

Initial Environmental Examination

October 2015

Samoa Submarine Cable Project

Prepared by the Government of Samoa for the Asian Development Bank and the World Bank.

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ABBREVIATIONS

ADB	–	Asian Development Bank
ASH	–	America- Samoa-Hawaii cable
BMH		Beach Manhole
COEP	-	Code of Environmental Practice
CSC	–	Submarine Cable System
EMP	–	Environmental Management Plan
ESIA	-	Environmental and Social Impact Statement
ESMP	–	Environmental and Social Management Plan
GAP	-	Gender Action Plan
Gbps	-	gigabits per second
GPS	-	Global Positioning System
GRM	-	Grievance Redress Mechanism
ICT	–	Information and Communications Technology
IEE	-	Initial Environmental Examination
IPP	-	Indigenous Peoples Plan
IPPF	-	Indigenous Peoples Planning Framework
IRDDR	-	Involuntary Resettlement Due Diligence Report
KBA	-	Key Biological Area
LTA	-	Land Transport Authority
MAFF	-	Ministry of Agriculture, Forestry and Fisheries
Mbps	-	megabits per second
MCIT	-	Ministry of Communications and Information Technology
MNRE	-	Ministry of Natural Resource and Environment
MPA	–	Marine Protected Area
MWCSD	-	Ministry of Women, Community and Social Development
MWTA	-	Ministry of Works, Transport and Infrastructure
NGO	-	Non-Government Office
OoTR	-	Office of the Regulator
OP	–	Operational Policy
PAD	-	Project Appraisal Document
PIA	–	Project Influence Area
PMT	–	Project Management Team
PSA	-	Poverty and Social Assessment
PSC	-	Project Steering Committee
PUMA	-	Planning and Urban Management Agency
RP	–	Resettlement Plan
RPF	–	Resettlement Policy Framework
SAS	-	Samoa-American Samoa
SCS	–	Submarine Cable System
SPRSS	-	Summary Poverty Reduction and Social Strategy
SPS	–	Safeguard Policy Statement
SSCC	-	Samoa Submarine Cable Corporation
SWA	-	Samoa Water Authority
TA	–	Technical Assistance
TOR	–	Terms of Reference
VFR	–	Village Fish Reserve
WB	-	World Bank

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I. INTRODUCTION

A. The Purpose and Proponent of the Project

1. Samoa's distance from major global markets and economic dependence on tourism underscores the importance of connectivity, particularly in the form of efficient transport systems and information and communication technologies (ICT). Samoa has the highest rates of mobile phone coverage and access in the Pacific region however internet access is lagging significantly which impacts the potential for connectivity to external markets. Samoa's telecommunication system relies on costly and narrow-band fiber optic cable service from American Samoa and unreliable and costly satellite service for all information and technology needs. This means poor, sometimes interrupted serves and very slow internet connections. Given the recent economic impacts of natural disasters, and reliance on agriculture and tourism sectors to provide significant medium-term opportunities for economic development, reliable high-speed and competitively priced internet connectivity and a skilled ICT labour pool are essential for aggregation business and satisfying tourism demand.

2. To address current connectivity constraints, the Government of Samoa (GoS) requested support from the Asian Development Bank (ADB) and the World Bank (WB) to improve international broadband connectivity. The proposed project focuses on building a submarine cable system (SCS) connecting Samoa to more efficient regional and global communications infrastructure via Fiji. Cable connections are proposed in Samoa - at Fagali'i on Upolu and Tuasivi on Savai'i – and at Laucala Bay in Suva, Fiji. The project will also support reforms to strengthen the legal and regulatory environment for telecommunications in Samoa.

3. By enacting the *Telecommunications Act 2005*, GoS opened its domestic telecommunications market to international suppliers and as a result Blue Sky, Digicel and Computer Services Ltd, now operate in the country. As of end 2014, over 95% of the population had mobile network coverage and 89% of the population had mobile phones; one of the highest rates of mobile phone coverage and access in the Pacific (ADB 2014). However, broadband penetration was estimated at about 1% via fixed equipment and 27% via smart phones and tablets.

4. Samoa is currently connected via one submarine cable: the Samoa-American Samoa (SAS) which connects Apia with Pago Pago in American Samoa and in turn to Hawaii via the American Samoa-Hawaii (ASH) cable. The SAS/ASH cable is capacity-constrained with a maximum capacity of 565 megabits per second (Mbps). This capacity is rapidly being exhausted so Samoa needs to secure alternative capacity sufficient to meet its future needs.

5. The Ministry of Communication and Information Technology (MCIT) is the proponent for this project and leads a project steering committee (PSC) comprised of government and private sector members. The ADB, World Bank, the Australian Department of Foreign Affairs and Trade (DFAT) and the Samoa Submarine Cable Company (SSCC) have agreed to co-finance this project to a total of \$57.41 million, covering all aspects of the work. The Government of Samoa is forming the SSCC to act as the project focal point and through which the grants will be disbursed, and which will de facto implement the project, working closely with the Technical Coordinator (TC) and the PSC.

B. Project Documentation

6. Both ADB and World Bank have classified this project as safeguards Category B. A joint-approach was agreed by co-financing parties on the content and format of

safeguard documentation to ensure compliance with relevant safeguard policies. This Initial Environmental Examination (IEE) was prepared to satisfy both the ADB and World Bank safeguard requirements.

7. The terms IEE and Environmental and Social Impact Assessment (ESIA) are interchangeable. This document also includes an Environmental and Social Management Plan (ESMP) - which will inform a contractor's ESMP based on the final design – and a Resettlement Policy Framework (RPF).

8. This IEE focuses on coastal zones and near-shore marine areas which form the majority of the project influence area (PIA). Terrestrial infrastructure is relatively limited in extent and utilises existing facilities (eg. beach manholes and cable landing stations) or is confined to public road reserves. Consistent with the marine focus, a series of marine surveys were completed and the findings are summarised in this document, with a detailed report in Annex 4.

C. The IEE Methodology

9. The IEE has been completed based on review of reports and consultations with technical consultants and government officials, followed by two field visits to both landing areas. The field visits included both interviews with local residents, village officials as well as local government officials on both Upolu and Savai'i. A due diligence assessment for the Fiji landing site is included as Annex 5.

10. The work included a review of relevant secondary information sources and two public consultations to determine existing environment conditions in the nearshore PIA corridors, at the landfalls and along the landside routes where the cables are to be buried. This was followed by an analysis of the potential impacts that the construction and operation of the fibre optic cable could have on the corridor's natural and socio-cultural environment. The topics for which data were collected included:

- locations and descriptions of sensitive components of the environment within the PIAs, including coral assemblages, village fish reserves (VFRs) and fish aggregation devices (FADs);
- marine ecology of the coastal zone and nearshore waters likely affected by the cable as it passed through the *ava* into the coastal reef zone and to shore;
- land ownership details and any potential impacts;
- poverty and gender conditions in relation to the proposed work;
- social impacts of faster and more reliable internet connections; and
- cultural heritage and archaeological sites within the PIA corridor.

11. The following activities were undertaken to assemble the necessary data with which to complete this IEE:

- inception mission to establish preferred landfalls for the cables and scope of work;
- meeting with MCIT and other agencies that will manage this project; and
- one field mission to Samoa to collect primary data on the nearshore marine system as well as the landing sites and record social issues focusing on land acquisition and the need to relocate people or structures to make way for the cable.

12. Consultation and information sessions were completed in Tuasivi on March 24th, 2015 and in Fagali'i on March 25th. A summary of the consultation sessions and slide show presentation are provided in Annex 2.

13. A rapid in-water visual field assessment and benthic profiling of the inshore marine environment and key indicator species associated with the proposed cable

alignment locations for Fagali'i and Tuasivi was undertaken by the team's marine ecologist with assistance of staff from the Ministry of Agriculture and Fisheries - Fisheries Division. The assessments included both visual observations and photographic records of bottom biotic and abiotic conditions along the PIA.

14. The marine assessment of the Fagali'i landing site (undertaken on 20 March 2015) focused on the PIA section from the barrier reef entrance (termed 'ava' in Samoan) of the Fagali'i channel through the channel and across the sub tidal and inter-tidal reef flat terminating at the foreshore rock retaining wall. This included seven assessment sites (shown on Figure 2 in Chapter III) from the outer barrier reef, outer and inner channel, sub-tidal and intertidal lagoon areas and the cable terminal location on the shoreline.

15. The marine assessment of the proposed Tuasivi landing site on Savai'i focused on the marine and coastal waters from the channel ('ava') through the barrier reef entrance (opposite the church of the village Sapinifaga) and across the sub tidal and intertidal reef flat terminating at the proposed hospital shore rock retaining wall. The area assessed (on 23 March) included the marine areas adjacent to the villages of Sapinifaga and Siufaga. This included twelve assessment sites (shown on Figure 4 in Chapter III) from the outer barrier reef, inner channel, sub-tidal and intertidal lagoon areas and the cable terminal location on the shoreline.

16. Site locations were selected based on their proximity to the cable route, representation of different biological habitats and potential conservation/protected status. The assessment methodology, specific site locations and detailed findings are presented in Annex 4.

17. Information obtained from the marine assessment provided a description of the natural reef system and resources associated with the cable alignment. This information was then used to gauge potential environmental impacts that will need to be considered and mitigated during the deployment of the cable in the nearshore environments.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

D. Environmental Legislation in Samoa

18. Environmental impact assessment (EIA) in Samoa is regulated through the Ministry of Natural Resource and Environment's (MNRE) Planning and Urban Management Agency (PUMA). PUMA administers the *Environmental Impact Assessment (EIA) Regulations 2007*, under the *Planning and Urban Management Act 2004*. The Regulations set out what level of EIA is required, the components required for an EIA and the process for review and approval. In 2007 PUMA developed an environmental practice code for Samoa, referred as the Code of Environmental Practices (COEP). It presents methods and/or procedures to be followed by consultants, designers and contractors for the avoidance or mitigation of adverse environmental effects that may arise from infrastructure development projects or maintenance work.

E. Marine Legislation in Samoa

19. The GoS is mandated to provide laws and regulations associated with the nation's marine environment and resources. Article 104 of the Constitution states that "...all land lying below the line of high-water mark shall be public land."¹ and hence falls under State jurisdiction. National laws include the *Fisheries Act 1998*, *Fisheries Amendment 1999*, *Fisheries Regulations 1996* and *Fisheries Fishing License Regulations 2001*² which acknowledge community usage and customary rights to access inshore marine resources and areas.

20. Inshore coastal and marine waters are governed by several agencies, namely the MNRE and the Ministry of Agriculture and Fisheries' (MAF) Fisheries Department. MNRE is responsible for coral environments, seagrass meadows and other benthic communities and habitats. The MAF is responsible for the marine resources such as finfish and invertebrates, fishing activities, protection and use of mangroves and village fish reserves (VFR). VFRs are community-based management areas that allow customary use of coastal resources with management plans to establish resource harvesting and conservation targets. There are currently 71 VFRs established in Samoa.

21. The MAF Fisheries Department manages inshore and offshore foreign commercial fishing activities that are undertaken within the EEZ.

F. Customary Ownership and Marine Areas

22. There are three types of land ownership in Samoa:

- (i) Freehold land: Freehold land is privately owned and constitutes approximately 12% of land area in Samoa and it can be transferred, leased, mortgaged or otherwise.
- (ii) Public land: Public land is owned by the Government of Samoa and constitutes approximately 7% of land in Samoa by area. Public land can be leased and, in certain circumstances, transferred.
- (iii) Customary land: Customary land is owned by the community in accordance with traditional custom and usage. Approximately 81% of land area in Samoa is customary land. Customary land may be leased but may not be otherwise sold or

¹ "high-water mark" means the line of median high tide between the spring and neap tides (WIPO)

² http://www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/TRAD/11/TRAD11_02_King.pdf;
<http://www.fao.org/fi/oldsite/FCP/en/WSM/profile.htm>

transferred.³ Both Upolu and Savai'i islands have predominantly customary land ownership, which extends to the high water mark.

23. Leases of public land and customary land are administered by MNRE and are based on standard terms.⁴

G. Legislation on Land Acquisition

24. Key legislation in Samoa relevant to involuntary resettlement and compulsory land acquisition includes the *Taking of Land Act 1964*, *Alienation of Customary Land Act 1965* and the *Lands, Surveys and Environment Act 1989* (LSE Act), as well as the Codes of Environmental Practice (COEP). The LSE Act provides a process for the alienation⁵ of Government land⁶, land administration and other matters such as environmental protection, wildlife conservation and coastal zones. The Minister may approve purchase of any land for public purpose (s23) or lease of government land for up to 20 years (s37).

25. The *Taking of Land Act 1964* establishes the taking of lands for "public purposes" (i.e. alienation of freehold or customary land). Once land is identified for acquisition reasonable notice is required to be given to the owner or occupier of freehold land or the *matai* who has the *pule* over customary land. Public notice of 28 days is allowed for any objections. If no written objection is received, the Minister may then proceed to take the land by Proclamation.

26. The Minister of Lands is appointed by the *Alienation of Customary Land Act 1965* to act for and on behalf of all beneficial owners in signing a lease for registration. The Minister may grant a lease or licence of customary land for authorized purposes (which are defined). The maximum lease in aggregate for a public, commercial, business or religious purpose is 40 years.

H. Legislation on Cultural Preservation

27. The key legislation protecting relics, antiquities and sites of historical and cultural significance in Samoa is the *Samoa Antiquities Ordinance 1954*. This ordinance aims to prevent the loss of national heritage treasures by export to overseas buyers but excludes botanical or mineral collections or specimens.

28. A Heritage Policy was passed by the Cabinet in 2002 for the sustainable management of Samoa's natural and cultural heritage sites.

I. International and Regional Treaties, Conventions and Agreements.

29. Samoa is signatory to the following International Conventions and Treaties of relevance to the project:

- Agreement establishing the South Pacific Regional Environment Program (SPREP), 1993;
- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1986;
- Convention on the Conservation of Nature in the South Pacific, 1976;
- United Nations Framework Convention on Climate Change, 1992;
- Kyoto Protocol to the Framework Convention on Climate Change, 2005;
- Convention on Biological Diversity, 1992;

³ <http://www.joneslanglasallesites.com/investmentguide>

⁴ Ibid

⁵ Defined to include limited disposal by lease.

⁶ Government land is a subclass of public land which is not set aside for any public purpose and includes land which has become the property of the Government as ownerless property.

- Convention concerning the Protection of the World Cultural and Natural Heritage, 1972;
- Convention of Migratory Species, 1979;
- Protocol concerning Cooperation in combating Pollution Emergencies in the South Pacific Region, 1990;

J. ADB and World Bank Safeguard Policies

30. In accordance with ADB's SPS 2009, the Project was classified as a Category B requiring an IEE report. This is equivalent to the World Bank's OP/BP 4.01 and the associated requirement for an ESIA report. The approach to completing an IEE is defined in Appendix 1 of SPS 2009. The environmental assessment includes an analysis of potential impacts resulting from project activities, appropriately scaled mitigation measures and the consultation process. The project development process also triggered several additional World Bank operational policies as described below.

31. OP/BP 4.04 Natural Habitats was triggered as marine protected areas exist in Fiji and Samoa. In addition, important habitats (eg. coral reef and seagrasses) were present near the PIA and would need to be avoided. The ESMP provides management measures to ensure full compliance with this policy, and relevant national and international laws, treaties and other obligations. The key mitigation measure will be avoidance of natural habitats through appropriate design.

32. OP/BP 4.11 Physical Cultural Resources was triggered on a precautionary basis. As two of the three landing sites are at existing facilities (and hence will not require new infrastructure) PCRs are unlikely to be relevant. Regardless, a Chance Find Procedure is contained in the ESMP and will be included in works contracts.

33. OP/BP 4.12 Involuntary Resettlement was also triggered to ensure the land tenure along the cable routes was fully assessed. Two of the three landing sites are at existing facilities. New infrastructure includes installation of ducts along public roads to connect the cable to landing sites and cable stations. While these roads were notionally identified as government-owned land, together with the hospital site in Savai'i and Royal Samoa Golf Course at Fagali'i, the policy was triggered to ensure due diligence in land investigations. A Resettlement Policy Framework (RPF) has been included as part of the ESMP to address any emerging issues in accordance with policy requirements and national law. The RPF includes a gap analysis of World Bank and Samoan land acquisition policy/legal requirements.

III. PROJECT DESCRIPTION

A. Project Need

34. Samoa's information technology and communications (ICT) system is connected to satellite and fibre optic cable via the Samoa-American Samoa (SAS) and American Samoa Hawaii Cable System (ASH). Currently, internet access is limited and expensive and Samoa's distance from major global markets underscores the importance of efficient ICT connectivity.

35. The proposed project will contribute to improved public services (including online government services such as health, education and financial services), support the tourism sector, facilitate disaster management and support better trade and communication among north Pacific island economies.

B. Project Components

36. The project involves two main components:

- design, supply and installation of a 1,360km submarine cable system to connect Samoa (Upolu and Savai'i) to Fiji (Suva), including marine survey, cable manufacture and cable deployment-marine operations. The indicative cable route is depicted in Figure 1; and
- Landing stations, terrestrial cable placement and ancillary equipment in Savai'i and Upolu, Samoa and system connections in Suva.

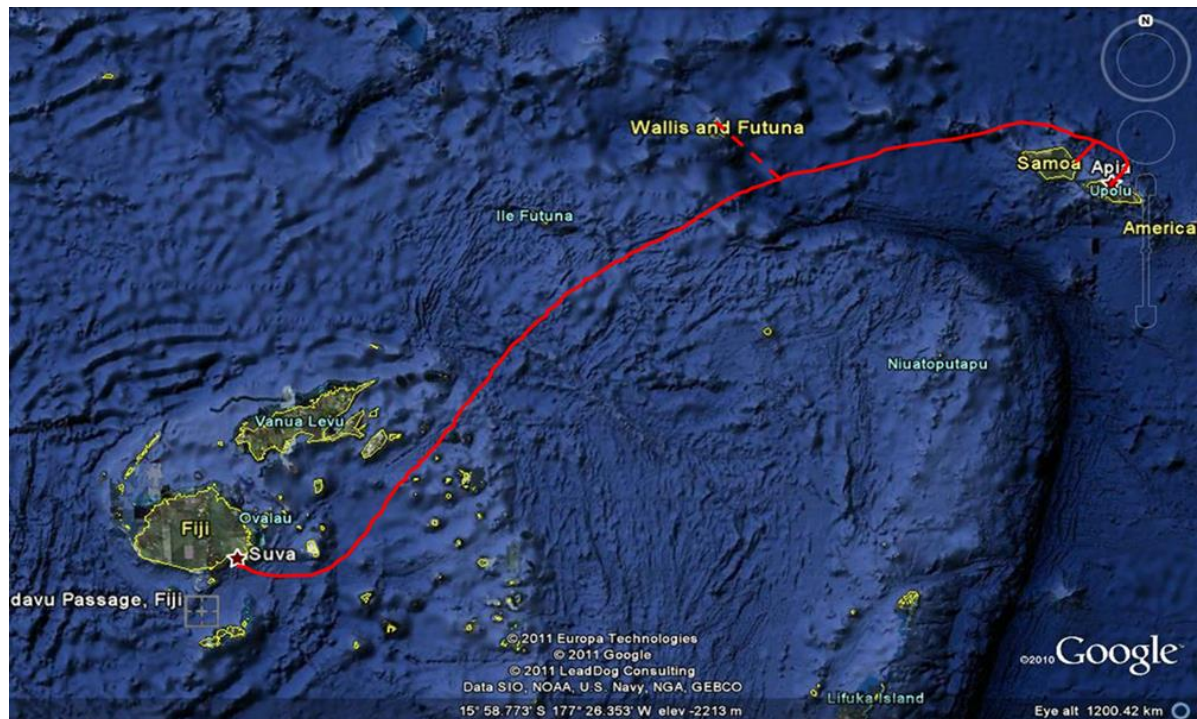


Figure 1. Approximate location of Samoa-Fiji Fibre Optic Communications cable

1) Submarine Component

37. The submarine component involves cable placement on the sea floor in the open ocean connecting Samoa and Fiji, with a spur providing a connection to Savai'i. Three "shore end" installations will be required at Fagali'i on Upolu (approximately 3km east of

Apia), Tuasivi on Savai'i and Laucala Bay in Suva, Fiji. The shore end installations will connect the open ocean segment to the terrestrial infrastructure traversing the barrier reef and lagoon at each location. The exact location of the cable routes will be determined following a detailed bathymetric marine survey during the design stage. Hence, the cable alignments described in the following sections are indicative and will be subject to refinement.

38. The marine survey will characterize the proposed cable route and allow avoidance of hazards and/or environmentally significant zones. Surveys include water depth and seabed topography, sediment type and thickness, and potential natural or human-made hazards. A marine route survey for a cable installation commonly assesses a seabed corridor from 1 to 10 km wide with repeat passes where necessary. The marine survey will determine the final cable route which will avoid sensitive submarine features such as sea mounts, hydrothermal vents, coral assemblages, seagrass beds, fishing reserves and other important environments. There is sufficient flexibility in alignment design such that individual coral heads in near shore environments, for example can be avoided.

39. The marine survey will also inform the detailed design of the submerged infrastructure – the cable and repeaters. This will determine the cable types and quantities, and clarify the nature of its deployment on the seafloor – surface laying, or trenching and burial – and the need for supplementary cable protection.

2) Fagali'i Shore End

40. Figure 2 shows the indicative marine cable route alignment at Fagali'i. The route parallels the existing Samoa/American Samoa (SAS) - American Samoa-Hawaii (ASH) cable route through the Fagali'i Channel which is a natural gap (or "ava") in the reef. Closer to shore the cable will traverse the intertidal reef flat before passing beneath the Main East Coast Road and entering the existing beach manhole (BMH).



Figure 2. Proposed Fagali'i Shore End Cable Route

41. The existing terrestrial cable route (owned by BlueSky Samoa) from the BMH follows the Main East Coast Road in a westerly direction toward the BlueSky cable station in Apia. This route is flood-prone with potential implications for cable integrity; hence it is proposed to establish a new cable station on higher ground potentially at the Royal Samoa Golf Course, approximately 1km south-east of the BMH. Figure 3 shows the proposed cable route connecting the BMH to the proposed cable station via the Main East Coast Road and Golf Course Road. The cable will be protected by case-hardened conduit which will be installed in a 30cm-wide trench in the road reserve.

42. The proposed new cable station – which will house the necessary equipment to enable the high-speed connection – will potentially be sited on a cleared portion adjacent to the Golf Course clubhouse on land owned by Samoa Land Corporation (SLC); a government-owned entity.

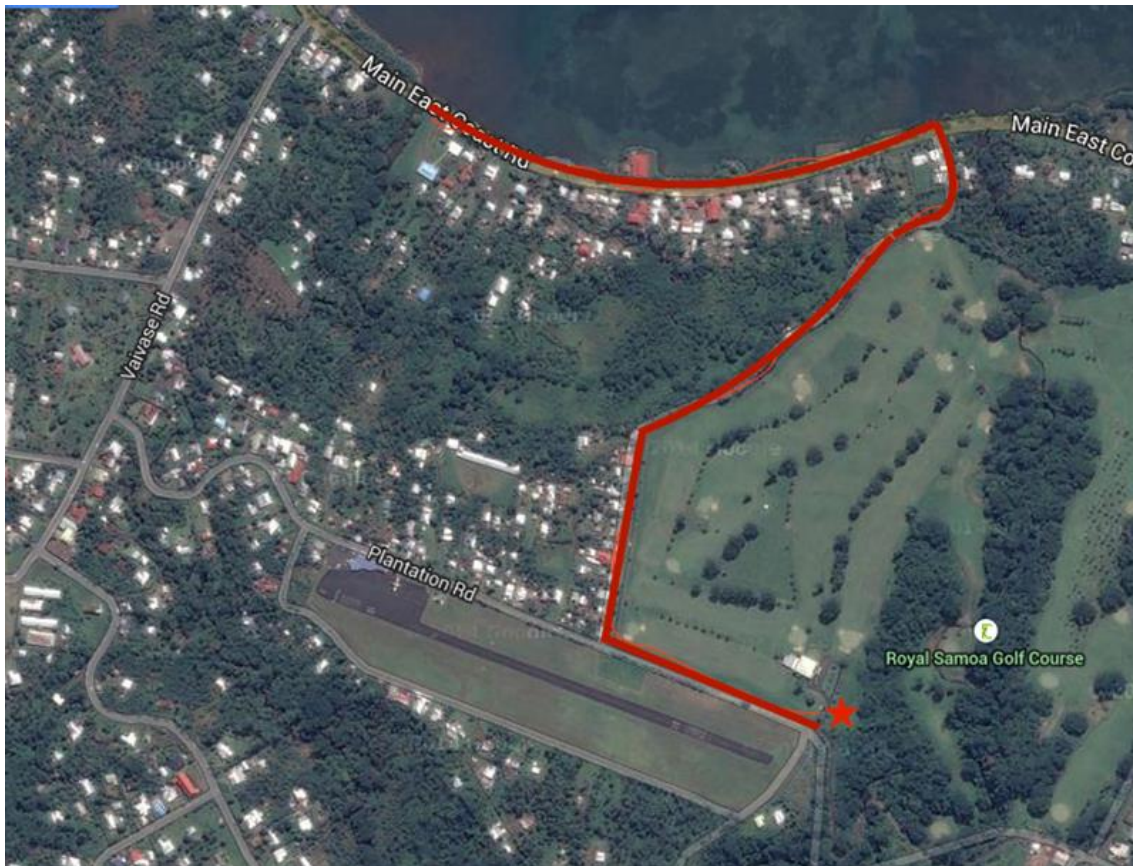


Figure 3. Proposed Cable Route from Fagali'i BMH to Golf Course

1) Savai'i Shore End

43. The cable connection to Savai'i will be via a spur from the main offshore submarine cable running south-west to Tuasivi. The proposed cable route will enter the near shore environment via an existing "ava" reef channel opposite Siufaga village.

44. Two options were considered for the cable routing in the Tuasivi lagoon as shown in Figure 4. Option 1 shown in red requires the cable to be laid from the 'ava' south through the coastal lagoon toward the hospital site. An alternative route (Option 2 in blue) would require a shorter cable route from the ava to the rock wall near Sapini-i-faga village with potentially less of an impact on the lagoon ecology.

45. Irrespective of the final option, both require a new BMH to be constructed to receive the cable and installation of ducted cable along the road reserve to connect to the Blue Sky Cable Station near the Tuasivi Post Office.

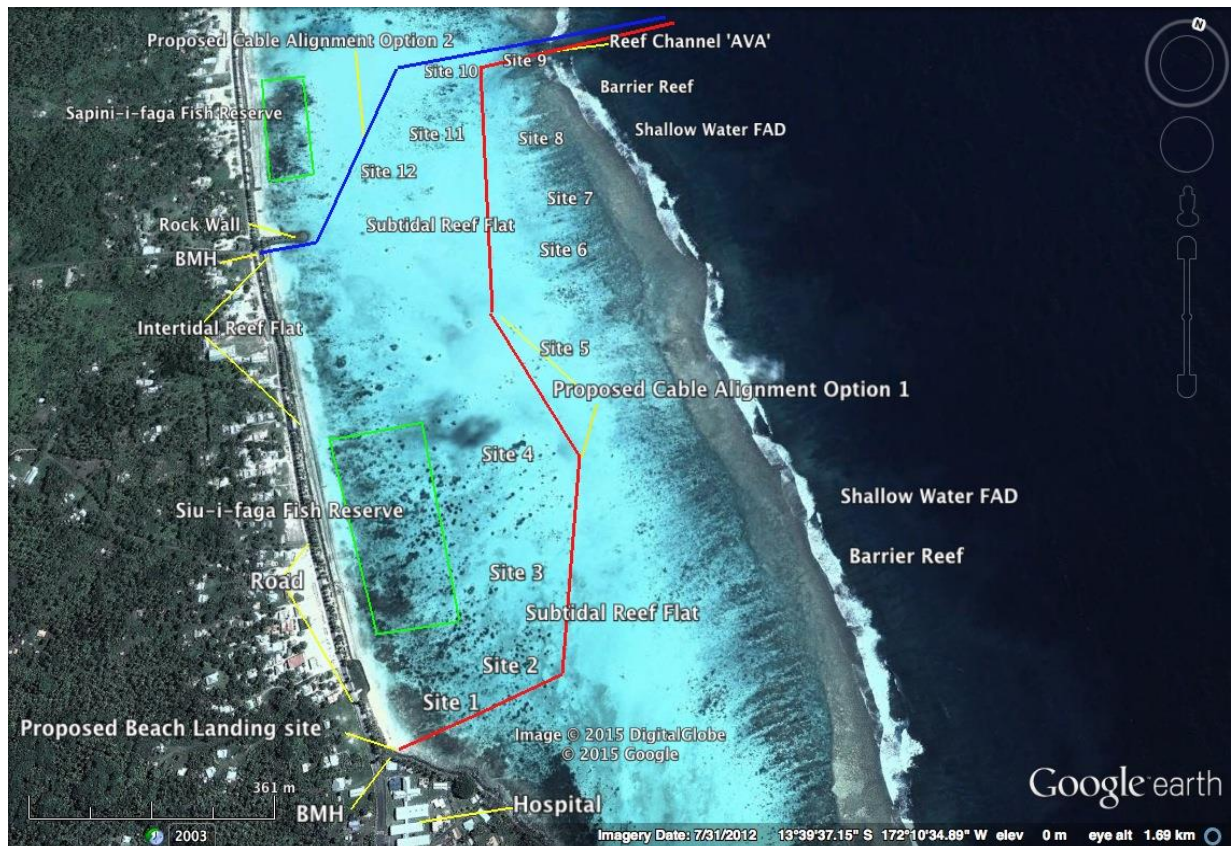


Figure 4 Cable Route Options in Tuasivi lagoon, Savai'i

C. The Cable

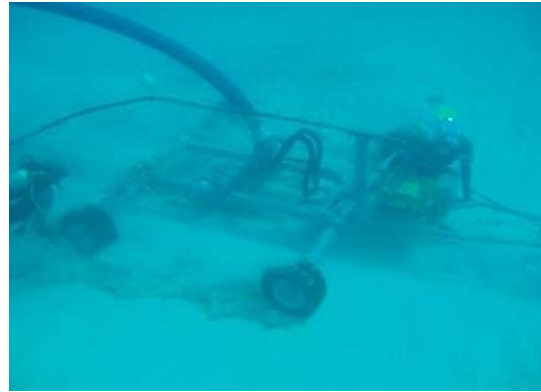
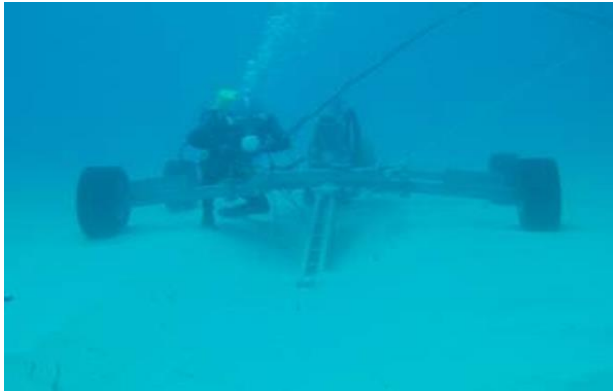
46. The glass fibres along which the signal is transmitted are 0.125mm thick (excluding the protective cladding). A bundle of these fibres make up the inner workings of a cable, while the other 98% of it is the protective steel cabling, water proofing and copper casing to transmit power to the repeaters location up to 300km apart along the cable.

47. Nearly all the cable laid on the deep sea floor is between 2cm and 4cm thick and is protected by very durable, extremely dense Kevlar-like covering with a lifespan of approximately 30 years, allowing it to sink very easily. To protect the cable in shallower waters, layers of steel cabling, insulation, water proofing and additional protective shielding is added.

48. The cable will be between 1.7cm (deep ocean area) and 6cm (inside barrier reef) in diameter and laid on the sea floor in deep oceanic water but buried in a trench in the shallow near-shore areas. The trench will be created by a hydro-jetting trenching machine, requiring a corridor of approximately 2.5 to 3 meters wide for installation to dig a narrow trench of approximately 30cm wide and one meter deep to bury the cable.



49. The hydro-jetting technique is anticipated to have the least environmental impact to near-shore waters (J. Hibbard, 2015 Pers. comms). Hydro-jetting is useful in applications where seabed materials are fairly consolidated. Hydro-jetting is proposed to be undertaken in submarine areas up to 30m depth. Beyond this depth, the cable will be laid on the sea floor without the need for trenching.



IV. BASELINE DATA

50. Samoa is a Pacific island country divided into the two main islands of Upolu and Savai'i by the Apolima Strait and two minor outer islands (Figure 5). About 70% of the population live on Upolu, the main island and location of the capital, Apia. Samoa is bordered to the east by American Samoa, Tonga to the south, Tokelau to the north, Wallis and Futuna to the northwest and Fiji to the west. Samoa is located about 13.5° south of the equator.

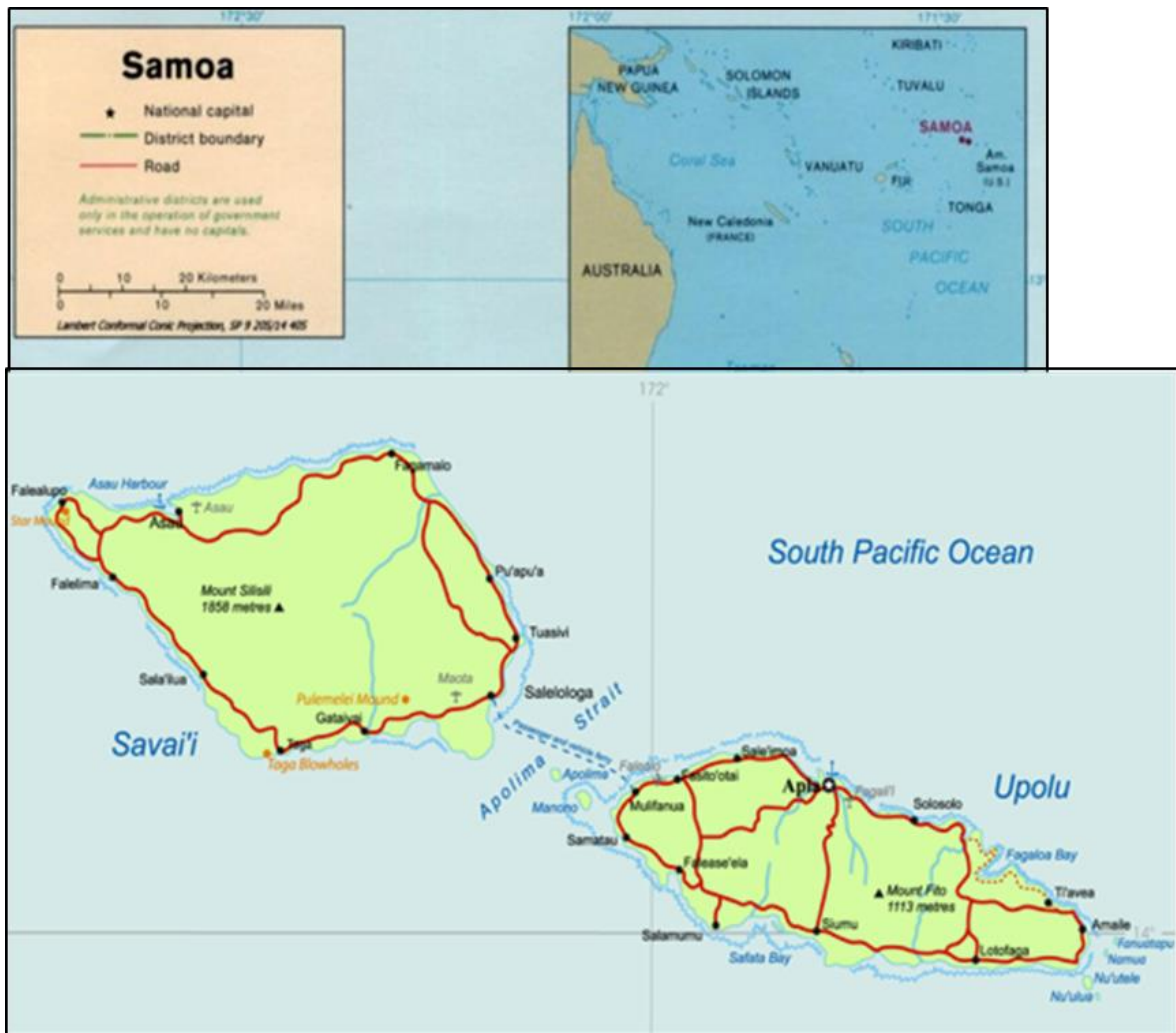


Figure 5. Samoa Geographical Location

A. Physical Environment

1) Climate

51. Samoa has a wet tropical climate with temperatures ranging between 17°C and 34°C (average of 26.5°C), average humidity of 83% and an average annual rainfall of about 2,000 mm with the majority of precipitation occurring during November- March associated with the south easterly trade winds. Samoa is subjected to tropical cyclones that are associated with the southeasterly trades and is also subjected to the effects of tsunamis generated from volcanic activity in the Asia-Pacific region.

2) Topography, Geology, Soils and Hydrology

52. The topography of Samoa is rugged and mountainous with about 40% of Upolu and half of Savai'i characterized by steep slopes descending from volcanic ridges (Mt. Silisili has the highest peak, 1,848m). The interior of both main islands is still covered with mountain forests and, in the case of the highest peaks on Savai'i, covered in cloud forest.

53. The Samoan islands are composed almost wholly of basic volcanic rocks such as olivine basalt, picrite basalt and olivine dolerite. Most of the soils are formed from weathered basaltic volcanic flows, including lava, scoria and volcanic ash. Soils are generally clay in texture, free draining, porous and relatively shallow.

54. A coral reef surrounds the islands for nearly half of the coastline, except where there are steep cliffs and where young lava flows have filled the lagoon. Coral sand is found along most of the coastline, up to 5m above sea level.

3) Seismology and Earthquakes

55. Earth tremors continue on a frequent basis in Samoa and the nation remains vulnerable to future volcanic activity. The last recorded eruptions were on Savai'i in 1902 and 1905-1911. The Samoa islands are subject to violent earthquakes. The last one occurred in 2009 resulting in a Tsunami in the south-eastern part of Upolu.

56. Earthquakes impact fibre optic cables when there are significant geological plate movements that can stretch, twist or even snap the cable. Based on data from the website <http://earthquaketrack.com/r/samoa-islands/recent>, the area around both of Samoa's islands experiences considerable seismic activity.

4) Tides

57. The basic tide parameters associated with Samoa include a maximum tidal variation of just over 2 meters (meso-tidal). They are semi-diurnal (2 tides a day) with a strong diurnal inequality with the twice-daily tides showing considerable variability in amplitude. Inclement weather systems e.g. storms, cyclones do have a marked impact on the tidal height and can cause increased coastal erosion if they coincide with high water periods. The placement of landings relative to tidal patterns will be important to plan well if erosion and related issues are to be avoided.

5) Deep Sea

58. The deep-sea bathymetry associated with the islands of Samoa is unique. The island of Samoa is located on the Samoan Archipelago at the northern end of the Tongan Trench. The deep sea bathymetry associated with Samoa and waters towards Fiji ranges in depth and includes deep ocean ridge, mountains (>4000m high) trenches, sea mounts, volcanoes and thermal vents, extinct and active underwater volcanoes and remote submerged and exposed rocky outcrops and islands (Figure 6). In general, little is known about deep water features, however they provide unique and important habitats including some of the richest biological "hotspots" on the ocean.

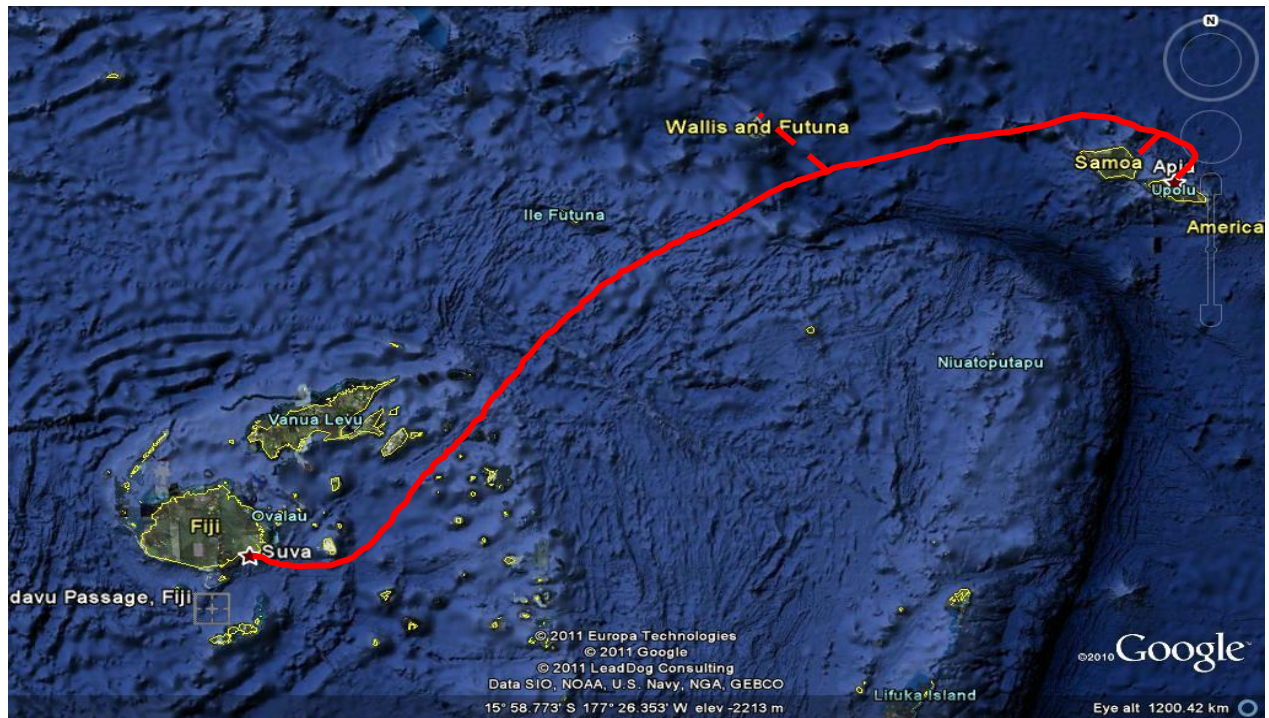


Figure 6. Bathymetry of the Suva, Fiji-Samoa cable corridor

Hydrothermal Vents

59. The bathymetric survey will identify key features of the seafloor such as hydrothermal vents and seamounts, however a detailed study is yet to be undertaken for this Project. Hydrothermal vents are present when volcanically heated water issues from cracks in the earth's crust.

60. Individual vent structures are usually small, measuring only a few tens of metres across, and stand a similar height off the surrounding sea floor. Deep sea thermal vents support unique ecosystems of densely populated organisms occurring within a few hundred square metres of the vent. The communities prey almost exclusively on microorganisms that reduce chemicals emitted by the vents to provide energy to sustain a variety of associated, mainly invertebrate, organisms. In the western Pacific hydrothermal vents are dominated by bathymodiolid mussels, "hairy" gastropod, vesicomid clams, and shrimp (Llodra & Billet 2006). Deep sea vents can be located in varying locations, but generally near volcanic activity, and can range from as shallow as 500m to the deep ocean⁷.

Seamounts

61. Seamounts generally originate as volcanoes and are associated with intra-plate hotspots, mid ocean ridges or island arcs. They support unique ecosystems that have high biodiversity (endemism has been reported as being high) and act as important aggregations sites for pelagic and demersal fish resources, invertebrates and have been reported to act as important navigational "waypoints" for oceanic migratory species (Rodgers, 2012). An important seamount zone is the Stearn's Bank, located just west of

⁷ For more details see https://php.radford.edu/~swoodwar/biomes/?page_id=1027 and <http://faculty.college-prep.org/~bernie/sciproject/project/HydroT/hydroint.html>

Savai'i's western tip and the Rochambeau Bank, some 480 km west and south of Savai'i, in the general corridor⁸ of the cable.

B. Ecological Environment

62. Samoa consists of two main islands (Upolu and Savai'i), seven smaller islands (two of which are inhabited) and several islets and rock outcrops all of which are volcanic in origin and are all surrounded by an outer barrier reef which is interrupted at intervals by small shallow water reef channels with a distinctive fringing reef that varies in length (100 m – 16 km) terminating onshore beaches. The nation's total land area is 2,935 km², which includes a total of 326 villages throughout the nation, of which about 230 are considered to be coastal settlements. The nation's marine and coastal habitats are complex with a total coastline length of 447 km and a total shallow water shelf area (to 200 m) of 4,500 km².

63. The following discussion documents the marine environment. While the proposal includes some land-based elements (i.e. cable trenches and a cable station at Fagali'i), none of this infrastructure will traverse or otherwise impact significant terrestrial habitats.

1) Oceanic Marine Habitats

The marine environments associated with the deep waters surround the islands of Samoa is poorly understood, especially the benthic and near bottom ecosystems. Information pertaining to movements of a number of highly migratory commercially targeted finfish species (e.g. tuna) is available at a large spatial scale however information pertaining to the movement of large iconic fauna such as the cetaceans (e.g. whales, dolphins) that are recorded to frequent these waters is scarce.

Two distinct habitats have been recorded associated with the deep benthic waters of the Samoa, however their biodiversity and ecosystem importance is unknown. These habitats include hydrothermal vents and seamounts, both known to host endemic species and the latter acting as feeding and spawning areas for the large pelagic fish. Beyond that, there are few data, making a survey of the proposed cable corridor important.

2) Inshore Marine Environment

64. It is reported that Samoa archipelago has 991 species of finfish, of which 890 inhabit the shallow waters or reefs and 56 are found in deeper waters and 45 are pelagic (Samoa Gov., 2009). 287 species of algae and 14 families with at least 45 species of hard corals (the *Acropora* dominating) have been documented for Samoa. Two species have been recorded from Samoa which include *Syringodium* sp. and *Holodula* sp., both of which were recorded during the marine assessments. They are a significant coastal habitat and contain high biodiversity value

65. The Fagali'i landing site - which has an existing cable installed in 2009 - is located on the eastern side of Upolu island. In addition to an inspection dive of the entire alignment seven sites along the alignment were surveyed by a marine specialist. In areas, between 20-50 m from the existing cable there is an abundance of seagrass as well as a mixture of hard and soft coral species. Detailed survey findings are provided in Annex 4. There are no mangroves associated with the two cable landing sites

66. The Tuasivi site is located on the eastern coast of Savai'i islands. In addition to an inspection dive along the entire alignment, twelve sites were surveyed by a marine specialist. The sites have a combination of intertidal and subtidal reef flats with healthy amounts of seagrass and a mix of hard and soft coral species. Mangrove coverage is very

⁸ Only when the oceanographic and bathymetric survey of the cable alignment takes place will a more precise corridor be identified. At that time measures to protect any identified vents or seamounts will be implemented.

low. Generally the benthic substrate is calcium carbonate derived sand and coral rubble. Detailed survey findings are provided in Annex 4.

3) Reef Systems

Fagali'i

67. The Fagali'i Bay landing site is characterised by a distinctive reef system that is dominated by a shallow intertidal reef flat that close to shore is exposed during low tide (refer Plate 5, Annex 4), a sub tidal reef flat that extends out to the barrier reef which terminates seaward to a wave dominated reef crest, reef edge and inner reef slope which descends rather steeply to the outer reef slope and beyond. Freshwater and high levels of sediment due mostly to uncontrolled pig activity along the shore, is discharged through the river during rainfall periods and deposited in the bay greatly increasing turbidity during outgoing tides. The majority of the discharge is directed directly into the reef channel and out to sea.

68. The Fagali'i Village Fish Reserve (VFR) is located in the sub tidal reef flat to the south of the proposed cable alignment (see Annex 4). The proposed cable alignment has no impacts on this reserve.

69. The shallow reef systems located adjacent to the proposed cable alignment is healthy and is in good condition possessing areas of good live coral coverage and associated healthy and diverse populations of marine plants. However, populations of invertebrates (e.g. mollusc, echinoderms, crustaceans, polychaetes) and vertebrates (e.g. fin fish) were observed in only very low numbers, due in large part to the high subsistence fishing practiced in the area.

70. The reef systems bordering the channel and proposed cable alignment show very similar benthic profiles. Bathymetric charts and visual survey undertaken during the assessment of the Fagali'i channel revealed that the sea floor follows a general pattern of steep sided channel reef slopes descending directly to the homogenous and relatively flat seabed. The sea floor adjacent to the channel entrance through the barrier reef has depth range of 15 - 25 meters which decreases towards the shore line with an average depth of 3-5 metres in the area the channel meets the sub tidal reef flat.

71. Reef sediments dominate the substrate located within the outer channel. It is expected that sediments located on the sea floor within the channel that are directly associated with the proposed cable alignment route would be derived from both reef and terrestrial sources.

Tuasivi

72. The Tuasivi landing site is located on the eastern coast of Savai'i Island. The entire Tuasivi coastline is bordered by a man made rock retaining wall (Plate 15, Annex 4) which includes a perpendicular seawall extension (groin) that is positioned roughly on the border of the two villages, Siufaga and Sapinifaga both of which jointly own the land directly adjacent to the marine area the proposed cable alignment will pass through.

73. The inshore marine area is characterised by a distinctive reef system dominated by a narrow shallow water intertidal reef flat that is close to shore and is exposed during low tide consisting of beach rock and a small sand beach (refer Plate 15, annex 4), and a sub tidal reef flat that extend out to the barrier reef which terminates seaward to a wave dominated reef crest, reef edge and slope which then descends rather steeply to the outer reef slope and beyond. During periods of high rainfall and observed during the field survey), natural springs discharge freshwater directly into the shallow waters in close proximity to the shoreline along the coastline of this site.

74. Directly east of the Sapinifaga church and approximately 250 meters to the north of the rock groin is a natural shallow seawater reef channel or Ava that opens directly to the sea and is used by local fishers to access the outer fishing areas. This is the closest natural opening in the barrier reef through which the cable will be laid (Plate 17, Annex 4).

75. The reef systems associated with the proposed cable alignment show very similar benthic profiles. The benthic visual survey undertaken during the assessment of the Tuasivi villages 'ava' revealed that the sea floor follows a general pattern that included a shallow entrance (4–8 m) crossing the barrier reef with a steep sided offshore reef system covered by hard substrate and a shallow homogenous and relatively flat seabed associated with the sub tidal reef system. The sub tidal reef flat ranges in depth between 2–4 metres terminating in very shallow water directly adjacent to the cables proposed terminal location.

4) Threatened Species and Protected Areas

76. Samoa has sixty-five (65) marine species listed as globally threatened on the 2009 IUCN Red List of Threatened Species and is thought that the true number of threatened species in Samoa is significantly higher than this. Samoa has a rich marine biota and diversity with a high diversity of hard and soft coral and a diverse invertebrate's flora and fauna, marine turtles and is located within the migratory routes of several large marine mammals (e.g., the humpback whales).

77. Samoa's EEZ has resident and transient or migratory populations of cetaceans (whales and dolphins). Miller (2009) stated that to date there has been no dedicated scientific survey undertaken to study to identify the marine mammal diversity within the waters of the Samoa resulting in a paucity of information on the presence and population status of cetacean within the nation nor if there are any seasonal migrations. However, cetacean species are common and their habitat is associated with the open ocean environments oceanic fronts and upwelling, seamounts, canyons, deep-sea trenches and the water column itself. Miller (2009) on behalf of the Whale and Dolphin Conservation Society (WDCS) documented 16 cetacean species in Samoan waters (Table 1), however, it is likely that more species are present. The humpback whale (*Megaptera novaengliae*) is believed to breed in Samoan waters.

Table 1. List of cetacean species of Samoa

Species	Common Name	IUCN Category
<i>Balaenoptera acutorostrata</i>	Minke Whale	Lc
<i>Balaenoptera edeni</i>	Bryde's Whale	Dd
<i>Megaptera novaengliae</i>	Humpback Whale	Lc
<i>Globicephala macrorhynchus</i>	Short-finned Pilot Whale	Dd
<i>Grampus griseus</i>	Risso's Dolphin	Lc
<i>Lagenodelphis hosei</i>	Fraser's Dolphin	Lc
<i>Orcinus orca</i>	Killer Whale	Dd
<i>Peponocephala electra</i>	Melon-headed Whale	Lc
<i>Pseudorca crassidens</i>	False Killer Whale	Dd
<i>Stenella coeruleoalba</i>	Striped Dolphin	Lc
<i>Stenella longirostris</i>	Spinner Dolphin	Dd
<i>Tursiops truncatus</i>	Common Bottlenose Dolphin	Lc
<i>Steno bredanensis</i>	Rough-toothed Dolphin	Lc
<i>Physeter macrocephalus</i>	Sperm Whale	Vu
<i>Kogia sima</i>	Dwarf Sperm Whale	Dd
<i>Ziphius cavirostris</i>	Cuviers Beaked Whale	Lc

Source: IUCN Red List of Threatened Species (version 2014.3)

Key: Dd=data deficient, Vu=vulnerable, Lc=Least Concern

78. Of the species of cetaceans recorded from the EEZ of Samoa only the sperm whale is considered globally threatened by the IUCN Red List (version 2014.3). It has a vulnerable or Vu designation. For the remaining cetaceans there is either not enough information to make scientific assessments (marked as data deficient (Dd)) or they have been assessed as being of least concern (Lc).

79. Three species of sea turtles are known to live within Samoa waters are on the IUCN Red List. The Hawksbill Turtle (*Eretmochelys imbricata*) is listed as Critically Endangered, the Green Turtle (*Chelonia mydas*) as Endangered and the Leatherback Turtle (*Dermochelys coriacea*) as Vulnerable. The Hawksbill Turtle breeds in small numbers on the Aleipata Islands and a few beaches on Savai'i Island.

80. Samoa's Marine Protected Area (MPA) network comprises approximately 12 million hectares comprising the entire EEZ - which was declared a sanctuary for whales, dolphins, turtles and sharks in 2002 - and the Palolo Deep Marine Reserve, the Aleipata MPA and the Safata MPA (Figure 7). In addition, a very significant part of Samoa's marine conservation area network is the network of village based fisheries and marine reserves. An estimated 71 functional reserves are known (Figure 8), however the total area is unknown (Ministry of Natural Resources, Environment & Meteorology, 2009).

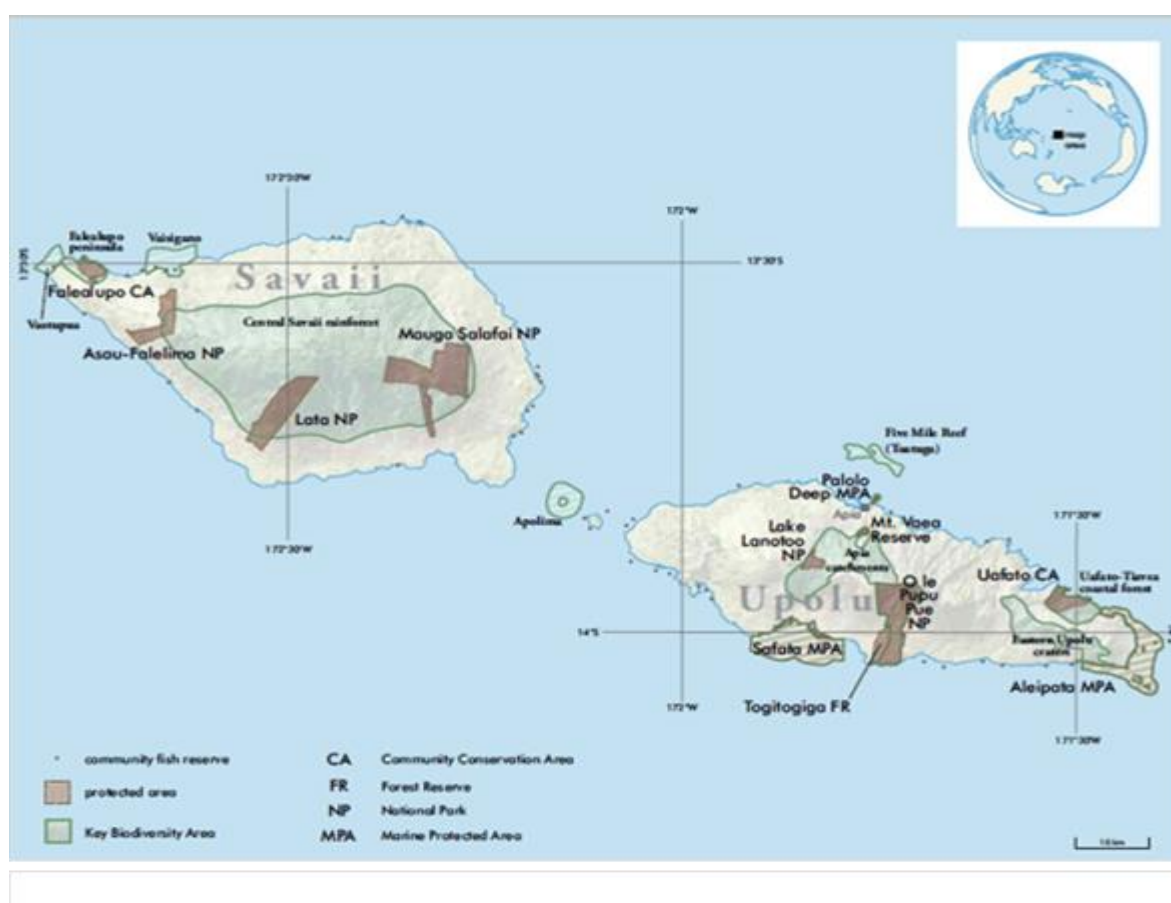


Figure 7. Samoa Protected Area Network

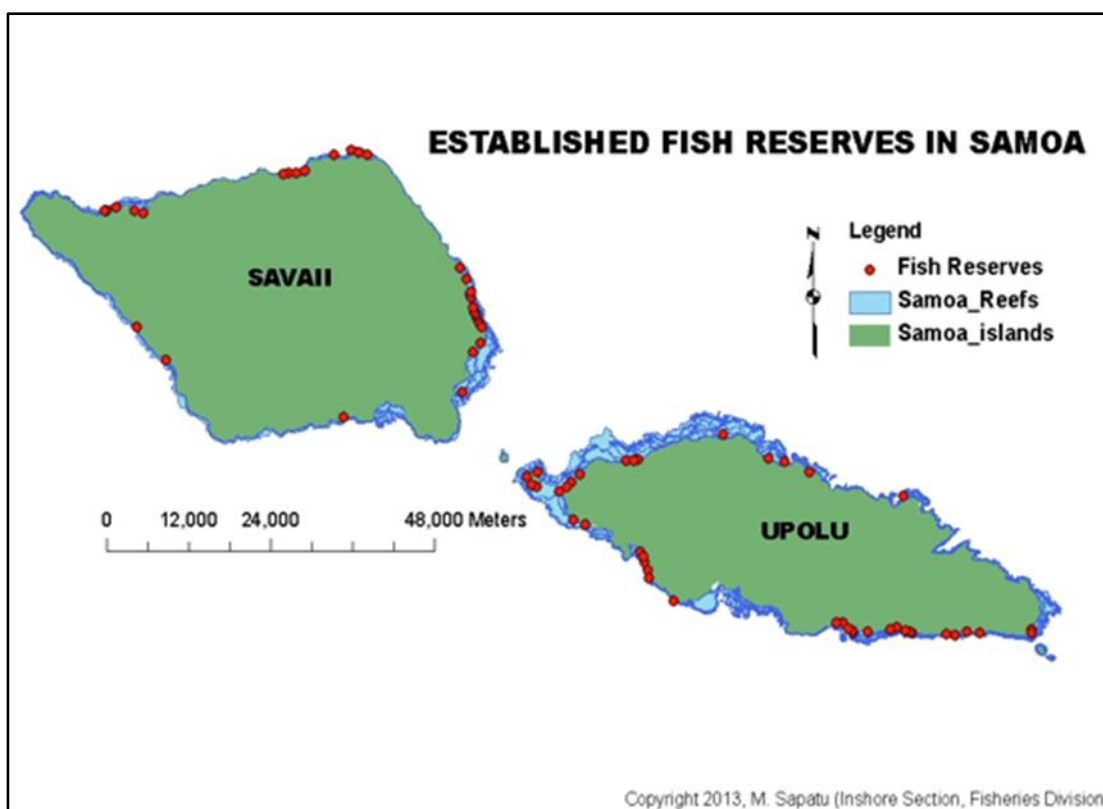


Figure 8. Village Fish Reserves (Community Based Marine Resource Management areas)

C. Socio-Economic Environment

1) Demographics

81. Samoa is comprised of two large islands, Upolu and Savai'i, and eight small islets. The country is remote from its main trading partners and increasingly reliant on high quality telecommunications connections. Samoa has a GDP per capita of USD 3,480 per person. The economy relies on agriculture, fisheries, tourism and remittances from family overseas.

82. Samoa's total population of 187,820 people is distributed across two main and two smaller islands. Upolu accounts for roughly 75% of the population where the capital city of Apia is located. Savai'i is the largest island and accounts for the remaining 25% of the population. Samoa has a strong traditional culture, community and family cohesion.

Table 2. Samoa population statistics

Total population and estimates 2006-2020				
	Year	Population ¹	Urban ²	Rural ³
Census	2006	180,741	37,708	143,033
Census	2011	187,820	36,735	151,085
	2015	193,483	35,957	157,527
	2020	200,562	34,984	165,579

Source: Samoa Bureau of Statistics, Population and Housing Census 2011

¹: Total estimate is based on annual growth rate of 0.8 percent from census 2011

²: Urban estimate is based on annual growth rate of -0.5 from census 2011

³: Rural estimate is based on annual growth rate of 1.1 from census 2011

83. Based on the 2006 Census table above, the Samoa population has increased from 180,471 in 2006 to 187,820 in 2011. The average household size was seven during the 2011 census.

Table 3. Samoa Demographic information

Feature	Project Location
	Samoa
Land area (Km ²)	2,944 Km ² ⁹
Population	187,820
Urban population	19.6%
Rural population	80.4%
Growth Rate	.04%
Population Density (km ²)	67 persons
Median age	20.7 years
Average Household Size	7
No. of Households	26,205

Source: 2011 Census, Samoa Bureau of Statistics

84. The Samoa Millennium Development Goal report in 2012 recorded that the country is on track to meet 3 of the 7 development targets for 2015 including (i) achievement of universal primary education (ii) reduce child mortality and (iii) ensure environmental sustainability. However there are mixed results in 4 of the 7 development goals for Samoa particularly in: (i) eliminate extreme poverty and hunger, where despite increase in productivity, hardship has increase, depth of poverty is up and income inequality persists as well as having weak job conditions and absence of data on vulnerable employment; (ii) promote gender equality and empower women, where gender parity has been achieved. Women's employment has increased but room for improvement and there is low female representation in parliament. (iii) Improve maternal health, where contraceptive use is low, high unmet need for family planning, increasing teenage pregnancy and high antenatal care and (iv) combat HIV/AIDS and other diseases, where there is high prevalence of obesity and diabetes, high risk of NCDs, and suicide attempts and deaths particularly among the youth, are on the rise.

2) Transportation and Infrastructure

85. The two main islands of Samoa are well served by coastal ring roads and Upolu has three cross-island roads. The completion of the current road improvement program should see all the main roads upgraded and tar-sealed. The main international port is Apia, with an inter-island ferry service operating between Mulifanua at northwest Upolu and Salelologa at southeast Savai'i. The islands were once linked by air service between Faleolo near Mulifanua on Upolu and Maota near Salelologa on Savai'i, but this air service was discontinued in 2006. Another airport is located in North-West Savai'i at Asau. The main international airport is Faleolo Airport in northwest Upolu. Samoa also has a large number of secondary roads, some paved, but many with earth and gravel surfaces.

86. The project roads where a small amount trenching within the designated road allowance is likely to take place will be the north coast road within Fagali'i on Upolu and the Savai'i coast road near Tuasivi.

3) Tourism

87. Tourism is an economically important industry for Samoa, accounting for approximately 20% of GDP. Following the 2009 tsunami, 13% of the nation's tourism

infrastructure was destroyed; the infrastructure has since been fully restored. A more reliable Internet connection will facilitate greater access to international markets for the sector and increasing the profile of Samoa internationally resulting in positive economic impacts.

4) Economy

88. Samoa's economy is dominated by subsistence agriculture and related activities, which support around three-quarters of the total population, including almost the entire rural population. The economy is also dominated by external aid and by remittances from Samoans residing and working abroad.¹⁰ The communications sector made up 4% of Samoa's GDP in 2013.

Table 4. 2011 Samoa Population Statistics

Location	Male	Female	Total
Samoa	96,990	90,830	187,820
Upolu	73,934	69,484	143,418
Savai'i	23,056	21,346	44,402

Source: 2011 Census, Samoa Bureau of Statistics

Fisheries Activities

89. The EEZ waters of Samoa support commercial purse seine and long line fishing activities that have both local and foreign ownership and operational involvement principally targeting species of tuna for many years. The commercial fishing fleet operates between Samoan near shore waters and outer boundary of the nation's EEZ. The Samoan "Alee" fishing boat, is almost exclusive utilised for the long line tuna and related pelagic fisheries with vessel ranging in length of 8 - 15 meters with most vessel averaging less than 3 fishing days at sea per trip. The tuna species are highly migratory and the Alee fleet will travel as far as 100 kilometres out to sea to fish.

90. Both near shore and offshore (deep sea) Fish Aggregation Devices (FADs) are utilised to support the local commercial fishing fleet. FADs act as artificial reefs providing shelter for smaller organisms, which in turn provide food for large organism higher up in the food chain, attracting small finfish that are targeted by large pelagic fish. Thus congregating pelagic fish around the FADs potentially increase catch rates and decrease fishing effort and expenses for local fishers. The main methods deployed around FADs are trolling, mid water "drop stoning" and hook and line in shallow near shore FADs throughout the waters of Samoa.

91. Deep sea offshore FAD in Samoa are position in waters deeper than 1,200 meters, and are deployed by the Ministry of Agriculture and Fisheries in conjunction with local village fishers with support from regional agencies. As of March 2015, there are 9 offshore deep water FADs operating, three of relevance to this project, one off the coast of Fagali'i and 2 off the Tuasivi landing sites (Table 5).

Table 5. Deep water FADs along Samoa's north coast

District Site	Village	Latitude	Longitude	Depth (m)	Distance from Shore (km)
Anna Alofi 2	Leulumoega	13°35.546'S	171°58.813'W	1,500 – 2,000	16.6

¹⁰ Final Initial Environmental Examination Report, ADB Samoa, Renewable Energy Development and Power Sector Development Project, October 2013

Vaimauga Sisifo	Apia	13°42.500'S	171°45.000'W	1611	16.68
Gagamauga 2	Saleaula	13°21.926'S	171°58.813'W	1,623	9.3

92. Nearshore FADs in Samoa are found in water less than 100 metres deep and are utilised by local fishers to supplement daily subsistence and small-scale commercial fishing activities. These are accessed by using Samoan traditional fishing canoes. The Fisheries Department with support from village communities deploy these FADs as part of the inshore fish reserve programmes. The FADs are used in principal to offset inshore fishing pressure on reef finfish to pelagic species that are attracted to FADs. Both villages of Tuasivi possess a single inshore FAD each (Table 6).

Table 6. Shallow water FADs along Samoa's north coast.

District Site	Village	Latitude	Longitude	Depth (m)	Distance from Shore (km)
Faasalelega 3	Siufaga	13°38.636'S	172°10.544'W	41	1.46
Faasalelega 3	Sapinifaga	13°39.049'S	172°10.470'W	41	1.35

93. There will be no direct impacts on the offshore and near shore FADs due to the deployment and operation of the telecommunication cable so long as installation guidelines defined in this IEE are adhered to. To avoid damage to the FAD notification of their location to the cable-laying contractor and to all vessels in the area of the cable vessel will be required.

94. There is no large-scale inshore commercial fishery in Samoa. However, there is considerable inshore resource exploitation principally for subsistence and small-scale commercial activities. Inshore fish and invertebrate populations stocks have been in a steady decline for a considerable period of time in Samoa (anecdotal information Fisheries Department) and a number of nation wide initiatives have been initiated to provide information and skills to ensure these stocks are management and fished sustainably. The development of village fish reserves is a prominent nation wide program that is providing positive outcomes.

95. However, small-scale fishing is undertaken in the near shore and inshore (lagoon) waters and associated reef systems in the area the cables will be deployed. These activities involve mostly collection of edible invertebrates by the women. During the deployment of the cable it is expected that some disruption to the daily fishing activities of community fishers may occur, however this will be short lived (a day or two) and is envisaged to have no impact on the ability of these fishers to catch daily requirements.

5) Marine Management Areas/Village Fish Reserves

96. The ownership and management of nation's inshore coastal and marine waters (from the high tide seaward) are governed by several agencies, namely the MNRE and the MOAF (specifically the Fisheries Department), each with control over different aspects of the marine environment. MNRE is responsible for the marine benthos like corals, while Fisheries are responsible for the marine resource extracted by fishing including finfish and invertebrates.

97. In the PIA, there is one village fish reserve within Fagali'i Bay. The Fagali'i Village Fish Reserve located about 150m to the south-east of the proposed cable alignment. There are two VFRs near Tuasivi; one in Sapinifaga and one in Siufaga Village, on either side of the proposed cable alignment (

98.

99.). All three fish reserves are located outside of the immediate area of influence of the proposed cable alignment; however during construct a conscious effort is required to ensure no impacts will occur. Each village fish reserve is discussed in Annex 4. Each village has a community Village Fish Reserve. Both reserves are located towards the inshore sub tidal reef system adjacent to their villages and encompass the best inshore coral reefs within their respective coastal areas. The proposed cable alignment options do not impact the fish reserves and are located some 200 meters to the south and southeast of the reserves boundaries for Sapinifaga and Siufaga, respectively and therefore are outside the direct influence area of the cable.

100. The 71 community village fish reserves are all associated with inshore lagoon waters, their primary function being to support specific habitat and species management action to ensure the protection of these resources. The management plans are developed and defined by the villages through a consultation process that is support by the fisheries Department. Each village fish reserve is therefore unique and the management develop to suit the issues of the village. Associated with the fish reserves in some villages is the establishment of near shore FAD's to off set the fishing pressure and ensure subsistence and income opportunities through resource harvesting are available.

6) Sociocultural Values

101. Improved access to internet is known to result in some undesirable access to particular websites. However, this issue is manageable via both the service providers and at the family level. The benefits of improved internet connection outweigh the potential for unwanted content.

7) Sites of Archaeological and Historical Value

102. There were no known sites of archaeological or historical value identified within the PIA. Regardless, a chance finds procedure (CFP) is included in the ESMP (Annex 1).

V. ANALYSIS OF ALTERNATIVES

A. Alternative Technologies

103. Both fibre optic cable and satellite connections were considered during the early feasibility studies¹¹, but the latter in use on both states had serious limitations in available bandwidth and was often restricted by the satellite service provider, leaving both states with very limited connectivity. The fibre optic cable would allow for much broader bandwidth and a level of service that is controlled by Samoa, not an external entity. It was therefore agreed that a second and higher capacity fibre optic cable option would be pursued.

B. Alternative Alignments

104. Various options for a new submarine cable from Samoa were examined from economic and strategic perspectives by the consultants and the PSC. These include Samoa – Fiji and Samoa – New Zealand routing options. For economic and strategic reasons, the Samoa-Fiji cable (**Error! Reference source not found.**) was identified as the preferred option for the Project. This report analyses the preferred routing option between Samoa and Fiji, but prior to a detailed bathymetry survey being undertaken.

1) Upolu

105. On Upolu, two landing sites were considered by government: (i) Fale'ula about 11.3km west of Apia along the West Coast Road; and (ii) Fagali'i about 6.5km from Apia centre along the East Coast Road.

Table 7. Comparison of alternative cable landing site on Upolu Island:

Factors: Marine/Coastal	Alternative Landing Sites & Locations	
	Fale'ula	Fagali'i
Engineering/Tech a. landing engineering b. proven reliability c. marine traffic d. coral e. existing access	a. Complicated b. None c. Minimal d. Yes and no ava e. None	a. Existing landing site b. Easy landing c. Minimal d. No coral impact and channel e. Sea access ducts in place
Cost	Moderate to high (installation and land cost)s	BMH (existing) \$0 Duct to cable station \$150K
Social a. land acquisition b. Displacement c. Culturally Sensitive Sites	a. Private land; b. Some relocation needed c. None	a. Govt land leased to golf course. b. Vacant block to be sub-leased to SSCC for cable station c. None
Environmental a. sensitive sites b. live coral affected c. cetaceans migration	a. yes b. yes c. likely off the coast	a. none b. no c. likely off the coast
Other considerations	No suitable cable station site nearby	Already identified from previous cable system investigations; Recommended by Govt
Factors: Terrestrial		
a. trenching distance	5km	2.2 km
b. access disruption	Partial road closures	Partial road closure
c. electromagnetic interference	N/A-since landside cable not powered	N/A-since landside cable not powered
Conclusion	Totally unsuitable	Near perfect, with no environmental and very minimal social impacts

Source: Project Technical Coordinator Team, 2015 pers. comms

¹¹ World Bank. 2009. Regional Telecommunications Backbone Network Assessment and Implementation Study. World Bank Project Report.

106. These two alternatives were screened according to the criteria listed in the left column of Table 7. The examination of environmental, social and cost criteria clearly favoured the Fagali'i Fagali'i site.

2) Savai'i

Two options were considered for the cable landing site (Table 8). Option A is shown in red in

107. below requires the cable to be laid from the 'ava' south through the coastal lagoon toward the Hospital site at Tuasivi. An alternative route (Option B) would require a short cable route from the ava to the rock wall near Sapini-i-faga with less of an impact on the coastal marine ecology but longer trenching along the road to the Blue Sky cable station site beside the Tuasivi's Post Office.

Table 8. Comparison of alternative cable landing site on Savai'i Island:

	Alternative Landing Sites & Locations	
	Option A	Option B
Factors: Sea-side	13° 39.946'S 172° 10.671'W	Directly south of ava for cable entry into inner reef area?
Engineering	a. Gap in reef	Gap in reef
a.	b. Sandy/coral mixed crossing of lagoon, but for 1 km	Sandy crossing of lagoon, almost no coral for 250m
b.	BMH required	BMH required
c.		
Logistics-landforms etc	Sandy Beach Good spot for BMH Short front-haul distance to cable station Established station	Sandy and old coral ridge reef beach, with rock seawall to cross into road allowance
Cost	Trenching inside reef-100k	Trenching inside reef 60K
a.	Duct route \$50K	Duct route \$50K
b.	BMH 100K	BMH 100K
c.		
Social	Govt Land for BMH	Gov't land except 2m crossing between break wall and road allowance
a. land acquisition	Road verge for conduit	
b. displacement	No	
c. Culturally sensitive sites	c. None	c. None
Environmental		
a. sensitive sites	a. Village Fish Reserves	a. no
b. live coral	b. Yes	b. marginal
c. cetaceans-migration	c. Likely offshore movement	c. very little
Other considerations		
Factors: Landside		
a. trenching distance from AVA to BMH	1000 metres	250 meters
b. trenching distance from BMH to cable station	300m	1000m
b. access disruption	Minimal	Minimal
c. electromagnetic interference from underground powered cable?	Nil	Nil
Conclusion	Very suitable; easy installation, but longer distance across inner reef area	Least environmental damage but some customary land requirement & longer trench along roadway

108. While Option B is the least environmentally intrusive, it would require a small amount of land acquisition as well as the possibility for compensation when crossing the entrances to private lands along the coast road. Given the inherent cost and time implications of compulsory land acquisition to the Project, Option A is currently the preferred alignment as it requires no private land acquisition. Notwithstanding, both options

remain under active consideration and if the land ownership issues can be effectively resolved (and there are no substantial technical issues to be overcome) Option B may become preferred.

VI. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Terrestrial Impacts

109. The terrestrial environmental and social impacts associated with the proposal are minor. Existing cable connection infrastructure will be utilised at Fagali'i and cable routes here and at Savai'i will be situated in public road reserves. None of the infrastructure placements require clearance of vegetation or interaction with significant habitats. The potential site for the new cable station at Fagali'i will be situated on cleared land.

B. Environmental Impacts from Submarine Cables

110. The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and The International Cable Protection Committee Ltd (ICPC) have published *Submarine Cables and the Oceans – Connecting the World* (Carter *et al.*, 2009) which provides an overview of the potential environmental impacts associated with submarine cable deployment and maintenance. The following sections summarise the key environmental issues highlighted in Carter *et al.* (2009).

111. Disturbances and impacts caused by cable laying and maintenance should be viewed in the context of the frequency and extent of these activities. The one-off disturbance associated with cable placement is restricted mainly to a strip of seabed less than 5–8 m wide and unless a cable fault develops, the seabed will not be disturbed again within the system's design life (approximately 25 years). For comparison, bottom trawl and dredge fishing operations, which occur in a number of locations along the cable route, are repetitive, can be tens of metres wide, indiscriminately sweep substantial areas of seabed in a single operation and are likely to be repeated over a year at the same site. The impact, of a single cable laying operation, lasting a few days, is much preferred over continuous, multiple or recurring impacts.

112. The United Nations Convention on the Law of the Sea (UNCLOS) prescribes the freedom to lay, maintain and repair cables outside territorial seas, but these are not necessarily inconsistent with the need to protect deep-ocean habitats and ecosystems, which is also reflected in UNCLOS:

- cable deployment in the deep ocean, i.e. laying of a 17–20 mm diameter tube on the surface of the ocean floor, has a minor if not negligible one-off impact; and
- cable repairs can result in substrate disturbance. However, cable failures in deep water are relatively rare and are mainly caused by major natural events such as the 2006 Taiwan earthquake and submarine landslide.

113. In addition, the submarine cable industry, together with environmental regulators, attempts to reduce or avoid any impact on vulnerable deep-water ecosystems by:

- utilizing modern seabed mapping and navigation systems that allow identification of benthic habitats in unprecedented detail and accuracy. Together with modern cable-laying techniques, it is now possible to deploy cables to avoid ecologically and biologically sensitive areas; and
- avoiding the deployment of cables on or through habitats such as seamounts, submarine canyons and hydrothermal vents, which are also unsuitable as cable

routes due to the risk of natural hazards. For example, canyons are often swept by powerful currents that may abrade or break cables; and seamounts can be volcanically active and subject to landslides and hydrothermal venting.

114. Modern deep-water fibre-optic cables are composed of several pairs of hair-like glass fibres, a copper power conductor and steel wire strength member, which are all sheathed in high-density polyethylene. Where extra protection is required - as for areas of rocky seabed or strong wave and current action - additional steel wire armour is added. Of these materials, cable-grade polyethylene is essentially inert in the ocean. Processes such as oxidation, hydrolysis (chemical breakdown in water) and mineralization are extremely slow; the total conversion of polyethylene to carbon dioxide and water will take centuries. The effects of ultraviolet light (UV-B) - the main cause of degradation in most plastics - are minimized through the use of light-stabilized materials, burial into the seabed and the natural reduction in light penetration through the upper ocean, where the photic zone rarely extends beyond 150 m depth. Any mechanical breakdown of a cable's plastic sheathing to fine-grained particles on the energetic continental shelf – a potential hazard for marine life – is minimized by armouring and burial (Carter *et al.* 2009).

115. Hence, the overall potential environmental impacts arising from the project are limited. The key environmental interactions are in the near shore areas where cable requires burial to avoid potential entanglement with fishing activities and other human activities.

C. Land Acquisition and Resettlement

116. In Fiji and Upolu the cable will utilise existing cable landing stations, whereas in Savai'i the landing station is proposed to be located on the Tuasivi public hospital site. Therefore land acquisition will not be required for the landing stations. While cable routes are expected to follow public road reserves, this is dependent on final design. To ensure land acquisition considerations are properly managed a Resettlement Policy Framework (RPF) is included as Appendix 6.

117. The shore end installations will connect the open ocean segment to the terrestrial infrastructure traversing the barrier reef and lagoon at each location. The exact location of the cable routes will be determined following a detailed bathymetric marine survey during the design stage. Similarly, the locations of land-based infrastructure (other than utilisation of existing facilities) will be subject to detailed design.

118. The existing terrestrial cable route (owned by BlueSky Samoa) follows the Main East Coast Road toward the BlueSky cable station in Apia. This route is flood-prone with potential implications for cable integrity; hence it is proposed to establish a new cable station on higher ground potentially at the Royal Samoa Golf Course, approximately 1km south-east of the BMH. Figure 3 shows the proposed cable route connecting the BMH to the cable station via the Main East Coast Road and Golf Course Road. The cable will be protected by case-hardened conduit which will be installed in a 30cm-wide trench in the road reserve.

119. The proposed new cable station – which will house the necessary equipment to enable the high-speed connection – will potentially be sited on a cleared portion adjacent to the Golf Course clubhouse on land owned by Samoa Land Corporation (SLC); a government-owned entity.

D. Preconstruction Period

120. Preventing negative impacts from occurring in the first place is all about early planning and provision of specifications that avoid future problems. Discussions with technical advisers during preparation of this document indicated that the engineering design requirements are sufficiently flexible to allow avoidance of environmentally sensitive

areas such as seagrasses, coral formations and hydrothermal vents. The latter pose a threat to cable integrity, hence a design buffer of 500m is imposed. A similar avoidance strategy will be adopted for seamounts as the relief at these locations means there is a risk of the cable becoming elevated above the sea floor, with the potential for entanglement in fishing nets or by marine animals. Coral formations in inshore areas will be avoided by diver-assisted cable placement and VFRs will not be encroached upon by the cable alignment.

121. Preconstruction period mitigation measures were identified, all related to including contract specifications that define the boundaries the survey and cable placement contractor will be required to implement these. These actions are summarized in the ESMP (Annex 1) and discussed in greater detail in the following section.

1) Physical Environment

122. **Hydrothermal Vents** and their associated ecosystems are fragile in nature and are not generally subjected to anthropogenic disturbances. However these ecosystems and the communities they support are highly ephemeral in nature and are totally reliant on the lifespan of the vents themselves. The environment associated with an active vent is hostile and subsequently during the deployment of the cable these sites would be actively avoided by a minimum of 500 metres. Avoidance will render impacts non-existent.

123. **Sea Mounts.** Seamounts and associated bathymetric features are known to be biodiversity hotspots in the open ocean and subsequently are a target for commercial fishing. These are sensitive in that if cable is placed across them will impact benthic communities such as deep-sea corals and therefore the cable route should avoid seamounts and associated bathymetric features. Sea mounts will be avoided by detailed design prescriptions.

124. **Fish Aggregation Devices.** Prior to any construction mobilization the TC will provide the contractor with the GPS coordinates of the FADs and provide instructions to avoid these underwater reef structures.

2) Ecological Environment

125. **Village Fish Reserves.** The specific cable routes have not been defined as the oceanographic survey has yet to take place. However protection of the three village fish reserves (1 in Fagali'i and 2 in Tuasiva) will be achieved since all vessel operations and cable placement will avoid these areas. Through community discussion community fishers expect no destruction to their daily fishing activities at the Fagali'i landing site as the area of the cable alignment is rarely used for this purpose. Daily fishing activities associated with the villages of Sapinifaga and Siufaga in Savai'i will have a minor impact, however this reef system is large and other areas can be assessed whilst the cable is deployed. Local fishers did not express any concern regarding the cable placement, especially after seeing the size of the actual cable.

126. **Coral Communities.** The cable laying operations will avoid infringing on any live coral reefs or areas where coral is recovering from past degradation. To that end the oceanographic survey team will receive instructions to align the cable around living reef patches, especially in the Tuasivi area.

127. **Seagrass.** No seagrass communities were identified within a 20m wide corridor on either side of the proposed alignments, although they do exist nearby, especially at Fagali'i..

128. **Cetaceans.** Whales are known to migrate through the waters the cable alignment survey and cable laying activities will take place in. The work could have two impacts: 1) acoustic effect of ocean sonar survey on marine mammals, and 2) entanglement in cable by deep diving cetaceans such as the sperm whale. To reduce the risk of this occurring vessel and survey operators will be instructed to:

- use best practices for operating vessels in proximity to marine mammals ;
- post a watch for whales and suspend activities when whales are within 1 Km of vessel;
- use multi-beam and/or side-scan sonar only – No Air Guns.

129. Neither the Fagali'i or Tuasivi landing sites are turtle habitat or have been known to host breeding activities. Therefore the project will not affect turtles.

3) Social Environment

130. **Community Information** – During the consultations it became very clear that the scale of the cable work was exceedingly exaggerated in that cable diameter was thought to be that of a pipeline and the cable contained toxic fluids or emitted electromagnetic radiation, damaging local marine food supplies. Recognizing this concern both the executing agency and the TC will conduct at least one additional information session laying out these specification details and highlighting other concerns raised, such as costing and cable connection issues.

131. **Community Grievance.** A grievance redress process is defined in Chapter VIII of and will assign the monitor to be available to process the complaints through the seven steps to getting resolution. To avoid encroachment on private properties or on customary lands, the contractor prior to construction is to carry out a land survey of the government reserve in coordination with LTA in both sites to ensure that the cable will be laid on the government land.

132. **Access Disruption and Landside Trenching-** Excavation and placement of the cable will result in temporary access restrictions and therefore a protocol for this work needs to be established defining a step-by step approach to notifying roadside residents of which access will be cut off and for how long. Further the trenching equipment will be trenching machine capable of digging a trench just wide enough for the cable to be buried along the road shoulder.

E. Construction Period

1) Physical Environment

133. **Hydrothermal Vents.** If hydrothermal vents exist anywhere along the alignment; and are detected during the oceanographic survey the 1 Km buffer zone requirement will need to be enforced. Any such features will be mapped by the survey vessel and avoidance as specified in the ESMP will be adhered to.

134. **Sea mounts.** The ocean corridor in which the cable is to be placed has not been mapped well and therefore all seamounts have not been identified. The bathymetric survey will provide the necessary information to allow these features to be avoided.

6) Ecological Environment

135. The trenching operations inside the barrier reef (i.e. once in the shipping channel) to bury the cable, needs to be done quickly and with the least amount of degradation of the benthic substrate the closer cable placement operations are to the shore. The general instruction to the contractor will be to stay away from coral and good coral colonization substrate, making sure that consultation with Dept. of Fisheries and MNRE takes place once a specific alignment has been mapped, but before it is final. Given that the cable starting from the landing site out to deep water will need to be precisely placed, it will either require placement during low tide with the trencher towed out to deep water by the cable laying vessel (see Figure 1), or during high tide, with the cable floated out and guided to the bottom by divers. Either way the cable placement can be controlled with very precise limits. A marine ecologist specializing in coral ecology will be retained to plan and participate in the nearshore cable placement.

136. In the deep ocean the cable placement will need to avoid rapid changes in elevations, i.e. undersea mountains or canyons, hydrothermal vent areas as well as seamounts which are fish congregating and fishing areas. These will be identified during the oceanographic survey, with findings presented to the Project Steering Committee (PSC) and responsible agencies prior contractor mobilization.

137. **Coral Communities.** The marine survey identified coral patches at the entrance to the Fagali'i channel as well as within 25 m on either side of the Tuasivi alignment (inside the barrier reef). There is little danger that the corals on the walls of the Fagali'i Bay channel walls will be affected by the cable, however the likelihood at the Tuasivi site is much greater given the proximity of coral heads to the proposed alignment. To prevent this the cable will be floated in and placed around the corals by divers working with a marine specialist who will direct this exercise. Further, the trenching machine will need to have a narrow as possible footprint such that the nearby VFRs are not damaged by siltation or physical damage while the trencher is in operation. Finally, coral relocation will be used when the cable alignment cannot avoid damaging live corals,

138. **Seagrass** - As with corals, the proposed nearshore alignment for the cable will avoid all seagrass beds.

139. **Cetaceans.** Contractors installing the cables will need to control cable tension so that the placed cable conforms to contours of seabed as per cable laying specification and/or provide anchors if needed. In this way the cable will be as unobtrusive as possible and eliminate the risk of cable-whale interaction. As well, the COEP contains specific instructions on minimally intrusive oceanographic survey methods, which the contractor will need to adhere to. Further a section on best practices has been included in Annex 4.

7) Socio-Economic Environment

140. **Coastal Resource Users – subsistence and artisanal fisheries-**Any damage to coastal, artisanal fisheries will be avoided by contractors adhering to the specifications and confining the cable alignment to a narrow corridor and consulting with the Fisheries Department to assign the best dates for cable placement inside the barrier reef and to define any other avoidance measures. The Technical Coordinator and contractor will discuss placement of temporary markers along the corridor where water depth is < 10m.

141. **Coastal shipping; Commercial Shipping and Ports-** The placement of the cables will mean potential short term danger to ship traffic in the seas. Therefore, the contractor will be required to 1) ensure a shipping notice is issued warning of cable-laying, dates, and safe clearance for other activities to 2) Request port authorities to advise local shipping of laying activities and avoidance measures and 3) ensure that marine navigation lights and other national maritime measures are closely followed by the project vessels at all times.

142. **Land-use and Access.** Given that there are no landside acquisition or access issues, the only impact possible could arise if contractors stray from the proposed alignment and encroach into communal resource harvesting areas. The cable route boundaries have been defined in the IEE and as such the contractor will be required to adhere to these conditions, and be permitted to deviate only after consultation with the Technical Coordinator

143. **Consultation and Information Disclosure** – Local communities expressed considerable concern about be excluded from the consultations following the surveys to establish the alignment at sea and on land. They wanted to be involved in that decision making process. They were also very concerned about the clean up after the landside trenching is complete, having had bad experiences in the past. To address this the contractor, working with the TC will conduct two consultation sessions—one for each village, updating them on results and getting feedback on locations and issues, as well as describing the post trenching rehabilitation actions and timetable-including landscaping.

These consultations will be completed before the contractor mobilizes to the field and final alignments are specified.

F. Operating Period

1) Physical and Ecological Environment

144. **Perceived Pollution when Cable installed-** Once the cable is in place it will be an inert, small diameter, glass, metal and plastic conduit buried about 0.75m (2.5ft) below the seafloor. In the deep ocean it will be a smaller diameter cable likely resting in the seafloor, which over time will become submerged in the deep-sea sediment. If required the cable may also be anchored to the seafloor with special anchoring devices. It will be a passive structure, similar to a rock formation and are often quickly colonized by deep-sea invertebrates

2) Social Environment

145. **Impact Associated with Improved Internet Access.** Comments expressed in Fagali'i at the consultation session that better internet access would allow for faster, easier and cheaper internet access, but at the same time increase in the access to socially less desirable sites, including pornography sites. The project implementing agency, the SSCC or specific service providers (specifics have not been worked out) will be encouraged by MCIT to inform each cable subscriber of the dangers and the methods available to block sites, but leaving decisions to the individual subscribers.

G. Poverty and Gender Impact

146. **Poverty –** Based on the 2012 Millennium Development Goal Report for Samoa, the level of poverty, or more accurately, hardship, in Samoa, as measured by the proportion of the population below the basic needs poverty line (BNPL), increased between 2002 and 2008. This is despite relatively good economic growth in the early-to-mid 2000s. The increase in the depth of poverty also indicates that the disadvantaged generally did not benefit from the earlier economic expansion. Although the share of the poorest quintile in national consumption increased, the higher Gini coefficient calculated from the 2008 HIES indicates that income inequality persists.

147. Economic growth outcomes only just recovered in 2010 from the adverse impact of the global crisis and 2009 tsunami. However, generally weak labour market conditions continue, exacerbated by job cuts by Samoa's biggest private employer (Yazaki Samoa). In addition, although inflation eased from its peak of 11.5 percent in 2008, prices have recently trended upwards and inflation was 5.2 percent at the end of 2011. These conditions make it difficult for households to get out of hardship.

148. It is important to note that the increase in the level and depth of hardship was significant for the rural areas, especially Savai'i, which accounts for a quarter of the poor in Samoa. Hardship in the urban centres generally declined. This means that more households in the rural areas are struggling to meet their basic living expenses on a daily or weekly basis i.e. to pay bills and/or purchase adequate and nutritious food etc. Reducing hardship is a key priority for the Government of Samoa. The Government recognises the need to target pro-poor growth, as well as developing the rural areas through assistance to the agriculture and tourism sectors.

149. In Samoa, as with other countries in the Pacific, there is a low prevalence of underweight children, as well as low food poverty. However, there are concerns that the poorest households are not receiving adequate nutrition despite an increase in dietary energy supply. In addition, there is growing concern of overweight children, linked to the high risk of non-communicable diseases in Samoa.

150. **Gender-** From the 2012 Millennium Development Goal Report, Samoa has achieved gender parity in all levels of education, with girls outperforming their male counterparts at all levels of education. However, there is concern over the performance of boys, with males less likely to complete secondary and tertiary education compared to girls. Government recognises this 'reverse gender gap' as an area for concern, linked to the higher risk of male unemployment, crime and violence against women and children. Consequently, with the support of the development partners, Government introduced school fee schemes to encourage higher male enrolment at secondary level.

151. On the empowerment indicators, women employed in the non- agricultural sector have increased over the years. However, Samoa's National Policy for Women (2010-15) recognises that while several support programs and services targeting women in the micro and small business development sector are in existence, much work remains to strengthen relevant policy and legal frameworks in place.

152. Women's representation in parliament is also an area in need of improvement. The low number of women politicians reflects significant obstacles, including the political system where only a chiefly (matai) title holder can run for election, as well as social and customary attitudes about women's roles, manifested in the deference of chiefly (matai) titles men, while women adopt more supportive roles to leadership. However, to redress the situation, Samoa introduced a legislation to facilitate a quota system for female representation in parliament.

153. Therefore, accounting for the relatively slow progress on women's empowerment compared to gender equality, Samoa's progress on the broader goal is mixed. *Source: Samoa (2010a, 2010b)*

H. Cumulative Impacts and Mitigation Measures

1) Environmental

154. Given that the cable installation involves the placement of a 2-6 cm diameter solid cable (containing no liquids, and buried in the shallower waters in a narrow trench on the seabed and will be carefully placed (via divers and/or a cable floated into place if needed) within one day, no cumulative effects are foreseen. There are no other known activities occurring at the same time that the cable is to be placed on the seafloor. There may be other construction activities on land, but since both landing will only require the construction of a small room and require some trenching, no cumulative effect will be triggered.

2) Socioeconomic

155. There are no expected irreversible and irretrievable cumulative social impacts resulting from the fibre optic cable project. Due to its small footprint, and even though it will cross the degraded (shipping channel) sections of existing marine protected areas, it is not expected to cause permanent loss of communal fishing grounds and local people's livelihoods.

I. Irreversible and Irretrievable Impacts

156. Given the very small disturbance to the environment from the cable installation and landside building (980 m²) construction, there will be no irreversible or irretrievable impacts due to the project. Implementation of the mitigation measures defined in the ESMP will ensure that no such impacts occur. If the cable poses a danger to nearby corals, they will be relocated, if the cable cannot be moved.

J. Environmental and Social Enhancements/Benefits

157. The fibre optic cable project, if properly prepared, will not only improve people's access to income and social services but may also enhance social networks particularly family relationships among Samoans and their respective family members living abroad. Faster internet is also expected to facilitate regular and affordable connections among local and overseas-based groups, particularly women's organizations who rely on internet to be in-touch. Better internet connections should also help with remote medical services and distance education.

VII. GRIEVANCE REDRESS MECHANISM

158. Although at this stage, there are no identified environmental and involuntary resettlement complaints associated with the proposed project, a grievance redress mechanism (GRM) is presented in the event that at the later stage there will be a need for one. For example, there could be a grievance filed as a result of fishing gear becoming snagged on the cable, presumed to be due to faulty cable placement or as a result of the failure of the contractor to clean up and landscape after the trenching is complete.

159. The GRM is scaled to the risks and adverse impacts of the project. If promptly addressed, and using an understandable and transparent process that is gender responsive, culturally appropriate, and at no costs and without retribution, the concerns and complaints of potentially affected people will usually be resolved.

160. The GRM mechanism does not impede access to regular judicial process, but simply provides a simpler access to complaint resolution. The TC, via the PSC will appropriately inform Fagali'i and Tuasivi community members about this GRM before commencement of any civil works. This will be done as part of consultation session where engineering details costs and feasibility will be tabled (see ESMP Task 1.12 and 1.13).

161. A grievance redress committee will be established to (i) record, categorize and prioritize the grievances; (ii) settle the grievances in consultation with complainant(s) and other stakeholders; (iii) inform the aggrieved parties about the solutions; and (vi) forward the unresolved cases to higher authorities.

162. The six member committee will be comprised of one member of the PSC or MCIT, and two representatives of each community, with at least one female member from each community. The chair of that committee has yet to be named, but it will likely be someone from MCIT.

163. The following six-step mechanism (Table 9) is proposed for grievance redress of social and environmental matters.

164. During implementation, the TC as well as MCIT will have a designated staff member responsible for interacting with the GRM. The MCIT Chair and the TC will be the grievance focal point, and receive and address project related concerns, via the designated staff member. Concerns will be resolved first by the TC and contractor. Affected people will be made fully aware of their rights regarding land ownership and environmental degradation (MNRE's PUMA). During the construction period the contractor will be a key participant in the grievance redress process, and the TC will need to confirm that the contractor has assigned a GRM coordinator.

165. Any complaint will be recorded and investigated by the TC or MCIT staff working with the project manager and the contractor (as appropriate). A complaints register will be maintained, and will show the details and nature of the complaint, the complainant's name, the date and actions taken as a result of the investigation. The register will also cross-reference any non-compliance report and/or corrective action report or other relevant documentation filed in relation to the original complaint.

166. When construction starts, a sign will be erected at all sites providing the public with updated project information and summarizing the grievance redress mechanism process including contact person details at MCIT. All corrective actions and complaint responses carried out on site will be reported back to MCIT and/or the TC. The TC/MCIT will include the complaints register and reporting on corrective actions/responses in its semi-annual progress reports to the ADB.

167. Throughout this process, MNRE will always be available to hear public complaints and provide advice if the complainant feels that MCIT responses are not satisfactory. The PSC will make sure that this cooperation is available.

Table 9. Grievance Redress Process

Step	Process	Duration
1	Affected Person (AP)/village elected or traditional chief takes grievance to TC, MCIT or Contractor	Any time
2	TC, MCIT or contractor reviews issue, and in consultation with village matai or traditional chief, relevant agencies and contractor (if appropriate), agrees to a solution and records the results.	2 weeks
3	TC/MCIT reports back to Matai and AP and gets clearance the complaint has been resolved.	1 week
<i>If unresolved</i>		
4	Matai take grievance to PSC for resolution	Decision within 2 weeks
5	If not resolved PSC must take matter to relevant national agency CEO for decision.	2 weeks
6	CEO and National Agency can deliberate for ≤ four weeks and resolve the case	4 weeks
If unresolved or if at any stage and AP is not satisfied with progress		
Matai can take the matter to appropriate state or national court.		

Source: Consultant experience, previous process development for similar projects & meetings with key stakeholders, March 2015.

VIII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

168. Consultation was undertaken in relevant communities in Samoa where the cable will come to shore (i.e. Tuasivi and Fagali'i). Given the limited impacts in Fiji, consultation was limited to the key stakeholders.

A. Upolu

1) Consultation

169. A public consultation session was held on March 25th, 2015 between 09:45 and 1300_held in Pilo'ua, Foamatu Hall, Fagali'i, with 43 people attending, including village chiefs, executing agency representatives, representatives of the Ministry of Women, Community Development and Social Affairs and community members. Of the 43 attending 11 were women (Annex 2).

170. The meeting was opened by the village chief, followed by a presentation by the consultant addressing seven key topics:

- i. Background to the Environmental and Socio-economic issues:
- ii. Expected Outputs Reports
- iii. Cable Installation and Methods
- iv. Findings and defining Actions on Environment
- v. Findings and defining Actions to be taken on Social Tasks
- vi. Conclusions to these Consultations and Findings.
- vii. Timing on Environmental and Social Safeguards documentation

171. The presentation (Appendix 3) took 35 minutes to deliver after which the floor was open for questions, mostly in Samoan, requiring translation

172. In addition to this formal session, the social sector specialist conducted at least three informal interviews with women's groups, discussing the issues around the location of the facility, the landing site and internet access. The feedback from these meetings was no objection to the project and no real issue concerning the location of the cable, except protection of two village fish reserves.

8) Questions and Answers

173. The comments by the participants focused on seven areas:

- Impact of the cable placement cutting through two village fish reserves;
- Cable contributing to natural disasters;
- Protection against negative social impact of better communication services;
- Displeasure with lack of prompt payment for maintenance by Bluesky
- Concern that cable will be powered;
- Concern that cable might affect fishing since several species disappeared since the Bluesky cable was placed in 2009; and,
- Need to be involved in planning the final alignment and seeing the environmental documentation once complete

174. **Impact of the cable placement and a new cable on the shore.** The consultant explained that the new cable alignment, although not finalized, would be placed beside the existing one in the middle of the channel away from the Village Fish Reserve and not disturbing corals or other sensitive habitat.

175. **Cable placement along the road and to the golf course cable station.** The consultant indicated that the cable would be buried within the road shoulder in the designated reserve area, in a trench dug, using a trenching machine (as opposed to a backhoe), allowing for quick placement and filling in of the open trench. There was some discussion about this since past experience was that contractors did not repair damage or re-establish driveways and roadside stopping areas once the work was done. The consultant indicated that instructions for this sort of clean up would be included in the construction contract and also identified in the environmental safeguard documentation now being prepared.

176. **Protection against negative social impact of better communication services.** The issue raised was about access to socially negative sites such as pornography and trafficking, to which the consultant explained that in other island countries working groups of concerned citizens were formed to develop an awareness raising campaign to help families control use. The consultant also indicated that control of what access is possible is easily controlled by the family and that service providers and advise on the best methods

177. **Payment delays for maintenance by Bluesky.** The executing agency MCIT responded, saying that it would address this with Bluesky. The Bluesky spokesperson indicated that since the community only leased the land from the government, that Bluesky wanted to pay the government directly. This issue is now being addressed by the MCIT's minister, who happens to be the grand chief of Fagali'i Village.

178. **Concern that cable will be powered.** The consultant responded by explaining that the cable will be well insulated, will not be powered once on land and that in the >50 years that powered cables have been in use, not one incident of electric shock or discharge have been recorded. Further the cable once inside the barrier reef, will be buried at least 0.75m under the surface.

179. **Concern that cable might affect fishing since several species disappeared since the Bluesky cable was placed in 2009.** The consultant explained that the Bluesky cable is not powered and the likely cause of the decline of some species is fishing pressure and habitat loss.

180. **Need to be involved in planning the final alignment and seeing the environmental documentation once complete.** The consultant agreed that this is essential and that the village should request copies of all documentation from MCIT. MCIT acknowledge. Further the consultant underscored (in the presence of MCIT, the executing agency) the involvement of the village in the decision on the final alignment and timing of the work (this should not be a problem as the village grand chief is the Minister or MCIT)

9) Summary of the Consultation

182. The overwhelming opinion of all participants was full support for the project and an urgency to get this in place as quickly as possible. There was not a single truly negative comment. The presenter responded with thanks and underscored that the safeguard document once drafted would be available for review at MCIT in Apia and also would be made available to the village chiefs in Fagali'iFagali'i.

10) Use of Consultation Results

183. The points raised have been incorporated into the environmental and social safeguard documents and most particularly in the ESMP and then the contract specifications.

11) Follow Up Program

184. The consultant indicated that once the safeguard documents are completed, and the work moves into the detailed design stage another consultation would be held with the community to update on details and timing.

185. The meeting minutes attendance sheets and a copy of the general presentation (two presentations were given, each tailored to the location—these are not provided due to file size, but are available if needed. The consultant gave these to MCIT), are provided as Annex 2

B. Savai'i

1) Consultation

186. A public consultation session was held on March 24th, 2015 between 09:00 and 1300__held with 55 people attending, including village chiefs, executing agency representatives, and community members. Of the 55 attending 11 were women (Annex 2). The meeting was opened by the village chief with a Kava ceremony which took about 25 minutes followed by a presentation by the consultant addressing six key topics

2) Questions and Answers

The following were the key questions and answers:

Concern that cable alignment will cut through the village fish reserves. Consultant indicated that cable based on the preferred alignment will pass two village fish reserves and that cable placement will be done by divers hydro plough making sure that the VFRs are not damaged. *(Note, the given less than 24 hours after the field inspection and mapping showing the relation to the two VFRs and an optional alignment identified by the consultant (*

187. *), was not yet available.)*

188. **Concern that emissions from cable and its installation will trigger natural disasters.** The consultant advised that there is no record of a cable, less than 4.5cm in diameter has caused or contributed to a natural disaster. The cable burial is usually <1m so not much ground disturbance.

189. **Concern that local fishers walking over cable could be electrocuted.** The consultant explained that the cable will be fully insulated and will be buried in the seafloor, this grounding it and no chance of electrocution. The power supply is wired such that if there is a short the power supply is immediately cut off—as with a fuse or breaker switch.

190. **Will this technology be provided free of charge.** The consultant advised that the service will not be free of charge, but would be fast and reliable

191. **Will the technology attract fish or lightning.** The consultant advised that the cable would not attract fish or lightning, as it is buried in the seafloor >0.75m .

192. **Who will maintain the cable.** The consultant advised that a company will be hired by MCIT or the entity established to manage the cable, to protect it from vandalism. However when asked about vandalism, the village chiefs responded saying that this is an essential service and no vandalism is likely and nothing like this has ever occurred on Savai'i.

193. **Village chief expressed need for a couple of laptops to learn how to use the internet.** Consultant replied that the message would be passed on to MCIT and would be recorded on the environmental documentation as a recommendation for a way to raise environmental awareness of the internet.

3) Summary of Consultation

194. The project received 100% support with no objection, aside from the concern over interference with the VFRs. The consultant indicated that this was also their concern that careful planning would take place and would make a recommendation in the environmental report that village leaders should be involved in deciding on the final alignment and receive all documentation once completed

4) Use of Consultation Results

195. The points raised have been incorporated into the environmental and social safeguard documents and most particularly in the ESMP and then the contract specifications.

5) Follow Up Program

196. The consultant indicated that once the safeguard documents are completed, and the work moves into the detailed design stage another consultation would be held with the community to update on details and timing.

197. The meeting minutes attendance sheets and a copy of the general presentation (two presentations were given, each tailored to the location—these are not provided due to file size, but are available if needed. The consultant gave these to MCIT), are provided as Annex 2.

C. Overall Conclusions

198. The conclusions from the two consultations were that there was overwhelming support for the project, but that communication and consultations with village heads in the two to three affected communities need to be improved. The communities need to be consulted again during the detailed design period when final alignments are being planned

IX. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

200. The ESMP is organized into two cross-referenced tables, namely the environmental mitigation table (EmiT) and monitoring table (EmoT) provided in Annex 1. These two tables list in detail the mitigation measures and monitoring actions that the Executing Agency has committed to implement, from the planning through the operating period of the project. The ESMP table numbering is consistent such that reference can be made in the bid documentation or during any other monitoring activity and the correct mitigation and monitoring measure will always be found.

201. This approach makes for an ESMP that is practical and can be easily be used during bid document preparation as well as during project implementation. The ESMP will inform the Contractor's ESMP which will be prepared following detailed design. .

A. Performance Indicators

202. Given that nearly all of the potential negative impacts would occur during the construction period, and that robust environmental contract clauses will be able to avoid all impacts. Key performance indicators will be:

- i) confirmation that the ESMP tasks are defined as specific individual or grouped environmental and social clauses in the contract bid documents.
- ii) confirmation that environmental management criteria are included as part of the contractor selection process, including their experience preparing and implementing ESMPs, working in sensitive tropical locations such coral reefs, recognizing fish aggregation/spawning areas, seagrass meadows and seamounts;
- iii) a marine ecologist (coral specialty) located and retained as an advisor by the Technical Coordinator's office or MCIT, providing assistance with coral management issues as well as contractor briefing on marine habitat protection, and participation in community consultation;
- iv) a written record of the briefing on safeguards and inspection of vessels, according to the tasks as they are defined in the ESMP and contract specification, completed with the survey and cable placement contractors, as soon as the contractors have been selected.
- v) compliance monitoring checklists prepared and being used by the contractor and TC and due diligence notes, completed as defined in the ESMP, and making the notes available in an easily accessible file for the contractor, Technical Coordinator and others to use.
- vi) a written mitigation and monitoring completion report, listing all mitigation and monitoring measures defined in the ESMP, their implementation timing, monitoring and any follow up actions; and,
- vii) a written record of interviews with local fishers, examining any cable placement issues, vis-à-vis fishing gear damage.

203. The TC will be responsible for preparing a performance indicator report, by listing the seven items above and provide a short text to indicate how these items were implemented and their success as of the start of the operating period of the project.

B. Implementation Arrangements

204. The Project Steering Committee will provide overall guidance for the Project and review implementation on a regular basis. The PSC has been in operation since October

2014. Its membership includes the MCIT (Chair), MoF, Attorney-General's Office, Bluesky, Digicel and CSL.

205. The implementing entity for Component 1 will be the SSCC. SSCC will retain technical advisor(s) as needed to assist with procurement and contract management. MoF will represent the Government of Samoa's interest in the SSCC. The implementing entity for Component 2 will be the OoTR. For day-to-day administration of the entire Project management, consultants will be engaged by the MCIT and MoF (as appropriate), and will be responsible for overall Project coordination, procurement, financial management, communications, M&E reporting, and audit functions.

206. The Project is overseen by a project steering committee (PSC) headed by the Minister of Communication Infrastructure and Telecommunication (MCIT) and the Samoa Submarine Cable Corporation (SSCC) which will be in charge of the new cable (Figure 9). The Technical Coordinator will be responsible for the preparation of bid documents and contractor selection, engineering, as well as overseeing the implementation of all ESMP measures during the preconstruction and construction periods. Three key agencies and community stakeholders will also provide input at the requested of MCIT.

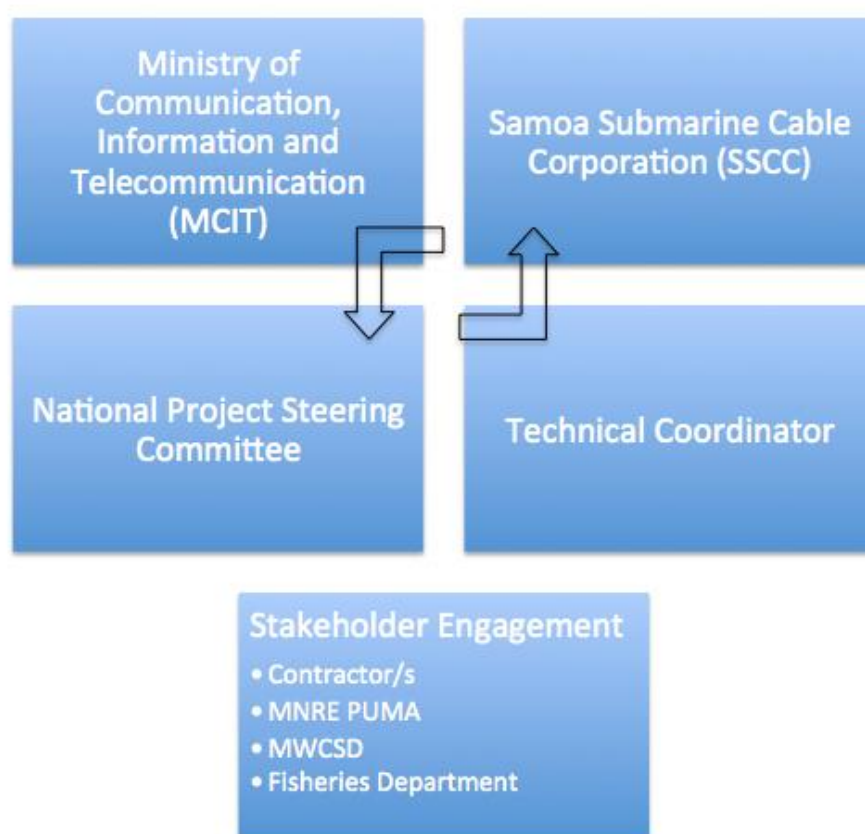


Figure 9. General organisation and chain of command for fibre optic cable project.

207. MNRE's PUMA will monitor compliance of the contractor and the Technical Coordinator will prepare regular (monthly) reporting on work progress and the compliance with the ESMP mitigation and monitoring tasks.

208. The MCIT has formed a PSC to provide overall guidance and input to any major decisions and emerging issues. Updates to the ESMP upon design completion will be led by the PSC if required.

209. The ESMP implementation will require an approximate six-month preconstruction period, a two-year construction period and 1-year operating period compliance monitoring

function. Main responsibility for implementation will be the TC and the marine ecologist specialist, as well as the PSC, with MCIT as the overall manager.

C. Institutional Capacity

210. Samoa has competent environmental compliance staff (MNRE's PUMA) with adequate capacity to fulfil their role in project delivery. Project management staff will have overall responsibility to ensure safeguard compliance in the preparatory phase and will work in collaboration with key agencies with regard to safeguard requirements. In addition, MoF has experience with ADB and World Bank Projects and safeguard requirements.

211. It is recommended that the contractors receive proper briefing from MNRE and documentation detailing mitigation measures to ensure environmentally-responsible construction activities in sensitive marine habitats. The bid documents will include a clause requiring bidders to have basic ESMP implementation skills.

D. Mitigation and Monitoring Costs

1) Environmental

212. During the construction period field monitoring will be required, weekly, when the cable placement is ongoing inside the barrier reef. The deep ocean work is expected to take about 300 days in total (rough estimate) with the oceanographic survey being completed several weeks ahead of the cable placement operation. The work inside the barrier reef at the two locations will take a total of say 8-12 days. It is during these periods that inspection of vessel operations will need to be conducted.

213. The total cost for the environmental mitigation and monitoring, is estimated to be around USD 250,000, including the salary of a part-time safeguards specialist and a short-term marine ecologist. This work would include all reporting and contractor briefing. Monitoring vessels and any equipment will be provided by the Fisheries Department and/or the villages (paid for as a service by MCIT), with the project also paying for fuel.

2) Social

214. Social mitigation and monitoring measures are detailed in the ESMP Annex 1. Cost of community awareness activities at each project stage are expected to be approximately WST\$20,000 focussed in for both landing sites.

3) Summary of Reporting and Monitoring Requirements

215. All reporting and monitoring requirements are specified in the ESMP. The contractor will be required to submit progress reports to the Technical Coordinator; in addition to the oceanographic survey findings and a semi-annual summary of ESMP implementation. This material will be submitted to the Technical Coordinator, who will forward it on to MCIT as well as the PSC for submission to the WB. The Technical Coordinator will submit the semi-annual compliance monitoring summary report, and the construction period mitigation and monitoring completion report, once the facility is fully installed.

216. Monitoring requirements are specified in the ESMP monitoring table (EMoT).

X. CONCLUSIONS AND RECOMMENDATIONS

217. Limited land-based infrastructure, mainly marine impacts, no acquisition, existing sites in Fiji and Upolu, hospital site in Savai'i

218. The project will impact a corridor of not more than 3-4 m wide (including the footprint of the submarine water-jet trenching machine on the sea floor in the inner reef zone, and to a depth of 0.75 m beneath the sediment. The cable, about 4 cm in diameter in the nearshore zone¹², will be buried as it passes through the natural channel (ava) through the barrier reef into the Fagali'i and Tuasivi nearshore zone. Burial of the cable will be done to reduce interference with coastal fishing gear and reduce the risk injury to corals and people during storm events. .

219. The cable route will avoid sensitive habitats such as corals and VFRs with placement guided by experienced divers who will place the cable according to instructions from a marine ecologist. These measures will limit any chance that the work will negatively impact the marine environment.

220. All land to be traversed by the cable and associated infrastructure is government owned, including the seafloor (according to Samoan law).

221. The preferred alignments for Fagali'i and Tuasivi will not interfere with any of the existing VFRs or any other protected areas..

222. The ESMP defines a full set of working area boundaries, work restrictions and timing limits, which will be included in the construction contract specifications and which the contractor will have to comply with. The Technical Coordinator and trained support staff will monitor compliance.

223. Given the small-scale impact of the work, and the fact that nearly all of the work takes on board a vessel at sea with a specially trained crew, no negative social impacts are predicted during any stage of the project.

224. The construction of the cable facility on land will require a small crew of local works, likely a local sub-contractor. The main impact will be the trenching of the cable on land and to address this rapid filling in an landscaping of the areas disturbed will be required and are specified in the ESMP. Further the trenching will have to be completed using a trenching machine (not a backhoe which makes an unnecessarily wide trench, given that the cable inside a case hardened conduit will be less than 6cm in diameter.

225. The TC and/or MCIT will provide full safeguard documentation to the two villages and will conduct consultations once the draft of the final alignments are ready, inviting the villages to help with final locations, particularly inside the reef boundary.

¹² The cable diameter varies depending on depth, thus for deep sea locations it will average 1.7 cm in diameter and near shore about 3.5 cm in diameter.

XI. REFERENCES

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ANNEXES

Annex 1: Environmental and Social Management Plan (ESMP)

Annex 2: Consultation Session Record and Presentation

Annex 3: List of People Met and Consulted

Annex 4: Marine Ecology Detailed Findings

Annex 5: Fiji End of Cable Due Diligence Report

Annex 6: Resettlement Policy Framework

Annex 1. ESMP:
Environmental and Social Impact Mitigation Table (ESMiT)

Environmental Parameters	Potential Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
1.0 PRE-CONSTRUCTION PERIOD: Planning and design actions to prevent future impacts						
Physical Environment						
Hydrothermal Vents	Physical damage to vents by cable or cable- laying equipment.	Avoid hydrothermal vents through design	Deep sea areas.	Design	SSCC and Technical Coordinator and contract specialist, oceanographer	PSC and Technical Coordinator
Sea mounts.	Physical damage to habitat	Avoid sea mounts through design	Oceanic deep-sea areas.	Design	SSCC and Technical Coordinator and contract specialist, oceanographer	PSC and Technical Coordinator
Fish Aggregation Devices (FAD)	Damage from survey or cable laying vessels	TC and MCIT need to provide the contractor with GPS coordinates of the FADs	NA	After the contractor has been selected, but before field mobilization	TC	MCIT and/or PSC
Ecological Environment						
Village Fish Reserves (VFRs)	Disturbance of marine organisms and habitats in VFRs.	Design cable alignment to avoid VFRs	NA	Prior to start of Construction	SSCC and Technical Coordinator, contract specialist & PSC	PSC and Technical Coordinator
Coral Communities	Destruction of coral assemblages	In contract specifications instruct cable survey team to survey cable alignment for coral outcrops, and design alignment to avoid. Coral assemblages to be marked on design drawings.	NA	Preparing bid construction contract documentation	Technical Coordinator and Monitoring Technician	PSC and Technical Coordinator

Environmental Parameters	Potential Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
Species potentially at risk (whales and dolphin only)	1. Ocean sonar survey affecting cetaceans. 2. Entanglement in cable by deep diving cetaceans such as the sperm whale.	Contract specifications to include reference to best practices for operating vessels in proximity to marine mammals as included in the Code of Environmental Practice (COEP) document, prepared as part of this assignment. These instructions include: 1. Post a watch for whales and suspend activities when whales are within 2 Km of vessel. 2. Multi-beam and/or side-scan sonar only – No Air Guns.	NA.	When Preparing bid and construction contract documentation	SSCC and Technical Coordinator and contract specialist, marine ecologist	PSCs and Technical Coordinator
Socio-Economic Environment						
Community Information	Misconceptions regarding the project raising people's fears regarding project footprint and potential damages to marine food supply.	Specify in contract docs that at least one community consultation prior to commencement of civil works, during construction and after project completion to reduce concerns about construction impacts.	NA	Before civil work begins	PSC/MCIT and Technical Coordinator	SSCC
Community Grievances	Minor concerns/issues developing community resentments due to unaddressed project related concerns.	Establishment of grievance redress mechanism prior to commencement of civil works and making this known to villages during follow up meetings before the work begins.	Fagali'i and Savai'i	Before civil works begin	TC and PCS	MCIT and PSC
Access during landside trenching	Failure of contractors to do trenching work with minimal damage and quick complete rehabilitation or roadside damage	Contract specs to include instruction concerning full rehabilitation immediately after trenching completed in one area	NA	Before civil works begin	TC and PCS	MCIT and PSC
Pre-Construction EMP Gaps						
	New data on whale migration not accounted for in EMP	Prior to the start of construction the TC and PSC should reexamine the environmental information assembled as part of the IEE and conduct any necessary surveys to fill an information gaps and define additional appropriate mitigative measures. The companion document with this IEE, the Code of Environmental Practices (COEP), defines these measures in further detail	NA	Before civil works begin	TC and PCS	MCIT and PSC
2.0 CONSTRUCTION PERIOD: impacts associated with the work						

Environmental Parameters	Potential Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
Ecological Environment						
Village Fish Reserves	Disturbance of marine organisms and habitats in VFR.	According to contract specs., the contractor(s) will ensure that they: 1. Lay cable along surveyed route providing for a safe distance (≥ 75 m) from VFRs as per cable laying specifications 2. Keep all survey and support vessels at safe (≥ 75 m) distances from VFR areas.	Inshore Coastal areas.	When work is under taken.	Contractor(s)	TC and a State marine resources spec.
Coral Communities	Destruction of coral communities	1. Contractor(s) to adhere to avoidance rule and lay cable along surveyed route, as per cable-laying specification, thus avoiding coral reefs and outcrops. 2. Cable placement in Tuasivi lagoon to be diver-assisted to avoid coral heads	Offshore, Inshore coastal areas.	1. When work is under taken. 2. Before work in coastal areas begins	1. Contractor(s) 2. Proj. Coordinator's office	TC and marine ecologist advisor
Species of special Interest – Cetaceans	1. Disorientation of cetaceans due to sea floor mapping using standard sonar gear 2. Entanglement in cable risk for deep diving cetaceans	1. Contractor to be provided with COEP which contains detailed guidelines on minimally intrusive oceanographic survey method, which need to be adhered to. 2. Control cable tension so that laid cable conforms to undulations of seabed as per cable laying specification and-or provide anchors if needed. 3. Contractor must strictly adhere to the specifications as defined in the COEP and conduct any necessary surveys and define mitigative measures to interfere with cetacean movement	Oceanic deep-sea areas.	When work is under taken.	Contractor	TC and marine ecologist advisor
Socio-Economic Environment						
Coastal Resource Users– subsistence and artisanal fisheries	1. Damage to local nearshore fishing grounds or introduce greater changes of gear entanglement	As per the contract specifications, contractor is to confine trenching activities to as narrow a corridor as possible and restore site when finished and confine trenching/laying activities to as short a period as possible 3. Request Fisheries authorities to advise local fishers of cable laying activities, dates, and avoidance measures. 4. Consider placing warning markers along cable line in shallow (<10 m) waters.	Offshore, Inshore Coastal areas.	When work is under taken.	Contractor	TC and SSCC

Environmental Parameters	Potential Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
Coastal shipping – commercial shipping and ports	1. Damage to ships through cable entanglement. 2. Disruption to shipping during cable laying.	1. Ensure a shipping notice is issued, warning of cable-laying, dates, and safe clearance for other activities. 2. Request Port Authorities to advise local shipping of laying activities and avoidance measures. 3. Contractors to provide written statement to Technical Coordinator that marine navigation lights and other national maritime measures are closely followed by the contractors' vessels at all times.	Offshore and inshore areas (particular issue associated with main shipping channel).	When work is under taken.	Contractor & Technical Coordinator	TC and SSCC
Land Use	Detour from agreed to cable alignment into communal resource area. Community perception of cable encroachment to 'no-go' marine protected areas.	Conduct a series of consultations with government, private sector and non-government organizations including women and youth on progress of work and cable alignment. These consultations have the objective of informing all interested people on the work and general alignment location and methods to used.	In Fagali'i/Fagali'i and Tuasivi	When work is under taken.	Contractor	TC and SSCC
Access	Temporary loss of access to fishing grounds for local communities during laying of undersea cable.	Provision of electronic and print notices to local communities/ fishermen of construction schedule and contact person in case of inquiries.	During cable laying	When work is under taken.	Contractor	TC and SSCC
Inadequate information disclosure	TC and contractor fail to include villages in final alignment planning and decision making	TC and Contractor, prior to start of work, present the draft plan to villages and seek input and agreement on final alignment plan, etc.	Fagali'i and Tuasivi	At start of construction	Contractor and TC	TC and PSC
3. OPERATING PERIOD						
Physical and Ecological Environment						
Perceived marine pollution from work	Fear of potential damages to marine life and impact to food supplies by communities	The use of the Grievance Redress Committee to address community concerns needs to be established by the Implementing Agency , taking immediate action to address mostly perceived concerns, before they become negative rumours.	Operatpr needs to understand IEE and GRM	At start of operating period	SSCC and TC	MCIT
Socio-Economic Environment						
3.3 Impact assoc. with improved Internet—better access to harmful sites	Failure to adopt measures and continue mitigation actions defined in the Construction Period	Make population aware of 'internet site blocking features available to every subscriber; possibly via a village advisory group.	When in use.	At all times	Service provider and An appointed NGO or women's group	SSCC

Environmental Parameters	Potential Impact	Mitigation Measures	Location	Timing/ Duration	Who will Implement	Who will Supervise
	Environmental Completion report.					

Annex 1 ESMP:
Environmental And Social Impact Monitoring Table (ESMoT)

Project Period and Environmental Parameters	Project Impact	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
1. PRE-CONSTRUCTION PERIOD						
Ecological Environment						
Village Fish Reserves	Disturbance of marine organisms and habitats in VFR.	Confirm contract specification in place as indicated in ESMP	During preconstruction period	Written and signed DD inspection note-to file	Technical Coordinator	SSCC & PSCs
Coral Communities	Failure to plan route around coral communities	Confirm that appropriate specification contained bid documentation	During preconstruction period	Written and signed DD inspection note-to file	Technical Coordinator	SSCC & PSCs
Species potentially at risk	1. Ocean sonar survey affecting cetaceans. 2. Entanglement in cable by deep diving cetaceans such as the sperm whale.	Confirm inclusion in contract specifications	When specifications are being written	Record to file	Technical Coordinator	SSCC & PSCs
Socio-Economic Environment						
ESMP implementation monitor	Lack of an experienced technician will likely lead to delayed or failed implementation of ESMP items, e.g. no clauses in the bid docs.	Confirm that the technician is on staff since the start of the project	At start of the detailed design stage	Note to file	Technical Coordinator	SSCC & PSCs
Community Information	Misconceptions regarding the project raising people's fears regarding project footprint and potential damages to marine food supply.	Confirm that community consultation activities are taking place	At key project milestones	Note to file	Technical Coordinator	SSCC & PSCs
Community Grievances	Minor concerns/issues developing community resentments due to unaddressed project related concerns.	Confirm that requirements for a grievance redress mechanism is in Contract specs. And and that it is in the IEE	During detailed design stage	A note to file	Technical Coordinator (TC)	SSCC & PSCs

Project Period and Environmental Parameters	Project Impact	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
Access during landside trenching	Failure of contractors to do trenching work with minimal damage and quick complete rehabilitation or roadside damage	Confirm that specifications are in contract documents	During contract preparation period	Note to file that check was completed	TC	SSCC & PSCs
2. CONSTRUCTION PERIOD						
Ecological Environment						
Village Fish Reserves	Disturbance of marine organisms and habitats in VFR.	Inspect cable laying operation in coastal waters and confirm avoidance	As soon as work takes place inside the barrier reef—inside the passage into nearshore waters	Record of inspection and findings—written and photos	Technical Coordinator and env. Monitor	Technical Coordinator
Coastal and Deep Ocean Habitats	Accidental discharge of pollutants from vessel.	Inspect both survey and cable laying vessel of contractor and confirm compliance	At start of work and for all vessels used	Written compliance checklist	Proj. Coordinator working with env. Monitor	Technical Coordinator
Coral Communities	Destruction of coral communities	Inspect cable laying operations in vicinity of coral formations and confirm compliance	1. When work is going on in vicinity of coral areas 2. defined during the detailed design work	Written compliance report (can be bullet format, with photos. Confirm that contractor has coral community location map	Proj. Coordinator working with env. Monitor	Technical Coordinator
Species of Special Interest – Cetaceans	Entanglement in cable risk for deep diving cetaceans	Discussion with person in charge of cable placement to confirm understanding re cetacean sensitivity	At start of survey and start of cable placement	DD note to file	Coordinator working with env. Monitor	Technical Coordinator
Socio-Economic Environment						

Project Period and Environmental Parameters	Project Impact	Details of Monitoring Action to be Undertaken	When/ Frequency/ Duration	Output to be Provided	Who Implements	Who Supervises
Land Use	Straying of agreed to cable alignment into communal resource area. Community perception of cable encroachment to 'no-go' marine protected areas.	Obtain review and file record/notes/ minutes of consultations completed	Within 5 days of landuse issue consultation taking place	Copy of record of meeting completed	Contractor	Technical Coordinator
Access	Temporary loss of access to fishing grounds for local communities during laying of undersea cable.	Inspect material distributed and confirm timely distribution	At start of construction where access restrictions could arise	Copy of material distributed	Contractor	Technical Coordinator

Annex 2
The Consultation and Information Session Record and
Presentation
MINUTES

ADB/WORLD BANK
FIBRE OPTIC CABLE PROJECT CONSULTATION PRESENTATION
HELD IN PILO'UA, FOAMATU HALL,
ON 25TH MARCH 2015 at 10.00am

PRESENT: *ADB/WB Team - Geza C. Teleki (Team Leader), Mrs Lulu Carmine (Sociologist),
Steve Lindsey (Marine Biologist), Tuaimalo A. Ah Sam (ACEO MCIT),
Ronnie Aiolutepeteo (MCIT), Tulima Tuleki (MCIT), Anthony Saaga (MCIT),
Letoa M. Faasino (MCIT), Vaasiliega Lagaia (MCIT), Rosabel Keil (assistant to
the ADB/WB team).*

IN ATTENDANCE: *(Please refer to attached list)*

9.45am: *Ava Ceremony begins*

10.35am: *Ava Ceremony ends.*

10.50am: *Tuaimalo A. Ah Sam, ACEO for MCIT declares the meeting open with brief outline and plans about the Submarine Cable Project. Acknowledges the representatives from Organizations and Ministries who are present. Introduction of Geza Teleki.*

Translations by Ronnie Aiolutepeteo and Vaasiliega Lagaia

Geza Teleki introduces himself and his team, Lulu Carmine and Steve Lindsey and explanation of their roles in this project. Added that from their Surveys, consultations and Assessments given in reports to ADB/WB, if accepted and approved, the project will then get underway with funding made available.

All those present were given a folder with outlines and descriptions of the project which included photos and illustrations of ship carrying the cables and machinery used for undersea jet trenching and ploughing. A cable given by Bluesky Samoa was also made available to show what it actually looks like.

Geza then begins Power Point Presentation for Submarine Cable Project:

- i. Background to the Environmental and Socio economic issues:*
- ii. Expected Outputs Reports*

- iii. *Cable Installation and Methods*
- iv. *Findings and defining Actions on Environment*

Lulu Carmine was introduced and began her Presentation on:

- v. *Findings and defining Actions to be taken on Social Tasks Consultations with 10 key stake holders, including 7 agencies, NGO's, Blue Sky Samoa and Chamber of Commerce*
- 2.**

Geza took the floor again to end the Consultation with:

- vi. *Conclusions to these Consultations and Findings. 100% response from consulting with Organizations which is beneficial to the report to be given to ADB, World Bank and the Government of Samoa.*
- vii. *Timing on Environmental and Social Safeguards documentations
Grant effectiveness
Tentative Construction Date – December 2015 / January 2016
Donor inspection during the Construction Period.*

Power Point Presentations by Geza and Lulu completed.

Floor was then open for Q. & A discussions. Translations by Ronnie Aiolutepotea and Vaasiliega Lagaia.

Q. (M) : What are the effects of this cable being laid closer to shore? This would be the

second time the beach would be dug up for cables to be laid.

A. (Geza): Existing cable is buried beneath the seabed and the second cable will be buried parallel to the first one in a trench. There will be no significant impact.

Q. (M): Could you clarify how the cable will be brought up to the Golf Course?

A. (Geza): It will come up to shore landing site which is the Bluesky Samoa manhole. It is buried one meter below surface along the roadside. A trenching machine will be recommended for this. The area used will be on the road allowance which will have no significant impact on properties or plantations, etc.

Q. (M): What are your results from consultations and how can we protect ourselves

From negative impacts in Social Areas.

A.(Geza): Once cable is in operation there will be positive impacts such as speed,

Internet access for trainings, studies, etc.

A.(Tuaimalo): Criminal effects – The Samoan Government have been looking at the impact

of internet made available so readily to families and have awareness

programs. It is really up to the parents and adults to look and monitor how

children are using the internet and to avoid them from gaining access to

undesireable websites.

A.(Lulu): The positive impact is faster internet. The Social impacts are that (1) the

role of parents come into play and communication between parents and

children is very important. (2) Using Palau as an example, be pro-active

particularly with Womens' Committees and other Organizations, monitoring

of internet usage and having awareness programs.

A.(Geza): You can get on to your service providers for information on software you can

download to restrict sites eg., pornographic sites.

3.

Q. (M): (1) Why Bluesky? Why not another Telecommunications company?

(2) What's in it for the village of Fagali'iFagali'i?

(3) What is the end product? How much is it going to cost the people?

A.(Geza): (1) Bluesky Samoa has the existing manhole without having to acquire additional

Land. In current discussions with Bluesky. Aside from issue of undesirable

Websites, nothing negative has come up.

(2) Benefit to Fagali'iFagali'i – it is hoped that service and higher speed will come at

a lower cost.

(3) In short – gain more knowledge at faster and cheaper cost

Q. (M): We hear that electricity will be running through these cables. Taking from last

cable laid, we notice a few breeds of fish are no longer around. I would also like

to address a matter to the CEO of Bluesky Samoa. Since the manhole had been put on our property the company has not kept to their word of payment to us for

lease for the manhole. Up to now nothing has come in so far. Could Adolfo

please give us a reply as to why? We are making sure that there is no damage

or vandalism done to this manhole 24 hours a day.

Q.(M): I would like to add something to the above question. We hear now of lease not

being paid to owner of this property. The assets that belong to the Government

which runs through the village of Fagali'iFagali'i are the Golf Course and the Airport and

now this Fibre Optic cable..how much more does the village of Fagali'iFagali'i have to

give to the Government to use our lands?

A.(Tuaimalo): In regards to the lease we will look into this further with Bluesky Samoa.

The Ministry (MCIT) will discuss this further and get back to the affected parties.

We have taken your concerns and questions into consideration.

Q. (M): We are awaiting a reply from Bluesky Samoa.

A. (Fuamatu): I will answer on behalf of Bluesky Samoa. In regards to the lease, this is

utmost on our priority list at the moment. Bluesky and the Government will be

meeting to discuss this very subject in the immediate future. In reply to the

question posed about the electricity in the cable affecting the marine life – no

impact at all to marine life.

Q. (M): I would just like to offer some advice for future references. From past

experiences with Land Transport Authority and Samoa Water Authority, my

strong recommendation is please to improve communications with the Mayor

of Fagali'i so we know where things stand, especially with lease matters

so this does not have to be brought up again.

Vaasiliega Lagaia then thanked the Mayor and Matais of Fagali'iFagali'i for attending this important Consultation and refreshments to be served.

The meeting was then declared closed at 1.00pm.

MINUTES

ADB/WORLD BANK
FIBRE OPTIC CABLE PROJECT CONSULTATION PRESENTATION
HELD IN TUASIVI COLLEGE HALL, TUASIVI, SALELOLOGA, SAVAI'I
ON 24TH MARCH 2015 at 10.00am

PRESENT: *ADB/WB Team - Geza C. Teleki (Team Leader), Mrs Lulu Carmine (Sociologist),
Steve Lindsey (Marine Biologist), Ronnie Aiolutepeteo (MCIT),
Tulima Tuleki
2 other MCIT Members, Vaasilieaga Lagaaia (MCIT), Rosabel
Keil (assistant to
the ADB/WB team).*

IN ATTENDANCE: *Invited Villages' representatives (please refer to attached list)*

10.10am: *Vaasilieaga Lagaaia (Matai on behalf of MCIT) opened with a speech to thank the
Matais from the neighboring villages of Fogapoa, Siufaga and
Tuasivi for
accepting the invitation from ADB/WB and MCIT to attend this
Consultation
Presentation:*

Ava Ceremony begins.

10.35am: *Ava Ceremony ends.*

10.40am: *Presentation begins with Geza Teleki taking the floor and introduces the rest of
the team. Ronnie Aiolutepeteo translates for Geza's part of the
presentation.*

Power Point Presentation by Geza Teleki begins with:

- i. Background to the Environmental and Social Assessment*
- ii. Expected Outputs Reports*
- iii. Cable Installation and Methods*
- iv. Findings and defining Actions on Environment*

Lulu Carmine was introduced and began her Presentation on:

- v. Findings and defining Actions to be taken on Social Tasks
Consultations with 10 key stake holders, including 7
agencies, NGO's,
Blue Sky Samoa and Chamber of Commerce*

*Geza took the floor again to end the Consultation with:
Conclusions to these Consultations and Findings.*

- vi. Timing on Environmental and Social Safeguards
documentations*

Grant effectiveness
Tentative Construction Date
Donor inspection during the Construction Period.

Power Point Presentations by Geza and Lulu completed.

Floor was then open for Q. & A. Translations by Ronnie Aiolutepa and Vaasiliega Lagaia.

2.

Q. (male) : Referring to Page 4 of Consultation report I wish to point out that the cable is cutting onto and through the shoreline of their Village - will there be any monetary compensation for this:

A. (Geza): This is a temporary alignment and other options will be looked into further.

Q. (male): Will there be markers to indicate where cables are being laid?

A. (Geza): Yes markers will be laid.

Q. (male): Doesn't this sort of thing (laying of undersea cables) affect or attract natural

Disasters eg. Such as cyclones? I'd also like to request to Geza that the next

time he comes to Samoa would he kindly donate 2 Computers to their village so

we too can learn and utilise this new fibre optic service?

A.(Geza): It is highly unlikely the the laying of these undersea cables attract natural

Disasters., and yes , should some kind donor be willing to purchase the

Computers I will bring them for you. I would also like to add that if any of

you want to know more about this project to please contact someone within

MCIT and they can discuss this with you.

Q. (F): With the installation of this cable, means faster internet, which I have 2

concerns about. (1)wouldn't this cause more problems within family,

mainly between man and wife ie., the undesirable websites.

(2) Women are

always fishing, would there be any effects to the women?

A.(Geza): The cable will not be visible to those fishing within these areas but this concern

will be added to our reports as something for the contractors laying the cables

to be aware of and looked into further.

A.(Lulu): *There are ways such as websites to help control what your children and spouses can download and watch. These will be documented in our reports.*

Q. (M): *If someone is within these areas fishing, is there a chance of being electrocuted?*

A.(Geza): *Only if someone were to dig up the cable and try to cut it then there is that*

Chance but as mentioned before the cable will not be visible but is also encased

inside a conduit – engineers have assured us that there is no chance of anyone

getting electrocuted. Laying of such cables have been around for years and no such thing has occurred to date.

Q. (F): *Do we have to pay for this more efficient and advanced technology?*

A.(Geza): *Yes, as with all things offering this type of technology and service there is always a fee but most likely cheaper.*

Q. (M): *What sort of affect would it have on our environment especially for those of us*

who live off the sea for daily food? Will this help us catch fish faster? I.e., would it help attract fish?

A.(Geza): *Well maybe through the internet you can Google and find a more effective and faster method of aggregation and catching fish.*

3.

Q. (F): *What about lightning? Will this affect the cable?*

A.(Geza): *No effects to the cable as it is buried beneath underneath the seabed.*

Q. (M): *Will there be someone to do maintenance on these cables should someone*

decide to vandalize? And how deep is the cable buried?

A.(Ronnie): *There will be a company contracted to check and maintain cables. These*

cables are buried 1 meter deep.

Namulauulu, one of the Matais concluded that the presentation on the consultations received have been very informative and thanked Geza and the team. He then added that as time was running short it would be best to close the meeting.

**12.20pm: A thank you speech by Vaasiliega to the participants and meeting was then
declared closed and refreshments were to be served.**

**ADB WORLD BANK AND MCIT
SAMOA SUBMARINE CONNECTIVITY PROJECT (SSCP)**

ATTENDANCE *Fagaliu*

On Environment and Social Safeguards Assessment

Fagaliu, 25 March 2015 (10:00 a.m – 12:00 p.m)

SUAFA	NUU	TELEFONI	ALI'ITAMA'ITA'I
SHORLEY MARINER	RESTAURANT	26605	TAMAITAI CHAN
LEAFU MOKUAI	Fagaliu	7717261	Tamaitai
Sina Vili	Fagaliu	7203128	Tamaitai
1200 Paimua Spt	Fagaliu	7274687	Tamaitai
Thoa	Fagaliu	7227388	Tamaitai
Al Sora. SANGELI	Fagaliu	7740462	"
Disapete Taale	Fagaliu	7281129	Tamaitai
Paabo. UENI	Fagaliu	7750015	Tamaitai
Sapati Tuti	Fagaliu	7274687	Tama
Mami	✓	7793284	✓
Asuka	✓	7274403	✓
Semisi M.	✓	7654351	✓
Iopu - A	✓	7716955	✓
Bidrigg. Moefauo	-	7271514	-
CALLER			
Sio Viliamu	Fagaliu	7771260	MALE
Angema Jealifano	Fagaliu	7275042	✓
Kalifa L.	"	8402088	MALE
TAMARA SARAIA	FAGALI	7515322	ALI
Kakafalia Pati	FAGALI	7270676	ALI
Taqala. Leola	Fagaliu	8402088	Ali
Tieto Faanusilo	Fagaliu		Ali
Mark FETU	Fagaliu	720 2136	M
Paolo. Vaa	Fagaliu	7786235	ALI
2444			
Manalo Zel	Fagaliu	761 8004	Ali
Mulion. Ulanoto	Fagaliu	7225406	Ali
Faure Feli	Fagaliu	7512842	Ali
Falacali. F. ULSOI	Fagaliu	7751984	Ali
Arangani Siofaga	Fagaliu	7775992	Ali

ALANI FAIAI	TOAMUA	7500899	ALII
Tuidlo Schuster	Uailima	7784140	Tamaitai.
Pamela Sua	Matautu-ula	7722244	Tamaitai
LINDA AH Kuo	Verde (MNRE)	776210/6728	✓
Fuamatu Lapana			
Fuamatu Fualia	Fagali-tai	7271363	Tamaitai
Huteri Tanyale	MNRE	7237076	Alii.
Peseta Mulimua, Sua	MWCSB	761504	Alii.
Joep Davetamiratu	SPREP	7253782	Male
DAVE MAIN	BLUESKY.	7571301	✓
ADOLFO MONTENEGRO	✓	7551016	✓
Marcus	Fagali		
Andy Sarge	MCIT	26117	Alii
Jaynon Mangal	Digicel	7749421	male.
DENNIS WILLIAMS	DIGICEL	7700155	MALE.
MAUR SANFORD	ASH cable	7500130	At
LOA SETALA	FAGALII	7227388	At
Elizara In Kolian	LTA	7231156	Off (Male)
Samau I. Lokein	Fagali	7648619	Off
Ronnie Diolopoko	MCIT	7780252	Off
TULIMA TULEKI	MCIT	76276255	T. Fuleki
Tuaimalo A. Ah. Sin	MCIT	7622908	MALE
Letoa M Fasino	MCIT	7622955	MALE
Vaasiliga Lagaria	MCIT		
FANAOLOENAU LOANE TAGATA	FAGALII	7755477	ALI

SS + ASB Com

Azra Teleki

for ASB/WB

Lulu Carmine

✓

Steve Lindsay

✓

Rosabel Kail

for Cera & team

Consultation-Presentation-

Sending as separate File

Annex 3

List of People Contacted

Sl. No.	Name	Designation	Organization
1.	Tua'imalo Asamu Ah Sam	Chief Executive Officer (CEO)	Ministry of Communications and Information Technology (MCIT), Samoa
2.	Manusamoa Tony Sa'aga	Assistant CEO	MCIT, Samoa
3.	Ronnie Aiolutepa	Assistant CEO, Policy	MCIT, Samoa
4.	Capt. Tafaigata Toilolo	Principal Shipping Officer	Ministry of Works, Transport and Infrastructure, Samoa
5.	Seimale'ula Sinapati Ulberg	Manager, Programming and Procurement	Land Transport Authority, Samoa
6.	Mataafa Sepelini Poufa	Manager, Savai'i Operations	Land Transport Authority, Samoa
7.	Seugamalii Jammie Saena	Managing Director	Samoa Water Authority, Samoa
8.	Ferila Brown	Principal Sustainable Development Officer	Planning and Urban Management Authority (PUMA), Ministry of Natural Resources and Environment (MNRE), Samoa
9.	Lemalama Taasalaina 'Malama taaloga'	ACEO	Internal Affairs Division, Ministry of Women, Community and Social Development (MWCSO), Samoa
10.	Antonia Wong	Operations Assistant	ADB/WB Development Coordination Office, Samoa
11.	Telee Kamu Tapueu Potog	Principal Officer	Internal Affairs Division, Ministry of Women, Community and Social Development (MWCSO), Samoa
12.	Peseta Mulinu Su'a	Senior Officer	Internal Affairs Division, Ministry of Women, Community and Social Development (MWCSO), Samoa
13.	Alani Faiai	Senior Manager	Wireless Networks and Engineering Bluesky Samoa
14.	Fetu Osooso		Wireless Networks and Engineering Bluesky Samoa
15.	Faafetai Alisi	CEO	Samoa Umbrella for Non-Government Organizations (SUNGO)
16.	Illuminado Aloaina	IT Manager	National University of Samoa
17.	Taua Autalavou	Primary Community	Department of Fisheries

Sl. No.	Name	Designation	Organization
		Fisheries Officer	
18.	Maria Sopotu	Senior Fisheries officer	Department of Fisheries
19.	Falaniko Afaese	Senior Registry Officer	MNRE
20.	Hobart (Pati) Vaai	Manager Member Services	Samoa Chamber of Commerce & Industry, Inc
21.	Pamela Sua	Acting Secretary/ Treasurer	Samoa National Council of Women
22.	Taulealeausumai A. Tiotio	Deputy General Manager- Operations	Electric Power Corporation (EPC)
23.	Alberta Vitale	Associate Director- Programmes	Women in Business Development
24.	Ms Filisita Heather	ACEO, Land Management Division	MNRE
25.	Ben Tuala	Head, Land Lease Section	Land Management Division, MNRE
26.		Head, Customary Land Lease Section	Land Management Division, MNRE
27.	Faavvaeolenwuu lone Taga	Matai (Chief) /Formerly SamoaTel Channel Manager	Fagali'i Village
28.	Samau I. Lokeni	Matai (Chief)	Fagali'i Village
29.	Sue Mulauulu	Store owner	Tuasivi Village

Annex 4.

Marine Ecology

This Annex included the detailed survey results both for the Fagali'i and Tuasivi landing sites, Upolu and Savai'i islands, respectively in Samoa as specified in the ToR and also provided supporting evidence for the results and discussion in the body of the IEE. The following tables clarify and further defining the findings, which are included in this annex:

- **Table A4.1 Cetaceans confirmed and likely Samoa Waters and IUCN Redlist category.**
- **Table A4.2. List of relevant environmental conventions and treaties associated with the marine sector of the Samoa.**
- **Table A4.3 Samoa membership list to international and regional organizations associated with the marine/coastal sector.**
- **Table A4.4. Village Fish Reserve in close proximity to the telecommunication landing sites, Upolu and Savai'i, Samoa.**

4.1 Methods

The marine assessment utilised standard and acceptable international marine biological methods (English et al., 1997) and was performed by the project team's marine ecologist with assistance from staff from the Ministry of Agriculture and Fisheries – Fisheries Department. Free diving (snorkelling) scientific visual survey method was employed to assess and provide a general description of the reef systems and benthic habitats/sea floor in close proximity to the proposed cable alignment.

Data collected included water depth, percent live coral cover, reef condition, dominant benthic forms, dominant hard coral genus and morphological forms, marine algae (turf, macro), sediment types and physical description including water movements/currents. Digital photos were taken of key biological features (biotic and abiotic) and a global positioning system (GPS) coordinates recorded for all assessments sites.

In total, seven (7) and twelve (12) sites were assessed during the survey of Fagali'i (Figure 1) and Tuasivi (Figure 2), respectively. The Fagali'i and Tuasivi marine assessments were undertaken on Friday the 20th and Monday the 23rd of March respectively. Each site assessed is individual described for Fagali'i and Tuasivi in Annex 4.2.1 and 4.2.2, respectively.

Two cable landing routes were assessed for the Tuasivi landing site. The proposed ADB/WB site is documented in Figure 2 and the alternative site is included in Figure 3, both are described in the main report.

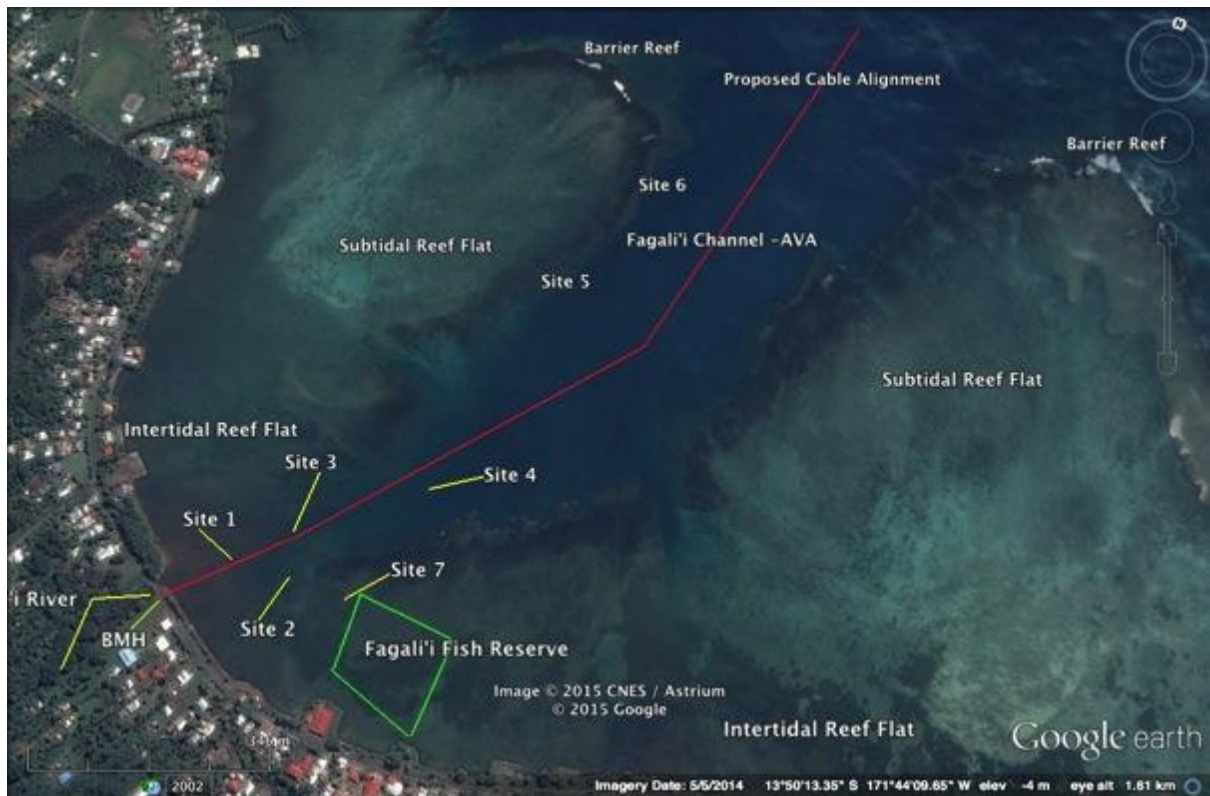


Figure 1. The locations of each field site in relation to the proposed cable alignment for the Fagali'i landing site, Upolu Island, Samoa (not to scale).



Figure 2. The location of each field site in relation to the proposed cable alignment for the Tuasivi landing site, Savai'i Island, Samoa (not to scale).



Figure 3. The location of each field site in relation to the alternative cable alignment for the Tuasivi landing site, Savai'i Island, Samoa (not to scale).

4.2 Coastal Zone: Nearshore baseline Conditions Reef Assessment Findings

4.2.1 Assessment Findings for Fagali'i landing site.

All assessment sites were undertaken within Fagali'i bay. Figure 1 provides the location of each assessment site and they are described below:

Inclement weather occurred during the field assessment producing high levels of freshwater and sediment discharging through the Fagali'i river resulting in high turbidity in inshore waters.

Fagali'i Bay Site Description

-
- Fagali'i bay is located on the eastern coast of Upolu Island approximately 3 km to the south of Apia, the capital of Samoa.
 - The bay is boarded along its entire shoreline by a man made rock retaining wall (Plate 1 a, b, c & d) and is intersected only by the Fagali'i river mouth (Plate 2 a, b c & d).
 - The bay is characterised by a distinctive reef system that remains similar throughout the bay and is dominated by a shallow intertidal reef flat that close to shore is exposed during low tide, a sub tidal reef flat that extend out to the barrier reef which terminates seaward to a wave dominated reef crest, reef edge and inner reef slope which descends rather steeply to the outer reef slope and beyond.
 - Directly eastward of the Fagali'i river mouth and located roughly in the centre of the bay is a natural seawater reef channel (termed an "Ava" in Samoa) that extend approximately half way into the reef flat and opens directly to the open sea (Figure 1). Freshwater and high levels of sedimentation are discharged through the river during rainfall periods and are deposited within the bay greatly increasing turbidity during outgoing tides. The majority of the discharge is directed directly into the reef channel and out to sea.
 - This site location has an existing Blue Sky Samoa Ltd telephone cable (commissioned in 2009, which is connected to Pago Pago, American Samoa and onto Honolulu, Hawaii) that enters through the reef channel, crosses the reef flat just to the south of the Fagali'i river mouth (Figure 1) and enters an existing telecommunication beach man hole (BMH) located on the western side of the road (Plate 3 a, b, c & d). The proposed fibre optic cable is to run parallel to the existing cable and utilise the existing infrastructure.
 - The Fagali'i community have a village Fish Reserve located in the southern corner of the bay (Figure 1 and Plate 4 a & b). The fish reserve is summarised in section A4.4 below and has a main function of regulating fishing activities in this area. The proposed cable alignment is located some 250 meters to the north of the fish reserve's closest boundary and therefore is outside the area of influence of the cable resulting in no foreseeable impacts.



Plate 1 a, b (High tide), c & d (low tide). Artificial rock wall along the shoreline of Fagali'i bay.





Plate 2 a, b (high tide), c, d (low tide). Fagali'i river mouth within Fagali'i bay.



Plate 3 a, b, c & d. Location of the existing telecommunication Beach Manhole.



Plate 4 a & b. Fagali'i bay Village Fish Reserve.

Intertidal Reef Flat

- The intertidal reef flat is exposed during periods of low water and as a result possesses no hard corals and/or seagrass beds. It is dominated by fine to coarse sand derived primarily from terrigenous volcanic origins (black sand), calcareous sand derived from the reef and fine mud (river discharge) (Plate 5 a & b).
- The intertidal area adjacent to the Fagali'i river mouth is the largest area in the bay and during periods of low water, extends a considerable distance terminating within 50 meters of the natural reef channel.
- The area just to the south of the river mouth (less than 15 meters) and next to the road bridge is the location of the existing blue sky telecommunication submarine cable (refer Figure 1 and Plate 3 a, b, c & d). Running parallel to this cable is the proposed alignment for the fibre optic cable terminating at the beach manhole adjacent to this site.
- There are no biological communities in the intertidal area that will be adversely affected by the deployment and operation of the cable. Invertebrate animals that inhabit this area (e.g. crustaceans, polychaetes, bivalves etc) will be disturbed in the area the cable is laid, however this disturbance is very minor and temporally and will allow these mobile animals to evade damage.



Plate 5 a & b. Fagali'i bay low tide with exposed intertidal reef flat.

Sub-tidal Reef Flat (Sites 1 – 7)

- The bays intertidal reef system possesses significant sea grass beds located on the inshore reef flats. These however are greatly reduced in the area directly adjacent of the

Fagali'i river mouth (due to freshwater and sediment inputs). These beds are substantial in the area close to and within the Fagali'i Village Fish Reserve (to the south (greater than 200m) of the proposed cable alignment).

- Healthy population abundance of seaweed (dominated by *Sargassum sp.* and *Padina sp.*) located in the deeper areas of the intertidal reef flat (most likely seasonally variations of abundance occurs) which also supports a very small number of hard corals dominated by small *Porities sp.* colonies.
- A number of large coral heads are located within the landward side (more on the northern side) of the reef channel which have live coral attached on the upper surface which are mixed with areas of algae covered rock. These coral heads terminate onto the sea floor, which is dominated by coral rubble and sand.
- Similarly, live percent hard coral coverage along the edge of the inner reef channel is present and dominated by a number of hard coral species most of which are branching *Acropora sp.* and massive and/or digitate *Porities sp.* Hard coral live percentage coverage and abundance does increase towards the outer channel and barrier reef, much of which is associated with the channels reef edge and slopes and the deeper reef edge and slope of the outer barrier reef.

Sites 1: 13°50.438S 171°44.388W

- This site is located directly adjacent to the Fagali'i river mouth and as such receives considerable freshwater and sediment discharge from the river system. The site is roughly 100 meters directly out from the coastal rock wall.
- This sub tidal reef flat area supports a small percentage coverage of sea grass (Plate 6 a & b), predominantly *Holodule pinifolia* as a result of less than ideal biological conditions available for their growth and survival.
- The substrate is dominated by fine to coarse sand derived primarily from terrigenous volcanic origins (black sand), calcareous sand derived from the reef and fine mud (river discharge).
- The reduced habitats associated with this section of the lagoon appear to be reflected in the very lower abundance of finfish and invertebrate species witnessed during the assessment (albeit only a short time in the water).



Plate 6 a & b. Seagrass diversity located on the sub tidal reef flat at Site 1.

Site 2. 13°50.479S 171°44.390W

- This site is located to the south of the Fagali'i river mouth (south of Site 1) adjacent to site 1 and as such receives considerable less freshwater and sediment discharge from the river system resulting in a higher abundance and biodiversity of marine plants.
- This sub tidal reef flat area supports a healthy percentage coverage of sea grass (Plate 7 a & b), predominantly *Holodula pinifolia* and the brown seaweed, *Sargassum sp.* and *Padina sp.* and the calcareous algae *Halimeda sp.* (Plate 8 a & b).
- The substrate is dominated by fine to coarse sand derived from both terrigenous volcanic origins (black sand) and calcareous sand derived from the reef and a much smaller proportion of fine mud (river discharge).
- A low abundance of finfish and invertebrate species witnessed during the assessment (albeit only a short time in the water).



Plate 7 a & b. Seagrass diversity located on the subtidal reef flat at Site 2.



Plate 8 a & b. Seaweed diversity located on the subtidal reef flat at Site 2.

Site 3. 13°50.371S 171°44.381W

- This site is located to the north of the Fagali'i river mouth adjacent to the landward side of the reef channel ("Ava") and as such only receives periodic inputs of freshwater and sediment discharge from the river system (fisheries staff anecdotal information) resulting

in a higher abundance and biodiversity of marine plants and the presence of hard corals.

- This sub tidal reef flat area supports a healthy percentage coverage of the brown seaweed, *Sargassum sp.* and *Padina sp.* (Plate 9 a & b) and supports a very small number of hard corals dominated by small *Porities sp.* colonies (Plate 10 a & b) and to a lesser extent the branching corals (*Acropora sp.*). These species are tolerant of increased seawater temperature, higher levels of sediment and can withstand wave action.
- The substrate is dominated by fine to coarse sand derived from both terrigenous volcanic origins (black sand) and calcareous sand derived from the reef and a much smaller proportion of fine mud (river discharge).
- A low abundance of finfish and invertebrate species witnessed during the assessment (albeit only a short time in the water).



Plate 9 a & b: Seaweed diversity located on the subtidal reef flat at Site 3.



Plate 10 a & b: Hard coral diversity located on the subtidal reef flat at Site 3.

Site 4. 13°50.233S 171°44.291W

- This site, which is a large coral head, is located within the reef channel ("Ava") approximately half way across the reef flat and directly east of the Fagali'i river mouth adjacent to a large exposed coral head that is located on the southern sub tidal reef flat.
- A number of large coral heads are located within this area of the channel, most towards the northern side of the reef channel which are dominated by an average percent (15-30) of live coral coverage of hard corals, predominantly branching/plate corals (*Acropora*

sp.) however other less common digitate forms are present (*Porities* sp. and *Pocillopora* sp.) that are attached on the upper surface of the coral head. The hard coral colonies are mixed with areas of algae covered rock and terminate onto the sea floor, which is dominated by coral rubble and sand.

- Finfish and invertebrates populations are low.
- The substrate is dominated by coral reef derived sediments.



Plate 11a & b. Hard coral diversity located on the coral head at Site 4.

Site 5. 13°50.211S 171°44.290W

- This site is located along the northern reef edge and slope of the reef channel (“Ava”) approximately two thirds across the reef flat. This site is subjected to waves during low tide periods.
- The reef flat, edge and slope posses 25-40 percent hard coral coverage and is dominated by digitate and encrusting forms associated with the reef flat, edge and crest (e.g. *Porities* sp. and *Pocillopora* sp.). Hard coral diversity, form and abundance increase with water depth and include branching/plate corals (*Acropora* sp.) located on the reef slope (Plate 12 a & b).
- The hard coral colonies are mixed with areas of algae covered rock (*Sargassum* sp.) and terminate onto the sea floor, which is dominated by coral rubble and sand.
- Finfish and invertebrates populations are low and few soft coral were located.
- Coral reef derived sediments dominate the substrate.

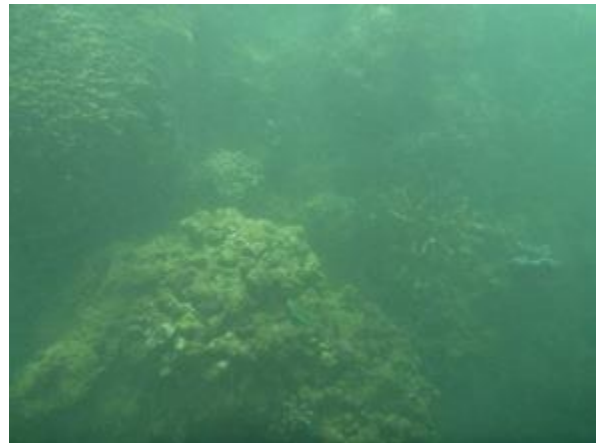


Plate 12 a & b. Hard coral diversity located on the reef flat and reef slope at Site 5.

Site 6. 13°50.127S 171°44.249W

- The site is located just inside the north eastern end of the Fagali'i channel entrance.
- This section of the channel is deep (8 – 12 m) and exchanges daily lagoon/oceanic water resulting in strong tidal currents, oceanic swell and waves associated with the shallow water reef.
- It includes both an extensive shallow reef flat and deeper water reef edge and slope.
- The sub tidal reef flat is dominated by a mix with small massive colonies and digitate forms of *Porities sp.* interspersed with seaweed (e.g. *Sargassum sp.*).
- Increased hard coral percent coverage (20-45%) dominates the reef flat close to the reef edge with equally distributed small massive (*Porities sp.*, *Montipora sp.*), digitate and branching corals (*Porities sp.*, *Acropora sp.*) dominating the reef.
- The reef edge, crest and slope have a high percent coral cover (30-60%), possess a high diversity of hard coral species and is dominated by larger massive (*Porities sp.*, *Montipora sp.*), digitate (*Porities sp.*) and branching (*Acropora sp.*) forms (Plate 13 a & b). The low abundance of soft corals is noticeable on the reef flat and reef edge.
- The reef slope is steep, supports a high coral coverage and diversity and extends directly to the bottom of the channel.
- Finfish and invertebrates populations are low.
- The substrate is dominated by coral reef derived sediments.

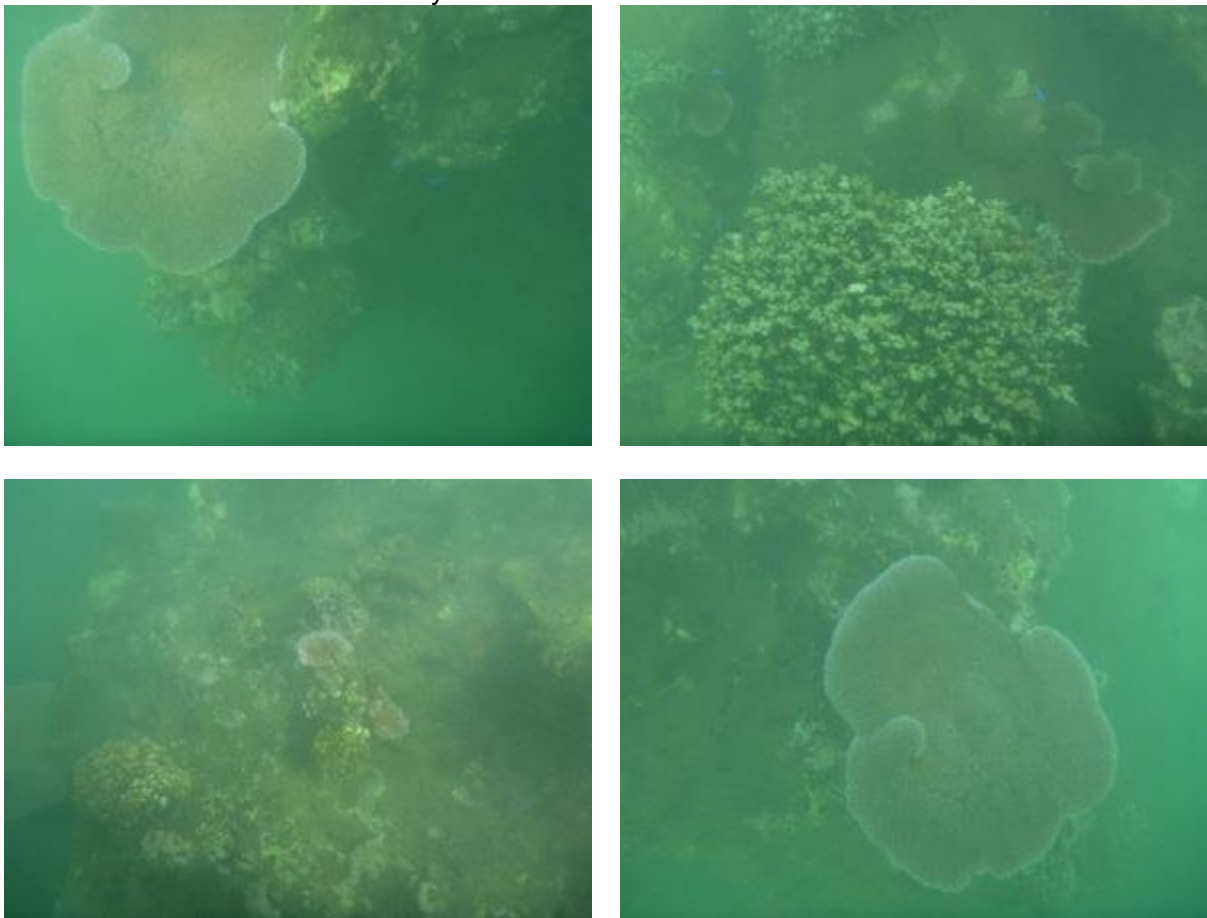


Plate 13 a & b. Hard coral diversity located on the reef edge and slope at Site 6.

Site 7. 13°50.271S 171°44.191W

- This sub tidal site is located directly (approximately 75 m) to the south of the southern corner of the Fagali'i channel entrance just to the north of the Fagali'i communities Village Fish Reserve.
- This sub tidal reef flat area supports a healthy and a high percentage coverage (75-85%) of sea grass (Plate 14 a & b), predominantly *Syringodium isoetifolium* with the brown seaweed, *Sargassum* sp. and *Padina* sp. and the calcareous algae *Halimeda* sp. present in low numbers through this area.
- The substrate is dominated by fine to coarse calcareous sand derived from both the reef and terrigenous volcanic origins (black sand).
- A lower abundance of finfish and invertebrate species were witnessed during the assessment (albeit only a short time in the water), however anecdotal information from the fisheries staff indicated that the fish reserve houses relatively good populations of fin fish.

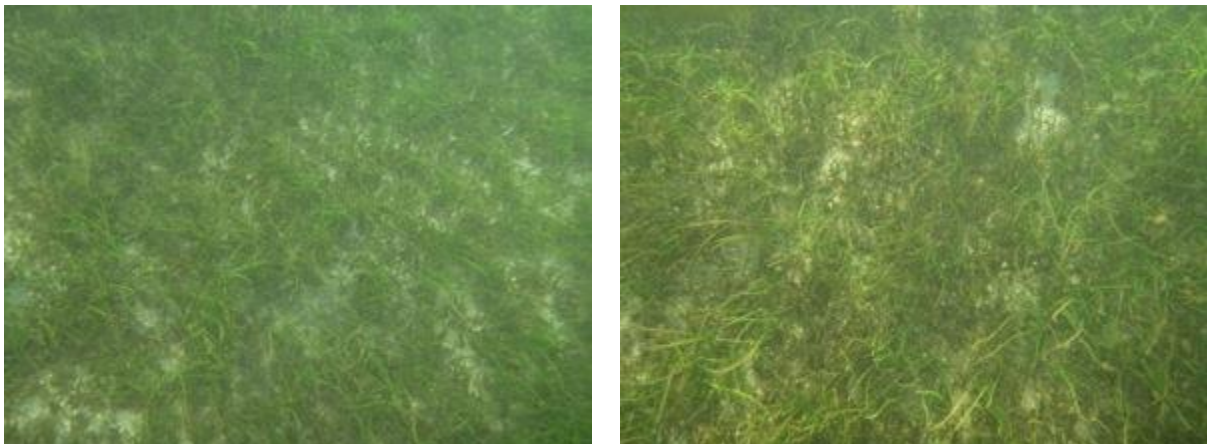


Plate 14 a 7 b: Sea grass density on the reef flat in close proximity to the Fagali'i Village Fish Reserve.

4.2.2 Assessment Findings for Tuasivi landing site.

All assessment sites were undertaken within Tuasivi shallow waters that include the intertidal and sub tidal waters direct adjacent to the villages of Siufaga and Sapinifaga. Figure 2 and 3 provides the location of each assessment site and they are described below:

Tuasivi Site Description

- Tuasivi is located on the eastern coast of Savai'i Island approximately 10 km to the north by road of the islands main shipping and ferry port located in the south eastern corner of the island.
- The Tuasivi coastline is boarded along it's entire shoreline by a man made rock retaining wall (Plate 15 a, b, c & d) which includes a perpendicular seawall extension (groyne) (Plate 16 a, b, c & d) that is positioned roughly on the border of the two villages, Siufaga and Sapinifaga both of which jointly own the land directly adjacent to the marine environment the proposed cable alignment will be positioned.
- The inshore marine area is characterised by a distinctive reef system that remains similar throughout the area and is dominated by a narrow shallow water intertidal reef flat

that is close to shore and is exposed during low tide consisting of beach rock and a small sand beach (refer Plate 15 b & d), and a sub tidal reef flat that extend out to the barrier reef which terminates seaward to a wave dominated reef crest, reef edge and slope which then descends rather steeply to the outer reef slope and beyond.

- The sub tidal reef flat is roughly horizontal throughout its entirety averaging between 2-5 meters water depth (it is tidally influenced) and is composed of reef derived sand (calcareous origins) interspersed with patches of hard and to a lesser degree soft corals which do include large coral colonies. Macro alga are present much of which is associated with stands of branching corals being cultivated by the damsel fish (*Dascyllus* sp.) and in patches attached to coral rubble. Sea grass was very limited.
- Directly eastward of the Sapinifaga church and approximately 250 meters to the north of the rock groyne is a natural seawater reef channel (termed an “Ava” in Samoan) that opens directly to the open sea (Figure 2 and 3). This Ava is used by the local fishers to gain access to the open sea. This is the closest natural opening in the barrier reef to the proposed shore based hospital compound in which the cable building will be hosted (Plate 17 a & b).
- During periods of high rainfall natural springs discharge freshwater directly into the shallow waters in close proximity to the shoreline along the coastline of this site. These are a natural event in Samoa and will have no impact on the cable deployment or operation.
- Each village has a community Fish Reserve (Figure 2 & 3 and Plate 18 a, b, c & d). Both reserves are located towards the inshore sub tidal reef system adjacent to their villages and encompass the best coral reefs within their respective coastal areas. Both fish reserves are summarised in section A4.4. The proposed cable alignment options do not impact the fish reserves and are located some 200 meters to the south and southeast of the reserves boundaries for Sapinifaga and Siufaga, respectively and therefore are outside the area of influence of the cable.
- Coral bleaching was recorded at a low scale in the southern assessment areas whilst crown of thorns starfish (*Acanthaster planci*) was recorded at Sites 2, 11 and 12.
- The marine environment assessment determined two options for the delivery of the cable to the shoreline to be terminated at the Savai'i hospital grounds cable station. Both options have the cable entering the barrier reef through the natural channel “Ava” adjacent to the church in Sapinifaga village.
 - ❖ The preferred Option provided to the environment team will deliver the cable to the hospital site by running it along the intertidal reef and entering a beach man hole within the hospital premises by crossing the reef flat system directly adjacent to the hospital rock wall. This alignment will have little impact on the live coral as it passes through the sub tidal areas however will need to be carefully laid around the intertidal reef system located at Site 1. Impacts to a small area including corals will need to be carefully managed (corals relocated if alignment changes are not possible) to ensure minimal impacts to the corals and its ecosystem.
 - ❖ The alternative option will deliver the cable to the shoreline directly to the south of the perpendicular rock (groyne) which will require a Beach Manhole adjacent to the road and have the cable delivered along the road to the hospital site. This option can be deployed without coming in contact with any coral.



Plate 15 a, b (high tide), c & d (low tide). Artificial rock wall along the shoreline of Tuasivi.





Plate 16 a, b (Siufaga), c & d (Sapinifaga). The man made rock wall (groyne) extension along the coastline that approximately delineates the boundary of the two villages of Suifaga and Sapinifaga adjacent to the cable alignment.



Plate 17 a & b. Location of the Ava in the barrier reef.



Plate 18 a & b. Official notification signs for the village fish reserves located in the villages of Suifaga and Sapinifaga, respectively.



Plate 19 a & b. Evidence of coral bleaching and crown of thorns located at site 2.

Site 1: 13°39.905S 172°10.661W

- The site is located at the southern end of the Siufaga village, directly adjacent to the hospital's coastal sea wall within the inshore sub tidal reef flat. This section of the reef is a direct extension of the inshore reef formation associated with the Siufaga fish reserve, which is approximately 100 meters to the north.
- Water depth at this site location ranges between 0.5 to 1.5 metres.
- The sub tidal reef flat is dominated by a mix of small massive colonies and digitate forms of *Porities* sp. (Plate 20 a & b) and branching *Acropora* sp. (Plate 20 c & d) interspersed with a small coverage in isolated areas of seaweed (e.g. *Halimeda* sp. and *Sargassum* sp.) and seagrass (*Holodula pinifolia*). The benthic substrate is calcium carbonate derived sand and coral rubble.
- Hard coral live percent coverage is varied, ranging from 5 to 50 percent, however hard coral skeletal coverage is extensive. Anecdotal information indicates that live coral coverage has decreased recently, attributed to increased sedimentation during periods of inclement weather, crown of thorns (*A. planci*), human interaction and the dominance within the branching corals of the damsel fish (*Stegastes fasciolatus*) that cultivates macro algae. Some bleaching was noted in the branching *Acropora* sp.
- Finfish and invertebrates populations are low with all fin fish species recorded as juveniles.
- The cable will need to be laid through the reef system associated with this site.



Plate 20 a, b, c & d. Hard coral diversity located on the reef flat at Site 1.

Site 2: 13°39.869S 172°10.642W

- The site is located at the southern end of the Siufaga village, directly adjacent to the hospital's coastal sea wall within the inshore sub tidal reef flat and directly offshore of Site 1. This section of the reef is a direct extension of the outer inshore reef formation associated with the Siufaga fish reserve. The site sits to the southeast of the fish reserve (approximately 100 meters).
- Water depth at this site location ranges between 1.5 to 2.5 metres.
- The sub tidal reef flat is dominated by a mix of significant stands of branching and to a lesser extent table *Acropora* sp. (Plate 21 a & b), small and medium size massive colonies (Plate 21 c) and digitate forms of *Porities* sp. and soft coral colonies dominated by *Sarcophyton* sp. (Plate 21 d) interspersed with a small coverage in isolated areas of the seaweed (e.g. *Sargassum* sp. and *Halimeda* sp.). The benthic substrate is calcium carbonate derived sand and coral rubble.
- Hard coral live percent coverage is varied, ranging from 5 to 70 percent, however hard coral skeletal coverage is extensive. Anecdotal information indicates that live coral coverage has decreased recently, attributed to increased sedimentation during periods of inclement weather, crown of thorns (*A. planci*), human interaction and the dominance within the branching corals of the damsel fish (*Stegastes fasciolatus*) that cultivates macro algae. Some bleaching was noted which was restricted to the branching *Acropora* sp.
- Finfish and invertebrates populations are low with all fin fish species recorded as

juveniles.

- The cable will need to be laid through the reef system associated with this site.



Plate 21 a, b, c & d. Hard and soft coral diversity located on the reef flat at Site 2.

Site 3: 13°39.740S 172°10.686W

- The site is located towards the southern end of the Siufaga village, directly adjacent and offshore to the village fish reserve within the inshore sub tidal reef flat. This section of the reef is situated in the eastern and deeper water extension of the outer inshore reef formation associated with the Siufaga fish reserve. The site sits to the southeast of the fish reserve (approximately 100 meters).
- Water depth at this site location ranges between 1.5 to 3.0 metres.
- The sub tidal reef flat is dominated by a mix of significant stands of branching and to a lesser extent table *Acropora* sp. (Plate 22 a), small and medium size massive colonies and digitate forms (Plate 22 b, c) of *Porities* sp. and soft coral colonies dominated by *Sarcophyton* sp. (Plate 22 d) interspersed with very small coverage in isolated areas of the seaweed (e.g. *Sargassum* sp. and *Halimeda* sp.).
- The benthic substrate is calcium carbonate derived sand and coral rubble. The sand substrate between the coral patches is extensive.
- Hard coral live percent coverage is varied, ranging from 5 to 50 percent with patches of hard coral skeletal coverage resulting from past environmental incidences. This includes an increase in sedimentation during periods of inclement weather, crown of thorns (A.

planci), human interaction and the dominance within the branching corals of the damsel fish (*Stegastes fasciolatus*) that cultivates macro algae. Some bleaching was noted which was restricted to the branching *Acropora* sp.

- Finfish and invertebrates populations are low with all fin fish species recorded as juveniles. Two sub adult specimens of the black teat fish (*Holothuria whitmaei*) were recorded.

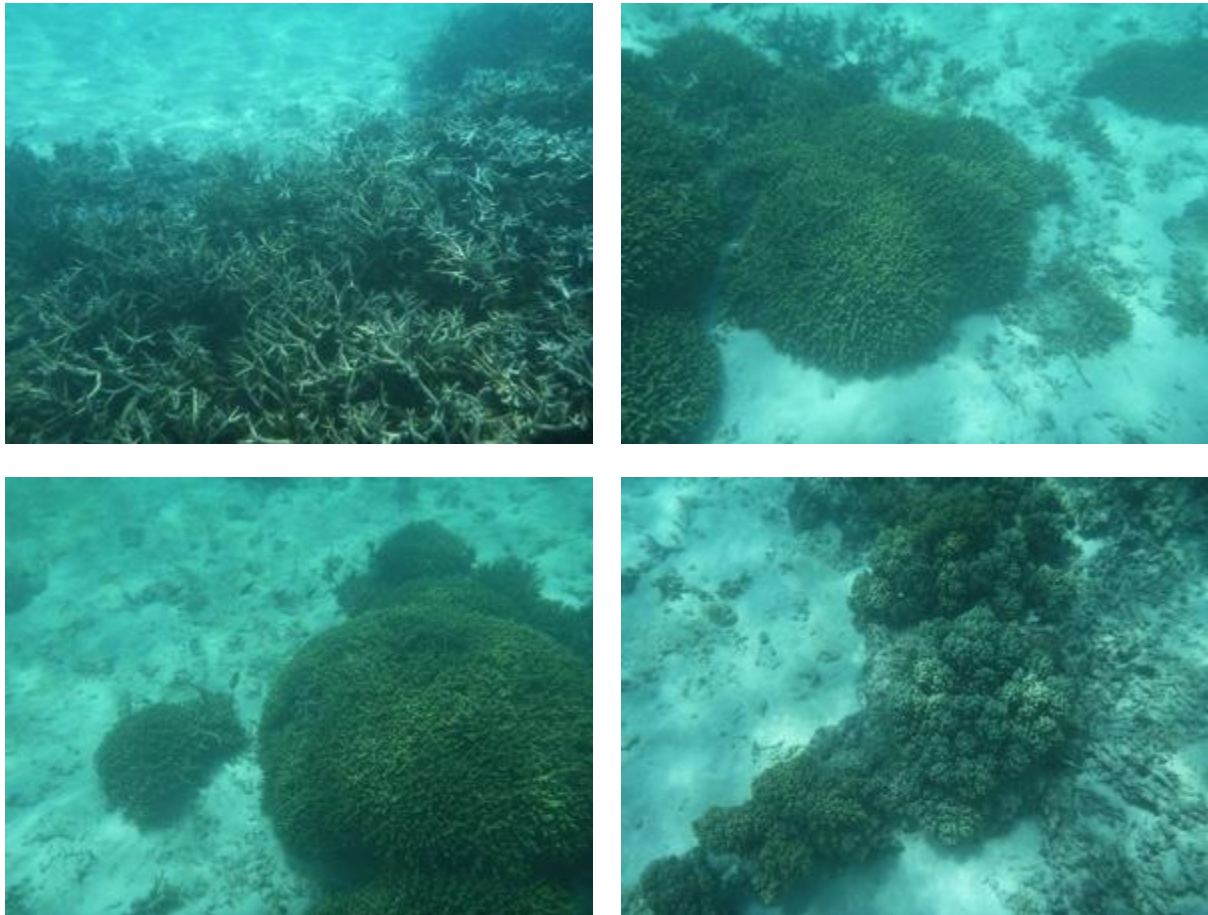


Plate 22 a, b, c & d. Hard and soft coral diversity located on the reef flat at Site 3.

Site 4: 13°39.657S 172°10.672W

- The site is located towards the middle of the Siufaga village, directly adjacent to the village fish reserve within the inshore sub tidal reef flat. This section of the reef is situated in the eastern and deeper water extension of the outer inshore reef formation associated with the Siufaga fish reserve. The site sits to the southeast of the fish reserve (approximately 200 meters).
- Water depth at this site location ranges between 2.0 to 3.5 metres.
- The sub tidal reef flat is dominated by a mix of significant stands of branching and to a lesser extent table corals, *Acropora* sp. (Plate 23 a, b & d) and a number of medium sized hard corals (*Pocillopora* sp.) (Plate 23 c). Sea weed (e.g. *Sargassum* sp.) and blue green algae are located attached to coral rubble located on the substrate.
- The benthic substrate is calcium carbonate derived sand and coral rubble. The sand substrate between the coral patches is extensive.

- Hard coral live percent coverage is varied, ranging from 5 to 60 percent with patches of hard coral skeletal coverage resulting from past environmental incidences. This includes an increase in sedimentation during periods of inclement weather, possible crown of thorns (*A. planci*), human interaction and the dominance within the branching corals of the damselfish (*Stegastes fasciolatus*) that cultivates macro algae. Some bleaching was noted which was restricted to the branching *Acropora* sp.
- Finfish and invertebrates populations are low with all fin fish species recorded as juveniles. It is noted the absence of octopi and gastropods typically located in these habitats.



Plate 23 a, b, c & d. Hard and soft coral diversity located on the reef flat at Site 4.

Site 5: 13°39.495S 172°10.704W

- This site is located towards the middle to outer inshore sub tidal reef flat in front of Siufaga village. This benthic substrate is dominated by extensive calcium carbonate derived coral sand and hard coral rubble (lesser degree), which has attached microalgae (*Dictyota* sp. and *Ulva* sp.) (Plate 24 a & b).
- This area is expansive and has a very low presence of hard and soft corals.
- Water depth at this site location ranges between 2.0 to 4.0 metres.



Plate 24 a & b. Substrate and algal density located on the reef flat at Site 5.

Site 6: 13°39.576S 172°10.674W

- This site is located towards the northern end of the Siufaga village, situated in the outer inshore sub tidal reef flat region. The site sits approximately 100 metres to the west of the barrier reefs back reef region.
- Water depth at this site location ranges between 2.0 to 4.0 metres.
- The sub tidal reef is dominated by significant digitate *Porities* sp. colonies (Plate 25 a, b, c & d) and small colonies of branching *Acropora* sp.
- Hard coral live percent coverage is variable, ranging from 0 (sand patches) to 80 percent associated with the coral colonies and patches.
- The benthic substrate is calcium carbonate derived sand with only a small number of coral rubble present. The sand substrate between the coral patches is extensive.





Plate 25 a, b, c & d. Hard coral diversity located on the reef flat at Site 6.

Site 7: 13°39.495S 172°10.704W

- The site is located towards the northern end of the Siufaga village, situated in the outer inshore sub tidal reef flat region. The site sits approximately 200 metres to the west of the barrier reefs back reef region.
- Water depth at this site location ranges between 2.0 to 4.0 metres.
- The sub tidal reef is dominated by significant massive colonies of *Porities sp.* (Plate 26 a, b & c) and substantive soft coral colonies (*Sarcophyton sp.*) (Plate 26 d) and small colonies of branching *Acropora sp.*
- The benthic substrate is calcium carbonate derived sand and coral rubble. The sand substrate between the coral patches is extensive.





Plate 26 a, b, c & d. Hard and soft coral diversity located on the reef flat at Site 7.

Site 8: 13°39.410S 172°10.721W

- The site is located at the northern end of the Siufaga village, adjacent to the sea wall groyne and is situated in the outer inshore sub tidal reef flat region. The site sits approximately 200 metres to the west of the barrier reefs back reef region. This site is very similar to site 7.
- Water depth at this site location ranges between 2.0 to 4.0 metres.
- The sub tidal reef is dominated by significant massive colonies of *Porities sp.* (Plate 27 a, b & c) and substantive soft coral colonies (*Sarcophyton sp.*) (Plate 27 d).
- The benthic substrate is calcium carbonate derived sand and coral rubble. The sand substrate between the coral patches is extensive.





Plate 27 a, b, c & d. Hard and soft coral diversity located on the reef flat at Site 8.

Site 9: 13°39.252S 172°10.849W

- The site is located within Sapinifaga village and is directly shoreward (50 m) of the barrier reef channel ('ava') that the proposed fibre optic cable will use to enter the lagoon.
- Water depth at this site location ranges between 1.5 to 3.0 metres.
- This site is subjected to strong water currents, which are dictated by the tidal movement of water moving through the channel. This water movement has a significant impact on the environment in this area.
- The inshore sub tidal reef is dominated by significant calcium carbonate derived coral rubble and sand (Plate 28 a, b, c & d) with blue green algae attached and low numbers of small size massive hard corals (*Porities sp.*) and branching colonies (*Acropora sp.*) (Plate 28 a and b respectively).
- The channel is dominated by coral rubble and sand and changes to coralline algae dominance in areas that are exposed to wave action and strong current in the reef crest and edge zones that are located within the channel and along the reef systems adjacent to the channel. Hard corals (small digitate, encrusting and branching) dominate the shallow reef edge and upper slope on the barrier reef, which increase in size and diversity as water depth increases down the outer reef slope.





Plate 28 a, b, c & d. Hard coral and substrate located on the reef flat at Site 9.

Site 10: 13°39.252S 172°10.898W

- The site is located within Sapinifaga village and is directly shoreward (130 m) of the barrier reef channel ('ava') that the proposed fibre optic cable will use to enter the lagoon. It is directly shoreward of Site 9 (80m).
- Water depth at this site location ranges between 1.5 to 3.0 metres.
- This site is subjected to water currents derived from the tidal moments associated with the channel. The water movement has a significant impact on the environment in this area, resulting in the constant deposition of coral sand and to a lesser extent coral rubble. The constant movement of the substrate in this area greatly reduces the ability of hard and soft coral to colonise.
- The inshore sub tidal reef is dominated by significant calcium carbonate derived coral sand (Plate 29 a & b) and to a lesser degree coral rubble (Plate 29 c & d) that support significant benthic populations of blue green algae.





Plate 29 a, b, c & d. Substrate and algae density located on the reef flat at Site 10.

Site 11: 13°39.329S 172°10.919W

- The site is located within Sapinifaga village and is shoreward and to the south of Site 10.
- The site is situated within the inshore sub tidal reef flat and is about 100 m to the east and directly adjacent to the Sapinifaga fish reserve.
- Water depth at this site location ranges between 2.0 to 4.0 metres.
- The sub tidal reef flat is dominated by a mix of significant stands of branching *Acropora* sp. (Plate 30 b, c & d) and small and medium size massive colonies of *Porities* sp. (Plate 30 a). Hard coral live percent coverage is varied, ranging from 0 to 50 percent.
- The benthic substrate is predominately calcium carbonate derived sand with patchy areas of coral rubble. The sand substrate between the coral patches is extensive.
- Finfish and invertebrates populations are low with all fin fish species recorded as juveniles. Two crown of thorns starfish (*A. planci*) were located in this area.





Plate 30 a, b, c & d. Hard coral and substrate located on the reef flat at Site 11.

Site 12: 13°39.435S 172°10.963W

- The site is located within Sapinifaga village, is situated within the inshore sub tidal reef flat and is seaward and to the northwest (60m) of the sea wall groyne. The site is southwest of the Sapinifaga fish reserve (130m).
- Water depth at this site location ranges between 2.0 to 4.0 metres.
- The sub tidal reef flat is dominated by the remnants of once healthy beds of branching *Acropora sp.* (Plate 31 a, b, c & b). These patch reefs have a very low percent live coral cover however provide habitat protection to juvenile finfish.
- The benthic substrate is predominately calcium carbonate derived sand with patchy areas of coral rubble. The sand substrate between the coral patches is extensive.





Plate 31 a, b, c & d. Hard coral and substrate located on the reef flat at Site 12.

4.3 Literature review of potential effects of sonar and entanglement on Cetaceans during oceanic cable deployment.

Cetaceans use sound as a means of communication with each other, to locate prey and to navigate. In order for cetaceans to hear effectively, they have a highly sophisticated auditory system and a similarly developed vocalisation system to emit sound. Both systems have the ability to detect and produce sounds spanning a very wide range of frequencies. These systems are, however, prone to disruption and damage by non-natural sound for which they have not evolved.

The sound they emit is one of the many forms of natural noise that can be detected in the ocean. In addition to this natural noise there is an increasing intensity and continuity of human-produced sound emanating from shipping and boat traffic, underwater construction, and dredging, acoustic exploration, military activity and active sonar systems. Such sound is commonly referred to as noise pollution. Both natural and anthropogenic sound can travel many hundreds or even thousands of kilometres underwater.

Marine Seismic assessments employ pulses of sound to image the geological structure of the seabed. If these activities are in close spatial proximity to marine animals (e.g. cetaceans) that rely on sound for orientation, communication and foraging the resulting noise from the sonar can increase the risk of harm to these animals (Berzina & Saksina, 2013).

The response of cetaceans to noise falls into three categories: behavioural, acoustic and physiological. Behavioural responses include individuals actively avoiding sound sources, modifying feeding behaviour, and even modifying surfacing behaviour. Acoustic responses include changes to the frequency, intensity and duration of vocalisation by individuals subject to external sound sources. Finally, and most severe, are physiological responses which include, at the lesser end of the spectrum, a change in heart rate through to physical damage of auditory systems in individuals exposed to high intensity sound (Nowacek 2007).

These responses typically deal with individuals. There is also the potential for population-level responses through, for example, altered mating behaviour affecting population fecundity. Given, however, that much of the data on cetacean population size is uncertain at best, finding changes to such metrics much less proving causative pathways to noise pollution is at present not possible (Nowacek, 2007).

The level of likely response by both individual cetacean and possibly by population is highly dependent on a number of factors. Primarily, the intensity and frequency of the sound source are of critical importance. In general, as the intensity increases the potential for negative response by cetaceans increase. The sensitivity of cetaceans also changes. During mating and migration for example, the rate of vocalisation is far greater than during periods of 'rest'. Consequently, these life history stages are more susceptible to noise pollution impacts.

Within the proposed development area there are likely two sources of sound pollution, one specific to the design phase and one originating during both the design and the construction phase.

During the marine route survey of the design phase, active sonar will be used to find the depth of water in which the cable will be laid in addition to the nature (topography and perhaps substrate) of the seabed. For this, two types of sonar will be used: a) multibeam sonar for bathymetry and b) side-scan sonar for bottom typing. Both these sonar types are at the lower end of the intensity scale, though they are generally considered high acoustic density sources and medium frequency generators.

The level of sound pressure ranges from about 200 dB re 1 μ Pa to 240 dB re 1 μ Pa. The frequency ranges from about 50 to 500 kHz. The nature of propagation varies depending on the nature of the survey, although it can generally be expected to conform to a conical pattern with a greater swath being covered in deeper water.

To survey deeper water it is necessary to use lower frequency to compensate for the attenuating properties of seawater. However, the lower the frequency of source used, the lower the resolution of images collected. Therefore, it is likely that for most operations the maximum detectable frequency will be used.

There is a significant difference in the effects of seismic and multibeam/side-scan surveys on cetaceans. Higher frequency emissions utilised in normal multibeam operations tend to be dissipated to safe levels over a relatively short distance despite having similar sound levels to seismic surveys. By contrast the lower frequency (and higher intensity) emissions of seismic surveys, including air gun arrays, travel over a far greater distance and resonify a greater area at greater intensity (Department of Environment, Heritage and Local Government, Government of Ireland, 2007).

Given this difference in intensity between seismic (air gun) survey and more conventional sonar bathymetric survey, this environmental assessment is valid only for multibeam and side scan sonar. In the unlikely event that seismic surveys are required during the route survey, this would require additional assessment, mitigation and management actions.

Information resulting from the Antarctic Treaty Consultative meeting on acoustic effects on

cetaceans in the Southern Ocean found the following level of responses and associated likelihoods of occurrence for multibeam sonar (Scientific Committee on Antarctic Research, 2006) and, given the similar acoustic properties of side-scan, a similar response is likely for the use of side-scan sonar.

- Individuals show no response or only a temporary (minutes) behaviour change. No change to environment or populations. Expected in almost all instances
- Individuals show short-term (hours) behaviour change. Temporary displacement of a small proportion of a population; small proportion of habitat affected; no impact on ecosystem function. Could occur in some cases
- Longer term (days) simultaneous displacement of a higher proportion of a population; disruption to behaviour; interference with feeding. May occur in exceptional circumstances.

The main concern associated is its effect on the large whale populations that utilise the waters associated with the proposed cable route area of interest. Information is not available on specific temporal scales to determine when different species and/or populations of these animal frequent the waters of around Samoa, however during this period displacement of a proportion of the population and disruption to behaviour could result in modified migration behavior (albeit marginal given the scale and short term nature of the hydrographic survey).

Given this concern, best practice should be followed when sonar is used during the route survey. This best practice is described in Annex A4.5 of this report. If this best practice is followed, most of the concerns can be mitigated and the impact would be rendered insignificant.

The second source of noise pollution during both the route survey design and cable laying construction phase is the activity of survey and cable-laying vessels. Vessels have acoustic footprints generated by engines and transmitted through the hulls as well as by moving propulsion systems in water (Whale and Dolphin Conservation Society 2009). Given, however, that the vessels involved in the route survey and laying stages are likely to be in the region for only relatively short periods of time and given that the proposed cable route area is traversed regularly by other vessels, the proposed development does not constitute a significant additional ship-noise burden.

The second potential impact is entanglement or physical contact by cetaceans with the cable when it is being laid. Given that the cable laying process will take place over a very short period of time, however, this is considered extremely unlikely and is therefore considered an insignificant impact.

The final potential impact comes after the cable has been laid during the operational phase. Between 1877 and 1955 there were 16 records of cetaceans becoming entangled in unsupported sections of submarine cables. The most at risk group of cetaceans are the deep diving toothed species such as sperm whales (Heezen 1953), whose feeding behaviour involves swimming along the seabed with the lower jaw skimming the sediment.

However, a more recent exhaustive study of cable fault databases containing records of 5740 cable faults, between 1959 and 2006, failed to find a single record of cetacean entanglement in cables (Wood & Carter 2008). The review attributes this change in the

frequency of entanglement, to change in the design of cables (coaxial to fiber optics), marine surveying resolution and availability, and cable laying techniques. In particular, the following five reasons are stated: 1) development of torque-balanced cables that were less prone to self-coiling; 2) laying armoured cables under slight tension to minimize suspensions and loops, and laying low-torque, non-armoured cables with minimum slack to follow the seabed topography; 3) avoidance of rough topography where suspensions may develop; 4) burial of cables below the seabed on the continental shelf and upper slope to protect against shipping and fishing activities; and 5) use of fault repair procedures that reduce cable slack. *This review concludes that entanglement by cetaceans is extremely unlikely to occur so this represents a non-significant impact.*

Table A4.1 Cetaceans confirmed and likely in Samoan Waters and IUCN Redlist category.

Species	Common Name	Status	IUCN Category
<i>Balaenoptera acutorostrata</i>	Minke-like whale	Confirmed	Dd
<i>Balaenoptera edeni</i>	Bryde's whale	Confirmed	-
<i>Megaptera novaeangliae</i>	Humpback whale	Confirmed	Dd
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	Confirmed	Dd
<i>Grampus griseus</i>	Risso's dolphin	Confirmed	Lc
<i>Lagenodlphis hosei</i>	Fraser's dolphin	Confirmed	Lc
<i>Orcinus orca</i>	Orca	Confirmed	Dd
<i>Peponcephala electra</i>	Melon-headed whale	Confirmed	Dd
<i>Pseudorca crassidens</i>	False killer whale	Confirmed	Dd
<i>Stenella coeruleoalba</i>	Striped dolphin	Confirmed	Dd
<i>Stenella longirostris</i>	Spinner dolphin	Confirmed	Dd
<i>Tursiops sp</i>	Bottlenose dolphin	Confirmed	Lc
<i>Steno bredanensis</i>	Rough-toothed dolphin	Confirmed	Lc
<i>Physeter macrocephalus</i>	Sperm whale	Confirmed	Vu
<i>Kogia sima</i>	Dwarf sperm whale	Confirmed	Lc
<i>Ziphius cavirostris</i>	Cuviers beaked whale	Confirmed	Lc

Dd=data deficient Vu=vulnerable, Lc=Limited Coverage

A4.2. List of relevant environmental conventions and treaties associated with the marine sector of the Samoa.

According to the Samoan Ministry of Foreign Affairs and Trade, Samoa is a party to the following Environment Conventions and Treaties.

- Agreement establishing the South Pacific Regional Environment Program (SPREP), 1993;
- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1986;
- Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, 1990;
- Convention on the Conservation of Nature in the South Pacific, 1976;
- United Nations Framework Convention on Climate Change, 1992;
- Kyoto Protocol to the Framework Convention on Climate Change, 2005;
- Convention on Biological Diversity, 1992;
- Vienna Convention for the Protection of the Ozone Layer, 1985;
- Montreal Protocol on Substances that Deplete the Ozone Layer, 1987;
- United Nations Convention to Combat Desertification, 1994;
- Convention concerning the Protection of the World Cultural and Natural Heritage, 1972;
- Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998;
- Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989;
- Convention on Persistent Organic Pollutants, 2001;
- Convention on Wetlands of International Importance, 1971;
- Convention on International Trade in Endangered Species of Wild Fauna, 1973;
- Convention of Migratory Species, 1979;
- Protocol concerning Cooperation in combating Pollution Emergencies in the South Pacific Region, 1990;
- Cartagena Protocol on Biosafety to the convention of Biological Diversity, 2003;
- International Plant Protection, 1951;
- International Treaty on Plant and Genetic Resources for Food and Agriculture, 2001;
- Plant Protection Agreement for the South East Asia & Pacific Region, 1956;
- Strategic Approach to International Chemicals Management, 2007.

A4.3. Samoan membership list to international and regional organizations associated with the marine sector.

International Organisation Membership

- United Nations (UN)
- United Nations Development Program (UNDP)
- Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Food and Agriculture Organization of the United Nations (FAO)
- International Seabed Authority (ISA)
- International Watershed Project (IWP)
- International Whaling Commission (IWC)
- International Tribunal for Law of the Sea (ITLOS)
- International Maritime Organization (IMO)
- Bureau (Secretariat) of the Convention on Wetlands (RAMSAR)
- Secretariat of the United Nation Convention to Combat Desertification (UNCCD)
- Secretariat of the United Nations Convention on Biological Diversity (UNCBD)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC)
- Asian Development Bank
- World Bank Group

Regional Organisations Membership

- Western and Central Pacific Fisheries Commission (WCPFC)
- Secretariat of the Pacific Community (SPC)
- Forum Fisheries Agency (FFA)
- Secretariat of the Pacific Islands Forum (PIF)
- Secretariat of the Pacific Regional Environment Programme (SPREP)
- Applied Geoscience and Technology Division (SOPAC) of the Secretariat of the Pacific (SPC)

A4.4. Village Fish Reserve in close proximity to the telecommunication landing sites, Upolu and Savai'i, Samoa

Number	Name	Village	Date Established/ By-laws Gazetted	Size	Type	Ecosystem/Species Protected
Fagali'i Bay, Upolu Island						
1	Fagali'i bay Village Fish Reserve.	Fagali'i	November 1998 June 1999	4,463 m ²	Intertidal and sub tidal coastal lagoon.	Ecosystem management includes a ban on all (i) destructive fishing methods, (ii) size limits on the mesh of gill nets, (iii) dumping rubbish on the shoreline or sea, (iv) smashing hard corals, (v) clearing mangroves and (vi) of any activity within the Fish Reserve.
Tuasivi, Savai'i Island						
1	Suifaga Fish Reserve.	Suifaga	December 1997 April 1999	9,000 m ²	Intertidal and sub tidal coastal lagoon.	Ecosystem management includes a ban on all (i) destructive fishing methods, (ii) size limits on the mesh of gill nets, (iii) dumping rubbish on the shoreline or sea, (iv) smashing hard corals and (v) of any activity within the Fish Reserve.
2	Spainifaga Village Fish Reserve	Spainifaga	April 2006 November 2007	7,500 m ²	Intertidal and sub tidal coastal lagoon.	Ecosystem management includes a ban on all (i) destructive fishing methods, (ii) all sand mining, (iii) dumping rubbish on the shoreline or sea, (iv) of any activity within the Fish Reserve.

A 4.5: Best Practice for Vessels Operating near Cetaceans.

Best practice for vessels operating acoustic apparatus within areas known to be frequented by cetaceans.

Guidelines for all vessels

1. When piloting vessels, vessel operators shall alter course to remain at least 100 yards from whales, and at least 50 yards from other marine mammals and sea turtles;
2. Reduce vessel speed to 10 knots or less when piloting vessels in the proximity of marine mammals;
3. Reduce vessel speed to 5 knots or less when piloting vessels in areas of known or suspected turtle activity;
4. Marine mammals and sea turtles should not be encircled or trapped between multiple vessels or between vessels and the shore;
5. If approached by a marine mammal or turtle, put the engine in neutral and allow the animal to pass;
6. Unless specifically covered under a separate permit that allows activity in proximity to protected species, all in water work will be postponed when whales are within 100 yards, or other protected species are within 50 yards.
7. Activity will commence only after the animal(s) depart the area;
8. Should protected species enter the area while in-water work is already in progress, the activity may continue only when that activity has no reasonable expectation to adversely affect the animal(s); and

Guidelines for vessel operating acoustic apparatus

General requirements

1. The minimum source level required to achieve results should be used and frequencies chosen to minimise impacts on marine mammals.
2. Continuous noise is likely to be more damaging to marine mammals than pulsed sounds and should be avoided where possible.
3. Qualified and experienced Marine Mammal Observers (MMOs) must be present on board all vessels conducting seismic (including boomers) or electromagnetic surveys at all times during the survey.
4. The MMO must use a distance measuring stick, reticle telescope or binoculars to ascertain distances to marine mammals.
5. MMOs must be engaged solely in monitoring the operator's implementation of these guidelines and conducting visual/acoustic observation of mammals during the survey.
6. The MMO must submit copies of the reporting template as outlined at the end of these guidelines and must submit this report to the competent government agency in Palau.
7. The vessel operator must provide a report (including a daily log) on the operation of the seismic equipment that will indicate the soft starts and their duration to the MMO.

Multibeam and side-scan sonar surveys

Pre-start scan for marine mammals

1. If survey work is to be conducted in sheltered and enclosed waters, survey work must start at the inner most part of the bay, inlet or estuary to be

surveyed and work outwards. This is to ensure that cetaceans are not driven into an enclosed area, which could cause them to panic.

2. MMOs should survey the area for the presence of cetaceans 30 minutes before the starting of operations.
3. A minimum distance of 2000 metres is required between the centre of the array/sound source and the nearest cetacean before starting.
4. If marine mammals are seen within 2000 metres of the centre of the sound source the start of the sound source(s) should be delayed until they have moved away, allowing adequate time after the last sighting for the animals to leave the area (30 minutes).
5. If the cetaceans do not leave the area it is recommended that the survey vessel alter course to ensure that the animals are outside the 2000 metres exclusion zone when soft start commences.

Soft-start procedures for multibeam and side-scan sonar

1. The sound level must be allowed to gradually build over a period of 20 minutes; where this is not possible, the equipment should be turned on and off over a 20 minute period to act as a warning signal and allow cetaceans to move away from the sound source.
2. Multibeam or side-scan sonar start-up must occur during daylight hours when MMO's can carry out the required start-up procedure.
3. The start-up procedure should be implemented at all times including during testing of the sound source.
4. If, for any reason, the sound source is stopped and not restarted for at least 5 minutes a full start-up procedure should be carried out.
5. Once the sound source has achieved its maximum output the survey need not be halted if cetaceans approach the vessel.
6. If turn-around time between sample lines or stations is greater than the time required to conduct a start-up procedure (30 minutes), then the sound source should be stopped and a full start-up procedure should be used prior to commencing the new line.

Annex 5.

Fiji End of Cable

Samoa Connectivity Project

This paper addresses the requirements of the World Bank Operational Policy 4.01 Environmental Assessment (Category B) for the Samoa Connectivity Project. Under OP4.01, an assessment of the environmental and social risks of the new and existing infrastructure for the new fibre optic submarine cable laid between Apia, Samoa and Suva, Fiji is required. The document compliments the Initial Environmental Examination (IEE) report prepared for the Samoa Connectivity Project by ES Safeguards (dated 1 April 2015) to assess the Project's potential impact in the Fiji locality. The remainder of the environmental and social impacts and routing options and landing sites are assessed in the IEE Report.

1. Project Overview

The Samoa Connectivity Project is a proposal to bring high-speed telecommunications to Samoa. The link will be a new fibre optic submarine cable connecting Samoa to Fiji to allow access to the main Pacific Ocean optic fibre infrastructure linking Australia and New Zealand with the USA via Fiji and Hawaii.

The proposed cable will run from Apia in Samoa (including a branch connection to Savai'i Island) to Suva, where it will connect to the existing fibre optic network. The cable will be laid on the seafloor and will connect via the existing landing station at Laucala Bay. As the landing station infrastructure is already in place only very limited construction is required and a service agreement for the interconnection, power, UPS, fire protection and security, etc will be negotiated with the Fiji telecommunications utility FinTel.

The cable has a 25 year design life with routine maintenance carried out as required. Repair and recovery will only be necessary in the unlikely event of damage from external sources.

The design phases includes:

- Initial route scoping and selection;
- Preparation of an Initial Environmental Examination (IEE) and Environmental and Social Management Plan (ESMP) in accordance with ADB procedures and associated safeguard instruments;
- A Marine Route Survey (MRS) on the selected route to investigate the bathymetry, seabed features, shallow geology and subsequent geotechnical sampling program;
- Final Detailed Design based on information provided in the marine survey and the IEE to detail the final cable route selection, surface laying or trenching and burial near coastline locations and supplementary protection requirements.

2. Administrative Framework

Four key agencies have responsibilities with regard to the Project development in Fiji. These are:

The **Department of Environment** whom administer the *Environment Management Act 2005*, compliance of environmental impact assessments with the Act and implementation of environmental management plans by Project proponents and developers. The Department also manage Fiji's participation in international conventions on biodiversity and the environment.

The **Department of Lands and Survey** is vested with authority to grant lease over State Land including soil under Fiji's waters should such a lease be deemed necessary in order to lay the cable.

The **Fiji Ports Corporation Limited** has authority, under the *Sea Ports Management Act 2005* and the *Marine Act 1986*, over the port of Suva and its approaches, including all shipping operations and shore and sea-based installations.

The **Ministry of Fisheries and Forests** manages fisheries in Fiji and administers the *Fisheries Regulations 2004*.

3. Legal Framework

The *Environment Management Act 2005* has a geographic jurisdiction to the limit of Fiji's Exclusive Economic Zone (EEZ). Its purpose is to apply the principles of sustainable use and development of natural resources and to identify matters of national importance to Fiji. The Act provides for environmental assessments (EA) to be reviewed by the Environment Management Unit, but there is minimal guidance in relation to submarine communications cables. A public hearing must be undertaken in the vicinity of the proposed development (s34), once an EA is complete. Projects are assessed according to their scale and potential impacts under Part 1 of the Act.

The *Crown Lands Act (CAP 132)* allows for the disposal of State Land permanently or, more commonly, temporarily under lease. Importantly, State Land is defined also to include foreshore land below high water mark and soil under the waters of Fiji. Under the Act, the granting of a foreshore land lease or lease of any soil under the waters of Fiji must be with the approval of the Minister and shall only be granted after declaration that the granting of such lease does not create a substantial infringement of public rights.

The *Marine Spaces Act (CAP 158A)* clarifies that the State owns marine resources from the high water mark to the edge of the EEZ, but also acknowledges the customary marine tenure system of Fiji. The country is divided into 410 customary fishing grounds as recorded by the Native Lands and Fisheries Commission. The Act allows for the Minister of Fisheries to make regulations over many activities within Fiji's waters (including foreign fishing vessels access to Fijian fish stocks).

The *Fisheries Act (CAP 158)* established the Native Fisheries Commission under the Ministry of iTaukei Affairs to administer a titling system over very reef, river and

lagoon in Fiji (Minter 2008). The Commission protects native customary rights to fish in coastal (*qoliqoli*) areas for non-commercial purposes. There are two customary groups (Vanua Suva and Vanua Burebasaga) recognized under this Act as having user-rights for fishing in proximity to the Suva cable station. The Fisheries (Protection of Turtles) (Amendments) Regulations 2004 gives absolute protection to turtles and turtle eggs of any species.

The *Continental Shelf Act* (CAP 149) makes provision for the protection, exploration, and exploitation of the natural resources of the continental shelf. Section 6 allows the Minister to make orders prohibiting ships from entering or remaining in any area specified as a safety zone. Section 10 allows the Minister to make regulations prescribing things for giving effect to the provisions of the Act.

The *Sea Ports Management Act 2005* vests authority over the ports in Fiji (including Suva) in Fiji Ports Corporation Limited.

The *Marine Spaces Act 1986* and related amendments and regulations contain numerous provisions relating to legal compliance and safety while undertaking a marine operation in Fijian waters.

The United Nations Convention on the Law of the Sea (UNCLOS) was signed by Fiji in 1982.

4. Permitting Requirements

A landing party agreement (LPA) will be established between FinTel and the Samoa Submarine Cable Company (SSCC) and confirmed by **Ministry of Communications**. The LPA will detail the plan to share cable landing point terrestrial ducting and cable station and manage the connection at the VCC site. Currently, FinTel has four spare ducts running from the shoreline to cable station, thus can sufficiently accommodate the duct route required for the Samoa-Fiji cable (Samisoni 2015). The cable will enter the existing beach manhole (BMH) through an existing duct route at the shoreline to connect to the VCC building.

FinTel will seek permits and approvals from the following stakeholders:

The **Ministry of Foreign Affairs** (MoFA) and **Fiji Islands Marine Survey Board** will be consulted for consent and guidance in laying the cable on Fiji's Continental Shelf and ensure the cable path avoids interference with navigation of vessels. FinTel will submit the LPA, EIA report and letter from the Samoan Government to MoFA, who in turn, provide a formal permit to FinTel and SSCC for the Project.

The **Department of Lands** will provide consent for the cable landing given there is no land acquisition or reclamation required for the cable landing. Advice will be sought from iTaukei Lands Trust Board (TLTB) regarding any potential disturbance to marine areas under customary ownership.

The **Department of Environment** will review and approve (with or without conditions) the environmental impact assessment (EIA) report for the Project and for any new land developments for the cable lay in Fiji (if required). At the Fiji end of the

cable shore-end infrastructure is already in place and no new or significant land development is expected.

The **Department of Meteorological Survey** will review and approve the cable survey routing and monitoring of the vessel laying the cable in Fiji's EEZ.

The **Fiji Ports Corporation Limited** (Harbour Master) will be consulted so they can notify vessels in proximity to the VCC landing site.

Suva City Council will be notified of the small-scale civil works to install the cable in the foreshore areas.

5. Baseline Conditions and Environmental Assessment

Suva Peninsula is bound by a barrier reef over 10km long. There are three main passages through the reef: Levu passage lies to the west of Suva peninsular providing shipping access to Suva Harbour and Kings Wharf (the main commercial port); Nukubuco passage to the south-east; and Nukulau passage near the mouth of the Rewa River (Figure 1). At present, the Tonga, Southern Cross Cable and Anscan (retired) cables pass through the eastern channel (Nukulau passage). The Vanuatu, Southern Cross Cable and Anscan (retired) pass through the western channel (Nukubuco passage) (Hibbard 2015; Samisoni 2015; Newsome and Comley 2010).

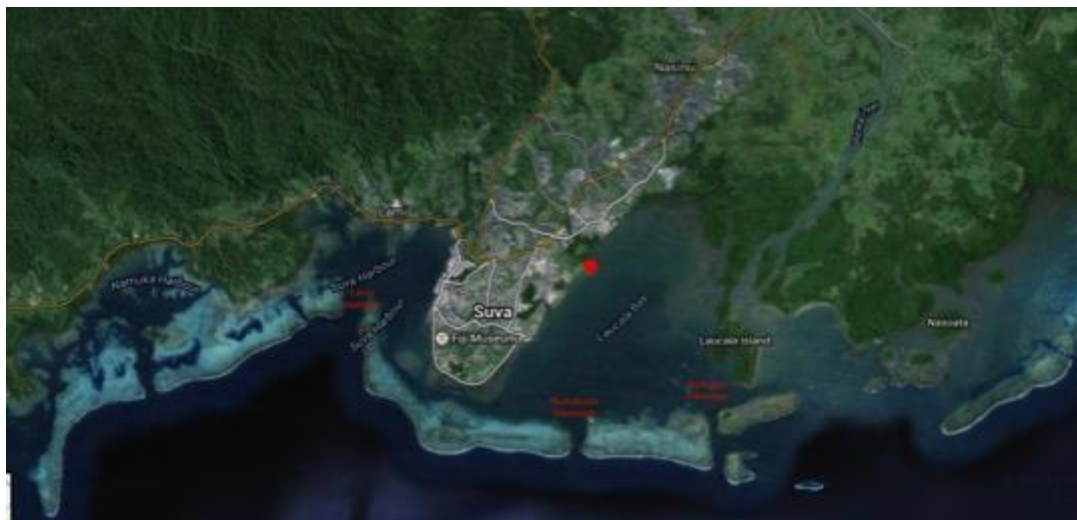
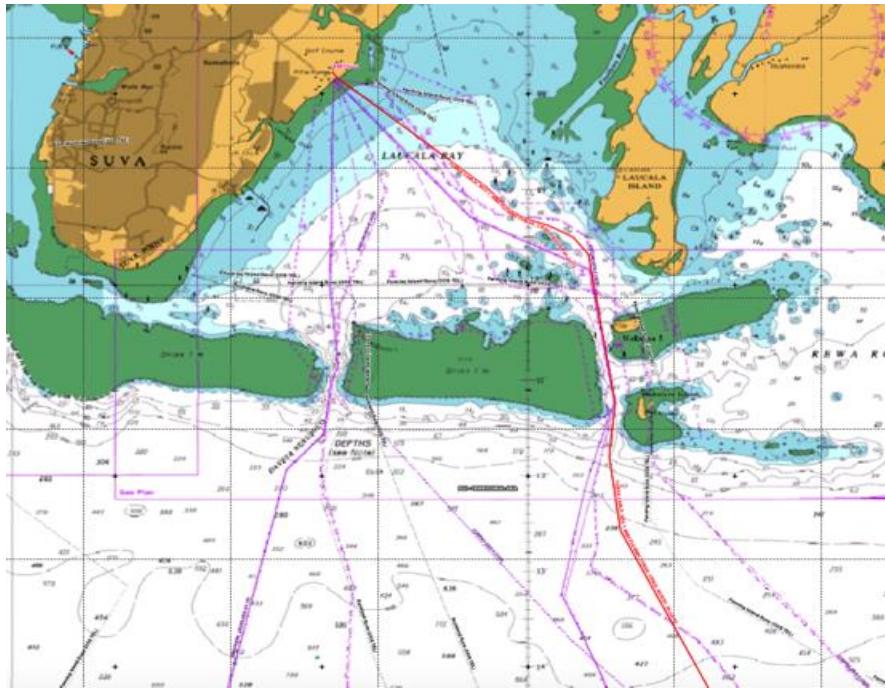


Figure 1. Suva Peninsula

The proposed routing for the cable will be from deep water (beyond 1000m) through the Nukulau reef passage (eastern channel) to the Vatuwaqa Communications Centre (VCC) on Rifle Range Road, Laucala Bay in Suva (Figure 3). The VCC houses the International Gateway Switch, the Data and Internet Gateway, Satellite Earth Station and Optical Fibre Submarine Cable terminal managed by FinTel. The new cable will parallel existing cable systems and infrastructure used as part of the Vanuatu, Tonga, Southern Cross Cable networks.

Figure 2. Nukubuco Reef Passage - Eastern Routing Option



The VCC property operated by FinTel comprises grassland on reclaimed land extending from the harbour to the existing cable station (Figure 3). The locality also includes recreational space (golf-course) and residential buildings to the southwest. The new cable will run from the existing Beach Manhole (BMH) to the cable station through a spare duct route in preparation for commissioning (Figure 4 and 5). The cable is likely to be buried in the immediate vicinity of the BMH approaching the landing station (for approximately 1km), then laid on the surface of the seafloor in Suva lagoon into deeper water. This will require minor civil works to bury the cable in the near shore area to avoid damage to the cable from recreational or other activities, and to feed the new cable into the existing duct route to connect to the VCC. A designated no-anchor zone is already established for existing cable routes from the reef entrance to landing site.

Figure 3. Vatuwaqa Communications Centre Landing Site

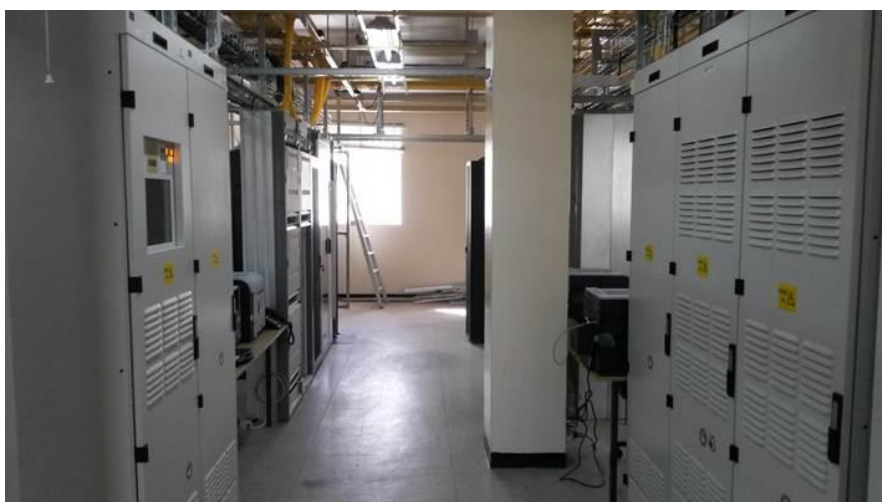


Figure 4. Landing site, Laucala Bay



(Samisoni 2015)

Figure 5. Existing cable station at VCC, Laucala Bay



(Samisoni 2015)

Land and Marine Tenure

The VCC, including the landing site and cable station, is leased by FinTel on crown lease for 99 years (effective 1954, expires 2053) (Samisoni 2015).

The cable will cross two customary fishing grounds in Suva lagoon: Vanua Suva (to the west) and Vanua Burebasaga (to the east) (Comley 2012). Consultation with relevant authorities (Native Lands and Fisheries Commission, TLTB etc) and community representatives of Vanua Suva and Vanua Burebasaga will be required as to the timing of cable laying activities in the near-shore area.

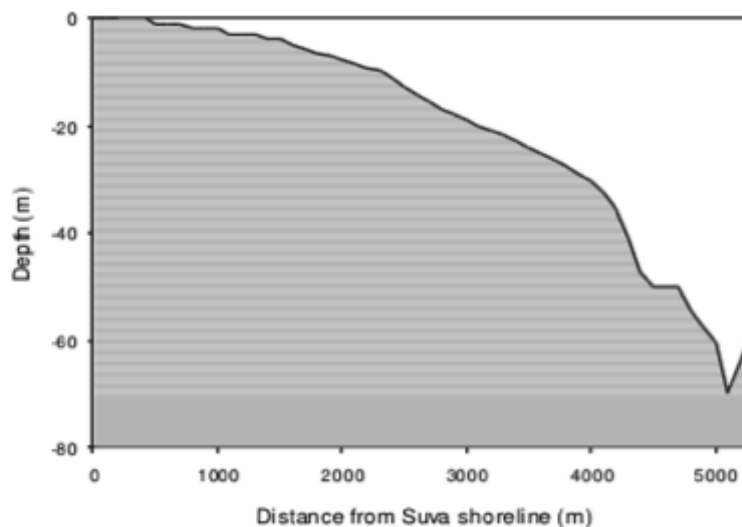
Topography and Marine Hydrology

The land at the Suva landing station is reclaimed land on former saline mudflats that previously supported mangrove communities. The site is characterized by poor soil

structure, a perennially high water table and poor internal drainage. The shoreline is coarse coral rock and gravel overlying a solid coral platform that grades into an extensive tidal mudflat (Comley 2012).

The cable route bathymetry for the landing site shows a gradual slope across Laucala Bay (Figure 6). Under its proposed route, the first approximately 300m from the shoreline will be across a tidal mud flat. There is gradual slope starting around 1km from shoreline to 4.5km where the seabed reaches a depth of 60m.

Figure 6. Bathymetry within Suva Harbour approaching the landing site



(Comley 2012)

Natural Habitats

Heavy sediment from the Rewa River discharges into the eastern coast of Suva Peninsula over alluvium covered marl platform (Pohler and Collen 2006). Being in proximity to a large urban corridor (the Greater Suva Area), the reef and in-shore area are exposed to pollution and effluent which has resulted in decline of coral cover and increase in algae and crown of thorn outbreaks (Vuki et al., 2000). Gleaning and fishing activities have reduced fish stocks and shellfish.

The soft sediments lining the shore in Suva harbor approaching the landing site support some dispersed and diffuse seagrass beds. Like the reef communities further offshore, these seagrass beds are also being heavily influenced by runoff and nutrient input (Seeto, 1992). In addition, extensive land reclamation has occurred and substantially reduced seagrass and mangrove habitats along the shoreline.

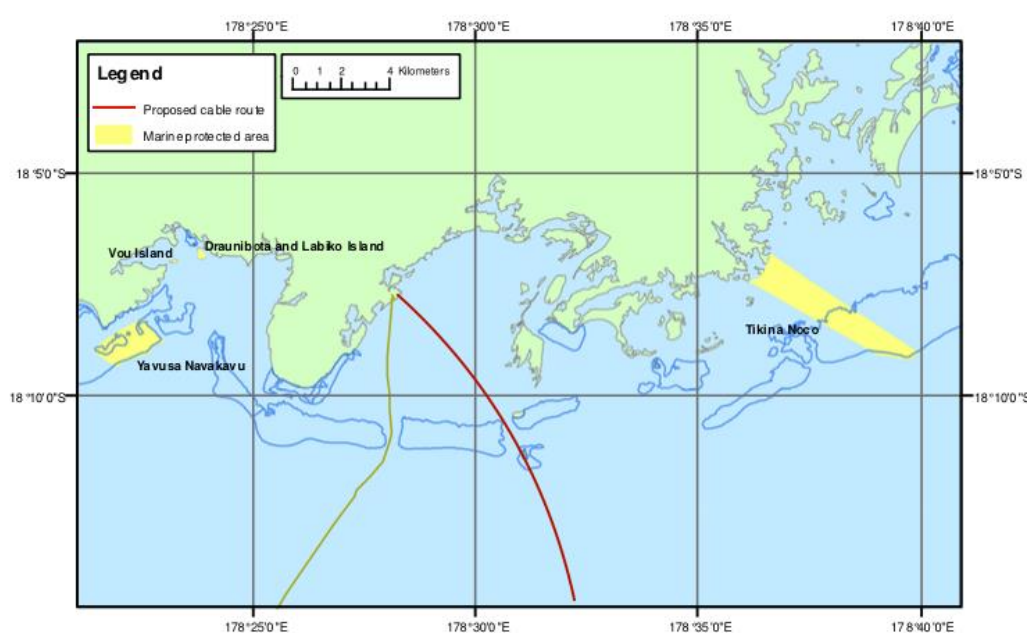
Intertidal mudflats within Suva lagoon cover approximately 1,000 hectares and are important for many bird species. On average 500 shorebirds use the intertidal mudflats around Suva point (Watling, 2006).

As the cable will be laid directly on the lagoon floor, impacts on seagrass beds or other habitat elements will be insignificant. There may be some localized turbidity caused by the

cable placement, however this will disperse rapidly. No terrestrial vegetation will be disturbed at the landing site. Based on previous cable-laying experience, it is expected that disturbance to shorebirds, fishing activities (including gleaning) and vessel movements will occur during cable laying operations, but these are considered a negligible impact, as any disturbance will be temporary in nature.

Critical Habitats and Protected Areas

There are four protected areas within approximately 10km of the proposed cable route (Figure 7). Vuo Island and Drauniboto and Labiko Islands were established as a Forest Park and Amenity Area by the Forestry Department. Yavusa Navakavu and Tikina Noco are community-based marine areas managed by customary landowners. None of these protected areas will be directly affected by the project.



(Comley 2012)

Figure 7. Protected Areas in Suva Lagoon

Hydrothermal and Seamounts

A recent compilation and validation of existing datasets on seamounts and associated bathymetric features was undertaken by the Secretariat of the Pacific Community (Allain et al., 2008). Within Fiji's EEZ, 112 underwater features (seamounts etc) were recorded. A detailed marine bathymetry survey will take place to identify whether any hydrothermal vents or seamounts are in proximity to the proposed cable route between Samoa and Fiji.

Threatened Marine Species

There are 308 marine species of concern (critically endangered, endangered or vulnerable on the IUCN Red List categories) on the present Red List. Twenty four percent of species on the Red List have been documented in proximity to the cable route, with the majority being coral species (concentrated in protected areas located 10 km from the cable route) (Comley

2012). The endangered Green Turtle (chelonian mydas) has been documented near to the cable route. The IEE describes in further detail the potential impacts from the project on marine species.

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Annex 6.

Resettlement Policy Framework

A. Introduction

The Project will trigger social safeguards policy OP4.12 Involuntary Resettlement. The objective of this policy is to ensure affected persons living standards are not adversely affected as a result of the Program or its interventions. As such, the Borrower is required to prepare appropriate social safeguard instruments to address all adverse impacts that will be generated as a result of project activities. This Resettlement Policy Framework (RPF) has been prepared specially to address impacts caused by involuntary land acquisition, such as economic or physical displacement, or loss of assets or access to assets. It has been developed in accordance with the principles, objectives, procedures and rules set out in the World Bank Operational Policy OP4.12 Involuntary Resettlement. It provides guidance for preparing Abbreviated Resettlement Action Plans (ARAP), voluntary land donation (VLD) and associated documentation. It outlines the procedures and information requirements for ARAPs in accordance with policy requirements and national legislation, as well as VLD and land use agreements for specific subprojects. The preparation of documents is the responsibility of the IA in each country, which will be submitted for Bank review.

1. Project Description

The Program will comprise the following three components:

Component 1. Submarine Cable System

Component 1(a). The Project will cofinance the design, supply and installation of a submarine cable system to connect Samoa (Apia) to Fiji (Suva). The proposed cable route is depicted in Figure A2-1. The cable length is 1,300 km. At a distance of about 1300 kilometers, Fiji is the nearest international connectivity hub to Samoa. A new cable on this path will provide Samoa with abundant international bandwidth capacity. A cable to Fiji will provide Samoa with access to direct IP transit services from Fiji suppliers, or cable extension capacity via Southern Cross to Australia, Hawaii or the US west coast. Fiji is a well-established submarine cable hub with connections to Australia, New Zealand, Hawaii, Tonga and Vanuatu. Costing for the Apia – Suva Cable assumes the turn-key supply and installation of a single fibre pair cable, 10 new repeaters, new PFE, and 100G SLTE for both ends. The estimated cost of the “wet segment” including the marine survey, cable manufacture and marine operations is US\$28 million to be procured through a single supply contract. *IDA will finance US\$14.0 million or 50 percent of this subcomponent. ADB will finance the other 50 percent.*

Component 1(b) Cable Landing Stations. The cable will land at the Fintel cable station at Laucala Bay in Suva where the Southern Cross (SSCCN) lands. Fintel advise the there is space available at this location as well as spare ducts from the beach manhole to the their cable station. The landing in Apia is proposed to be at the same location at Fagali'iFagali'i as SAS and use the same BMH with its spare ducts to the sea. The cable station location will be about 1 kilometer up the hill behind the Fagali'iFagali'i landing point and adjacent to the golf course. The Savai'i cable landing station will be located at Tuasivi. The estimated cost of the cable landing station and related onshore facilities is US\$6 million. *This component will be financed by ADB and DFAT.*

Component 1(c) This subcomponent will finance the prepayment of capacity in the form of a fifteen year Indefeasible Right of Use (IRU) for a total cost of US\$7 million. It will also finance technical Project/contract management costs plus required permits and licenses associated with the cable system. The estimated cost is US\$1 million. *This component will be financed by the SSCC.*

Component 2. ICT Regulatory Technical Assistance

This component will finance a program of technical assistance for the Office of the Regulator to review, develop and implement effective regulation for the sector with a particular focus on wholesale markets. Such assistance will include provision of legal and regulatory expertise, especially for competition and market regulation activities; review of existing legal regulatory framework including drafting new instruments and reforms; and training and skills development. The financing will also support specific advisory assistance on wholesale tariff regulation, including price and non-price terms for access to all international fiber optic bandwidth services in Samoa.

Focus areas identified by OoTR include: market definition, declaration of dominance in new markets, regulation of wholesale prices especially for providers of Internet capacity, regulation of new and existing cable companies, cost modelling for provision of capacity and establishment of appropriate quality of service standards. The component will support a nationwide consumer survey to understand the benefits of ICT particularly for women. Additionally, funding will be provided for procurement of technical equipment that is needed to administer and plan effective arrangements for the sector.

Component 3. Project Management and Administration

This component will finance Project transactional implementation and management support to the Ministry of Finance (MoF). This component will finance: (a) project finance and transactional assistance in connection with the operationalization of the SSCC pursuant to robust PPP arrangements; (b) overall Project coordination, financial and contract management, procurement, communications and outreach plus reporting, monitoring and evaluation

B. Justification for Preparing a Resettlement Policy Framework for the Project: In Fiji and Upolu the cable will utilise existing cable landing stations, whereas in Savai'i the landing station is proposed to be located on the Tuasivi public hospital site. Therefore, no land acquisition will be required for the landing stations. While cable routes are expected to follow public road reserves, this is dependent on final design. To ensure land acquisition considerations are properly managed a Resettlement Policy Framework (RPF) is included as Appendix 6.

The existing terrestrial cable route (owned by BlueSky Samoa) follows the Main East Coast Road toward the BlueSky cable station in Apia. This route is flood-prone with potential implications for cable integrity; hence it is proposed to establish a new cable station on higher ground potentially at the Royal Samoa Golf Course, approximately 1km south-east of the BMH. Figure 3 shows the proposed cable route connecting the BMH to the cable station via the Main East Coast Road and Golf Course

Road. The cable will be protected by case-hardened conduit which will be installed in a 30cm-wide trench in the road reserve.

The proposed new cable station – which will house the necessary equipment to enable the high-speed connection – will potentially be sited on a cleared portion adjacent to the Golf Course clubhouse on land owned by Samoa Land Corporation (SLC); a government-owned entity.

Since the precise location/s of the conduit from the landing site to the cable station has not been confirmed during project preparation, this RPF establishes the principles, objectives, procedures and rules to be used in the preparation of resettlement-related safeguard instruments.

Fixed assets (crops, structures, etc.) may be present on the land and need to be accounted for prior to land agreements being signed or construction commencing. Fixed assets or access to such assets may be lost as a result of the land purchase or donation and there is potential for adverse socioeconomic impacts to occur if this is not properly managed. The RPF exists to protect people's rights and ensure project activities are approached with full consideration of existing assets, with appropriate valuation of assets, and persons affected by economic displacement are duly compensated.

C. Objectives, Definitions and Key Principles

Objectives

In World Bank-assisted projects, borrowers are expected to take all necessary measures to avoid, minimize, mitigate and compensate for adverse social impacts, including, but not limited to, those impacts associated with involuntary resettlement.

Every viable alternative project design and location should be explored to avoid, where feasible, or minimize involuntary resettlement.

If involuntary resettlement cannot be avoided altogether, sufficient resources should be made available to conceive and implement resettlement activities as sustainable development programs, in close consultation with displaced persons.

Displaced Persons should be assisted in their efforts to improve, or at least restore, their livelihoods and living standards to pre-displacement levels or levels prevailing prior to project implementation. This is accomplished primarily through: a) compensation at full replacement cost for losses of assets (for example, unharvested crops, structures etc); b) provision of other forms of assistance for livelihoods restoration; and c) physical relocation of assets, as necessary in accordance with OP 4.12.

Key Definitions

For the purpose of this RPF, “**involuntary resettlement**” refers to economic displacement as a result of project activities set out in Section B. In this context, “**displaced persons**” refers to persons who are affected by the voluntary acquisition of land resulting in:

- relocation or loss of shelter;
- loss of assets;
- loss of access to assets; or
- loss of means of livelihood as a direct result of loss of assets or access to assets.

"Full Replacement cost" is defined, under OP 4.12, as a method of valuation of assets that helps determine the amount sufficient to replace lost assets and cover transaction costs. Depreciation of

structures and assets to be replaced is NOT taken into account to determine the compensation amount necessary to meet Full Replacement Cost.

Full Replacement Cost for:

- **Agricultural land, produce or established gardens:** it is the pre-project or pre-displacement, whichever is higher, market value of food produce of equal productive potential or use located on the voluntarily acquired land, plus the cost of preparing alternative areas to harvest levels similar to those of the voluntarily acquired land, plus the cost of any registration and transfer taxes.
- **Houses and structures or assets:** it is the market cost of the materials to build a replacement structure or asset with an area and quality similar to or better than those of the existing asset/s, or to relocate the existing asset/s, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes. In determining full replacement cost, depreciation of the asset and the value of salvage materials are not taken into account, nor is the value of benefits to be derived from the project deducted from the valuation of an affected asset.
- **Land in urban areas:** Pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.

Where domestic laws do not meet the standard of compensation at Full Replacement Cost, compensation under domestic law is supplemented by the additional measures set out in this RPF.

Key principles

OP4.12 establishes the key principles to be followed in resettlement planning and implementation. Of particular relevance for this RPF are the following:

- Wherever possible, project design and ARAPs should be conceived as sustainable development programs, so that Displaced Persons may benefit from the benefits, services and facilities created for, or by, project activities.
- Involuntary Resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- All Displaced Persons are provided prompt and effective compensation at full replacement cost for losses of assets (example: crops, trees, etc) attributable directly to the project.
- Displaced Persons without a recognizable legal claim or right to the land they are occupying are provided with compensation for loss of assets and resettlement assistance (example: skills training, employment, etc).
- Displaced Persons should be provided prompt and effective compensation at full replacement cost (including without depreciation or deduction for tax arrears, licensing or registration fees, or for any other purpose).
- When cultivated land is acquired, the borrower should support the reestablishment of crops through the transitional period if that is the preference of the Displaced Person.
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- If a commercial enterprise (e.g., shop or vendor, service provider, industrial facility) is required to close temporarily, the owner or operator is compensated for temporary loss of profits. If a commercial enterprise is required to relocate, the owner or operator is compensated at replacement cost for loss of assets and structures (including fixtures or improvements that cannot be relocated), is provided transitional assistance sufficient to meet costs of moving equipment and inventory, and compensated for loss of profits until business operations can be restored.

- The involuntary resettlement transition period should be minimized. Compensation for crops, structures and other assets should be paid prior to involuntary resettlement. Transitional support should be provided prior to the time displaced persons will incur transitional expenses.
- Displaced Persons should be informed and consulted through culturally appropriate methods/languages during the process of ARAP preparation, so that their preferences and concerns regarding involuntary resettlement and other resettlement arrangements are solicited and considered.
- Both the draft and final ARAPs are publicly disclosed in a manner and place accessible to Displaced Persons.
- The previous level of community services and access to resources should be maintained or improved after involuntary resettlement takes place.
- The ARAP should include an estimated budget for all costs associated with involuntary resettlement, including contingency arrangements.
- Monitoring and evaluation arrangements should be established for the borrower to adequately assess the effectiveness of ARAP implementation.
- Methods by which displaced persons can pursue grievances will be established as necessary, and information regarding these grievance procedures will be provided to displaced persons.

D. Legal and Regulatory Framework

The following information should be provided in the legal and regulatory framework analysis:

- The scope of the power of eminent domain and the nature of compensation associated with it, in terms of both the valuation methodology and the timing of payment;
- The applicable legal and administrative procedures, including a description of the remedies available to displaced persons in the judicial process and the normal timeframe for such procedures, and any available alternative dispute resolution mechanisms that may be relevant to resettlement under the project;
- Relevant national law (including customary and traditional law) governing land tenure, valuation of assets and losses, compensation, and natural resource usage rights; customary personal law related to displacement; and environmental laws and social welfare legislation;
- Laws and regulations relating to the agencies responsible for implementing resettlement activities; and
- Any legal steps necessary to ensure the effective implementation of resettlement activities under the project, including, as appropriate, a process for recognizing claims to legal rights to land, including claims that derive from customary law and traditional usage.

Summary of Land Tenure and Acquisition

Land ownership in Samoa is under three categories: freehold, customary and state-owned land. Customary land is land owned jointly within extended families, and is the predominant form of land ownership particularly outside the capital, Apia. It is clusters of these land-holding extended families that form the villages of Samoa and provide customary representatives to the associated village councils.

The Constitution provides ultimate protection for Samoans against any form of compulsory land acquisition by the State. Articles 13 and 14 acknowledge the right to reside, and provide protection from compulsory acquisition, while Articles 101 and 102 state that customary land cannot be alienated. Thus, the Samoan government does not have powers of compulsory land acquisition.

The relevant law governing land acquisition and compensation is the *Taking of Land Act 1964*. This Act applies to freehold and customary land, including land of this type that is currently under

leasehold, and provides for the taking of land for public purposes. The Act provides the procedures for land acquisition, sets out the circumstances in which compensation is payable, methods for assessing such compensation and dispute resolution procedures. Section 7 empowers the state to take customary land or freehold land required for any public purpose. Furthermore, Section 3 provides that the state may declare any purpose to be a public purpose within the meaning of this Act. Part VI of the *PUM Act 2004* addresses rights to compensation on the taking of land. Thus, the state has powers to acquire land, but only with the agreement of all the owners. Obligation rests clearly on the State to inform the existing landowners and persuade them of the merits of allowing their land to be taken, in order to achieve such agreement.

The *Customary Land Advisory Commission Act* (2013) established a consultative Commission to advise the government on its approach to customary land and promote greater economic use and development of customary land.

Village Councils (*'fonos'*) are formally recognised by the *Village Fono Act* (1990) and deal exclusively with village affairs such as culture, customs, traditions, as well as all customary land matters. Land decisions made by the *fonos* may be challenged in the Land and Titles Court, which in turn may be reviewed by the Supreme Court.

Gap Analysis

For this project, the IA agrees to carry out the project in accordance with this RPF and OP4.12 and so the IA agrees to waive any national legal, regulatory provisions in contradiction to the requirements established in this RPF, and to take actions necessary to ensure full and effective implementation of ARAPs prepared in accordance with the RPF.

A gap analysis between national laws covering involuntary resettlement and the Bank's OP/BP 4.12, and the measures to bridge such gaps is detailed in Table 2, and will be completed when ARAPs are being prepared.

Table 2 Country-level Gap Analysis

Samoa Legislation	WB Policy Requirements	Gaps and Consistencies between the GoS and WB Policies
Consultation and Negotiation under Land Acquisition		
In Part IIA of the Taking of Land Act 1964 (TLA), Section 24F states that: “In the exercise of the powers conferred by this Part of this Act the Minister or his officers, workmen or others by his direction shall do as little damage as may be;...”	Involuntary resettlement should be avoided wherever feasible, or minimized, exploring all viable alternative project designs.	While the Act has stated it differently, the meaning, however, is consistent with the Bank’s policy.
TLA Part IIA Section 24F: While there is no provision for livelihood option in the Act, Section 24F of Part IIA, further states that”...and every person having any estate or interest in land entered upon for the purposes of this Act or injuriously affected thereby or suffering any damage from the exercise of any of the said powers shall be entitled to full compensation to be ascertained in the same manner as compensation for land taken under Part III of this Act.” This provision is also consistent with that of the Bank’s policy.	Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits.	There is no specific provision in the Act for resettlement activities per se, and for such activities to be conceived and executed as sustainable development programs. The Act however emphasizes every person “...having any estate or interest in land entered upon for the purposes of this Act or injuriously affected thereby or suffering any damage from the exercise of any of the said powers...” shall be entitled to full compensation to be ascertained in the same manner as compensation for land taken under Part III of this Act.” This provision is also consistent with that of the Bank’s policy.
TLA Section 14 stipulates public notification and specifically requires direct notification of each owner, occupier and person having an interest in the land, or the agent of any of them, whose name and address are readily ascertainable, stating the Government's proposal to take the land, the public purpose for	Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.	The intent of the Act is consistent with WB policy, insofar as compensation is concerned but it falls short of engaging displaced persons in planning and implementation of resettlement programs.

<p>which it is wanted, that the plan thereof may be inspected in the said office in ordinary office hours, and that any person affected may give written notice of objection with reasons to the Chief Executive Officer within 28 days of the first publication of the notice;</p> <p>The same provision is written in Section 14A covering customary land in which the notice is written in <i>Savali</i>.</p>		
Compensation standard and eligibility		
TLA Part III Section 25 refers to the right for 'full and just' compensation for all affected people as the basis for determining the offered value of the affected land.	Full replacement cost	GoS policy has same intention as that of the WB policy.
Displaced persons include only those with formal legal rights to land	Displaced persons: (a) with formal legal rights to land; (b) without formal legal rights but with valid claims to land/assets; and (c) without either (a) or (b) to the land they are occupying.	Include the rights of persons without legal rights to land
The legislation allows for compensation but not transitional assistance.	Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is	GoS policy is less specific in its language, but its requirement for full and fair compensation for all displaced people can be interpreted to have the same intention as that of the WB policy. Moving and/or transitional assistance will be offered where applicable.

	higher.	
Impacts resulting from the taking of lands is widely defined in the TLA under phrases such as - every person having any estate or interest in land entered upon for the purposes of this Part or injuriously affected thereby or suffering any damage from the exercise of such powers.	Relevant impacts are direct economic and social impacts that both result from Bank assisted investment projects and caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) loss of assets or access to assets; or (iii) loss of income sources or means of livelihoods, whether or not the affected persons must move to another location; or (iv) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on livelihoods of the displaced persons.	WB and GoS differ in terms of the level of specificity and wording but the intent is the same. The same intent is applicable to involuntary restriction of access to legally designated parks and protected areas even though parks in Samoa did not come into existence until 1974.
TLA Section 28 requires full and fair compensation for all displaced people.	Borrower must explore all viable alternative project designs to avoid physical displacement of these groups.	The Act uses the term 'all people' and this is all-inclusive of all people affected and displaced. In this regard, it is consistent with WB policy.
TLA Section 52, 53 and 54 of the Act make provisions for the exchange of land as compensation in part or full, "...for the land taken and the damage done if compensation for the same were made wholly in money in the usual way."	When it is not feasible, to avoid such displacement, preference is given to land-based resettlement strategies for these groups that are compatible with their cultural preferences and are prepared in consultation with them.	GoS and WB policy are compatible.

N/A	Each involuntary resettlement is conceived and executed as part of a development project or program.	The GoS has no written policy consistent or equivalent with that of the Bank.
<p>TLA Section 14 and 14B requires the GoS to “cause a notice to be publicly notified and to be sent to each owner, occupier, or persons having an interest in the land, or the agent of any of them, whose name and address are readily ascertainable, stating the Government's proposal to take the land, the public purpose for which it is wanted, that the plan thereof may be inspected in the said office in ordinary office hours, and that any person affected may give written notice of objection with reasons to the Chief Executive Officer within 28 days of the first publication of the notice</p> <p>Section 37 stipulates cut-off date for calculation of compensation.</p>	The DPs are to be identified and recorded as early as possible in order to establish their eligibility through a population record or census that serves as an eligibility cut-off date, preferably at the project identification stage, to prevent a subsequent influx of encroachers or others who wish to take advantage of such benefits.	The GoS and WB policies are consistent both in terms of identifying DPs early and in setting a cut-off date for the determination of compensation
<p>TLA Section 28 stipulates the following - By whom claim may be made - (1) A claim for compensation may be made by any person (including an executor or administrator) ceased, possessed of, or entitled to such lands, or to any estate or interest therein, whether such person has or has not the power to sell and convey the same. (2) Any such claim on behalf of beneficiaries, infants or mentally defective persons may be made by their trustees, guardians or committees respectively. (3) Where a beneficiary, infant or mentally defective</p>	Particular attention must be paid to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples, ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation.	The GoS and WB policies are consistent with respect to ensuring that the rights of vulnerable groups to fair and full compensation, including those without legal title to the land or other assets are upheld.

person does not have a trustee, guardian or committee in Samoa, the Public Trustee shall be deemed to be his or her trustee, guardian or committee, as the case may be, for the purposes of this Act		
N/A	The full cost of resettlement activities necessary to achieve the objectives of the project are included in the total cost of the Project. The cost of resettlement, like the cost of other project activities, are treated as a charge against the economic benefits of the project; and any benefits to displaced persons (as compared to the without-project circumstances) are added to the benefit stream of the project. Resettlement components of free-standing resettlement policies need not be economically viable on their own, but they should be cost effective.	The GoS has no equivalent written implementing rules and regulations. This policy requirement needs to be adapted in the ARAPs.
N/A	Where loans include subprojects, components or investments prepared only after project approval and loans through financial intermediaries that are likely to cause involuntary resettlement, sufficient	The GoS has no equivalent written implementing rules and regulations. This policy requirement needs to be adapted in the ARAPs.

	contingency allowance must be allocated for resettlement prior to approval of the loan.	
N/A	Similarly resettlement plans should also reflect the timeframe for resettlement planning and implementation.	The GoS has no equivalent written implementing rules and regulations. This policy requirement needs to be adapted in the ARAPs.
N/A	Eligible cost of compensation, relocation and rehabilitation may be considered for inclusion in WB loan financing for the Project, if requested, to ensure timely availability of the requested resources and to ensure compliance with involuntary resettlement procedures during implementation.	The GoS has no equivalent written implementing rules and regulations.
LTA Section 37 2(b) The value of land shall, subject as hereinafter provided, be taken to be the amount, which the land if sold in the open market by a willing seller on the specified date. LTA also stipulates that compensation shall be full and fair.	Cash compensation levels should be sufficient to replace the lost land and other assets at full replacement cost in local markets.	Both the WB and GoS policies are in agreement.

E. Preparing and Approving Safeguard Instruments

If any land acquisition is required at all, the scale of land acquisition possible under the project is very small. Accordingly, the appropriate instrument would be an Abbreviated Resettlement Action Plan (ARAP). Responsibility for preparation, implementation and monitoring of safeguard instruments (including responsibility for meeting all associated costs with their implementation) rests with the IA in collaboration with the government agency who has direct and overall responsibility for managing the land acquisition and involuntary resettlement process in the participating country. As necessary, the IA will exercise its authority to coordinate actions with any other agencies involved to ensure timely and effective ARAP implementation.

Preparation of safeguard instruments will commence as soon as once the specific location of facilities and infrastructure is known and it is determined that involuntary resettlement is required to carry out project activities and shall be finalized prior to implementation or commencement of any works. Safeguard instruments will include an assessment and validation of the impacts of land acquisition, in coordination and full consultation with all stakeholders. Draft safeguard instruments will be provided to the Bank as a condition of subproject approval.

If land use is changed or involuntarily lost through temporary occupation by the Project activities, rent as agreed between the Project and the leaseholder for an agreed term (time period) will be arranged. Agreement and record of payment will be documented in writing and maintained in the PMU.

For involuntary loss of gardens, trees, crops, perennials, and/or productive trees/plants, or other elements of livelihoods such as loss of business income due to the Project, compensation will be paid by the Project at a scheduled rate (current market value) by the Project, or based on negotiation/agreements made with the owners of the business.

Voluntary donations of land, structures or goods for project implementation will be made with informed consent, free from any coercion, and will not unduly affect the livelihood of the donor. The purpose and any terms of the donation will be recorded in writing with the signature of the owner (see Attachment 1).

Detail Required for an ARAP

The IA (with support from other agencies as required) will carry out a SA or socioeconomic survey to identify and enumerate Displaced Persons and to identify and inventory land and other assets to be required. The survey must cover 100 percent of the Displaced Persons and establish whether any displaced persons are significantly affected by loss of productive land, whether any commercial enterprises are affected, or loss of assets.

Appropriate mitigation measures (e.g., compensation at full replacement cost for loss assets, transitional assistance for relocation, transitional assistance for livelihood restoration, transitional assistance for commercial enterprises) will also be established for any adverse impacts.

The following will be addressed in the ARAP depending on the scale of impacts and subproject category:

- Description of the project activity causing involuntary resettlement and explanation of efforts to avoid or minimize involuntary resettlement associated with the project (alternative project designs or locations considered);
- Range and scope of potential adverse resettlement impacts including identification of alternative sites and selection;
- Findings of socioeconomic survey, gender analysis and baseline census survey information (including number of people affected);

- Review of relevant laws and regulations relating to land acquisition and involuntary resettlement;
- Percentage of land holding taken and evidence of landownership, tenure, acquisition and transfer titles or documents;
- Description of asset valuation procedures and specific compensation rates (or alternative measures) for all categories of affected assets;
- Inventory, valuation of, and compensation for lost assets (quantity and type of assets);
- Other assistance measures, if any, necessary to provide opportunities for livelihood restoration for Displaced Persons;
- Assistance to affected commercial enterprises;
- Eligibility criteria for compensation and all other forms of assistance;
- Summary entitlements matrix;
- Relocation arrangements, if necessary, including transitional support;
- Resettlement site selection, site preparation, and measures to mitigate impacts on host communities, if necessary;
- Restoration or replacement of community infrastructure and other services;
- Land donation arrangements and documentation requirements as per VLDP, if relevant;
- Organisational responsibilities for implementation;
- Community participation and disclosure requirements and arrangements;
- Resettlement implementation schedule with time-bound actions;
- A detailed cost estimate and budget;
- Monitoring and evaluation;
- Grievance resolution and appeals procedures.

F. Eligibility Criteria

“Displaced persons”, as defined under Section C above, are eligible to receive compensation or assistance under the PREP. The social assessment (SA) will identify persons whom may fall into these specific categories.

Valuation methodology for compensation packages will be determined in accordance with national legislation and regulations and approved by the Bank.

G. Voluntary Land Donation

For land donated by the community or landowners for specific project needs, the Voluntary Land Donation Protocol (VLDP) in Attachment 1 will be followed.

H. Communal Land Acquisition – Guiding Principles

If communal land is required for the Project, the resettlement planning process and safeguard instrument/s establishes the following:

- Alternatives to land acquisition are considered. Especially where replacement land is scarce or non-existent, or where customary land tenure is deemed inalienable, negotiated agreements for long-term lease, even for infrastructure siting, should be considered.
- Where communal land must be acquired, collective compensation may be appropriate. Under such conditions, compensation is used solely for appropriate community purposes, or is distributed equitably among community members. The ARAP describes arrangements for usage of collective compensation.
- Individual users and occupants of acquired communal land are identified in the census prepared for the ARAP and the ARAP describes mitigation measures or negotiated agreements providing for restoration of their livelihoods or living standards.

- Where replacement land does not exist, it will be impossible to establish a technical valuation for replacement cost. The ARAP describes alternative means used for valuation. This may include negotiated agreement with affected communities.
- Where negotiated agreements for land valuation, for long-term lease, or for provision of remedial assistance to users or occupants of acquired communal land, are to be established, the resettlement plan describes the methods by which affected communities are involved in the negotiations, and methods by which terms of negotiated agreements are fully disclosed to them, in a manner accessible to the affected community.
- If relevant, the ARAP describes any changes that may occur regarding land use and tenurial arrangements for remaining communal land in project-affected areas.
- The ARAP describes a process by which conflicting claims to ownership or use rights will be addressed.

I. Implementation Process

A time-bound implementation schedule of all activities relating to involuntary resettlement shall be included in the ARAP. Payment of compensation should be completed at least one month prior to involuntary resettlement. If there is a delay of one year or more between land or asset valuation and payment of compensation, compensation rates will be adjusted for inflation purposes.

J. Budget and Costs

Compensation will be paid to persons who have suffered temporary or permanent involuntary loss as a result of project activities. The IA bears responsibility for meeting all costs associated with involuntary resettlement. Any ARAPs prepared in accordance with this RPF require a budget with estimated costs for all aspects of their implementation. All affected persons are entitled to compensation or other appropriate assistance and mitigation measures, regardless of whether these persons have been identified at the time of resettlement planning, and regardless of whether sufficient mitigation funds have been allocated. For this reason, and to meet any other unanticipated costs that may arise, the ARAP budget shall include contingency funds, i.e. at least 10 percent of estimated total costs.

Compensation must be paid promptly and in full to the Displaced Person within a mutually agreed timeframe. No deductions from compensation will occur for any reason and agreements will be honoured in full. The ARAP should describe the fiscal procedures by which compensation funds will flow from the IA to the displaced persons.

K. Consultation and Disclosure Arrangements

A Consultation Plan must describe consultation activities taken to consult with affected persons regarding proposed land acquisition, transitional assistance, relocation arrangements, and other arrangements, and results of those consultations. The Consultation Plan in the Project Operations Manual may be referred to.

The IA discloses the draft and final versions of the ARAP to the displaced persons and the general public in the project area, in a language, format and location accessible to them. Disclosure of the draft ARAP should occur at least one month prior to Bank review. Disclosure of the final ARAP occurs following Bank acceptance.

L. Monitoring Arrangements

Monitoring arrangements will be established in the ARAP to assess the effectiveness of ARAP implementation in a timely manner. Monitoring includes review of progress in land acquisition, payment of compensation, provision of transitional assistance, and functioning of project grievance procedures. The ARAP should establish the frequency of monitoring activities. Monitoring should be

conducted by an individual, firm, or community organization not directly affiliated with the IA or PMU. Any issues or problems associated with ARAP implementation that are observed in the monitoring process will be reported to the IA and the World Bank project team.

Prior to project completion, the monitoring process will assess whether livelihoods and living standards of displaced persons have been improved, or at least restored. If these objectives have not been achieved, the IA identifies, plans and implements supplemental measures necessary to achieve satisfactory outcomes.

M. Grievance Procedures

A consultative ARAP process and effective ARAP implementation will reduce the likelihood of project-related complaints. However, to ensure that displaced persons have avenues for raising complaints relating to land acquisition, compensation payment, relocation, impacts on livelihoods, construction-related damages, or other aspects of project implementation, a multi-step grievance procedure will be established in the ARAP. **The GRM will need to be consistent with the GRM in the ESMP**

The IA keeps a record of all complaints referred to the grievance committee, including a description of issues raised and the outcome of the review process.

K. Attachment 1

Land Use Agreement

A Land Use Agreement (LUA) may be required where (i) subprojects or activities require access on a permanent or temporary basis to certain sites on customary land; (ii) no suitable alternative sites exist; (iii) customary landowners have agreed for the land to be used for a specific purpose for the benefit of the whole community; and/or (iv) any other situation where it may be deemed the most appropriate instrument for the local context.

The LUA does not apply when state- or privately-owned land will be utilized or needs to be acquired or leased (ARAP or national process to be followed in these circumstances). However, where formal land use or leasing agreement are being delayed due to circumstances outside the PMU's control, the LUA may provide a 'stop-gap' or temporary safeguard instrument, subject to approval by the Bank.

It is important that absentee landowners are engaged, and that a suitable witness (non-clan member) signs the agreement.

The process used to enter into the LUA is as follows:

- Share the rationale for the subproject and its proposed siting, and seek the granting of access of the necessary land by the landowning clan or household;
- Village representatives of the community, organize a meeting with the representatives of the specific clan/s who have customary ownership of the proposed land or access-way;
- Any persons with fixed physical assets on the land/proposed site, but not considered a landowner, is involved in meetings and their rights are taken into consideration;
- The meeting would discuss the proposed subproject with the landowning clan or household to reach an understanding that the subproject is for the benefit of the whole community and access of land (either permanent or temporarily) is required;
- The payment of access fees should be discussed and agreed in writing (if applicable);
- The landowners would be clearly notified that the agreement to allow land access should be completely voluntary and the specific timeframe should be mutually agreed too;
- If agreement to proceed is reached, then a LUA will be entered into between the clan, the other clans and the leader of the community;
- The LUA should be endorsed by the District or Town Officer or equivalent;
- The signed LUA will be submitted as part of the subproject proposal.
- The LUA is submitted to the local magistrate (Commissioner of Oaths) or equivalent for certification.

Exit Strategy and Grievances

If all landowner parties are in disagreement about the land or conditions of LUA, or if landowners are excluded from initial discussions then the subproject will not proceed and the grievance process must be followed where relevant.

LAND USE AGREEMENT LETTER TEMPLATE

Project: _____

Location: _____

Project Partner	Name	Organisation
Team Leader (PMU)		
Town, District or Provincial Officer		
Project Representative		

Dear Sir/Madam,

- 1) We, the undersigned being the representatives of the hereby acknowledge that..... have the right under the native law and custom to make decisions on the land known as for the purpose of with the rights to the receive the proceeds of any development or other conducted on the said land. We certify that all members of the said clan agree to the truth of this certificate and that we are the persons authorized by the clan to sign it.

.....

Signature of Witness

.....

Full Name of Clan Leader

.....

His Signature/ Mark

.....

Signature of Witness

.....

Full Name of Clan Leader

.....

His Signature/ Mark

.....

Signature of Witness

.....

Full Name of Clan Leader

.....

His Signature/ Mark

- 2) We, the undersigned being the representatives of clan of Village, District, hereby declare that;

- (1) We have the right under customary law to allow access or use of the land for the purpose of (project

name) and agree to allow access to to support this project (entity);

- (2) That we undertake not to interfere in any manner on any activities or developments undertaken by ouron the said parcel of land;
- (3) That we understand the use of natural resources located on the said land (edible or non edible plants/shrubs, sand, gravel, rocks, timber, water sources, bush materials and other organic matters) will not be used for the purpose of the said project;
- (4) That we understand rental payment of will be made by for right of access to the said parcel of land (put nil if no rent is expected);
- (5) We commit ourselves in upholding the contents and the spirit of this agreement for so long as it remains in force;
- (6) We will undertake efforts to convey the contents of this agreement to members of the clan/s and to ensure that they so honour it.

3) **SIGNATORIES**

Name	Signature / Date	Role
		PMU
		Town, District or Provincial Officer
		Village Representative

4) **WITNESSES**

We, the undersigned being representatives of clan (who share the land boundary with clan) hereby declare that by Customary Law, we are rightful owners of the land known as “.....” located at Village District and that it has the right by customary law to transfer/ lease the said parcel of land.

NAME

SIGNATURE

DATE

.....

.....
.....

Made under our hands these agreements:

This _____ day of _____ 201_ at _____
village _____ District _____ in _____.

Submitted to:

Commissioner of Oaths at this location _____

On this _____ day of _____ 20__ at _____.