Annex 2
Consultation and Information Session; Presentation Meeting Record and Attendance sheet
Yap, July 31, 2014

WB/ADB: Mr. Geza Teleki (team leader) and Ms. Luisa Lulu Zuñiga-Carmine-Social Sector Specialist.

FSM TC&I: Mr. Jolden Johnnyboy

FSM Telecom Yap: Mr. Peter Garamfel

Meeting Overview

1. Opening and Welcoming Remarks by Governor Anefal at 9:25am.
2. Remarks and Introduction of WB/ADB Consultants by Mr. Johnnyboy
3. Presentation of FSM- Palau Fibre Optic Cable Project by Mr. Johnnyboy
4. Yap Component Presentation by Mr. Geza
5. Social Sector Assessment Presentation by Ms. Zuñiga-Carmine
6. Adjournment at 11:15am.

Attendance: 36 People (see list for details)

Questions and Answers throughout the Consultation:

Q1: (John Waayan/Div of Land Resources) – What is the lifetime of a used versus new fibre optic cable?
A1: (Mr. Johnnyboy) – World Bank does not encourage the use of used cables; cables have protective shelling on the outside and the lifetime of a new cable is about 25-30 years. Type of cable to be used will have to be worked on in partnership with Palau.

Q2: (Vincent Figir/Dept of Public Works & Transportation) – Possibility of used cable from Palau to Yap and a new cable from Yap to Guam?
A2: (Mr. Johnnyboy) – Decisions on the type of cable to be used would be a concession between Yap and Palau.

Q3: (Governor Anefal) – Did the assessment include social and cultural aspects beyond completion of landing the cable?
A3: (Mr. Geza) – Assessments made include any effect that the project could trigger, for example higher speed and better connectivity allowing access to unwanted sites which may have social impacts.

Q4: Follow up by Governor – Copper wiring from the cable will need to be replaced at some point.
A4: (Mr. Geza) – The assessment team's Terms of Reference ends with the facility that the wire would go through on shore. Beyond that, the next step would be to consider how it is then distributed to homes and around the island; from this aspect and beyond is not included in the team's TOR.

Q5: Follow up by Governor – So the assessment on land did not include impacts in 25 years time?
A5: (Mr. Johnnyboy) – No; however the provision of $2.5m targeted for Technical Assistance could be tapped to assist with this discussion and looking at those possible impacts down the line.

Q6: (Governor Anefal) – Should we be worried about possible emission or radiation eg electronic from the cable or building?
A6: (Mr. Geza) – No; there is electricity in the cable but it is shielded by a ring.

Q7: Follow up by Governor – What about repeaters?
A7: (Mr. Geza) – There is no issue with emissions of any type from the repeaters; they are made of glass, steel, and rubber.

Q8: (Governor Anefal) - Did the social assessment include consulting with the clergy?
A8: (Ms. Lulu) – No; however they can be consulted per Governor's recommendation.

Q9: (Phillip Tamag) - Approaching near shore area, will the cable be buried?
A9: (Mr. Geza) – The cable can be buried up to 3 feet beneath the surface. This will depend on the Project Manager and decisions to be made after consultation as to the exact location of the cable approaching near shore. At this point one side of the channel is preferred to the other based on the factors and screening conducted however this may change. The other landing site options had challenges once they were screened such as proximity to dive sites and MPAs.

Q10: Follow up by Mr. Tamag – The channel and bay are shallow in some areas, can the cable be impacted by ongoing activities or future activities?
A10: (Mr. Johnnyboy) – The cable will be buried.
A10.1: (Mr. Geza) – The cable will be buried but can be lifted and bent to a certain extent if needed to while laying or afterwards. It will be buried at depth.
A10.2: (Mr. Johnnyboy) – The cable will have a conduit once it comes ashore.

Comments by Mr. Johnnyboy – Should we expect the final reports by the end of September?
(Mr. Geza) – The end of August is being targeted for submission of draft reports to ADB and WB with review to take approximately 2-4 weeks. It is hoped that mid-September is when final documents and reports will be ready after ADB and WB review.

Q11: (Sen. Mooteb) – Can the Palau – Yap phase of the project go ahead of the Chuuk phase?
A11: (Mr. Johnnyboy) – Palau and FSM's reports will be separate, however for the FSM component this includes both Yap and Chuuk, which area included in the TOR for this phase of the project. There will be a consultation held in Chuuk on 6 August 2014 with a team from PNI to assist with the consultation.
Consultations will allow for and are important to secure funding, afterwhich the next phase will be the oceanographic survey for FSM and Palau. Completion of reports after consultations will secure funding; funding is needed to secure the Project Manager, finalize design, and subsequent activities. The Chuuk component of the project includes a branch off of the cable to Satawan but assessments need to be done there.

Q12: (Frank Haregaichig – Dept of Resources & Development) – When did Chuuk become a part of the project?
A12: (Mr. Johnnyboy) – Yap and Palau were included in the initial project targeted with previous fund, with Kosrae and Chuuk also discussed and considered to be able to include of all FSM States. IDA 17 and this project had Chuuk along with Yap as the first component for FSM.

Q13: (Governor Anefal) – The people of Yap want the project to be as inclusive as possible with our sister States, however I hope that the width and breadth of the project is now final so that project planning does not drag out further.

A13: (Mr. Johnnyboy) – The estimated $51m for this project needs to be confirmed and with reports, design, and others to be finalized by the deadlines indicated, we're hoping that the total figure can be finalized by November.
A13.1: (Mr. Geza) – ADB and WB is hoping that Chuuk provides as much information as possible in support of their component for this project so that everything can be finalized by the deadlines targeted.

Q14: (Sen. Raglmar-Subolmar) – Given that Satawan is being considered to be linked for Chuuk, the cable going for Yap will pass Ulithi on the way to Guam and as a central island in the neighboring islands, Ulithi can also be considered.
A14: (Mr. Johnnyboy) – Ulithi is between Yap and Guam, however the challenge with Ulithi is the trench between Yap and Ulithi.

Additional information from Mr. Johnnyboy – The challenge is possibly holding up this project with completing all of the surveys and assessments for Yap and Chuuk, because an important next phase is the survey to be conducted by the ship with a cost estimated at about $100K/day.

Q15: (Philip Tamag) – What is the timeframe for funding becoming available?
A15: (Mr. Johnnyboy) – Micro-Pal will help with coming up with milestones for the project.
A15.1: (Mr. Geza) – Once the loan is activated, the Project Manager needs to be hired and brought on to work with governments to come up with bid documents, and the assessments to be approved and incorporated into the bid documents.
A15.2: (Mr. Johnnyboy) – Correction, funding has been set aside and is available to hire the Project Manager.

Q16: Follow up by Mr. Tamag – When will the project be completed, what is the timeline?
A16: (Mr. Johnnyboy) – Schedules will be determined and decided with the Project Manager and in consultation with the States.

Q17: Follow up by Mr. Tamag – Will the project take 3-4 years for completion then?
A17: (Mr. Geza) – An estimated timeline of about 300 or so days to lay the cable from Guam to Palau via Yap.
A17.1: (Mr. Johnnyboy) – The project will take an estimated 18 months to be completed, dependent on how the cable is laid.

Q18: (Governor Anefal) – Who does the Project Manager report to or is supervised by?
A18: (Mr. Johnnyboy) – The Project Manager reports to Micro-Pal with their time to be split between Palau and FSM.

Q19: Follow up by Governor Anefal – The Project Manager will be one person, will they have clerical staff or such support?
A19: (Mr. Johnnyboy) – The Project Manager is being focused on now, and he/she will need to rely on officials and others for assistance, however this can be worked out in the Project Manager's contract.

Q20: (Governor Anefal) – I have a recommendation with composition of the State Steering Committee. Governor proceeded to recommend adding representatives from the Yap State Legislature, Chamber of Commerce, Council of Pilung, and the Council of Tamol to the State Steering Committee.

Q21: (Phillip Tamag) – What is the onshore facility after the cable is landed?

A21: (Mr. Garamfel) – The cable once landed will need to be diverted to the Earth Station either through utility poles or underground.

Additional information from Mr. Johnnyboy – The Telecom Act of 2014 grants open access, with FSMTC to operate under this law and Regulatory Authority. Other users have rights to access through open access where FSM Telecom is one carrier that will lease bandwidth from the cable.

Q22: (Sen. Raglmar-Subolmar) – Yap cannot own the cable then?
A: (Mr. Johnnyboy) – That will be up to Yap State in terms of how to organize formulation of managing the cable.

Q23: (Governor Anefal) – I share the concern of meeting deadlines as well and the addition of Satawan to the project impacting the FSM moving forward. We talked about IDA 16 supporting this project and now we are in IDA 17 with the newly discussed addition of Satawan to the project.

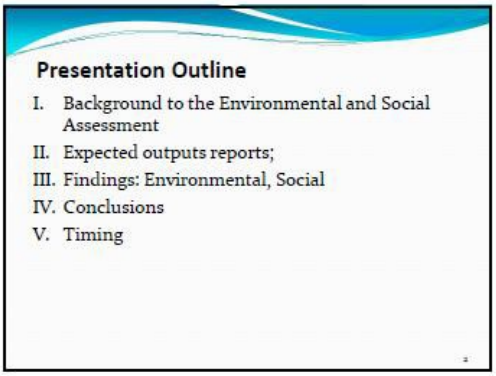
Q24: (Governor Anefal) – Has the issue of possibly coming across mines or ordnances being considered as we came across this before where we had to ask assistance from the US military to come in and detonate ordnances found in the channel.
A24: (Mr. Geza) – UXO specialists will be brought in as part of this project and will note this to be highlighted and included in th and make sure included in the recommendations.

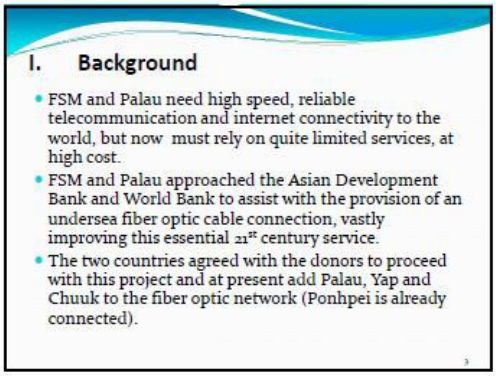
Attendance List-Yap_
Public Consultations
29 July 2014 Yap

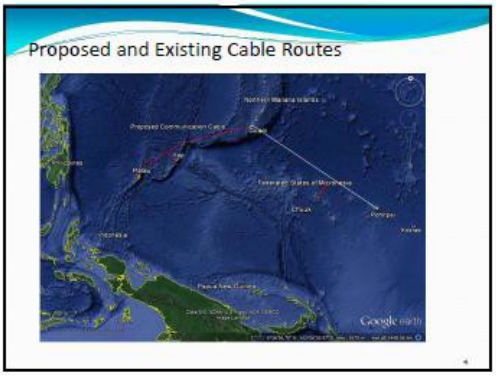
No.	Name	Office/Organization
01.	Christina Fillmed	Environmental Protection Agency
02.	Frank Haregaichig	Dept of Resources & Development
03.	Leona Tamag	Women's Interest Office/Yap Women's Association
04.	Paul J. Ayin	Quality Catch
05.	Sebastian Anefal	Governor – Yap State
06.	John W.K. Fillmed	Dept. of Youth & Civic Affairs
07.	Marie Laamar	Yap Chamber of Commerce
08.	Stella Laamar	Manta Ray Bay Hotel
09.	Vincent Figir	Dept. of Public Works & Transportation
10.	Joseph Giliko	Yap State Legislature
11.	James Yinug	Marine Resources Management Division (Dept of R&D)
12.	George Pong	Yap Fishing Authority
13.	Peter Tharngan	Waab Transportation Company
14.	Peter J. Tairuwepiy	Council of Tamol
15.	Theodore Pong	Maap Community
16.	David Y. Marmar	Tomil Council – Meerur Representative
17.	Steven Mar	Council of Pilung
18.	John E. Mooteb	Tomil Resources Conservation Trust/Yap State Legislature
19.	Dominic Fanasog	Dept. of Education
20.	Aaron Lukan	Yap Cooperative Association
21.	Ray Igechep	Office of Planning & Budget
22.	Dominic Taruwemai	Dept. of Health Services
23.	Vitus Foneg	Tomil Resources Conservation Trust
24.	John Waayan	Division of Land Resources (Dept. of R&D)
25.	Peter Garamfel	FSM TC

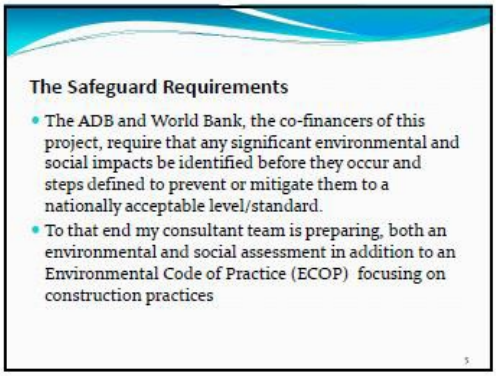
26.	Lorenzo Sartilug	Dept. of Education
27.	Jeffrey Adalbai	Yap Chamber of Commerce
28.	Liyon Sulog	Yap Marina Sports Bar & Grill
29.	Tom Fetan	Yap Chamber of Commerce
30.	Sara Fillmed	United Airlines
31.	Jesse Raglmar	Yap State Legislature
32.	Alphonso Ganang	Village View Hotel (VVH)
33.	Philip T. Ranganbay	Yap Chamber of Commerce
34.	John P. Runman	Yap State Historic Preservation Office (DY&CA)
35.	Katherine K. Gisog	FSM Development Bank
36.	Manuel Maleichog	Dept. of Public Works & Transportation

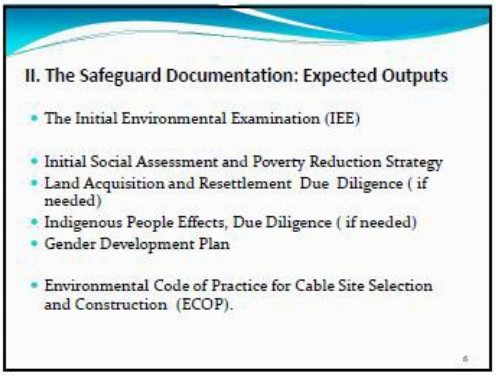
Yap Presentation during public consultation-July 29, 2014











THE CABLE

Deep-sea fibre-optic cable, sectioned to show internal construction; fine strands at top are optical fibres used to transmit data

Source: J.Carter

Source: Rockfall

- Telecommunications cables weigh from 0.7 kg /metre for unarmoured deep-water types (example shown above left) to 4.8 kg/m for cables with two layers of steel armour protection
- Power cables weigh up to 140 kg/m depending upon type
- The picture (above right) shows the composite or "bundled" system of one fibre-optic cable and two power cables, together weighing 67 kg/m, being laid onto the seabed

www.ncpc.org

- ✧ Fibre optic cables are often thinner than coaxial cables. Common outside diameters range from 12 to 50 mm (0.5 - 2 inches).

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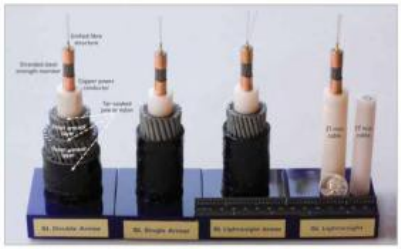
CABLE DIAMETER AND WEIGHT



Note: The shallower the water the more armouring is used

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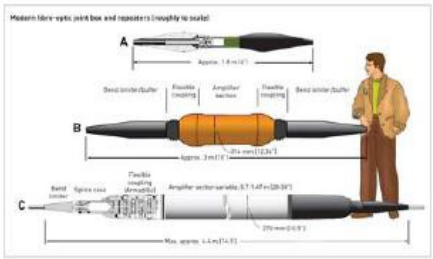

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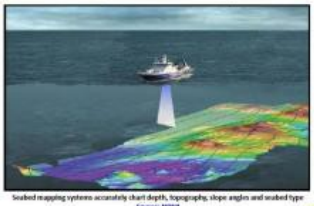
Cable Route Survey

Cable routes are carefully surveyed and selected to minimize environmental impacts and maximize cable protection



Seabed mapping systems accurately chart depth, topography, slope angles and seabed type

Source: NOAA

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Figure 6. Cableship Cutaway

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Cable Burial - 1

- Cables may be buried in a narrow (<1 m wide) trench cut by water jet or plough
- The plough lifts a wedge of sediment so that the cable can be inserted below
- Average burial speed is around 0.2 km/hr, dependent on cable type and seabed conditions

❑ About 4-5 km per 24 hours, but highly dependent on bottom type and need to bury.

Power cable installation using Hydroplow

Power cable installation using Hydroplow

Sources: Center Mariner

www.ncpc.org

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Cable Laying - 3

- As a cable comes ashore it may be suspended by floats and guided into position by small boats and divers
- Floats are detached or deflated and the cable is placed in its final position as determined by the route survey, which in very shallow water may be undertaken by divers
- Picture on left shows the Basslink cable, which connects the Australian mainland to Tasmania, coming ashore suspended by floats to allow guidance into its final position

Source: Basslink

Situation leading to this project

- Since 04/2010, Pohnpei has been connected to the HANDTRU-1 submarine cable system with a link to Guam,
- Chuuk, Kosrae and Yap, still depend on satellite links which are relatively expensive and offer limited capacity.
- Therefore, the fiber optic cable connections, greatly improving the speed and reliability of the internet and telecommunication are being pursued by the Department of Transportation, Communication and Infrastructure (DTCI).

Who Will Administer This Project ?

- Under the oversight of the Micronesia-Palau (MICROPAL) committee, and an appointed international technical project advisor/director, the work in FSM will be executed by:
  - Department of Transportation, Communication and Infrastructure (DTCI); and,
  - The ES Safeguards Services (ESSafeguards) consultant team, is completing these assessments on behalf of the DTCI

Implementing the project at the state level (suggested)?

- Governor's Office: Special Assistant, MICROPAL Proj. Coordinator and:
  - Project working group
    - Dept. of Resources & Development, Division of Lands
    - Dept. of Resources & Development, Marine Resources Div.
    - EPA
    - National Telecom
    - Yap Community Action Program
    - Legislative member
    - Chamber of Commerce
    - Council of Pilung (Chiefs)

Environmental Assessment

- An environmental assessment is underway to
  - identify sensitive components of the natural and social-cultural environment found on the project corridor;
  - Identify any significant potential impacts resulting from the construction and operation of the fiber optic cable system
  - defined the best ways to prevent such impacts from occurring or if that is not possible, to define appropriate mitigative measures to manage the negative effects.

Social Assessment

- The social assessment is under way and is focusing on:
  - identifying potential impacts of the nearshore placement of a cable (4-7 cm or 1.6-2.75" in diameter) on landuse and livelihood, such as fishing and tourism;
  - Defining coastal zone customary ownership impacts of cable routing;
  - Defining Land acquisition requirements at the cable landing site: i.e. any RoWs across private land, access restrictions;
  - Identifying potentially negative social impacts of having high speed affordable internet services; and,
  - Identifying possible gender benefits of the proposed project.

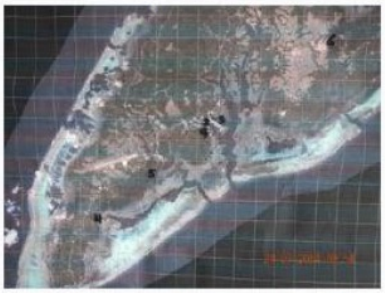
III. Impacts-General

- Burial disrupts the seabed along a narrow path and form turbid water, depending on burial technique, seabed type and wave/current action
- analysis of seabed disturbance from fishing and other activities suggests that impacts are short-lived (months) where waves/currents are active, but possibly longer-lived in deeper, less turbulent water
- cable is brought to shore through shallower water, which contains sensitive coral reef and nearshore marine habitat.
- Cable placement interferes landuse and ownership conditions

Optional Alignments and Landing Sites Considered

- 6 alignments and landing sites
  1. Petrocorp Tank farm area-via the main shipping channel-Colonia
  2. Main shipping channel into Colonia, under bridge into Chamorro Bay and landing West of police and fire station
  3. Marine Resources dock area and storage area
  4. Rull Channel
  5. Behind Yap Public High school using the sea approach between
  6. Gagil Sports facility area

The 6 Optional Sites

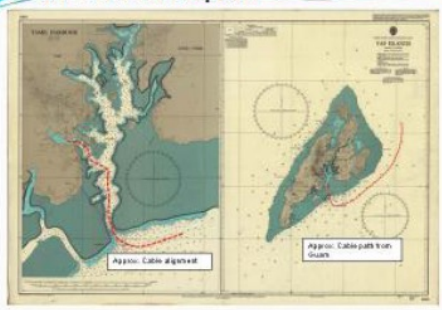


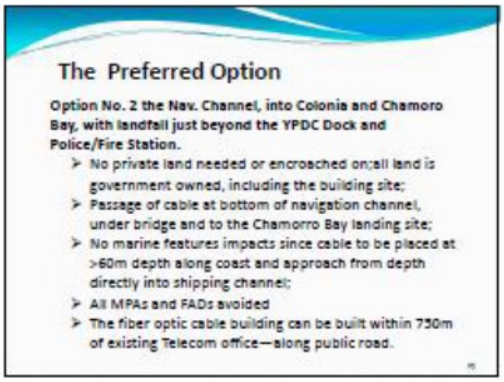
Screening the Options

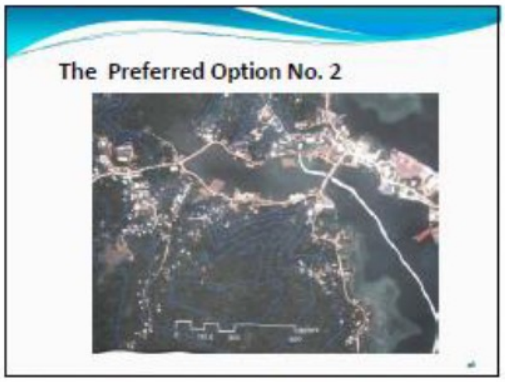
6 optional alignment were examined and screened for :

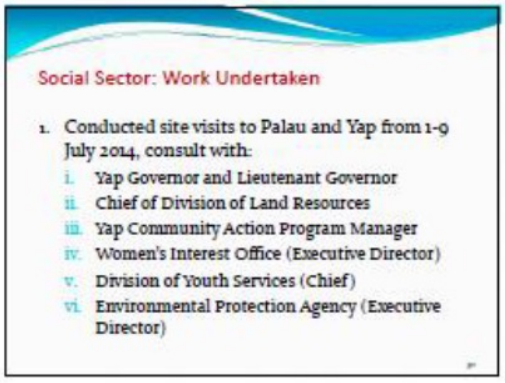
- Least amount of encroachment on private lands;
- Least amount of interference with marine protected areas;
- Least effect on coastal and nearshore marine features;
- Lowest interference with tourism activities and their operations;
- Proximity to the existing telecom facilities.

The Preferred Option









Consultation and Information Session; Presentation Meeting Record and Attendance sheet, Yap February 22 and March 8, 2016

February 22, 2016 Consultation and Information Session list of Attendees:

1.	James Limar	COP-Gilman	jamesl@pacificsbdc.com
2.	John Wayan	Chief of Land Resource	landresources@mail.fm
3.	James Yinug	Chief of Marine Resources	jayinug@yahoo.com
4.	Christina Fillmed	Director of EPA	epayap@mail.fm
5.	Sebastian Tamagken	Media & Protocol	s.tamagken@gmail.com
6.	Peter Gilinug	FSMTC	peter.gilinug@fsmtc.fm
7.	Peter Garamfel	FSMTC GM	peter.garamfel@fsmtc.fm
8.	Chris Chingyan	FSMTC	chris.chingyan@fsmtc.fm
9.	Kevin Gilmoon	DOE	kevingilmoon@yahoo.com
10.	James Neumann	WorldBank TTL	jneumann@worldbank.org
11.	Aaron Warren	FSM Project Coordinator	alw.fsm@gmail.com
12.	Mark DeOrio	FSM ASC	transcom@mail.fm
13.	Tamdad Sulong	private landowner	agricultureyap@mail.fm
14.	James Limar	Magachgil municipal chief	

Consultation and Information Session:
Yap March 8, 2016
Venue: Yap Small Business Development Center

Meeting Overview

1. Opening and Welcoming Remarks by Yap Director of the Department of Youth & Civic Affairs (DY&CA) Francis Itimai
2. Project Coordinator (PC) presentation
3. Question and answer period
4. Review with landowners and chiefs of terms of MOA and voluntary land donation agreement
5. Adjournment for chiefs and landowner to engage in additional consultations amongst extended family and other members of affected communities

Summary of Meeting: prepared by the Project Coordinator at conclusion of meeting (included immediately below)

Attendance: 18 People (sign-in sheet included below)

Project Coordinator Presentation: (included below)

Summary of Meeting on March 8, 2016

After opening remarks by Director Itimai, the Project Coordinator asked attendances to sign an attendance sheet.

The Project Coordinator noted the purpose of having public hearing, and that the hearing is intended to be inclusive of all members of affected communities, not just government officials and not just men. Director Itimai confirmed that public notice was given and that community representatives and chiefs of affected communities are present.

The Project Coordinator presented a Power Point presentation regarding the Yap Cable landing social and environmental impacts. The presentation provided an overview of all associated wet and dry works for the Yap cable landing in Magchgil Yap to the cable landing station.

Potential impacts identified from the Yap cable construction were on sea life, damage to reef area, need to enclose or fence off cable alignment and beach manhole area for life of cable, temporary delays or detours along road easement and noise pollution during terrestrial construction, need to allow access to qualified persons to beach manhole and along cable alignment for emergency and routine repairs for life the cable. Visuals were provided of a cable laying ship, a fiber optic cable, and details showing wet cable laying trenching work. FSM Telecom employees confirmed that they have a trenching machine for terrestrial work that has been previously used in Yap.

The Project Coordinator noted the findings of the March 4, 2016 marine survey for the landing and that no major concerns were identified. The Project Coordinator asked whether there might be any records of unexploded munitions at the landing point or whether any other department had knowledge or information of any FADS, MPAs, fishing or nesting grounds were in the landing zone area. None were identified. Possible impacts during installation on boat traffic and reef activities were identified. It was also asked whether a no anchoring zone could be imposed along the cable route, but noted that there is minimal boat traffic as there is no docking area and boats are prevented from entering the near shore area by the reef. It was noted that an EPA permit application had not yet been submitted and these issues were still subject to review by the Yap EPA.

Particular impacts specific to the activities of women were raised and discussed. These might include fishing and gathering activities on the reef area.

A question was asked about what method, boring or trenching, would be used for the nearshore landing of the cable through the reef area. The Project Coordinator noted that either may be used, but was not yet confirmed by the supplier. Additional information would be sought and provided before construction began. The Project Coordinator also described the dimensions of the beach manhole which would likely be encased in a six by six feet slab of concrete and according to the supplier most likely at the same gradation as the surrounding land. While it may be possible to walk or drive over the beach manhole, it is also possible that it will need to be protected by fencing or other enclosure.

A question was asked about whether some consideration would be given to extension of the seawall along the nearshore alignment as erosion was impacting the shore area. The Project Coordinator noted that the seawall could be extended without impacting the alignment and that contractors would be required to restore and rehabilitate the shore area to the extent reasonably required to protect the habitat and ensure the security of the cable system.

There was some discussion as to the types of machinery that would be used for wet and dry installation and how wide and how deep the trenching work would be. The Project Coordinator indicated that these were technical questions that had not yet been specifically determined for landing the Yap cable, but that typically the closer to shore and terrestrial works required a deeper dig than deep water cable laying. The trenching would be minimal but if trenching rather than boring was the determined method for the nearshore reef area, it could require clearing a corridor of at least a few feet wide through the reef.

The Project Coordinator reviewed the terms of the proposed land donation agreement and MOA for the landing area. The Project Coordinator indicated that the agreements were completely voluntary and that additional time and due opportunity would be allowed for the interested persons and affected parties to review the agreements within their families and communities before signing.

The Project Coordinator indicated that the land donation agreement and MOA were not legally binding agreements and that for the project to progress further legal easements would be required along the cable alignment area. Yap state officials indicated that from the beach landing, the cable would run along a public road easement to the landing station.

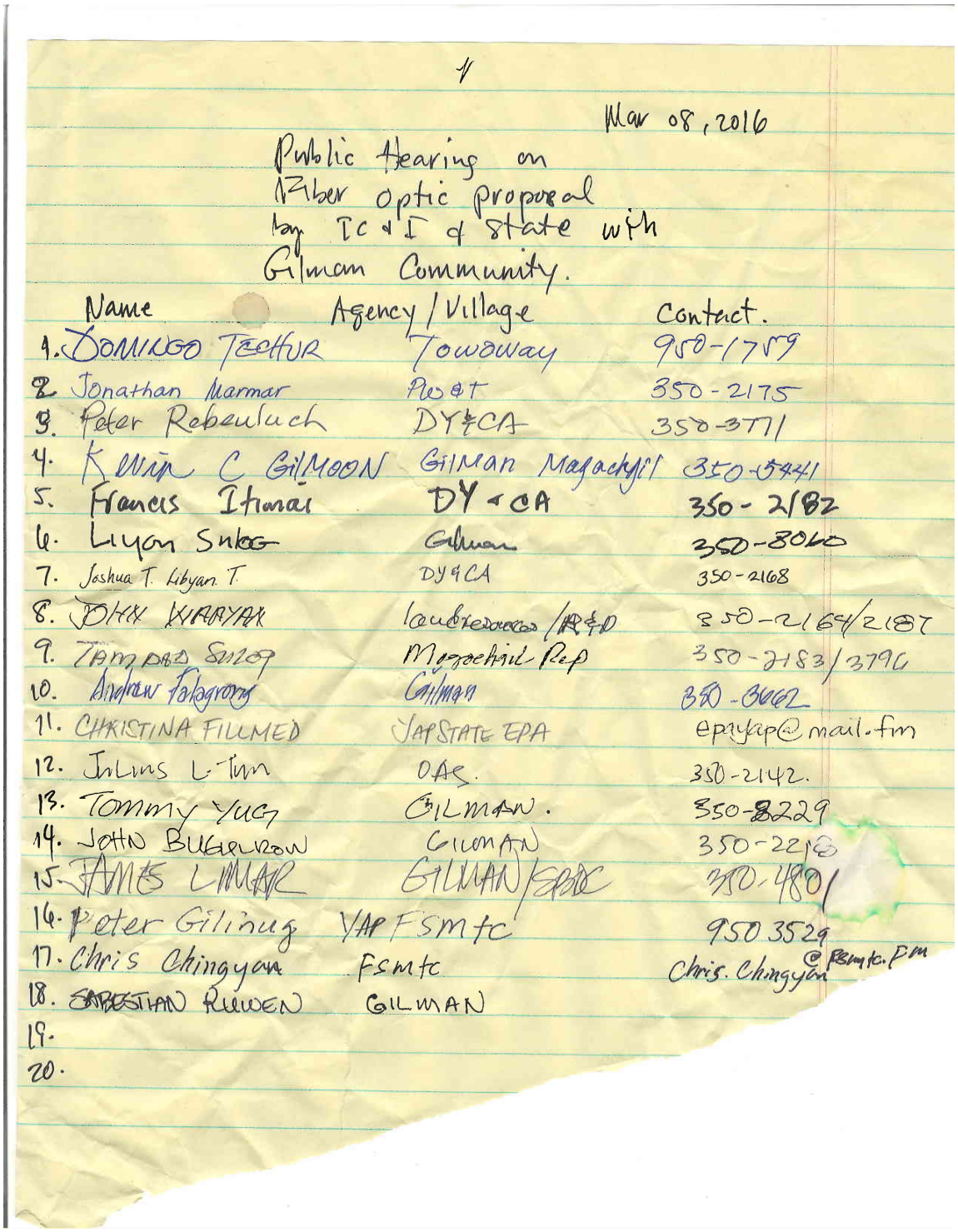
The Project Coordinator provided information and links to the Grievance Redress mechanism that is in place for the construction period and provided an overview of the proposed implementation arrangements for the cable, including the Project Coordinator and DTC&I support, a technical project manager, and a safeguards specialist to monitor compliance with the

ESMP.

The meeting began at 9 a.m. and ended at 11:30 a.m., March 8, 2016.

March 8, 2016 Public Hearing Sign-In sheet

1



Mar 08, 2016

Public Hearing on
Fiber optic proposal
by IC & I & State with
Gilman Community.

Name	Agency / Village	Contact.
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5. Francis Itimai	DY & CA	350-2182
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7. Joshua T. Libyan T.	DY&CA	350-2168
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9. TAMARA SULOG	Magachgil Rep	350-2183/3796
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FSM Telecom Sector Reform Project

Yap Cable System

March 8, 2016

Environmental and Social Assessment Study

Yap Cable System Overview

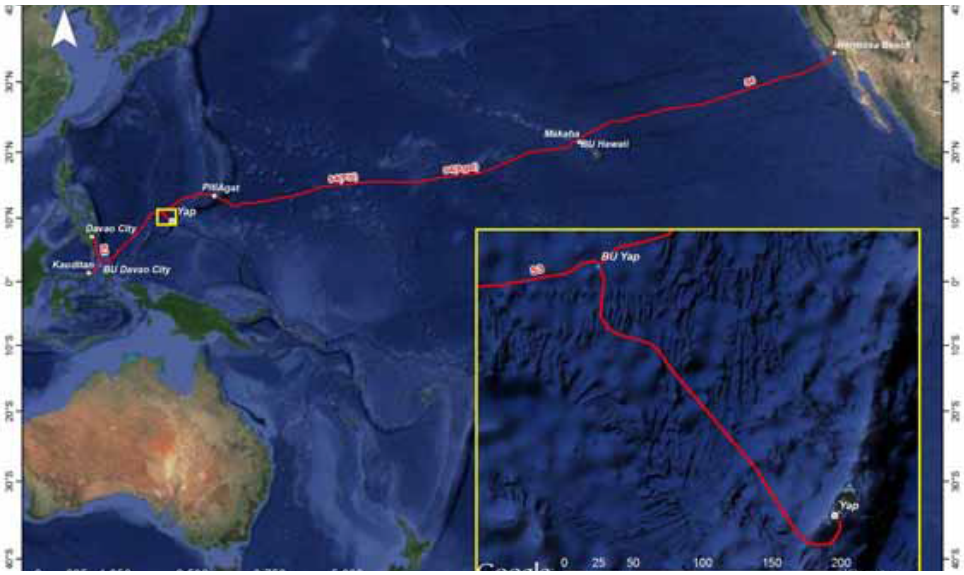
The purchase of a fiber optic cable system for Yap State is made possible through World Bank grant funding administered by the FSM Department of Transportation, Communication, & Infrastructure.

Yap Cable System Contracts

- There are two contracts for the Yap Cable System
- FSM is contracting with SEA-US West party Telin for wavelength capacity on SEA-US main trunk from Guam
- FSM is contracting with SEA-US supplier NEC for the Yap spur

SEA-US Cable System

Yap Spur on SEA-US System



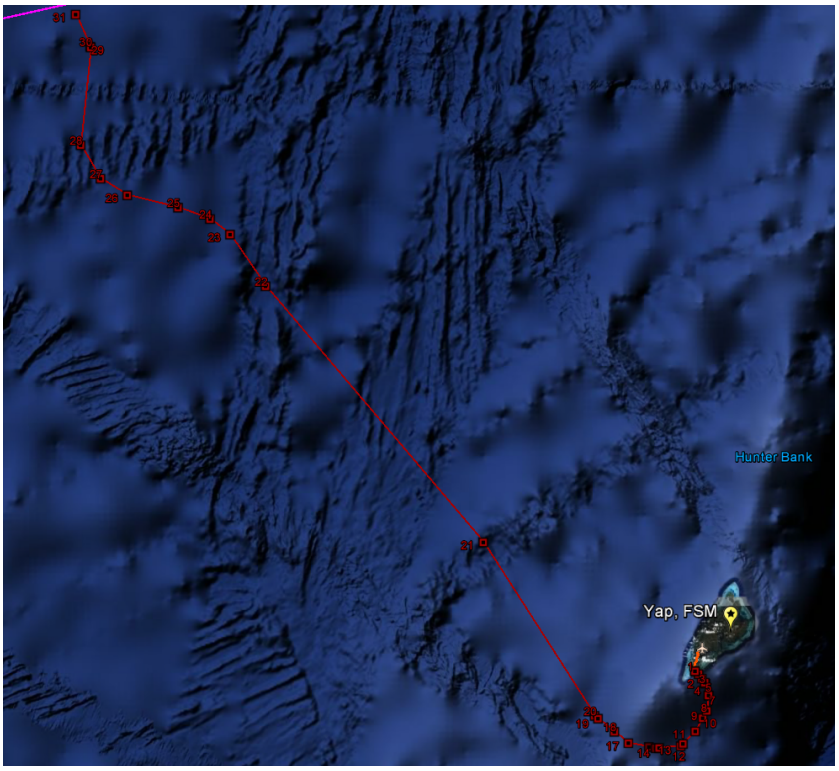
Yap Cable System Key Dates

- NEC desktop study results in February, 2016
- Contracts for Yap Cable System now up to World Bank for clearance
- CIF date end-March 2016
- Wet Construction by NEC Summer 2017
- Ready for Service Fall 2017

Yap Cable System Configuration

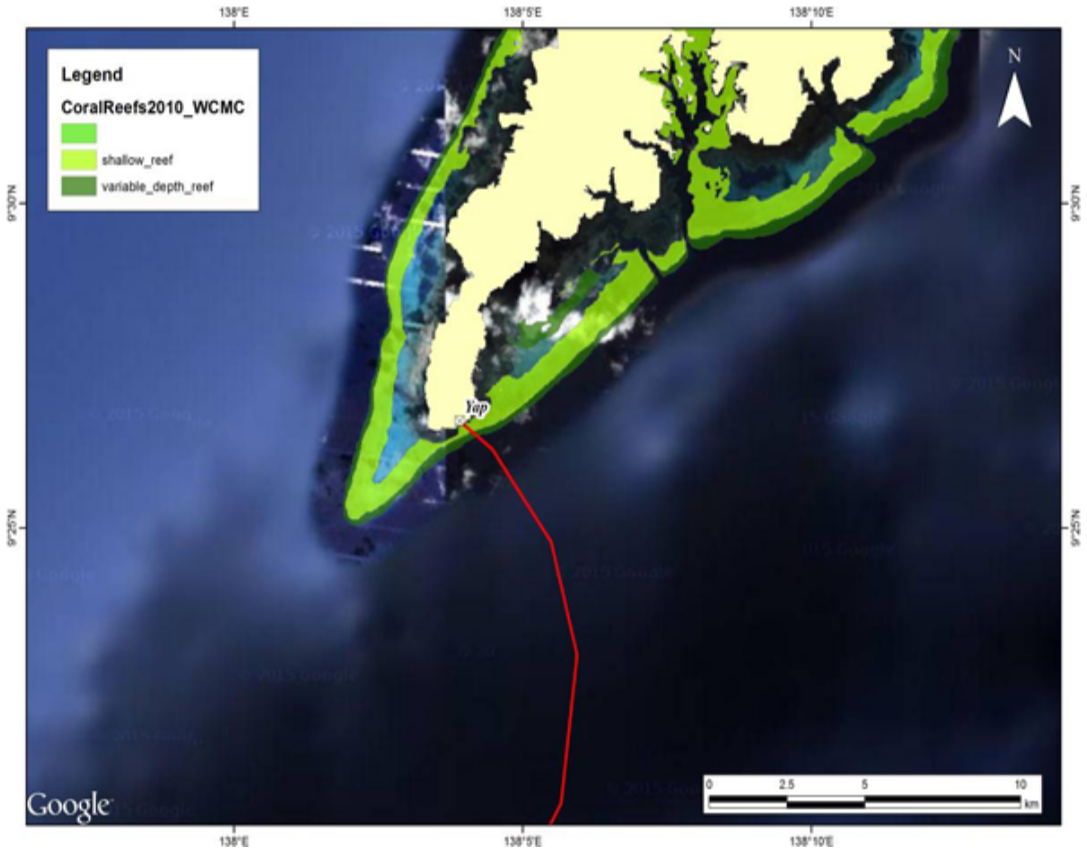
- Routing and landing is based on recommendation of SEA-US supplier NEC
- The landing at Magachgil requires additional due diligence since it was not considered when the Initial Environmental Examination (IEE) was prepared for the project

Yap Spur Route – as per NEC Planning in its Desk Top Study



Yap Spur Route – as per NEC Planning

Location of Landing point and beach man hole



Landing Point

450 metres (approx.) from shore to outer reef at landing point

LANDING POINT FEATURES

Marine Survey of Landing Zone reef area conducted by Yap Marine Resource Management (3/4/16)

Edge of reef is shortest possible from shore– approx. 450 metres

No FADs or protected fishing or nesting areas

No wrecks or historic preservation areas identified

Minimal boat traffic—no anchoring zone is recommended

No unexploded munitions (no known survey yet conducted)

No existing residential or commercial development

Area is affected by extreme weather—LP and BMH area covered by water during strong typhoons

The proposed route for the landing of the Yap Spur will require a crossing of a small section of reef. Installation of the Yap Spur will need to consider the effect of the unavoidable crossing.

Methods of installation are either boring or trenching through reef

Fiber Optic Undersea Cable

Deep-sea fibre-optic cable, sectioned to show internal construction; fine strands at top are optical fibres used to transmit data

Source: L.Carter

Source: Basslink

- **Telecommunications cables weigh from 0.7 kg /metre for unarmoured deep-water types (example shown above left) to 4.8 kg/m for cables with two layers of steel armour protection**
- **Power cables weigh up to 140 kg/m depending upon type**
- **The picture (above right) shows the composite or "bundled" system of one fibre-optic cable and two power cables, together weighing 67 kg/m, being laid onto the seabed**

www.iscpc.org

Cable Burial - 1

- Cables may be buried in a narrow (<1 m wide) trench cut by water jet or plough
- The plough lifts a wedge of sediment so that the cable can be inserted below
- Average burial speed is around 0.2 km/hr, dependent on cable type and seabed conditions

Power cable installation using *Hydroplow*

Power cable installation using *Hydroplow*

Sources: Center Marine www.iscpc.org

What are Potential Environmental and Social Impacts to be Considered from Cable landing?

Impact on reef is minimal, but portions of the reef may be broken or disturbed during installation. Also, the Cable imposes a burden on community to protect the cable from damage and ensure it is properly maintained during its life (25+ years)

To assess impacts need to ask:

- What is reef used for and how will those activities be affected? E.g. Fishing, gathering, transit in reef area may be disrupted.
- What activities on the reef are there by women? Are the impacts on those activities understood and acknowledged?
- Will the cable be secure from damage and maintained for life of cable with safeguards in place (e.g. no anchoring zone, fenced off BMH area, access granted for routine and emergency maintenance and repair)

Terrestrial Route from BMH to CLS

- The terrestrial route will be an entirely new route, requiring new infrastructure.
- The cable will be buried within ducts for security.
- About 6.5 kilometers on the existing road easement from BMH to CLS
- Construction to be coordinated with wet works

Yap Spur Route – terrestrial landing and route to Cable Landing Station

Beach Manhole location

Yap Cable Landing Station Proposed at
existing FSMTC Sub Station

Possible Refurbishment of Building at FSMTC Sub Station for Cable Landing Station

Installation of Terrestrial Work requires trenching along public road easement

Work should be within existing easement, but noise, dust, temporary detours and delays may occur that impact surrounding community

Notice and information regarding impacts particularly around entrances to schools, churches, and other public facilities will be provided

IMPLEMENTATION ARRANGEMENTS

Implementation Stage Project Manager will work under implementing agency (DTCI/ FSMTC)

Safeguards Monitor on site during cable installation

Grievance Redress Mechanism is Provided for in the *Initial Environmental Examination* (IEE), as amended, available at the DTC&I web-site (http://www.ict.fm/communications.html)

DTCI Project Coordinator
Aaron L. Warren
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691-925-4334, 691-320-2865

Questions

MOA and Voluntary Land Donation

The article below was published by the Yap State Government on March 11, 2016 regarding the March 8, 2016 public hearing for the Magachgil landing. It is available at the Yap State web-site:

http://us9.campaign-archive1.com/?u=9640342ddd234c5a7381e57a2&id=c20f4a98de

Submarine Fiber Optic Cable Project Coordinator Briefs Yap State On Project Status, Environmental Assessment

COLONIA, Yap (*Civic Affairs*) — On Tuesday, March 8, 2016, the project coordinator of the FSM Telecommunications Sector Reform Project met with stakeholders in Yap State. The meeting was held at the Yap Small Business Development Center multi-purpose facility in the morning, beginning after 9:00AM.

Project coordinator Aaron L. Warren of the FSM Department of Transportation, Communication & Infrastructure (TC&I) met with stakeholders from the state government, FSMTC and communities, to provide an updated briefing of the project's status and to present the environmental and social assessment study.

This meeting was stated to be the last phase on environmental and social safeguards, but meetings concerning advancing the project will be continually held afterwards. On Monday, Mr. Warren met and briefed the Office of the Governor; Mr. Warren has also been in Yap several times in the past weeks to finalize plans for the landing of the Yap cable system.

The meeting began with introductory remarks by the newly appointed head of the Department of Youth & Civic Affairs (DY&CA), Director Francis I. Itimai. Mr. Warren then launched into his environmental and social assessment study presentation.

The configuration of the Yap cable system has changed since its initial planning. For one, the initial plan was to have the Yap spur of the submarine fiber optic cable routed via the channel to Tamil Harbor and landed in Colonia before connecting to the FSMTC Yap branch. Based on the recommendations made by the SEA-US cable supplier NEC—which visited Yap last December—the new routing and landing configuration will be at the southern end of the Yap Main Islands. Instead of surfacing at Colonia at the east-central side of the Yap Main Islands, the new plan will have the cable landing at Magachgil, Gilman Municipality; this alternative would be less expensive and may save the project about $6 million dollars.

Because of this recent NEC recommendation, additional due diligence was required because the alternate routing and landing was not considered when the Initial Environmental Examination (IEE) was prepared for the project. The series of meetings in Yap sought to remedy this. More information on the IEE is available at the TC&I website: *http://www.ict.fm/communications.html*

The Yap cable system would connect to the main SEA-US (Southeast Asia – United States) cable system via a spur. The submarine SEA-US cable system is under construction by NEC as of April of last year, and will span the Pacific Ocean from Los Angeles in the US to Manado, Indonesia, with landings in Hawaii, Guam and the Philippines in between.

According to the new NEC plan, the Yap spur will be routed from its connection to the SEA-US cable northwest of the Yap Main Islands, down south and up towards Gilman Municipality. The Yap spur will then cross a section of reef closest to the coast before landing on the shore of Magachgil. From its landing, the terrestrial route would follow

the main road up the island towards the old airstrip before being linked to a proposed cable landing facility at the FSMTC substation.

In his environmental and social assessment presentation, Mr. Warren displayed the route of the Yap spur, then outlined and discussed with the stakeholders the landing point features of the cable.

After a marine survey of the landing zone at the reef area was conducted by the MRMD (Marine Resources Management Division of the Yap State Department of Resources & Development) on March 4, 2016, it was found that:

1. The edge of the reef targeted for the cable's crossing was the shortest possible from shore—approximately 450 meters (1,476 feet)
1. There were no FADs (fish aggregation devices) or protected fishing or nesting areas
1. No wrecks or historic preservation areas identified
1. Minimal boat traffic (a "no anchoring zone" was recommended)
1. No unexploded munitions (no known survey, yet)
1. No existing residential or commercial development
1. The area is affected by extreme weather (the spur's landing point and proposed beach manhole would be covered by seawater during typhoons)

The meeting discussed these points, and the stakeholders made some points that 1) an archival, post-WWII munitions survey may be available for the area, it was just a matter of finding it, and 2) Mr. Warren understood that the area may be inundated in severe weather conditions, but assured the stakeholders that the cable and supporting landing structures would be safe. The proposed route of the landing of the spur will require a crossing of a small section of the reef—from the open ocean into the lagoon; methods of crossing discussed were either boring through the reef or trenching.

Mr. Warren's presentation highlighted that the impacts on the reef should be minimal, but portions of the reef may be broken or disturbed during the installation. Another point of concern made by Mr. Warren was the potential burden the cable might have on the community, in terms of the duration of construction, to the impacts on communal activities in the cable's vicinity and the cable's maintenance during its 25+ operating lifespan.

The terrestrial route of the cable would require new infrastructure, from its landing at a proposed beach manhole in Magachgil, and cable-burying within ducts beside the 6.5km (4 miles) of road to the proposed cable landing station at FSMTC's facility. The construction of the terrestrial route would be coordinated with the wet works. The installation of the terrestrial route would be constructed within the existing road easement, but temporary interferences to the public may occur for the duration of construction; notice and information regarding impacts would be provided beforehand for the public's sake.

After his presentation, Mr. Warren spoke with the community representatives at the meeting concerning the voluntary land donation and other property-related matters for the cable landing in Magachgil. The landowners of Magachgil have collectively allowed for the landing of the cable in their property, before it crosses over to the public easement of the main road.

The Yap cable system, specifically the purchase of the submarine fiber optic cable, is made possible through funding by a World Bank grant, administered by TC&I. There are two contracts for the Yap cable system: 1) the FSM is contracting with SEA-US

West party member Telin for wavelength capacity on the SEA-US main trunk from Guam, and 2) FSM is contracting with SEA-US supplier NEC for the Yap spur. The contracts for the Yap cable system is now up to the World Bank for clearance. Wet works by NEC is expected to begin in the summer of 2017, and the cable system would be ready for service by fall of the same year. It is hoped that the cable system for Yap would increase the islands' available bandwidth (e.g. 38Mbps to 20,150Mbps), as well as cut costs of internet access in the long run. For more information on the World Bank grant for the project, visit the project page at:
http://www.worldbank.org/projects/P130592/?lang=en&tab=overview

The Chief of Media & Protocol, Mr. Sebastian F. Tamagken of the Yap State Department of Youth & Civic Affairs (DY&CA) has been appointed as the state focal point in coordination with the Mr. Warren. For more information or clarifications, contact DY&CA or Mr. Warren at Email: alw.fsm@gmail.com

Consultation and Information Session; Presentation Meeting Record and Attendance sheet:

Chuuk

Note: These minutes are abbreviated as no state staff was available to assist with minutes. The consultants recorded observation, questions and answers-

WB/ADB: Mr. Geza Teleki (team leader) and Ms. Luisa Lulu Zuñiga-Carmine-Social Sector Specialist and Steve Lindsay, Marine Ecology Specialist, Consultants.

FSM TC&I: Mr. Jolden Johnnyboy

FSM Telecom Yap: Mr. Peter Garamfel

Date: August 6, 2014, at Truk Stop Hotel Conference Center, Weno, Chuuk State

Meeting Overview

1. Opening and Welcoming Remarks by Jolden Jonnyboy at 9:15am.
2. Remarks and Introduction of WB/ADB Consultants by Mr. Johnnyboy
3. Presentation of FSM- Palau Fibre Optic Cable Project by Mr. Johnnyboy
4. Chuuk Component Presentation by Mr. Geza Teleki with assistance from Ms. Carmine and Mr. Lindsay
5. Question and Answer Session
6. Adjournment at 11:15am.

Attendance: 32 People (see list for details)

Questions and Answers throughout the Consultation:

1. Internet use issues with public information, people trafficking, pornography etc.
2. Comment with interaction of normal vessels entering the Northeast Passage. Concerning usage with commercial vessels?
3. Life span of the cable? 25-30 years.
4. Issues with radioactive, issues with cable affecting marine live? No issues certainly not radioactivity, no power issues, hazardous materials etc. Discussed the issue with pollutions from the boat GCF or hitting reefs etc.

5. Social impact on cable associated with telecommunication to other islands within Chuuk State? Domestic systems not included in this activity. Will it be delivered etc?
6. Depth of the cable how it is positioned within the lagoon. Restated information already provided. Concern about ongoing sand mining-dredging locations, these sites need to be identified so no impacts. We need a map to identify these sites. EPA regulates these activities-so they know exact locations.
7. Ownership issue on land and water. Commercial issues for the laying the cable, Attorney General's office. Easement in the water? Having people to wave these issues. This will be an issue, but AG and deputy Governor Chuuk state indicated it would be dealt with internally. It is a domestic issue. A letter of agreement will be developed.
8. Comment on elevation of the terminal site. Land ownership not a problem.
9. Comments associated with Telecom ownership on land for the cable, will they be willing to allow competition using the cable. Sharing the service provider. The new law passed recently explains this. Internal State concern – needs more internal FSM national and State government discussions. Equal access bases. Joldon explained the law most understand now. Needs to be sorted out. FSM will take this lead in due time.
10. Geza brought up importance of the IEE and other safeguards documents will be signed off by the States therefore must review since it wil become a legal requirement. Our role is to provide the information for the States.
11. Domestic cable issues – Big issue and many comments. Much interest of connection of other islands within Chuuk lagoon and the islands of the State. The state government needs to make a call on these domestic issues.
12. Some discussion based on FSM roles and States – more awareness and understanding needed. This will come as promised by Jolden .
13. Identified the cost sharing arrangements of the WB IDA Grant for FSM;
14. Any pollutions issues with the cable when sitting in the oceans. No electromagnetic or hazardous materials issues with the new cable.
15. Tangle of fishing gear with cable.
16. Issues with theft of cable, damage etc.
17. The state committee needs to address much of the above.

Chuuk Attendance Sheet

CHUUK PUBLIC CONSULTATION 6 July 2014

NAME	POSITION	ORGANISATION	CONTACT
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2. Jolden Johnnybay	FSM TC+I	Advisor 4 TC+I	transcom@mail.fm
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4 Geza Teleki	ADB Consult.	"	gteleki@sympatico.ca
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17 MARK DeORIO	FSM TC&NI	FSM NATIONAL GOV'T	transcom@mail.fm
18 SISINIO WILLY	Chuuk ODA		swilly chuukdco@yahoo.com
19 (copy of presentation)			

CHUUK PUBLIC CONSULTATION
6 July 2014

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(17) JAVIER CUETOS-BUENO	RESEARCHER	PACIFIC MARINE RESOURCES INSTITUTE	JAVIERCUETOS@GMA 932-4065
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(19) LEON FRED	INSPECTOR		
(20) Jason S Poll	Deputy	PLANNING (DAS) EPA	931-1442
(21) TR Mori	IT Support	i Solutions Micronesia	3304158 4159
(22) Joshua Mori	Volunteer	Int. Org for Mig.	3307554
(23) Jennifer Killion	Senior Program Assistant	IOM	330-8580
(24) Gracelyn Shirai	Program Assistant	IOM	330-8580
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(26) Joe N. Suka	~~CVB~~	CVB	330-4480
(27) Malon Etop	Gov. Office	OCO	330-2234
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Annex 3
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Yakbay, Arnold	Admin, Department of Health		
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Tarum, Vincent	Director, Department of		

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Nitagyon, Geraldine	Small Business Center	350-4801	
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Lukan, Aaron	Yap Cooperative Association	350-8324	
Laamar, Marie	Yap Chamber of Commerce	350-8990	
Muguy, Augustine	Techstar Works	350-8324	
Ganang, Al	Village View Resort	350-4679	
Forau, Tom	Manager, Statistics Office		Sboc.fm

LIST OF PEOPLE MET: Chuuk

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Ishmael Mikel	Environmental Protection Agency	931-3372	
Enjoy Rain	Executive Director, Marine Resources Department	330-6729	
Ana Sipenuk	Public Affairs	330-2281	
Peter	Land Management Chief		
Mark Waite	Government Representative		
Mino Mori	FSM Telecoms		
Kiki Stinett	Chuuk Women's Association		
Hon. Innocente Oenisom	Speaker, State Legislature	330-2382	
Hon Mark Mailo	President, State Legislature	330-4283	
Camilo Noket	Chief Justice/Iras Village Chief	330-2175	
Gardenia Aisek	Executive Direcor, Chuuk State School System	330-5430	Gardenia.aisek@gmail.com
Bill Stinett	Chamber of Commerce		
Redlley Killion	Vice President and Chamber of Commerce, Chuuk State		
Paul Howell	Water & Sewers Operations Manager		
Peter Attein	Head, Land Management		
Jennifer Killion	Senior Program Assistant, International Organization for Migration (IOM)		
Virginia Mamangon	PC Counselor, College of Micronesia (COM)		

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Macleen Remit	Secretary, COM		
Kaum Assio	CRD Agent, COM		
Mike Abbe	Coordinator, CRE, COM		
Jayleen Kokis	Library Assistant, COM		
Ben Akkin	Project Manager, COM		

Annex 4.
Marine Ecology

This Annex includes the detailed marine survey results for both Yap and Chuuk States, FSM and also supporting material in support of the conclusion defined in the IEE. The following tables clarifying and further defining the findings are included in this annex:

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

2. **Table A4.2 List of relevant conventions and treaties associated with the marine sector of the FSM.**

3. **Table A4.3 FSM membership to international and regional organizations associated with the marine sector.**

4. **Table A4.4. Conservation Areas of Yap and Chuuk States.**

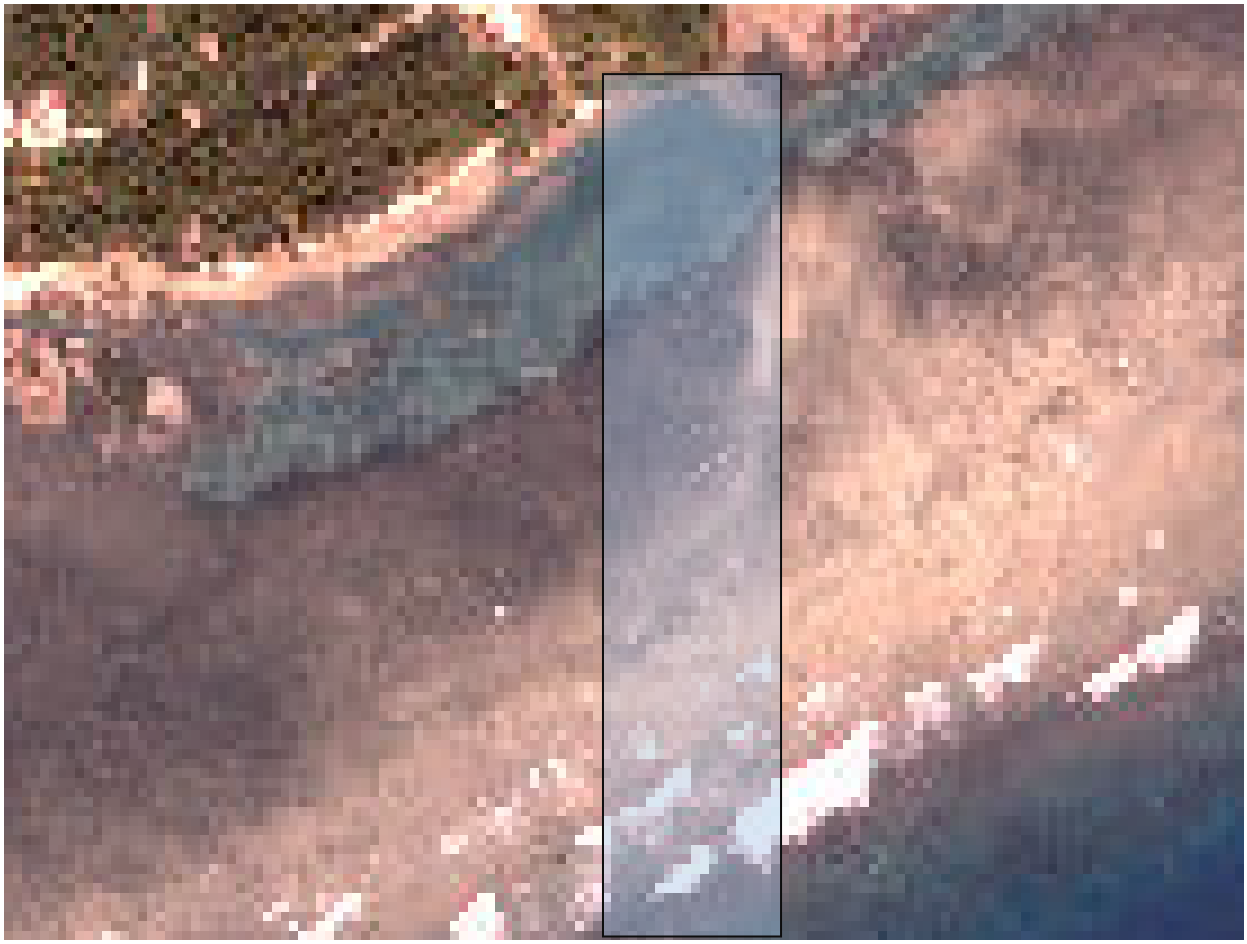
1. Methods

The marine assessment utilised standard and acceptable international marine biological methods. The project team's marine ecologist conducted the original assessment with assistance from staff from Yap Pacific Divers in Colonia, Yap and Department of Marine Resources in Weno, Chuuk[27]. The March, 2106 assessment of the Magachgil landing was conducted by the Yap Resource Management Division. Spot surveying utilized a mixture of free-diving, snorkeling, and scuba diving. With these techniques, these surveys provide a general description of the reef systems and benthic habitats/sea floor in close proximity to the proposed cable alignment.

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

The Yap Marine Resource Management Division completed the marine survey of the nearshore landing zone area for the Magachgil landing on March 4, 2016. (Figure 1). Within 450 metres of the shore, the cable alignment enters deep water, which is beyond the scope of the assessment. During the September 2014 site assessment of the routing through Chuuk Lagoon, seven (7) sites were assessed along the inner-lagoon alignment. (Figure 2),

[27] Project team leader also participated in the Chuuk survey



Proposed Landing Site for the Fiber Optic Cable. Shaded area has been surveyed by Yap MRMD.

Figure 1. The locations of the nearshore landing zone for the proposed cable alignment in Yap Proper, Yap State, FSM.

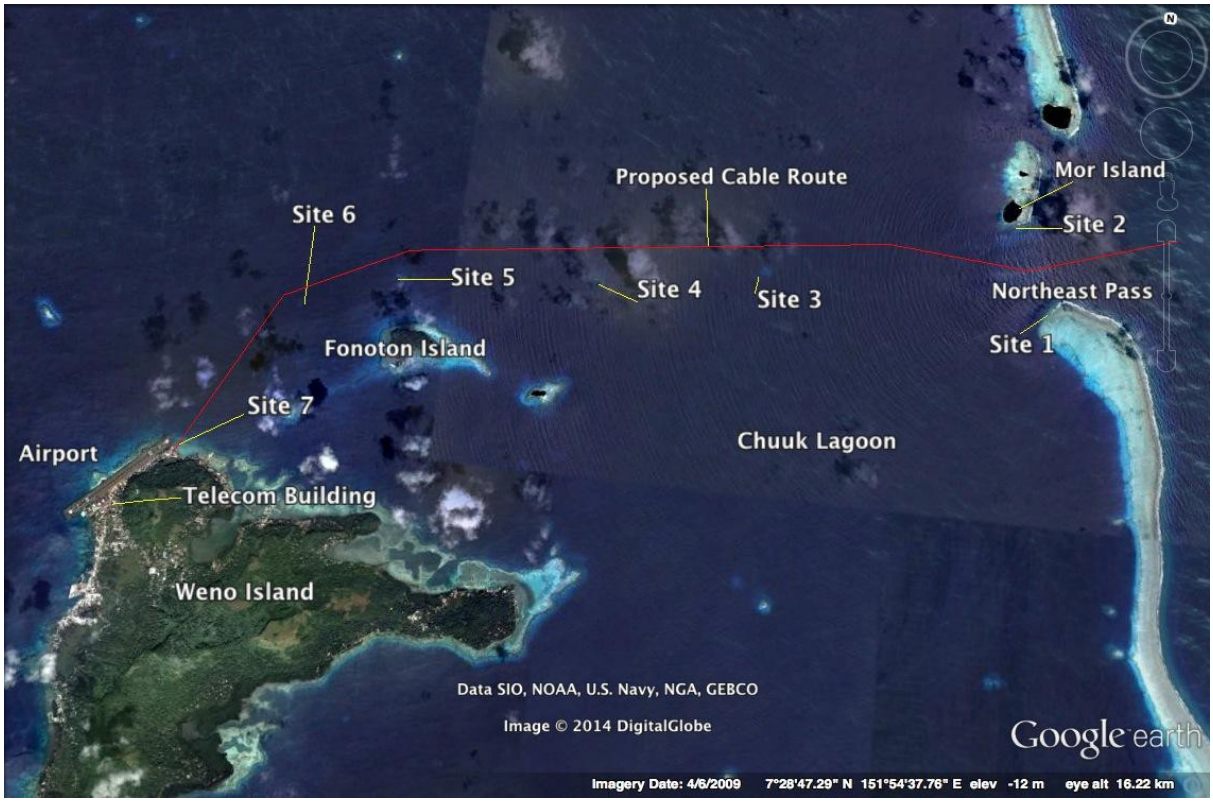


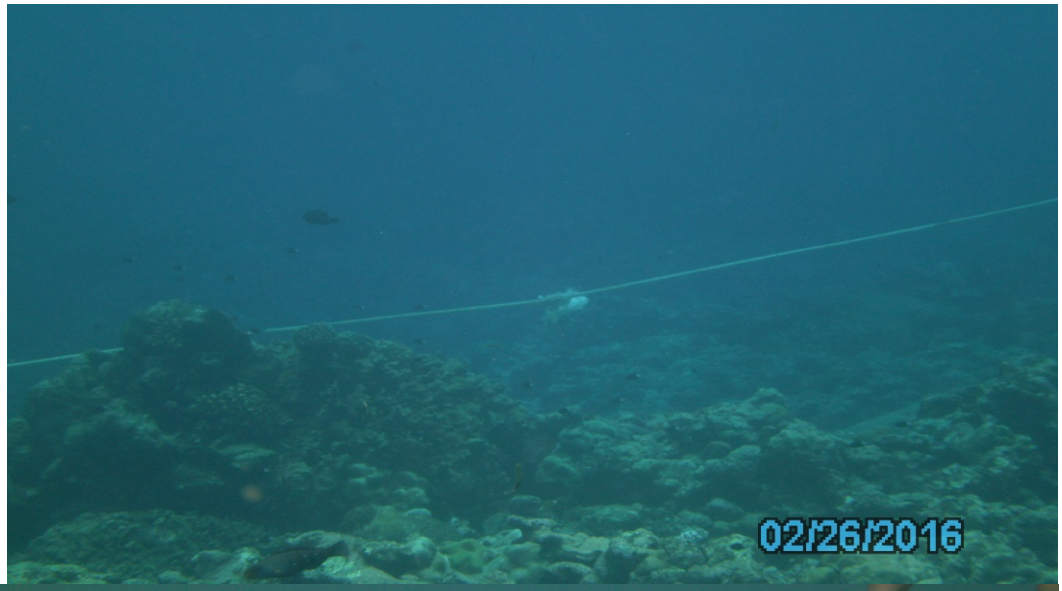
Figure 2. The location of each field site in relation to the proposed cable alignment in Chuuk Lagoon, Chuuk State, FSM.

2. Coastal Zone: Nearshore Shore Baseline Conditions Reef Assessment

1. Yap

The area surveyed was in Magachgil, Kanifay, Yap State. The proposed landfall location at this point is some 450m from the outer reef. This is the closest point to the outer reef on the entire Island. Deep water is reached quickly as the route crosses the 200m, 500m and 1000m WD contours in quick succession at KP1.29, KP2.8 and KP4.2 respectively. The proposed landing point position, recorded by hand-held GPS is **09°26.632' N, 138°03.933.** On two consecutive days, February 25, and 26, of 2016, three staff from Marine Resources Management Division, namely Xavier Jibemai, Damasus Mailing, and Martin Kenmed conducted a survey of the general area to identify sensitive areas and assess the general habitat in the area. The first day of the survey was concentrated on the Reef Flat, from the surf breaker all the way to shore. The second day of the survey was focused on the outer reef, slope reef down to a wall and deeper water. The assessment purpose was to observe what existed in the waters of the proposed landing site and to note any species of marine life that is observed.

The first day of survey was conducted by establishing a clear line of sight from shore or beach and stretched approximately 600 meter outwards toward the breakers. A reference flag was planted on the beach, the proposed landing site, and a 25 footer Yamaha double deck fiberglass boat was moored on the outside of the reef to serve as ending reference for the reef flat survey. GPS coordinated were recorded at both ends of the established line. Surveyors with mask, fins, snorkels, data recording form, and a quadrant, swam the 600m line placing the quadrant surveying tools every 10 meters apart, on alternative sides of the established reference line. Data of what was found within the quadrant tool were being noted and recorded. Survey commenced from beach, proposed shore landing site, to the breakers, the edge of the sloping reef. The total area surveyed was approximately 12000 square meters. The pictures below show the survey area and details of the flat reef area.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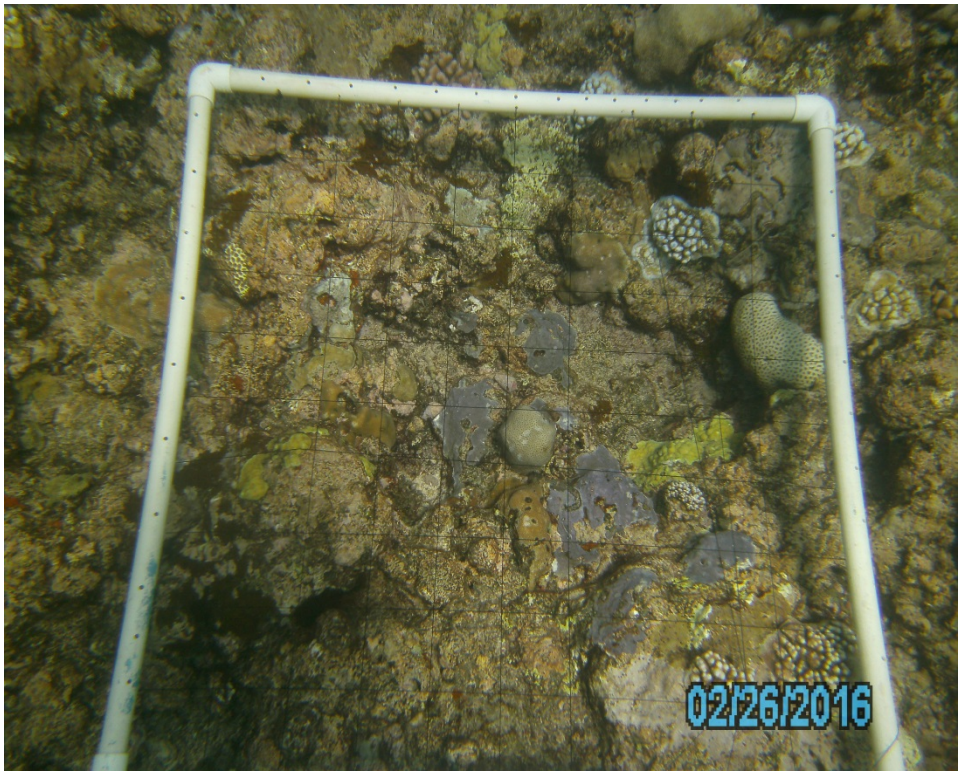

On the second day, SCUBA gears were used to survey the deeper areas outside of the breaker zone. The same survey method, as the previous day, was used except SCUBA gears were used instead of snorkeling gears. The beginning of the survey commenced at approximately 90 feet(28 meters) and up to 7 feet (2 meters), which places the coordinate right outside of the breaker point.

As a result of the first day of survey, Reef Top Survey, the following are produced:

Habitat Type and Invertebrates	Coverage (%)
Sand	20%
Sea grass	5%
Rubbles	19%
Boulders	6%
Clams	1%
Calcium Carbonate	40%
Live Corals	6%
Dead Corals	3%
Sea Cucumber	0

As a result of the second day of survey, Outer Reef Survey, the following are produced:

Habitat	Coverage (%)
Live	56%
Dead	32%
Soft	5%
Calcium Carbonate	7%

This following table is the distribution of the live hard corals and by species.

Live Hard Corals Distribution by Species	Distribution (%)
Porites	13%
Galaxea	9%
Hydnophora	9%
Astreopora	7%
Echinopora	3%
Montipora	7%
Lobophyllia	4%
Goniastrea	4%
Leptoria	5%

This following table is the distribution of the soft corals and by species.

Soft Corals Distribution by Species	Distribution (%)
Alveopora	1%
Euphyllia	2%
Heliophyllia	3%

Reflecting the findings of the two surveys the Yap Marine Resources Management Division (MRMD) concluded that only 12% of the reef flat is considered living whereas the remaining 88% consist of mostly calcium carbonate and sand. The outer reef however comprised of 61% live hard and soft corals, the other 39% is mostly dead corals. This concludes that the reef flat is in a much degraded state and the outer reef in a good healthy state. Additional information is provided in the recommendation below on how work can be implemented with minimal damages to the 61% of the live environment within the outer reef and reef slope. The pictures below show the mixture of coral and sediment and sand at the reef flat and outer reef area.

In concluding its marine survey of the Magachgil landing site, the Yap MRMD recommended that should there be any trenching activities on the outer reef the project proponents consider the natural cut/valleys on the reef areas. These natural cuts/valleys extend from beyond 100 feet (33 meters) up to 7 feet (2 meters) spanning 3 feet (1 meter) to 6 feet (2 meters) wide and contains minimal marine life growth at the bottom. As a matter of observation of the general cuts/valleys, 95% bottom coverage of the trenches is calcium carbonate and sand. This would ensure fewer damages on the marine resources in the general area.

2. **Chuuk.**

All assessment sites were undertaken on the reef systems either within or adjacent to the cable area of influence. Figure 2 provides the location of each assessment site and they are described below:

Chuuk States Commercial Shipping Channel-Overview

1. The proposed cable alignment will enter the State's Northeast passage and follow the commercial shipping channel that passes north of Falo Island and terminates on land at the south eastern corner of the airport runway.
2. There are only two small areas of the reef that the cables area of influence will pass through (the barrier reef in the Northeast channel and the intertidal reef flat that associated with the airport) whilst the remainder of the cable will be situated on the lagoon floor in deep water associated with the main shipping channel.
3. The use of dynamite for fishing within Chuuk lagoon has been practised since the WWII and unfortunately continues. Anecdotal information gathered during the resource assessment indicates that all reefs associated with and adjacent to the cable area of influence at some stage over the past decade or two have been affected by this illegal fishing practise. The structure of the reef systems assessed confirms these reports.

Site 1: North East Channel – Southern Reef 07°29.910N 157°58.315E

4. The site is located just inside the south eastern corner of the Northeast channel entrance.
5. The northeast channel is a natural channel that bisects the Chuuk lagoon barrier reef and is the States main commercial shipping access point for the lagoon.
6. This section of the channel varies in depth and exchanges daily lagoon/oceanic water resulting in the presence of strong tidal currents during tidal movements, oceanic swell and waves associated with the shallow water reef.
7. It includes both an extensive shallow reef flat (partially exposed during low tide), distinctive reef edge and slope that descends steeply into deep water offshore and inside the lagoon.
8. The reef slope and sea bed that runs through the channel directly between the southern and northern sections of the barrier reef is relatively shallow that possess a gentle reef slope that reaches a maximum of 30 -35 meters in the center, dominated by a flat benthic surface composed of reef derived sediments (coral rubble and sand). As

reef slope ascends towards the north and south barrier reefs the benthic substrates increases into a hard bottom (most of which is remanet coral structures that have been scoured by water current activities) with hard and to a lessor degree soft coral percent live coverage increasing as the shallow water are attained. The upper reef slope has the highest percent coral coverage.

1. Hard and to a much lower percentage soft coral percent coverage dominates the reef flat close to the reef edge and the reef edge (Plate 14a & b) with massive (*Porities sp.*) forms dominating the shallow areas and small digitate and branching corals (*Acropora sp.)* becoming more prevenance as depth increases (Plate 14c & d). The percent coral cover is low with algae (including blue greens) supporting extensive hard substrate coverage, especially in areas of shallow water.
2. The low abundance of finfish and invertebrate populations is fully noted.

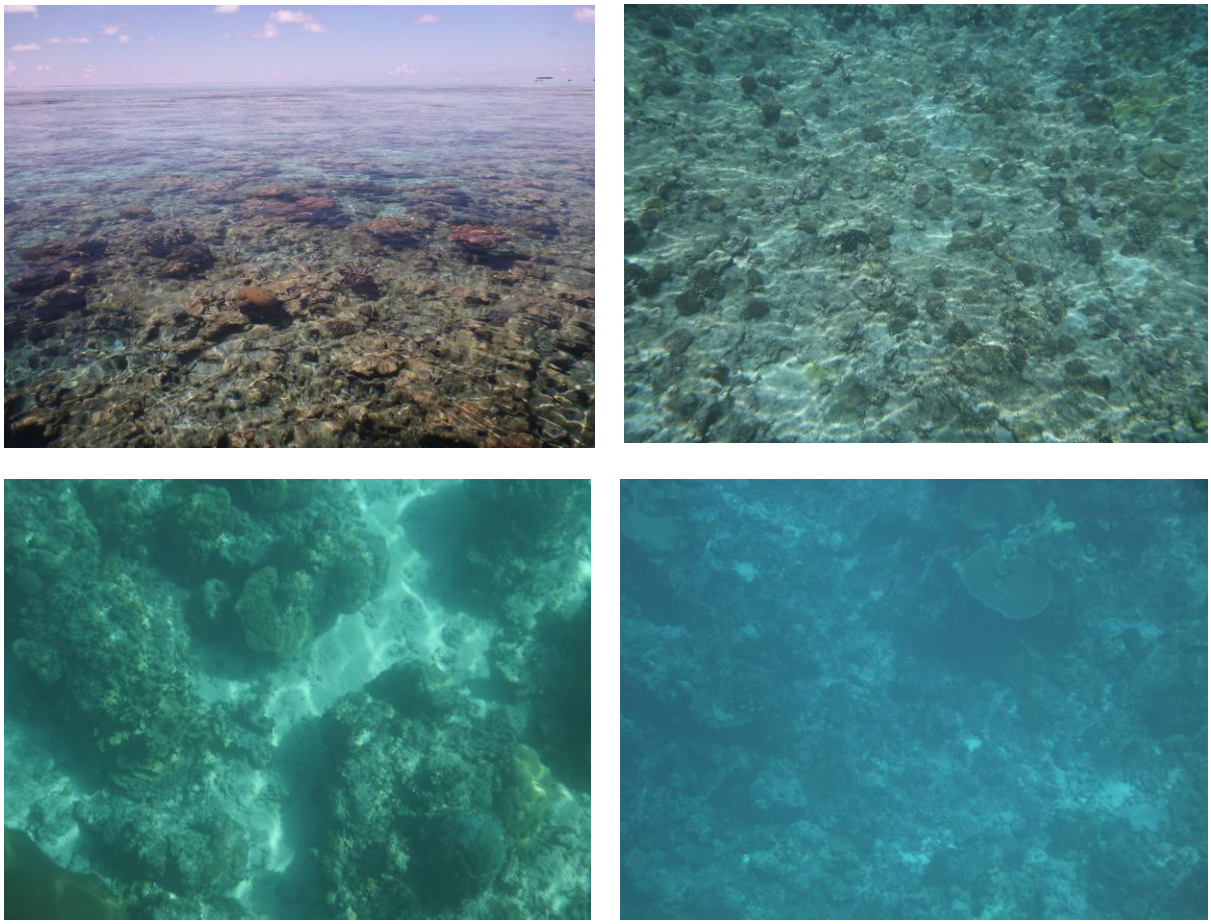

Plate 14 a, b, c & b. Hard coral diversity located on the reef flat and reef slope at Site 1.

Sites 2: North East Channel – Northern Reef 07°30.638N 151°58.114E

1. The site is located inside the northern side of the Northeast channel entrance, adjacent to Mor Island.
2. The northeast channel is a natural channel that bisects the Chuuk lagoon barrier reef and is the State's main commercial shipping access point for the lagoon.
3. This section of the channel varies in depth and exchanges daily lagoon/oceanic water resulting in the presence of strong tidal currents during tidal movements, oceanic swell and waves associated with the shallow water reef.
4. It includes both an extensive shallow reef flat (partially exposed during low tide),

distinctive reef edge and slope that descends steeply into deep water offshore and inside the lagoon, with the bottom substrate mostly sand.

1. The reef slope and sea bed that runs through the channel directly between the southern and northern sections of the barrier reef is relatively shallow that possess a gentle reef slope that reaches a maximum of 30-35 meters in the center, dominated by a flat benthic surface composed of reef derived sediments (coral rubble and sand). As the reef slope ascends towards the north and south barrier reefs the benthic substrates increases into a hard bottom (most of which is remanet coral structures that have been scoured by water current activities) with hard and to a lesser degree percent live soft coral percent live coverage increasing as the shallow water are attained. The reef slope is more extensive on the north side of the channel and in most part shallower than the southern side. The upper reef slope has the highest percent coral coverage.
2. Hard and to a lesser degree soft coral percent coverage dominates the reef flat close to the reef edge and the reef edge (Plate 15a & b) with massive (*Porities sp.*), digitate and branching (*Acropora sp.)* forms dominating the shallow areas all of which increase in percent coverage as the reef slope deepens (Plate 15c & d). The percent coral cover is low with algae (including blue greens) supporting extensive hard substrate coverage, especially in areas of shallow water.
3. The low abundance of finfish and invertebrate populations is fully noted.

Plate 15 a, b, c & d. Hard coral diversity located on the reef flat and reef slope at Site 2.

Northeast Channel

The entrance to the main shipping channel of Chuuk is a natural channel that is

approximately 1.4 kilometres, which bisects the lagoons barrier reef. It is boarded to the north by the reef associated with Mor Island and the barrier reef to the south, which possess a lighthouse on the intertidal reef flat. The channel is subjected to considerable tidal currents and during period of inclement weather is subjected to oceanic swells and heavy wave action on the outer reef systems (Plate 16a, b & c).

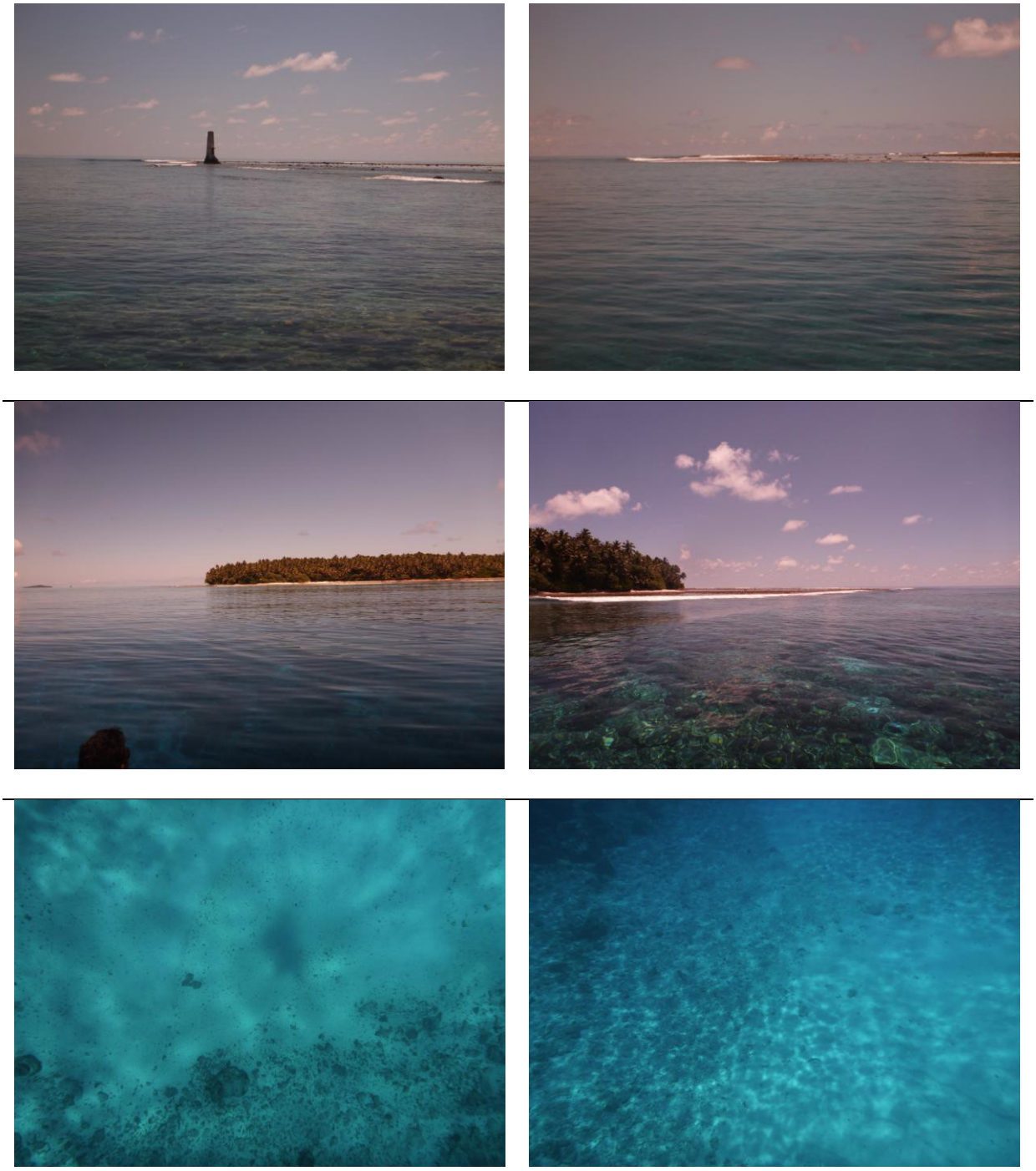

Plate 16 a, b & c. Southern, northern sides and benthic substrate of the entrance to the Northeast Channel.

Site 3 Patch Reef 07°30.124N 1561°55.868E

1. The single small sub surface patch reef roughly 40 x 40 meters in diameter is located within the large lagoonal area situated to the south of the main shipping channel (Plate 17a).
2. The patch reef consists of a sub tidal reef flat and a relatively gentle slopping upper reef slope that descends into a steeper lower reef slope that terminates at the seabed.
3. The patch reef has a low hard and soft coral percent coverage (Plate 17b, c & d) dominated by small massive (*Porities sp.*) forms and isolated table corals (*Acropora sp*.).
4. The reduced habitats associated with this section of the lagoon appears to be reflected in the lower abundance of fin fish witnessed during the assessment (albeit only a short time in the water) however invertebrate populations and diversity remain relatively high when compared to other sites assessed.
5. Water currents driven by tidal movements are present however considerably less pronounced as found in the northeast channel. The low abundance of finfish and invertebrate populations is fully noted.

Plate 17 a, b, c & d. Hard coral diversity located on the reef flat and reef slope at Site 3.

Site 4. Patch Reef 07°29.910N 151°54.391E

1. The single small patch reef roughly 70 x 70 meters in diameter including a small coral island is located within the large lagoonal area situated to the south of the main shipping channel (Plate 18a).
2. The patch reef consists of a gentle sloping intertidal and sub tidal reef flat and a relatively gentle slopping upper reef slope and a steep lower reef slope that terminates at the seabed.
3. The intertidal and sub tidal reef flat (Plate 18b) is dominated by algae covered coral rubble interspersed with small massive (*Porities sp.*) *and branching* (*Acropora sp*.) corals.
4. Coral percent coverage considerable increases on the upper and lower reef slope dominated by massive (*Porities sp.*) and branching and plate hard corals (*Acropora sp*.) (Plate 18c).
5. Water currents driven by tidal movements are present however considerably less pronounced as found in the northeast channel.
6. The low abundance of finfish and invertebrate populations is fully noted.

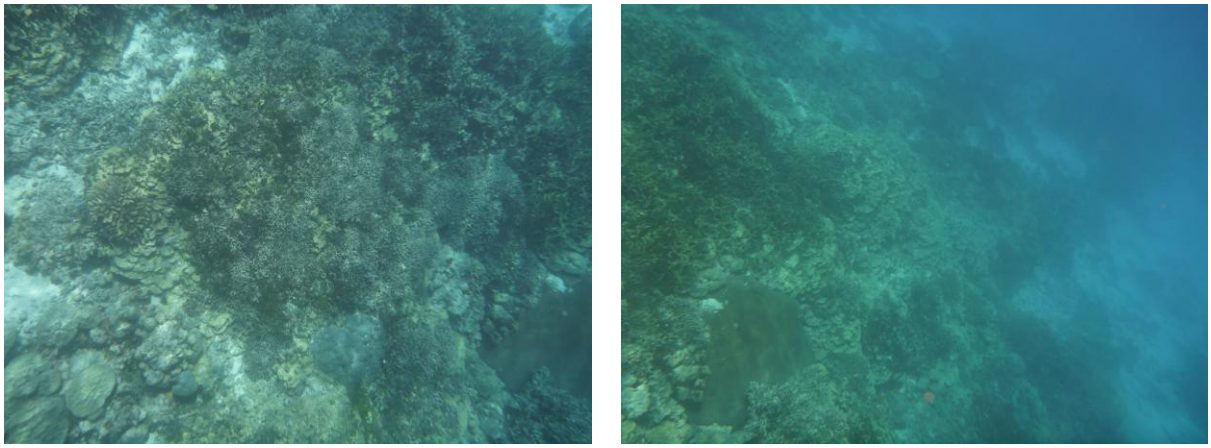

Plate 18a, b & c. Hard coral diversity located on the reef flat and reef slope at Site 4. Note how the coral density drops off rapidly along the channel slope (lower right panel)

Site 5. Patch Reef 07°29.743N 151°52.673E

1. The single small patch reef roughly 50 x 50 meters in diameter located within the large lagoonal area is situated to the south of the main shipping channel, adjacent and to the north of Fonoton Island (Plate 19a).
2. The patch reef consists of a sub tidal reef flat and a relatively gentle slopping upper reef slope that includes areas of sand patches that then descends into a steeper lower reef slope that terminates at the seabed.
3. The sub tidal reef flat (Plate 19b) is dominated by algae covered coral rubble interspersed with small massive (*Porities sp.*) *and branching* (*Acropora sp*.) corals.
4. Coral percent coverage increases on the upper and lower reef slope dominated by massive (*Porities sp.*) and branching and plate hard corals (*Acropora sp*.) (Plate 19c).
5. The percentage coral coverage and biodiversity on the sub tidal and upper and lower reef slope is higher at this site than other assessment sites.
6. Water currents driven by tidal movements are present however considerably less pronounced as found in the northeast channel.
7. The low abundance of finfish and invertebrate populations is fully noted.

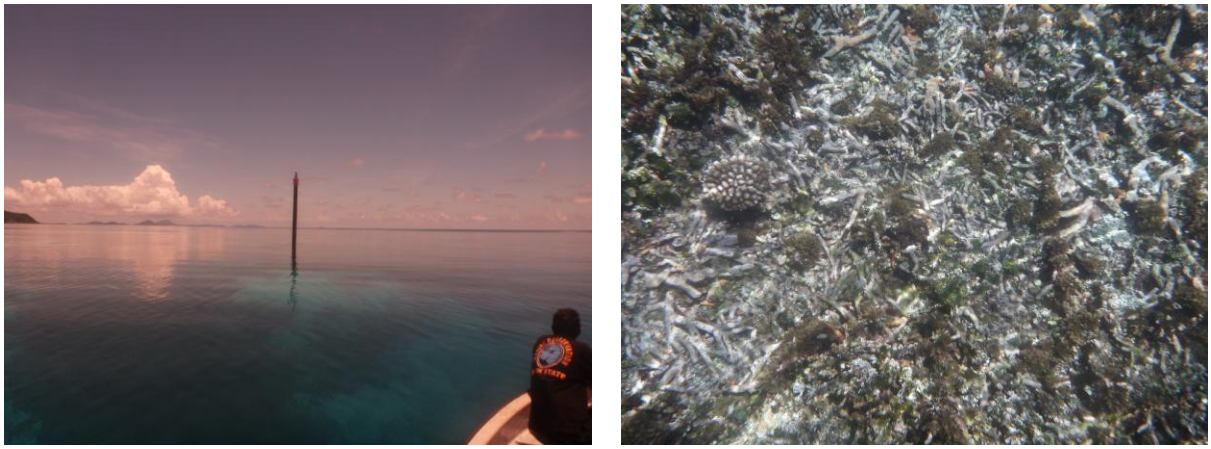

Plate 19a , b & c. Hard coral diversity located on the reef flat and reef slope at Site 5.

Site 6. Patch Reef 07°29.374N 151°51.861E

1. The single small patch reef roughly 40 x 40 meters in diameter located within the large lagoonal area is situated to the south of the main shipping channel (Plate 20a).
2. The patch reef consists of a sub tidal reef flat and a small descending upper reef slope and a steeply descending lower reef slope that terminates at the seabed.
3. The sub tidal reef flat (Plate 20b) is dominated by algae (including crustose coralline) covered coral rubble interspersed with only a small number of small massive (*Porities sp.*) *and branching* (*Acropora sp*.) corals.
4. The upper and lower reef slopes are dominated by coral rubble beds dominated by algae in the shallow areas and sand patches. Coral percentage coverage is low consisting of small colonies of branching and plate hard corals (*Acropora sp*.) and small massive colonies (*Porities sp.*) (Plate 20c).
5. The low percentage coverage and presence of hard corals clearly shows evidence of reef damage that may be of an anthropogenic origin.
6. Water currents driven by tidal movements are present however considerably less pronounced as found in the northeast channel.
7. The low abundance of finfish and invertebrate populations is fully noted.

Plate 20a, b, c & d. Hard coral (mostly acropora rubble) located on the reef flat and reef slope at Site 6.

Site 7: Terminal Marine Cable End (Preferred Option) 07°28.060N 151°51.009E

1. This site is situated at the south eastern end of the airport runway and is directly adjacent to the airport retention wall and barriers (Plate 21a).
2. The marine environment includes a gentle decreasing reef slope almost exclusively of reef sediments terminating in a shallow water intertidal reef flat that contains an extension of the benthic substrate located in the reef slope and small isolated patches of both massive (Porities sp.) and branching (Acropora sp.) hard corals (Plate 21b).
3. The sub tidal and reef slope areas have been greatly altered due to land reclamations and dredging operations associated with the development and expansion of the airport run way and more recently sand mining activities (surface barge). Suspended sediments are high.
4. There is a visibly lack of intertidal invertebrates.

Plate 21a & b. Location of the terminal end of the marine cable and Hard coral diversity located on the reef flat at Site 7. High suspended sediment levels due to sand mining operations in the vicinity.

Site 8: Terminal Marine Cable End (Second Option) 07°28.060N 151°51.009E

This site is situated at the south western end of the airport runway and is directly adjacent to the airport retention wall and barriers (Plate 22).
The area is used as a mooring location for vessel and has been highly modified due to land reclamations and dredging operations associated with the development and expansion of the airport run way and more recently sand mining activities (surface barge). Suspended sediments are high.
The marine environment includes a gentle decreasing reef slope almost exclusively of reef sediments terminating in a shallow water intertidal reef flat that contains an extension of the benthic substrate located in the reef slope.

4. The area is almost devoid of hard substrate including living coral.

The sub tidal and reef slope areas have been greatly altered due to land reclamations and dredging operations associated with the development and expansion of the airport run way and more recently sand mining activities (surface barge). Suspended sediment levels are high.

6. No intertidal invertebrates were seen.

Plate 22. Location of the second option for the terminal end of the marine cable.

A. Literature Review Of Potential Effects Of Sonar And Entanglement On Cetaceans During Oceanic Cable Deployment.

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 can trigger behavioural and physiological changes. Behavioural responses include individuals actively avoiding sound sources, modifying feeding behaviour, and even modifying surfacing behaviour. Whales can also change 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).

The level of likely response is highly dependent on the intensity and frequency of the sound source, such that as the intensity increases the potential for negative response by cetaceans grows. 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.

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 1µPa to 240 dB re 1µPa. 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.

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.

1) Individuals show no response or only a temporary (minutes) behaviour change. No change to environment or populations. Expected in almost all instances; and,
2) Individuals show short-term (hours) behavioural change. Temporary displacement of a small proportion of a population; small proportion of habitat affected; no impact on ecosystem function, could occur.

The main concern associated is its effect on whales that utilise the waters in the vicinity of the proposed cable route is interference with migration and movement activities, and due to the oceanographic survey or cable laying process. Information is not available on specific movements of whales and dolphins through the FSM waters, but is generally in the fall and spring of the year. During this period there is a very small risk that a proportion of the population will be temporarily disrupted and could result in modified migration behaviour.

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

Given that the vessels involved in the route survey and cable 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.

Another 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.

Between 1877 and 1955 there were 16 records of cetaceans becoming entangled in unsupported sections of submarine cables. The most at risk 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. Another survey of cable fault databases (Wood & Carter 2008) containing records of 5740 cable faults, between 1959 and 2006, failed to find a single record of cetacean entanglement in cables. The review attributes high success rate to the following five “best practices”: 1)

development of torque-balanced cables that were less prone to self- coiling; 2) laying armoured cables under slight tension to minimize suspensions[30] 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.

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

Species	Common Name	Status	IUCN Category
Balaenoptera sp.	Bryde's-like whale	Confirmed	-
Globicephala electra	Short-finned pilot whale	Confirmed	Dd
Lagenodlphis hosei	Fraser's dolphin	Confirmed	Lc
Peponcephala electra	Melon-headed whale	Confirmed	Dd
Stenella coeruleoalba	Striped dolphin	Confirmed	Dd
Stenella longirostris	Spinner dolphin	Confirmed	Dd
Tursiops sp	Bottlenose dolphin	Confirmed	Lc
Physeter macrocephalus	Sperm whale	Confirmed	Vu
Mesoplodon gingkodens	Gingko-toothed beaked whale	Confirmed	Dd
Ziphius cavirostris	Cuviers beaked whale	Unconfirmed	Lc
Orcinus orca	Orca	UnConfirmed	Dd
Stenella attenuate	Pantropical spotted dolphin	Unconfirmed	Lc

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

Wood & Carter (2008) concluded that entanglement of cetaceans with fibre optic cables is extremely unlikely and this represents an insignificant impact.

[30] Suspensions are sections of cable that are suspended above the seafloor.

A4.2 Relevant Conventions And Treaties and Memberships For FSM

Table A4.2. List of relevant conventions and treaties associated with the marine sector of the FSM.

Ratified	Convention and/or Treaty
1991	To ratify the United Nations convention on the Law of the Sea ("UNCLOS").
1993	Kyoto Protocol to the United Nations Framework Convention on Climate Change.
1993	Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of 10 Dec 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
1994	To ratify the amendments to the Federated States of Micronesia Arrangement for Regional Fisheries Access (The FSM Arrangements).
1994	To accede to the "Convention on Biological Diversity," the objectives of which are to conserve biological diversity, to promote the sustainable use of biological components, and to provide for the fair and equitable sharing of the benefits of genetic resources and technology, including biotechnology.
1995	Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal
1995	Ratifying the convention for the prohibition of fishing with the long driftnets in the South Pacific, otherwise more popularly known as "The Wellington Convention"
Date unknown	To ratify the amendment to the treaty on fisheries between the Governments of certain Pacific Island States and the Government of the United States of America, the Aim of said amendments is to allow U.S. long line vessels access to high seas within the treaty area.
1999	To provide for the acceptance, approval and ratification by the Republic of Palau of UNESCO's Convention for the safeguarding of the Intangible Cultural Heritage.
1999	To ratify the Articles of Agreement establishing the Arrangement for the Management of the Western Pacific Purse Seine Fishery, otherwise known as "The Palau Arrangement".
1992	Ratifying the Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region and 2012 amendment.
2002	Convention concerning the Protection of the World Cultural and Natural Heritage
2005	Convention on the Conservation and Management of Highly Migratory Fish

Ratified	Convention and/or Treaty
	Stocks in the Western and Central Pacific Ocean
2005	To ratify the accession of the Republic of Palau to the Convention for the Conservation of Migratory Species of Wild Animals.
2009	To ratify the Agreement on Regional Cooperation in Matters Affecting International Commercial Shipping in Micronesia.
2010	To ratify a number of agreed upon amendments to the Palau Arrangement for the Management of the Western Pacific Purse Seine Fishery.
2010	To ratify the Third Arrangement Implementing the Nauru Agreement Setting Forth Additional Terms and Conditions of Access to the Fisheries Zones of the Pacific.
2011	International Convention for the Prevention of Marine Pollution from Ships, 1973 (MARPOL) adopted in London on 2 Nov 1973 and its Protocol of 1978, adopted in London on 2 Nov 1973 and its Protocols of 1978, adopted in London on 17 Feb 1978(MARPL 73/78), including following subsidiaries:

Table A4.3. FSM membership to international and regional organizations associated with the marine sector.

International Organisation Membership
I. United Nations (UN)
A. 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)
2) International Whaling Commission (IWC)
A. International Tribunal for Law of the Sea (ITLOS)
A. International Maritime Organization (IMO)
2) Bureau (Secretariat) of the Convention on Wetlands (RAMSAR)
(i) Secretariat of the United Nation Convention to Combat Desertification (UNCCD)
(i) Secretariat of the United Nations Convention on Biological Diversity (UNCBD)
A. United Nations Educational, Scientific and Cultural Organization
1. Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC)
a) Asian Development Bank
A. World Bank Group
Regional Organisations Membership
• Western and Central Pacific Fisheries Commission (WCPFC)

1) Secretariat of the Pacific Community (SPC)
2) Forum Fisheries Agency (FFA)
2) Secretariat of the Pacific Islands Forum (PIF)
• Secretariat of the Pacific Regional Environment Programme (SPREP)
1) Applied Geoscience and Technology Division (SOPAC) of the Secretariat of the Pacific (SPC)

A4.3 Conservation Areas in Yap Proper and Chuuk Lagoon, FSM.

The proposed cable alignment will not pass through or impact any of the States conservation areas.

Table A4.4 List of Conservation Areas in Yap Proper and Chuuk Lagoon, FSM.

	Name	Municipality	Size Ha	Type	Ecosystem/Species Protected
Yap Proper					
1	Balabat Marine Conservation Area	Rull	476 total 179 No-Take 297 Managed	Marine, lagoon and coastal (low water mark).	Ecosystem includes a no-take zone for total preservation (flora and fauna) and a sustainable resource managed area for resource extraction. Includes sea grass beds.
2	Tamil Marine Managed Area	Tamil	1,521 total 548 No-Take 973 Managed	Marine, lagoon, estuary and coastal low water mark).	Ecosystem includes a no-take zone for total preservation (flora and fauna) and a sustainable resource managed area for resource extraction. Includes extensive sea grass beds and mangrove forests.
3	Gachpar Marine Protected Area	Gagil	92	Marine, lagoon and coastal (low water mark).	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna).
4	Riken Marine Protected Area	Gagil	27	Lagoon inshore coastal (low water mark).	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
5	Wacholab 1	Maap	63	Marine and Lagoon.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
6	Wacholab 2	Maap	101	Marine and Lagoon.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.

7	Rumung 1	Rumung	307	Marine and	Ecosystem management includes sea grass bed and coral communities

	Name	Municipality	Size Ha	Type	Ecosystem/Species Protected
				Lagoon.	and associated flora and fauna.
8	Rumung 2	Rumung	91	Marine, lagoon and coastal (low water mark).	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna).
9	West Fanif Marine Conservation Area	Fanif	360	Marine, lagoon and coastal (low water mark).	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna).
10	Nimpal Marine Conservation Area	Weloy	79	Marine and Lagoon.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
11	Reey Marine Conservation Area	Gilman	317	Marine, lagoon and coastal (low water mark).	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
Chuuk Lagoon Proposed or under development					
1	Sapwwk Conservation Area	Weno	Yet to be finalised	Lagoon and coastal.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
2	Parem Conservation Area	Parem	Yet to be finalised	Lagoon and coastal.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
3	Uman Conservation Area	Uman	Yet to be Finalised	Lagoon and coastal.	Ecosystem management includes sea grass bed and coral communities and associated flora and fauna.
4	Wichukuno Conservation Area	Tol	Yet to be finalised	Lagoon and coastal.	Ecosystem management includes Mangroves and sea grass bed and coral communities and associated flora and fauna).
5	Piaanu Conservation Area	Polle	24^2km	Marine, barrier reef, lagoon.	Ecosystem management specifically finfish aggregation sites.