Title of Proposal - INDIGO West 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 Jakarta, Indonesia. This cable system, Indigo West, will be owned and managed by a telecoms consortium consisting of AARNet, Google, Indosat, Singtel, SubPartners, and Telstra. The fibre optic submarine cable is intended (once installed) to provide high speed international internet connectivity and reliability.
At the time of installation the cable will connect to existing onshore infrastructure via a submarine pop out point (POP) within the Perth PZ, passing north-west to the point where the cable leaves the exclusive economic zone (EZZ), approximately 465 km offshore, in a water depth of 3850 m. The cable route re-enters Australian waters where it transitions through the Christmas Island EEZ, passing approximately 130 km west of Christmas Island in water depths of 5100 m. The cable route has a maximum width of 10 m, with the area of actual seabed disturbance comprising a small 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 POP to the EEZ boundary (i.e. 200 nm); i.e. through the Perth PZ and into Australian waters.
— Area of the Australian EEZ around Christmas Island.
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.
Cable Installation Method
Cable protection at Perth landing

For the Perth landing, the cable will utilise an existing conduit. The conduit has already been pre-installed under the seabed. The POP of the conduit is located approximately 730 m west of the Beach man Hole (BMH) at approximately 10 m water depth. It has been recommended in the RPL (ASN, 2017) that a DA cable be used within the conduit for connection.

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.

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.

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. Survey data collected to inform route alignment will be interrogated to also inform site conditions and burial potential. If full burial is not possible, a shallow burial may provide sufficient protection and will be considered.

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 West, this approach will be adopted in water depths of more than 1,000 m offshore of Perth. Average vessel speeds will be limited to 4 knots during surface lay operations.

Schedule, Operations, Maintenance

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

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

Repair would, therefore, require a number of grapnel deployments across (perpendicular to) the cable route. This would result in disturbance of the seabed within the footprint of the grapnel run. The need for this within Australian waters is, however, considered highly unlikely given that 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 may effect rate of placement. At this stage, it is estimated the works will take four months to complete.

Installation schedule

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

— Oceanographic factors
— Bathymetry / substrate
— Water depth
— Cable placement method and in turn rate of placement of the cable

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
x	1	-32.086717516828	115.40723325041
x	2	-32.451607539005	114.96250690249
x	3	-32.086717516828	115.40723325041
Indigo West	1	-31.83849392621	115.74389167093
Indigo West	2	-31.748849772708	114.82982970737
Indigo West	3	-31.659118745992	114.02123488449
Indigo West	4	-31.209169900469	113.03686149381
Indigo West	5	-29.037375097181	111.62201912339
Indigo West	6	-26.392294296995	110.25092617805
Indigo West	7	-23.007381083489	107.89545715983
Indigo West	8	-13.539661527197	103.28998894627
Indigo West	9	-12.717975494098	103.25483189161
Indigo West	10	-11.893616119603	102.51655117805
Indigo West	11	-9.1980173677614	102.1298329645
Indigo West	12	-7.3542224413369	101.98920742805
Indigo West	13	-7.3542224413369	101.98920742805
Indigo West	14	-7.3542224413369	101.98920742805
Indigo West	15	-31.83849392621	115.74389167093

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 route will extend from an existing submarine pop out point (POP) within the submarine cable protection zone (PZ), passing north-west to the point where the cable leaves the EEZ, approximately 465 km offshore, in a water depth of 3850 m. The POP is located in 10 m water depth (WD). From this point where required and appropriate the cable will be ploughed or water jetted into the seabed along the route up to WD of 1000 m. From this point the cable will be placed on the open seabed.

The cable route re-enters Australian waters where it transitions through the Christmas Island EEZ, passing approximately 130 km west of Christmas Island in water depths of 5100 m. The cable route has a maximum width of 10 m, with the area of actual seabed disturbance comprising a small portion of this area; exact disturbance area is dependent on cable installation method in any one location.

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

Cable length of 1767km, maximum 10m corridor. Maximum disturbance footprint 17.67 km2

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title. Not applicable as project is wholly marine

1.8 Primary Jurisdiction.

International Waters

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;

-WA State Government agencies

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

1.1Commonwealth Legislation and Bodies

1.1.1Telecommunications 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 environmental assessment to be undertaken and that all required approvals/notifications for the project are obtained.

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

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

1.1.2Environment Protection and Biodiversity Conservation Act 1999

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

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

This Environmental Assessment forms part of the EPBC Act Referral approval process.

1.1.3Historic 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.

1.1.4Australian 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.

1.1.5Department 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. To provide information for this EA, the Department of Defence (Defence) was consulted regarding the project. No specific training zones have been identified to conflict with the proposed route. Further communications and recommendations from Defence are detailed in Appendix C.

1.2 Western Australian State Legislation, Department and Bodies

1.2.1Environmental 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 actions or permits required for this project will be resolved and attained prior to commencement of cable installation works.

1.2.2Heritage 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.

1.2.3Aboriginal 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.

1.2.4Land 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 resolved prior to cable installation.

1.2.5Department 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.

1.2.6Department 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.

1.2.7Department 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.

1.2.8RecFishWest

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.

1.2.9Western 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.

1.2.10Port 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 survey and cable lay/installation. In addition, the project will ensure that the Port of Fremantle receives the relevant charts once the cable has been installed.

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 Table 2. 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 Perth PZ, and will be protected under the Telecommunications Act 1997. Across all jurisdictions of relevance to the alignment, required 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 in attached

Table 1.

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 November 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 Western Australia (WA), as well as with reference to relevant Commonwealth legislation. The development intends to comply wholly with all relevant WA and Commonwealth 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 Environmental Assessment Report (GHD, 2017). A summary of the potential impacts on matters of NES is provided in this EPBC Act referral.

Within the Perth EEZ cable corridor the PMST identified the following matters of NES of relevance:

-Two Commonwealth Marine Areas

-One threatened ecological community

-54 threatened species and

-62 migratory species

Within the Christmas Island EEZ cable corridor the PMST identified the following matters of NES of relevance:

-One Commonwealth Marine Areas

-Four marine mammals

-Six marine reptiles

-One shark

-Three birds

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 WD

-Direct placement on the seabed

Vessels will be required to support the project activities, including the connection of the cable with the POP.

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 Jakarta 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 environmental impact assessment.

Separate to the proposed action is the proposed Indigo Central submarine telecommunication cable (Indigo Central). Indigo Central is being undertaken by the same proponents and is being assessed in parallel to Indigo West. 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-four listed threatened species were identified by the PMST 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 (nine plants, two mammal and three birds), were omitted from further consideration. The species of relevance to assessment included: — Six marine mammals — Four marine reptiles — Three sharks — 27 birds Of these only the following threatened species were considered likely to occur in the Perth EEZ cable corridor: — Five marine mammals: • Australian sea-lion (Neophoca cinerea) • Blue whale (Balaenoptera musculus) • Fin whale (Balaenoptera physalus) • Humpback whale (Megaptera novaeangliae) • Southern right whale (Eubalaena australis) — Four marine reptiles: • Flatback turtle (Natator depressus) • Green turtle (Chelonia mydas) • Leatherback turtle (Dermochelys coriacea) • Loggerhead turtle (Caretta caretta) — Two sharks: • Great white shark (Carcharodon carcharias) • Whale shark (Rhincodon typus) — Nine birds: • Australian fairy tern (Sternula nereis nereis) • Blue petrel (Halobaena caerulea) • Curlew sandpiper (Calidris ferruginea) • Indian yellow-nosed albatross (Thalassarche carteri) • Northern giant petrel (Macronectes halli) • Northern royal albatross (Diomedea sanfordi) • Red knot, knot (Calidris canutus) • Soft-plumaged petrel (Pterodroma mollis) • White-capped albatross (Thalassarche cauta steadi)	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
For these marine mammals, reptiles, sharks 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).	
The cable route does not intersect any Threatened Ecological Communities (TECs) within the Christmas Island EEZ. Fourteen listed threatened species were identified by the Protected Matters search as matters having the potential to occur within the Christmas Island EEZ cable corridor and 10 km buffer area. These species include: — Four marine mammals — Six marine reptiles — One shark — Three birds As was completed for the Perth EEZ cable corridor alignment, a likelihood of occurrence assessment was also conducted for those species overlapping with the Christmas Island EEZ alignment to determine the likelihood of these species, or species' habitat, occurring within the cable corridor. This was undertaken for each species identified in the Protected Matters search. The following threatened species were considered likely to occur in the Christmas Island EEZ cable corridor: — Two marine mammals: • Fin whale (Balaenoptera physalus) • Humpback whale (Megaptera novaeangliae) — Five marine reptiles: • Flatback turtle (Natator depressus) • Green turtle (Chelonia mydas) • Hawksbill turtle (Eretmochelys imbricata) • Leatherback turtle (Dermochelys coriacea) • Loggerhead turtle (Caretta caretta) — One shark: • Great white shark (Carcharodon carcharias) — Three birds: •	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
Abbott's booby (Papasula abbotti) • Christmas Island frigatebird, Andrew's frigatebird (Fregata andrewsi) • Red knot, knot (Calidris canutus) For these marine mammals, reptiles, shark and birds, the likelihood of occurrence largely relates to known migration pathways overlapping with the cable corridor and/or neighbouring feeding grounds and 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 identified by the Protected Matters Search as matters having the potential to occur within 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: — Ten marine mammals (of which five are also listed as	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

Species	Impact
threatened); — Four reptiles (of which all are also listed as threatened); — Seven 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 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: — Three marine mammals: • Bryde's whale (Balaenoptera edeni) • Pygmy right whale (Caperea marginata) • Sperm whale (Physeter macrocephalus) — Five sharks and rays: • Giant manta ray (Manta birostris) • Longfin Mako (Isurus paucus) • Porbeagle (Lamna nasus) • Reef manta ray (Manta alfredi) • Shortfin mako (Isurus oxyrinchus) — 12 birds: • Bridled tern (Onychoprion anaethetus) • Common greenshank (Tringa nebularia) • Common noddy (Anous stolidus) • Common redshank, redshank (Tringa totanus) • Flesh-footed shearwater, fleshy-footed shearwater (Ardenna carneipes) • Grey-tailed tattler (Tringa brevipes) • Osprey (Pandion haliaetus) • Red-necked phalarope (Phalaropus lobatus) • Red-necked stint (Calidris ruficollis) • Sharp-tailed sandpiper (Calidris acuminata) • Sanderling (Calidris alba) • Whimbrel (Numenius phaeopus) 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	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
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).	
Twenty-five listed migratory species were identified by the Protected Matters Search as matters having the potential to occur within the Christmas Island EEZ cable corridor. In addition to those 25, 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 remaining species include: — Seven marine mammals (of which four are also threatened); — Six reptiles (all of which are threatened); — Four sharks and rays (one of which is threatened); and — Eight birds (of which two are threatened). As noted, 13 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 species overlapping with the Christmas Island EEZ alignment to determine the likelihood of these species, or species' habitat, occurring within the cable corridor. Of the remaining 12 migratory species those considered likely to occur in the Christmas Island EEZ were: — Two marine mammals: • Bryde's whale (Balaenoptera edeni) • Sperm whale (Physeter macrocephalus) — Three sharks and rays: • Giant manta ray (Manta birostris) • Longfin Mako (Isurus paucus) • Shortfin mako (Isurus oxyrinchus) — Three birds: • Common noddy (Anous stolidus) • Great frigatebird, greater	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 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
frigatebird (Fregata minor) • Lesser frigatebird, least frigatebird (Fregata ariel) 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?

Yes

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 Jakarta, Indonesia. 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 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.

A full description of the cable route is provided in Section 1 of this referral, and the attached Environmental Assessment. The cable route will extend from an existing submarine POP within the Perth submarine cable protection zone (PZ), passing north-west to the point where the cable leaves the EEZ, approximately 465 km offshore, in a water depth of 3850 m. The cable route re-enters Australian waters where it transitions through the Christmas Island EEZ, passing approximately 130 km west of Christmas Island in water depths of 5100 m..

Uploaded Figure 1-1 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 three provincial bioregions:

-Southwest IMCRA Transition

-Central Western Province

-Central Western Transition

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 (Section —) 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.

Christmas Island EEZ

The proposed cable route will pass approximately 130 km west from Christmas Island. Near shore impacts are not expected and therefore are not considered further. High pelagic productivity in the region flows from upwelling along the south Java coast and medium-term, seasonal, cold core eddies. A relatively high abundance of pelagic fish is found here and the area appears to correspond with the western end of the southern blue fin tuna spawning area. A number of unique habitats occur around Christmas Island and include deep holes and valleys, seamounts and abyssal plain environments. The cable corridor will cross both the Wharton Basin and Christmas Central Ridge subregions that occur in the deep waters off Christmas Island. The Central Ridge is characterised by a seamount chain running through the centre of the subregion, while the Wharton Basin is comprised extensively of abyssal plain with isolated seamounts. These seabed characteristics are discussed further below.

Offshore Habitats

Abyssal Plains

The Wharton Basin is characterised by abyssal plain, with over 90 % of the total basin occurring in depths of over 4000 m. Approximately 67% of the Wharton Basin is abyssal plain with geomorphic features including a single deep hole, and knolls ranging in elevation from 30 to 200 m. According to Brewer et al., little is known about the geomorphology of the large expanses of deep abyssal plain that dominate this region. Deep abyssal plains, in general, cover approximately 40% of the ocean floor and are typically covered by silt. Sediments range from sand-dominated to mud-dominate. Habitats may also contain some scattered regions of hard

bottom particularly on the margins at the base of the continental slope.

Seamounts

Deep seamounts are considered likely to support unique communities on a regional and national scale (Brewer et al. 2009). Seamounts provide surfaces and structures for the recruitment and growth of sessile, epibenthic suspension feeders such as deep sea corals, sponges, crinoids, ascidians and bryozoans (Genin et al. 1986). These communities provide habitats for a range of demersal deep water squids, crustacean and small fish, which are prey for larger species. This includes Whale Sharks and other large migratory species with the Christmas Island marine region being an important area through which these species migrate or target for feeding. Both the Wharton Basin and Christmas Central Ridge have numerous seamounts and seamount plateaus (Brewer et al. 2009).

The Wharton Basin seamounts have lower elevations than most of those in the central ridge subregion and are not obviously connected to the main seamount chain. Seamount peaks in this subregion occur in water depths ranging from 1,800 m to >5,000 m, although more than 75% of the total area of seamounts occurs in water depths >3,000 m (Brewer at al., 2009).

The Central Ridge is characterised by a shallow seamount chain that forms part of the volcanic province within the broader Wharton Basin. The seamount chain forms a unique habitat within the region and is the only location in the Christmas Island marine area not dominated by abyssal plain.

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.

Not applicable

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

Not applicable

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 the Perth POP 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 760 m. Shortly after exiting the PZ, the 1,000 m depth contour and the continental shelf is reached and the route descends steep slopes rapidly into deep water where the route crosses the proposed ASC-1 cable before adjusting towards the north-west and Christmas Island. The route remains west of the continental shelf in deep water with a relatively benign seabed until a scarp-like feature is negotiated onto the Wallaby Saddle. The cable then exits Australia's EEZ into international waters.

The cable route re-enters Australia's EEZ from international waters to pass through the Christmas Island EEZ near Horizon Ridge. Immediately south of Christmas Island the route passes through the more rugged terrain of the Venning Meinesz Seamounts, whilst bypassing the Bartlett Seamounts to the east and Golden Bo'sunbird and Shcherbakov Seamounts to the west. The route then passes west of Christmas Island outside of its Territorial Sea boundary in approximately 5,100 m water depth. From here, the route continues north into very deep waters where it exits the Australian EEZ directly into Indonesia's EEZ.

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 portion of the cable corridor is heavily urbanised, with the POP located at offshore from Perth (Floreat Beach).

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

There are no known sites located within 500 m (0.27 nm) of the cable route within the Perth or Christmas Island EEZ. However, three sites were identified with centre points within 2.5 nm of the cable route within the Australian EEZ surrounding Australia including:

-Shipwrecks of Centaur and Countess; and

-Ammunition dump of unexploded depth charges.

The descriptions, locations and distances from the cable corridor for these three sites are provided in the Appendix C of the attached Environmental Assessment. Preliminary marine survey reports indicate that no wrecks were observed or charted within the survey corridor.

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.

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

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.

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 West cable landing site in Perth (Perth PZ, up to 1000 m water depth), 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 West 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:

+Southern Bluefin Tuna fishery

+Western Tuna and Billfish fishery

+Western Skipjack fishery

+Western Deepwater Trawl fishery

+Small Pelagic fishery

-Several finfish fisheries operate in the waters of the Perth region:

+Rock lobster fishery

+West coast estuarine fisheries target nine main finfish species, including sea mullet, western

sand whiting and yellow-eye mullet

+Cockburn Sound finfish fisheries target southern sea garfish and Australian herring, with smaller catches of shark, whiting and mullet

+West coast beach fishery targets mainly sea mullet, blue sprat and western sand whiting

+West coast purse seine fishery targets pilchards and sardinella

+West coast demersal scalefish fishery targets primarily West Australian dhufish and pink snapper

Submarine cables and pipelines

The cable route is proposed to cross eight existing out of service (OOS) submarine cables within Australian waters.

cable type/Lat/Lon/depth

Telegraph (OOS)	31	04.8391	S	113	40.4584	E	4829m
Telegraph (OOS)	31	15.8437	S	114	07.7498	E	4506m
Telegraph (OOS)	31	19.6576	S	114	18.0979	E	4072m
AIS Seg A (OOS)	31	32.2051	S	114	39.8607	E	1480m
Telegraph (OOS)	31	43.6150	S	114	57.8718	E	534m
Telegraph (OOS)	31	48.9084	S	115	24.8420	E	43m
Telegraph (OOS)	31	48.8663	S	115	25.1033	E	42m
Telegraph (OOS)	31	48.1905	S	115	27.6356	E	41m

Planned submarine cables

The ASC-1 Cable is currently being installed, with a completion date set as August 2018. This cable will connect Australia to Singapore via Christmas Island and Jakarta, following a north-south route similar to that of Indigo West. The installation of this cable is also being completed and managed by ASN, as such ongoing internal collaboration between ASNs engineers will

ensure the offshore routing of ASC-1 and Indigo West do not conflict, and neither cable should be impacted by Indigo West activities.

The Indigo Central cable is planned to connect from the Perth PZ to the Sydney PZ to provide a domestic Australian connection. 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-West was planned to install a fibre optic telecommunications cable from Perth to Singapore with branches to Indonesia and other locations. In January 2014, this was determined to be not a controlled action in regards to the EPBC Act (EPBC 2013/7102). The APX-West alignment will be superseded by Indigo West. SubPartners who are the named party for APX-West are members of the Indigo consortium. SubPartners will rescind any approvals or rights over the existing permits and alignment prior to Indigo West being constructed. It is expected that a letter of rescindment will be required as a provision of approvals under the EPBC Act and in support of permitting under the ACMA.

Also refer to uploaded Appendix C for additional information and figures.

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 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 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 (ALARP), 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;

Pre-laying of the cable, benthic survey data will be reviewed to identify any debris along the proposed cable route. The route may be adjusted to avoid these areas and minimise the requirement for further seabed disturbance;

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

-Items on board the survey vessel or 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;

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 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, 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.

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, 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 Tables 4.

On the basis of the preceding 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 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.

On the basis of the preceding 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 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.

Telstra has not been involved in any incidents or accidents with adverse environmental consequences. The executive management team of Telstra also have a proven track record of successfully completing other submarine cable system projects inclusive of the North Rnaking Spur Fibre Optic Cable, offshore of Western Australia (EPBC 2016/7836) as well as the similar works for marine fibre telecommunications cable installation for Onslow (EPBC 2014/7373). These projects are in addition to extensive construction of a terrestrial fibre-optic cable networks (e.g. Kosciuszko Road New South Wales (EPBC 2013/6874) and Tinderbox Tasmania (EPBC 2012/6283). 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, Telstra 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.

Telstra's environmental policy highlights their commitment to minimising environmental harm from its activities, including limiting damage to flora and fauna, minimising resource use and missions where possible, and complying with relevant environmental laws, standards, and practices. Telstra's environmental policy has been provided as an attachment.

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.

Telstra has previously referred a number of actions under the EPBC Act, inclusive of, but not limited to, the following:

EPBC 2016/7836: North Rankin Spur Fibre Optic Cable

EPBC 2014/7373 Telstra Marine Fibre Optic Cable (Onslow)

EPBC 2013/6874 Telstra Corporation Limited/Telecommunications/Kosciuszko Road, Perisher Valley/NSW

EPBC 2012/6283 Telstra/Telecommunications/Tinderbox Tasmania/TAS/establishment of a mobile network telecommunications facility

Among many others

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 List in uploaded reports.	Published material from reliable sources	Refer to Reference List in uploaded reports.

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 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 a 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 matters of NES, 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 20 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

Manager Cable Project Engineer

9.2.2 First Name

Roger

9.2.3 Last Name

Schwarz

9.2.4 E-mail

Roger.J.Schwarz@team.telstra.com

9.2.5 Postal Address

363 Oxford Street
Paddington NSW 2021
Australia

9.2.6 ABN/ACN

ABN

33051775556 - TELSTRA CORPORATION LIMITED

9.2.7 Organisation Telephone

0407 949 679

9.2.8 Organisation E-mail

Roger.J.Schwarz@team.telstra.com

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, ROGER SCHWARZ, 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: Roger J Schwarz Date: 15/1/2018

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

Manager Cable Project Engineer

9.5.2 First Name

Roger

9.5.3 Last Name

Schwarz

9.5.4 E-mail

Roger.J.Schwarz@team.telstra.com

9.5.5 Postal Address

363 Oxford Street
Paddington NSW 2021
Australia

9.5.6 ABN/ACN

ABN

33051775556 - TELSTRA CORPORATION LIMITED

9.5.7 Organisation Telephone

02 8289 0174

9.5.8 Organisation E-mail

Roger.J.Schwarz@team.telstra.com

Proposed designated proponent - Declaration

I, Roger Schwarz, 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: 15/1/2018

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: 10 JAN 2018

Appendix A - Attachments

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

1. 2126628-rep_indigo_west_appendix_c_20171215.pdf
2. 2126628-rep_indigo_west_ea_master_document_doee_20171220.pdf
3. 2126628-rep_indigo_west_eia_physical_environment_appendix_a_20171215.pdf
4. 2126628-rep_indigo_west_impact_assessment_appendix_d_20171215.pdf
5. 2126628-rep_indigo_west_marine_ecology_appendix_b_20171215.pdf
6. 2126628-rep_indigo_west_pmst_searches_appendix_e_20171215.pdf
7. figure_1-1_master_21_26628_035_rev_1.pdf
8. figure_2-1_master_21_26628_036_rev_1.pdf
9. figure_b-1_ab_21_26628_039_rev_1.pdf
10. figure_b-2_ab_21_26628_040_rev_1.pdf
11. figure_b-3_ab_21_26628_041_rev_1.pdf
12. figure_b-4_ab_21_26628_042_rev_1.pdf
13. figure_b-5_ab_21_26628_043_rev_1.pdf
14. figure_b-6_ab_21_26628_044_rev_1.pdf
15. figure_b-7_ab_21_26628_045_rev_1.pdf
16. indigo_west_coordinates_28-nov-17.zip
17. table_1_stakeholder_engagement_summary_west.pdf
18. table_2_summary_list_of_threatened_migratory_and_other_species_west.pdf
19. table_4_significant_impact_assessment_west.pdf