Solomon Islands Submarine Cable Company Limited

Solomon Islands Submarine Cable Project

Public Environment Report

10 August 2018

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1. Introduction

1.1 Background

The Solomon Island Submarine Cable Company (SISCC) is managing the installation of a new submarine telecommunications cable which includes both an international connection between the Solomon Islands and Australia and domestic cable connections between various islands within the Solomon Islands. The international cable system is referred to as the Coral Sea Cable System (CS2). The element of the CS2 that occurs within the Solomon Islands Economic Exclusion Zone (EEZ), inclusive of the international branch into the Solomon Islands and the internal domestic connections, is herein referred to as the Solomon Islands International and Domestic Network (SIIDN).

The installation of submarine telecommunications cables in the Solomon Islands has been under consideration for the last eight years and was previously managed by the Solomon's Oceanic Cable Company (SOCC). Under the management of SOCC the cable installation was subject to two related Initial Environmental Examinations (ADB 2012 and ADB 2014) submitted to the Asian Development Bank in support of the proposed development application processes. Since then, the project has evolved; and now provides opportunity for connection into Papua New Guinea. The CS2, an international cable, will traverse from Sydney into the Coral Sea, where it will branch with one section landing at Port Moresby, Papua New Guinea and the other section landing at Honiara, Solomon Islands.

The SIIDN cable installation, managed by the SISCC, is co-funded by the Solomon Islands and Australian Governments and the overall delivery of the cable installation is currently being supervised by the Australian Department of Foreign Affairs and Trade (DFAT). The SISCC is responsible for delivery of works within the Solomon Islands EEZ, inclusive of seeking all relevant permits and managing construction and operational works.

1.2 Project overview

The SIIDN project will entail the CS2 international connection into Honiara and three domestic cable connections within the Solomon Islands EEZ. These three domestic cables will connect Honiara with the outlying provincial centers of Taro Island (in Choiseul Province), Noro (in Western Province) and Auki (in Malaita Province). The proposed CS2 and SIIDN cable routes are shown in Figure 1-1 and Figure 1-2.

Marine works will include installation of the submarine cable along the seabed, through the intertidal areas up to the terrestrial landing points. The land based components will include the on-shore landing point, land cable duct route from the landing point to a cable landing station (CLS).

A number of technical studies have been undertaken to the support the development of the project and have informed the preparation of this Public Environment Report (PER) and the associated Social Impact Assessment (SIA). Key studies include:

- Alcatel, 2018, Coral Sea Cable System (CS2) Site Survey Reports, Site: Solomon Islands Domestic
- Fugro Australia Marine Pty Ltd (2018a), Desktop Study for the Coral Sea Cable System, Volume 5: Solomon Islands Permitting Issues, Fugro Document No: GPH116414-05 (Appendix A)
- Fugro Australia Marine Pty Ltd (2018b), Desktop Study for the Coral Sea Cable System, Volume 4: Solomon Islands Landings, Fugro Document No: GPH116414-04 (Appendix B)

- Jacobs (2018), Coral Sea Cable Installation Environment Protection and Biodiversity Conservation Act - Section 160 Supporting Information Document, Document No: IW175400-0000-NP-RPT-001 | F (Appendix C)
- SISCC (2018), Summary Business Case for Investment Coral Sea Cable System (CS2) and Solomon Islands Domestic System (Appendix D)
- SISCC (2016), SISCC Business Plan 2016-2036 (Appendix E).

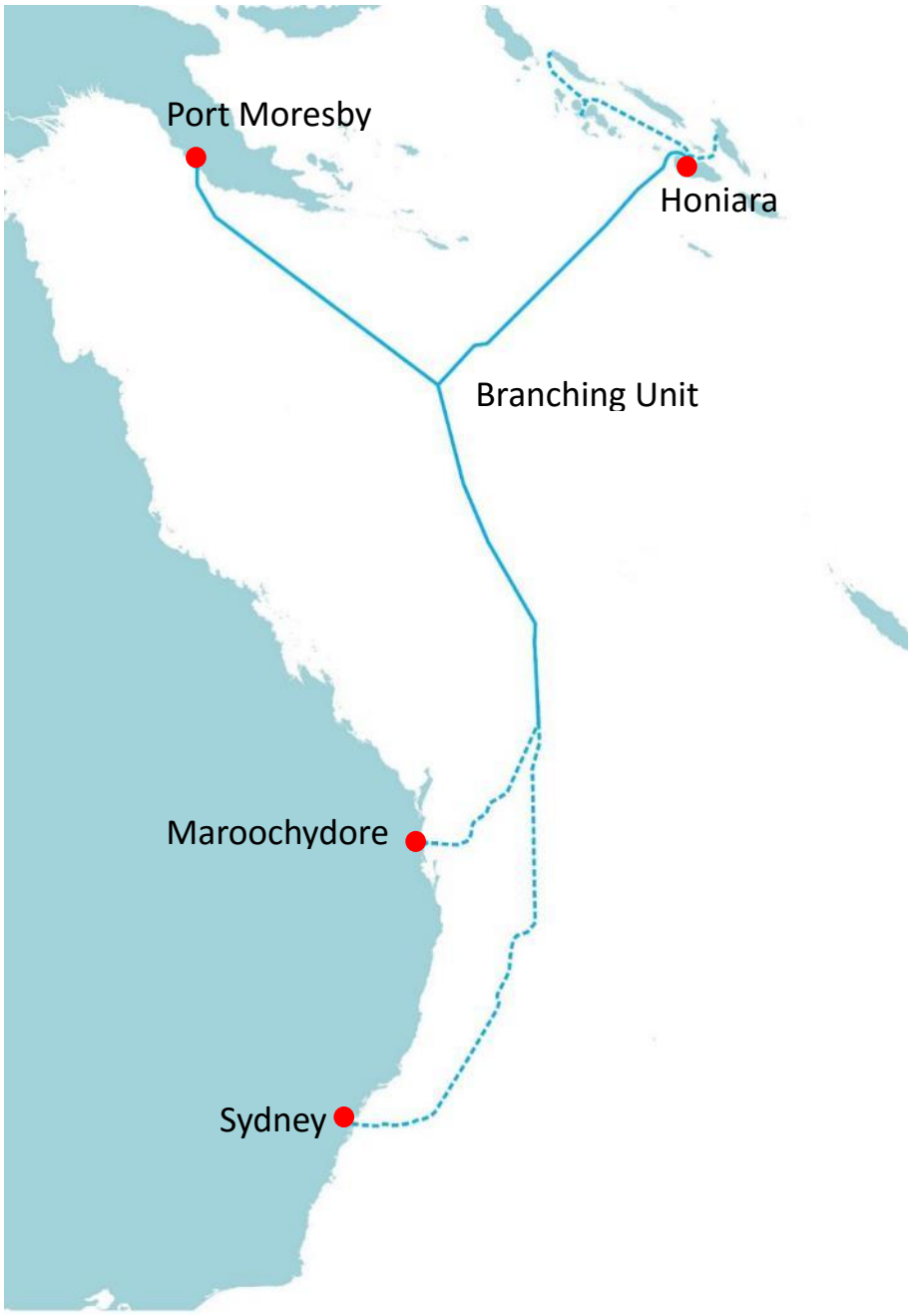

Figure 1-1 Overview of Coral Sea Cable Route

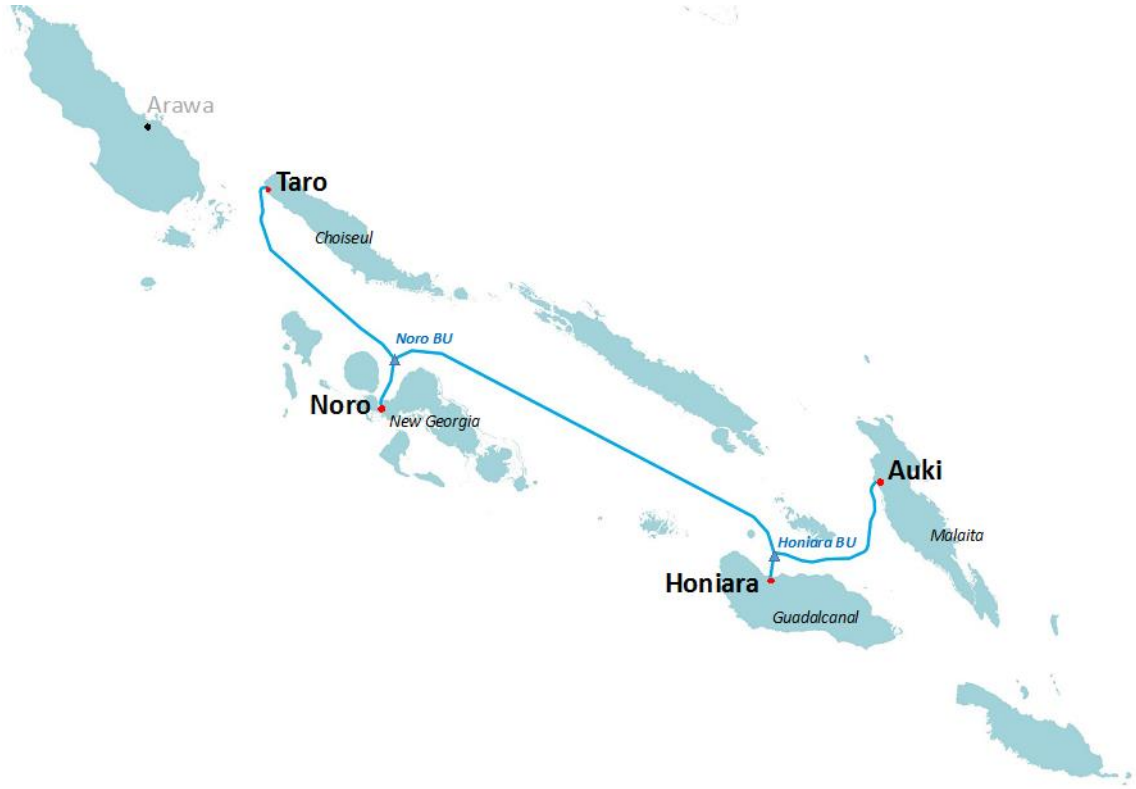

Figure 1-2 Solomon Islands cable distribution

1.3 Project justification

The Solomon Islands currently rely on satellites for international telecommunications connectivity, which is expensive and provides limited capacity of an inferior quality when compared to that provided by fibre-optic international submarine cables.

This project is being undertaken to provide an international fibre-optic submarine cable which will connect the Solomon Islands to the global internet and provide it with an ample and future-proof supply of reliable and low-cost broadband capacity sufficient to meet its needs for at least the next 25 years. It will also provide a domestic submarine cable system connecting initially three other provinces to the international cable gateway in Honiara. This will enable the wider population of the Solomon Islands to access much lower-cost broadband internet and other communications services, thus contributing to its socio-economic development[2].

Faster and lower cost broadband capacity is expected to have numerous positive development impacts, including reduced transaction costs and increased efficiency for business, government and household communications. Other benefits expected to follow will be new business opportunities, such as a boost to tourism and investments in e-commerce and business process outsourcing facilities. Much improved international and domestic connectivity will facilitate improved public service delivery, and the growth of e-education and e-health services.

Improved connectivity with Pacific Developing Member Countries (PDMCs) should strengthen the existing regional public goods and foster new ones by allowing countries to share knowledge across the limited human resources available in PDMCs.

As summarised in the Summary Business Case for Investment in CS2 and SIIDN (SISCC, 2018) (Appendix D), the robust demand forecast model originally developed under the ADB sponsored SOCC project has remained the basis of SISCC's business plan and strong demand for the services is forecast.

The socio-economic benefits that are predicted to be realised from the project are discussed in the SIA reported separately to this PER[1]. Social impacts and controls of relevance to this PER assessment have, however, been captured herein.

1.4 Purpose of this report

The SISCC is seeking decision on need for, and if required, issue of development consent for the SIIDN Project. An environmental impact assessment (EIA) is required as part of the development consent approval (DA) in accordance with S17(1) of the *Environment Act (1998)* (EAct) & Regulation 6 of the Environment Regulations 2008.

The proposed works are considered to be prescribed development of low risk to the environment and as such an EIA through a PER is to be completed in accordance with the Solomon Islands Government EIA Procedural Guidelines, 2010, as illustrated by the flow chart in Figure 1-3.

SISCC engaged GHD to prepare this PER. The objective of this PER is therefore to provide a consolidated report for SISCC to append to the DA to the Ministry of Environment, Climate Change and Disaster Management (MECDM).

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[2] http://pid.adb.org/pid/LoanView.htm?projNo=44382&seqNo=01&typeCd=3

[1] SIA is available from Solomon Islands Cable Company

Confirmation of this assessment format and requirement was provided during stakeholder consultation undertaken by GHD and SISCC with the Director of Environment on 24 May 2018. The approach was also confirmed to be relevant as per Fugro 2018a, section 2.1.3.

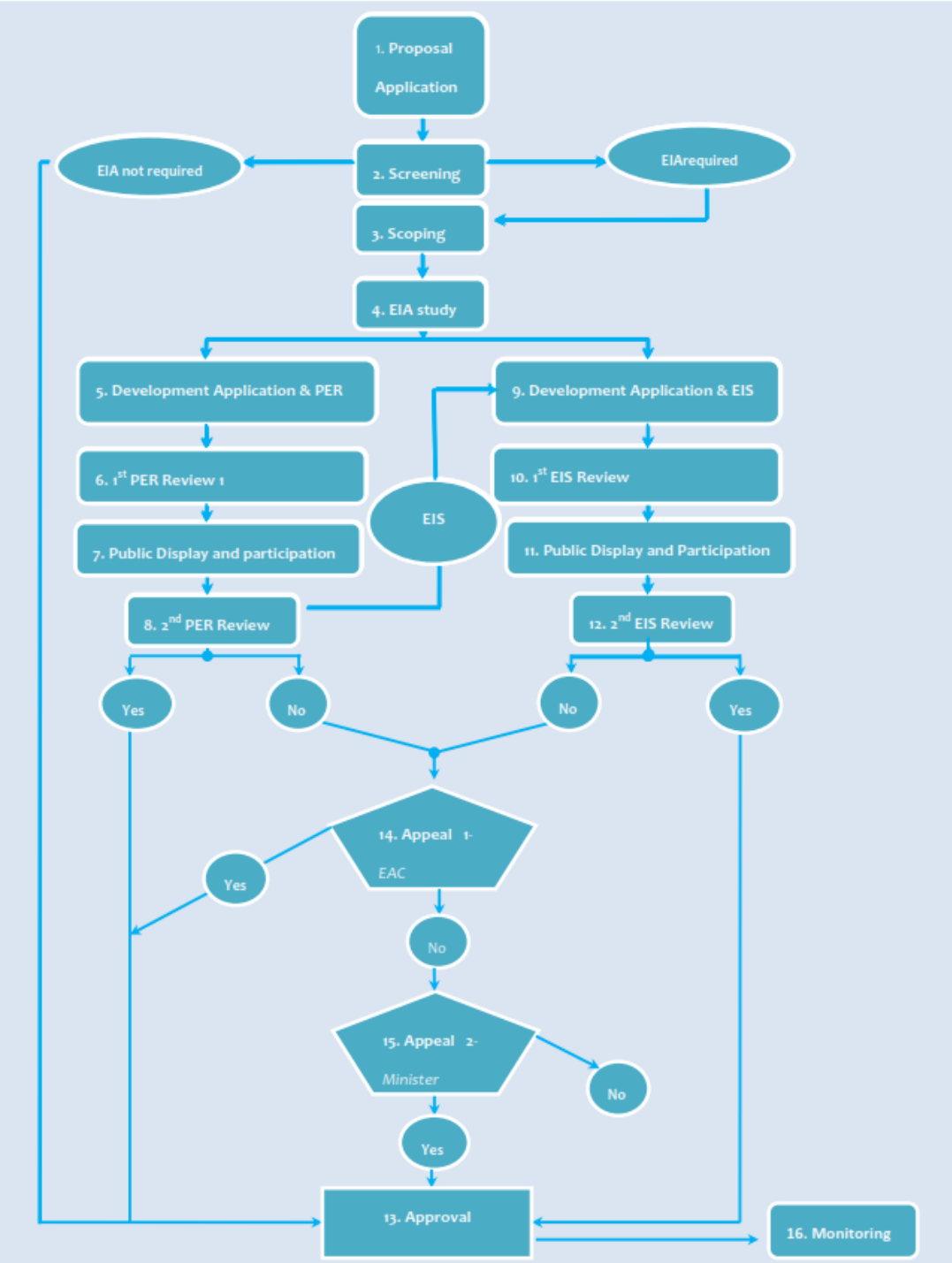

Figure 1-3 EIA procedural steps (extracted from the Solomon Islands Government EIA Procedural Guidelines (2010))

1.5 Structure of this report

To meet the Solomon Islands Government requirements the PER is organised as follows:

1. Introduction - provides a background of the prescribed development;
2. Project details - provides details of the prescribed development;
3. Description of the existing environment - describes the environment likely to be impacted by the prescribed development;
4. Potential impacts – describes the relevant potential environmental and social impacts pertaining to the prescribed development; this section is inclusive of consideration of relevant safeguards and mitigation measures – accordingly this section describes the proposed controls to the potential development impacts with a summary of monitoring obligations;
5. Environmental management plan - provides the proposed safeguards and mitigation measures and monitoring in an environmental management plan framework;
6. Conclusion – a summary of key findings from this PER; inclusive of requirements for any approvals and indication of potential impact management controls or conditions;
7. References - provides the sources whereby the information has been obtained for use within this report).

1.6 Scope and limitations

The CS2 project will require environmental and planning permits and approvals across all landing locations; Australia, PNG and Solomon Islands. DFAT has contracted Jacobs to support environmental permitting processes pertaining to Australian waters (refer Jacobs 2018).

SISCC are managing their obligations for environmental permitting for cable installation and operation in the Solomon Islands. As noted above, GHD have been contracted by SISCC to support that process through delivery of a PER. This PER will inform DA to the Solomon Islands government for land and marine construction works.

The geographic limits of this PER are the terrestrial lands and marine environments associated with proposed cable installation and operational works within the Solomon Islands EEZ. The assessment has taken into account currently proposed cable landing points, cable routes, project funding arrangements and assessment pathways. The scope is also informed by a separate SIA undertaken by GHD, a site visit and stakeholder consultation undertaken from 21 May to 1 June 2018.

The scope of this PER is, therefore, determined to be:

- Description of environmental social values at potential risk of the proposed project across all four cable landing locations inclusive of terrestrial and marine cable routes
- Assessment of potential environmental and social impacts and identification of relevant mitigation measures for the above works pertaining to construction and operation of the cable
- Reporting of impact assessment findings (across both social and environmental phases of works) in accordance with the requirements of the Solomon Islands Government EIA Procedural Guidelines, 2010

This work is not required to address Australian or other international impact assessment guidelines. As such it has taken into account relevant international social impact assessment guidelines as well as DFATs safeguard policies.

This report has been prepared by GHD for Solomon Islands Submarine Cable Company Limited and may only be used and relied on by Solomon Islands Submarine Cable Company Limited for the purpose agreed between GHD and the Solomon Islands Submarine Cable Company Limited as set out in section 1.4 of this report.

GHD otherwise disclaims responsibility to any person other than Solomon Islands Submarine Cable Company Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report where relevant. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Solomon Islands Submarine Cable Company Limited and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Project details

2.1 Cable alignments

The SIIDN project background and overview is provided in Sections 1.1 and 1.2 and proposed cable routes are provided in Figure 1-1 and Figure 1-2.

The following sections describe the proposed development in terms of types of cables to be used, installation methods, and detailed descriptions of the cable alignments and land based works for each of the cable routes. The phases of the development (construction and operation) are also described in the sections below to inform potential impacts and management strategies that would need to be applied during each phase of work. Those elements are addressed later in this report.

The international fibre-optic submarine telecommunications cable will be installed from Sydney to Honiara. Refer to for international and domestic cable lengths.

Table 2-1 International and Domestic Cable lengths

Cable lengths	Length of cables (km)
Total length of international and domestic cable	4,216
Total length of cable from start of PNG EEZ to start of Solomon Islands EEZ	518
Total length of domestic cable routes that will be installed within the Solomon Islands EEZ	1,138
Length of cable from Honiara to Noro	400
Length of cable from Honiara to Auki	148
Length of cable from Noro to Taro	218

Bathymetric information for this project is based on the data reported in the Initial Environmental Examination (ADB 2012), bathymetric charts (BA1713, BA1735, BA1747, BA1750 and BA3995-BA3998), site visit observations and reviews of aerial photographs.

2.1.1 Honiara – CS2 International Cable Connection

The incoming international CS2 branch enters the Solomon Islands EEZ along the abyssal plain at depths of approximately 5,600 m before ascending up the continental shelf into the nearshore environment of Honiara.

The proposed landing location will be positioned a few meters apart from the proposed BMH (located approximately at co-ordinates S09°25.747’ / E159°56.993’ [Alcatel, 2018]) on the Eastern side of the SMI site (the former G Club) opposite town ground in Point Cruz, Honiara.

The cable will be installed through a single articulated duct that will be pinned to the fringing reef and connected to a shore based BMH. The land based cable will run in a trench from the SMI site, across Tandai Highway around Townground and up the hill to Lengakiki Ridge. This route includes use of an easement over private property up the hill to avoid impact upon users of Hibiscus Avenue and Lengakiki Road during construction works. A CLS will be located on a site located on Lengakiki Ridge. The location of the landing site and the location of the

proposed beach manhole (BMH) in Honiara is shown in Figure 2-1, and Figure 2-2. Figure 2-4 shows an aerial of the cable landing point and on land cable route.

In terms of bathymetry, the seabed rapidly deepens from Honiara beach to about 40 m water depth (WD) once the cable has left the BMH. The seabed drops off steeply at about 20 km offshore to a depth of approximately 700 m WD. The route passes through the Iron Bottom Sound, where numerous ship wrecks are known to be located towards Savo Island. A high point in the bathymetry is encountered of at Savo Volcano, in the vicinity of 75 km chainage (approximately) from Honiara. Past Savo Island, the route follows a depression with depth ranges between 2000 m WD and 4500 m WD.

The land section of the domestic cable connection into Honiara will share the same ducts as the international connection from CS2 thus minimising construction impacts.

Figure 2-1 Looking east along beach with cable route and BMH indicated in yellow

Figure 2-2 Aerial view of Honiara cable landing point and BMH with marine (yellow) and terrestrial (red) routes indicated

Figure 2-3 View of BMH

Figure 2-4 Honiara cable landing point and on land cable route

2.1.2 Honiara – Noro

The route from Honiara to Noro follows the same route as the Honiara – CS2 alignment for the first 42 km, through Iron Bottom Sound, as far as Savo Island, before continuing into New Georgia Sound (Figure 1-2) past Russel Islands before continuing into Noro Beach. The cable passes through Noro Channel, a deep water habitat used by commercial shipping and for port activities. This cable route is approximately 400 km in length.

The Noro beach landing point is located north-east of the Noro town centre. The proposed landing point for the cable will be positioned a few meters apart from the BMH (approximate co-ordinates S08°12.879' / E157°12.268' [Alcatel, 2018]) within a government easement located just outside the centre of Noro, the land located adjacent to Markworth area (Figure 2-5). Once landed, the cable will then proceed from the BMH through the easement, buried to approximately 1.5 m depth. This area is currently covered in dense vegetation (Figure 2-6 and Figure 2-7) which will need to be cleared to support installation works.

Once the cable reaches Niep Road, it will be trenched in an alignment parallel to that road towards the CLS, located in the Solomon Telecom base station site off Niep Road, approximately 0.5 km from the landing site (Figure 2-8). Figure 2-9 shows an aerial of the cable landing point and on land cable route.

The bathymetry through New Georgia Sound as the route turns into Noro appears to be undulating yet grading gradually down to approximately 1800 m before gradually inclining to 600 m. The coral reef extends approximately 45-50 m out to sea before a steep drop off. The 20 m depth contour is approximately 120 m off the landing point, increasing to more than 100 m water depth within 260 m of the landing point.

Figure 2-5 Aerial view of Noro landing point, marine and terrestrial cable routes and CLS

Figure 2-6 View of proposed cable landing point at Noro within government easement

Figure 2-7 Dense vegetation along alignment through which cable will be trenched

Figure 2-8 View of Telekom compound for the proposed CLS (Vocus, 2018)

(Source: Vocus pty Ltd, 2018)

Figure 2-9 Noro cable landing point and on land cable route

2.1.3 Honiara - Auki

This domestic cable segment commences at Honiara and heads east towards Auki through the Sealark Channel as shown in Figure 1-2. Having traversed through Sealark Channel, the route drops to 1500 m WD and follows the Indispensable Strait before ascending towards Auki, to the south of Alite Reef. Shallow fringing reefs are present just offshore of the Auki landing point. This section of the submarine cable route is approximately 148 km in length.

The proposed landing point for the cable at Auki will be positioned a few meters apart from the BMH located at the approximate co-ordinates S08°46.226' / E160°41.209' (Alcatel, 2018) (Figure 2-10, Figure 2-11 and Figure 2-12). Once installed, the cable will extend from the beach alongside the existing Kunu Road (Figure 2-12); this will effectively widen the road by approximately half a meter. The cable alignment will cross the Langa-Langa freshwater lagoon at the bridge over the culverts (Figure 2-13) and head towards the centre of Auki town centre to the CLS site. The route from the landing site to the CLS site is identified in Figure 2-14. Crossing the lagoon along the road, will mitigate the risk of draining or causing ecological damage to the lagoon.

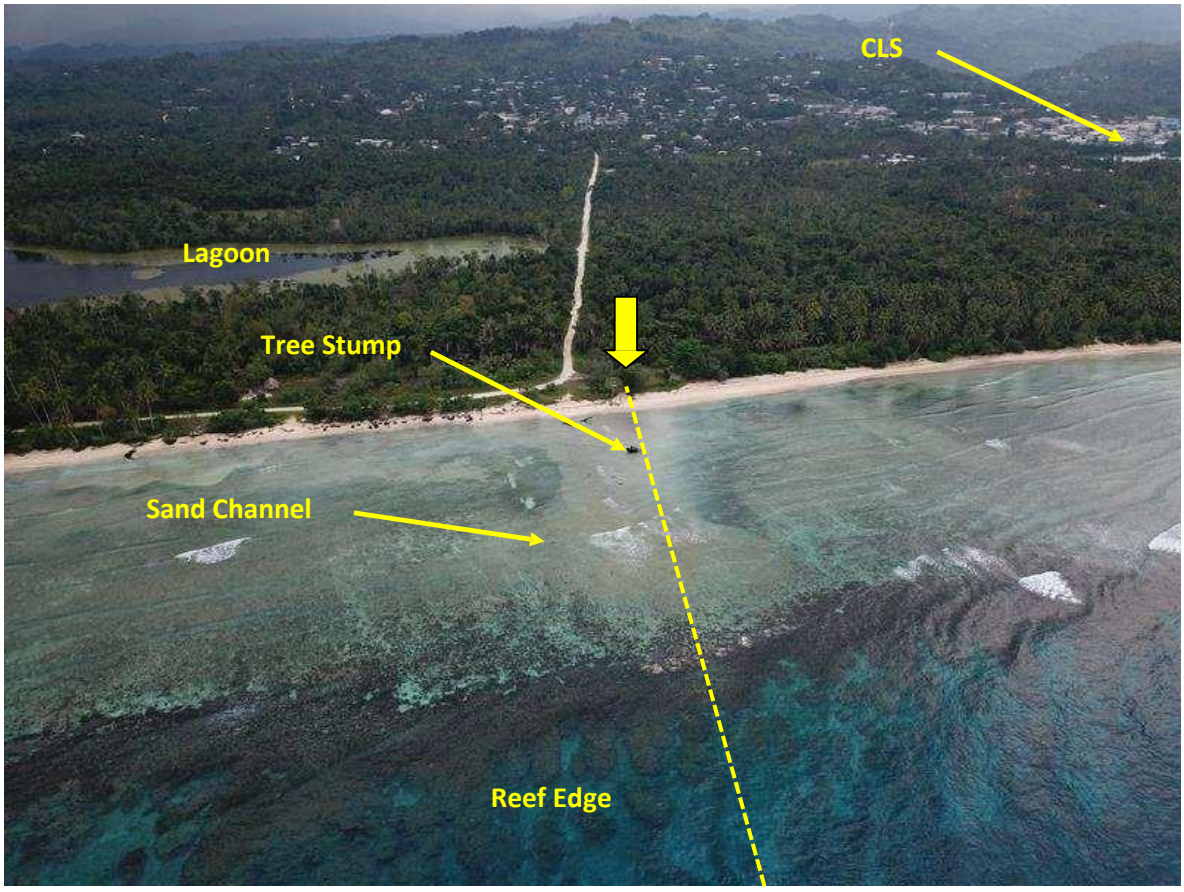

Figure 2-10 View of Auki landing point

Figure 2-11 Auki BMH and proposed seaward ducts

Figure 2-12 Cable route along existing kunu road

Figure 2-13 Crossing culverts over Langa-langa freshwater lagoon

Figure 2-14 Auki cable landing point and on land cable route

2.1.4 Honiara - Taro

This cable is part of the domestic connection branch that lands in Noro. Where the cable branches to Noro via the deep water channel it also continues west continuing to traverse the deep water environment (>1500m WD) of the Solomon's Sea towards Taro, as shown in Figure 1-2. The cable alignment approaches Taro via the deep water shipping channel to the west of the island. This section of the submarine cable route is approximately 218 km in length.

The proposed landing point for the cable at Taro will be positioned a few meters apart from the BMH located at co-ordinates S06°42.759' / E156°23.936' (Alcatel, 2018) (Figure 2-15). Once installed, the cable will be trenched a very short distance from the BMH across a footpath into the CLS to be constructed on Government land adjacent to the existing Telekom compound (Figure 2-15 and Figure 2-16). The overall cable route is identified in Figure 2-17.

Figure 2-15 Aerial view of Taro landing point

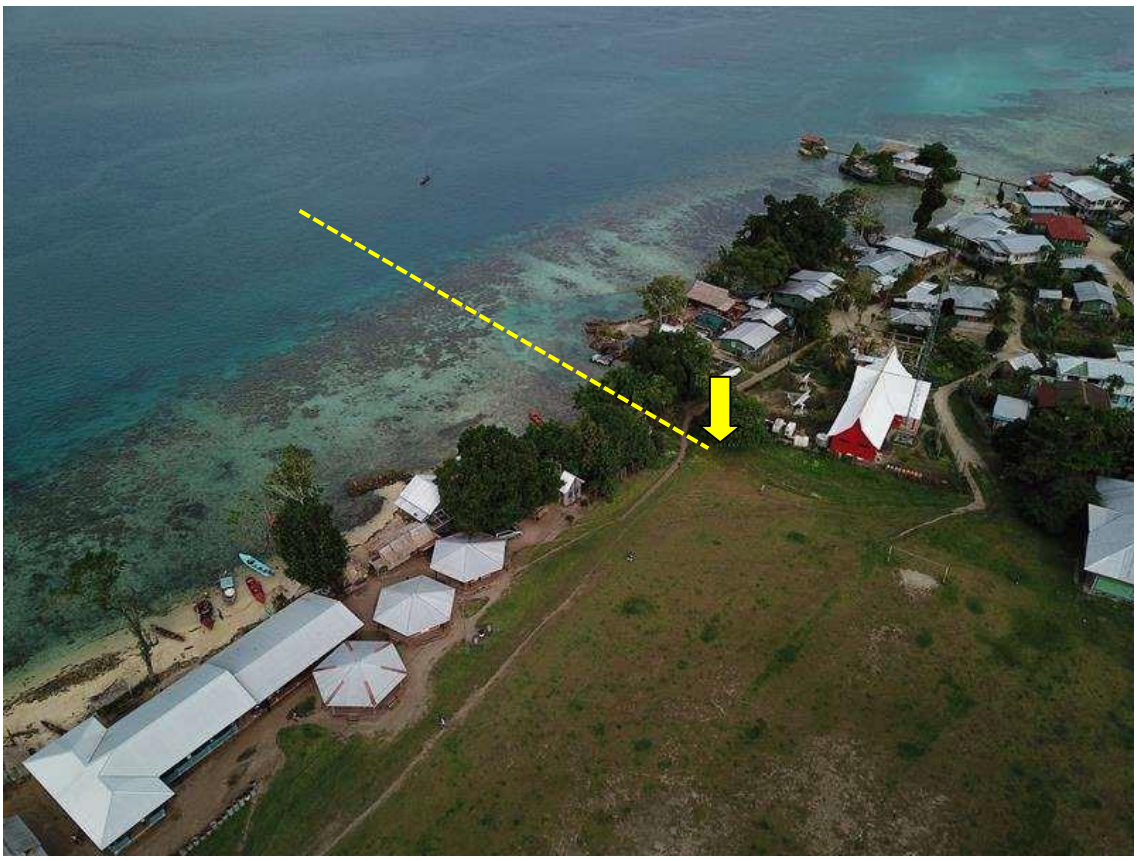

Figure 2-16 BMH and CLS to be located just outside of Telekom fenceline

Figure 2-17 Taro cable landing point and on land cable route

2.2 Construction phase

Marine works will include installation of the submarine cable along the seabed, through the intertidal areas to connect into the landing points. A schematic of the installation activities is provided by the proposed construction works conceptual diagram (Figure 2-19).

The land based components of the cable system at each site will include the on-shore landing point within a manhole near the beach, and the cable route from the landing point to the CLS.

The cable will be installed by a purpose built cable laying vessel ('cable ship') that will lay the cable directly on the seabed. This vessel will bring the cable into the Solomon Islands and lay the cable through all water depths towards the landing point, stopping just offshore in water depths of approximately 25 m. Depending on vessel draft requirements and water depths; from the 25 m (or shallower) depth contour to the intertidal area the cable may be laid directly on the seabed by other means, such as by the use of remote operated vessels (ROVs) or divers.

Reef habitats commonly fringe most islands in the Solomon Islands. Where reef habitats are present within the shallow waters of the cable route, the cable will be installed in an articulated pipe which will be pinned to the reef. This will provide protection to the cable from anchorage or other activities that may occur in shallow waters. This will also support protection of the reef from any damage the cable may cause if a severe storm occurred, as the pipe will be anchored to the reef to stop the cable moving (refer to Figure 2-18).

A BMH will be installed at each beach landing point to support connection of the cable to landing infrastructure and CLSs will be built at each location. From the BMH to the CLS, the cable will be trenched at approximately 1.5m depth.

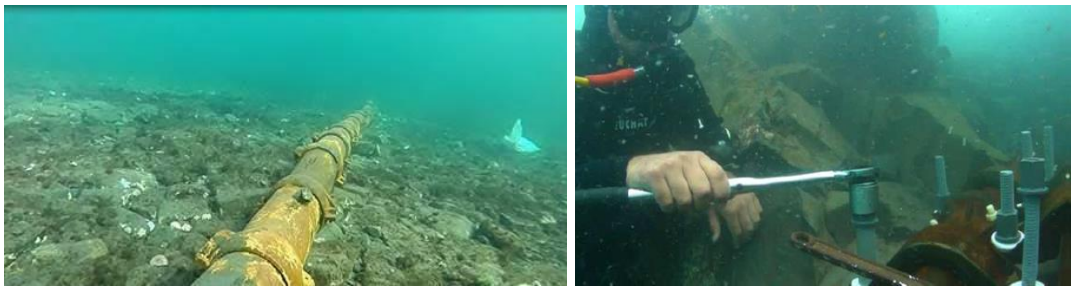

Figure 2-18 Articulated piping

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Figure 2-19 Proposed construction works conceptual diagram

2.2.1 Types of cables

A range of cable types will be installed across the various locations of the project. A description of the range of cable types, features, and applications proposed to be used are shown in Table 2-2.

Table 2-2 Variety of cable types, applications and features

Cable Type	Features	Application
Lightweight (LW)	Core cable with polyethylene insulation for electrical installation but no additional external protection	• Best used in areas where the seabed is smooth and the cable can be confidently installed in full compliance with the seabed contours • Typically used in water depths 2000-8000 m
Lightweight Protected (LWP) or Special Applications (SPA)	Metallic tape and polyethylene outer jacket applied over core with additional abrasion protection and hydrogen sulphide protection	• Areas of non-uniform or potentially abrasive seabed or where the cable requires extended handling and use in rocky areas with moderate abrasion and/or attack by marine life • Ideal for depths up to 6500 m
Light-Wire Armoured (LWA) or Single Armour Light (SAL)	Light single armour wire layer applied to core cable	• Best for aggressive seabed in water depths up to 2000 m
Single Armoured (SA)	Heavy armour wire layer applied to core cable	• Best in rocky areas or where the cable is at risk from external aggression and cannot be buried • Ideal for depth up to 1500 m
Double Armoured (DA)	Two armour wire layers applied to core cable	• Best for use in shallow water (<800 m) where the cable is at risk from environmental or external aggression and cannot be buried. • Ideal for depth up to 800 m
Double Armoured High Abrasion (DA-HA)	Two heavy armour wire layers applied to core cable	• Best for use in rocky terrain high likelihood of trawler damage and high abrasion risk • Ideal for depth up to 800 m
Rock Armoured (RA)	Short-lay armour wire layer applied over SA cable	• Best for use in rocky terrain with high risk of abrasion and risk of crushing • Ideal for depth up to 200 m

2.2.2 Proposed installation methods

The proposed methods of cable installation will combine the following construction techniques:

- Placement of cable directly on the seabed;
- Use of articulated pipe and pinning (reef works only); and
- Trenching (land-based works only).

Due to the high potential for unexploded ordinance (UXO) within the project area, submarine cable burial methods have been determined to be of too great a risk and as such burial or trenching of the cable into the seabed has been excluded from the proposed project scope. Instead to provide protection to the cable in shallow waters it will be installed within an articulated pipe. Where required, application will also be made to the Solomon Islands Maritime Safety Authority (SIMSA) for a no anchorage exclusion zone to provide protection of damage to the cable from anchor drop.

Placement of cable directly on the seabed

The cable will be laid directly on the seabed from the point it leaves the articulated pipe through to deep waters that exit the EEZ. It will be installed using a purpose built cable laying vessel ('cable ship'). The entire cable is carried on this vessel and laid out slowly as the vessel travels along the cable alignment. This enables the vessel to place the cable onto the seabed in accordance with the required alignment, determined from a marine route survey.

During direct lay operations ships can operate up to a practical maximum of about 5-6 knots, periodically slowing down to control cable tension and pay-out speed. Once a steady-state is achieved, the cable pay-out speed should be approximately the ship's speed plus 2–3%, assuming the seabed topography is fairly constant.

Laying operations undergo constant and accurate monitoring. The ship's position and speed are measured by differential GPS, and the water depth by precision echo-sounders and seabed mapping systems (from the marine route survey), whereas cable pay-out speed and length are recorded by a rotometer. On board, the cable engineer, with the assistance of computer modelling software, will scrutinise the laying progress with constant reference to the engineered route plan, making adjustments if necessary.

Use of articulated pipe and pinning

Use of articulated pipe and pinning usually involves the fitting of a split cast iron piping around the cable which is then pinned or clamped to the seafloor/reef structure using stainless steel fixtures in order to provide minimal impact on the surface in which the cable is being laid and to provide shallow water abrasion and impact protection to the cable. The tasks for this installation method usually comprise the following:

- Survey swim to confirm status of cable alignment prior to installation;
- Fixing of cast iron articulated half shell pipe sections to the cable;
- Bolting of sections using nuts & bolts (nominal one set every 5-10 m);
- Stabilisation of the articulated pipe using saddle clamps pinned into bedrock (nominal spacing 25 m); and
- Survey swim of completed works to confirm installation is complete.

A pre-installation survey swim is usually performed by divers at the start of operations to determine local seabed conditions along the route. Following the survey, the area(s) of the

cable to be protected by the articulated pipe will be confirmed by the supervising representative on site. The survey is used to identify possible locations for the saddle clamps to be fitted and any areas of coral, where pinning into the seabed must be avoided.

In areas where attachment of articulated pipe is applied and coral is present, the cast iron pipe sections are lowered to the seabed in a manner that seeks to avoid or minimise damage to the coral. Pipe sections are fitted in one direction (from BMH seawards) such that there are no gaps in the protection in the areas identified by the survey. Each pipe section is checked to ensure that it is interlocked correctly before fitting the next section. Sections of pipe are fixed in place by fitting self-locking stainless steel nut and bolt sets which are fitted at nominal intervals of 5-10 m. Usually following the completion of the works a video survey is performed to demonstrate that the articulated pipe has been fitted correctly and that the seabed has been cleared of any waste associated with the works.

Articulated piping is proposed for cable protection across the intertidal and reef areas immediately offshore of the BMHs. The piping would extend from the landing point to 15 m to 25 m water depth depending on conditions. This will help protect the reef and cable from any impacts associated with waves, severe storms, other beach activities (e.g. vessel landings) and anchor damage.

Cable trenching on land

Depending on the area and sediment type into which the cable is to be installed on land, trenching will be done using a backhoe or excavator or manual labour (e.g. to dig into sands near the beach). This will be completed from the BMH to the CLS. It will also support delivery of the cable from the BMH to the start of the articulated pipe within the intertidal zone.

2.3 Operation phase

The design life of the cable system is 25 years. Once the cable is installed, there is generally no requirement to access the cable. The CLS units are buildings containing automated systems. Alarms and back-up generators are in-place should power, connectivity or other systems malfunction. In the event of emergency maintenance requirements, specialist telecommunications contractors will attend each site, diagnose and undertake actions to rectify any problems. These are likely to be engineers from one of the licensed operators who are available in each province. The building compounds will be secured and maintained (grass cut) on an ongoing basis by local workers.

Should any maintenance or repair of the cable be required it will be undertaken as described below.

2.3.1 Maintenance

Regular maintenance needed for the satisfactory operation of the cable system is expected to be confined to activities at the CLS'. On rare occasions in the event of a break or fault in the cable, it may be necessary to retrieve the cable from the seafloor. Such breakage or fault is usually caused by external source (most commonly fishing vessels, ships anchors, and, infrequently natural events). Recovery generally entails the use of a specialist cable ship for:

- Location of the cable if a repair is required;
- Retrieval of the section of the cable requiring repair with specially designed grapnels deployed from the repair vessel (or with the assistance of an ROV); and
- Lifting of the damage cable to the surface, repair by splicing new cable into the damaged section; and

- Return of the repaired cable to the seabed.

It is important to note that since the position of the as-laid cable will be accurately known (to +5 m in depths less than 200 m, and +20 m in depths greater than 2000 m); the grappling activity is closely controlled and the cable can be reinstalled along the same alignment, to minimise disturbance to the seabed.

2.3.2 Decommissioning

It is proposed that the marine cable is left *in situ* following decommissioning, while the onshore CLS and ancillary equipment may be decommissioned and demolished should no other related uses for the structures be found. Decommissioning would involve similar works and potential impacts as would result from installation works; these have therefore been considered as part of this impact assessment (refer section 4).

2.4 Project timeframes

The project will be undertaken in following distinct phases as shown in Table 2-3. Nominal dates for activities are below, these will be revised as the overall works program is developed with SISCC.

Table 2-3 Proposed schedule[2]

Activity	Expected Commencements	Duration
Marine Survey	late Sep 2018	14 days
Construction of BMH, Ducts, CLS Foundations	late Oct 2018	4 Months
Installation of prefabricated CLS	early Apr 2019	12 days
Land Cable Installation	late Aug/early Sept 2019	6 weeks
Marine Cable Installation (International & Domestic)	late June/early July 2019	4 Months
Cable Systems in Service	late Dec 2019	25 years

2.5 Regulatory and legislative framework for assessment

The following is an outline of legislative, institutional and regulatory frameworks for the Solomon Islands, which are relevant to the PER assessment for this project. Fugro (2018a) have also completed a desktop review on permitting and other approvals issues which may affect the Coral Sea Cable. The focus of that review is on operational permits and the reader is directed to that report for details in regards to those elements. Information as it pertains to environmental assessment and permitting is presented following.

2.5.1 Environmental policy and legislation

Environmental management including impact assessment in the Solomon Islands is regulated under the *Environment Act* (1998) and the accompanying statutory instrument, the Environment Regulations (2008). The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECCDMM) is the institution that administers this Act. The Environment and Conservation Division (ECD) within MECCDMM implements the Environment Regulations which stipulates the form of assessment, consultation, and development consent process for projects. The ECD is the government agency responsible for assessing development applications on behalf of the Government.

The proposed cable development is required to comply with the *Environment Act* and Regulations.

2.5.2 Environment Act

The *Environmental Act* (1998) provides for the protection and conservation of the environment, through the establishment of the ECD and the Environment Advisory Committee.

The core objectives of the Act are as follows:

[2] Current project timeframe estimates are subject to change depending on contractor, permitting and other conditions

- to provide for and establish integrated systems of development control, environmental impact assessment and pollution control;
- to prevent, control and monitor pollution;
- to reduce risks to human health and prevent degradation of the environment by all practical means, including the following:
    - regulating the discharge of pollution to the air, water and land;
    - regulating the transport, collection, treatment, storage and disposal of wastes;
    - promoting recycling, re-use and recovery of materials in an economically viable manner; and
- to comply with and give effect to regional and international conventions and obligations relating to the environment.

The Act is divided into the following four sections:

- Part I Article 4.1 provides the Act with considerable power which states that in the event of conflict between the *Environment Act* and other legislation, the *Environment Act* shall prevail.
- Part II establishes and defines the powers and role of the ECD.
- Part III establishes the requirements for environmental assessment, review and monitoring. This provides for an environmental assessment to consist of either a Public Environmental Report (PER) or if the development is shown to be of such a nature as to cause more serious impacts then the developer is required to submit an Environmental Impact Statement (EIS) to the MECCDMM.
- Part IV details requirements for pollution control and emissions (noise, odour and electromagnetic radiation) and requirements to permits for the discharge of waste. Noise (restrictions on emitting unreasonable noise) is covered in Article 51(1).

Some of the key functions of the Act are:

- promote coordination among Ministries and government divisions;
- revise and amend the national environmental strategies and programme as necessary;
- develop, coordinate and facilitate implementation of national policy concerning environmental planning, environmental impact assessment and pollution control; and
- monitor and advise on international developments in environmental matters and to ensure the fulfilment of obligations of Solomon Islands under the relevant international and required treaties and conventions.

The proposed cable development is required to comply with the *Environmental Act* (1998) in order to obtain development consent for the construction. The proposed works are considered to be prescribed development of low risk to the environment and as such EIA through a PER is to be completed to inform the development consent application. Confirmation of this assessment format requirement was provided by the Director of ECD on 24 May 2018.

2.5.3 Environment Regulations

The Environment Regulations (2008) establishes the procedures for undertaking the environmental assessment of any projects categorised as 'Prescribed Activities'. The developer is required to first submit a Development Application following which the MECCDMM determines the next step. This will be a choice from the following:

- no further assessment is required,
- a PER is required, or
- where major projects are considered such as logging, large agricultural developments, mining and large scale tourism developments and infrastructure projects, an EIS is required which includes technical, economic, environmental and social investigations.

Both the PER and EIS require public consultation. Following assessment of the PER/EIS and, assuming a determination of approval, by the MECCDMM a Development Consent is issued.

Environmental standards are not provided in the regulations, however the MECCDMM requires the use of WHO standards. Although the regulations provide for licenses to discharge waste or emissions, the enforcement of these will be difficult without defined standards.

It is understood that the proposed cable development is required to comply with the Environment Regulations in order to obtain development consent for the construction works associated with infrastructure installation. Additional information regarding environmental standards to be met by the assessment is provided in Section 2.5.10, relating to obligations required by the Australian Government in support of their co-funding of the project.

As survey to inform route alignment for the cable installation does not relate to prescribed works for construction of infrastructure, it does not trigger need for development consent application. As such, marine hydrographic survey is not included in the assessment completed herein. Survey vessels undertaking any such hydrographic or bathymetric seabed survey will, however, be required to source relevant permissions from SIPA/SIMSA for operation of survey equipment within the Solomon Islands EEZ. That activity is considered separate to this PER.

2.5.4 Marine Conservation Areas

Marine conservation areas within the Solomon Islands EEZ can be designated as Marine Protected Areas (MPAs), Marine Conservation Areas (MCA) or Locally Managed Marine Areas (LMMA). The MECCDMM has the role of national administration of these areas. Local landowner groups normally implement targeted management of the areas themselves. Those groups have been consulted during development of this PER. Mapping of protected areas has also informed cable alignment selection. These activities have sought to mitigate risk of impact upon these areas; this has informed design of controls presented in this PER.

2.5.5 Planning and Development Consent Permission

Proposed cable installation works are defined as development under the *Town and Country Planning Act* 1982. SISCC will, therefore, need to apply for physical planning permission to the Planning and Development Boards of each location where the cable will land and where infrastructure will be established. The information presented within this PER will support that application by providing a full description of the proposed works both on land and through provincial waters, the boundary of which is up to 6 nautical miles from the shoreline.

2.5.6 Transport and Other Infrastructure

Installation works on land will require road works. To secure those permissions, SISCC (or their installation contractor) will be required to submit plans and work descriptions to the Ministry of Infrastructure and Development. That content should include sketches of proposed infrastructure layout, planned work, schedule and environmental management control plans. This should be undertaken for any infrastructure that may also be affected by proposed works; such as water or power. As such, notifications and permissions may also be needed in regards to Solomon Water and Solomon Power. The information presented in this PER will support

those communications by presented proposed construction environment management controls of relevance to mitigating potential environmental impacts.

Within the marine environment there is potential to conflict with other users of the seabed or shipping channels during either project installation or operation. The relevant stakeholders SISCC will be required to consult with are detailed in Fugro (2018a) and include the SIMSA, provincial governments in all sectors of construction/operation and relevant National Government departments, such as the Ministry of Mines, Energy and Rural Electrification, in regards to seabed licenses for petroleum or other exploration activities. Consideration of potential land/seabed use conflicts has informed development of this PER.

2.5.7 Telecommunications Act

The *Telecommunications Act* (2009) provides the regulatory framework for the telecommunication sector and establishes the Telecommunication Commission of Solomon Islands. The Act repeals the *Telecommunications Act* (Cap. 115) and the Solomon Telekom (Limitation of Liability) Act (Cap. 114) and related matters.

The principle objective of the *Telecommunications Act* (2009) is to enhance long-term wellbeing of the population of the Solomon Islands, the inclusiveness and fairness of its society and the productivity of its economy by improving the availability, affordability, quality of service and kinds of telecommunications services in the Solomon Islands.

This act is relevant to the proposed development as this will continue to ensure provision of adequate, sustainable and efficient telecommunication services in all sectors of development, and also this could put in place a reliable telecommunications infrastructure and ensure service inter-connectivity nationally and internationally. It is understood that confirmation of applicability of this Act will be carried out through legal counsel with SISCC. Fugro (2018a) notes that SISCC will be required to seek a license to operate under this Act.

2.5.8 Fisheries Act

The *Fisheries Act* (1998) provides the framework for fisheries management and development, including licensing of fishing vessels and processing plants. It also lists prohibited fishing methods and provides for the establishment of Marine Protected Areas (MPAs) and the preparation of coastal management plans. The Act regulates the utilisation and conservation of marine resource.

It is understood that the confirmation of applicability of this Act will be carried out through legal counsel with SISCC.

2.5.9 Shipping Act

The *Shipping Act* (1998) consolidates and amends the laws relating to shipping and seamen to control the registration, safety and manning of ships, and to give effect to certain international maritime conventions, and other related purposes.

It is understood that confirmation of applicability of this Act will be carried out through legal counsel with SISCC. During the construction phase it may be necessary to consider the Shipping Act. This will mainly be in relation to safety in maritime shipping movements during construction works and securing a no anchor zone over cable alignment in Honiara near the coastline. The former would be managed through notification a maritime notification of cable ship movements and requirement to avoid interaction. The latter would be secured through notification of, and request to include, a no anchor zone on maritime navigation charts.

Notification to mariners of ship movements during construction can be undertaken by the cable laying ship via the Regional Harbour Master. Notification and request to implement a no anchor zone within the navigational charts can be undertaken via request to the Solomon Islands Maritime Safety Authority. This will require coordinates of the installed cable to be known and would be managed by SISCC following installation.

Additional information of relevance to survey operations, permissions and regulations (e.g. with respect of permit to work in vicinity of ship wrecks) is also provided in Fugro (2018a); that content has informed potential risks and impact mitigation measures described by this PER.

2.5.10 DFAT Policies

The Australian Government's DFAT is responsible for managing funding provided to foreign countries through the Australian Aid program. As part of that DFAT requires projects funded by Australian aid investments to demonstrate adequate management of environmental and social impacts of relevance to the funded project. In support of that, DFAT has developed a number of policies that work to ensure that the effective design and implementation of investments leads to improved and positive development outcomes within the country receiving the aid and developing the project. The principles and practices that should be adhered to for the protection of the environment and children are outlined in DFAT's Environmental and Social Safeguard Policy for the Aid Program (DFAT 2018) and Child Protection Policy, 2017 (DFAT, 2017). This Safeguard Policy describes principles and practices inclusive of:

- Do no harm and maintain the health, diversity and productivity of the environment
- Identify, assess and manage environmental and social impacts
- Effectively engage with stakeholders
- Work effectively with country laws to avoid imposing duplicate or unnecessary safeguard assessment or management requirements not of relevance to country requirements or risks
- Effectively identify and manage environmental and social risks to promote improved outcomes
- These safeguards have been taken into account in preparing the PER.

How this PER has considered and addresses the DFAT safeguards is identified in Appendix F.

2.5.11 International Treaties and Agreements

Solomon Islands is a signatory to a number of International environmental agreements including those for regional agreements; chemicals, waste and pollution; biodiversity and climate. These are described by the Solomon Islands Government under their "International Obligations" information available online at: http://www.mecdm.gov.sb/about-us/divisions/environment-conservation.html.

The requirements of the Solomon Islands government for delivery of a PER takes into consideration the governments delivery against these agreements.

2.6 Methodology to prepare the PER

The PER has been completed based on a review of relevant primary and secondary information sources, site visits, and consultations to determine the existing environment conditions surrounding the proposed cable routes and landing sites. This was completed in order to carry

out a detailed analysis of environmental and social impacts of the proposed activities. The following is an outline of the broad activities undertaken for the project:

- Desktop reviews of historic and current site information
- Consultations with Solomon Island Government regulators, DFAT, client and key stakeholders, including provincial government, customary land and public
- Site visits to support consultation and inspection of each of the landing sites and cable alignments proposed for:
    - Honiara;
    - Noro;
    - Auki; and
    - Taro
- Geospatial, route alignment and other data analysis, including conceptual modelling, to support ability to:
    - Describe environmental and social values of relevance to the proposed works
    - Identify potential impacts or risks to values identified
    - Describe relevant management and mitigation measures and
    - Develop a project specific Construction Environment Management Plan
- Report findings in a PER format in support of a DA consent
- The following sections of this PER document present the findings of the PER with regard to values, protection mechanisms and outcomes expected based on assessments completed for this PER.

3. Description of the existing environment

3.1 General

The Solomon Islands is made up of hundreds of coral atolls and volcanic islands forming an archipelago stretching approximately 1,600 km across the South-western Pacific Ocean. The total land area is approximated to be 28,300 km^2 (Fugro 2018b).

The islands rise steeply from a deep ocean floor and have very little underwater shelf area. Coral reefs characteristically surround the islands, either close to the shore (fringing reef) or further offshore (barrier reef). There is coastal lagoon enclosed between the shore and barrier reefs. The unique geography and scattered nature of islands has given rise to considerable environmental and ecological diversity, which is evident at the four project sites.

The submarine cable routes will traverse various offshore terrains including; seismically and volcanically active areas of irregular relief containing; deep depressions and high ridges. Seismic and volcanic activity is common and sub-sea slope failures and turbidity flows have been recorded previously within Solomon Island waters.

Land based alignments will primarily coincide with existing road infrastructure to avoid impact to undisturbed areas. There will be a need to clear vegetation primarily at the sites of Noro and Auki where cable alignment overlaps with areas currently in use for market gardens as well as vegetated areas within government easements.

The following sections describe the physical, biological, and social environmental values associated with the area of influence for the Solomon Islands Cable installation works.

3.2 Physical and biological environment

3.2.1 Marine Protected Areas (MPAs)

There are 22 marine protected areas within the Solomon Islands and one designated marine conservation area (Arnavon Marine Conservation Area). The marine protected areas are informally designated and are located on Figure 3-1. The other marine protected areas are informally designated and include the customary management areas established in Roviana and Vonavona Lagoons. The figure below illustrates the MPA in the Solomon Islands (Figure 3- 2) and a list of names of these areas is presented in Appendix G.

Additionally, a number of marine conservation areas have been established by communities in Marau Sound, Ngella, Marovo Lagoon, Tetepare, Roviana Lagoon and Gizo. Similar areas are likely to be established for marine resource management in the Shortland Islands, Russell Islands, Three Sisters Islands, Leli Island, Lau Lagoon, Suafa Bay, Langalanga Lagoon, Are'Are Lagoon and Small Malaita, Northern Isabel and Northern Choiseul (Figure 3-2).

Figure 3-1 Marine protected areas in the Solomon Islands

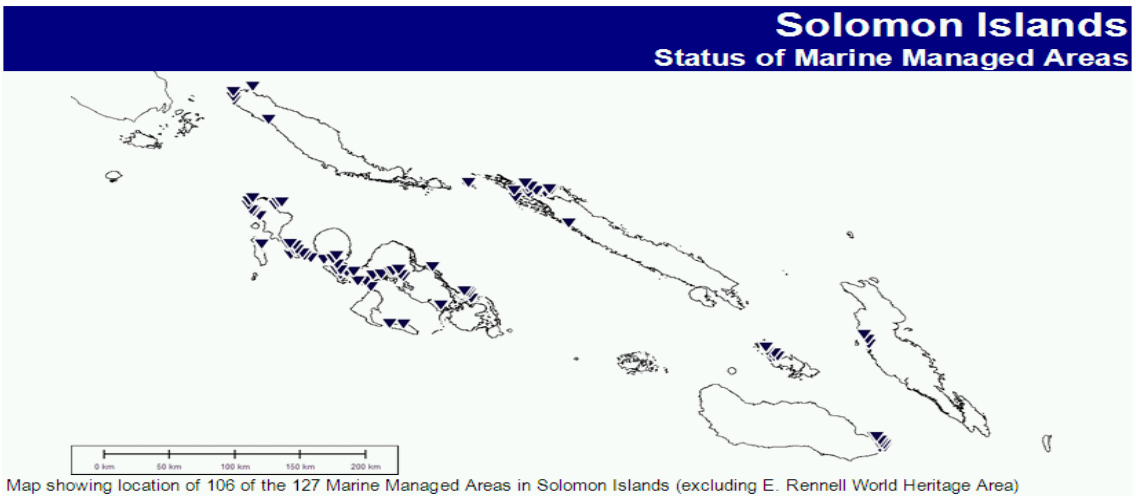

Figure 3-2 Community Marine Managed Areas in the Solomon Islands

3.2.2 Threatened and protected species

As with other Pacific Nations, there is currently little understanding of threatened and protected species knowledge in the Solomon Islands. At present there are no regional resource documenting the types of species that exist and/or are threatened in the Solomon Islands or the Pacific region. Data is often dispersed, taxonomic expertise is absent, and nomenclature and classification systems can be disputed for various species.

Cetacean species are common in Solomon waters and their habitat is usually major rivers, mangroves and open ocean environments such as oceanic islands, oceanic fronts and upwelling, seamounts, canyons, deep-sea trenches and the water column itself. As one of the few equatorial regions worldwide where hemispherical oceanic exchange of a wide variety of marine life occurs, The Nature Conservancy conducted a survey in 2006 to trace movements of these cetaceans. According to a survey, cetacean movements between the South Pacific and North Pacific are known or suspected (depending on the species) to occur through the major island passages of the Solomon Islands' archipelago, such as Indispensable Strait, Bougainville

Strait - separating the Solomon Islands from Papua New Guinea (PNG), Manning Strait and New Georgia Sound. These areas have been classified as the migratory corridor for these marine mammals. There is no known readily available information on their seasonal migrations.

3.2.3 Substrate – offshore and onshore

Knowledge of seabed conditions and sediment types are a key component of submarine cable installation projects as the nature of seabed sediment and existence of reef may impose constraints on cable placement methods and result in unnecessary impacts on the local environment. There is little information available on the distribution of seabed sediments and associated morphology throughout the Solomon Islands for both the offshore and inner shore coastal zones along any of the proposed routes.

3.2.4 Hydrothermal vents and seamounts

Active hydrothermal vent and seamount fields were discovered in the early 2000s at Grover Seamount in the San Cristobal Arc and Starfish Seamounts in the northern New Hebrides arc in the eastern Solomon Islands (McConachy, 2002). The arc-related vent field discoveries in the eastern Solomons are associated with quite localised, gas-rich hydrothermal plumes (methane and carbon dioxide). Hydrothermal vents in the Solomon Islands are common in parts of Marovo, Vella lavela, Simbo and Kavachi in the Western Solomon's and also in Santa Cruz and Savo.

Hydrothermal vents are known to support an abundance of ecological values which inhabit the vent surroundings. Fauna near vents depend on bacteria that are able to convert sulphur found in the vent's fluids into energy through chemosynthesis. The organisms are short lived in their nature and depend on the lifespan of the vents. Likewise, seamounts are a unique ecosystem with high biodiversity in the open ocean.

3.2.5 Wave climate, currents and tides

It is understood that on eastward-facing coastlines, such as Honiara, local seas and swell waves generated by trade winds are generally persistent and form the dominant component of the local wave environment (Gillie, 1992). Typical current strength in the region has been measured to be around 4 knots. The tidal gauge at Honiara indicates that the tides are usually diurnal, i.e. one high and one low tide each day. This is a common occurrence for the Solomon Islands. The tide levels between mean lower low water (MLLW) and mean higher high water (MHHW) ranges between 0.37 and 0.84 m for Honiara. It is clear that the tidal ranges are relatively small. The relevant tidal ranges for a subset of the sites are summarised below in Table 3-1. Given the consistency in ranges across Honiara and Auki, these are considered to be consistent and relevant also for Noro and Taro.

Table 3-1 Tidal ranges at a subset of sites[3]

	MHHW (m)	MLHW (m)	MHLW (m)	MLLW (m)
Honiara	0.84	0.78	0.62	0.37
Auki	0.79	0.78	0.46	0.25

There is a local phenomenon that occurs where the sea level drops to its lowest level around the month of June and this phenomenon is typically referred to as 'dry reef'. This phenomenon

[3] https://www.tidetime.org/australia-pacific/solomon-islands/

impacts the beaches with low lying coral reefs and hardstand features such as Honiara, Noro and Auki.

3.2.6 Coastal erosion

Coastal erosion (such as the undermining of trees) has been noted at several of the landing sites through observations and anecdotal evidence from local sources (Fugro 2018b). Fugro determined that only a few coastal areas in the South Pacific have been surveyed or mapped often enough to develop consistent and reliable data on shoreline changes and rates of change. Furthermore, no information is available on the magnitude of storm surges associated with cyclones, nor does there appear to be high resolution contour data. The landing sites for this project have not been monitored previously and hence this lack of basic information impedes the carrying out of any detailed coastline erosion assessment, storm bite prediction, and quantitative analysis of flooding and inundation risk.

3.2.7 Natural hazards

Geological hazards

A summary of relevant geological information for the cable routes and landing sites is outlined below:

- Volcanoes are located at proximity to the proposed international route that enters the Solomon Islands EEZ and traverses to Honiara. These are located on Mborukua Island and also Kavachi Submarine Volcano. The latter is one of the most active submarine volcanos in the region.
- Honiara is located on Guadalcanal Island. The landing sites will be on alluvium soils. Volcanoes have been identified on the Northern end of the island. The cable will be at a safe distance away from these volcanoes. On the proposed route from Honiara to Noro, there exists at least one volcano on the island of Savo.
- Noro is located on the New Georgia Islands which has a number of active volcanoes scattered around the island. Based on the geological maps, the geology of the island comprises mainly of volcanic rock such as Andesite. Limestone raised reefs are located offshore of the landing site at Noro. They are also located offshore of the landing at Taro, further west of Noro within the Choiseul Province. No active volcanos have been identified on Taro. In the interest of protecting the submarine cable from abrasion it is best to minimise the reef areas where the cable may be placed and/or ensure appropriate armouring for both the protection of the cable and the reef substrate.
- The proposed route from Honiara to Auki does not appear to traverse near any extreme geological features; however the proposed route does pass through Sealark Channel.
- Auki is located on Malaita Island and the landing point is surrounded by shallow rocky reefs. Malaita Island comprises of Micocene Sediments. No volcanoes have been identified on this island.

Volcanoes

The volcanoes of the Solomon Islands form a NW-SW trending island chain continuing along to the Bougainvilla Island chain (which forms part of Papua New Guinea) as seen in Figure 3-3. The islands belong to a volcanic arc caused by the subduction of the oceanic crust of the small Solomon Plate under the Pacific Plate. New Georgia Sound constitutes the junction between the New Georgia-Kolombangara-Vella Recent volcanic province and the older Choiseul

Cretaceous-Early Tertiary basaltic platform. The main observed faulting is NW-SE[4]. It is understood that this area is tectonically complex, marked by the interaction of several closely spaced oceanic microplates separated by subduction zones and short spreading centres, such as one extending from SE New Guinea to Kavachi volcano[5]. The volcanoes in the vicinity of the Solomon Islands are listed in the table below and shown in Table 3-2.

It is understood that four volcanoes in the Solomon Islands have been active in recent history. They are Savo, Kavachi, Cook and Tinakula. Kavachi is a submarine volcano which erupts frequently. Cook is also a submarine volcano however there are doubts of its level of activeness. Both Savo and Tinakula are island volcanoes that have erupted frequently in recent history and have been responsible for considerable damage to surrounding areas of the islands resulting in high death tolls.

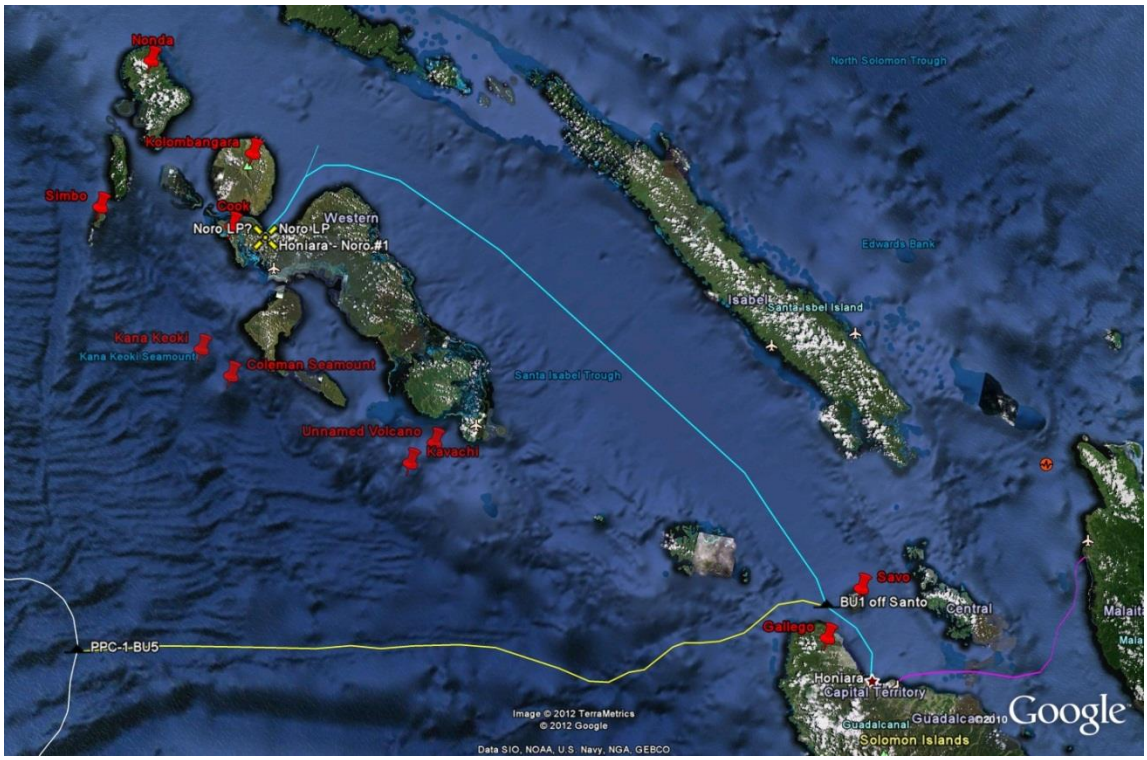

Figure 3-3 Volcanoes in the Solomon Islands

Table 3-2 List of volcanoes around the Solomon Islands

Name of Volcano	Type of Volcano / Current Status	Location
Nonda	Stratovolcano - Dormant	Solomon Islands, -7.67°S / 156.6°E
Kolombangara	Stratovolcano - Dormant	Western Province, Solomon Islands, -7.95°S / 157.08°E
Cook	Submarine volcano – Dormant (Last eruption 1991)	Western Province, Solomon Islands, -8.25°S / 157.06°E
Simbo	Stratovolcano – Dormant (Last eruption ~1910)	Simbo Island, Solomon Islands, -8.28°S / 156.52°E
Kana Keoki	Submarine volcano – Dormant	Western Province, Solomon Islands, -8.75°S / 157.03°E
Coleman Seamount	Submarine volcano - Dormant	Western Province, Solomon Islands, -8.83°S / 157.17°E

[4] SOPAC Final Report – CST Area - SOPACMAPS

[5] http://www.volcanodiscovery.com/solomon-islands.html

unnamed	Submarine volcano - Dormant	Western Province, Solomon Islands, -8.92°S / 158.03°E
Kavachi	Submarine volcano – Dormant (Eruptions in the last 20 years - 2007, 2004, 1999-2003, 1999, 1998, 1997, 1991)	Solomon Islands, -9.02°S / 157.95°E
Savo	Stratovolcano - Dormant	Central Province, Solomon Islands, -9.13°S / 159.82°E
Gallego	Volcanic field - Dormant	Guadalcanal Province, Solomon islands, -9.35°S / 159.73°E
Tinakula	Stratovolcano – Restless (Eruptions in the last 20 years - 2012, 2008-2011, 2006-07, 2002, 2001-02, 2002-2001, 1999, 1995, 1989-90)	Santa Cruz Islands, Solomon Islands, -10.38°S / 165.8°E

Earthquakes

The Solomon Islands are subject to earthquakes and tsunamis. It is understood that seismic activity in the Solomon Islands is generally due to the underthrusting of the Solomon Sea Plate beneath the north western islands of the Solomons, however the tectonic system is complex and the distribution and intensity of earthquakes is varied.

A number of small earthquakes have occurred in the Solmon Islands within the past month, registering below 5 on the Richter scale. Severe/strong earthquakes measuring over 6 on the scale have occurred relatively frequently in the last few years; including one registered at Auki about a year ago in about 4 km WD[6]. More devastating earthquakes have not occurred in recent history but at least more than 5 years ago. Of geographical relevance to the proposed cable a devastating earthquake took place on 2 April 2007 in Gizo, Western Province, near the cable landing for Noro and cable passage to Taro. Its magnitude was calculated by the United States Geological Survey (USGS) as being at 8.1 on the Richter scale. The tsunami that followed the earthquake killed 52 people and resulted in extensive damage to the natural environment. According to the USGS, the focus was 10 km deep and 40 km South South-East of Gizo township on New Georgia Islands. There were numerous aftershocks, the largest of which had a magnitude of 6.2. [7]

Local earthquakes in the coastal zone may directly result in the subsidence or uplift of the shore zone and adjacent terrestrial and marine areas. Subsidence of this nature has been observed at locations such as Noro. Cable land routes and installation will need to take account of this potential risk.

Tsunami

Tsunamis are caused by vertical displacement of seabed fault lines during earthquakes, or by other processes such as a volcanic eruption, volcanic collapse or submarine landslide. Tsunami-generating earthquakes tend to be shallow and of relatively-large magnitude (i.e. greater than Richter magnitude 7), hence the occurrence of a large, shallow earthquake located beneath the ocean will more often than not produce a tsunami, providing there is vertical offset of the sea floor. Currently, the Pacific Tsunami Warning Centre in Hawaii provides tsunami warning advice for the Pacific Island Countries, including the Solomon Islands.

It is understood that the tsunamis experienced in the Solomon Islands originate from earth quakes occurring in the following locations:

[6] https://www.earthquaketrack.com/p/solomon-islands/recent?mag_filter=6

[7] http://www.met.gov.sb/index.htm

- locally;
- elsewhere in the Solomon Sea (near Bougainville); or
- other parts of the Pacific Rim.

Most of the tsunamis recorded in the past have been generated by submarine earthquakes. The damage and impacts from tsunamis to the coastal zone in the areas of interest have not been well documented; however records indicate a total of 1290 people have died on the Solomon Islands in relation to tsunamis that have occurred since 1899[8]. The strongest tidal wave registered to date within the Solomon Islands reached a height of 59 meters and at least two people are known to have died from this event. However other events since that tsunami have had more widespread impact in terms of injuries, distribution of property and impacts to the economy. Construction and operational activities will need to maintain vigilant watch for tsunami risk and take evasive action to maintain safety of the workforce should a tsunami warning be issued.

3.2.8 Climatic hazards

Tropical cyclones

Solomon Islands lies in the area prone to tropical cyclones. A number of tropical low pressure systems occur each year over the Solomon Islands at times when the equatorial trough is in the vicinity; however few of these develop into tropical cyclones. Average frequency of cyclone occurrence is between one and two per year, tending to increase southward as illustrated in Figure 3-4 and Figure 3-5. Figure 3-5 has been generated based on 36 years of data from 1969 to 2005.

Tropical cyclone season in the Solomon Islands is generally considered to extend from November to April. However, there have been cyclones such as Cyclone Namu and Cyclone Ida that have occurred in mid-May, 1986 and late May-early June 1972.[9] In addition, tropical cyclones will naturally result in abnormally high ocean tides which may rise up to 3-6 m above the regular tide. This is due to the pooling of sea water by the frictional effect of very strong winds persistently gusting on shore as the cyclone approaches a shallow coastline. This can result in inundation of low lying coastal plains which in turn impacts on beach profile change/seasonal beach oscillation (at some areas as much as 0.5-1 m in beach elevation and 5-10 m in beach width).

[8] https://www.worlddata.info/oceania/solomon-islands/tsunamis.php

[9] Solomon Islands Final Report – Natural Hazards and risk assessment in the Solomon Islands – R J Blong – July 1991

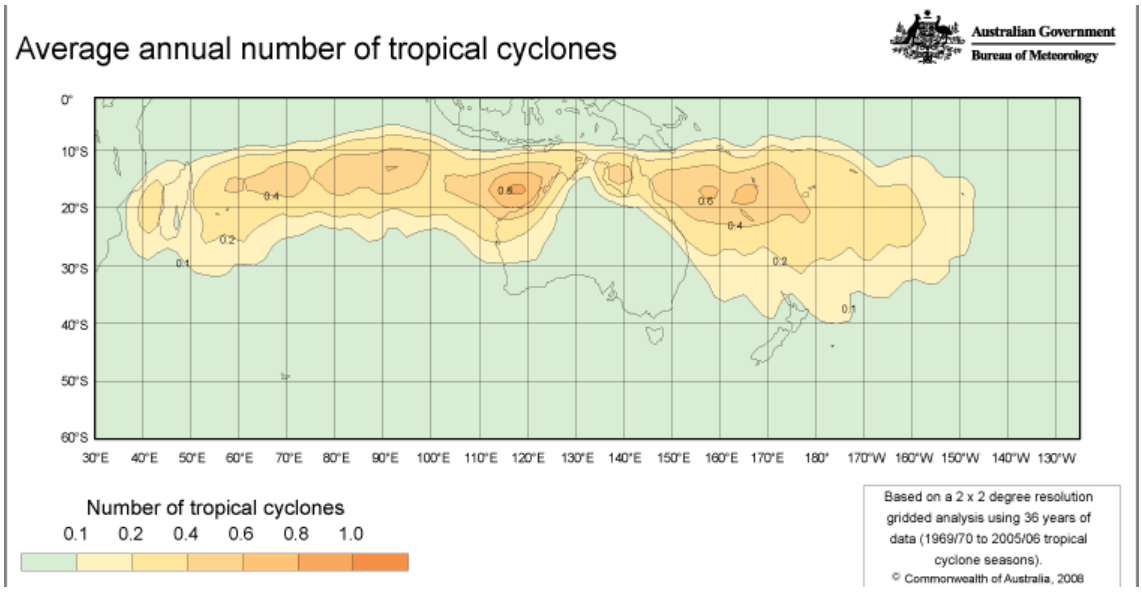

Figure 3-4 Map showing average annual number of tropical cyclones for Australia and the Pacific Region

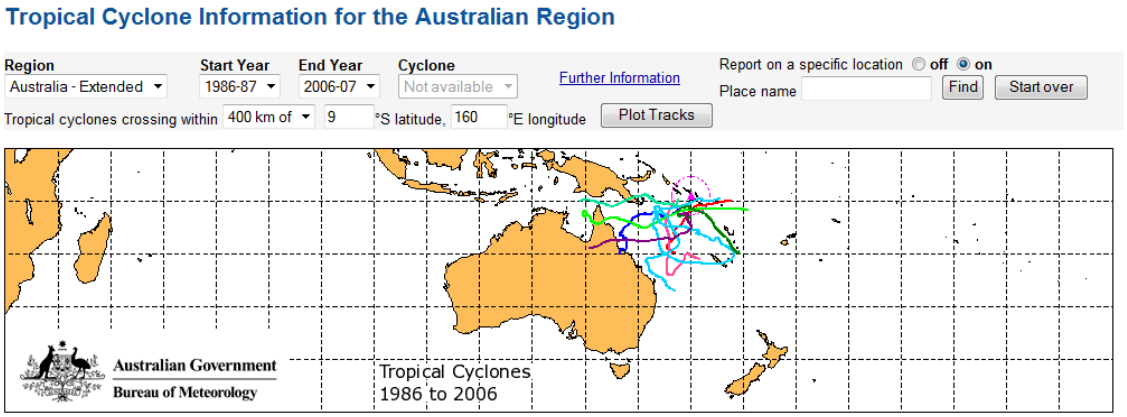

Figure 3-5 Tropical cyclone tracks from 1986-2006 for the Pacific Region[10]

[10] http://www.bom.gov.au/cyclone/history/tracks/index.shtml

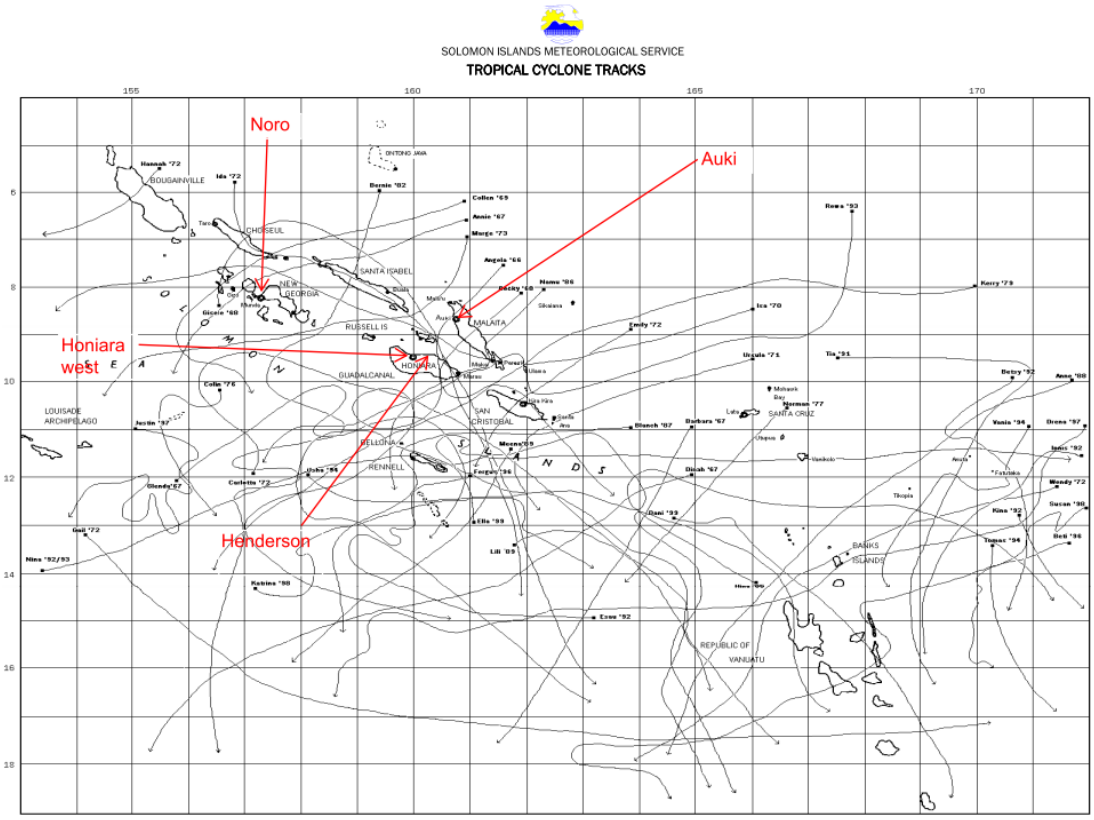

Figure 3-6 Historical cyclone tracks for the Solomon Islands[11]

Sea level rise

Historical rates of local sea-level change in the Pacific region are variable and dependent on both local and regional factors. In addition changes in sea level can also be associated with non-climatic change processes such as:

- movements in tectonic regimes; and
- "abnormal" conditions associated with El Nino/Southern Oscillation (ENSO) events (such events have occurred in 1972, 1977/78, 1982/83, 1987, and a recent prolonged moderate event from 1990-1994);

The South Pacific Sea Level and Climate Monitoring Project is an initiative to establish a regional network to monitor the sea level and the possible impact of climate change. The project was developed by the Australia Government in response to concerns raised by the member countries of the South Pacific Forum on the potential impacts of the enhanced greenhouse effect on climate and sea levels in the region. Monitoring stations in the Pacific have only recently been setup and hence the available records cover 10-20 years of data only. The sea level rise predictions gathered during the literature review indicate various and ranging records of both increasing and decelerating sea level rise.

Of the landing sites proposed for cable installation, Taro is at greatest risk of inundation from sea level rise (Albert *et al.* 2016; Peralta 2016). The design and construction of the BMH and CLS will need to take into consideration inundation risk and risk of sea level rise.

[11] www.met.gov.sb

Sharks and crocodiles

Sharks and crocodiles are found throughout the Solomon Islands and sightings/attacks are common. Sightings of saltwater crocodiles are common in the Western Province, especially in parts of Noro and Munda. In recent history the frequency of crocodile attacks has been increasing; the most recent fatality recorded has been anecdotally noted in social media was a diver who was indicated to have been attacked in early 2018. In 2017 numerous attacks were reported and a girl was killed in the western provinces. Crocodiles are currently protected however the government is considering control programs to deal with the increasing number of attacks. In Auki, the lake located in the vicinity of the cable route, is crocodile habitat and all cable contractors working adjacent and within the marine environment will need to adopt safety controls to manage the risk of crocodile attack.

In regards to shark bites, sharks are unlikely to attack divers or cable installation equipment as they are likely to be displaced from the area of works due to habitat disturbance. Sharks are usually found in the depth range from the surface to 2,500 m water depth. Regardless, measures to protect works from crocodile attacks should include consideration of risk from sharks and other dangerous marine fauna.

3.2.9 Cable landing environments

Honiara landing

The Honiara landing can be broadly described as a mix of rocky reef and coral rubble/sandy beach and is characterised by low energy processes. From the intertidal zone towards land the beach profile increases gradually into a coral rubble fore dune. To the immediate west of the landing site established vegetation includes a large strangler fig (*Ficus benghalensis,* Figure 3- 7). This tree is not considered native to the area but likely the root system is supporting dune stability.

To avoid impact upon this tree and interference with other facilities occupying this area the landing site was positioned to the east (approximately -9.428741, 159.949311), to come ashore in an area that is already substantially developed, supporting infrastructure (buildings, roads). The tenure is currently government land with a cadastral boundary extending into the sea; the inner 200 m water marine waters comprise customary lands (Figure 2-2).

Figure 3-7 Strangler fig and palms behind recreational facilities (soccer field) to east of Honiara beach landing site, looking across site to west

Beach sediments within this area consist of pebbles and broken coral of pieces approximately 1-5 cm in length. The beach may be subject to high energy waves and/or erosion based on observations such as the undermining of trees and anecdotal evidence from local residents.

Once the cable traverses across the grassed beach dune into the BMH it will be trenched through existing compound infrastructure between buildings and along the compound access road. It will be buried up to 1 m into the ground to avoid potential impact/interference with the cable from any future works.

The alignment will connect with, and then travel briefly along Mendana Avenue, crossing at the roundabout into Sana Place and then travel in a trench towards Hibiscus Avenue/Lenggakiki Road (shown on Figure 2-4). At the junction with Hibiscus Avenue the cable trench will cross the road and connect into a private easement to travel up the hill to connect into the CLS to be positioned on top of Legnakiki Ridge, in lands secured for this purpose, refer Figure 2-4.

An alternative alignment was considered, however it was considered to have too much risk of impact upon existing recreational facilities and interference with vegetation; such as the large fig tree as roots would need to be removed to support trenching works. As such, realignment was informed by potential social and environmental impacts to select the preferred alignment shown.

Use of the private easement has been negotiated with the land owner by SISCC; legal framework for this agreement is currently being completed by SISCC. This alignment will avoid impact upon users and infrastructure associated with Hibiscus Avenue and Lenggakiki Road, the other route via which the cable could have accessed the CLS. This route was not selected given potential impact upon road users during construction and also for potential future impact to cable infrastructure following installation.

Noro landing

The Noro landing is a deepwater port, approximately 12 km northwest of Munda Airport. The cable passes through the Noro channel within Hathorn Sound, which ranges in depth from >60 m to circa 30 m nearshore. This deepwater access is used for commercial port activities. The landing point is located approximately 2.2 km to the north of the Noro township. Bathymetry, as for elsewhere in the Solomon Islands, shoals steeply with transition from deepwater habitat across a coral fringing reef to shallow intertidal reef within a few hundred meters of the shoreline. Anchoring within the Sound within this part of Noro is prohibited. This provides protection to the subtidal cable infrastructure. The landing point is characterised by hard coral flats with the intertidal reef exposed at low time.

As Fugro (2018b) reports, an inwater visual assessment of the cable landing point was completed in July 2014 using snorkelling. That survey indicated the reef systems located within the area of influence of the cable were in healthy condition with substantive live coral cover. Interspersed with the coral and sand patches were seagrasses, algaes and numerous other benthic primary producers (sponges, coralline algae etc). Invertebrates included molluscs, echinoderms, crustaceans and polychaete worms typical of shallow reef systems. These areas are also known to support numerous fishery species (juveniles and adults) targeted recreationally, commercially and for subsistence.

The lower reef slope was reported to support between 70-85% cover of healthy diverse coral communities in water depths from 10 m to > 30 m water depths. Dominant species were reported to include *Pocilliopora* spp., *Symphyllia* spp., *Stylophora* spp. and *Sinularia* spp. In shallower areas of the upper reef slope, live cover decreased to be less than 50%. The deeper water species were still dominant but in lower cover; *Porities* spp. colonies were also prevalent, particularly in shallow waters. In 2014 it was noted that the reef crest spanned approximately 40 m in very shallow (<0.8 – 4 m) waters (Figure 2-5) and this demarcated a change in habitat conditions. In waters less than 4 m habitats were observed to be dominated by coral rubble with little live cover.

The 2014 site observations were consistent with those made during the 2018 site visit. As far as was plausible without an inwater inspection, the subtidal deepwater reef systems were observed to still be in relatively good health. Shallow intertidal reef systems within the cable landing point were, however, observed to mainly support invertebrates (including juvenile sea cucumbers) and fish. The shallow nature of the reef flat within this location and its exposure during low tide means most of the reef flat is characterised by coral rubble (Figure 3-8). Turtle nesting is not known to occur in the area with beaches being limestone and rocky rubble with very short unvegetated dune systems.

Figure 3-8 Shallow reef flat at Noro beach landing site showing coral rubble

The beach area is also characterised by coral rubble and coral sands. Within the land area large trees are present, including specimens of: *Mimusops elengi¸ Calophyllum inophyllum, Casuarina equisetifolia*, and *Tespesia populneoides (*Figure 3-6). A storm water drain is also located in close proximity to the landing site. This is connected to a shallow tidal lagoon immediately behind the foredune and associated with residential property. Previous assessments indicate this lagoon may be used for fish farming; it may also be used to stage water release from the residential facilities into the nearby coastal system.

The alignment is being considered so as to avoid impact to as many of the beach stabilising trees and any residential infrastructure as far as practicable/feasible. Where required, trees and roots will be cleared to support cable landing.

The cable trench is planned to be installed adjacent a fence line within a government easement abutting lands currently used for residential housing, market gardens and subsistence. The BMH is planned to be located at an elevation of approximately 10 m above mean sea level on a dune ridge inland from the beach landing. From that point, the cable trench will connect to the nearby unsealed road and run along the edge of that road back towards Noro to connect into the CLS.

As the landscape along the cable alignment is heavily vegetated this will require significant clearing of plants including palms, ferns, weeds, grasses and some naturally occurring food plants such as paw paws and taro. To the north of the cable alignment market gardens exist; alignment is being planned to avoid impact upon these. Alignment occurs adjacent an existing unsealed road; risk of future impacts to the cable should road upgrade occur informs use of the vegetated road verge for cable trench alignment.

Figure 3-9 Beach and vegetation in vicinity of Noro landing site

Figure 3-10 Vegetation along proposed cable alignment looking towards road

Auki landing

Auki, the provincial capital of Malaita province, serves as the main administrative, educational and economic centre for the province and is one of the largest provincial towns in Solomon Islands. The Auki domestic cable landing point is situated at Kelakwai beach, near the southeastern end of the Langa freshwater lagoon on the northwest coast of Malaita Island.

An inwater visual assessment of the cable landing point was completed in July 2014 using snorkelling (ADB 2014, Fugro 2018b). That survey indicated that the nearshore coastal environment is described by a shallow water intertidal reef flat of sands, rubble and seagrasses. Directly offshore of that limestone reef crest and slope drops quickly into deepwater. The reef crest is approximately 20 m wide and helps break waves from incoming oceanic swells. Hard and soft corals are generally low profile species typically of high energy environments. Coralline and macro algaes, sponges and sea whips are also typical of theses environments.

The 2014 survey noted that the reef crest was generally always submerged in 1-2 m water; the upper reef slope supported higher coral diversity from circa 2 m water depth down to 30 m water depth. Up to 25% live coral cover was reported; mainly short digitate and encrusting species such as *Porites* spp.

Although an inwater survey was not completed during the 2018 site visit, observation of shallow subtidal seagrass meadows and beach wrack confirmed the reef flat continues to support extensive seagrass meadows. Species include *Cymodocea* spp*., Thalassia* spp. *and Halodule* spp. The meadows were intermixed with various algaes such as *Padina* (Figure 3-11).

Figure 3-11 Example seagrasses and algaes collected from Kelakwai beach landing site.

The cable is proposed to land on the beach within a vegetated fore dune located at an elevation of about 1.5 m above mean sea level. The dune supports grasses and coastal trees (e.g. *Thespesia populneoides*) (Figure 2-11). The beach sediment is composed of medium gravel, sand with shell and coral pieces (3-10 cm in length). The surrounding area behind the beach is of relatively low gradient and the sediment along the cable route is predominantly compacted coral sand and clay with some shell and pebble content.

Behind the beach dune system the area is generally low lying and the groundwater table appears to be shallow with much of the lands behind the beach dune swampy in nature. Fugro (2018b) suggests the elevation of the back beach/dune may represent a depositional feature or tectonic uplift, which is common in this area.

While the reef crest and lagoon system will afford some protection to the beach environment from severe storms/waves; trees within this area will also be offering stabilisation to the beach environment. Selection of the cable landing point and BMH installation area have taken this into account to minimise need for any vegetation clearing. The cable alignment has also considered potential for interference with other users; the beach environment is accessed by the coral sand road by nearby residents for recreational activities.

The nearest residents to the landing live in Lilisiana Village. This village lies 100-200 meters to the south-east of the existing road from the beach. The village and surrounding area supports households, school facilities and market gardens.

To the direct north of the BMH is a lake. The unnamed road that facilitates access to the beach near the cable landing point also crosses the headwaters of the lake. The road is built up higher than the lake level and supports water retention within the lake. Lower lying lands on the south-eastern side of the road drain into ditches beside the road with water channelled into the lake via a culvert that runs beneath the road (Figure 3-12). Surrounding lands are, therefore, swampy in nature and used for market garden crops of sago and swamp taro.

Figure 3-12 Lake (left) showing road edge and culvert; drainage point into lake on right side road (right) showing limited water body

As shown by the alignment displayed on Figure 2-9, the cable is proposed to be trenched 1.5 m into the ground along the unnamed road that provides access to the beach. At a point 637 m from the beach and 395 m from the lake the cable will turn south to traverse through village before reconnecting to a different unnamed road. The cable will be trenched (1.5 m deep) into the easement beside the road, pass between government buildings and eventually connect into the CLS located in the main town centre (Figure 2-9).

A potential alternative cable alignment was also considered within this area that would reduce need for disturbance to the road. It would, however, required greater land clearing of vegetation. That alignment is currently being discussed with customary land holders to understand which option would provide the least impact to village and garden activities. The proposed and assessment alignment is the current preferred option. It is also the option considered likely to require the most disturbance of existing road infrastructure and, hence, has the greatest potential to interfere with other road users. As such, it has been used for this assessment as representing the worst case scenario. Should any alternative alignments be selected at a later time, the assessment completed here is considered to be of direct relevance to addressing impacts that may occur from that alignment.

Taro landing

Taro island is the provincial capital of Choiseul Province. It is located in Choiseul bay off the northwest coast. Significant infrastructure currently occurs on the island including the Taro Hospital, which is the main referral hospital for health care in the Choiseul Province. Other government offices and infrastructure located on the island include Royal Solomon Islands Police and RAMSI and Telekom.

Prior to World War II Taro Island supported a coconut plantation. Today much of the island is occupied by the grass airport runway (to the north, crossing the entire island), solar farm (adjacent the airport and nearby swamp area), residential housing, school facilities and government infrastructure.

Primary mode of transport on the island is by walking. Small craft are used to support transit between Taro Island and other nearby islands.

The island is low lying with only 5% of the island (two hectares) considered to be more than 3 m above sea level (Fugro 2018b) and research (e.g. Albert *et al.* 2016) has shown it is highly susceptible to sea level risk, raising concerns that residents and infrastructure may need to be relocated in the near future. Studies are, however, considering how the island can be made resilient to any future sea level risk to avoid impact upon residents and infrastructure.

The proposed cable alignment will connect with Taro Island from deepwater channel access to the south of the island (Figure 3-13). To the north, this channel is marked to support navigational passage for the freighter and ferry commercial shipping movements. The cable will follow the deepwater channel to connect into a beach landing site on the eastern edge of the island, south of the commercial port.

Figure 3-13 Taro Island, Redman Island and the proposed southern marine cable route presented by Fugro 2018b

Fugro 2018b reported that the channel depth immediately off the landing site is estimated to be 12-26 m of depth. As such, the cable may be surface laid by the cable laying ship to a point immediately offshore, and then floated ashore to be installed into the BMH.

The reef crest flat in this area are typical of islands in the Solomon Islands. This area shoals steeply into deepwaters and supports a mix of limestone blocks, coral rubble, live hard and soft corals and other invertebrates. This area is not known to support any seagrasses and turtles, while known to pass through the channel are not known to use any of the areas on the island for nesting. The beach in this area is short and supported by trees similar to those found on other islands.

Approximately 48 m from the beach dune is the Telekom telecommunications facility; located inside a fenced and gated plot about 44 x 28 m in size. The cable is planned to be installed using an articulated pipe across the reef flat, trenched through the shallow beach dune and installed into a CLS that will be established immediately adjacent the Telekom building (Figure 2-15).

Immediately in front of the Telekom building and proposed CLS is a public path. The cable will need to be trenched through this area and that will briefly interrupt use of the path to transit to/from market and other buildings. There are suitable other alternative routes and, as such, this is not considered to be an impact of concern for the proposed landing. Fishing in the channel area is not considered to be common. Small craft accessing the island tie up or anchor at a location further north along the channel, adjacent to the market area. Immediately adjacent the landing site, to the south, is a residential house complex built across reclaimed lands back to the beach dune and path area. This area is not going to be affected by the cable landing. The owner was consulted during site visitation and indicated support for the cable installation.

Figure 3-14 Taro cable landing beach site with house located on the edge (left) cable route from close to the tree looking towards the beach and house (right)

3.3 Social values

3.3.1 Honiara

As the capital of the Solomon Islands, Honiara serves as the main administrative, educational and economic centre for the country. The main economic activities in Honiara are in the services sector, including wholesaling, retailing, banking, restaurant and hotel related businesses (UN Habitat, 2012).

The cable approach to the Honiara landing through the Savo Sound, is known as the Iron Bottom Sound. The region contains numerous shipwrecks and aeroplane wrecks and is considered by some government agencies (including the US Navy) as sacred waters from World War II which took place in the Solomon Islands between 1942 and 1943.

The landing site at Honiara is approximately 1.5 km west of the city center on a government owned property. The property is 0.75ha in size and was previously an expatriate club known as the 'G Club'. Now owned by the MPF, the site includes several buildings, a sheltered seating area, small sports field, hard courts, a disused pool and gymnasium (refer to Figure 2-2). Several of the buildings are used by the University of the South Pacific (USP) for Pacific TAFE courses.

The property borders the beach to its north, Mendana Avenue to its south, on the other side of the eastern fence of the property are office buildings on a private property. Along the cable route from the beach landing to the CLS, the social environment includes main roads like Mendana Avenue, Hibiscus Avenue/Lenggakiki Road. These are busy roads and provide arterial connectivity for the city. A mixture of commercial and residential use is noted along either sides of the roads, until the cable turns into a provide property easement with established residential use along the easement.

Fishing for subsistence/consumption or for cash is common in Solomon Islands, and although the cable landing point area is not a regular fishing ground or launch point, local fishermen are very likely to informally and irregularly fish these beaches and waters.

3.3.2 Noro

Noro is the main industrial center in the Western Province. Noro has grown rapidly over recent years, from 3,365 persons in 2009 to 6,054 in 2016. Known as 'Tuna Town' in the Solomon Islands, Noro is home to the country's two biggest commercial fishing companies: Soltuna Fishing and Processing, and the National Fisheries Development. Together, the two companies employ 1,550 people, and the majority of workers are female (Noro Town Council, 2017). Many of the employees live in a village directly next to the cannery. Noro hosts the country's second international seaport, particularly busy for fishing vessels and timber shipments. There are several schools, shops and services, and a market located in Noro town.

Noro is connected to Munda by a well-maintained highway, linking to a post office, Telekom office, bank, rural hospital and police post as well as schools and tourist accommodation. Further industrial growth is planned for Noro and expansion of the tourism industry is also proposed for Munda, which is a key destination for scuba divers.

The proposed landing point for the cable is located just outside the centre of Noro, on the land adjacent to the property owned by the Markworth group. The cable route on the land will be through a Utility Easement designated by the Government of Western Province. At the time of site visit it was noted that the easement was primarily vacant bushland with three informal vegetable gardens located up the rise towards the coral road reserve, which had banana, cassava, potato plantations made by three separate families that lived in the neighbouring

village. Two houses are located at a fair distance on either side of the easement. The coral road connects to Neip Road on one side and an old saw mill on the other. The coral road is used mainly as a pedestrian walk way by people of the village and those accessing Noro town from the saw mill. Some cars were also observed on the road reserve.

3.3.3 Auki

Auki is the capital of Malaita Province, with a population of around 5,000 persons in 2009 (Solomon Islands National Statistics Office, 2009). Auki is the main port, with shipping services to Honiara and to other parts of the island and a daily market providing the focal points of the town. As the provincial capital, it is a main service town with several government offices, post office, Telekom office, bank, several primary and high schools, local market, several stores, service stations, market and some tourist accommodation.

Once on land the cable route will be partly located on an unnamed road, past a fresh water lagoon and through the Lilisiana Village within the customary land of the Aisisiki Group, and then partly along existing roads through the town till it connects to the CLS in town near the market.

Within the customary land the cable route travels past approximately 20 houses in close proximity and the edge of the Alotaa School boundary. Along the roads beyond the customary land there are mainly houses located on either sides of the road and commercial use along the roads in town.

The beach and waters in the vicinity of the cable landing point is used for fishing and recreational activities by the locals.

3.3.4 Taro

Taro island is the provincial capital of Choiseul Province. It is mainly a service town with a hospital, government offices and infrastructure located on the island; these include the Royal Solomon Islands Police and RAMSI and Telekom. A market occurs daily visited by surrounding island residents and the island is serviced by an airport with 2-3 flights from Honiara per week.

The cable landing point is at a small beach, with a house located on one side and the beach used by the home owner to keep their boats. There are other houses on the other side of the beach, but further away from the landing point. The cable crosses a small road which is used for pedestrian access to the main town centre/market area by the households in that area and sometimes to access the airport from the town centre.

Fishing or recreational use was not observed in the vicinity of the beach where the cable will land.

3.4 Summary of values

The values known to exist within the area of influence at each of the cable landing locations are summarised in Table 3-3. These values have potential to be affected by the proposed cable works.

Table 3-3 Summary of values present within each cable alignment

Location	Honiara	Noro	Auki	Taro
Marine Protected Areas	None overlapping	None overlapping	None overlapping	None overlapping

Hydrothermal Vents and Seamounts	None overlapping	None overlapping	None overlapping	None overlapping
Threatened and Protected Species	Occasionally overlapping from transient movements	Occasionally overlapping from transient movements	Occasionally overlapping from transient movements	Occasionally overlapping from transient movements
Coral Reefs	Present on reef crest	Present on reef crest	Present on reef crest	Present on reef crest
Seagrass Meadows	None overlapping	Present on reef crest	Present on reef crest	None overlapping
Mangroves and coastal trees	None overlapping	Present	Present	Present
Lagoons and Estuaries	None overlapping	Adjacent; man made	Adjacent alignment	None overlapping
Terrestrial Protected Areas	None overlapping	None overlapping	None overlapping	None overlapping
Crocodile Habitat	Nesting areas absent	Nesting areas absent	Nesting areas absent	Nesting areas absent
Residential housing, and commercial operations	Present	Present	Present	Present
Community use (schools, recreational use, roads)	Present	Present	Present	Present
Private land ownership	Present	Not present	Not present	Not present
Customary land ownership	Not present	Not present	Present	Not present
Government land ownership	Present	Present	Present	Present

4. Assessment of potential impacts

4.1 Potential impacts

This section provides an analysis of the potential environmental and social impacts of the project for the following stages of the project:

- Construction Phase – cable laying activities from the existing cable stations, along the land based routes, through the beach/intertidal zone and offshore, including potential environmental impacts, impacts to communities and cultural values, and influence of natural hazards and geological features; and
- Operations Phase - during operation of the cable and any maintenance that may be required.

A conceptual model summarising the potential impacts is provided below in Figure 4-2.

4.1.1 Construction phase

Below is a list of the potential environmental and social impacts considered for this project.

Offshore cable laying

- Mobilisation of sediment
- Vessel and underwater noise emissions
- Artificial lighting
- Vessel discharges
- Atmospheric emissions
- Invasive marine species
- Marine fauna collision/entanglement
- Accidental waste release from vessels
- Seabed disturbance
- Interference with other users of the marine environment

Onshore cable laying

- Mobilisation of sediment
- Artificial lighting
- Atmosphere emissions
- Interference with other users of the lands through which the cable will traverse

4.1.2 Operation phase

- Cable maintenance carries same impact risks as installation work impacts listed above.

4.1.3 Decommissioning phase

- Decommissioning and demolishing of onshore CLS and ancillary equipment carries same impact risks as installation work impacts listed above.

4.2 Mitigation measures

The following table presents an assessment of how potential impacts could occur as a result of the project; and identifies relevant management and mitigation strategies for each. These are provided with aim to avoid and/or minimise potential impacts to various environmental or social aspects associated with the proposed works. Mitigation measures provided represent the minimum requirements that should be adopted during the construction, operational or decommissioning phases of the project.

Table 4-1 Mitigation measures

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
Offshore works – Operation of the sea vessel	Collision with marine fauna from vessel movements and disturbance to marine megafauna.	Marine works are planned to avoid turtle nesting periods. Survey equipment will be used with output frequencies and sound energy density levels below the threshold for marine mammals. Vessel crews to keep watch of cable laying areas for possible occurrences of dolphins, whales, turtles and dugongs. Should there be any sightings of any of the marine mammals in the vicinity of the work area, the vessel will execute measures to avoid collisions and/or disturbances; this may include not changing course suddenly but decreasing speed to enable animal to move out of vessel pathway.	The vessel Contractor will adhere to project timeframes to avoid disturbance to marine fauna. Interference with any marine megafauna should be reported by the Contractor Principal to the SISCC Principal, including the date and location of the interference, description/identification of the megafauna and any corrective action taken.
	Off-shore release of potential contaminants, pollutants (including hydrocarbon spills) from off-shore activities.	All chemicals (environmentally hazardous) and hydrocarbons will be stored in closed, secure and appropriately bunded areas on board the vessel; Storage of materials should not be in areas at risk of inundation; 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; A Material Safety Data Sheet will be available for all chemicals and hydrocarbons in locations nearby to where the chemicals/wastes are stored; Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) and the quantity of spill recovery materials will be appropriate to the quantity of stored chemicals. Spills will be cleaned up immediately; Any contaminated material collected will be contained on board for appropriate onshore disposal;	The Contractor will ensure potential contaminants, pollutants (including hydrocarbon spills) are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		Refuelling operations will be a manned operation and in the event the refuelling pipe is ruptured the fuel bunkering activity will cease by turning off the pump; Any lifting equipment will be rated, certified and lifting will only be conducted in suitable weather and sea state conditions. Items on board the vessel will be securely sea-fastened to reduce the chance of dropped objects polluting the seafloor.	
	Off-shore release of emissions from off-shore activities.	Where appropriate, at night vessel deck lighting will be switched off and spot lights directed inboard to reduce direct light spill onto marine waters. Vessel machinery should be maintained in accordance with the manufacturer's specifications to reduce noise emissions; 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; Vessel engines will hold a valid and current International Air Pollution Prevention Certificate (IAPPC); and Ozone-depleting substances (ODS) will not be deliberately released in the course of maintaining, servicing, repairing or disposing of systems or equipment, and through good maintenance, fugitive emissions will be minimised.	The vessel Contractor will ensure potential emissions are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.
	Waste generated during off-shore works impacting upon the marine environment.	Sea vessel operations will comply the standards set out by MARPOL at all times. Any waste generated on the vessel including (but not limited to) sewage, oily water, plastics and food waste will be collected and disposed of onshore or in accordance with MARPOL.	The vessel operator will ensure waste streams generated during off-shore works are managed in accordance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		Scupper plugs or equivalent will be available on 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.	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.
	Introduction or spread of invasive pest species	No ballast water exchange will take place in waters less than 200 m deep or within 12 nautical miles from nearest land; All ballast water exchange details are to be recorded in a ballast water log; 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; 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 introduced or declared pest species is identified on site or on vehicles/vessels during operations or is suspected, then the contractor member is obliged to immediately (within 24 hours) notify the SISCC Principal who will advise on course of action.	The vessel Contractor will ensure the measures to minimise risk of introduction or spread of invasive species are carried out in accordance with the ESMP. The Contractor Principal will ensure certificates and risk assessments have been obtained and are valid prior to commencement of construction.
Offshore works – Placement of cable on the seabed	Disturbance to the seabed within the path of cable laying (including benthic layer, sea grass meadows, kelp and other marine vegetation) and impacts to marine fauna.	The cable laying route in deep waters will be positioned to avoid underwater features such as rocky reefs. A pre-laying cable survey will identify any debris along the proposed cable laying route. The route may be adjusted to avoid these areas and minimise the requirement for further seabed disturbance from pre-lay grapnel runs.	The Contractor will avoid installation of cable across any ecologically sensitive areas by adhering to the pre-determined route position list. The Contractor will not anchor in sensitive habitats except in the event of an emergency requirement.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		Cable placement activities to include detailed records of cable locations to enable relative certainty of cable position during cable maintenance grapnel activities. Ecologically sensitive areas will be identified and avoided if possible. If vessel anchoring is required, it will be avoided in any ecologically sensitive areas such as seagrasses or rocky reefs.	
	Interference with other users of the area affected by cable laying	Stakeholder consultation with the commercial fishing industry, and others, who could be affected by offshore works; Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day to support management of collision risk or entanglement / interference with other users.	The Contractor will ensure measures to minimise interference with other users are managed in accordance with this ESMP.
	Disturbance of any wrecks or unexploded ordnance.	A pre-laying cable survey will identify if any wrecks or unexploded ordnance are within the proposed cable route; In the event that the proposed cable routes traverse wrecks, the route should be modified based on the results of the survey in order to avoid laying cable through, over or immediately adjacent to any wrecks; If, during cable laying operations, a wreck is encountered, measures should be undertaken to lay the cable around the wreck, where possible. If a wreck is disturbed, measures will need to be undertaken to minimise the impacts, inform the appropriate authorities, keep records of the impact and notify a qualified maritime archaeologist, where required.	If required, a qualified maritime archaeologist should review findings to assist the marine geophysicist choose a suitable cable route that will avoid cultural material.
	Disturbance to reefs	Articulated pipes to be used, with the pipe being pinned to the reef, to both protect the cable across reef areas and to minimise the impact of the cable moving and causing abrasion to the reef.	The Contractor will ensure measures to minimise reef disturbance are managed in accordance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
Onshore works – Onshore site establishment (including temporary facilities and stockpiles). Onshore trenching. Repair/upgrade the vehicle access tracks to the beach. Excavation of material. Construction site decommissioning and make good.	Potential disturbance to native vegetation in areas to be cleared.	Minimise the construction area footprint and avoid, where possible, disturbance to native vegetation; Place site depots, equipment compounds and stockpile areas on previously cleared areas away from trees, bushes and native grasses, where possible; Avoid work/storage within the drip-line of trees to prevent damage to the tree roots and soil compaction. Use existing access tracks where possible to minimise additional disturbance; Reinstate any areas of vegetation, including road verges, which have been impacted during the construction phase;	The Contractor and Site Clerk will ensure measures to minimise vegetation disturbance are managed in accordance with the ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements. All disturbed grounds will be reinstated to condition equivalent or better to that pre-Construction works. At decommissioning all installed cable infrastructure will be removed unless agreed otherwise with regulators.
	Impact to the natural movement of surface and groundwater	Existing natural drainage paths and stormwater facilities not blocked or restricted. Runoff from unsealed areas at the construction sites does not enter stormwater drains or natural drainage lines. Control surface run-off entering and leaving the work areas and divert stormwater around stockpiles. Cleared areas to be stabilised / rehabilitated promptly and where possible enhance the natural value of these areas.	An inspection checklist will be developed by the Contractor to monitor and report on compliance with the ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements.
	Impact to water quality	Minimise runoff, erosion and associated water quality issues resulting from sediment disturbances during onshore works, particularly around waterbodies or road verges that drain to coastal waters or wetlands.	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
			will use that checklist to ensure compliance with ESMP requirements.
	Noise and vibration from construction activities may impact on nearby sensitive receptors including residential dwellings	Work hours will be between 6am and 6pm Monday to Saturday only.	The Contractor will ensure works occur within the given periods.
	Waste generated during construction inappropriately disposed of and impacting the environment.	All waste generated during construction to be appropriately disposed if not able to be re-used on site - **No plastics are to enter any waterway or ocean.** No burning or burial of hazardous waste on site. Any food waste should be contained and removed from site regularly to prevent attracting pest species.	The Contractor will ensure waste is managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will routinely inspect the vessel and operational procedures against the Inspection Checklist to ensure compliance with ESMP requirements.
	Disturbance of sediments	All sediment that is disturbed during the trenching process will be restored as trenches are backfilled	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements.
	Disturbance of crocodile habitat	Vessel crews and hired workers should keep watch when laying cable in areas where there are possible occurrences of crocodiles. Any sightings should be reported to the site clerk, including date and location, identification and description.	Sightings of crocodiles should be reported to the Site Clerk, including the date and location of the sightings, as well as identified and description of the animal.
	Impacts to road, water or power networks.	The Project will be required to submit plans and work descriptions to the Ministry of Infrastructure and Development, and will include	SISCC will require the Contractor to submit plans and work descriptions to relevant

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		sketches of the proposed infrastructure layout, planned work, schedule and environmental management control plans. Notifications and permissions may be required from Solomon Water and Solomon Power if the cable route will impact on water or power networks.	regulatory stakeholders to manage risk of interference with other services. The Contractor will seek all relevant permissions prior to installing any infrastructure with potential to interfere with other services.
	Interference with other users of the area affected by cable laying	Cable corridor will traverse through areas including roads, footpaths, private lands and public spaces. During installation works or operational maintenance other users of these spaces will be affected to manage safety and environmental risks. This will include impacts upon traffic passage. Stakeholders with potential to be affected will be notified of proposed construction works and relevant management plans will be in place to mitigate risk of safety or traffic incidents occurring.	The Contractor will develop site relevant traffic, safety and construction management plans that prescribe measures to mitigate risk of interference with other users. The Site Clerk will ensure described measures are implemented.

Table 4-2 Conceptual model of potential impacts

5. Environmental and social impact management plan

5.1 Purpose of this ESMP

This ESMP seeks to provide guidance to avoid and/or minimise potential environmental and social impacts associated with the proposed cable works. It also identifies potential mitigation measures and management strategies that should be adopted during construction or operational works to manage risk of environmental or social harm occurring.

The purpose of the ESMP is to:

- Provide for works to be carried out in accordance with applicable legislation, guidelines, policies and/or standards;
- Outline measures to monitor and control potential risk of environmental or social impacts occurring as a consequence of the proposed works;
- Provide government, community and other stakeholders with assurance that environmental and social issues associated with the works are managed appropriately; and
- Allocate responsibilities for the implementation of relevant impact/risk management measures.

The proposed ESMP will address the following phases of the proposed works:

- Construction of land based infrastructure to support cable landing
- Construction and laying of cable infrastructure across land and water environs out to the Solomon Islands EEZ
- Operation of the cable infrastructure

5.2 Scope

It is understood that Contractors will be engaged to install land based cable infrastructure, inclusive of the BMH and CLS infrastructure. Separate Contractors will be engaged to install the submarine and terrestrial telecommunications cables. Other Contractors may also be engaged during operational works to support any operational maintenance works required. This ESMP should be read, understood and adapted for use by all Contractors across all phases of works.

5.3 Implementation responsibility

Managing environmental and social issues and promoting awareness of such during project related site works is an essential component of responsible project management. It requires the active consideration of environmental, social, health and safety issues as a prerequisite to all works. This section identifies the parties who will be responsible for implementation of key management measures required to avoid or minimise likely impacts.

The roles and responsibilities of key participants in implementing the ESMP for the project are outlined below:

- The SISCC Principal
- The Site Clerk (also referred to as site supervisor, assigned by the Contractors Principal)
- Contractors and Staff

The Construction Contractors will be responsible for ensuring this ESMP is implemented by all staff or any subcontractors involved with the construction works.

The SISCC Principal will ensure that all contractual documents specifically quote an ESMP in terms of responsibility for addressing and implementing relevant environmental and social requirements. The contractual documents should also indicate that the Contractor is responsible for ensuring legislative and ESMP compliance controls are maintained on site.

The SISCC is responsible for confirming, and if required, obtaining, Development Consent from the ECD within MECCDMM. Alternatively, the SISCC is responsible for obtaining a waiver of Development Consent requirements. The SISCC Principal will provide such to the Contractor in support of project delivery.

The Contractor is responsible for obtaining all other relevant approvals/permits/licences prior to works commencing.

The Contractor will appoint a Site Clerk who will have overall responsibility for ensuring that all employees, subcontractors, and persons involved with the planning and carrying out of the proposed works are familiar with their obligations to comply with environmental or social requirements.

Successful implementation relies upon support for, and compliance with, the ESMP's requirements from all involved parties. Table 5-1 outlines the phases of the project and the responsibilities of the principal, Site Clerk and contractor(s) and staff during the phases of the project.

Table 5-1 Project Role Description and Responsibility

Phase	Role	Responsibility
Planning	SISCC Principal	• Responsible for the overall supervision and co-ordination of the project. Responsible for ensuring environmental compliance during the design phase. • Responsible for undertaking appropriate land access consultation, negotiation and compensation with private, government, customary landholders and informal vegetable garden owners in Noro. • Responsible for consultation with stakeholders and public notification about the project. • Responsible for review of the draft ESMP and preparation of final ESMP prior to construction commencing, including finalisation of the SCP and Grievance Management Procedure. • Agree procedures for emergency response. • Agree frequency and method of auditing, monitoring and other matters which are to be reported to SISCC.
Construction or Operational works	SISCC Principal	• Key contact and representative of SISCC • Responsible for ensuring contracts adequately identify requirement for ESMP adherence and compliance • Responsible for reporting any breaches of ESMP conditions to the ECD within MECCDMM • Responsible for regular progress reporting to DFAT

	Contractor Principal	• Responsible for obtaining all required site licences to support effective implementation of the ESMP and completion of all works with regards to legislative obligations • Responsible for ensuring reviewing, updating and revising the ESMP to be consistent with legislative requirements for site works • Responsible for ensuring adherence and compliance with the ESMP including preparation of management plans and workforce strategy as outlined in the ESMP • Responsible for reporting any breaches of ESMP or legislation to the SISCC • Responsible for appointing an appropriate Site Clerk to oversee all ESMP requirements
	Site Clerk	• Responsible for supervising, managing and implementing environmental and social controls, requirements, licences and procedures described by the Contractor Principal and/or the ESMP • Conducts environmental audits/monitoring during all stages to ensure implementation of requirements • Ensures provision of appropriate training or site instructions to site staff to enable them to meet their environmental and social obligations • Maintains records of site works, including any training regarding adherence to ESMP requirements, site incident reports or site complaints management • Responsible for the emergency response procedure for environmental, health, safety or other social incidents and reporting of such to the Principal
	Contractor(s) and staff	• Implement environmental and/or social controls described by the ESMP and/or Site Clerk • Report all incidents to the Site Clerk

5.1 Site description

Site identification details are summarised in Section 2 of this PER.

Detailed description of environmental and social values of the site that have potential to be affected by the proposed works are also described by this PER. This has informed identification of those management controls and procedures considered to be minimum requirements for implementation as part of this ESMP.

5.2 Environmental management controls and procedures

The required management objectives to be adhered to for implementation of this ESMP are summarised in Table 5-2

Table 5-2 ESMP controls and procedures

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
Offshore works – Operation of the sea vessel	Collision with marine fauna from vessel movements and disturbance to marine megafauna.	Marine works are planned to avoid turtle nesting periods. Survey equipment will be used with output frequencies and sound energy density levels below the threshold for marine mammals. Vessel crews to keep watch of cable laying areas for possible occurrences of dolphins, whales, turtles and dugongs. Should there be any sightings of any of the marine mammals in the vicinity of the work area, the vessel will execute measures to avoid collisions and/or disturbances; this may include not changing course suddenly but decreasing speed to enable animal to move out of vessel pathway.	The vessel Contractor will adhere to project timeframes to avoid disturbance to marine fauna. Interference with any marine megafauna should be reported by the Contractor Principal to the SISCC Principal, including the date and location of the interference, description/identification of the megafauna and any corrective action taken.
	Off-shore release of potential contaminants, pollutants (including hydrocarbon spills) from off-shore activities.	All chemicals (environmentally hazardous) and hydrocarbons will be stored in closed, secure and appropriately bunded areas on board the vessel; Storage of materials should not be in areas at risk of inundation; 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; A Material Safety Data Sheet will be available for all chemicals and hydrocarbons in locations nearby to where the chemicals/wastes are stored; Spill clean-up equipment will be located where chemicals and hydrocarbons are stored and frequently handled (i.e. 'high risk' areas) and the quantity of spill recovery	The Contractor will ensure potential contaminants, pollutants (including hydrocarbon spills) are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		materials will be appropriate to the quantity of stored chemicals. Spills will be cleaned up immediately; Any contaminated material collected will be contained on board for appropriate onshore disposal; Refuelling operations will be a manned operation and in the event the refuelling pipe is ruptured the fuel bunkering activity will cease by turning off the pump; Any lifting equipment will be rated, certified and will lifting will only be conducted in suitable weather and sea state conditions. Items on board the vessel will be securely sea-fastened to reduce the chance of dropped objects polluting the seafloor.	
	Off-shore release of emissions from off-shore activities.	Where appropriate, at night vessel deck lighting will be switched off and spot lights directed inboard to reduce direct light spill onto marine waters. Vessel machinery should be maintained in accordance with the manufacturer's specifications to reduce noise emissions; 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; Vessel engines will hold a valid and current International Air Pollution Prevention Certificate (IAPPC); and Ozone-depleting substances (ODS) will not be deliberately released in the course of maintaining, servicing, repairing or disposing of systems or equipment, and through good maintenance, fugitive emissions will be minimised.	The vessel Contractor will ensure potential emissions are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
	Waste generated during off-shore works impacting upon the marine environment.	Sea vessel operations will comply the standards set out by MARPOL at all times. Any waste generated on the vessel including (but not limited to) sewage, oily water, plastics and food waste will be collected and disposed of onshore or in accordance with MARPOL. Scupper plugs or equivalent will be available on 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 Contractor will ensure waste streams generated during off-shore works are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.
	Introduction or spread of invasive pest species	No ballast water exchange will take place in waters less than 200 m deep or within 12 nautical miles from nearest land; All ballast water exchange details are to be recorded in a ballast water log; 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; 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 introduced or declared pest species is identified on site or on vehicles/vessels during operations or is suspected, then the contractor member is obliged to	The vessel Contractor will ensure the measures to minimise risk of introduction or spread of invasive species are carried out in accordance with the ESMP. The Contractor Principal will ensure certificates and risk assessments have been obtained and are valid prior to commencement of construction.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		immediately (within 24 hours) notify the SISCC Principal who will advise on course of action.	
	Safety at sea during severe storms or other natural hazard event. Storms, cyclones or other severe weather events have potential to interfere with cable installation works and safe operation of the vessel.	Captain of the vessel will plan ships passage and works to maintain safety and take evasive action as required, with adherence to international vessel operating standards for safety at sea.	Vessel Captain will be responsible to maintain safety of vessel and crew during installation operations. Any amendments to installation schedule or plan in regards to safety will be reported to the Contractor Principal.
Offshore works – Placement of cable on the seabed	Disturbance to the seabed within the path of cable laying (including benthic layer, seagrass meadows, kelp and other marine vegetation) and impacts to marine fauna.	The cable laying route in deep waters will be positioned to avoid underwater features such as rocky reefs. A pre-laying cable survey will identify any debris along the proposed cable laying route. The route may be adjusted to avoid these areas and minimise the requirement for further seabed disturbance from pre-lay grapnel runs. Cable placement activities to include detailed records of cable locations to enable relative certainty of cable position during cable maintenance grapnel activities. Ecologically sensitive areas will be identified and avoided if possible. If vessel anchoring is required, it will be avoided in any ecologically sensitive areas such as seagrasses or rocky reefs.	The Contractor will avoid installation of cable across any ecologically sensitive areas by adhering to the pre-determined route position list. The Contractor will not anchor in sensitive habitats except in the event of an emergency requirement.
	Interference with other users of the area affected by cable laying.	Stakeholder consultation with the commercial fishing industry, local subsistence fishers near cable landing sites and others, who could be affected by offshore works;	The Contractor will ensure measures to minimise interference with other users are managed in accordance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		Visual observations will be conducted by trained watch keepers on all vessels 24 hours per day to support management of collision risk or entanglement / interference with other users. Notice to mariners to be issued to warn all ships and recreational craft to maintain safe operating distance from cable ship and tender vessels.	The Vessel Contractor will develop activity relevant safety management plans that prescribe measures to mitigate risk of interference with other users, inclusive of notice to mariners and security of work areas in shallow waters from recreational or other vessel traffic.
	Disturbance of any wrecks or unexploded ordnance.	A pre-laying cable survey will identify if any wrecks or unexploded ordnances (UXOs) are within the proposed cable route; In the event that the proposed cable routes traverse wrecks or UXOs, the route should be modified based on the results of the survey in order to avoid laying cable through, over or immediately adjacent to any wrecks or UXOs; If, during cable laying operations, a wreck or UXO is encountered, measures should be undertaken to lay the cable around the wreck, where possible and safely avoid any UXOs. If a wreck or UXO is disturbed, measures will need to be undertaken to minimise the impacts, inform the appropriate authorities, keep records of the impact and notify a qualified maritime archaeologist, where required.	If required, a qualified maritime archaeologist should review findings to assist the marine geophysicist choose a suitable cable route that will avoid wrecks and UXOs
	Disturbance to reefs	Articulated pipes to be used, with the cable installed within the pipe and pinned to the reef, to both protect the cable	The Contractor will ensure measures to minimise reef disturbance are managed in accordance with this ESMP.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		across reef areas and to minimise the impact of the cable moving and causing abrasion to the reef.	
	Safety during installation in relation to severe storms, tsunamis or other natural hazards inclusive of crocodile and shark attack. Storms, cyclones or other severe weather events have potential to interfere with cable installation works and safety of the installation crew.	During diver placement of cable on seabed and pinning of cable to reef there is potential risk of crocodile attack or impact from other dangerous marine fauna. There are also risks associated with diving activities and work under/over water. Captain of the vessel will plan all installation activities to maintain safety and take evasive action as required, with adherence to international vessel operating standards for safety at sea. A diver supervisor will be required to plan and supervise all diver related activities for safety management. All crew will be familiar with safety at sea working conditions, including controls to manage risk of man-over-board. These will form part of the crew induction processes.	Vessel Captain will be responsible to maintain safety of vessel and crew during all installation operations. Contractor Principal will appoint a diver supervisor to oversee safety of any diver related activities, including development of dive safety plans as/if required. Vessel Captain will require all crew to be inducted to vessel safety operations including drills for man-over-board. Any amendments to installation schedule or plan in regards to safety will be reported to the Contractor Principal.
Onshore works – Onshore site establishment (including temporary facilities and stockpiles). Onshore trenching and construction. Repair/upgrade the vehicle access tracks to the beach. Excavation of material and installation of cable and associated infrastructure.	Land access and easement management	Access to land for securing cable easement will need to be negotiated with landholders. SICSS will consult and negotiate voluntary land access with all affected landholders including Commissioner of Lands, Provincial Government, Customary groups and private owners.	SICSS will consult with all relevant parties and engage legal advisors and compensation negotiation will be undertaken in accordance with applicable legislation. SICSS has initiated land access consultation with all landholders since June 2018 and will continue to engage through the land access and compensation negotiation process.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
Construction site decommissioning and make good.			
	Involuntary economic displacement of informal vegetable gardens in Noro	Further consultations is required with the households who tend the vegetable gardens located along the government utility easement in Noro to correctly identify who uses the plots, the number of plants within each and determine the appropriate amount of compensation per household, in accordance with applicable legislation. Notify Noro Town Council about timing of construction activities and seek their assistance to relocate the gardens to alternate land to avoid any livelihoods impacts on the families.	SICSS will consult with all relevant parties and engage legal advisors and compensation negotiation will be undertaken in accordance with applicable legislation.
	Access and disturbance to customary waters and land in Auki	SISCC will engage in further consultations and land access negotiations with the customary owners - Mr Jonathan Malai who is the leader of the Aisisiki group. These negotiations will be held in accordance with legal advice sought by SISCC. SISCC will engage with the other eight claimants of the customary land, and provide information about the project. This will help to minimise group conflicts therefore minimise the risk to the project. In collaboration with Mr Jonathan Malai, SISCC will consult with the households and the school in the Lilisiana village to inform them about the project construction activities.	SICSS will consult with all relevant parties and engage legal advisors and compensation negotiation will be undertaken in accordance with applicable legislation.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
	Construction workforce benefits	To maximise the benefits from the project SISCC, through its contractors' terms and conditions will ensure that: • Preference is given to local workforce where possible and suitable • No child labour or illegal migrant workers will be engaged on the project • Non-residential workers who will be accommodated at the site for short durations will conduct themselves within legal and good citizen behaviour code of conduct.	SISCC will include these condition as part of contractor's terms and conditions and monitor through review of tender submissions and regular reporting. Contractors will be responsible to implement such aspects within their workforce strategy.
	Potential disturbance to native vegetation in areas to be cleared.	Minimise the construction area footprint and avoid, where possible, disturbance to native vegetation; Place site depots, equipment compounds and stockpile areas on previously cleared areas away from trees, bushes and native grasses, where possible; Avoid work/storage within the drip-line of trees to prevent damage to the tree roots and soil compaction. Use existing access tracks where possible to minimise additional disturbance; Reinstate any areas of vegetation, including road verges, which have been impacted during the construction phase;	The Contractor and Site Clerk will ensure measures to minimise vegetation disturbance are managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements. All disturbed grounds will be reinstated to condition equivalent or better to that pre-Construction works. At decommissioning all installed cable infrastructure will be removed unless agreed otherwise with regulators.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
	Impact to the natural movement of surface and groundwater	Existing natural drainage paths and stormwater facilities not blocked or restricted. Runoff from unsealed areas at the construction sites does not enter stormwater drains or natural drainage lines. Control surface run-off entering and leaving the work areas and divert stormwater around stockpiles. Cleared areas to be stabilised / rehabilitated promptly and where possible enhance the natural value of these areas.	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements.
	Impact to water quality and coastal habitat stability from construction works	Minimise erosion and runoff and associated water quality issues resulting from sediment disturbances during onshore works, particularly around waterbodies or road verges that drain to coastal waters or wetlands. Rehabilitate areas immediately post works to avoid ongoing erosion risk. Consider beach stabilisation requirements to manage risk of future erosion due to wave or other action.	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements.
	Noise and vibration and dust from construction activities may impact on nearby sensitive receptors including residential dwellings and schools	Work hours will be between 6am and 6pm Monday to Saturday only. All machinery and equipment used for construction is maintained in good order.	The Site Clerk will ensure works occur within the given periods and ensure all machinery and equipment used for construction is maintained in good order
	Waste generated during construction inappropriately disposed of and impacting the environment.	All waste generated during construction to be appropriately disposed if not able to be re-used on site - **No plastics are to enter any waterway or ocean.** No burning or burial of hazardous waste on site.	The Contractor will ensure waste is managed in accordance with this ESMP. An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		Any food waste should be contained and removed from site regularly to prevent attracting pest species.	Clerk will use that checklist to ensure compliance with ESMP requirements.
	Disturbance of sediments, erosion risk potential	All sediment that is disturbed during the trenching process will be restored as trenches are backfilled	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP. The Site Clerk will use that checklist to ensure compliance with ESMP requirements.
	Disturbance of crocodile habitat	Vessel crews and hired workers should keep watch when laying cable in areas where there are possible occurrences of crocodiles. Any sightings should be reported to the Site Clerk, including date and location, identification and description.	Sightings of crocodiles should be reported to the Site Clerk, including the date and location of the sightings, as well as description of the animal.
	Impacts to road, water or power networks.	The Project will be required to submit plans and work descriptions to the Ministry of Infrastructure and Development, and will include sketches of the proposed infrastructure layout, planned work, schedule and environmental management control plans. Notifications and permissions may be required from Solomon Water and Solomon Power if the cable route will impact on water or power networks.	The SISCC will require the Contractor to submit plans and work descriptions to relevant regulatory stakeholders to manage risk of interference with other services. The Contractor will seek all relevant permissions prior to installing any infrastructure with potential to interfere with other services.
	Interference with other users of the area affected by cable laying (traffic and site safety and access)	Cable corridor will traverse through areas including roads, footpaths, private lands and public spaces. During installation works or operational maintenance other users of these spaces will be affected to manage safety and environmental risks. This will include impacts upon traffic passage. Stakeholders with potential to be affected will be notified of proposed construction works and relevant	The Contractor will develop site relevant traffic, safety and construction management plans that prescribe measures to mitigate risk of interference with other users. The Site Clerk will ensure described measures are implemented.

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
		management plans will be in place to mitigate risk of safety or traffic incidents occurring. These should include measures to (but not limited to): • Minimise traffic and access disruption • Maintain safe access to all adjacent properties • Maintain safety of surrounding communities, school children where the cable route is located near schools in Taro and Auki through fencing or putting barriers to restrict access to construction sites, • Consultation with key stakeholders to inform them about construction activities (such as private property owners, users, Honiara Council and provincial governments in Noro, Auki and Taro and the Aisisiki Group, residents of the Lilisiana village and schools near the cable route in Auki and Taro) • Gather community feedback through a grievance redress procedure	
	Sea level rise affecting infrastructure security	Detailed design should give consideration to sea level rise potential risks and design trench, CLS, BMH and coastal stability infrastructure to take account of such risks.	Contractor Principal will be responsible for ensuring that detailed design takes account of sea level rise risk mitigation measures.
	Storms, cyclones or other severe weather events have potential to interfere with cable installation	An emergency response plan will be developed to manage safety of staff/crew in response to any natural hazard risks.	Contractor Principal will be responsible for development of a site specific emergency response plan that is inclusive of response to natural hazard

Construction Activity	Potential Impacts	Controls / Actions	Inspection / Criteria/ Target/ Responsibility
	works and safety of the installation crew and staff.		emergencies. Site Clerk will be responsible for implementation of the plan and reporting of any action taken to Contractor Principal.

5.3 Stakeholder Consultation Plan (SCP)

In accordance with the ESMP, a Stakeholder Consultation Plan (SCP) will be prepared and implemented by SISCC in conjunction with the contractors. The SCP outlines potential methods of consultations and communication, stakeholders to be consulted, the timing and purpose of consultations. The consultation plan should be read in conjunction with the mitigation strategies in Table 5-2.

Methods of consultations/communication

Various forms of communication will be required for effective consultations. Some appropriate forms of communication for this Project are listed below:

- Face to face meetings with government officials, directly affected persons and land owners
- Written communication in the form of letters, notifications or legal agreements to ministries, other government offices, communities, affected persons and land owners
- Community information sessions specifically around project sites

It is recognised that there will be other consultation efforts and methods that will be deployed by SISCC for the benefit of the project.

Stakeholder Consultation Plan

Table 5-3 presents a consolidated consultation plan to comply with DFAT requirements for meaningful consultations through the project implementation and operational phases.

Table 5-3 Stakeholder Consultation Plan

Project phase	Stakeholders to be consulted	Purpose of consultation
Prior to construction	Community at proposed project sites – Honiara, Noro, Auki and Taro (including the GST group in Auki)	Create general awareness about the project, disseminate project information and engage with community for confirmation and further identification and management of social impacts
	Land owners of proposed project sites – private property owners and customary land owners	Initiation of land access process, with initial meetings, notifications and land access negotiations to arrive at an agreement
	Vegetable farmers / growers in Noro	Confirm who the families are, the size of plots/number of plants, and initiate compensation process as per the legislative compensation process and rates
	Department of Fisheries, Department of Mining, SIMSA, provincial governments of Guadalcanal, Malaita, Western Province and Choiseul and local governments of Honiara, Noro Auki and Taro	To generate awareness about the project, its potential social and environmental impacts, timing of project construction, discussing required co-operation from the agencies and providing notifications within their jurisdictions
	Construction contractor	To inform the contractor about the project terms and conditions particularly regarding maximising compliance with the ESMP and their role in consultation and grievance redress.

During construction	Land owners at project sites, local community around project sites	Maintain contact to inform any changes to project construction program or any unidentified project impacts, attend to grievances or inquires, provide information on safety around project sites
	Department of Fisheries, maritime office, harbour master	Maintain contact to update information on the movements of the Marine Survey Ship and the Cable Laying Ship
Operation	Landholders, maritime authorities	Consult with property owners prior to accessing their land for any maintenance activities as per the negotiated agreement drawn prior to construction. For maintenance work of cable in case of breakage or damage to cable.

5.4 Grievance Management Procedure

To meet the requirements of the Solomon Islands Government EIA Procedural Guidelines, 2010 and DFAT Environmental and Social Safeguards, 2018, a Grievance Management Procedure will be put in place. Grievance Management Procedure detailed below will be adopted where relevant in addressing any potential grievances raised in response to the project.

For land access

To ensure fair process is in place consultation and land access and easement compensation negotiation will be carried out with all private property owners by SICSS's legal advisors and compensation negotiation will be undertaken in accordance with applicable legislation.

Should land owners not be satisfied that SISCC is progressing with fair and reasonable intentions, an independent party may represent the land owner's interests in identifying and/or raising the issue with the SISCC Principal to seek resolution. The cost for the third party assessors, if required, will be negotiated and agreed between SISCC and the landholders.

The Land and Titles Act does not include grievance redress mechanisms for negotiated agreements (be they transfers, leases or easements) where these are not under the auspices of the Commissioner of Lands. However the Telecommunications Act requires service providers to advise land owners as to how they can access impartial legal advice, with this advisory service pre-empting a grievance redress requirement, as the negotiation is not underpinned by default compulsory acquisition.

During construction

During construction and to a lesser extent, operation of the project it is possible that people may have concerns with the project's environmental and social performance. In order to capture and address these concerns the grievance management procedure will allow affected persons to register their complaints and provide the project an opportunity to resolve them.

This grievance management procedure places ultimate responsibility for grievance resolution with SISCC, however on site complaints can also be directly addressed by the Contractor's Site Clerk.

If the complaint is straightforward then the Site Clerk will resolve the complaint immediately. If the complaint is complicated and outside the control of the Site Clerk, it will then be referred to the Contractor Principal, who will have 48 hours to respond with an appropriate mechanism to resolve the complaint and will communicate such to the affected person.

The Contractor Principal should maintain records of all complaints and resolution procedures and report these to SISCC on a schedule agreed through contract conditions.

If the affected person is not satisfied with the complaint resolution, they may be able to take the complaint to the SISCC. If the affected person is dissatisfied with the outcome, they may appeal to the National Court, which will initially be at their own cost.

All complaints made to the Site Clerk are to be documented in a register that will be maintained by the Site Clerk or Contractor Principal at the site. Details of the complaint should be recorded by date, name, contact address and reason for the complaint. A duplicate copy of the entry will be given to the affected person for their record at the time of registering the complaint and another copy of the complaint will be sent to the Contractor Principal.

Complaints are to be responded to within 48 hours and then further updates if required to be provided every two days, until the complaint is resolved. Complaints resolution via the Site Clerk will be free of charge to the affected person. The complaints register will show a record of who within the Contractors staff has been directed to deal with the complaint and the outcome of the complaint. The register will also record other details such as the date and time when the action was commissioned, complaint was resolved, when and how the affected person was informed of the decision. The register is then signed off by the person who is responsible for the decision and dated. The register is to be kept at the SISCC Offices or at the Contractors site office near the project sites; registers are to be maintained as public documents.

During operation

Very few complaints are expected to arise during operations. It is anticipated that complaints during operations will be mainly about cable vandalism, unlikely incidences where anchors or fishing gear might be caught in the cable and potential environmental impacts during cable maintenance works.

SISCC will ensure contact details for any complaints are made available to any member of the public through display of information on the CLS infrastructure. During operations should any person wish to report an incident to SISCC's representatives they should use those details. SISCC's representatives will respond within 48 hours of receipt of the complaint following the same procedure as that described above for management during construction.

5.5 Training and site induction

The Contractor Principal will require that the Site Clerk instructs all employees, sub-contractors and visitors of their obligations in relation to the ESMP and legislative requirements of relevance to all site works. Each person will be made aware of and have an understanding of their obligations and duties detailed in this ESMP and will be familiar with the components relevant to their role.

During construction works, the Contractor Principal must ensure that each operative is trained to use the machinery and materials on site efficiently and safely. The Site Clerk is responsible for making sure that all required ESMP, environment, social, health and safety controls are implemented on site.

5.6 Emergency response and incident management

The following sections provide an outline of emergency response procedures and protocols, including responsibilities, to enable effective response with minimal environmental harm or disruption.

5.6.1 Environmental incidents (Notification of environmental harm)

For a particular incident, the requirement for notification in accordance with legislation depends on the extent of harm or the potential damage to the environment. To ensure that SISCC has a consistent approach to incident reporting, the SISCC Principal must be contacted immediately or as soon as possible, after the site has been made safe following any environmental harm incident.

The Contractor's Site Clerk will, therefore, be responsible for:

- Identification of any onsite incident through onsite observation of activities/communication with onsite team undertaking works
- Ensuring an immediate assessment of the potential onsite and offsite impacts of any observed incident
- Consulting (if necessary) with government, emergency services or regulatory authorities, where these authorities can provide assistance with mitigation of impacts
- Instigating appropriate steps to mitigate the impact/s
- Advising the Contractor Principal of any incident and actions taken.

The Contractor Principal will provide details of the incident notification to the SISCC Principal within 48 hours of the site being made safe or incident occurrence.

The SISCC Principal will notify appropriate authorities within 5 working days of incident notification and work with authorities to provide any required/requested information relating to the incident details and/or management.

5.6.2 Emergency response plan

Emergencies that may occur during the construction phase of the project include:

- Storm conditions i.e. wave action, high tides, tsunamis, earthquakes, flooding, uncontrolled erosion.
- Fire
- Chemical spill
- Explosion
- Wildlife Injury
- Damage to power or services infrastructure
- Personnel injury

5.6.3 Emergency response contacts register

Prior to the commencement of any site works, the Contractor Principal and Site Clerk are to agree on communication procedures for emergency response. This should include which emergency services should be contacted in the event of an emergency occurring on site. A suggested format for recording these contacts is provided by Table 5-4.

Table 5-4 Incident/emergency contact register

Organisation	Title	Telephone Number
Principal (SISCC Representative)	TBC	TBC
Contractor Principal	TBC	TBC
Contractor Site Clerk	TBC	TBC
Emergency Services	TBC	TBC

It is the responsibility of the Site Clerk to contact any emergency services (e.g. health, police, other) should these be needed. It is also the responsibility of the Site Clerk to induct and instruct site staff in the emergency response procedures, including requirement for communication and management of any observed incidents. Staff working on site are required to report any incidents to the Site Clerk to support effective response.

5.6.4 Emergency response procedures

To minimise the risk of an environmental accident or emergency during construction phase of the Project and to ensure emergencies are managed appropriately, the Contractor, Site Clerk and all staff are to follow these general procedures:

- Ensure that an Emergency Response Plan is maintained as part of the site ESMP kept in place readily available to site staff to support response to any accidents or incidents that may impact on the environment or safety. This should include contact details of all relevant emergency services determined by the Contractor Principal and Site Clerk.
- The Site Clerk is to ensure that all personnel are made aware of the requirements of the Emergence Response Plan and ESMP and of required communication of any issues observed on site.
- Material Safety Data Sheets for all relevant materials used or stored on site for the construction works shall be kept on site by the Site Clerk.
- Spill Response Kits, fire extinguishers and/or other emergency response equipment should be fully maintained and readily available where risk of fire or chemical spill exists.
- In the event of an emergency the Contractor's Site Clerk is to notify the Contractor's Principal as soon as possible but no later than 48 hours post incident occurrence. The Site Clerk will also notify any relevant emergency services.
- Following an emergency, the affected areas shall be monitored and remediated as required by site relevant legislative obligations.

Follow up action is to be undertaken to ensure adequate provisions are implemented to minimise or eliminate the risk of reoccurrence of the emergency.

Once immediate mitigation steps have been undertaken and the incident contained. All incidents/emergencies will be reported to the SISCC Principal by the Contractor Principal. The Contractor Principal is to inform the SISCC Principal of the following:

- Time and location of the emergency or incident
- The environmental harm or nuisance caused, or threatened to be caused by the emergency/incident
- Any rectification or remediation work undertaken

- Actions to be taken to prevent further incidents/emergencies and mitigate any environmental harm and/or nuisance caused by the incident/emergency

Non-conformance with this plan shall be documented by the Contractor Principal and corrective action undertaken to ensure future conformance.

The process for investigating, revising and reporting emergency incidents should follow that described by ESMP implementation in Section 0.

5.7 ESMP monitoring, review and reporting

The ESMP will only be effective if it is appropriately managed and utilised, and as such, it is important that regular review, monitoring and reporting is carried out. This will ensure that the measures, responsibilities, criteria and corrective actions remain achievable, effective and suitable to the project, whilst maintaining compliance with relevant legislation and policy.

5.7.1 Site specific monitoring, review and reporting

Monitoring to demonstrate ESMP effectiveness

The construction Site Clerk will undertake daily site walk overs to ensure the controls outlined in the ESMP are being applied. If they are not being applied, the Site Clerk will take action by reporting to the Contractor Principal. The Contractor Principal will then determine if further action is required.

Investigation and review of ESMP

Any reported incidents will be investigated within 48 hours by the Principal to determine need for further action.

Should any changes to site activities or ESMP controls be deemed to be required to maintain effective control against environmental or social harm, the Contractor Principal will direct what change is required to occur. The Site Clerk will be instructed on such change and be responsible for implementation of such on site.

Records

Records will be maintained by the Contractor Principal of:

- Any incidents reported by the Site Clerk
- Findings of investigations undertaken by the Contractor Principal or Site Clerk
- Changes made to the ESMP or instructed to the Site Clerk to be implemented on site to avoid recurrence of such incidents. The process for review of the ESMP is noted in Section 5.7.2 following.

Records will be maintained by the Site Clerk of any monitoring required to be completed by any approvals, licences or Conditions of Consent granted for the proposed works

Reporting

The Site Clerk will communicate to the Principal contractor weekly construction progress checks in regards to confirmation that ESMP controls are in place. The Site Clerk will also communicate any complaints made by Contractor(s), staff or public. The Contractor Principal will maintain records of such and provide progress reports to the SISCC Principal in accordance with contractual requirements.

5.7.2 Overall ESMP monitoring, review and reporting

The overall responsibility of monitoring, review and reporting of the ESMP rests with SISCC. During planning and construction phase SISCC will monitor site activities on a daily bases. Through the site monitoring and review and reporting process, SISCC will collect all the necessary information from Contractors or Site Clerks to ensure compliance with the ESMP. Should any updates to the ESMP be deemed to be required by contractors or Site Clerks to support ongoing relevance of the ESMP, the Contractors Principal and/or Site Clerk will need to agree to such updates with the SISCC Principal prior to implementation; except in the event of

emergency response. Following any emergency response, required ESMP updates will be notified to the SISCC Principal by the Contractors Principal as soon as safety practical.

Monthly progress reporting by SISCC to its Board of Directors will record compliance and shortfalls with the ESMP. These progress reports will be consolidated and submitted to the DFAT and the Solomon Islands Ministry of Environment at a frequency agreed between SISCC and the parties through the project planning, construction and operations phase.

Any shortfalls of the ESMP will be addressed through revision and updating, as appropriate, to maintain ongoing relevance and intent of the controls prescribed within the ESMP for protection of social and environmental values from project works across all phases of work.

5.7.3 Required plans and approvals

The following table summarises the appropriate plans and/or approvals that will be required for the project as prescribed by the ESMP.

Table 5-5 Required plans and approvals

Inspection checklist	An inspection checklist will be developed by the Contractor to monitor and report on compliance with this ESMP.
Material Safety Data Sheet	A Material Safety Data Sheet will be available for all chemicals and hydrocarbons in locations nearby to where the chemicals/wastes are stored;
International Air Pollution Prevention Certificate	Vessel engines will hold a valid and current International Air Pollution Prevention Certificate (IAPPC)
Ballast Water Log	All ballast water exchange details are to be recorded in a ballast water log
Biofouling vessel risk assessment	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
International Anti-fouling System Certificate	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
Land access	Access to land for securing cable easement will need to be negotiated with landholders. SICSS will consult and negotiate voluntary land access with all affected landholders including Commissioner of Lands, Provincial Government, Customary groups and private owners
Notification and permission for impacting on other networks	SISCC will require the Contractor to submit plans and work descriptions to relevant regulatory

	stakeholders to manage risk of interference with other services. The Contractor will seek all relevant permissions prior to installing any infrastructure with potential to interfere with other services, this will include notification to mariners.
Traffic, safety and construction management plans	The Contractor will develop site relevant traffic, safety and construction management plans that prescribe measures to mitigate risk of interference with other users. The Site Clerk will ensure described measures are implemented.
Emergency response plans	The Contractor will develop an emergency response management plan that will support delivery of works in regards to safety in the event of emergency or incident on site.
Grievance management plan	The Contractor will develop a grievance management plan which will enable complaints or grievances to be effectively managed.

6. Summary and recommendations

This document provides a detailed assessment of the environmental and social matters associated with the installation, operation and decommissioning of a proposed international and domestic cable network within the Solomon Islands. It also prescribes necessary controls that must be adhered to in order to mitigate identified risks to social and environmental values. Key background to this project is outlined below:

- The installation of an international submarine cable in the Solomon Islands has been under consideration for the last eight years and was previously initiated by the Solomon's Oceanic Cable Company (SOCC). The current project being undertaken by the Solomon Islands Submarine Cable Company (SISCC) has evolved to support international cable connectivity into Honiara and domestic cable connectivity between four provinces of the Solomon Islands.
- The Solomon Islands currently rely on satellites for international telecommunications connectivity, which is expensive and provides limited capacity of an inferior quality when compared to that provided by fibre-optic international submarine cables.
- This project will connect the Solomon Islands to the global internet and provide it with an ample and future-proof supply of reliable, high-quality and low-cost broadband capacity enabling the wider population of the Solomon Islands to access much lower-cost broadband internet and other communications services, with a positive impact on its socio-economic development.
- The project is co-funded by the Solomon Islands and Australian Governments and the overall delivery of the project is being supervised by the Australian Department of Foreign Affairs and Trade (DFAT). The SISCC is responsible for delivery of works within the Solomon Islands EEZ, inclusive of seeking all relevant permits and managing construction and operational works.

Accordingly, the SISCC, along with Vocus Communications is seeking decision on development consent for the elements of the Project that will occur within the Solomon Islands EEZ. An environmental impact assessment (EIA) is required as part of the development consent approval (DA) in accordance with S17(1) of the *Environment Act (1998)* (EAct) & Regulation 6 of the Environment Regulations 2008. The proposed works are considered to be prescribed development of low risk to the environment and as such an EIA through a PER is to be completed in accordance with the Solomon Islands Government EIA Procedural Guidelines (2010). SISCC engaged GHD to prepare the PER.

The PER has been undertaken using a combination of desktop review, site visitation and consultation. The PER provides a consolidated report across environment and social values that have potential to be affected by the project; inclusive of presenting relevant impact mitigation and management controls.

On the basis of the assessment completed by the PER it is concluded that potential impacts are able to be controlled through application of a project specific Environment and Social Management Plan (ESMP). That plan has been described within this PER and addresses all phases of works across construction, operation and decommissioning. The ESMP also takes into account environment and social safeguards prescribed by DFAT in support of meeting co-funding agency requirements.

This PER and all content herein, inclusive of the ESMP, are considered of relevance to:

- Seeking permission from the MECDMM for Development Consent, this is the primary purpose of this PER;
- Contractors seeking to undertake works of relevance to the proposed project; the ESMP is considered of primary relevance as it prescribes specific impact management and mitigation controls and requirements for monitoring, review and evaluation to demonstrate controls are being effective; and
- Any stakeholders, community or other interested parties who wish to understand what works are proposed, what environment and social elements may be affected by the proposed works and how impacts are expected to be controlled; the ESMP includes procedures for forward notification of planned works as well as grievance resolution procedures should complaints be raised.

The key environmental and social elements of relevance to the proposed works, and the controls that will seek to mitigate risks to those elements are summarised following. They are described in detail within the main PER document.

Key environmental and social values of relevance to proposed works:

- Areas used for recreation
- Areas used for housing, transport, public services and commercial industry
- Historic and customary values inclusive of shipwrecks and customary lands
- Marine and terrestrial species inclusive of coral reefs, seagrasses, fishes, mangroves, taro, paw paw and other plants and animals of importance for fishing, coastal stability protection, market garden farming, recreational and biodiversity benefits

These values and the potential impacts that are able to be controlled of relevance to the proposed works are summarised in Figure 6-1. The ESMP presents all relevant controls and should be referred to for details.

Taking into consideration all elements assessed under the PER, it is recommended that the PER be appended to a Development Consent Application to the MECCDMM and that the Minister give consideration to approval of the Development Consent on the provision that the ESMP described by the PER is adhered to during all phases of works.

Table 6-1 Conceptual summary of values and potential impacts of relevance to proposed works, which are addressed by the ESMP

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Appendices

Appendix A - Fugro Australia Marine Pty Ltd (2018a), Desktop Study for the Coral Sea Cable System, Volume 5: Solomon Islands Permitting Issues, Fugro Document No: GPH116414-05

Appendix B - Fugro Australia Marine Pty Ltd (2018b), Desktop Study for the Coral Sea Cable System, Volume 4: Solomon Islands Landings, Fugro Document No: GPH116414-04

Appendix C - Jacobs (2018), Coral Sea Cable Installation Environment Protection and Biodiversity Conservation Act - Section 160 Supporting Information Document, Document No: IW175400-0000-NP-RPT-001 | F

Appendix D - Summary Business Case for Investment Coral Sea Cable System (CS2) and Solomon Islands Domestic System (SISCC, 2018)

Appendix E - SISCC (2016), SISCC Business Plan 2016-2036

Appendix F - DFAT Safeguards

DFAT's Environmental and Social Safeguard Policy for the Aid Program

DFAT is committed to promoting sustainable economic development through the Australian aid program. The Environmental and Social Safeguard Policy for the Australian Aid Program provides a structured approach to assessing and managing environmental and social impacts.

The table below provides an overview of how the PER is aligned with the principles of DFAT's Environmental and Social Safeguard Policy for the Aid Program.

Element	Alignment
Principle 1: Do no harm Seek to protect the rights, health, safety, and livelihoods of people including children, women, indigenous people, and other vulnerable or disadvantaged groups. Maintain the health, diversity and productivity of the environment.	**PER** The regulatory and legislative frameworks relevant to the project are outlined in section 2.5 of the PER. This section identifies the objectives and functions of these acts and regulations, and how the PER addresses these.
	SIA Social risks and impacts associated with health, safety and livelihoods of the surrounding community have been identified and described in SIA section 5 and measures to address these risks and impacts are provided in SIA section 6.
Principle 2: Identify, access and manage environmental and social impacts Identify potential environmental and social risks in the early stages to allow for avoidance, or where avoidance is not possible, minimise, mitigate or offset. Assess and manage direct and indirect environmental and social impacts through management plans and monitor and report on their delivery.	**PER** Section 5.3 of the PER outlines requirements of monitoring as part of the ESMP. Section 5.6 of the PER outlines mitigation measures that are to be implemented to avoid and/or minimise potential impacts to environmental aspects associated with the works. The mitigation measures provided represent the minimum requirements that should be adopted during the construction phase of the project.
	SIA Social risks were identified early on in the process through site inspections and suitable design changes have been incorporated to avoid and minimise social impacts. A full description and assessment of impacts is provided in SIA section 5.
Principle 3: Engage effectively with stakeholders Provide affected people with access to information about the investment, its risks and potential social and environmental impacts. Engage with affected parties and other stakeholders early and ensure	**PER** Section 5.5.4 of the PER outlines the details of providing community information, as well as outlines the Grievance Management Procedure that will be put in place.

consultations include directly and indirectly affected parties. Provide accessible and culturally appropriate grievance redress mechanisms and ensure they are handled promptly, transparently and without retribution or cost to the party that raised the concern.	**SIA** SISCC and GHD teams undertook stakeholder consultation as part of the preparation of the SIA and the Public Environment Report (PER). In addition SISCC has been involved in ongoing stakeholder consultation with stakeholders and will continue to do so through the planning and delivery of the project (SIA sections 3.2.4, 6.3.2, 6.3.7)
Principle 4: Work effectively with partners Comply with partner country safeguard laws and policies and where possible build partners' capacity to develop and implement environmental and social governance systems. Work with partners to manage safeguard risks in a way that maximises the use of country systems and avoids imposing duplicate or unnecessary safeguard assessment and management planning requirements.	**PER** Section 2.5 of the PER outlines legislative, institutional and regulatory frameworks for the Solomon Islands that are relevant to the project. This section notes that the Solomon Islands is a signatory of a number of international environmental agreements. The requirements of the Solomon Islands government for delivery of a PER takes into consideration the governments delivery against these agreements.
	SIA SIA section 3.3.3 provides a list of relevant legislation in Solomon Islands that is relevant to social issues, which are mainly related to land access. They are addressed in SIA section 5.4 and 6.3.
Principle 5: Promote improved environmental and social outcomes Where possible, promote improved environmental and social outcomes by integrating ecologically sustainable development into aid investments. Improve the implementation and outcomes of aid investments by effectively identifying and managing environmental and social risks.	**PER** Section 4 of the PER identifies the potential environmental risks associated with the project, as well as providing mitigation measures to manage these. Section 5.6 also provides mitigation measures aimed at avoiding and/or minimising potential impacts to various environmental aspects associated with the construction works. Section 5 of the SIA identifies, categorises, describes and assesses the social impacts associated with the project.
	SIA Social benefits from the project are outlined in SIA section 5.3 and improved outcomes through management and mitigation of social impacts are presented in SIA section 6.

DFAT's Child Protection Policy

DFAT has a zero tolerance approach to child exploitation or abuse and recognises that it is a shared responsibility of all adults to prevent this. DFAT, as part of their child protection framework, produced the Child Protection Policy which articulates DFAT's zero tolerance

approach and includes expectations for DFAT staff and funded partners in the management of child protection risks.

The tale below provides an overview of how the PER is aligned with the requirements of DFAT's Child Protection Policy.

Element	Alignment
Principle 1: Zero tolerance of child exploitation and abuse DFAT work to minimise the risks of child exploitation and abuse and trains its staff and partners on their obligations under this policy.	The SIA considers this principle within the workforce policy for the project. SISCC and its contractors will not engage child labour for any construction and operational work.
Principle 2: Assess and manage child protection risk and impact. Careful management to identify, mitigate, manage or reduce risks to children that may be associated with DFAT functions and programs.	Safety risks to children and others around construction sites are considered in the construction safety management in the SIA for the project.
Principle 3: Sharing responsibility for child protection Commitment, support and cooperation of partner organisations and individuals who help deliver programs administered by DFAT.	SICSS through its terms and conditions to engage cable construction contractors, will ensure the responsibility of child protection is share by all parties involved in delivering the project.
Principle 4: Procedural fairness DFAT will apply procedural fairness when making decisions that affect a person's rights or interests.	NA
Principle 5: Recognition of the best interests of the child Australia is a signatory to the UN Convention on the Rights of the Child. Committed to upholding the rights of the Child and Australia's obligations under this convention. In all actions concerning children, the best interests of the child shall be a primary consideration.	As per response to Principles 1, 2, 3 above.

Appendix G - MPA's within the Solomon Islands

MPA Site Name	Designation * international	Designation Status	Date Designated	Total Area (km2)
Arnavon Islands	Marine Conservation Area	Designated	1995	82.70
Barasipo	Marine Protected Area	Informally designated	2004	3.533
Baraulu/Bule Lavata	Marine Protected Area	Informally designated	2002	1.032
Barivuto	Marine Protected Area	Informally designated	2004	1.622
Buni	Marine Protected Area	Informally designated	2004	1.428
Dunde	Marine Protected Area	Informally designated	2004	1.046
Ha'apai	Marine Protected Area	Informally designated	2003	1.261
Iriri Pasapasa	Marine Protected Area	Informally designated	2004	0.421
Kekehe	Marine Protected Area	Informally designated	2004	2.721
Kida	Marine Protected Area	Informally designated	2003	0.725
Kinamara	Marine Protected Area	Informally designated	2003	1.363
Kindu	Marine Protected Area	Informally designated	2003	0.764
Koqu Rua	Marine Protected Area	Informally designated	2005	0.359
Kozou	Marine Protected Area	Informally designated	2002	0.452
Lodu Hokata	Marine Protected Area	Informally designated	2005	0.335
Nazareti	Marine Protected Area	Informally designated	2003	2.120
Niumala	Marine Protected Area	Informally designated	2005	3.114
Nusa Hope Mangrove	Marine Protected Area	Informally designated	2005	0.884
Nusa Hope/Heloro	Marine Protected Area	Informally designated	2002	1.138
Nusa Roviana	Marine Protected Area	Informally designated	2003	2.017
Olive	Marine Protected Area	Informally designated	2003	1.567
Saika	Marine Protected Area	Informally designated	2003	1.602

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