the Central Western Province (refer above).

Marine Flora and Fauna

DEWR (2006) describe how 398 species of demersal fish have been described for this bioregion. This region is often considered to be the environmental boundary that distinguishes assemblages between southern and western Australia.

Although there is limited biodiversity information from this bioregion, there are similarities to the marine flora and fauna Central Western Province with nutrient-rich upwelling's that attract feeding whales. There are also reportedly high occurrences of deep sea crabs on the sea floors, notably including the champagne and crystal crabs (DEWR, 2006). Due to upwellings and geomorphic complexities it is thought that there is likely to be a high degree of deepwater diversity and endemism (DEWHA, 2008a).

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Western tuna and billfish fishery;

-Western skip jack fishery;

-Western deepwater trawl fishery;

-Southern tuna and billfish fishery;

-Small pelagic fishery; and

-Southern bluefin tuna fishery.

Southern Province Bioregion

Substrates and Geomorphology

This Southern Province bioregion is entirely within Commonwealth waters and is largely characterised as deepwater edged by continental slope, canyons and mid-slope terraces in the east. This bioregion also includes the Diamantina Fracture Zone which is likely to be a unique seafloor feature and is listed as a KEF (DEWHA, 2008a). The cable corridor does not, however, intersect with this KEF.

Interrogation of the CSIRO marine benthic substrate database (2017) shows this area of the bioregion to include muds and sands, calcareous ooze and pelagic clays.

Marine Flora and Fauna

The majority of information on the benthic environment in this region comes from fish landings taken from the shelf break and slopes. Species commonly caught include:

-orange roughy

-blue grenadiers

-Bight redfish

-School, gummy and angel sharks

-gemfish

-deepwater flatheads

-leatherjackets

-latchets

-stingrays and

-stinageers.

This region is likely an important spawning and aggregation area (DEWHA, 2008a). Currents and upwellings around the canyons produce nutrient-rich areas which also attract whales into this bioregion.

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Western skip jack fishery;

-Southern tuna and billfish fishery;

-Southern and eastern scalefish and shark fishery; and

-Small pelagic fishery.

Sydney EEZ alignment

Nearshore habitats likely to be within the Sydney EEZ alignment include:

Rocky Reef

Temperate rocky reef habitats are known to support a diversity of species, including listed EPBC Act species and commercially and recreationally important marine species. Rocky reef habitats support a comparatively higher diversity of marine fauna than sandy areas. This is due to a number of factors including the availability and higher diversity of niche habitat areas and refugia, which encourage the settlement of sessile organisms and provide shelter/resources of sedentary fauna. This in turn promotes macro-invertebrates and teleosts to recruit to these habitats (Diaz et al., 2004).

Nearshore rocky reefs in the Sydney region are known to support sponges, temperate corals, echinoderms, molluscs and crustaceans (Connell and Glasby, 1999). Recreationally and commercially relevant fishery species that inhabit these areas include snapper (Pagrus auratus), yellowtail kingfish (Seriola lalandi) and a variety of cephalopods and crustaceans. The nearshore rocky reef environments also provide habitat suitable for pipe fishes (Syngnathidae), protected as marine animals under the EPBC Act.

The cable route will commence at an existing POP in a water depth of 30 m, approximately 2 km offshore. It will therefore bypass the majority of the nearshore (intertidal) and subtidal rocky reefs, inclusive of the nearby Bronte-Coogee Aquatic Reserve, located within the Randwick City Council. From the POP to a depth of approximately 40 m benthic habitats may include a mix of open soft sandy seabed intermixed with sparse patches of rocky reef. From the cable pop out point any cable laid on the seabed could, therefore, have direct interaction with the deep water patchy rocky reef habitat. The majority of the cable alignment is, however, planned to occur through soft sediment environments.

Macroalgal Beds

Temperate rocky reefs, such as those found within the cable corridor, are often associated with macroalgal beds. In the waters of the SSPZ the macroalgal beds are generally characterised by kelp (Ecklonia radiata) and species from the genus Sargassum. Macroalgal beds provide habitat for a high diversity of animals and act as nursery areas for many species. As such, they have high ecological significance within the near shore environment (Dayton, 1985). Additionally, macroalgae can form part of the diet for marine turtles, and is therefore an important resource for these threatened species.

As the cable corridor overlaps with locations where macroalgal beds are known to occur in the nearshore area, these habitats and associated communities have potential to be directly impacted by the project if appropriate management measures are not put in place.

Soft Sediment

The benthic habitats within the cable corridor at depths greater than 40 m are primarily comprised of unvegetated soft sediments, including open sandy expanses. Characterised by a high energy wave climate and associated highly mobile sediments, the soft sediment habitats of the region primarily support limited infaunal and epifaunal invertebrate communities (Davie, 2011). At these depths these open seabed environs are only infrequently interspersed with macroalgae beds on small patches of rocky reefs. Collectively these habitats support higher order transient organisms such as teleost fishes.

Infaunal organisms are those that burrow through surface sediments and include polychaete worms, sipunculids, bivalve molluscs and crustaceans. Epifaunal assemblages found in the nearshore waters of the Sydney region include crustaceans, echinoderms and molluscs.

At depths greater than 40 m. the cable corridor will have direct impact on the soft sediment habitat and associated communities within the footprint.

Fisheries Resources

The diversity of nearshore and offshore habitats off Sydney support a speciose fish community that is of ecological, recreational and commercial importance. Recreational fishing in the Sydney region (including fresh and salt water fishing across coastal and inland systems) is thought to create the equivalent of 14000 fulltime jobs and generate about $3.4 billion of economic activity into the NSW economy every year (NSW Department of Primary Industries, 2017)

A number of species form part of locally targeted recreational and commercial fisheries. Such species include the blue swimmer crab (Portunus pelagicus), the Eastern king prawn (Penaeus plebejus) and the school prawn (Metapenaeus macleayi). These species are all highly mobile, and as such may occasionally transit in the cable corridor.

Throughout coastal and offshore waters of broader NSW, the wild harvest commercial fishing sector alone generates more than $90 million per year (NSW Department of Primary Industries, 2014). A number of species of importance to commercial marine and estuarine fishing in NSW are supported by habitats within the SSPZ namely:

-Snapper (Pagrus auratus)

-Yellowfin bream (Acanthopagrus australis)

-Flathead (Platycephalus spp.)

-King (Melicertus spp.) and school prawns (Metapenaeus spp.)

-Sea mullet (Mugil cephalus)

-Mulloway (Argyrosomus japonicus)

-Whiting (Sillago spp.)

-Yellowtail kingfish (Seriola lalandi)

-Eastern rock lobster (Jasus verreauxi)

-Crabs (Portunus spp., Scylla spp.)

Marine and coastal fisheries species disperse through both active and passive movement within their lifetimes. Most species have a larval phase which can last from a few days to months, during which time larvae are moved by the tides and currents (passive dispersal) and recruit to new populations (Sheaves et al., 2007; Smith, 2003; Watts and Johnson, 2004). Larval dispersal also results in rapid recolonisation of disturbed habitats and supplementation of small populations that are not self-sustaining (Barber et al., 2002; Crowder et al., 2000; Gaggiotti, 1996).

Post larval phase fisheries species actively move through their environment and are not dependent on passive dispersal (Roberts and Ayre, 2010). Consequently, at this developmental phase fisheries species are able to move away from danger, disturbance or low-quality habitat(s). This active dispersal also allows organisms to colonise areas and move in search of suitable breeding or foraging resources (Kaunda-Arara and Rose, 2004).

Installation of the cable directly on, or embedded into, the seabed has the potential to disturb fisheries species occurring in the direct path of activities, leading to temporary avoidance of the area. It also has potential to affect habitats fishery species may be dependent upon for breeding which could influence recruitment success.

Offshore habitat of the Sydney EEZ is characterised by seven provincial bioregions:

West Tasmania Transition

Western Bass Strait Shelf Transition

Bass Strait Shelf Province

Southeast Shelf Transition

Southeast Transition

Central Eastern Province

Central Eastern Shelf Province

West Tasmania Transition

Substrates and Geomorphology

The geomorphology of the bioregion extends from abyssal plain/deep ocean floor to continental slope/rise as the route approaches the Bass Strait. The dominant geomorphic units of these biomes are known to include calcareous gravel, sands and silt across the plain and mud to sand across the continental slope.

The mud and ooze substrates that are consistent with the continental slope are comprised of fine biofragments and pelagic components (McLeay et al., 2003) from numerous dentalium, pteropods, gastropods, echinoid plates, spherical and vagrant bryozoans, benthic foraminiferans, ostracods, micromolluscs and angular clasts (Rollet et al., 2001; McLeay et al., 2003).

Marine Flora and Fauna

Currie and Sorokin (2011) studied the benthos and epifauna of the Great Australian Bight deep ocean floor and found the most common types of fauna to be Chordata (fish), Porifora (sponges), Enchinodermata (brittle stars and cucumbers) as well as Cnidaria (corals and anemone). Given the average depth (-3,900 m) and substrates of this bioregion are similar to that of the Bight, a significant level of similarity of biodiversity could be assumed. Those works also reported an epifaunal biomass increase with decreasing depth and decreasing distance from shore (Ward et al, 2006), where epifaunal biomass was lowest at 2000 m compared to similar levels at 500 m and 1000 m of depth.

The biodiversity in shelf waters of the region is largely influenced by the Zeehan Current and its interactions with the continental slope. Benthic species that are known to inhabit the continental shelf of the region include lace corals and sponges. The greatest diversity of sponges occur between the 200-350 m depths. Such sponge gardens also support a high diversity of other invertebrates and act as aggregation areas for fish.

A number of fish species, such as orange roughys, also aggregate around canyon structures and seamounts (DEWHA 2007). The latter are also believed to support spawning. Seabed canyons and seamounts are mapped as occurring along the eastern wall of this bioregion.

Fisheries Resources

State level managed fisheries in this bioregion that intersect the cable corridor include:

-Giant crab fishery;

-Rock lobster fishery; and

-Scallop fishery.

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Bass Strait Central Zone Scallop Fishery;

-Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector and Scalefish Hook Sector;

-Southern and Eastern Scalefish and Shark Fishery: Shark Gillnet and Shark Hook Sectors;

-Southern Bluefin Tuna Fishery (line fishing only);

-Southern Squid Jig Fishery;

-Eastern Tuna and Billfish Fishery; and

-Small Pelagic Fishery.

Western Bass Strait Shelf Transition

Substrates and Geomorphology

The dominant substrate type the route will cover will consist of calcareous gravels, sands and silt, which extend from the upper slope at the western edge of the bioregion and across the Bass Strait. The floor is known to be dominated by rocky reef patches interspersed with large patches of sediments. This region is dominated by shelf and abyssal plain and is characterised by a deep escarpment through which the route is expected to proceed (CSIRO 2017).

Marine Flora and Fauna

In places sessile invertebrate assemblages such as sponges dominate. These provide habitat and shelter for many other invertebrates and fishes.

Infauna samples completed in 2010, showed a dominance of Annelida (bristle worms) accounting for 38% of species, with Mollusca (shellfish) and Arthropoda (crabs and shrimp) following (Currie and Sorokin, 2011).

Fisheries Resources

Given the relative shallow average depth (-75 m) benthic communities are targeted by commercial fisheries aiming for blue grenadier (Macruronus novaezelandiae), gemfish (Rexea solandri) and orange roughy (Lynch and Garvey, 2003 cited in Rogers et al., 2013).

Victorian state-level managed fisheries in this bioregion that intersect the cable route include:

-Giant Crab Fishery;

-Rock Lobster Fishery; and

-Scallop Fishery.

Commonwealth fisheries in this bioregion that intersect the cable route include:

-Bass Strait Central Zone Scallop Fishery

-Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector and Scalefish Hook Sector;

-Southern and Eastern Scalefish and Shark Fishery: Shark Gillnet and Shark Hook Sectors;

-Southern Bluefin Tuna Fishery (line fishing only);

-Southern Squid Jig Fishery;

-Eastern Tuna and Billfish Fishery; and

-Small Pelagic Fishery.

Bass Strait Shelf Province

Substrates and Geomorphology

The substrates within this bioregions are heavily influenced by the relatively shallow (-61 m) depths and terrigenous inputs. Key substrates of the Bass Strait Shelf Province are characterised by rocky-reef and soft sediments. CSIRO information indicates the Shelf is 1 of 4 bioregions in Australia to contain five classes of geomorphic units, including sandbanks, deep escarpments, plateaus, ridges, abyssal plain and continental slope.

Marine Flora and Fauna

The relative shallow water depths mean a greater degree of seasonal temperature fluctuations. The mixing caused by these factors and the east Australia current result in a unique environment supporting a broad range of taxonomic groups. Sediment and benthic biota sampling completed in the Bass Strait indicates a very diverse range of productive invertebrates, including rich assemblages of bryozoans and hydroids (Boreen et al. 1993). The area is not well described, however, and Passlow et al. (2004) also found that of 20% of species sampled where poorly known or undescribed and 22.5% were endemic to south Eastern Australia.

The waters of the Bass Strait accommodate for several threatened and priority species protected under the EPBC Act. These are identified in Section 2.

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Bass Strait Central Zone Scallop Fishery;

-Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector and Scalefish Hook Sector;

-Southern and Eastern Scalefish and Shark Fishery: Shark Gillnet and Shark Hook Sectors;

-Southern Squid Jig Fishery;

-Small Pelagic Fishery; and

-Eastern Tuna and Billfish Fishery.

Southeast Shelf Transition

Substrates and Geomorphology

Seafloor substrate is consistent with that of the Bass Strait. Rocky reefs are present which support encrusting, erect and branching sponges, shell grit substrates with large patches of sponges and sparse sponge habitats. Sediment structure of the bioregion is dominated by sand with mud and gravel forming less than 20%. Carbonate content within substrate is high and increases towards the outer shelf and upper slope.

Marine Flora and Fauna

Based on studies by Passlow et al. (2004) the sea-floor of this bioregion is expected to be exceptionally rich in biodiversity, particularly sponge, crustacean and molluscan fauna. These, in turn, attract diverse fishery assemblages. The bioregion is an important migration and resting area for the southern right whale as well as providing a foraging habitat for Australian fur seal, killer whale, white shark and several seabird species.

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable route include:

-Bass Strait Central Zone Scallop Fishery;

-Small Pelagic Fishery;

-Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector and Scalefish Hook Sector;

-Southern and Eastern Scalefish and Shark Fishery: Shark Gillnet and Shark Hook Sectors;

-Southern Bluefin Tuna Fishery (line fishing only);

-Southern Squid Jig Fishery; and

-Eastern Tuna and Billfish Fishery.

Southeast Transition

Substrates and Geomorphology

The offshore bioregion occurs predominantly (>80%) in deep waters >-2000 m. The dominant seafloor features of the bioregion are continental shelf and abyssal plain. In studies completed by Ward et al. (2006), epifaunal richness and biomass has been shown to decline with increasing depth and distances from the shore along the shelf.

Marine Flora and Fauna

Very little is known about the benthic assemblages of the intermediate to deeper water of the southeast transition zone, however parallels can be drawn to other temperate habitats at similar latitudes. Seabed biodiversity is likely similar to other deep water environs of southern Australia noted above. A unique mix of temperate and warm waters create a habitat for free-floating phytoplankton, driven by seasonal changes to oceanographic conditions. Such productivity invites foraging from albatrosses, the great-winged petrel, cape petrel and wedge-tailed shearwater. The region is also a known passage for humpback whale migration routes along the east coast.

Fisheries Resources

Commonwealth fisheries in this bioregion that intersect the cable route include:

-Bass Strait Central Zone Scallop Fishery;

-Small Pelagic Fishery;

-Southern and Eastern Scalefish and Shark Fishery: Commonwealth Trawl Sector and Scalefish Hook Sector;

-Southern and Eastern Scalefish and Shark Fishery: Shark Gillnet and Shark Hook Sectors;

-Southern Bluefin Tuna Fishery (line fishing only);

-Southern Squid Jig Fishery; and

-Eastern Tuna and Billfish Fishery.

Central Eastern Province (Southern Extent)

Substrates and Geomorphology

The substrates within the bioregion are reflective of the geomorphology, representative of abyssal-plain, deep ocean floor, canyons and continental slope. Similarly, to that described above for the Southeast Transition, with the benthic environment dominated by deep ocean floor and the associated communities.

Marine Flora and Fauna

The biological communities in the bioregion have been identified of having a high amount of endemism, with of more than 630 demersal species found, 56 are endemic to the region. The species found along the demersal outer shelf are typically narrow-ranging, resulting in the characterisation of 3 distinct biomes (upper slope (280-490 m, mid-upper slope 610-830 m and lower slope 910-1080 m) related to the species that inhabit that slope area.

The previously mentioned canyons in the bioregion channel upwelling off the coast, influencing biological productivity. Plankton blooms resulting from the increasing nutrient availability attract populations of yellowfin tuna, whales and albatross.

Fisheries Resources

State level managed fisheries in this bioregion that intersect the cable corridor include:

-Rock Lobster Fishery;

-Ocean Trap and Line Fishery;

-Ocean Trawl Fishery (from Barrenjoey Head to QLD border);

-Ocean Trawl Fishery (from Barrenjoey Head to Vic border, up to 3 nm); and

-Offshore Recreational and Charter Boat fishery.

Commonwealth fisheries in this bioregion that intersect the cable corridor include:

-Eastern Tuna and Billfish Fishery;

-Small Pelagic Fishery;

-Southern Bluefin Tuna Fishery; and

-South East Scalefish and Shark Fishery (Commonwealth trawl, scalefish hook and deepwater trawl sectors).

Central Eastern Shelf Province

Substrates and Geomorphology

Consistent with other regions, the distribution of benthic habitats in southern NSW is reflective of the patterns in bedrock geology, history and nearby coastal inputs. Overall the sediments of the Central Eastern Shelf are dominated by clastic sediments closer to the coast and coarser sediments to the outer shelf (Department of Environment, Climate Change and Water NSW, 2010).

Marine Flora and Fauna

The fauna of this bioregion is characterised by the influence of the spatial location, between the temperate south and subtropical north. Therefore, the dominant species of this bioregion include eastern warm/subtropical species, with the East Australian Current supplying subtropical juvenile species from the north. These variations in coastal waters will also determine and influence pelagic water species. Such coastal upwellings may result in short-lived diatom blooms (days to weeks) and associated zooplankton production (Bulman et al., 2006).

Most of the animals in the benthic habitat of the intermediate shelf are infaunal species, with more than 500 macrobenthic fauna identified, dominated by polychaetes, crustaceans and molluscs.

Little is known about the benthic assemblages on the intermediate depths of the bioregion, however consistent with reefs at these depths in other temperate regions assemblages are likely to include habitats dominated by sponges, invertebrates such as ascidians, hydrozoans, gorgonians and bryozoans (Butler, 1995).

Fisheries Resources

State level managed fisheries in this bioregion that intersect the cable corridor include:

-Rock Lobster Fishery;

-Ocean Trap and Line Fishery;

-Ocean Trawl Fishery (from Barrenjoey Head to QLD border);

-Ocean Trawl Fishery (from Barrenjoey Head to Vic border, up to 3 nm);

-Ocean Trawl Fishery (from Barrenjoey Head to QLD border to the 4 000 m isobath); and

-Offshore Recreational and Charter Boat fishery.

Commonwealth fisheries in this bioregion that intersect the cable route include:

-Eastern Tuna and Billfish Fishery;

-Small Pelagic Fishery;

-Southern Bluefin Tuna Fishery; and

-South East Scalefish and Shark Fishery (Commonwealth trawl, scalefish hook and deepwater trawl sectors).

3.2 Describe the hydrology relevant to the project area (including water flows).

Not applicable

3.3 Describe the soil and vegetation characteristics relevant to the project area.

Not applicable

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.

The New South Wales system of marine protected areas comprises multi-use marine parks, aquatic reserves, and national parks and reserves with marine components. The nearest Aquatic Reserve is the Bronte-Coogee Aquatic Reserve, located approximately 2 km from the cable route.

The Bronte-Coogee Aquatic Reserve is approximately 4 km long, extending from the southern headland at Bronte Beach to the rock baths at the northern headland of Coogee Beach. Within the reserve, waters extending 100 m from the shore are protected from a number of harvesting activities, including the collection of invertebrates and blue grouper (Office of Environment and Heritage, 2014).

Benthic habitats in this reserve consist primarily of temperate rocky reef environments which house macroalgal beds, cunjevoi communities and sponges. These habitats support a diverse range of marine taxa including macro-invertebrates, teleosts, cephalopods and elasmobranchs. There are a number of commercially and recreationally important marine species within the reserve, including the blue grouper, abalone, octopus and other teleosts (Office of Environment and Heritage, 2014).

3.5 Describe the status of native vegetation relevant to the project area.

Not applicable, project is wholly marine.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The cable route commences at 10 m water depth within the Perth PZ. The water depth progressively increases until the cable route exits the PZ at water depths of approximately 700 m. Shortly after exiting the PZ, the 1,000 m depth contour and the continental shelf is reached. The cable route then descends steep slopes before tracking south in deep water. The cable corridor passes south of Cape Leeuwin, negotiating the steep shelf west of Cape Leeuwin into the Diamantina Fracture Zone. 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 a small adjustment supports approach and ascent of the steep slopes of the Bass Strait western shelf. Shortly after the 1,000 m contour the route enters the western limits of the Bass Strait and into waters as shallow as 50 m.

The route continues in shallow water towards the Bass Strait exit into the Tasman Sea. Depths deepen gradually from 50 m to 200 m before the continental shelf break where the slopes increase and the route descends rapidly. 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, remaining in the deep waters of the Tasman Abyssal Plain following the New South Wales coastline towards Sydney until the route deviates west to make its approach to the continental shelf. From here water depths decrease until the Sydney POP is reached, situated in a water depth of 30 m.

3.7 Describe the current condition of the environment relevant to the project area.

The current state of the environment within the cable route is considered to be relatively pristine. However, the land alongside the inshore portions of the cable corridor is heavily urbanised, with the POPs located at offshore from Perth (Floreat Beach) and Sydney (Coogee Beach), respectively.

3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.

There are 49 marine archaeological sites and shipwrecks within 4.63 km (2.5 nm) of the cable route. These comprise:

-30 shipwrecks;

-Six ammunition dumps;

-Four boat dumps;

-Two chemical dumps;

-One other dump, and;

-Six anomalies

The descriptions, locations and distances from the cable corridor for these 49 sites are provided in the attached EA (Appendix C).

3.9 Describe any Indigenous heritage values relevant to the project area.

There are no known aboriginal heritage sites or indigenous heritage values within or adjacent to the cable corridor. The EPBC referral identified one National Heritage place of Indigenous significance, the Cyprus Hellene Club – Australian Hall, of relevance to the cable corridor. This building is located 8.4 km from the POP; no works will occur within, adjacent to or proximal to this building. Accordingly, no impacts to indigenous heritage values are expected.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.

Western Australia

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 WA Land Administration Act 1997. Furthermore, the WA 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 for WA.

Tasmania

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.

3.11 Describe any existing or any proposed uses relevant to the project area.

Fisheries

As certain parts of coastal Australia have been designated as cable protection zones, including at the Indigo Central cable landing sites in Sydney and Perth, these areas are rigorously managed with heavy penalties for breaches of no anchor or fishing restrictions. In view of these prohibitions, interaction between the Indigo Central cable and commercial fisheries in these areas are unlikely.

Outside of the protection zones, the following fisheries operate in proximity to the cable corridor:

Commonwealth fisheries:

-Bass Strait Central Zone Scallop fishery

-Southern and Eastern Scalefish and Shark fishery

-Southern Bluefin Tuna fishery

-Southern Squid Jig fishery

-Eastern Tuna and Billfish fishery

-Western Tuna and Billfish fishery

-Western Deepwater Trawl fishery

-Small Pelagic fishery

State fisheries:

-Giant crab fishery

-Rock lobster fishery

-Scallop fishery

-Ocean Trap and Line fishery

-Ocean Trawl fishery

-Offshore Recreational and Charter Boat fishery

Hydrocarbon activities

The proposed cable intersects seven concession blocks, all located within Bass Strait. Of these, four are not currently operated. Origin Energy operates two of the remaining blocks (T/34 P and T/30 P) and 3D Oil operates the third block (T49/P).

Submarine cables and pipelines

The cable route traverses Bass Strait where the route crosses submarine infrastructure

connecting Australia and Tasmania. The route also crosses an in service cable twice within the SSPZ. Details of this infrastructure are presented in Table 3. 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.

-Bass Strait 2 (In service cable): depth 77m LAT 39°21.6536'S LON 145°35.1685'E

-Yolla-Victoria (Pipeline): depth 76m LAT 39°21.5358'S LON 145°39.2634'E

-Bass Strait (In service cable): depth 75m LAT 39°20.6517'S LON 145°59.1649'E

-Basslink (Power cable1): depth 64m LAT 39°18.1030'S LON 146°54.4188'E

-Victoria-Tasmania (Pipeline): depth 62m LAT 39°17.5694'S LON 147°04.9626'E

-Southern Cross Seg A (In service cable): depth 1489m LAT 34°18.2474'S LON 151°37.1324'E

-Southern Cross Seg A (In service cable): depth 133m LAT 34°00.4745'S LON 151°23.3334'E

Planned submarine cables

The planned HAWAIKI Cable is proposed to link Australia, New Zealand, American Samoa, Pacific Islands, Hawaii and Oregon, on the U.S. West Coast (ASN 2017a). The engineering and installation will be conducted by TE Subcom and is proposed to be in service June 2018. The HAWAIKI cable is proposed to land immediately south of Indigo Central at Coogee Beach, NSW, and planned alignment remains close to the Indigo Central route throughout the designated SSPZ. This alignment has been considered in planning the alignment of the Indigo Central cable.

At the planned point of intersection between the two cables, the Indigo Central cable is intended to be surface laid, and as such will not require a Route Clearance. TE Subcom has been contacted by ASN and are the two groups are collaborating to confirm there is no conflict in the offshore routes (ASN 2017a).

The ASC-1 Cable connecting Australia to Singapore is underway with a completion date proposed to be August 2018. It is also being managed and installed by ASN, such that internal collaboration between ASN engineers ensures offshore routing does not conflict (ASN 2017a).

The Indigo West cable is planned to connect from the Perth PZ to the north to provide an international connection into Indonesia and Singapore. It is also being managed for planned installation by ASN, such that internal collaboration between ASN engineers ensures offshore routing does not conflict (ASN 2017a).

APX-East was planned to install a fibre optic telecommunications cable from Coogee Beach in Sydney through the SSPZ to California with a branch to Samoa. This project was referred to the

Commonwealth for assessment under the EPBC Act in 2013. It was determined to be a not controlled action in April 2014 (EPBC 2014/7139). The APX-East alignment within the SSPZ is intended to be used by Indigo Central. SubPartners, who are the named party for APX-East, are members of the Indigo consortium. Use of the APX-East alignment and any approvals will be rescinded prior to any actions being undertaken for Indigo Central to ensure there is no conflict over cable route alignments for permitting assessment.

SubPartners also proposed to install a similar telecommunications cable through the Western Australia PZ to Singapore with branches to Indonesia and other locations. This was also determined to be not a controlled action in regards to the EPBC Act in January of 2014 (EPBC 2013/7102). Similar to APX-East, the APX-West alignment will be superseded by Indigo West. SubPartners, as members of the consortium for Indigo West will rescind any approvals or rights over the existing permits and alignment prior to Indigo West being constructed.

It is expected letters of rescindment for both cable alignments will be required as a provision of approvals under the EPBC Act and in support of permitting under the ACMA.

Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

The methods to be used during the project for cable placement which have the potential to harm the environment will be:

-Burial by ploughing or jetting; and

-Direct placement on the seabed.

Vessels will be required to support the cable laying activities. The risks to the environment from these activities are:

-Collision with marine fauna from vessel movements;

-Disturbance of seabed within the path of cable laying;

-Noise and lighting pollution from vessel platforms;

-Release of potential wastes, contaminants or pollutants (including hydrocarbon spills) from operational activities;

-Release of emissions from activities; and

-Interference with other users of the area affected by cable laying.

Impacts may be realised as a result of planned activities, or occur as a result of an unplanned event. To reduce or eliminate the risks associated with cable laying, site survey and any required cable maintenance to as low as reasonably practicable, the following management controls will be implemented as necessary. Further detail regarding impact assessment and associated management responses are provided in Appendix D of the attached EA.

Onshore and seabed disturbance

-The cable laying route in deep waters will be positioned to avoid underwater features such as rocky reefs as far as practicable;

-Ecologically sensitive areas identified from review of benthic survey data as well as desktop assessments will be avoided if possible;

-Items on board the cable laying vessel will be securely sea-fastened to reduce the chance of dropped objects polluting the seafloor;

-If any lifting is required on board vessels, all lifting equipment will be rated and certified and will only be conducted in suitable weather and sea state conditions to avoid dropping of objects overboard.

Artificial light emissions

-Light on vessels will be directional to reduce direct light spill onto marine waters, unless such actions do not comply with navigation and vessel safety standards (AMSA Marine Orders Part 30: Prevention of Collisions; AMSA Marine Orders Part 21: Safety of Navigation and Emergency Procedures).

Artificial noise emissions

-Activities that generate underwater noise (installation activities) could be timed to reduce overlap with migratory movements and therefore reduce potential threat to migratory mammals;

-Vessel machinery can be maintained in accordance with the manufactures specifications to reduce noise emissions;

-The interaction of all vessels with cetaceans, pinnipeds and whale sharks will be compliant with Part 8 of the Environment Protection and Biodiversity Conservation (EPBC) Regulations (2000). The Australian Guidelines for Whale and Dolphin Watching (DEH, 2006) 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.

+If animals are bow riding, do not change course or speed suddenly.

Planned discharges

-Food waste will be collected, stored, processed and disposed to comply with the vessel's garbage or waste management plan;

-A vessel with access to a food macerator, in accordance with Regulation 4 of the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V, will be required to have food waste ground or comminuted to <25 mm and discharged only when >12 nautical miles from the territorial baseline;

-Sewage and food waste will be collected, placed into storage, processed and removed of in accordance with the vessel waste management plan;

-Outside of State waters liquid substances will be discharged in compliance with MARPOL, including:

+Untreated sewage will be stored onboard and disposed of onshore at a reception facility or to a carrier licensed to receive the waste, or discharged at a distance of more than 12 nautical miles from the nearest land in accordance with Regulation 11 of MARPOL Annex IV.

+Treated sewage will be discharged in compliance with Regulation 11 of MARPOL Annex IV.

+Sewage system will be compliant with Regulation 9 or MARPOL Annex IV and be maintained in accordance with the vessels planned maintenance system.

+As per MARPOL Annex IV / AMSA Marine Orders 96, any vessel licensed to carry more than 15 persons will have an International Sewage Pollution Prevention Certificate.

+Vessels may discharge oily water after treatment to 15 ppm in an oily water filter system as required by MARPOL Annex I Regulations (for the prevention of pollution by oil). To discharge, the vessels will require a current International Oil Pollution Prevention (IOPP) certificate for oily water filtering equipment, and a current calibration certificate for the bilge alarm.

-Vessel masters will ensure that the maximum carrying capacity of the sewage system is not exceeded;

In the event food cannot meet the requirements for disposal (e.g. equipment failure or otherwise), the stored food waste will be transferred to land for disposal;

-Scupper plugs or equivalent will be available on support vessel decks where chemicals and hydrocarbons are stored and frequently handled (i.e.' high risk' areas). Non-hazardous, biodegradable detergents will be used for deck washing;

-The vessel operator will record the quantity, time and onshore location of the oily water disposal in the vessel Oil Record Book; and

-Use of non-toxic, low ampere, highly insulated, water insoluble cable material.

Atmospheric emissions

-All equipment will be properly maintained in good working order;

-Catalytic converters and exhaust filters will be correctly fitted where appropriate and available to minimise diesel exhaust emissions;

-Idling time of diesel engines should be limited and engines should not be overloaded;

-Fuel oil will meet regulated sulphur content levels in order to control SOX and particulate matter emissions;

-Engines will be operated in a manner so that regulated NOX emission levels are achieved;

-Compliance with MARPOL Annex VI (as implemented in Commonwealth waters by the Commonwealth Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (PSPPS Act); and Marine Orders - Part 97: Marine pollution prevention - air pollution). In particular:

+Optimisation of fuel use to increase efficiency and minimise emissions

+Use of low sulphur fuel when it is available to minimise emissions from combustible sources

+Implementation of a planned servicing / maintenance system to manage emissions

-Vessel engines will hold a valid and current International Air Pollution Prevention Certificate (IAPPC); and

-ODS will not be deliberately discharged during the maintenance, service, repair or disposal of systems or equipment, and through good maintenance, fugitive emissions will be minimised.

Interference with other users

-Cable laying related activities will be undertaken in accordance with all marine navigation and vessel safety requirements under the International Convention of the Safety of Life at Sea (SOLAS) 1974 and Navigation Act 2012. For the vessels, this requires equipment and procedures to comply with AMSA Marine Order - Part 30: Prevention of Collisions, and Marine Order - Part 21: Safety of Navigation and Emergency Procedures;

-Stakeholder consultation will support notification of proposed activities (local councils, fishing bodies etc);

Notification to the following Australian Government agencies will be made prior to moving the cable laying vessel on location:

+The Australian Hydrographic Office (including hydro.NTM@defence.gov.au) of proposed activity, location (i.e. vessel location) and commencement date to enable a Notice to Mariners' to be issued.

+The Australian Maritime Safety Authority (AMSA) Rescue Coordination Centre (RCC) of proposed activities, location (i.e. vessel location) and commencement date to enable an AusCoast warning to be issued.

-Vessels will also be equipped with appropriate navigational safety equipment such as an automatic identification system (AIS) and an automatic radar plotting aid system capable of identifying, tracking and projecting the closest approach for any vessel (time and location) within radar range (up to approximately 70 km);

-Visual observations will be conducted by trained watch keepers (e.g. skipper or similar) on all vessels 24 hours per day to support management of collision risk or entanglement/interference with other users;

-Where possible, the cable can be buried to a target depth of 1 m below soft substrate using plough or ROV water jet burial to avoid interference with over users; and

-In shallow water depths (0 to 30 m off Sydney and 0 to 10 m off Perth) the cable will be passed through a sub-surface conduit to limit any risk of entanglement or interference with inshore waterway users.

Pest introduction and proliferation

-International vessels arriving in Australia from a foreign port or location should adhere to Australian quarantine requirements available described by AQIS guidelines and the Australian Ballast Water Management Requirements (version 7) available at http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/avm/vessels/ballast/australian-ballast-water-management-requirements.pdf

-The vessel will have in place a relevant Ballast Water Management System.

-Ballast water exchange is being phased out in favor of other management measures. If exchange occurs it must be conducted as far from the nearest land as possible, and in all cases within an acceptable area as defined in the ABWMR (DAWR, 2017).

-All ballast water exchange details are to be recorded in a ballast water report and submitted in accordance with the requirements outlined in the ABWMR (DAWR, 2017).

-A biofouling vessel risk assessment (VRASS) must be carried out within sufficient time prior to mobilisation to site to enable any required cleaning operations to be undertaken prior to the cable laying activities.

-The vessels will be in possession of a current International Anti-fouling System Certificate to verify that it complies with the International Convention on the Control of Harmful Anti-fouling Systems on Ships.

-If an IMP is identified or suspected, then the contractor or ASN team is obliged to immediately (within 24 hours) notify the applicable government agency (Department of Primary Industries and Regional Development in the State of WA; or Department of Agriculture, Fisheries and Forestry in Commonwealth waters).

-Changes to Australia’s biosecurity system came into effect on 16 June 2016 with commencement of the Biosecurity Act 2015. New biosecurity requirements may come into force during the life of the project. If this occurs, these management controls should be reviewed to confirm adequacy.

Accidental release of solid wastes

-Appropriate waste containment facilities will be included on site and managed to avoid overflow or accidental release to the environment.

-No waste materials will be disposed of overboard, all non-biodegradable and hazardous wastes will be collected, stored, processed and disposed of in accordance with the vessel’s Garbage Management Plan as required under Regulation 9 of MARPOL Annex V.

-Hazardous wastes will be separated, labelled and retained in storage onboard within secondary containment (e.g. bin located in a bund).

-All recyclable and general wastes to be collected in labelled, covered bins (and compacted where possible) for appropriate disposal at regulated waste facility.

-All solid hazardous wastes are documented and tracked via waste tracking records.

-Solid non-biodegradable and hazardous wastes will be collected and disposed of onshore at a suitable waste facility or to a carrier licensed to receive the waste if required by legislation.

Dropped objects

-All equipment and gear on the vessels should be securely fastened during mobilisation/demobilisation to avoid dropping gear overboard.

-Anchoring is not planned to be undertaken for any seabed environs and should not occur in sensitive habitats except in the event of emergency.

-Lifting is to be carried out by competent personnel using equipment that is suitable, certified and maintained.

-Waste management controls are to remain effective to reduce risk of release of wastes that could be ingested or cause entanglement.

-During the activities, detailed records of equipment lost overboard or dropped will be maintained and reviews will be undertaken to reflect on methods to mitigate repetition of the incident.

Marine fauna collisions/entanglement

-Timing of activities can be coordinated to avoid peak frequency of marine fauna if it is known that activities cross known cetacean migratory routes.

-Operations of vessels will be commensurate with Part 8 of the EPBC Regulations (Interacting with Cetaceans and Whale Watching).

-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.

+If animals are bow riding, do not change course or speed suddenly.

Hydrocarbon, chemicals and other liquid waste

-Chemicals and hydrocarbons will be packaged, marked, labelled and stowed in accordance with MARPOL Annex I, II and III regulations. Specifically, all chemicals (environmentally hazardous) and hydrocarbons will be stored in closed, secure and appropriately bunded areas;

-A Material Safety Data Sheet (MSDS) will be available for all chemicals and hydrocarbons in locations nearby to where the chemicals/wastes are stored;

-Vessel operators will have an up to date Shipboard Oil Pollution Emergency Plan (SOPEP) and Shipboard Marine Pollution Emergency Plan (SMPEP). All shipboard chemical and hydrocarbon spills will be managed in accordance with these plans by trained and competent crew. Related mitigation measures in place:

+Spill exercises will be conducted at minimum of every three months and recorded in the vessel log.

+Spill kit will be located near high risk spill areas and the quantity of spill recovery materials will be appropriate to the quantity of stored chemicals;.

+Spills will be cleaned up immediately, spill kits re-stocked and clean up material contained, and not washed overboard.

-Any contaminated material collected will be contained on board for appropriate onshore disposal;

-Transfer deck run off discharges to the sea via the scuppers. Scupper plugs or equivalent will be available on vessel decks where chemicals and hydrocarbons are stored and frequently handled (i.e.’ high risk’ areas). Plugs will be utilised during handling of large quantities of hydrocarbons or hazardous chemicals;

-Any equipment or machinery with the potential to leak oil will be enclosed in continuous bunding or will have drip trays in place where appropriate;

-Following rainfall events, bunded areas on open decks of the vessels will be cleared of rainwater;

-All machinery and equipment containing hydrocarbons have maintenance scheduled on their respective planned maintenance system (PMS);

-All hoses for pumping and transfers will be maintained and checked as per the PMS;

-On board oily water disposal will be managed in accordance with the Marine Pollution

Regulation 2006. The vessel operator will record the quantity, time and onshore location of the oily water disposal in the vessel Oil Record Book;

-If vessels are equipped with an oily water filter system, they may discharge oily water after treatment to 15 ppm in an oily water filter system (providing they have a current calibration certificate for the bilge alarm) as required by MARPOL Annex I Regulations (for the prevention of pollution by oil). To discharge, the vessels will require a current IOPP certificate for oily water filtering equipment, and a current calibration certificate for the bilge alarm.

-The following controls can be implemented when possible for the purposes of mitigating or eliminating the risk of the spillage of hydrocarbon from refuelling:

+Refuelling operations will be a manned operation. In the event the refuelling pipe is ruptured, fuel bunkering will cease.

+Spill clean-up equipment will be located where hydrocarbons are stored and frequently handled (i.e. ‘high risk’ areas).

+Refuelling of a vessel will not take place within 12 nautical miles of the territorial baseline (except in port). It will only occur in suitable weather conditions.

Damaged fuel tank associated with vessel collision

-Visual observations will be maintained by watch keepers on all vessels;

-Regular notification to the following Australian Government agencies before and during operations:

+The AMSA RCC of proposed activity, location and commencement date to enable a AusCoast warning to be issued.

+The Australian Hydrographic Office (including hydro.NTM@defence.gov.au) of proposed activity, location and commencement date to enable a ‘Notice to Mariners’ to be issued.

+In the event of a spill resulting in notification to AMSA, other sea users (e.g. fishing industry) will be informed of the incident via Marine Notices to prevent vessels entering an area where hydrocarbons have been released.

-Vessel will operate in compliance with all marine navigation and vessel safety requirements in the International Convention of the SOLAS 1974 and the Navigation Act 2012. This includes the requirement for all equipment and procedures to comply with the following AMSA Marine Orders:

+Marine Orders - Part 30: Prevention of Collisions

+Marine Orders - Part 21: Safety of Navigation and Emergency Procedures

+Marine Orders - Part 27: Radio Equipment: sets out ship requirements regarding radio installations, equipment, watch keeping arrangements, sources of energy, performance standards, maintenance requirements, personnel and recordkeeping

+Marine Orders Parts 3 and 6 – Seagoing Qualifications and Marine Radio Qualifications: ensures seafarer competency standards meet the needs of the Australian Shipping Industry

+Vessels will also be equipped with an automatic identification system (AIS) and an automatic radar plotting aid system capable of identifying, tracking and projecting the closest approach for any vessel (time and location) within the operational area and radar range (up to approximately 70 km)

-Marine diesel oil compliant with MARPOL Annex VI Regulation 14.2 (i.e. sulphur content of less than 3.50% m/m) is the only engine fuel to be used by the vessels.

-Oil spill responses will be executed in accordance with the vessel's SOPEP, as required under MARPOL.

Seabed disturbance associated with cable maintenance activities

-Inshore alignment of the cable to be within the PZ as much as practically relevant for cable alignment to reduce the potential for third party damage (and thus required maintenance) to the cable.

-Cable placement activities to include detailed records of cable locations to enable relative certainty of cable position during grapnel activities.

-To minimise impact footprint selection of grapnel sizes is to be based on smallest available to achieve required outcome.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.

As described under Section 2 of this referral and as summarised in Tables 4.2A-C, a number of threatened and migratory species and other protected matters are considered likely to overlap with the proposed action during either installation or operation. To consider the proposed environmental outcomes to be achieved applying the prescribed controls an assessment of potential to impact upon these matters has been completed.

The nature of any impact to marine fauna (protected or not) is likely to be behavioural at most

expressed as temporary displacement from an area. Occurrence of this would be limited to the immediate vicinity surrounding the cable and cable laying vessels. This is due to the fact that cable laying activities will occur across a wide geographical area, and that cable laying is usually conducted at one point in time and will not have to be revisited once the cable is installed (with the exception of repair and maintenance, which is rarely required). Further, this impact has a lower likelihood outside of migratory seasons when chance encounter with species is reduced.

The protected species considered likely to overlap with the Project area are all noted to be transient or mobile species. It is possible that some of these species may be observed during the cable laying activity; however if they are disturbed by the activity, they will likely change their course of travel or temporarily relocate away from habitat to avoid any audible or visual disturbance. The proposed activities do not block or disturb any migration routes or access to resting areas, feeding grounds or breeding grounds. The impact to migratory species is expected to be limited to passing infrequent individuals who may alter the path to avoid the disturbance. There is no expected impact upon their habitat for feeding or breeding.

In regards to protected matters other than threatened or migratory species, potential to overlap or impact upon the yellow-bellied seasnake would also be restricted to chance encounters. This mobile animal is also expected to temporarily relocate away from any installation or maintenance disturbance activities and is not expected to be impacted by the proposed action.

A number of the marine parks and reserves through which the cable is planned to be installed are currently under transitional arrangements. For all of those and the Beagle Reserve, review of in place or draft management objectives indicates that the proposed action is consistent with, and unlikely to detriment, the management objectives or values of the Reserves.

The cable route will traverse shallow habitats that may support species of syngnathids. The route has been selected to avoid key habitat for these animals as far as practical. Any potential impacts are expected to be transient in nature during installation and relate primarily to displacement. Once the cable is laid species are expected to return to the area rapidly. No significant impacts to this family of fish is expected.

To inform the environmental outcomes proposed to be achieved an assessment of potential impacts upon threatened or migratory species and Commonwealth marine areas likely to interact with the proposed action has been undertaken against the Significant Impact Guidelines and is presented in the attached Tables 4.

On the basis of the preceeding assessments and with regard to the findings provided in the EA appended to this referral, this project has been assessed as unlikely to have significant impact on any Endangered or Vulnerable species or other matters protected under the EPBC Act.

The mitigation measures proposed for the action are considered appropriate and relevant to control potential for impact upon the environment and the associated protected matters.

Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

5.1.9 A water resource, in relation to coal/gas/mining

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

A seabed survey has collected data to inform alignment of the cable route to avoid sites of ecological or heritage significance. The proposed route will traverse a number of currently ungazetted Commonwealth Marine Reserves (multi-use) but review of management objectives with regard the proposed action indicate values of these reserves should not be affected by the proposed action. Otherwise the cable route has been planned to avoid all other marine reserves and known shipwrecks.

No terrestrial impacts are expected as the undersea conduits and BMHs into which the cable will connect are already constructed.

Very few vessels are required to support installation or operational maintenance (rarely needed). All are slow moving which limits the chances of a marine fauna collision.

The cable will be largely buried in shallow waters (up to 1000 m) to prevent any movement or danger, risk of impact to the cable (requiring maintenance). This will also work to minimise risk of entanglement with fishing gear (interference with others) or marine fauna.

No protected species are solely resident in the areas where cable laying activity will occur. All species are transient and migratory.

Protected species considered likely to intersect/overlap with the cable corridor are not present in

large numbers and are not present at all times of the year.

As the cable is being laid onto the seafloor in mostly deep waters, there will be no reduction in habitat, no reduced occupancy for pelagic species, and no barriers to migration or food supply.

The planned disturbances created by cable laying and burial will not cause significant impact to protected or other marine species as the disturbance will be short-term.

Standard controls will be in place to manage risk of unplanned disturbances, such as vessel collision. They are currently effective for the vast majority of ship movements that occur annually within Australian waters. No unplanned disturbances are, therefore, expected from the proposed action.

Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.

SubPartners Pty Ltd has not been involved in any incidents or accidents with adverse environmental consequences. The executive management team of SubPartners also have a proven track record from successfully completing another submarine cable system project (PIPE International (Australia) Pty Ltd's PIPE Pacific Cable 1 (or PPC-1) installed during 2008-2009) and extensive construction of a terrestrial fibre-optic cable network (PIPE Networks Pty Ltd) between 2004 and 2013. These significant projects were planned and carried out with due regard for all relevant environmental protection obligations, and were completed without any adverse consequences to the environment.

In addition, SubPartners Pty Ltd has engaged the services of ASN to deliver a turn-key submarine cable system, including marine engineering and installation activities. ASN have a long and successful history of delivering submarine cable systems and as they have all required functions 'in-house' they are able to maintain strict project management and environmental controls on all aspects of the project.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.

Not applicable

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes

6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.

SubPartners is currently finalising their draft Environmental Management Plan and can confirm that it will be complete and in place prior to any construction or installation activity commencing.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes

6.4.1 EPBC Act No and/or Name of Proposal.

APX-West Fibre Optic Telecommunications Cable System, Perth, WA to Singapore Project (EPBC 2013/7102)

APX-East Fibre Optic Telecommunications Cable System, from Sydney to California (EPBC 2014/7139).

Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
Refer to Reference Lists in uploaded documents	Published material	As per published material, refer to Reference Lists in uploaded documents

Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

8.0 Provide a description of the feasible alternative?

None. There are no feasible alternative methods of achieving additional high speed and high capacity fibre optic telecommunications connections between east and west coast of Australia.

A number of alternative terrestrial cable landing areas and cable routes were investigated as part of primarily investigations for the project. The use of an existing landing infrastructure and submarine conduits was selected to minimse impacts upon the sensitive nearshore coastal and terrestrial environments. A detailed marine seabed survey was also undertaken to enable cable route alignment to be designed to avoid marine parks and protected areas, mapped known habitats of importance for MNES, seabed features, such as sea mounts, canyons or steep shelf drops that may be of importance for protected species as well as marine parks, protected areas, seagrasses, reefs or other important habitats and existing cable or other seabed infrastructure. The cable route selected has, therefore, sought to minimise risk of impacting upon sensitive environmental matters as well as other users.

The proposed cable installation methods are industry standard and considered to be the most relevant at minimising risk of impact. No alternative installation methods are deemed relevant.

A number of different cable types may be installed at different points along the cable route. These are described in Section 3 of this referral and may include single or double armoured cable. Use of armouring or need for burial of the cable has been determined for different sections of the cable alignment to minimise risk of cable damage, which would require maintenance works that would further disturb the environment. The cable types to be used are considered industry standard with a design life in excess of 25 years. Accordingly no further consideration of alternative materials or installation approaches are deemed relevant for the project.

The materials, installation methods and cable route described within this referral have, therefore, given consideration to different approaches/materials. Those selected are considered to be the most relevant at minimising risk to the environment from the proposed action.

8.1 Select the relevant alternatives related to your proposed action.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

9.2 Organisation

9.2.1 Job Title

Chief Network Architect

9.2.2 First Name

Lee

9.2.3 Last Name

Harper

9.2.4 E-mail

lee.harper@subpartners.net

9.2.5 Postal Address

333 Ann Street
Brisbane City QLD 4000
Australia

9.2.6 ABN/ACN

ACN

158967401 - SUBPARTNERS PTY LTD

9.2.7 Organisation Telephone

+61 7 3088 5922

9.2.8 Organisation E-mail

info@subpartners.net

9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Not applicable

Small Business Declaration

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:…… Date: ……

9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations

No

9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made

Person proposing the action - Declaration

I, Lee Harper, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:…… Date: 15-Jan-2018

I, _____, the person proposing the action, consent to the designation of _____ as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:…… Date: ……

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Chief Network Architect

9.5.2 First Name

Lee

9.5.3 Last Name

Harper

9.5.4 E-mail

lee.harper@subpartners.net

9.5.5 Postal Address

333 Ann Street
Brisbane City QLD 4000
Australia

9.5.6 ABN/ACN

ACN

158967401 - SUBPARTNERS PTY LTD

9.5.7 Organisation Telephone

+61 7 3088 5922

9.5.8 Organisation E-mail

info@subpartners.net

Proposed designated proponent - Declaration

I, _____, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:…… Date: 15-Jan-2018

9.6 Is the Referring Party an Organisation or Individual?

Organisation

9.8 Organisation

9.8.1 Job Title

Principal Marine Scientist

9.8.2 First Name

Kerry

9.8.3 Last Name

Neil

9.8.4 E-mail

kerry.neil@ghd.com

9.8.5 Postal Address

145 Ann Street
Brisbane City QLD 4000
Australia

9.8.6 ABN/ACN

ABN

39008488373 - GHD PTY LTD

9.8.7 Organisation Telephone

+61 7 3316 3187

9.8.8 Organisation E-mail

kerry.neil@ghd.com

Referring Party - Declaration

I, KERRY NEIL, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence.

Signature:..... Date: 15 JAN 2018

Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. 2126628-rep_indigo_central_ea_master_document_doee_20171220.pdf
2. 2126628-rep_indigo_central_eia_other_considerations_appendix_c_20171215.pdf
3. 2126628-rep_indigo_central_eia_physical_environment_appendix_a_20171215.pdf
4. 2126628-rep_indigo_central_eia_pmst_searches_appendix_e_20171215.pdf
5. 2126628-rep_indigo_central_impact_assessment_appendix_d_20171215.pdf
6. 2126628-rep_indigo_central_marine_ecology_appendix_b_20171220.pdf
7. figure_1-1_master_21_26628_000_rev_1.pdf
8. figure_2-1_master_21_26628_001_rev_1.pdf
9. figure_2-2_master_21_26628_002_rev_1.pdf
10. figure_b-1_ab_21_26628_007_rev_1.pdf
11. figure_b-2_ab_21_26628_008_rev_1.pdf
12. figure_b-3_ab_21_26628_009_rev_1.pdf
13. figure_b-4_ab_21_26628_010_rev_1.pdf
14. figure_b-8_ab_21_26628_011_rev_1.pdf
15. figure_b-9_ab_21_26628_012_rev_1.pdf
16. figure_b-10_ab_21_26628_013_rev_1.pdf
17. figure_b-11_ab_21_26628_014_rev_1.pdf
18. figure_b-12_ab_21_26628_015_rev_1.pdf
19. figure_b-13_ab_21_26628_016_rev_1.pdf
20. figure_b-14_ab_21_26628_017_rev_1.pdf
21. indigo_central_s1_coordinates_28-nov-17.zip
22. table_1_stakeholder_engagement_summary.pdf
23. table_2_summary_list_of_threatened_migratory_and_other_species.pdf
24. table_4_significant_impact_assessment.pdf